

Indicating the main pressures of physicians and suppliers on Dutch hospitals that hinder value-based procurement

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ABSTRACT,

Procurement teams in Dutch hospitals are experiencing higher cost pressures because of rising healthcare expenditures. The importance of value-based procurement emerges with the need for limiting costs while retaining clinical outcomes. Evidence of the pressures of the most critical stakeholders on Dutch hospital procurement is missing and not extensively discussed in the context of value-based procurement. Therefore, this study aims to overview the pressures of physicians and suppliers that hinder value-based procurement in Dutch hospitals. By giving such an overview, the dynamics between purchasers, physicians and suppliers can be better understood in the shift from a cost-oriented to a value-based mindset in procurement. This overview was constructed through a case study in the bounded system of five hospitals. Eight interviews were conducted, with five strategic purchasing experts and three medical experts. Overall, the results aligned with the influences of physicians and suppliers mentioned in the existing literature. After discussing the results, it shows that physicians can put significant pressure on the procurement process with their preference for medical supplies but that the reason for this preference is not always transparent for purchasers. The reasons can be personal preferences, confidence with current devices, or supplier influence. The power to declare these preferences comes from the need for physicians' clinical expertise to select new devices. What hinders value-based procurement is that the purchaser cannot always know the interests behind these preferences because of the lack of transparency between the stakeholders. Suppliers hinder value-based procurement by the lack of transparency on prices and performance data of medical supplies. Another finding is that all these pressures differ for various products and hospital departments. Furthermore, this study discusses strategies to deal with the pressures of physicians and suppliers. Future research in this field should focus on finding out the differences in pressures for different products and departments and look at the influence of the employment status of physicians.

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Keywords

Healthcare procurement, physician influence, supplier influence, value-based procurement, purchaser-physician-supplier triad

1. INTRODUCTION

The healthcare sector is experiencing increased costs and, therefore, cost pressures on hospital operations. Healthcare expenditures in the Netherlands are expected to keep rising until 2060, from which the most significant part will be on hospital care. Rising 2.8% per year on average, the increase in expenditures is estimated to become 96 billion euros in 2060. Population ageing is a significant cause of this increase, but two-thirds originate from other factors (Vonk et al., 2020). Other reasons for increased financial pressures are higher supply costs, lower reimbursements, and a shift from fee-for-service compensation. As a result of these financial pressures, hospitals are nowadays more concerned with containing costs while improving the quality of care. These measures heavily affect hospitals' procurement departments, given that supply expenditures represent around 30% of hospital costs (Nyaga & Schneller, 2018). With this significant part in hospital expenditures, procurement is the second largest category after labour costs (Abdulsalam & Schneller, 2019). Therefore, purchases are nowadays pressured to purchase at a lower price.

Cost pressures are rising, but clinical outcomes still seem most important in procurement decision-making. Especially if we compare the healthcare sector to the non-healthcare industry, cost and operational efficiency are less critical in the healthcare sector (Nyaga & Schneller, 2018). The need for value-based procurement emerges because of rising healthcare expenditures and the importance of clinical performance. With value-based procurement, the focus on short-term cost savings is replaced with an emphasis on long-term treatment efficiency and patient outcomes (Prada, 2016). The study of Prada (2016) shows how a short-term cost-oriented mindset prevented Canadian hospitals from diagnosing and managing healthcare challenges due to the lack of innovative adaptation, again underlining today's importance of value-based procurement. In adopting value-based procurement, purchasers must deal with all actors in the healthcare supply chain. Critical actors in the supply chain are healthcare providers (physicians), hospital management, manufacturers and suppliers, and patients (Montgomery & Schneller, 2007). This report focuses on the challenges coming from suppliers and physicians.

Value-based procurement is *“a collaborative effort through strategically aligning supplier's resources, products, and services to broad outcomes-based goals of the organisation.”* (Meehan et al., 2017). Suppliers have a crucial role in creating value by developing new technologies that help with a focus on long treatment efficiency and patient outcomes (Prada, 2016). In other words: supplies have a crucial role in value-based procurement. The problem is that hospital purchasers are not the only deciding party acquiring materials from suppliers and manufacturers.

Physicians have strong relationships with suppliers because they also take responsibility for developing the supplies they use and prefer in their practices. Physicians influence the purchasing process of a hospital by stating these preferences (Burns & et al., 2009). With these preferences, physicians act as surrogate buyers. These physician preference items (PPIs) account for around 50% of the total supply expenditure in hospitals and create tensions between hospitals and their suppliers. (Abdulsalam & Schneller, 2021). Cases from Burns (2009) have shown how suppliers interact in the physician-purchaser relationship by aligning themselves with surgeons. This alignment makes the hospital less potent in the procurement decision-making process, sometimes even making physicians' decisions and influences dominant. This causes implications that can hinder value-based procurement because physicians'

decisions are primarily based on product technology, which best fits their expertise, and service considerations, instead of costs or value to the hospital (Burns & et al., 2009).

There are several studies on the importance of value-based procurement, the relationships between healthcare purchasers, suppliers and physicians, and the challenges these relationship dynamics bring. This study will research the main influences and powers physicians and suppliers have on Dutch hospitals because of this misalignment of interests. Additionally, this study explains how these influences can hinder value-based procurement. With this overview, potential ways to overcome these pressures can be found more efficiently, which will help hospitals transition to successful and effective value-based procurement in the future. This study will, therefore, examine the following research question:

What are the main pressures physicians and suppliers exert on Dutch hospitals that hinder value-based procurement?

This study gives a more in-depth overview of the buyer-supplier-physician dynamics in Dutch hospitals and links these dynamics to value-based purchasing. Additionally, by giving such an overview, this study can provide insights into how to successfully foresee or overcome these pressures. This makes this study mostly interesting for hospital purchasers, but it can also move physicians and suppliers to behave in a way that adds more value to hospitals. There have been several studies on the consequences of physician-supplier relationships, but this study further explains the most critical pressures for Dutch hospitals specifically. It also discusses how Dutch hospitals currently deal with these pressures and the success of the procedures in place.

The next part of this report will give an overview of the relevant theoretical background based on the most important literature on the presented topics. The third chapter of this study explains the methodology of this study. Then an overview and analysis of the results will follow, after which they will be discussed. At last, this report summarises all findings and discusses the implications and limitations of this research.

2. LITERATURE REVIEW

2.1 Healthcare Procurement

2.1.1 Purchasing In Healthcare

Purchasing practices are a process, meaning a set of organisational activities to reach a specific goal. Purchasing refers to the actions of an organisation that ensure that the necessary materials and services are delivered at the right time, in the right place, have good quality, and are bought at an acceptable cost (Raaij, 2016). In healthcare, this is a crucial activity for clinical outcomes and is responsible for hospitals' most significant expenditure category after labour costs. In the citations discussed by Abdulsalam and Schneller (2017), total healthcare expenses were estimated to be between 17% and 45%, depending on the type of healthcare activities and the inclusion or exclusion of labour costs related to supply management activities (Abdulsalam & Schneller, 2019).

Several models describe the key procurement activities. The World Health Organization defines the standard procedures of the procurement process as shown in Figure 1 in the context of the procurement of medical devices and health technologies (World Health Organization, 2011). Technology assessment and device evaluation are separate from the procurement process but are essential preparatory steps for successful procurement. Device evaluation assesses medical devices' performance and checks if the product fulfils the manufacturer's promises.

Technology assessment is gathering information related to health technology as a whole and finding the most critical issues.

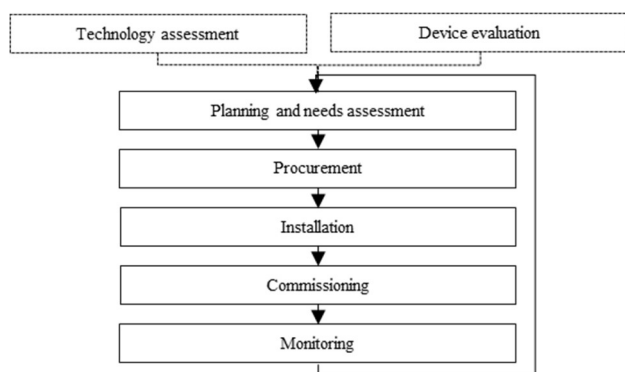


Figure 1 A flow chart of the procurement process (World Health Organization, 2011)

The first step of the procurement process is planning so that medical goods are on time and are acquired at a reasonable cost. Additionally, the need for medical devices is assessed by researching the gap between a healthcare institution's desired and current situation. The procurement step in the flowchart of Figure 1 is about acquiring what is required by the previous planning step. Installation is the process of getting the obtained goods in place. Commissioning is the process of testing the functionality and safety of the installed medical device, and monitoring is the process of gathering and managing data from the whole procurement process. This data is cycled back to the planning step so the process can be further optimised (World Health Organization, 2011).

As efficient purchasing practices are becoming increasingly important, procurement has evolved from a traditional operational function to a strategic function in hospital operations. Therefore the hospital's purchasing strategy should be aligned with the general strategy of the hospital (Arantes et al., 2022). In strategic purchasing, the purchasers should take a more active role in procurement. They should look further than only making purchasing decisions based on price and quantity or reimbursement of suppliers. Strategic purchasers should also look at population needs, quality, evidence, and efficiency and be concerned for equity and population health. Given the importance of these factors, purchasers have three main policy objectives that need to be addressed for successful strategic purchasing: effective stewardship of the government, empowerment of patients and improved performance of suppliers (Sanderson et al., 2019).

2.1.2 Dutch Healthcare System

Looking at the healthcare structure in the Netherlands, there is a competing market structure for health providers, with high levels of competition between purchasers and high levels of hospital market competition. Health insurers are essential purchasing/paying organisations (Klasa et al., 2018). Health insurers, thereby, have an indirect influence on hospital procurement. Insurers pressure healthcare providers by negotiating price, volume and quality of care (Dohmen & van Raaij, 2019).

Purchasing of healthcare (insurers) and purchasing for care (health providers), the field of research in this study, could be studied together. This means that they are interconnected. Suppliers of technology are developing propositions for health insurers, and they are then involved in the negotiations with suppliers (Raaij, 2016). This means they both influence procurement. This study focuses on purchasing products for care.

It addresses the direct influences of physicians and suppliers, so the impact of financiers of care is not included in the scope of this research.

Looking at the quality of care, not only insurers and health providers have a prominent role, but also the insured citizens are involved. In the Netherlands, citizens are free to switch health providers and can choose their health insurer yearly based on quality or price (Ministerie van Volksgezondheid, 2016). This freedom is essential for the Dutch healthcare system. To choose health insurers and providers, citizens need to be reliably informed. Therefore the government has a responsibility to make sure information is available on the quality and prices of care (Kroneman et al., 2016).

Insurers have a duty of care, meaning they must ensure that appropriate and affordable care is available for all insured citizens. In the Netherlands, citizens can choose between 11 health insurers (Zorgverzekeraars Nederland, 2023). Because of their duty of care, health insurers also have a prominent role in the quality of care. They check the quality of health providers and ensure it fits their insured citizens' needs. At last, the health providers have a prominent role in the quality of care by deciding how healthcare is implemented. Since health providers are specialists in treating patients, they are also responsible for setting guidelines for the quality of care (Ministerie van Volksgezondheid, 2016).

2.1.3 Value-Based Procurement

Value-based procurement emerged from the need to improve clinical and financial outcomes while containing healthcare expenditure costs. There is a need to shift from short-term cost-focused procurement strategies to long-term efficiency strategies focusing on adding patient value (Prada, 2016). The importance of value-based purchasing increases with increased healthcare expenditures, as stated earlier in the introduction of this report. Value-based purchasing is a framework that guides purchasers in procuring medical supplies and devices. To engage in value-based purchasing, several factors are essential: standardising information, checking patients' experience, identifying stakeholders, improving data analysis, developing decision criteria, and improving contracts through value propositions (Rahmani et al., 2021).

Value-based procurement endeavours to enhance value while containing costs. However, the absence of transparency on pricing and performance of medical supplies poses a significant challenge to value-based purchasing. Lack of price transparency and the need for performance data are two implications that impede the effectiveness of value-based purchasing (Robinson, 2008). Lack of price transparency occurs because of suppliers' market power gained from patent protection and limited market competition; suppliers can charge some buyers more than others by hiding their pricing history (Pauly & Burns, 2008).

Hospitals engage in group purchasing organisations (GPOs) and consulting firms to get insight into supplier prices and to obtain benchmark information on what other hospitals pay for similar devices. Some suppliers protect themselves against these GPOs by building confidentiality clauses on their invoices (Robinson, 2008). Performance data is necessary because purchasers need to know the effectiveness of devices and supplies before deciding on procurement. This does not regard particular data on separate machines but the performance data of the entire course of treatment. The spread of data into different systems and the low level of integration between these systems disable purchasers and physicians from efficiently comparing alternatives (Robinson, 2008).

In the transition to value-based procurement, hospitals not only deal with the knowledge problems described above. Healthcare procurement is part of a complex supply chain with many different stakeholders. Essential stakeholders are patients, physicians, manufacturers, insurers, GPOs, distributors, and hospitals (Abdulsalam & Schneller, 2021). Lack of information transparency is a big problem for value-based procurement. However, Robinson (2008) concludes that the main obstacle to value-based purchasing is the fragmentation and misalignment of information, incentives, and organisational capabilities between hospitals and surgeons (Robinson, 2008). In managing the various stakeholders involved, the physician or surgeon holds the most prominent role and is considered the primary stakeholder in this research.

With the definitions of healthcare procurement and value-based purchasing given above, the next part of this chapter will further discuss the dynamics between physicians, purchasers and suppliers. Physicians and suppliers create the main obstacles to value-based purchasing and, therefore, are crucial stakeholders of this study.

2.2 Physician and Supplier Power

2.2.1 Physician Preference Items (PPIs)

Many studies are addressing Physician Preference Items (PPIs). A recent study defines PPIs as the medical-surgical supplies used for treating patients for which physicians have exerted preference. This preference can be either for a specific product or a specific supplier. By stating these preferences, the physician controls hospital procurement by exerting this preference through the hospital's purchasing process and the materials manager (Burns et al., 2018). The application of the term PPI has been contested since it might imply that physicians always have a choice in using specific medical supplies, which is not always the case (Nyaga & Schneller, 2018). The study of Nyaga and Schneller (2018) states that frequent examples of PPIs are implantable devices. However, the definition could also be applied to simpler medical supplies such as examination gloves. Over these supplies, physicians can also state their preferences based on familiarity and experience, resulting in the assumption that alternatives do not have the same ease of use or results (Nyaga & Schneller, 2018).

PPI management can be one of the hospitals' best opportunities to reduce costs (Montgomery & Schneller, 2007). This interests hospital procurement teams since they aim to reduce costs as much as possible. On the contrary, these teams also recognise that the physicians are the final users of the products they buy and that not meeting the clinical standards of physicians will have negative consequences. When dealing with PPI procurement, there ideally is a focus on price, quality and clinical outcome. Therefore, PPI procurement decisions must balance the hospital's financial and the specialist's clinical goals (Nyaga & Schneller, 2018).

Suggestions of PPIs by medical specialists can significantly increase the variety of products used in hospitals. If physicians suggest new products, the variety of products that needs to be managed will keep rising over time (Shbool & Rossetti, 2020). Therefore good PPI management is desired, but PPIs are not always wholly based on personal preferences. The study by Burns et al. (2018) concludes that PPIs do not always differ among orthopaedic surgeons, who give consistent ratings to implant types and suppliers. This means that physicians' preferences can be related to the experienced benefit of the patient. What must be mentioned is that the study suggests future research to verify this conclusion in other healthcare sectors (Burns et al., 2018). PPI management within hospitals can be

improved by selecting the best PPIs possible based on the following five objectives (Shbool & Rossetti, 2020):

- Maximize treatment effectiveness
- Improve patient's long-term outcome
- Maximize clinicians' satisfaction
- Maximize organisational benefits
- Maximize supply chain performance

It is interesting to note that Shbool's & Rossetti's (2020) objective hierarchy does not include costs as an objective. This is because, in selecting the best PPI, the PPI is assessed based on added value. The objectives look similar to the objectives of value-based procurement. Deciding on costs when deciding on critical items could be risky. At last, costs could be treated separately by looking at the added value over the price (Shbool & Rossetti, 2020).

2.2.2 Purchaser-Supplier-Physician Triad

As described in the previous part, suppliers have power over hospitals in negotiations through limited transparency about device performance and pricing (Pauly & Burns, 2008). Compared to other industries, this complicates integration between buyers and suppliers. Other organisations invest in integrating buyers and suppliers to increase performance and innovation outcomes, whereas hospitals lack buyer-supplier integration (Abdulsalam & Schneller, 2021). This lack of integration is also visible in need for purchasing alliances like GPOs, where hospitals collectively buy supplies to improve their strength in the bargaining process (Burns & Briggs, 2018).

In the selection of supplies, physicians have an important role. The personal preference of physicians for the use of different devices and supplies can conflict with the strategies proposed by purchasers (Nyaga & Schneller, 2018). Physicians state their preferences based on product technology, fitting their expertise, and service considerations, whereas purchasers look at costs and added value to the hospital (Burns & et al., 2009). These preferences are the PPIs described before.

Physicians have power in procurement because they have more clinical expertise on devices than purchasers. Additionally, physicians are most responsible for hospitals' income, being the healthcare suppliers, making the hospital dependent on them. Physicians are mainly accountable for decisions on health care treatments and, thereby, also the use of medical devices (Montgomery & Schneller, 2007). Physicians are generally not concerned with the economic effects of their choices and have a weak business affinity with their hospitals (Robinson, 2008).

Physicians are concerned with the suppliers of their preferred devices. Often devices are engineered with interactions between manufacturers and physicians, and physicians are usually trained in using specific devices (Robinson, 2008). Because of the influence of physicians in hospital purchasing, suppliers engage in long-standing supplier-physician relationships, going back as far as when they were first trained. On top of that, physicians are reluctant to switch to other supplies due to efficiency and safety, which are optimised by familiarity with a particular device (Burns & et al., 2009).

The fact that physicians create revenue streams for hospitals through patient admissions (Abdulsalam & Schneller, 2021) develops an urgency for purchasers to manage physician preferences to limit supply costs. Three basic strategies have been proposed for managing these preferences (Robinson, 2008): limiting the number of vendors for physicians to choose from, ensuring disclosure policies for physicians to disclose payments from manufacturers to physicians, and improving physician cooperation by creating gainsharing incentives for physicians

coming from financial-saving. In the next part of this chapter, strategies are further discussed.

Based on the above, it can be concluded that the three stakeholders are closely connected. A purchaser has to deal with suppliers and physicians, but these two also influence each other. Therefore, these three stakeholders form the physician-purchaser-supplier triad and form the main focus of this study. The study of van Raaij (2016) states that purchasing for care takes place in a tetradic force field, including the board of management. This is also an essential stakeholder since a hospital board might listen more to a physician than a purchaser (Raaij, 2016). Van Raaij's tetradic force field is shown in Figure 2. However, this study does not research these connections with the board of management. This study provides additional insight into the dynamics between medical and purchasing professionals, as shown in Figure 2.

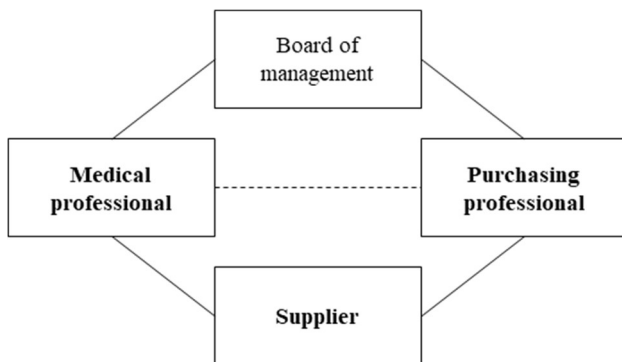


Figure 2 The purchasing tetrad for care inspired by van Raaij (2016)

2.2.3 Strategies for Dealing with Physicians and Suppliers

This chapter mentioned that PPIs could be managed by selecting the best PPI based on five objectives (Shbool & Rossetti, 2020). The literature also mentions strategies to deal with the pressures of Physician Preference Items. The fundamental method for cost savings in PPI management is standardisation. However, the standardisation of PPIs is challenged by the barriers of the dynamics between the crucial actors. Again, the most critical obstacles are alliances between physicians and suppliers and inadequate data (Montgomery & Schneller, 2007). Other approaches to reduce PPI costs besides standardisation are (Nyaga & Schneller, 2018):

- indicating cost targets and payment caps,
- reducing the inventory levels of PPIs and, thereby, inventory costs,
- reducing the number of PPI suppliers to choose from,
- developing external relationships with suppliers or GPOs,
- instituting accountability for item procurement by making the physician responsible for the outcomes,
- reducing contact with sales representatives of PPIs so clinicians are less influenced,
- communicate cost savings from PPI management to physicians,
- streamlining the procurement process by training and involvement of supply chain experts.

These approaches set out by Nyaga & Schneller (2018) aim to cut costs and fit a cost-focused strategy, contradicting the objectives set by Shbool & Rossetti (2020), where they try to select the best PPI possible based on five objectives. These objectives focus on adding value (Shbool & Rossetti, 2020). The listed approaches exclude PPIs by setting payment caps and

removing expensive ones. Also, the best possible PPI might be excluded by reducing contact with PPI representatives and reducing the number of suppliers to choose from.

Strategies like communication, developing relationships and streamlining the process could add value and help select the best PPIs. Other literature suggests physicians can be driven to be more mindful of the supply chain. Bureaucratic measures like employment can drive them to make more mindful supply decisions. Professional elite figures can move physicians to make better decisions in line with supply chain efficiency (Abdulsalam & et al., 2018).

When dealing with the supplier's pressures, like hiding prices and performance information, hospitals engage in group purchasing organisations (GPOs). With these GPOs, hospitals can bundle their demand and have a strong negotiation position against manufacturers. These GPOs' effectiveness is debated and argued to be limited to smaller hospitals only. Bigger hospitals often cannot bundle their demand and primarily use GPOs to gather benchmark pricing information (Saha et al., 2019). As described in 2.2.2, suppliers influence the procurement process through physicians (Burns & et al., 2009), which could be handled through the physician with the abovementioned PPI approaches. Overall, purchasers should play an active role in facilitating the relationship between physicians and suppliers. Additionally, hospitals could provide alternate services to restrain the supplier's influence on physicians (Abdulsalam & Schneller, 2021).

2.3 Literature Summary and research propositions

Based on the theoretical background, this study tests several propositions with the methodology described in the next chapter. Based on the information from the literature, three critical interactions in this research can influence the value-based procurement process of hospitals: purchaser-physician, purchaser-supplier, and physician-supplier interactions.

For the purchaser-physician interaction, the literature states a strong physician influence on the purchasing process because of their clinical expertise and the fact that they are responsible for the hospital's income (Montgomery & Schneller, 2007). Additionally, they state their preferences based on experience or familiarity (Nyaga & Schneller, 2018). This results in the first propositions of this study:

Proposition 1: *Physicians hinder value-based procurement by stating personal preferences through their strong influence because of clinical expertise and their responsibility for hospital income.*

For purchaser-supplier interaction, suppliers hide the prices of medical products and are often unable to deliver the needed details on the performance data of their products (Pauly & Burns, 2008). This results in the second proposition of this study:

Proposition 2: *Suppliers hinder value-based procurement through limited transparency of device performance and pricing.*

When it comes to physician-supplier relationships, the procurement process is influenced because devices are engineered by manufacturers with the help of physicians (Robinson, 2008). Additionally, physicians can have long-standing relationships with suppliers and are reluctant to switch suppliers (Burns & et al., 2009). This leads to the following proposition:

Proposition 3: *Value-based procurement is hindered because of relationships between physicians and suppliers.*

This research discusses pressures from physicians and suppliers that hinder value-based procurement. The three propositions above examine where these pressures come from and how they could impede value-based procurement. It is also important to discuss if these pressures result in an overall negative impact on value-based procurement. Just listing pressures that hinder value-based procurement could insinuate an overall negative impact.

Even though this study lists effects that hinder value-based procurement, the overall influence of physicians or suppliers could also be positive. Therefore the final proposition of this research is:

Proposition 4: *Pressures of physicians and suppliers have an overall negative influence on Dutch hospital value-based procurement.*

Based on the results, these propositions will be addressed in the discussion of this study.

3. METHODOLOGY

Now that the theoretical background on the purchasing processes of hospitals and the dynamics between purchasers, physicians and suppliers is given, this chapter explains the methodology of this research. This study aims to overview the pressures physicians and suppliers exert on Dutch hospitals that hinder value-based procurement. By giving such an overview, this study helps better understand the influences of physicians and suppliers so that more effective value-based procurement can be adopted in the future. This chapter explains how this overview was constructed and how the data was collected and analysed.

3.1 Research Design

To answer the research question: “*What are the main pressures physicians and suppliers exert on Dutch hospitals that hinder value-based procurement?*” a case study was done on five Dutch hospitals. A case study is a qualitative research approach exploring bounded or multiple bounded systems by collecting in-depth data (Creswell & et al., 2007). Qualitative research aims to get an in-depth understanding of a specific situation. The research is done to understand the process and meaning of the things happening in a situation, business or, in this case, a hospital. This study was designed to get a deeper understanding of the influences of physicians and suppliers on Dutch hospital procurement (process) and explain why these influences exist (meaning).

By doing a case study research, this study answers the research question based on real-life examples of the procurement process dynamics of Dutch hospitals. This study conducted research in the bounded system of five Dutch hospitals. Case studies will be used if a qualitative research question traces an operational process over time rather than mere frequencies or incidence (Yin, 2018). This study aims to find an answer to how physicians and suppliers influence the purchasing processing processes over time, making a case study an excellent approach to the problem statement. Case study research is a research methodology that combines individual interviews with record analysis and observation (Cooper & Schindler, 2014). In this study, data was collected through individual interviews. The results were connected to the literature research of the previous chapter, resulting in the conclusions and recommendations of this study.

3.2 Data Collection

The case study was done by collecting data through interviews. Interviews are beneficial for explaining events and giving insight into participants’ perspectives. Interviews are one of the most important sources of case study data and are often used in qualitative case study research (Yin, 2018). Therefore interviews were also used to gather the insights of experts in this field. To

get a double-sided view of the problem statement, eight interviews were done with both strategic purchasers (five) and physicians (three). For this research, all experts needed to work in a Dutch hospital. Additionally, the purchasers needed to be involved in the strategic decision-making of the procurement process, making them strategic purchasers or managers of a procurement department. Table 1 lists the interviewees from which data was gathered. Facility managers were also directly managing the procurement process of medical devices and were involved in strategic procurement decision-making. Physicians have specific expertise and specialise in working with specific medical supplies. The most critical perspective for this study is the purchaser’s perspective. They are the stakeholder that experiences and deals with the pressures of physicians and suppliers. However, including the physician’s perspective enabled this study to discuss the dynamics between purchasers and physicians and the misalignment of interests (Nyaga & Schneller, 2018) (Robinson, 2008) from two perspectives. For this research, no suppliers were interviewed. This study determines suppliers’ pressures based on the literature and the pressures purchasers and physicians experience.

Table 1 List of Interviewees

Respondent	Hospital	Profession
R1	A	Strategic Purchaser
R2	B	Manager Procurement
R3	C	Strategic Purchaser
R4	D	Facility Manager
R5	E	Facility Manager
R6	B	Physician (radiology)
R7	C	Physician (neonatology)
R8	E	Physician (haematology)

Case study interviews are unstructured and should resemble more like a guided conversation than a structured query (Yin, 2018). For both experts, a different set of open-ended questions was created, so respondents could construct their answers to give a clear picture of their interpretation of the situation in their hospital. In this way, the respondents were not pushed to give specific answers, and there was room for conversation. So two semi-structured (Crowe et al., 2011) interviews were created to gather the data for this study, shown in Appendix 1.

The interviews were created based on the literature review set out in the previous chapter. The book of Yin (2018) states that there are five different levels of questions for case study research. For this study, the first two levels were of interest: level 1 questions, questions verbalised to specific interviewees and level 2 questions, questions about the case representing the line of inquiry (Yin, 2018). The first introductory questions asked about the purchasing process in the hospital and how the expert is part of the hospital’s operations. This was asked to better understand Dutch procurement and the participant’s role (Level 1 questions). The questions that were key to answering the research question of this research were on the influence and pressures of physicians and suppliers (Level 2 questions). The interviews were held in an online environment. Visiting the hospital would not have added any significant value to this study. Respondents were asked to agree to a recording of the interview, so the interview could later be transcribed and analysed.

3.3 Data Analysis

After data collection through the interviews, similarities and deviations between respondents were highlighted and categorised. To do so, the recordings of the interviews were all transcribed. The transcribed interviews were analysed and compared with the use of a codebook. The data needs to be coded to compare the different interviews with each other and the literature of the previous chapter (Crowe et al., 2011). This study follows an inductive coding approach. This means that the codebook was created based on the participants' answers. In induction, conclusions are drawn from evidence (Cooper & Schindler, 2014), such as the research interviews. The results of the interviews are shown in the next chapter, after which they will be discussed. In the final chapter of this research, the research is wrapped up by stating the conclusions and discussing the implications and limitations of the research. Also, suggestions for future research are given based on the process and outcome of this study.

4. RESULTS & ANALYSIS

In this chapter, the results of the interviews are discussed and analysed. A codebook was created from the transcripts of all interviews, shown in Appendix 2. In this chapter, all information presented is based on the answers given by the experts of the five hospitals, which will be further analysed and compared to the literature of this study in the next chapter.

The eight interviews done for this study were spread over five different hospitals. Hospital A was a general hospital with a relatively small amount of beds. Therefore it also had a relatively small procurement team, where the interviewee was the only medical purchaser. Because of the smaller size of the hospital, the purchaser also had the role of medical device coordinator. All five hospital procurement teams always consisted of a combination of team managers, strategic buyers, tactical buyers, operational buyers and inventory managers. As mentioned in the methodology part of this research, we interviewed team managers and strategic buyers because of their expertise and power in decision-making.

Hospital B was a non-academic, general hospital with a broad range of services and, therefore, a big budget for health expenditures. The procurement team was relative of greater size. When the purchasers were asked about the size of the procurement team, it was mentioned that the size of a procurement team does not necessarily increase with the size of the hospital. The variety of products was often comparable, but the quantities were higher, meaning that the procurement department's workload did not always necessarily increase.

Hospital C was also a general hospital, where a couple of strategic purchasers were responsible for guiding the purchasing process of particular departments, together handling all procurement activities of the hospital. The hospital was also a relatively big general hospital. A noticeable difference between a bigger Hospital C and a smaller Hospital A, as mentioned by R1, is that it is easy to bump into the right physicians as a purchaser. The communication lines are short. In bigger hospitals, it was harder to encounter the right people, and contact was less frequent. R7 mentioned that the physician speaks to the purchasing team two to four times yearly.

Hospital D was also a general hospital, where the procurement department was split into a team of operational and tactical buyers. In this hospital, the procurement department buys everything for the hospital: medical and non-medical supplies. Only the pharmacy has its own procurement team for medicines.

Hospital E was the only academic hospital that was interviewed. Besides focusing on research and science, another essential

characteristic is that academic hospitals are publicly financed—health insurers primarily finance general hospitals. Additionally, in academic hospitals, most physicians work at the hospitals, whereas in general hospitals, the physicians are not directly employed.

4.1 Procurement in Dutch Hospitals

To understand the pressures of physicians and suppliers and their influence on value-based procurement, we must first understand the procurement process in the hospitals interviewed for this research. The Dutch healthcare system consists of academic and general hospitals. This is important because they are financed in two different ways. Academic hospitals are mostly publicly funded for scientific and educational purposes. General hospitals are mainly funded by health insurers, meaning that the hospitals have to negotiate with health insurers. An additional significant difference is that most physicians work at the hospital in academic hospitals. In contrast, in general hospitals, many physicians work in partnerships as separate businesses. This is essential information for understanding procurement in a hospital because R2 stated:

“So academic hospitals are very instrumental in procurement, and physicians are employed at the hospital, meaning they emphasise science more than their own interests. In general hospitals, most physicians are not directly employed at the hospital and are united in their own boards and partnerships, meaning they have their own income interests.”

General hospitals have to deal with physicians that have their own income interests. Because of these interests, purchasers have to deal with stronger and less transparent preferences of physicians than purchasers in academic hospitals. In general hospitals, there is a higher risk of misalignment of interests. Even though this difference was mentioned, R5, who is working at an academic hospital, stated that physicians still have the same preferences as physicians in other hospitals:

“Also, in academic hospitals, physicians have preferences for specific products. They are scientists here but still attend the same conferences, where suppliers convince them of their product preference.”

All respondents were asked about the purchasers' role and the focus and goals of hospital procurement. As shown in Table 2, the most critical goals were very similar, but there were some interesting mentionable differences. All purchasers did mention that they try to serve the hospital's best interests and must contribute to its vision.

Table 2 Key focuses of procurement

Procurement focus and goals	R1	R2	R3	R4	R5	R6	R7	R8
Process manager		X	X	X	X	X	X	X
Cost orientation	X		X	X	X	X	X	
Increased cost pressures	X	X	X	X	X		X	
Availability products		X	X	X			X	
Risk mitigation		X	X		X			
Sustainability	X		X				X	
Value-based procurement	X	X						

Respondents R2 and R4 all directly mentioned the current problem of the availability of products. Especially after Covid-19, many supplies are harder to retrieve. R3 and R7 also

addressed the availability problem, but R3 still emphasised the role of procurement in negotiating prices as more essential, and R7 did not experience the problem as significant from a physician’s perspective. R4 stated:

“Availability is a big issue, and cost is also a huge issue. Moreover, that combination results in us putting most time and energy into getting products at all.”

Because of the availability problem, a cost-oriented mindset is not in place because you primarily have to stress about getting the supplies. In practice, this often means getting the medical equipment at any cost. For products where availability was not an issue, it became evident that, in general, a cost-oriented mindset is still the way to go since the procurement team often has the task of buying as cheaply as possible. Other goals as sustainability and risk mitigation, were mentioned, but it can be concluded that the three most essential focuses were: contributing to the hospital’s (financial) goals, availability and costs.

Almost all purchasers felt the need to behave more cost-responsibly because of the increased cost pressures, as mentioned in the introduction of this report. As for the physicians, one respondent said that they had to communicate the added value of new products way better and write a good business case for products exceeding a specific price. So increased cost pressures were noticeable for both purchasers and physicians.

The physicians were not asked about the role of procurement and were only added to Table 2 if they described the purchaser’s role in selecting and acquiring new products. All physicians (R5, R7, R8) described the purchaser as the process manager of buying new products. The physicians are the ones to come up with the requirements of new materials, and purchasers are responsible for contacting suitable suppliers, bringing the essential stakeholders to the table and managing the overall process. The physicians mentioned that the purchaser is concerned about minimising the costs, implying that the procurement team adopted a cost-oriented purchasing strategy. Purchasers agreed with being a process manager, but the influence in selecting medical supplies differed. In Hospital C, the purchaser was focused on negotiating prices, and the physicians were mainly responsible for stating device requirements. In Hospitals A and B, the purchasers had a more prominent role in suggesting suppliers or products.

Even though the procurement process is still cost-oriented and not so much value-based, some procurement improvements were mentioned, which hinted at a switch from a cost-oriented mindset to a value-based procurement mindset. R3 said it might be the way to go for the future, but it is not realistic in the current procurement process yet. These answers are given in Appendix 3, Table 10. These value-based ideas on procurement often resulted from the problem of availability and increased costs.

4.2 Pressures of Physicians on Dutch hospital procurement

Physicians were mentioned as the most important stakeholder in buying new materials. All purchasers mentioned that the hospital’s supply chain involves many stakeholders depending on the purchasing project. Examples are physicians, suppliers, board members, managers, data controllers, building experts etc. For example, the purchaser must also deal with building experts and patients when buying hospital room supplies. Physicians have the most decisive influence in the final decision-making on medical purchases. What these influences were, based on the respondents, are shown in Table 3. This section of the results will provide further explanation of these pressures.

When contracting new suppliers, the purchaser has to deal with the physician, the user of the product and sometimes a department or board manager, depending on the contract size. So did R3 mention:

“When I buy pacemakers, ICDs or heart valves, I work with the department manager, who has to agree on what I am doing, as has the cardiologist, and often also a business manager. The last one is the manager of the complete cardiology department of the hospital. So that would be three people I ask for approval before I sign a contract.”

Table 3 Pressures of Physicians on the procurement process

Physician pressures	R1	R2	R3	R4	R5	R6	R7	R8
Need for clinical expertise.	X	X	X	X	X	X	X	X
Physicians need to agree on medical devices.	X	X	X	X	X	X	X	X
Physicians have personal preferences.		X		X	X	X	X	X
Physicians know the market better.			X	X	X	X		X
Physicians are specifically trained.	X	X		X		X		
Different preferences and communication in different specialisms	X	X	X			X		
Preferences differ between academic and non-academic hospitals.		X				X		

The fact that the physician has to agree on new purchases was very clear from all respondents. This was mainly reasoned by the physician being the final product user. It is impossible to make physicians use a product they do not want. If the physician does not like it, the purchaser cannot buy it. This highlights the importance of stakeholder collaboration in selecting and purchasing new supplies. For almost all pressures that will be presented, good communication and collaboration were presented as the way to deal with these pressures (see also codebook in Appendix 2). Therefore most respondents also mentioned the role of the purchaser that he acts as a process manager of the purchasing process in a way that he has to bring the right people together and present alternative options (Table 2).

Besides physicians needing to agree on medical devices, all respondents mentioned the need for input from specialists (Table 3). Logically they are educated to work with medical devices to treat patients as well as possible. Most hospital purchasers have a business background and are not educated in treating patients. Therefore, they must involve physicians in their projects from the earliest stages. R7 gave a fitting example:

“The hospital ordered that only safe needles were used for all practices. These were too big and clumsy since we are working with babies. So we had to go against the hospital’s policy as physicians and made clear that we would not do that.”

Yet again a reason for close collaboration. Besides their clinical expertise, physicians have more experience with the specific market, as R3, R4, R5 and R6 mentioned. The physicians are the ones that go to conferences and symposia and often know better than the purchasers what is on the market. One purchaser even said he had ordered products from which he did not know precisely how they were used.

Besides the fact that clinical expertise and the agreement of physicians had to be dealt with, other pressures did not always occur everywhere or were not mentioned by all respondents. Firstly some physicians had personal preferences. So mentioned R4 the following:

“It occurs that the user, being the specialist, says that they can only work with a specific product because they like it or think it would hurt the process if they used something else. It is hard for the purchaser to tell if that statement is subjective or objective.”

The problem with these personal preferences is that it is tough for the purchaser to determine if they are based on treating the patient right or just on personal preference. Physicians get used to specific products, which can come from experience, but also because they have been explicitly trained in using a particular type of product. R7 explained that the hospital has two types of needles with the same functionality. Some colleagues preferred one over the other and felt their needles worked best because they learned to use that particular type.

Additionally, it was interesting to hear from most respondents that preferences for medical devices differ for different specialisms inside the hospitals. So it can be concluded that the presented pressures differ for all different departments of the hospital. So was mentioned by R1:

“It is very dependent on the specialism. Where orthopaedics, in general, are more conservative, surgeons are often the first ones that want to see what could be changed. Orthopaedics are more like what we use at the moment is good, so no need for change, and are often trained in a certain way.”

It was surprising that the physicians mentioned all pressures presented by the purchasers. Some purchasers did not mention some of the other pressures presented, whereas R6 mentioned all the pressures in Table 3. It was found that when it comes to these pressures, both stakeholders know what the interests of the other stakeholder could be. The problem for the purchaser is that they do not always know what interests are in place in a particular situation. The physician might be reasoning from personal interest, from a value perspective or the influence of a supplier. The possible motivations are often straightforward, but how a physician is reasoning in a particular situation is not transparent.

Additionally, not all pressures are seen as problems. Purchases often look at these pressures as challenges in the purchasing process that logically come from the complex stakeholder dynamics in hospitals. The purchaser’s responsible for asking the right questions, starting the conversation, involving the right stakeholders, and finding the right alternatives. So did R1 mention:

“You must show your added value as a purchaser by starting with smaller successes. With these successes, you collect credits, after which you can ask something from specialists.”

This underlines that physicians and purchasers are adding value to the process from their perspectives. Therefore it is essential to get the interests of both perspectives aligned. This view again suggests that the purchaser functions as a process manager in acquiring new materials, as mentioned in Table 2.

At last, the difference in preferences between academic and non-academic was mentioned by R2 and R6, which is already explained in 4.1.

4.3 Pressures of Suppliers on Dutch hospital procurement

Looking at the supplier’s influence on Dutch hospital procurement, all purchasers saw the supplier as an external stakeholder. The most important pressures are listed in Table 4. No respondents mentioned intensive collaboration with suppliers. The most critical impact on the purchasing process is that they try to negotiate the highest price possible without transparently showing the prices for which they sold their goods before. This effect is even more substantial for devices that are new on the market, which means that the supplier is one of the first sellers of the product. From R6, it was learned that physicians would want the best and newest products possible, meaning that you would be stuck with the high prices of a supplier that is a forerunner in some technology. R6 mentioned:

“When a firm comes with a new product that improves a way of treatment, then you want that product for the patient, and you are stuck to that supplier, probably asking for a very high price.”

With fewer suppliers, the supplier’s influence in price negotiation and their influence on physicians increases. The scarcity of suppliers is also why availability is shown in Table 4. As already mentioned in 4.1, availability is a big issue for hospitals. Especially after Covid-19, but also because of the introduction of the new Medical Device Regulation (MDR) by the European Union, which dictates that medical devices need a new certification with higher qualifications. R2 mentioned:

“Because of the new MDR certification, suppliers must go through more trouble to get their products on the European market. Some stop selling in Europe, making availability an even bigger problem than price.”

Also, R3, R4 and R5 called out the problems with this new certification. This indicates that suppliers are not in the business of adding value to hospitals. Even though some respondents mentioned some projects where physicians work with suppliers to develop products, this was generally not the case and was stated to be more common in academic hospitals. Academic hospitals did indeed have some connections with suppliers, based on the answers of R5, but most research was done internally without the involvement of manufacturers.

Table 4 Pressures of suppliers on the procurement process

Supplier pressures	R1	R2	R3	R4	R5	R6	R7	R8
Lack of (cheaper) alternatives			X	X	X	X		X
Price Transparency	X	X	X	X		X		
Product dependent	X	X		X		X		X
Number of suppliers	X				X	X		
Availability		X		X				

In Table 5, the most important supplier selection criteria are given. Interestingly, many suppliers are chosen based on the prior experience of purchasers or relations to the hospital. For more expensive products, the whole market is evaluated again, but generally, for standard products, purchasers have a set of known suppliers from which they choose. In the purchasing process, R1 also mentioned that it was easier to use existing suppliers, and

R7 also felt the pressure of the purchasing department to use existing suppliers as much as possible for efficiency and bargaining reasons. Costs and added value align with the purchasing goals and focuses, as discussed in 4.1. However, again, we also see the influence of the physician in the selection of suppliers.

Table 5 Selection Criteria of Suppliers

Supplier selection based on	R1	R2	R3	R4	R5	R6	R7	R8
Added value	X	X	X	X	X	X	X	X
Experience	X	X	X	X				X
It depends on the product/supplier.	X	X			X	X		X
Physicians preference		X	X		X	X		X
Costs	X		X	X		X		
Collaboration/Partners	X					X	X	
Long-standing relationships	X				X		X	

4.4 Physicians-supplier relationships

All purchasers were explicitly asked if they encountered any problems regarding physician-supplier relationships. These answers are shown in Table 6. Physicians were asked if they had any preferences for suppliers and about their relationships with suppliers.

Table 6 Issues regarding physician-supplier relationships

Physician-supplier relationships	R1	R2	R3	R4	R5	R6	R7	R8
Close Contact	X		X		X		X	X
Lack of transparency	X	X	X	X				
Physicians have longer relationships with suppliers.	X	X		X		X		
Physicians get convinced by suppliers.		X	X		X			
Cash-flows		X						

As mentioned before, physicians have close contact with suppliers. Even though purchasers can engage in relationships with suppliers as well, they are more likely to change position or hospital, where physicians engage in way longer relationships, as mentioned by R2:

“All stakeholders can change from time to time, but physicians are often longer in the same place, which means they know with whom they communicate well. Because of this, they often also have the best communication with suppliers.”

These relationships were not directly mentioned as key problems, but after the question was asked, the main issue was that these relationships were not transparent. If physicians have contact with suppliers in the background, the purchaser is not fully informed when negotiating with other suppliers or even the same supplier. Even though this is an issue and remains a problem, there is more transparency around these relationships than in the past. Cash flows were not mentioned as an existing problem. So does R3 state:

“They text each other, so it could be that they are charmed by a certain firm and therefore have a preference for a certain product, but often those guys are just very skilled at what they do, and they just want the best product.”

This was confirmed by one of the physicians who mentioned that the physicians want the medical device with the best qualifications and highest quality. For example, the radiology department wants the device with the most precise pictures and a low radiation dose for their patients.

Even though legislation prohibits cash flows between suppliers and physicians and more transparency is in place, suppliers influence physicians differently. They make physicians feel important and influence their medical supply choices. A comparison was made to the fashion industry. Every year the trends change, and people make different choices in their clothing because they get influenced by the trends. This is what suppliers also try to do with physicians. R2 mentioned:

“Physicians are influenced by suppliers on what specifications are important. This is not always by cash flows, but praise the importance of physicians, as they also work together to make better products.”

Even if they do not work together on developing products, the suppliers are busy influencing physicians at conferences, where suppliers are looking for a way in a hospital. Specialists will get approached at these conferences by suppliers that are not even in the business of their expertise. Suppliers do everything they can to get a connection to enter the hospital’s business. R5 even mentioned that physicians also work at suppliers to train the people at the supplier on how to handle and implement new medical devices. Suppliers need the expertise of physicians to be able to make their products implementable for hospitals.

4.5 Strategies for Dealing with Physicians and Suppliers

After investigating the pressures of suppliers and physicians on procurement, the question was asked how purchasers are strategically dealing with physicians. In this case, the most crucial finding is that the purchasing department must collaborate with the physicians and suppliers. This was also presented as the responsibility of the communication skills of the purchaser by the purchasers themselves. As mentioned in 4.2, most pressures were not problematic for purchasers with excellent communication with their specialists. See Table 14 in Appendix 3 for responses on strategy. The most important strategies are listed in Table 7. When the purchasers were asked about the quality of the communication between physicians and purchasers, four out of five responded that that depended on the quality of the purchaser. A purchaser needs the skillset of timely communication with physicians and inclusion in the process.

The second most important strategy for dealing with physicians was to make the specialists responsible for their departments; to create a feeling of shared responsibility. They are already working in their departments and partnerships, where you can show them their purchasing performance results. Other performance metrics that can be presented are sustainability and waste management. Several respondents also addressed the importance of involving physicians early. This responsibility aligns with the proposed strategy of making costs visible to physicians.

A third approach that was mentioned was dual management. Dual management means having a management team or board with a mix of different experts: purchasing managers, business managers and medical experts. With such a form of governance, you always have a commission to fall back on when purchasers and physicians cannot come to the same conclusion. Because of

the duality of such a board, all interests are represented. These boards are only addressed if a situation escalates or the project is big, expensive, or has a significant impact. R3 gave an example of such a board in place:

“Such a tender board contains several medical specialists, including business managers, so that is a mix of experts within a hospital, and they all discuss it together.”

Table 7 Strategies for Dealing with Physicians

Physician strategies	R1	R2	R3	R4	R5	R6	R7	R8
Communication skills purchaser	X	X	X		X			X
Shared responsibility	X	X	X	X		X		
Dual Management		X	X	X	X			
Make costs visible	X	X		X				
Standardisation	X				X			X
Training physicians	X						X	

Other strategies that were mentioned were standardisation and training of physicians. With standardisation, the purchasers tried to minimise the variety of products used in the hospital for efficiency reasons. With training physicians R1 and R7 gave examples of training physicians in using the materials appropriately so waste is minimised.

Regarding suppliers, the most significant pressures were information problems (transparency) and the availability of products. The most successful strategy was engaging in knowledge exchange relationships with other hospitals, as shown in Table 8. There are several organisations which hospitals can join that exchange information successfully, as mentioned by R4:

“We have a partnership with other hospitals, which is successful. Here we exchange information about suppliers, availability, quality and some about prices of products.”

Table 8 Strategies for Dealing with Suppliers

Supplier strategies	R1	R2	R3	R4	R5	R6	R7	R8
Information exchange with other hospitals		X	X	X	X			
Purchasing with other hospitals	X		X					
Improve supplier-buyer relationship	X							

Hospitals can freely join these partnerships to exchange information. With this information, hospitals get a better view of the supply chain and the supplier market and have a better position in bargaining with suppliers. Additionally, these partnerships offer a view into the availability of other institutions, so the problem of not having the medical supplies to help patients can be overcome.

Most collaboration between hospitals was on information exchange. There were some mentions of purchasing projects, where hospitals bought together to get better prices from a supplier. These projects were often complicated since they had to deal with medical specialists and purchasers from different

hospitals, which could all have other interests. Therefore these projects are not always successful.

5. DISCUSSION

Looking at the purchasing processes in Dutch hospitals, it can be concluded that there still mainly exists a cost-oriented mindset. Prada (2016) describes a need for a shift away from cost-focused purchasing to long-term-efficiency strategies with a focus on adding value for patients (Prada, 2016). Looking at the five hospitals, it could be said that it might be a possible solution for the future, but it is still definitely not standard procedure. As R3 stated, it might be an excellent way to purchase in the future, but it is currently not applied. Purchasers get the task of buying as cheaply as possible. Physicians get paid for treating patients well, and purchasers are partly responsible for the hospital’s financial performance.

As for the standard procurement steps, the literature review stated that several models describe the procurement process. The standard procurement procedures are shown in Figure 1, displaying a procurement process flow chart (World Health Organization, 2011). These steps were recognised in the discussions with purchasers on acquiring new products and technologies. The results add one crucial extra step. Because of problems like Covid-19 or a new MDR certification, as discussed in the results, availability became a huge issue. As a result, purchasers do not have the opportunity to bargain about costs but have to stress about getting particular products at any price. Therefore, the results suggest a step where the market is evaluated, and the availability of products is determined. The flow chart, as given by the World Health Organization (2011), is very internally oriented. Still, the external market should be assessed to make timely considerations about potential solutions for scarce products. It could be argued that this is part of the planning or procurement step, but based on the results, this study suggests that this is so significant that it is a separate procurement step. These practices underline that procurement evolved into a strategic function (Arantes et al., 2022). Also, two purchasers said that the purchaser’s role is to help the hospital reach its goals, indicating that the purchaser’s strategy is aligned with the hospital’s strategy and behaves in the interests of the hospital.

This research underlined the increasing importance of a more effective way of purchasing because of the problems mentioned in availability and increased costs. Given that supply costs represent around 30% of hospital expenditures (Nyaga & Schneller, 2018), all respondents agreed that the increased cost pressures were increasing the challenges in the procurement process of the hospital. Additional issues that made it even worse were Covid-19 and the new MDR certification. It could be argued that this certification can help value-based procurement because it ensures the quality of medical devices. However, at this moment, it further increases the problems of costs and availability.

The pressures of physicians on the purchasing process, as mentioned in the literature review, are:

- their clinical expertise on devices, their responsibility for the income of the hospital, physicians being the user of the devices (Montgomery & Schneller, 2007),
- weak business affinity with the hospital but strong affinity with suppliers (Robinson, 2008),
- long-standing relationships with suppliers and familiarity with devices (Burns & et al., 2009)

Looking at Table 3 in Chapter 4.2, these influences are almost identical to the pressures mentioned by the respondents. There are no significant differences in pressures. The only thing that was not particularly mentioned by respondents was the power of

physicians because they directly generate income for the hospital. The literature outcomes, therefore, correspond with the pressures presented in the interview results, and the first proposition is true. A side note must be made that these preferences and pressures are primarily a problem once they are not transparent or the interests of the purchaser are not aligned. R3 and R5 stated the influences of physicians as dangerous for efficient procurement once interests were not aligned.

It could be argued that all pressures hinder value-based procurement. What became clear from the results and literature is that Physicians' clinical expertise and knowledge of the market are necessary to select supplies that add value to the patient and the hospital's goals. Therefore these "pressures" are very needed for value-based procurement and do not necessarily hinder value-based procurement and are consequently coloured grey in Table 3. As R6, the radiologist, stated, physicians want the best possible product based on device performance (most precise image of MRI). For these types of products, the findings correspond to the study of Burns et al. (2018). This study concludes that PPIs do not always differ among surgeons, and these preferences can be related to patient benefits (Burns et al., 2018).

Another pressure that can hinder value-based procurement is that physicians can have the final say in the selection of supplies. This is a problem since the results show that most physicians can have other interests than the hospital's vision dictates because they are not employed but working in their partnerships. A value-based strategy needs physicians' cooperation to purchase the right supplies because of their field knowledge.

Additionally, physicians get attached to certain products because of experience or training. This makes some physicians resilient to change to new suppliers or products. This also hinders value-based procurement since these products will not always keep adding the most value to the firm due to new technologies. At last, physicians hinder value-based procurement when they work behind the closed door of their partnerships, where the purchaser does not know the interests. Logically these partnerships have their income interest, but not precisely knowing these interests disables a purchaser from implementing a value-based procurement strategy.

Looking at the discussion above, there is one crucial strategy to deal with the pressures of physicians: collaborate with them and increase transparency. Purchasers need to involve physicians early and try to get them to make decisions in line with supply chain objectives. The strategies listed by Nyaga & Schneller that excluded expensive PPIs and reduced contact with manufacturers (Nyaga & Schneller, 2018) were not mentioned at all. Based on this study, limiting physicians' freedom is inappropriate since purchasers must get medical specialists on board for value-based procurement. One respondent also mentioned that acting as a policeman will make physicians shut the door on you.

When it comes to relationships between suppliers and physicians, the literature mentioned that devices are engineered with interactions between manufacturers and physicians, physicians are explicitly trained (Robinson, 2008), physicians and suppliers engage in long-term relationships, and physicians can be reluctant to switch suppliers once they are familiar with a device (Burns & et al., 2009). Looking at the results of supplier-physician relationships in this study, all mentioned interactions are given in the results and could be derived from Table 6. Again, these issues were only problematic once these relationships were not transparent or physicians were convinced about particular products based on factors other than clinical performance or added value. Therefore this study's third proposition is considered true once the relationships are not transparent and

suppliers unknowingly influence the physicians, which is often the case.

Looking at strategies for dealing with suppliers, the literature stated that purchasing alliances as GPOs are a practical solution (Burns & Briggs, 2018). In Dutch hospitals, these are not used as successfully and are only used for some types of standard products, such as examination gloves. More successful is engaging in partnerships to exchange information on quality, supplier information and availability. Several respondents mentioned this as an excellent strategy to get more insight into the supply chain. The literature also argued the success of GPOs. It stated that effective group purchasing was limited to smaller hospitals and that bigger hospitals primarily use these alliances for gathering benchmark information (Saha et al., 2019). This study included bigger and smaller hospitals. Based on the respondents, this study concludes that primarily gathering information is the most effective practice for all sizes.

Looking at the literature, the lack of information on price transparency and the need for performance data was a significant implication for value-based procurement (Robinson, 2008). It can be said that when it comes to pressures of suppliers that hinder value-based procurement, the most important is the lack of information and availability of products. The results of the interview analysis correspond with the literature review, and the second proposition is also true. When trying to overcome these pressures, hospitals must try to retrieve more information through partnerships with other hospitals without directly engaging in complex purchasing structures that are time-consuming and often result in a conflict of interest.

At last, this study included a fourth proposition that argues if the overall pressures of physicians and suppliers negatively influence value-based procurement. Based on the discussion above, where the interview results validated many pressures of physicians and suppliers, this last proposition is also considered true. Currently, these pressures would negatively influence value-based procurement. This research also found that physicians and suppliers are crucial in successful value-based procurement. The crucial principle in this role is transparency. Physicians must be transparent about their reasoning for preferences and their relationships with suppliers. Suppliers need to be transparent about the performance of their products and added value over costs.

6. CONCLUSION

This chapter concludes this research after a literature review, an in-depth analysis of interviews with procurement experts and physicians and the discussion above. It will formulate an answer to the research question: *'What are the main pressures physicians and suppliers exert on Dutch hospitals that hinder value-based procurement?'*

Looking at the procurement teams of the interviewed hospitals, they all had a cost-oriented mindset in place because the task of the purchasers is to negotiate with suppliers to buy as cheaply as possible. However, an important issue emerged. Three out of five hospitals addressed the problem of the availability of products. Due to Covid-19, increased costs and a new medical device regulation (MDR), many medical supplies are hard to acquire. Because of this availability problem, a cost-oriented mindset is not always in place since hospitals must stress getting the materials at any cost. Based on the availability problems and the wide recognition of the increased cost pressures, the importance of value-based procurement was underlined by the results of this study.

When it comes to hindering value-based procurement, physicians hinder value-based procurement by stating their personal

preferences based on experience, training and products that they like. Because of the purchaser's lack of clinical expertise, the purchaser cannot always independently judge the physicians' preferences. This results in a strong pressure of physicians on the procurement process. Partnerships, not being employed at the hospital further aggravate this dependency due to stating preferences behind the closed doors of these partnerships.

Because of the physician's clinical expertise, the physician has the power to state these preferences. The results also found that this knowledge gap is not necessarily alarming for value-based procurement, but physicians should be part of a value-based procurement strategy. Therefore, physicians should be included in the early stages of purchasing projects. The purchaser should make sure that there exists transparent communication between both stakeholders.

Half of the respondents said that influences from physician preferences depended on the type of product and the department the physicians are working in. Some departments are interested in new technologies, whereas others are not likely to change when they are content with the current materials. In the evaluation of pressures of physicians and implementing strategies to deal with physicians, the type of department must therefore be taken into account. With different types of preferences, a different approach could be optimal.

Regarding pressures from suppliers, the most critical pressures are their influence on physicians and the lack of information they give on performance data, quality and price of products. It also hinders value-based procurement when suppliers do not try to satisfy their hospital's needs by ensuring all products are available with the correct standards.

Hospitals should partner with other hospitals to gain knowledge on supplier information like quality, availability and price without directly engaging in complex purchasing alliances to overcome the lack of information.

6.1 Limitations

A limitation of this study is the size of the group of respondents. To give better conclusions on the influences of the different stakeholders, it would be better to have more input from other hospitals and from more respondents inside one hospital to compare different views on procurement. This study is limited to one procurement or physician respondent per hospital.

Additionally, the interviewees had room for additional follow-up questions, so the interviews differed. The key takeaways could be compared, but some findings were not always as comparable, and the different lines of questioning could have influenced the answers given by the respondents.

Interviewing is a form of communication research. There are three primary sources of error when data is collected through interviews: errors in measurement questions, interviewer errors, and participant errors (Cooper & Schindler, 2014). These sources of error are to be considered in the conclusions and recommendations of this study. Errors in the measurement questions could have been that the questions did not fully cover the complete content of this research. Interviewer errors could have occurred when the interviewer did not secure full participant cooperation or did not handle the data correctly. Participant errors could have occurred because of a lack of participant motivation, but this was not likely in the case of this study since all respondents participated voluntarily.

Another limitation of this research is that it looks for influences on value-based procurement, while value-based procurement is not implemented yet in Dutch hospitals. The current pressures of

physicians and suppliers are linked to value-based procurement principles. However, once implemented, it would be good to test if the pressures would change with the successful implementation of value-based procurement.

6.2 Future Research

One of the results of this research was that the pressure differed between the different specialisms. Therefore it would be interesting to research the pressures from other departments specifically, where this research gave a general overview of pressures from physicians and suppliers.

Another important finding of this research was the influence of physicians' partnerships, meaning they are not employed at the hospital. It would be interesting further to research the implications of these partnerships for value-based procurement and set out the real advantages and disadvantages since these are not yet always transparent for all stakeholders.

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8. APPENDICES

8.1 Appendix 1: Interview Questions

Purchaser Interview

1. What are your core responsibilities and activities in the procurement process of this hospital?
2. What are the procurement department's main goals, tasks and responsibilities?
 - a. What are the main challenges in achieving these goals?
3. Are other departments or clinical staff involved in the procurement process of this hospital?
4. Can you describe any significant (ongoing) changes in the procurement process in your hospital regarding increased cost pressures and the need for value-based procurement?
5. Which criteria are used to select different types of suppliers?
6. What are the main obstacles when dealing with suppliers?
7. Can you elaborate on the role of physicians in the procurement process?
8. How do you communicate with physicians concerning the procurement process?
9. How do physicians influence the procurement process?
10. What are the main challenges regarding the physicians' influence on the procurement process?
11. Do you experience problems regarding physician-supplier relationships?
 - a. Are these relationships always fully transparent?
12. What strategies do you use to gain commitment from physicians to cooperate with the purchasing strategy?
13. How can the strong physicians' influence in the procurement process be improved?

Physician Interview

1. What are your main tasks and responsibilities in this hospital?
2. What medical devices are needed for your practices?
3. How are the medical devices and supplies that you use selected?
4. Can you elaborate on any hospital limitations or regulations that influence your choice of medical devices?
5. Have there been any changes in recent years in the choice of medical devices or supplies (due to cost pressures or the transition to value-based procurement)?
6. Do you participate in the process of buying new medical devices or supplies?
7. Do you have a strong preference for specific medical devices?
 - a. How is this preference determined?
8. Do you have a preference for certain suppliers?
 - a. How is this preference determined?
9. How would you describe the collaboration between physicians and purchasers?
10. Do you think about costs or sustainability in choosing medical devices?
11. Would you be willing to switch suppliers if this would benefit the overall financial performance of the hospital?
12. How can the procurement process of your hospital be improved?

8.2 Appendix 2: Codebook

Table 9 Codebook created based on the interview transcripts

Code	Explanation	#
Added value	The respondent discusses how the process or product should add value to the hospital.	5
Availability	The respondent talks about the problem of availability.	9
Collaboration	The respondent discusses collaboration or the need for collaboration between physicians, purchasers or suppliers.	16
Cost-oriented	The respondent talks about the importance of costs.	12
Financial performance	The respondent talks about the importance of the financial performance of purchasing.	8
Hospital needs	The respondent talks about the procurement process serving its hospital needs.	10
Misalignment of interests	The respondent talks about a misalignment of interests.	14
Physician preference	The respondent names a form of physician preference for medical products/devices.	25
Physician-supplier relationship	The respondent talks about the influence of physician-supplier relationships.	12
Dependent on the purchaser's skillset	The respondent gives the purchaser responsibility for particular events or processes.	8
Strategies	The respondent gives strategies on how to deal with physicians or suppliers.	6
Supplier involvement	The respondent talks about the involvement and power of suppliers.	10
Transparency	The respondent talks about the lack or the importance of transparency.	21
Value-based procurement	The respondent talks about value-based procurement.	5

8.3 Appendix 3: Important Citations from Interviews

8.3.1 Value-based Procurement in Dutch Hospitals

Table 10 Value-based procurement responses

Answer	Respondent
“Additionally, I look if we can purchase in another way, instead of with a package of requirements, but asking the question differently on the supplier market. I ask the suppliers: We have these purchasing wishes, and what is the most valuable solution?”	R1
“Then you must consider how much it contributes to the value chain. So what are our goals? Those are our patients. So, to what extent do you have to select suppliers that add value to the patient.”	R2
(on value-based procurement) “We think that it might be the future of procurement. We negotiate; that is our job, which becomes outdated at some point.	R3
“Besides availability and financial goals, we also have a quality task to ensure it fits the actual need.”	R4

8.3.2 Pressures of Physicians

Table 11 Physician pressure responses

Answer	Respondent
“Specialists are often trained in a certain way.”	R1
“It is very dependent on the specialism. Where orthopaedics, in general, are more conservative, surgeons are often the first ones that want to see what could be changed. Orthopaedics are more like what we use at the moment is good, so no need for change, and are often trained in a certain way.”	R1

“Lack of medical policy plan from the hospital disables the purchaser to make statements to specialists about what they may or may not do.”	R1
“So academic hospitals are very instrumental in procurement, and physicians are employed at the hospital, meaning they emphasise science more than their own interests. In general hospitals, most physicians are not employed at the hospital and are united in their own boards and partnerships, meaning they have their own income interests.”	R2
“Physicians have a strong influence. They have particular knowledge and are longer educated than any other stakeholder.”	R2
“Physicians know very well what is on the market in their specialism. They have asked me if they can have firm X on trial because I heard good things about it. ... He is the product expert. I am a purchaser. I do not know what a good stent or ICD is. That is what they know best.”	R3
“If the physician says no to product A, I can try whatever I want, but A will not happen. ... You need to collaborate and do not want to ruffle any feathers, then they close the door.”	R3
“It occurs that the user, being the specialist, says that they can only work with a specific product because they like it or think it would hurt the process if they used something else. It is hard for the purchaser to tell if that statement is subjective or objective.”	R4
“Physicians have strong preferences for their products because they sometimes feel comfortable holding.”	R5
“In general, physicians are not bothered with the costs of a product. The physician wants to treat his patient as well as possible, and then it is easily said: “I want the best and most expensive product”.”	R5
“Where they use things like catheters and stents, the people that work with those things strongly prefer a certain material.”	R6
“In practice, we often want the most expensive product, not because it is expensive, but because it has the highest quality and will last longer than “older” machinery.”	R6
“We (physicians) know that what we want is often the most expensive, but also know that the price is important, so if two machines are comparable, then I am always okay with going for the cheaper version, knowing that it is better for the hospital, which benefits all stakeholders.”	R6
“The hospital ordered that only safe needles were used for all practices. These were too big and clumsy since we are working with babies. So we had to go against the hospital’s policy as physicians and made clear that we would not do that.”	R7
“In laboratories, they just order whatever they think is necessary after discussing it with the head of the department.”	R8
“Every department has its responsibility of determining what they need. You need particular knowledge to determine what is currently the standard to use for these practices.”	R8

8.3.3 Pressures of Suppliers

Table 12 Supplier pressures responses

Answer	Respondent
“It became normal that suppliers started engaging in relationships with specialists. The challenge is to convince specialists that they have to handle transparently.”	R1
“Of course, suppliers stay competitors of each other, but nowadays, suppliers also look together to see how they can offer the best solutions for hospitals.”	R1
“Because of the new MDR certification, suppliers must go through more trouble to get their products on the European market. Some stop selling in Europe, making availability an even bigger problem than price.”	R2
“You have concrete products, so specific that is such a niche market that you can only get them from one supplier, for example, then there is little to negotiate about the price.”	R3

“Availability is a big issue, and cost is also a huge issue. Moreover, that combination results in putting much more time and energy into getting products at all. And then you also try to get it under the best possible conditions, which is a huge fight.”	R4
“Challenges with suppliers mainly arise because of new MDR certification and the fact that have a big influence on specific products.”	R5
“The supplier is not the most important. Every supplier has its products, and it can be that they use a type of product, which they do not sell at other firms, then we are dependent on that firm, but there is no direct preference”.	R6
“When a firm comes with a new product that improves the way of treatment, then you want that product for the patient, and you are stuck to that supplier, probably asking for a very high price.”	R6

8.3.4 Physician-Supplier Relationships

Table 13 Physician-supplier relationship responses

Answer	Respondent
“It exists in the Netherlands, but there is more and more transparency around it”.	R1
“You need to dare to ask. It happens, it is not allowed, but it happens.”	R1
“We must do this with the nurse, specialist and supplier. We make it a business case and look at what would be the added value in the end.”	R1
“So there is an integral interest between physician and supplier, and thus they have influence. Rightly so, the question is whether that is always weighted, whether you want it that way.”	R1
“All stakeholders can change from time to time, but physicians are often longer in the same place, which means they know with whom they communicate well. Because of this, they often also have the best communication with suppliers”.	R2
“Physicians are influenced by suppliers on what specifications are important. This is not always by cash flows, but praise the importance of physicians, as they also work together to make better products.”	R2
“they text each other, so it could be that they are charmed by a certain firm and therefore have a preference for a certain product, but often those guys are just very skilled at what they do, and they just want the best product.”	R3
“I do not always know what their interests are either. You often deal with partnership constructions, and I only see what they do for the hospital, but not what the partnership’s interests are.”	R3
“Also, in academic hospitals, physicians have preferences for specific products. They are scientists here but still attend the same conferences, where suppliers convince them of their product preference.”	R5
“We (physicians) tell the purchaser they should invite particular firms. We know what is on the market, so sometimes I want the purchasing team to invite particular firms. Often we also already have medical devices from certain firms, and then they rather have that we use those firms for bargaining reasons.”	R7

8.3.5 Strategies

Table 14 Strategy responses

Answer	Respondent
“You must show your added value as a purchaser by starting with smaller successes. With these successes, you collect credits, after which you can ask something from specialists.”	R1
“Prices on packaging help, but also make specialists responsible for their department.”	R1
“After signing new contracts, provide insight on savings and the additional costs when materials are not properly used.”	R1
“..., a specialist who is, therefore, co-responsible for the outcome. This is a way to try to manage that together.”	R2

<p>“Together with other hospitals, we exchange information for better insight into the supply chain.”</p>	<p>R2</p>
<p>“Such a tender board contains several medical specialists, including business managers, so that is a mix of experts within a hospital, and they all discuss it together.”</p>	<p>R3</p>
<p>“We have a partnership with other hospitals, which is successful. Here we exchange information about suppliers, availability, quality and a bit about prices.”</p>	<p>R4</p>
<p>“You need the clinical expertise of physicians for effective purchasing. It becomes dangerous if the interests start to differ. Therefore, you must be transparent with a physician and start the conversation early.”</p>	<p>R5</p>
<p>“Collaboration is excellent. Especially if everybody knows each other’s interests.”</p>	<p>R6</p>