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Application of ABC Inventory Analysis for Effective Pharmaceutical Procurement Across Hospitals in Tasikmalaya

Yogi Eka Triyogi[1*], Nia Kurniasih[2]

1. *RSUD Tasikmalaya*
2. *STIKes Muhammadiyah Ciamis, Indonesia.*

Correspondance: Davit Nugraha

Email:triyogi01@gmail.com

Address : Jl. K.H. Ahmad Dahlan No.20, Ciamis, Kec. Ciamis, Kabupaten Ciamis, Jawa Barat

ABSTRACT

Pharmaceutical supplies play a vital role in hospital healthcare services, with nearly 50% of hospital revenue derived from pharmaceutical management. To enhance the selectivity and effectiveness of pharmaceutical procurement planning, an ABC analysis was conducted on inpatient drug utilization at Dr. Soekardjo Regional General Hospital in Tasikmalaya City. This study aims to categorize pharmaceutical items based on their contribution to total inventory value, allowing for more strategic and efficient planning in the procurement process. This research is a non-experimental descriptive study that utilizes hospital prescription data as the foundation for calculating pharmaceutical supply needs. The data were obtained from the hospital information system database and processed through computerized methods. The analysis focuses on inpatient drug usage over a specified period to identify high-cost and high-usage drugs that require priority in procurement and inventory control.

The results of the ABC analysis successfully illustrate the distribution of pharmaceutical usage in several dimensions: cost classification (Class A, B, and C), generic versus non-generic drugs, e-catalog versus non-e-catalog drugs, and therapeutic class. Class A drugs, which represent the highest cost yet the smallest number of items, are recommended to be prioritized in planning and closely monitored to prevent overstocking or shortages. Meanwhile, Class B and C drugs, although lower in value, require efficient stock management to support comprehensive hospital services. This study emphasizes the importance of utilizing ABC analysis as a decision-making tool to optimize pharmaceutical procurement strategies, reduce unnecessary expenditures, and ensure the availability of essential medicines. The findings can be used by hospital management to refine budgeting, procurement schedules, and stock control, ultimately improving the quality and efficiency of healthcare service delivery.

Keywords : ABC analysis, pharmaceutical procurement, inventory management, hospital information system.

INTRODUCTION

Pharmaceutical supplies are a crucial component in delivering hospital healthcare services, significantly influencing the operational and financial performance of healthcare institutions. Efficient planning and procurement of pharmaceuticals are essential to ensure the availability of vital drugs, reduce inventory waste, and improve patient care outcomes (Sartika et al., 2022). Studies have shown that up to 50% of hospital expenditures are related to pharmaceutical procurement, highlighting the importance of adopting strategic inventory management tools (Pratiwi & Rachmawati, 2018).

One of the widely used inventory control techniques is the ABC analysis, which categorizes items based on their consumption value: class A (high value, low quantity), class B (moderate value and quantity), and class C (low value, high quantity). This method allows hospitals to focus their resources on managing high-priority items, enhancing procurement efficiency, and minimizing stockouts or overstocking (Abdelrahman et al., 2020).

In Indonesia, particularly in regional hospitals such as those in Tasikmalaya City, pharmaceutical inventory systems often face challenges due to limited resources, inaccurate forecasting, and lack of structured procurement strategies (Nugroho & Andriyani, 2019). The implementation of ABC analysis has proven to be effective in addressing such challenges in both developed and developing countries (Rahmani et al., 2016; Parwez & Kumar, 2021).

This study aims to apply ABC analysis to pharmaceutical procurement planning across hospitals in Tasikmalaya City, with a focus on inpatient drug utilization. By classifying drugs based on cost and usage patterns, hospital managers can make more informed decisions regarding procurement, budgeting, and inventory control (Alemayehu et al., 2019; Chikowe et al., 2017). This is expected to support better resource allocation and contribute to more sustainable hospital operations.

TOOLS AND MATERIALS

The tools and materials used in this research include both physical and digital resources necessary for data collection, processing, and analysis: Hospital Information System (HIS).

Tools used as the primary source of prescription and drug usage data. The system provides access to inpatient drug records, item codes, quantities used, and financial values. Computer with

Data Processing Software equipped with Microsoft Excel and SPSS (Statistical Package for the Social Sciences) for data entry, sorting, and statistical analysis, ABC Analysis Template (Excel-based), Internet Access For literature review, downloading references, and accessing online journals relevant to inventory and pharmaceutical management, Stationery and Documentation Tools (Pens, notebooks, printed forms, and folders used during the documentation and initial data recording phase.

Materials: Hospital Prescription Data of inpatient prescriptions from the selected hospitals in Tasikmalaya City, including drug names, usage volume, and total cost over a one-year period. Drug Price Lists including e-catalogue and non-e-catalogue drug pricing, used to calculate annual consumption value. Drug Classification Documents related to generic/non-generic status, therapeutic classification, and drug registration from hospital formularies or pharmaceutical databases. Research Protocol and Ethical Approval Documents outlining the objectives, methodology, and ethical considerations, approved by the relevant hospital research ethics committee.

METHODS

1. This study is a retrospective descriptive research with a case study approach. The data obtained will be analyzed using the ABC analysis method to provide an overview of the pharmaceutical procurement planning process in the regional public hospitals (RSUD) of Tasikmalaya City. The data collection technique involved using the entire dataset of inpatient drug usage as the population to be analyzed.
2. The research instruments consisted of: A data collection worksheet for inpatient drug usage, and An ABC analysis worksheet to classify and analyze the drug usage data.
3. Validity and Reliability Testing of Research Instruments

   The method used to ensure validity and reliability was through interviews with relevant parties, including the Head of the Hospital Pharmacy Department, the Planning Team, and the Procurement Division.
4. Research Duration and Location

The research was conducted over a period of three months at the Pharmacy Department of Regional Public Hospitals (RSUD) in Tasikmalaya City, involving the Head of the Pharmacy Department, the Planning Team, and the Drug Procurement Division.

5. Data Source

   The data collected included records of inpatient drug usage, retrieved consecutively from the Hospital Information System (HIS) database, specifically from the "Inpatient Pharmacy Drug Usage" menu. From the HIS database available in the procurement division, the data extracted were related to the utilization of pharmaceutical supplies. Below is a table showing the drug data classification based on the downloaded records from the hospital information system.

6. Research Procedure

   In the preparation stage, a research proposal was developed along with a research design to serve as the basis for analysis. The study was conducted at the Pharmacy Department, where the analysis involved multiplying the quantity of pharmaceutical supply items by their respective unit prices, followed by computerized summarization of prescription transactions.

7. Data analysis

   Data processing was conducted manually by multiplying the quantity of each pharmaceutical supply item by its corresponding unit price. This calculation generated the total value for each item, which was then converted into a percentage, ranked from the highest to the lowest value. Subsequently, an ABC analysis was applied to categorize the pharmaceutical supplies into three main classes:

   Category A: Items that consume 70–90% of the total budget, typically representing less than 10% of the total inventory volume.

   Category B: Items that account for approximately 20–30% of the budget, with a moderate volume range of 20–30%.

   Category C: Items that consume around 10–20% of the budget, but make up the largest volume, approximately 60–75% of the total inventory.

   After the classification into Categories A, B, and C, the analysis provided a clear picture of the utilization pattern of pharmaceutical supplies, which served as a foundation for future procurement planning.

RESULTS

The data collected consists of the usage of pharmaceutical supplies for all inpatient prescriptions issued by prescribing doctors to the Inpatient Pharmacy Department at Tasikmalaya City Regional General Hospital (RSUD Kota Tasikmalaya), processed through a computerized system. The data is limited to drug usage only and does not include the use of Consumable Medical Supplies (CMS). A total of 9,122 Medical Record IDs represent the number of patients from all inpatient wards at the hospital. There are 421 inpatient drug items, which are then classified into 27 therapeutic classes and analyzed using the ABC analysis method. The classification results in three categories based on the amount of expenditure: Category A includes 5 therapeutic classes (18.52% of the total classes), accounting for 65.48% of the total drug expenditure, with a total of 206 drug items, Category B includes 6 therapeutic classes (22.22% of the total classes), accounting for 23.65% of the total drug expenditure, with 102 drug items, Category C includes 16 therapeutic classes (59.26% of the total classes), accounting for 10.88% of the total drug expenditure, with 113 drug items.

The results of the ABC analysis on drug utilization based on the expenditure per therapeutic class are presented in the table below:

Table 1. Results of ABC Analysis of Drug Use Based on Therapy Class

No	Therapeutic Class	Number of Drug Items	Percentage of Drug Items	Total Drug Cost	Percentage of Drug Cost	Category	Percentage by Category	Percentage per Number of Classes Teraspi
1	Blood and Plasma Products	6	1.43%	1,358,166,148	19.57%	A	65.48%	18.52%
2	Electrolyte and Nutritional Solutions	45	10.69%	1,351,719,208	19.48%	A		
3	Anti-Infectives	46	10.93%	796,721,238	11.48%	A		
4	Cardiovascular Drugs	75	17.81%	564,702,495	8.14%	A		
5	Gastrointestinal Drugs	34	8.08%	413,505,469	5.96%	A		
6	Psychopharmaceuticals	22	5.23%	365,043,935	5.26%	B	23.65%	22.22%
7	Analgesics, Antipyretics, NSAIDs	11	2.61%	321,146,224	4.63%	B		
8	Anesthetics	10	2.38%	311,417,425	4.49%	B		
9	Analgesik,Antipiretik Antiinflamasi Non Steroid	31	7.36%	253,215,030	3.65%	B		
10	Hormonal and Endocrine Drugs	24	5.70%	239,781,423	3.46%	B		
11	Immunomodulatory Drugs	4	0.95%	190,466,209	2.74%	B		
12	Hematologic Agents	9	2.14%	143,181,604	2.06%	C	10.88%	59.26%

13	Medical Gases	3	0.71%	136,686,277	1.97%	C		
14	Respiratory Drugs	28	6.65%	123,885,722	1.79%	C		
15	Vitamins	17	4.04%	123,155,009	1.77%	C		
16	Diuretics and BPH Treatment	7	1.66%	88,711,892	1.28%	C		
17	Oxytocics	4	0.95%	39,828,747	0.57%	C		
18	Peripheral Muscle Relaxants	3	0.71%	37,937,455	0.55%	C		
19	Ophthalmic Drugs	11	2.61%	26,397,586	0.38%	C		
20	Antiallergics	7	1.66%	14,168,582	0.20%	C		
21	Antidotes	4	0.95%	11,185,318	0.16%	C		
22	Diagnostic Agents (Radiology)	1	0.24%	9,762,985	0.14%	C		
23	Antiparkinsonian Drugs	3	0.71%	8,104,547	0.12%	C		
24	Migraine and Vertigo Medications	1	0.24%	3,637,370	0.05%	C		
25	Topical Dermatologicals	12	2.85%	3,428,407	0.05%	C		
26	ENT Medications	2	0.48%	2,848,103	0.04%	C		
27	Oncology Drugs	1	0.24%	254,826	0.00%	C		
	Jumlah Total	421	100.00%	6,939,059,235	100.00%		100.00%	100.00%

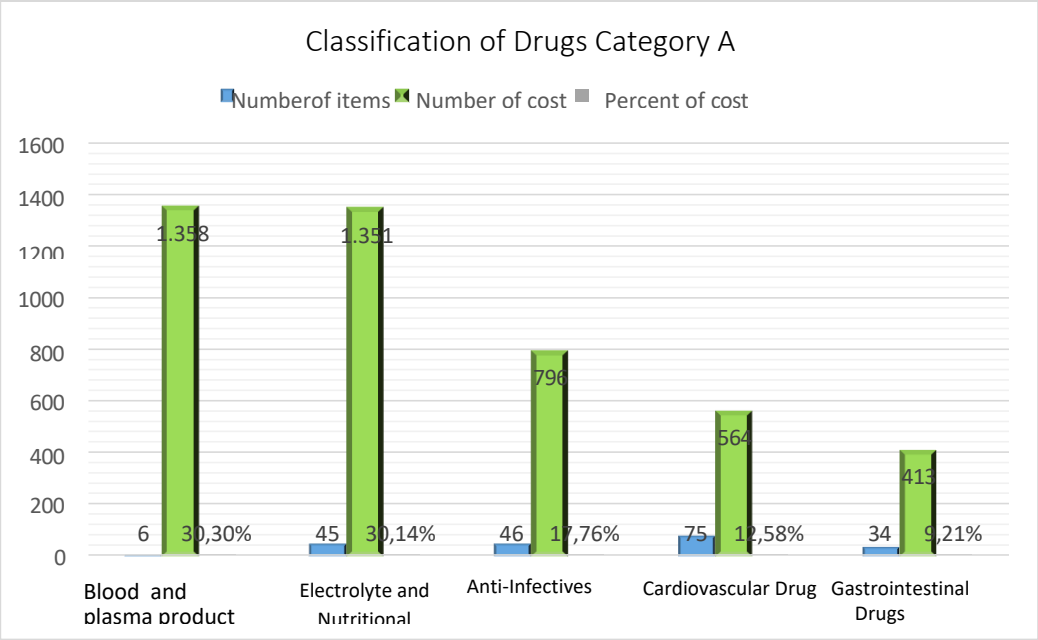

Figure 1. Classification of category A drugs based on therapeutic class

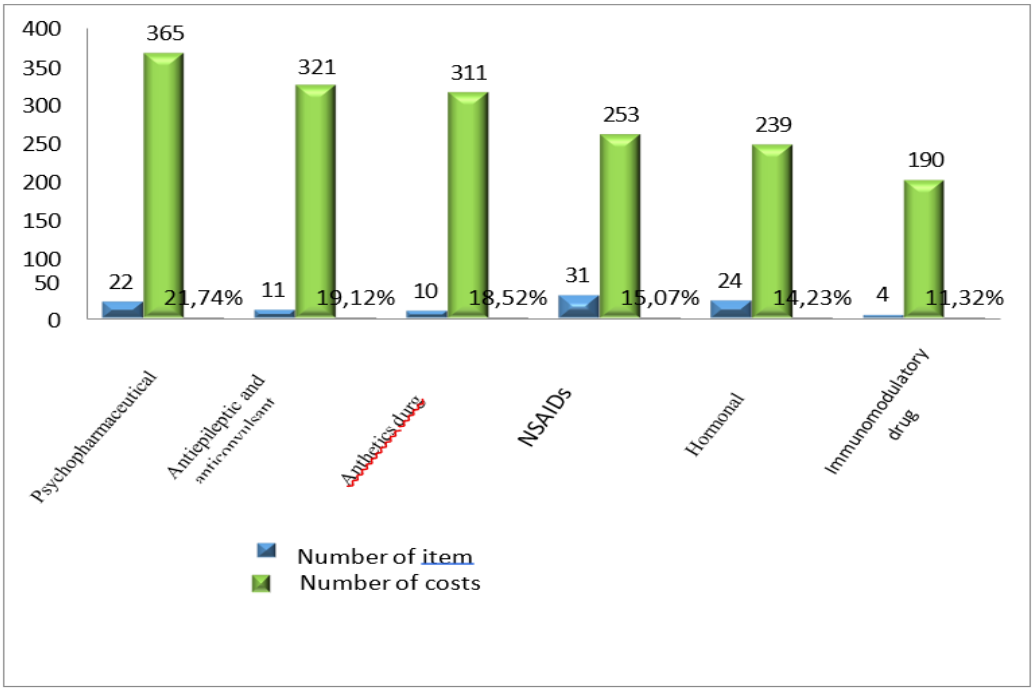

Figure 2. Classification of category B drugs based on therapeutic class

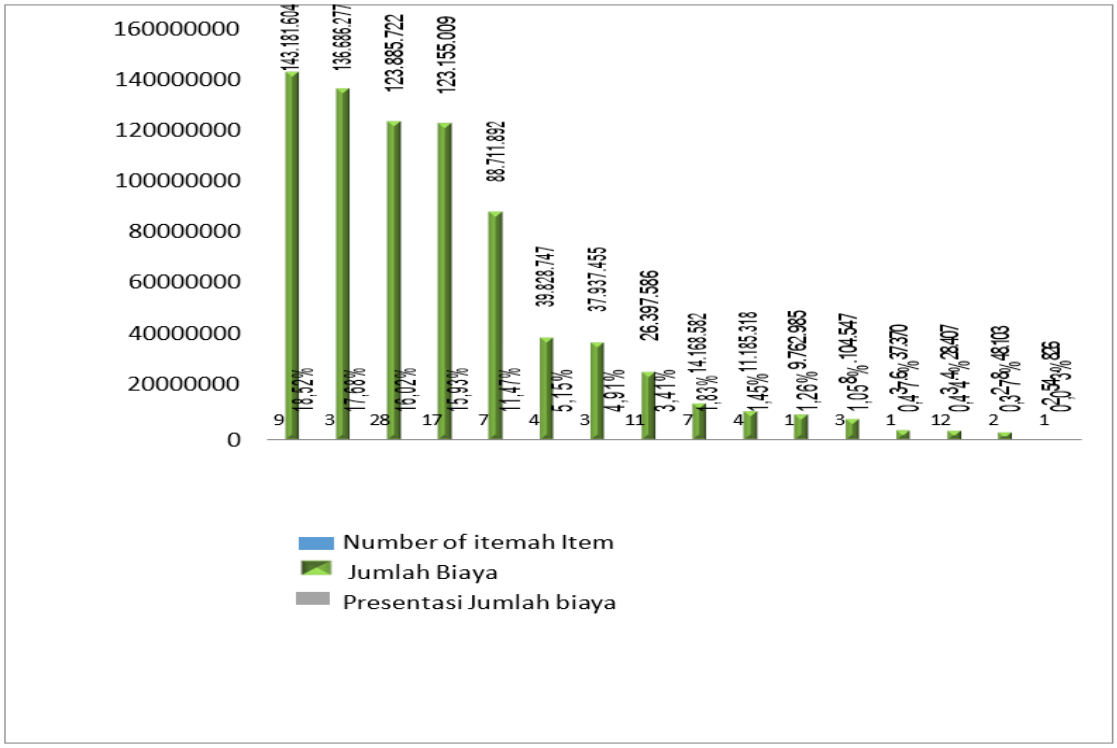

Figure 3. Classification of category C drugs based on therapeutic class

DISCUSSION

The results of the data analysis in Table 1 above can be correlated with the disease data treated at Tasikmalaya City Hospital, which is broadly categorized into 18 disease groups. The ABC classification of inpatient drug usage based on therapeutic classes identified five classes in Category A, representing the highest proportion of total drug expenditure despite varying item counts. The Blood and Plasma Products therapeutic class accounted for the largest share of expenditure in Category A (30.30%), although it contained the fewest number of drug items. This disproportionate cost is attributable to the high unit price of drugs in this class, which are primarily utilized in the management of hemophilia and hypoalbuminemia. In terms of disease classification, these conditions are grouped under anemia in the hospital's disease prevalence data.

The Electrolyte and Nutritional Solutions class ranked second in expenditure at 30.14%, comprising 45 drug items. These drugs are ubiquitously used across all inpatient cases, reflecting their critical role in maintaining fluid and nutritional balance during hospitalization. Their high usage frequency justifies the considerable financial impact despite moderate pricing.

The Anti-Infective class contributed 17.76% of the total drug expenditure, consisting of 46 drug items. This class includes antibiotics and other anti-infective agents used in the treatment of various infectious diseases such as tuberculosis, typhoid fever, pneumonia, and other acute or chronic infections prevalent among inpatients. The substantial cost reflects the clinical importance and frequency of infectious diseases encountered in hospital settings. The Cardiovascular class represented 12.58% of the expenditure and included 75 drug items, the highest among all therapeutic classes. This finding is consistent with the high burden of cardiovascular diseases, particularly congestive heart failure (CHF), which is one of the most frequently managed conditions in the hospital. The broad range of cardiovascular drugs used ighlights the complexity and diversity of treatment regimens for these patients. Lastly, the Gastrointestinal drug class accounted for 9.21% of the total expenditure, comprising 34 drug items. These drugs are commonly used to treat conditions such as diarrhea and dyspepsia, as well as to prevent or mitigate gastrointestinal side effects induced by other medications, particularly anesthetics and analgesics known to irritate the gastric mucosa.

These findings underscore the importance of aligning pharmaceutical budgeting and

procurement strategies with disease prevalence and treatment complexity, particularly in resource-limited hospital settings.

Based on the ABC classification, Category B drugs were distributed into six therapeutic classes, each contributing moderately to the overall drug expenditure. The Psychopharmaceuticals class accounted for the highest expenditure within Category B, representing 21.74% of the total in this group and comprising 22 drug items. These medications are primarily used to treat neurological and psychiatric conditions, including disorders of reflexes and accommodation. The Antiepileptic and Anticonvulsant class followed, contributing 19.12% of the expenditure with 11 drug items. These drugs are also utilized in the treatment of neurological disorders, particularly those involving abnormal reflex responses, such as epilepsy. The Anesthetic class constituted 18.52% of the expenditure and included 10 drug items. These agents are essential in supporting surgical interventions, both major and minor, such as appendectomy, biliary procedures, hernia repair, and other operative treatments, highlighting their indispensable role in perioperative care.

The Analgesic, Antipyretic, and Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) class accounted for 15.07% of Category B costs, consisting of 31 drug items. These drugs are commonly administered for managing pain and inflammation, particularly in conditions such as dengue hemorrhagic fever, typhoid fever, and post-operative pain, which are frequently encountered in the inpatient setting.The Hormonal and Endocrine class contributed 14.23% of the expenditure and consisted of 24 drug items, with primary utilization in the management of endocrine disorders, particularly diabetes mellitus, which remains a high-burden disease requiring chronic pharmacological management.

Finally, the Immunomodulatory Drugs class, while representing the lowest expenditure in Category B (11.32%), included 4 drug items with significant clinical impact. This group consists of therapeutic sera, such as anti-tetanus serum (ATS) used for tetanus treatment and prevention, particularly among trauma and traffic accident victims, and anti-diphtheria serum, which has been critical during diphtheria outbreaks designated as extraordinary public health events in several regions of Indonesia.

These findings highlight that Category B drugs, though not comprising the highest cost overall, play a crucial role in managing a broad spectrum of diseases ranging from neuropsychiatric

to infectious and surgical conditions, thus emphasizing the need for balanced pharmaceutical budgeting to support essential yet moderately costly therapeutic areas. The ABC classification identified 16 therapeutic classes in Category C, comprising a total of 113 drug items. Although these classes account for the lowest proportion of total drug expenditure, they play a supportive yet essential role in the clinical management of various conditions. The Hematologic Agents class accounted for the highest expenditure within Category C (18.52%), consisting of 9 drug items. These medications are predominantly used in the treatment of renal failure, anemia, and in perioperative care. The Medical Gases class contributed 17.68% of the Category C expenditure, with only 3 drug items. Despite the low number of items, the cost is relatively high due to their essential use in critical care settings, such as for patients in ICU, NICU, those undergoing surgical procedures, and patients with pneumonia who require oxygen therapy.The Respiratory Drugs class accounted for 16.02%, consisting of 28 items, primarily used in the treatment of pneumonia and other respiratory conditions. This reflects the continued burden of respiratory infections among hospitalized patients.

The Vitamins class represented 15.93% of Category C expenditure, with 17 drug items. These are commonly prescribed for patients with anemia and neurological disorders, where micronutrient supplementation is often a necessary component of therapy. The Diuretics and BPH (Benign Prostatic Hyperplasia) Drugs class accounted for 11.47%, comprising 7 drug items. These drugs are mainly used in the management of cardiovascular diseases and urinary tract conditions, such as hypertension and prostatic enlargement. The Oxytocics class contributed 5.15% of the costs with 4 drug items, and is utilized in the management of gynecological and obstetric cases, particularly those categorized under impacted conditions, such as labor induction and postpartum hemorrhage. The Peripheral Muscle Relaxants class accounted for 4.91%, including 3 items, used in patients with neuromuscular disorders, particularly reflex and accommodation-related conditions. The Ophthalmic Drugs class made up 3.41% of the expenditure with 7 drug items, also used primarily for reflex and accommodation disorders involving the visual system.The remaining eight therapeutic classes in Category C had relatively small expenditure percentages. Most of these drugs serve as supportive therapies or adjunct treatments in the management of diseases discussed in the previous categories, further emphasizing their complementary role in

comprehensive patient care.

CONCLUSION

The ABC analysis conducted on inpatient drug utilization at Tasikmalaya City Hospital revealed a significant concentration of pharmaceutical expenditure within a limited number of therapeutic classes. Category A, which includes only 5 therapeutic classes, accounted for the majority of the total drug expenditure (65.48%), dominated by high-cost medications such as blood and plasma products, electrolyte solutions, and anti-infectives. Category B, with 6 therapeutic classes, represented a moderate expenditure (23.65%) and included essential drugs for surgical, neurological, and endocrine conditions. Meanwhile, Category C, encompassing the largest number of therapeutic classes (16), contributed only 10.88% to the overall cost, consisting mainly of supportive medications.

These findings highlight the importance of prioritizing procurement and inventory control for Category A drugs, while maintaining adequate stock of Category B and C drugs to ensure comprehensive and uninterrupted patient care. The ABC classification provides a strategic framework for optimizing drug budgeting, resource allocation, and rational drug use in hospital pharmacy management. Future policy decisions should integrate both expenditure patterns and disease prevalence data to enhance the effectiveness and efficiency of pharmaceutical services.

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