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The ABC Analysis of Pharmaceutical Supply Use and Cost in Orthopaedic Surgery Outpatients - National Health Insurance

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ABSTRACT

Orthopaedic outpatient services require various drugs, medical devices, and consumables for pain management, inflammation control, bone support, and wound care. Efficient use of pharmaceutical supplies is crucial, directly affecting both clinical service delivery and hospital financial management. This study analyzed usage patterns and cost profiles of pharmaceutical supplies for outpatient JKN patients at the Orthopaedic Surgery Polyclinic. A prospective observational design reviewed 1,236 prescriptions from March to June 2024. The ABC method (80%-15%-5%) classifies supplies by usage and investment value. The analysis included 1,236 prescriptions from eight diagnostic groups, covering 59 drug types, 38 medical device types and medical consumables (BMHP). By usage, class A: 8 drugs, 2 types of medical devices and medical consumables; class B: 10 drugs, 11 types of medical devices and medical consumables; class C: 41 drugs, 25 types of medical devices and medical consumables. By investment value, class A: 9 drugs, 12 types of medical devices and medical consumables; class B: 12 drugs, 8 types of medical devices and medical consumables; class C: 38 drugs, 18 types of medical devices and medical consumables. The ABC analysis revealed distinct prioritization patterns based on usage amount and investment value, indicating that Class A items require stricter monitoring because they dominate either utilization or cost, while Class B and C items should still be managed according to clinical need and item criticality.

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ABSTRAK

Layanan rawat jalan ortopedi membutuhkan berbagai obat, alat kesehatan, dan bahan medis habis pakai untuk penanganan nyeri, kontrol inflamasi, penunjang tulang, dan perawatan luka. Penggunaan perbekalan farmasi yang efisien sangat penting karena berdampak langsung pada pelayanan klinis dan manajemen keuangan rumah sakit. Penelitian ini menganalisis pola penggunaan dan profil biaya perbekalan farmasi pada pasien JKN rawat jalan di Poliklinik Bedah Ortopedi. Penelitian ini menggunakan desain observasional dengan pengumpulan data resep dan biaya secara prospektif dari database rumah sakit, mencakup 1.236 resep pada periode Maret hingga Juni 2024. Metode ABC (80%-15%-5%) digunakan untuk mengklasifikasikan perbekalan farmasi berdasarkan jumlah penggunaan dan nilai investasi. Analisis mencakup 1.236 resep dari delapan kelompok diagnosis, yang terdiri atas 59 jenis obat, 38 jenis alat kesehatan, dan bahan medis habis pakai (BMHP). Berdasarkan penggunaan, kelas A terdiri atas 8 obat serta 2 jenis alat kesehatan dan bahan medis habis pakai; kelas B terdiri atas 10 obat serta 11 jenis alat kesehatan dan bahan medis habis pakai; dan kelas C terdiri atas 41 obat serta 25 jenis alat kesehatan dan bahan medis habis pakai. Berdasarkan nilai investasi, kelas A terdiri atas 9 obat serta 12 jenis alat kesehatan dan bahan medis habis pakai; kelas B terdiri atas 12 obat serta 8 jenis alat kesehatan dan bahan medis habis pakai; dan kelas C terdiri atas 38 obat serta 18 jenis alat kesehatan dan bahan medis habis pakai. Analisis ABC menunjukkan adanya pola prioritas yang berbeda berdasarkan jumlah penggunaan dan nilai investasi, yang menunjukkan bahwa item kelas A memerlukan pemantauan lebih ketat karena mendominasi penggunaan atau biaya, sedangkan item kelas B dan C tetap perlu dikelola berdasarkan kebutuhan klinis dan tingkat kepentingannya.

Kata Kunci: Analisis ABC, Perbekalan farmasi, JKN, Manajemen persediaan, Pasien rawat jalan ortopedi

1. Introduction

Effective pharmaceutical supply management is essential in outpatient hospital services, as medications, medical devices, and Medical Consumables Supplies (BMHP) constitute critical components of clinical care and healthcare financing. In orthopaedic surgery clinics, pharmaceutical supply requirements typically involve the management of musculoskeletal pain and inflammation, supportive therapy for bones and nerves, and wound care or clinical procedures [1],[2].

Prescription patterns in orthopaedic services often involve multiple items within a single service episode, reflecting diverse therapeutic needs, including analgesics, anti-inflammatory drugs, supportive therapies, and supplies for clinical procedures. Evaluating pharmaceutical supply usage is essential for objectively mapping usage patterns and informing more accurate inventory planning [1].

Inadequate inventory management may result in stock mismatches, unnecessary expenditures, and disruptions in the availability of essential service items. Consequently, data-driven inventory planning and control are required to ensure pharmaceutical supply availability and effective cost management [3],[4].

ABC analysis is a method that categorizes items according to their contribution to usage amount and investment value. This approach facilitates the identification of

priority items that require enhanced supervision in planning, procurement, and cost control [5],[6].

Despite the significance of this topic, research specifically examining the usage patterns and costs of pharmaceutical supplies among outpatient patients in Indonesia's National Health Insurance (JKN) system at orthopaedic surgery polyclinics is limited. Therefore, this study analyzes the usage and cost profiles of pharmaceutical supplies for outpatient JKN patients at the Orthopaedic Surgery Polyclinic of Airlangga University Hospital using the ABC method.

In the JKN payment context, efficient pharmaceutical supply planning is particularly important because hospitals must maintain item availability while controlling expenditure and avoiding unnecessary stock accumulation. Outpatient orthopaedic services may have specific pharmaceutical supply patterns because prescriptions often involve analgesics, anti-inflammatory drugs, bone-supportive therapies, and procedure-related medical consumables. These characteristics may differ from general hospital pharmacy utilization patterns, making specific inventory analysis in JKN orthopaedic outpatient services necessary.

2. Methods

Study Design and Setting

This study used an observational design with prospective collection of prescription and cost records from hospital databases. The research was conducted at the Outpatient Pharmacy Installation of Airlangga University Hospital in Surabaya, focusing on JKN outpatient patients at the orthopaedic surgery polyclinic from March to June 2024. The study population comprised prescription sheets for all JKN outpatients at the Orthopaedic Surgery Polyclinic during the study period. Samples were selected using the time-limited sampling method, in which all prescriptions meeting the inclusion criteria during the study period were included. The inclusion criteria were all prescription sheets for JKN outpatients from the Orthopaedic Surgery Polyclinic during March to June 2024 that contained complete information on item type, quantity, unit price, and diagnosis. The exclusion criterion was duplicate prescription records.. The unit of analysis in this study is the prescription sheet of outpatient JKN patients at the orthopaedic surgery polyclinic.

Data Collection

Data were obtained from electronic prescription systems, Hospital Management Information Systems (SIMRS), hospital procurement databases, and structured data collection sheets. The collected data included patient visit identifiers, diagnoses, types of pharmaceutical supplies, quantities, unit prices, and total prescription costs. Pharmaceutical supplies in this study include drugs, medical devices, and BMHP used in patient services.

Data Processing and ABC Classification

The collected data is recorded on a data collection sheet, then processed and analysed descriptively. ABC analysis is used to group pharmaceutical supplies based on usage amount and investment values. Usage amount was defined as the total quantity of each pharmaceutical supply item dispensed during the study period. Investment value was calculated by multiplying the total quantity used by the unit price of each item. The formula was: investment value = quantity used × unit price. Unit price data were obtained from the hospital procurement database and represented the procurement price recorded during the study period. The data were then sorted from

highest to lowest, and cumulative values and percentages were calculated. Group A includes items with a cumulative value of up to 80%; group B includes items with a cumulative value of more than 80% to 95%; and group C includes items with a cumulative value of more than 95% to 100%.

Ethical Approval

This research has received ethical approval from the Research Ethics Committee of Universitas Airlangga Hospital, with the ethics approval letter number UA-02-24045.

3. Results and Discussion

Pharmaceutical supply usage profile

Analysis of 1,236 outpatient JKN patient prescriptions at the orthopaedic surgery clinic indicates that most prescriptions contain two to three items, with an average of 3.17 items per prescription. This average exceeds the optimal range recommended by the World Health Organization (WHO) and the International Network of Rational Use of Drugs (INRUD), which is approximately 1.6 to 1.8 drugs per encounter, suggesting a tendency toward combination therapy [7]. Nevertheless, this finding aligns with drug utilization studies in orthopaedic outpatient departments, which report an average of 3.05 drugs per prescription, ranging from one to five drugs [8]. The frequent use of multiple drugs in orthopaedic patients likely reflects the need for pain management, inflammation control, and supportive therapy, depending on clinical conditions. Analgesics are a key component of prescriptions for orthopaedic patients, and several studies have noted that gastroprotectors and antimicrobials are often co-prescribed with analgesics in specific situations [9].

Table 1. Top Drug Utilization by Therapeutic Class.

No.	Therapeutic Class / Drugs	Percentage (%)
1.	**Non-opioid analgesics**	
	Paracetamol 500 mg	13.50
	Meloxicam 7.5 mg	9.07
	Sodium diclofenac 50 mg	6.43
	Ibuprofen 200 mg	4.82
	Meloxicam 15 mg	3.74
	Mefenamic acid 500 mg	1.26
	Ketoprofen 100 mg	0.86
	Sodium diclofenac 25mg	0.29
	Ibuprofen 400 mg	0.27
	Paracetamol syrup	0.01
2.	**Vitamins and Minerals**	
	Calcium lactate 500 mg	21.96
	Vitamin B complex	12.62
	Vitamin C 50 mg	2.14
	Vitamin B12 50 mcg	1.12
	Vitamin B6 10 mg	0.64
	Vitamin B1 50 mg	0.58
3.	**Neuropathic Pain Medications**	
	Gabapentin 100 mg	5.89
	Gabapentin 300 mg	5.56
	Pregabalin 75 mg	1.26
4.	**Antibacterials**	
	Cefixime 100 mg	2.40
	Cefixime 200 mg	0.66

	Cefadroxil 500 mg	0.35
	Gentamicin 0.3% EO	0.09
	Gentamicin 0.1%	0.03
	Metronidazole 500 mg	0.03
	Rifampicin	0.03
5.	**Antacids and Antiulcer Drugs**	
	Omeprazole 20 mg	1.17
	Ranitidine 150 mg	0.32
	Lansoprazole 30 mg	0.32
	Antacid combination	0.27

Note: Percentages were calculated based on the total quantity of all drug items dispensed during the study period.

Tables 1 and 2 illustrate the utilization patterns of drugs, medical devices, and medical consumables among JKN outpatients at the Orthopaedic Surgery Polyclinic. Drug use is predominantly characterized by non-opioid analgesics, particularly paracetamol, meloxicam, and sodium diclofenac. This trend underscores the centrality of pain management in Orthopaedic care, and the use of paracetamol and non-steroidal anti-inflammatory drugs (NSAIDs) is consistent with recommendations for non-opioid analgesics, especially in post-procedural or musculoskeletal pain scenarios [10]. Vitamins and minerals, notably calcium and B-complex vitamins, serve as supportive rather than primary therapies and should be prescribed based on specific clinical indications. While the importance of nutrition, including adequate calcium intake, for bone health is acknowledged, routine supplementation is not emphasized in WHO prescribing indicators [11],[12]. The prescription of gabapentin suggests the presence of neuropathic pain components in some patients, as gabapentin and pregabalin are recommended for neuropathic pain management. The relatively low use of antibiotics aligns with rational antimicrobial stewardship, and omeprazole may be appropriate for patients at risk of NSAID-induced gastrointestinal complications [13],[14],[15].

Table 2. Top Drug Utilization by Therapeutic Class.

No.	Medical Devices and Medical Consumables	Percentage (%)
1.	**Sterile Gauze**	
	Sterile gauze 7.5 × 7.5 cm, 8 ply	72.80
2.	**Dressing**	
	Bactigras 10 × 10 cm	4.67
	Cuticell classic 10 × 10 cm	1.61
	Cutimed Sorbact 7 × 9 cm	0.35
	Espuma non-adhesive foam	0.38
	Pharma-Algi F 10 × 10 cm	0.78
	Pharmacoll hydrocolloid 10 × 10 cm	0.28
	W-Care AH dressing foam	0.60
	Orthopaedic padding 3 inch	0.63
	Orthopaedic padding 4 inch	0.78
	Orthopaedic padding 6 inch	0.28
	Rolled gauze 4 m × 15 cm	0.45
	Rolled gauze 4 m × 10 cm	0.43
3.	**Underpad**	
	Nonsterile underpad 60 × 90 cm	6.90
4.	**Roller Bandage**	
	Uniflex 7.5 cm × 4.55 m (3 inch)	1.10

	Uniflex 10 cm × 4.55 m (4 inch)	2.13
	Uniflex 15 cm × 4.55 m (6 inch)	0.18
	High elastic bandage 15cm × 450 cm	0.80
5.	**Syringe**	
	Syringe 10 ml	0.18
	Syringe 1 ml	0.03
	Syringe 3 ml	0.60
	Syringe 5 ml	0.88
	Needle 25G × 1	0.03

Note: Percentages were calculated based on the total quantity of all medical device and medical consumable items dispensed during the study period.

Among outpatient JKN patients at the Orthopaedic Surgery Polyclinic, the most commonly used medical devices and BMHP were sterile gauze, accounting for 72.80% of usage. This finding reflects a substantial demand for basic BMHP for wound care and simple procedures, particularly in post-procedure and soft-tissue injury cases at the study site. However, this result should not be generalised to all orthopaedic services, as BMHP requirements are highly dependent on case characteristics and procedural types. The predominance of sterile gauze is attributable to its role as a conventional dressing for wound protection, exudate absorption, and contamination prevention, while alternative dressings such as Bactigras, Cuticell, and foam dressings are selected based on specific wound conditions [16],[17]. Dressing selection is significant in orthopaedic care, as evidence suggests that dressing type can affect blistering and wound-healing outcomes [18]. The use of underpads and roller bandages addresses the needs of patients with limited mobility and requirements for compression or stabilisation in certain clinical scenarios. It is important to reference the literature on wound bed preparation when discussing the function of roller bandages, rather than studies focused solely on compression bandages for extremity injuries or post-orthopaedic procedures [19],[20]. From a management perspective, the prevalence of high-usage items necessitates precise stock planning to avoid shortages or overstocking. Additionally, the management of medical devices should prioritise quality, safety, and efficiency in accordance with WHO guidelines on medical device regulation [15].

ABC Analysis

ABC analysis based on drug usage amount and investment value

Table 3 shows that ABC analysis based on drug usage amount and investment value follows the Pareto principle. In the analysis of usage amount, class A consists of 8 types of drugs, or 13.56% of the total of 59 types of drugs, but accounts for 79.62% of total usage. In contrast, class C covers 41 types of drugs, or 69.49% of the total types of drugs, but contributes only 5.18% to total usage. This pattern suggests that a small percentage of drugs account for the majority of uses, in accordance with the ABC (Pareto) principle for controlling pharmaceutical inventories [6].

In the investment value analysis, class A comprises 9 drug types (15.25% of the total) but accounts for 79.70% of the total drug cost. Class B consists of 12 drug types, accounting for 14.91% of the total cost, while class C includes 38 drug types and accounts for only 5.39% of the total cost. This shows that drugs with high frequency of use are not always the same as drugs that provide the greatest cost burden, because the unit price of the drug also influences the investment value. The difference between the drug quantities in the use-amount analysis and the investment value suggests that the two approaches should be used together. Value-of-use analysis is important to ensure the availability of the most commonly used drugs. In contrast, investment analysis is

necessary to identify drugs that have a significant impact on costs. This approach aligns with the concept of hospital inventory control, which emphasises that high-value items require stricter oversight of planning, procurement, and cost monitoring [5],[21].

Table 3. Results of ABC analysis of drug usage amount and investment value

Group	Usage Amount			Investment Value		
	Number of item types (n)	Percentage of item types (%)	Usage contribution (%)	Number of item types (n)	Percentage of item types (%)	Cost contribution (%)
A	8	13.56	79.62	9	15.25	79.70
B	10	16.95	15.20	12	20.34	14.91
C	41	69.49	5.18	38	64.41	5.39
TOTAL	**59**	**100.00**	**100.00**	**59**	**100.00**	**100.00**

However, the results of the ABC analysis should not be judged solely by cost size. Class C drugs are used in small quantities and are low-cost, but they can still be important for certain patient conditions. Therefore, ABC analysis should be complemented by an analysis of drug importance, such as VEN/VED. In this way, drug procurement decisions not only consider cost efficiency, but also ensure that the drugs patients need remain available [3],[5].

Table 4. Top Five drug in ABC Classification Based on Usage Amount and Investment Values

Usage Amount		Investment Value	
Drugs	Group	Drugs	Group
Calcium lactate 500 mg	A	Sodium hyaluronate 20 mg/2 ml	A
Paracetamol tablet 500 mg	A	Sodium hyaluronate 25 mg/2.5 ml	A
Vitamin B complex	A	Gabapentin 100 mg	A
Meloxicam 7.5 mg	A	Gabapentin 300 mg	A
Sodium diclofenac 50 mg	A	Calcium lactate 500 mg	A
Meloxicam 15 mg	B	Cefixime 100 mg	B
Cefixime 100 mg	B	Sodium chloride 0.9% 500 ml	B
Vitamin C 50 mg	B	Cefixime 200 mg	B
Mefenamic acid 500 mg	B	Sodium diclofenac 50 mg	B
Pregabalin 75 mg	B	Meloxicam 15 mg	B
Vitamin B1 50 mg	C	Triamcinolone acetonide	C
Codeine 15 mg	C	Fentanyl transdermal	C
Diazepam 2 mg + Metamizole 500 mg	C	Omeprazole 20 mg	C
Cefadroxil 500 mg	C	Cefadroxil 500 mg	C
Lansoprazole 30 mg	C	Sodium chloride 0.9% 100 ml	C

Table 4 shows the differences in the distribution of drug types between ABC analysis based on usage amount and investment value. In terms of usage, Class A is dominated by drugs with high usage frequency, such as paracetamol, meloxicam, and

sodium diclofenac, reflecting the high need for pain management in outpatient orthopaedic patients. The use of NSAIDs aligns with osteoarthritis and musculoskeletal pain management recommendations. In contrast, paracetamol can still be used as a non-opioid analgesic in certain conditions, although its strength of recommendation is more limited compared to NSAIDs [2],[10]. In the investment value analysis, Class A is dominated by drugs with high unit prices, such as hyaluronic acid and gabapentin, even though their usage frequency is not always the highest. Hyaluronic acid is used as an intra-articular therapy for osteoarthritis, but recommendations and cost-effectiveness vary across guidelines and economic studies, so its use should be evaluated selectively [2],[22]. The difference between Class A's usage amount and investment value indicates that usage amount does not always align with cost contribution. Therefore, both usage-amount and investment-value analyses should be conducted together to determine procurement priorities, stock control, and cost monitoring. Items in Class A require closer supervision, while items in Classes B and C still need to be managed with consideration of clinical indications and criticality [5].

ABC analysis based on the usage amount and investment value of medical devices and medical consumables

Table 5 shows differences in the distribution of medical devices and consumables by usage amount and investment value. In the analysis of usage amount, Class A consists of only 2 types of items, or 5.26% of the total 38 types of medical devices and consumables, but accounts for 79.70% of total usage. Conversely, Class C includes 25 item types, accounting for 65.79% of all types, but contributes only 5.17% of total usage. This pattern indicates that medical devices and consumables are highly concentrated in a few items, so Class A items should be prioritised in daily stock planning. This finding aligns with the ABC analysis principle, which states that a small number of items can account for the greatest share of usage or costs, thus requiring tighter inventory control [6].

Table 5. Results of ABC analysis of usage amount and investment value of Medical Devices and BMHP

Group	Usage Amount			Investment Value		
	Number of item types (n)	Percentage of item types (%)	Usage contribution (%)	Number of item types (n)	Percentage of item types (%)	Cost contribution (%)
A	2	5.26	79.70	12	31.58	77.72
B	11	28.95	15.13	8	21.05	16.04
C	25	65.79	517	18	47.37	6.24
TOTAL	**38**	**100.00**	**100.00**	38	**100.00**	**100.00**

In the investment value analysis, Class A comprises 12 item types, accounting for 31.58% of all medical device and consumable types and contributing 77.72% of the total cost. Group B includes 8 item types (21.05%) and contributes 16.04% to total costs, while Group C comprises 18 item types (47.37%) and accounts for only 6.24% of total costs. This difference shows that the most frequently used items are not always the ones that incur the highest costs. In other words, investment value is influenced not only by the amount of use but also by the unit price of each item. This aligns with hospital inventory

management concepts that emphasise the need to consider both cost value and service needs when classifying items [4].

In practice, Class A items, based on usage amount, should be prioritised to ensure stock availability and prevent service disruptions. Meanwhile, Class A items based on investment value require more stringent cost monitoring because they have a significant impact on total expenses. Therefore, both usage-amount and investment-value analyses should be conducted simultaneously to enable hospitals to determine procurement priorities more accurately. This approach is also supported by studies in Indonesia, which show that ABC analysis can help with more targeted inventory planning and control [23].

Although Class C has a low contribution to usage and costs, low usage can still be important in certain clinical conditions. Therefore, ABC analysis should be complemented by criticality analyses, such as VED/VEN, to ensure that procurement decisions consider not only cost efficiency but also patient care needs [4],[5].

Table 6. Top Five Medical Devices and Medical Consumables in ABC Classification Based on Usage Amount and Investment Values

Usage Amount		Investment Value	
Medical devices and medical consumables	**Group**	**Medical devices and medical consumables**	**Group**
Sterile gauze 7.5 × 7.5 cm, 8 ply	A	Uniflex 10 cm × 4.55 m (4 inch)	A
Nonsterile underpad 60×90 cm	A	Elastomull haft 10 cm × 4 m	A
-	-	Uniflex 7.5 cm × 4.55 m (3 inch)	A
-	-	Bactigras 10 × 10 cm	A
-	-	Sterile gauze 7.5 × 7.5 cm, 8 ply	A
Bactigras 10 × 10 cm	B	Cuticell classic 10 × 10 cm	B
Uniflex 10 cm × 4.55 m (4 inch)	B	Uniflex 15 cm × 4.55 m (6 inch)	B
Cuticell classic 10 × 10 cm	B	Espuma non-adhesive dressing 10×10 cm	B
Uniflex 7.5 cm × 4.55 m (3 inch)	B	Delta-lite conformable size 3 (7.5 cm×3.6 m	B
Elastomull haft 10 cm × 4 m	B	Poliban natural 3 inch	B
Syringe 3 ml	C	Delta-lite conformable size 5 (12.5 cm×3.6 m)	C
W-Care AH dressing foam	C	Delta-lite conformable size 4 (10 cm×3.6 m)	C
Rolled gauze 4 m × 15 cm	C	Tripod Baymed	C
Rolled gauze 4 m × 10 cm	C	Aluminum crutch size M	C
Double Spike OneMed	C	Sterile gloves size 6.5	C

Note: Based on the number of item types in the usage amount classification, only two medical device and medical consumable items were included in Class A. "-" indicates no additional item in that class.

According to **Table 6**, the classification of medical devices and consumables differs between ABC analyses based on usage amount and investment value. In the usage-amount analysis, Class A includes only two items: sterile gauze 7.5 × 7.5 cm and nonsterile underpads 60 × 90 cm. This pattern indicates that BMHP utilisation in the orthopaedic surgery outpatient clinic is dominated by frequently used basic items for wound care and patient support. However, this pattern should be interpreted

specifically within the research site's context and not generalised to orthopaedic services more broadly. The dominance of sterile gauze may reflect its role as a conventional dressing that protects wounds, absorbs exudate, and prevents contamination. Meanwhile, the high use of nonsterile underpads reflects the need for supporting consumables in outpatient orthopaedic care, particularly for patients with limited mobility, wound drainage, or procedures requiring the protection of examination surfaces. The use of varied dressing products, such as Bactigras, Cuticell, and foam dressings, also suggests that dressing selection may be adjusted according to wound characteristics and clinical needs [16],[17].

A notable observation is that not all BMHP items with high usage are categorised as high investment-value items. For instance, nonsterile underpads measuring 60 × 90 cm are Class A based on usage, not on investment value. This suggests that high usage volume does not always equate to highcost contribution, as investment value also depends on unit price and item features. Conversely, in the investment value analysis, Class A includes more items such as Uniflex, Elastomull haft, and various dressings. These items may not rank high in usage counts, but they significantly impact total costs due to their higher unit prices. Consequently, both usage-amount and investment-value analyses should be combined to set procurement priorities, manage stock, and monitor costs for BMHP. This aligns with hospital inventory management research, which recommends using multiple criteria rather than a single indicator for classification [4].

From a managerial perspective, Class A items based on usage volume should be prioritised to maintain stock availability and prevent service disruptions. In contrast, Class A items based on investment value should be managed with tighter cost controls. Nevertheless, BMHP items in Classes B and C should not be ignored, because some low-use or low-cost items may still be clinically important in specific procedures or patient conditions. This approach aligns with the principle of ABC analysis as a tool for identifying priority items in hospital inventory management, although interpretation should still consider clinical needs and item criticality [4],[6].

From a managerial perspective, Class A items should receive tighter monitoring because they contribute the largest proportion of either utilization or cost. High-usage Class A items require safety-stock planning to prevent shortages and service disruption, whereas high-cost Class A items require regular cost review and procurement evaluation. High-cost but low-use items should also be reviewed periodically to ensure that their procurement remains clinically justified. This approach is consistent with multi-criteria hospital inventory management, which recommends that stock classification should not rely only on a single criterion such as cost, demand, or criticality [24]. Recent ABC-VEN studies also show that integrating cost-based classification with clinical criticality helps identify priority items, reduce stockouts, improve procurement control, and minimize inventory waste [25],[26],[27]. Therefore, ABC analysis should be complemented by VEN/VED or other criticality analyses before final procurement decisions are made.

4. Conclusion

The ABC analysis showed that Class A items accounted for the largest contribution to pharmaceutical supply utilization and investment value. Therefore, these items should be prioritized in procurement planning, stock control, and cost monitoring. However, ABC analysis should be complemented by clinical criticality analysis, such as VEN/VED, before final procurement decisions are made to ensure the availability of low-use but clinically important items.

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Conflict of Interest:
The authors declare that there are no conflicts of interest related to this study.

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