

Analysis of Drug Inventory Control in Indonesian Hospitals Using the ABC Critical Index Method: A Systematic Review

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Abstract

Background: Drug inventory management in hospitals is very important to ensure the availability of safe and effective drugs, especially within the framework of the National Health Insurance (JKN). The ABC critical index method has been recognized as an efficient strategy for improving drug inventory control. **Objective:** This study aims to investigate the application of the ABC Critical Index method in drug inventory management in hospitals, as well as to improve the overall quality of health services. **Methods:** This systematic review followed the PRISMA guidelines and involved a literature search in four databases, namely Garuda, Scopus, SpringerLink, and Google Scholar, using relevant keywords. Of the 169 articles found, eight articles were selected to meet the criteria for further analysis. **Results:** This review shows that drug inventory control can be improved through the application of the Critical Index ABC analysis method, which groups drugs into categories A, B, and C based on their usage value and contribution to the budget. Category A drugs, despite their small number of items, absorb the largest portion of the budget and therefore require close monitoring. In addition, the study also emphasized the importance of integrated information systems and electronic prescription systems to improve the accuracy of stock monitoring and reduce the risk of stock outs. Several studies also highlighted the benefits of the Economic Order Quantity (EOQ) and Reorder Point (ROP) methods in determining the optimal order quantity and reorder time, which overall contribute to the efficiency of hospital pharmacy logistics. **Conclusion:** The implementation of the ABC Critical Index method in controlling drug inventory in hospitals can improve operational efficiency and ensure the availability of quality drugs. Cooperation between pharmacists and hospital management is very important to ensure the effectiveness of the control system, which in turn can improve the overall quality of health services.

Keywords: Control; Drugs; Hospitals; ABC Critical Index Method

1. INTRODUCTION

Hospital pharmaceutical installations play a vital role in managing medicines and other pharmaceutical products to ensure their availability, safety, effectiveness, and efficient use for patients (1,2). Effective pharmaceutical management encompasses planning, procurement, storage, distribution, and inventory control, rather than focusing solely on drug procurement (3,5). As healthcare services become more complex and patient demand continues to increase, efficient pharmaceutical logistics management is essential to support the quality and continuity of hospital care (4).

Drug inventory control is a key component of pharmacy management because poor inventory practices can lead to drug shortages, expired products, and inefficient use of resources (6,7). An effective inventory control system ensures medicine availability, improves operational efficiency, optimizes hospital budgets, and supports financial sustainability, with pharmacists playing a central role in its implementation (8–13). Various inventory control methods are used in healthcare facilities, including ABC, VEN, ABC–VEN, EOQ, EOI, Minimum–Maximum Stock Level (MMSL), Fixed Order Period, Fixed Order Quantity, Two-Bin and One-Bin systems, Safety Stock, Material Requirement Planning, Card File Systems, and computerized inventory management (14).

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The ABC Critical Index method is an effective approach for prioritizing drug inventory based on investment value and clinical importance (15–17). It classifies medicines into three categories: A (high priority and high investment), B (moderate priority), and C (low priority), enabling hospitals to focus resources on medicines with the greatest impact on patient care and cost efficiency (18). In the era of National Health Insurance (JKN), where drug supply management has become more challenging, implementing the ABC Critical Index method can improve inventory control, enhance operational efficiency, and ensure the continuous availability of safe and quality medicines through effective collaboration between pharmacists and hospital management (19–21). This study therefore aims to evaluate the application of the ABC Critical Index method in hospital drug inventory management.

2. METHODS

Desain studi

This study employed a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to evaluate hospital drug inventory management using the ABC Critical Index method (22). A comprehensive literature search was conducted in four databases Garuda, Scopus, SpringerLink, and Google Scholar—using the keywords “Drug Inventory Control Analysis,” “ABC Critical Index Method,” and “Hospital,” combined with the Boolean operators AND and OR. Retrieved articles were screened for duplicates using Zotero, and studies meeting the predefined inclusion and exclusion criteria (Table 1) were included in the review.

Table 1. Inclusion and Exclusion Criteria For Articles Reviewed

Inclusion Criteria	Exclusion Criteria
Published between 2014-2024	There is no inventory control method.
Indonesian and English	There is no critical index ABC analysis method.
Full-text articles available	Review articles, proceedings, books, theses, and dissertations.
Research setting at hospital health facilities in Indonesia	There is no inventory control method.
Supplies provided were pharmaceutical supplies	

Study Quality Assesment

The methodological quality and risk of bias of the included studies were assessed using the Joanna Briggs Institute (JBI) critical appraisal tool (23). The assessment covered research objectives, study design, sampling methods, eligibility criteria, instrument validity and reliability, data collection procedures, data analysis, control of confounding factors, and clarity of result reporting. This appraisal ensured that only high-quality, reliable, and relevant studies were included in the review. The results of the risk of bias assessment are presented in Table 2.

Table 2. Quality assessment and risk of bias of studies included in the meta-analysis

ID	Studi (Tahun publikasi)	Apakah kriteria inklusi dalam sampel didefinisikan dengan jelas?	Apakah subjek penelitian dan tempat penelitian dijelaskan secara rinci??	Apakah pajanan diukur dengan cara yang valid dan andal?	Apakah kriteria yang objektif dan baku digunakan untuk mengukur kondisi tersebut?	Apakah faktor perancu diidentifikasi?	Apakah strategi untuk mengatasi faktor perancu dijelaskan?	Apakah hasil (outcome s) diukur dengan cara yang valid dan reliabel?	Apakah analisis statistik yang digunakan sudah sesuai?	Total
1	Putri et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
2	Setiawati et al.,	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8

2020										
3	Octavian y, M., 2018	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	7
4	Wahyuni et al., 2014	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	7
5	Khuriyah , L.I., 2016	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	7
6	Muliana et al., 2022	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8
7	Herman et.al., 2022	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	7
8	Susanto et al., 2019	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	8

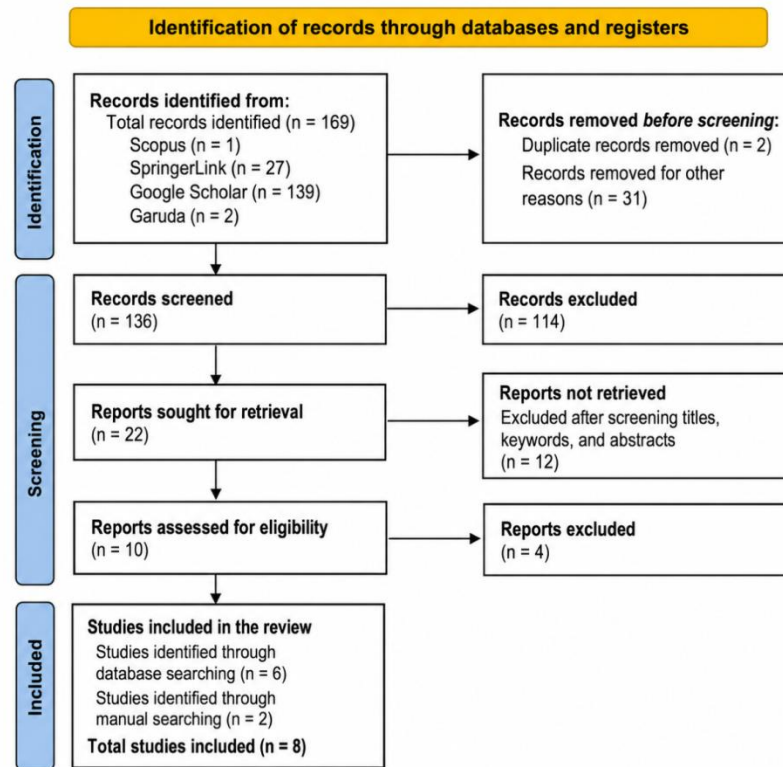
Data Extraction

Data from the eligible studies were extracted independently using a standardized form. The extracted information included: (1) first author and year of publication; (2) study location and period; (3) study design; (4) sample size and characteristics; and (5) outcomes related to the ABC Critical Index analysis, including the percentage of items, percentage of investment, and investment value.

3. RESULTS

Study Characteristic

The literature search identified 169 articles from four databases: Scopus (n = 1), SpringerLink (n = 27), Google Scholar (n = 139), and Garuda (n = 2) (Figure 1). Studies published in English or Indonesian between January 1, 2014, and November 30, 2024, were considered. After removing duplicates and screening titles, abstracts, and eligibility criteria, eight studies were included in the systematic review.



The articles used all employ retrospective data taken from several different hospitals throughout Indonesia that contain data on drug use. These articles also include the results of interviews with parties involved in drug supply management at the hospitals concerned. Research publications between 2014 and 2022. The characteristics of the studies included in the descriptive analysis are presented in Table 3.

Table 3. Study characteristics

No	Nama penulis dan tahun	Tempat	Jenis data	Periode data
1	Putri et al., 2022	RS Agung Jakarta	Retrospektif	2020-2021
2	Setiawati et al., 2020	RS Pluit	Retrospektif	Mei-Oktober 2018
3	Octaviany, M., 2018	RS Meilia	Retrospektif	Januari-Desember 2014
4	Wahyuni et al., 2014	IFRSI Siti Khadijah Palembang	Retrospektif	Januari-Maret 2012
5	Khuriyah, L.I., 2016	RSUP Dr. Mohammad Hoesin Palembang	Retrospektif	April-Mei 2015
6	Muliana et al., 2022	RS Awal Bros Batam	Retrospektif	Oktober 2015-September 2016
7	Herman et.al., 2022	RSI Ibnu Sina Padang	Retrospektif	Februari 2021-Maret 2022
8	Susanto et al., 2019	RS XYZ Pekanbaru, Riau	Retrospektif	Januari-Desember 2018

Control Of Drug Supplies

Drug inventory control is a key component of hospital pharmacy management that ensures the availability of medicines while promoting efficient resource utilization. This systematic review analyzed eight studies on hospital drug inventory control and found that the ABC analysis method effectively optimizes inventory management by classifying medicines according to their consumption value and cost. This classification enables hospitals to prioritize monitoring and control of high-value medicines, thereby improving cost efficiency and supporting the continuity of pharmaceutical services (24,25).

The reviewed studies also emphasize the importance of integrated information systems in drug inventory management. Real-time monitoring of medicine use and stock levels enhances inventory accuracy, supports evidence-based procurement planning, and reduces the risks of stockouts and overstocking (26,27). Furthermore, the combined application of Economic Order Quantity (EOQ) and Reorder Point (ROP) methods enables hospitals to optimize order quantities, minimize inventory-related costs, and maintain adequate drug availability, thereby improving overall inventory management efficiency (25,28).

ABC Critical Index Method

The ABC Critical Index method is a very useful tool in managing drug supplies in hospitals, especially in classifying drugs into categories A, B, and C. Each article reviewed in the hospital found different numbers of items, as shown in Table 4.

Tabel 4. Study Result

Artikel ke -	Karakteristik data yang di ambil	Kategori		
		A	B	C
1	Medication use for 1 year and questionnaire	9 item (1,23%)	106 item (14,48%)	617 item (84,29%)
2	Medication use for 6 months and interview	76 item (4,10%)	559 item (30,18%)	1217 item (65,17%)
3	Antibiotic use for 1 year and interview	21 item (12,72%)	45 item (27,27%)	110 item (66,67%)
4	Medication use for 3 months and direct observation accompanied by a questionnaire	37 item (20,6%)	96 item (53,3%)	47 item (26,1%)
5	Chemotherapy medication use for 2 months accompanied by an interview and questionnaire	8 item (9,64%)	34 item (40,96%)	41 item (49,40%)
6	Medication use for 1 year and an interview	4 item (38,77%)	5 item (52,91%)	1 item (8,32%)
7	Medication use for 14 months accompanied by observation and an interview	9 item (14,1%)	34 item (80,25%)	5 item (5,56%)
8	Medication use for 1 year accompanied by observation and an interview	62 item (3,1%)	619 item (30,4%)	1354 item (66,5%)

Category A medicines account for approximately 70% of the pharmaceutical budget despite representing only 10–20% of total inventory items. Due to their high consumption and investment value, these medicines require strict monitoring and effective inventory control to ensure continuous availability while minimizing costs. Effective management of Category A medicines has been demonstrated at Awal Bros Batam Hospital, where targeted inventory control improved pharmaceutical supply management (28).

Category B medicines account for approximately 20% of the pharmaceutical budget and 10–20% of inventory items. Although less critical than Category A, they require regular monitoring to maintain availability and cost efficiency. In contrast, Category C medicines represent 60–80% of inventory items but consume only about 10% of the budget. Despite their low investment and usage value, appropriate inventory management remains essential to prevent overstocking and unnecessary waste. The ABC Critical Index method classifies medicines according to their usage, investment value, and level of criticality, enabling hospitals to prioritize inventory management. Category A medicines require the highest level of control because of their substantial impact on patient care and hospital expenditure, whereas Category C medicines may be stocked more conservatively to

optimize resource utilization. This approach supports efficient budget allocation, reduces the risk of stockouts, and improves the overall quality of pharmaceutical services (29,30).

Table 5. Drug groups based on ABC critical index analysis

Penulis	Grup	CIS	Item total	Persentase item (%)	Nilai investasi (Rp)	Persentase investasi (%)
Putri et al., 2022	A	9.5-12	9	1.23	2,354,717,736	28.94
	B	6.5-9.4	106	14.48	2,753,521,764	33.84
	C	4-6.4	617	84.29	3,028,906,380	37.22
Setiawati et al., 2020	A	9.5-12	76	4.10	7,203,645,473	19.73
	B	6.5-9.4	559	30.18	23,933,229,090	65.54
	C	4-6.4	1217	65.17	5,380,898,867	14.74
Octaviany et al., 2018	A	9.5-12	10	12.72	2,114,748,870	39.91
	B	6.5-9.4	45	27.27	2,380,506,460	44.92
	C	4-6.4	110	66.67	803,183,274	15.17
Wahyuni et al., 2014	A	9.5-12	37	20.5	424,029,377	79
	B	6.5-9.4	97	53.3	90,423,248	17
	C	4-6.4	47	26.1	23,344,380	4
Khuriyah et al., 2016	A	9.5-12	8	9.64	12,472,877,428	37.22
	B	6.5-9.4	34	40.96	19,070,269,961	56.91
	C	4-6.4	41	49.40	1,966,678,968	5.8
Muliana et al., 2022	A	9.5-12	4	40	93,283,694,43	38.77
	B	6.5-9.4	5	50	127,306,102,92	52.91
	C	4-6.4	1	10	20,008,009,15	8.32
Herman et al., 2022	A	9.5-12	9	14.1	4,835,967,190	54.87
	B	6.5-9.4	34	80.25	27,350,027,380	44.87
	C	4-6.4	5	5.56	1,894,564,000	0.26
Susanto et al., 2019	A	9.5-12	62	3.1	26,907,367,588	70
	B	6.5-9.4	619	30.4	7,658,578,148	20
	C	4-6.4	1354	66.5	3,855,565,755	10

Across the reviewed studies, Category A medicines represented only a small proportion of total inventory (approximately 1–10%) but accounted for the majority of drug usage and investment, highlighting their priority in inventory management. For example, Putri et al. (2022) reported that Category A comprised only 1.23% of items yet contributed 28.94% of the total investment value, whereas Category C accounted for 84.29% of items but only 37.22% of the investment value (31). These differences likely reflect variations in hospital formularies, prescribing patterns, and inventory management practices. Overall, ABC Critical Index analysis enables hospitals to prioritize procurement and monitoring of high-value, high-impact medicines, thereby improving drug availability, enhancing patient safety, and optimizing resource allocation and operational costs.

DISCUSSION

The reviewed studies indicate that integrating information systems into drug inventory management improves the accuracy of stock monitoring, reduces the risks of stockouts and overstocking, and enhances overall cost efficiency. These findings are consistent with previous studies in developing countries, which highlight the value of real-time inventory monitoring and electronic prescribing systems in strengthening pharmaceutical logistics (33). Compared with manual systems, digital inventory management enables faster and more accurate responses to drug demand by minimizing recording delays and data entry errors, thereby improving medicine availability and continuity of patient care (34,35).

Further analysis demonstrates that although Category A medicines comprise a relatively small proportion of inventory items, they account for the largest share of pharmaceutical expenditure and therefore require the strictest inventory control. This finding is consistent with international evidence showing that 10–20% of

medicine items typically account for 70–80% of hospital drug costs (36). In contrast, Categories B and C include a larger number of items but contribute less to total expenditure because they mainly consist of lower-cost medicines (37, 29, 40). These findings confirm that the ABC Critical Index method is an effective tool for prioritizing inventory management, optimizing resource allocation, and ensuring the availability of high-impact medicines in hospitals (38, 41).

This review has several limitations. Only eight studies met the inclusion criteria, which may limit the generalizability of the findings. In addition, most included studies used retrospective designs, potentially introducing reporting bias. Furthermore, few studies evaluated the integration of the ABC Critical Index method with complementary inventory management approaches, such as Economic Order Quantity (EOQ), Reorder Point (ROP), or digital information systems. Future research involving larger samples, prospective designs, and integrated inventory management strategies is needed to provide stronger evidence for improving hospital pharmaceutical inventory control.

4. CONCLUSION

The reviewed studies indicate that although Category C medicines comprise the largest proportion of inventory items, they account for only a small share of the pharmaceutical budget, highlighting the need for efficient inventory management to prevent waste while maintaining availability. Overall, the findings demonstrate that the ABC Critical Index method is an effective tool for prioritizing drug procurement and inventory control, ensuring the continuous availability of essential medicines, optimizing budget utilization, and improving the quality and efficiency of hospital pharmaceutical services.

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CONFLICT OF INTEREST

The author declares no conflict of interest or personal relation that could have appeared to influence the studies reported in this review.

REFERENCES

1. Wylegała K, Religioni U, Czech M. The Impact of Hospital Pharmacy Operation on the Quality of Patient Care. *International journal of environmental research and public health*. 2023;20(5).
2. Ryan R, Santesso N, Lowe D, Hill S, Grimshaw J, Prictor M, et al. Interventions to improve safe and effective medicines use by consumers: an overview of systematic reviews. *The Cochrane database of systematic reviews*. 2014;2014(4):Cd007768.
3. Siregar CJP, L. *Farmasi Rumah Sakit: Teori dan Penerapan*. Jakarta: EGC; 2004.
4. Jones CH, Dolsten M. Healthcare on the brink: navigating the challenges of an aging society in the United States. *npj aging*. 2024;10(1):22.
5. Faizar AH, Dachi RA, Bancin DR, Nababan D, Sirait A. Analysis of Pharmaceutical Logistics Control Management. Qualitative Study at the Pharmaceutical Installation of Hajj General Hospital Medan in 2021. *Jurnal Info Sains : Informatika dan Sains*. 2023;13(02):691-702.
6. Ramadhani S, Asthary M, Girsang E. Analysis of the Implementation of Drug Inventory Control with the Always Better Control-Economic Order Quantity-Reorder Point-Safety Stock Method. *Open Access Macedonian Journal of Medical Sciences*. 2022;10:1397-401.
7. Quick JD, Hogerzeil HV, Rankin JR, Dukes MNG, Laing R, Garnett A, et al. Managing drug supply : the selection, procurement, distribution, and use of pharmaceuticals / Management Sciences for Health in collaboration with the World Health Organization; editors : Jonathan D. Quick ... [et al.]. 2nd ed., rev. and expanded ed: West Hartford, Connecticut : Kumarian Press; 1997.
8. Kar SS, Pradhan HS, Mohanta GP. Concept of essential medicines and rational use in public health. *Indian journal of community medicine : official publication of Indian Association of Preventive & Social Medicine*. 2010;35(1):10-3.

9. Basile K, Martínez M, Lucaci JD, Goldblatt C, Beer I. Enhancing Operational Efficiency and Service Delivery through a Robotic Dispensing System: A Case Study from a Retail Pharmacy in Brazil. 2024;12(5):130.
10. Balkhi B, Alshahrani A, Khan A. Just-in-time approach in healthcare inventory management: Does it really work? Saudi pharmaceutical journal : SPJ : the official publication of the Saudi Pharmaceutical Society. 2022;30(12):1830-5.
11. Permata D. Strategi Pengendalian Persediaan Obat Pada Instalasi Farmasi Rumah Sakit Islam Ibnu Sina Bukittinggi. Jurnal Ekonomi STIE Agus Salim Bukittinggi 2016;19(1).
12. Olawade DB, Popoola TT, Egbon E, David-Olawade AC. Sustainable healthcare practices: Pathways to a carbon-neutral future for the medical industry. Sustainable Futures. 2025;9:100783.
13. Jorge VM, Esteban ZM, Bruno SA, Yeralin HF, Pablo DJ. Implementation of supply management strategies by the pharmacy service in a general hospital during the COVID-19 pandemic. Exploratory research in clinical and social pharmacy. 2022;7:100161.
14. Ali Kusnadi S. Manajemen Obat di Rumah Sakit 2015.
15. Yuniasih S, Insan K, Kautsar A. Managing Drug Inventory by ABC Critical Index Method in Primary Healthcare Center in Bandung, Indonesia. Research Journal of Pharmacy and Technology. 2017;10:1994-7.
16. Durmuş A, Öner Ö, Gökmen AN. Analysis of Medication Inventory System for Intensive Care Unit: A Hospital Example. Turkish Journal of Intensive Care. 2025;23(1):70-7.
17. Deressa MB, Beressa TB, Jemal A. Analysis of Pharmaceuticals Inventory Management Using ABC-VEN Matrix Analysis in Selected Health Facilities of West Shewa Zone, Oromia Regional State, Ethiopia. Integrated pharmacy research & practice. 2022;11:47-59.
18. Susanto NMP, Y. V. Penerapan Metode ABC Indeks Kritis dalam Pengelolaan Persediaan Obat di Instalasi Farmasi Rumah Sakit. Jurnal ARSI (Administrasi Rumah Sakit Indonesia). 2019;2(2).
19. Anggriani Y, Ramadaniati HU, Sarnianto P, Pontoan J, Suryawati S. The Impact of Pharmaceutical Policies on Medicine Procurement Pricing in Indonesia Under the Implementation of Indonesia's Social Health Insurance System. Value in Health Regional Issues. 2020;21:1-8.
20. Francis J, Abraham S. Clinical pharmacists: Bridging the gap between patients and physicians. Saudi pharmaceutical journal : SPJ : the official publication of the Saudi Pharmaceutical Society. 2014;22(6):600-2.
21. Latifah E, Kristina S, Suryawati S, Ali Kusnadi S. Availability of Key Drugs at Referral Hospitals in Yogyakarta, Indonesia. International Medical Journal (1994). 2020;25:2501-11.
22. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. Bmj. 2021;372:n71.
23. Moola S, Munn Z, Tufanaru C, Aromataris E, Sears K, Sfectu R, et al. Chapter 7: Systematic reviews of etiology and risk. In: Aromataris E, Munn Z (Editors). JBI Manual for Evidence Synthesis. 2020.
24. Octaviany M. Analisis Pengendalian Persediaan Obat Antibiotik di RS MEILIA pada Tahun 2014 dengan Menggunakan Metode Analisis ABC Indeks Kritis. Jurnal ARSI (Administrasi Rumah Sakit Indonesia). 2018.
25. Khuriyati IL. Pengendalian Persediaan Obat Kemoterapi Melalui Pendekatan Analisis ABC Indeks Kritis di Ruang Pencampuran Instalasi Farmasi RSUP Dr. Mohammad Hoesin Palembang Tahun 2015. . Jurnal ARSI (Administrasi Rumah Sakit Indonesia). 2016;3(1).
26. Setiawati E, Purba AV, Hidayat WU. Analysis of Drug Planning and Control at the Pluit Hospital in 2015. JURNAL ILMU KEFARMASIAN INDONESIA; Vol 18 No 1 (2020): JIFIDO - 1035814/jifiv18i1782. 2020.
27. Wahyuni AT, Budi IS, Destriatania S. Pengendalian Persediaan Obat Umum dengan Analisis ABC Indeks Kritis di IFRSI Siti Khadijah Palembang. Jurnal Ilmu Kesehatan Masyarakat. 2014;5(2).
28. Muliana H, Sutanto R, Wahab S. Analisis Pengendalian Persediaan Farmasi di Rumah Sakit Awal Bros Batam. Jurnal Manajemen Dan Administrasi Rumah Sakit Indonesia (MARSRI) 2022;6(2).
29. Aditama, T. J. (2010). *Manajemen Administrasi Rumah Sakit*. Edisi Kedua, Penerbit Universitas Indonesia (UI Press), Jakarta.
30. Atmaja, H. K. (2012). *Penggunaan Analisis ABC Indeks Kritis untuk Pengendalian Persediaan Antibiotika di MH Thamrin Salemba*. Jurnal Manajemen Kesehatan

31. Putri YR, Indrawati L, Fresley H. Analisis Perencanaan Dan Pengendalian Obat Dengan Metode ABC Indeks Kritis Di Instalasi Farmasi Rumah Sakit Agung Jakarta Tahun 2020-2021. *Jurnal Manajemen Dan Administrasi Rumah Sakit Indonesia (MARSI)*. 2022;6(1):86-97.
32. Herman WP, Yetti H, Isniati. Analysis of Drug Inventory Control Using the ABC Method of Critical Index in Islamic Hospital Ibnu Sina Padang in 2021 for Public Welfare. *Budapes International Research and Critics Institute-Jurnal (BIRCI-Jurnal)*. 2022.
33. Hareem A, Lee J, Stupans I, Park JS, Wang K. Benefits and barriers associated with e-prescribing in community pharmacy - A systematic review. *Exploratory research in clinical and social pharmacy*. 2023;12:100375.
34. Alolayyan MN, Alyahya MS, Alalawin AH, Shoukat A, Nusairat FT. Health information technology and hospital performance the role of health information quality in teaching hospitals. *Heliyon*. 2020;6(10):e05040.
35. Bowman S. Impact of electronic health record systems on information integrity: quality and safety implications. *Perspectives in health information managemen*. 2013;10(Fall):1c.
36. Kivoto PM, Mulaku M, Ouma C, Ferrario A, Kurdi A, Godman B, et al. Clinical and Financial Implications of Medicine Consumption Patterns at a Leading Referral Hospital in Kenya to Guide Future Planning of Care. *Frontiers in pharmacology*. 2018;9:1348.
37. Hanson K, Briki N, Erlangga D, Alebachew A, De Allegri M, Balabanova D, et al. The Lancet Global Health Commission on financing primary health care: putting people at the centre. *The Lancet Global health*. 2022;10(5):e715-e72.
38. Kirkbride JB, Anglin DM, Colman I, Dykxhoorn J, Jones PB, Patalay P, et al. The social determinants of mental health and disorder: evidence, prevention and recommendations. *World psychiatry : official journal of the World Psychiatric Association (WPA)*. 2024;23(1):58-90.
39. Iqradiya, Azdyra, et al. Overview of Sales And Investment of Hard Drugs in Pharmacy “X” In Pamusian Village, Tarakan City With ABC Analysis For The Period Of October 2023–October 2024. *JURNAL FARMASIMED (JFM)*, 2025, 7.2: 204-209.
40. Putra, Gunawan Satria; SARAGIH, Sahat; HATTA, Iha Haryani. Analysis of Strategic Business Planning for a New Pharmacy in the Depok Area. *JURNAL FARMASIMED (JFM)*, 2025, 7.2: 407-416.
41. Sumardi, Cicillia Debora Melissa; PUSPANDARI, Diah Ayu; WIDAYANTI, Anna Wahyuni. Narrative Review: Expired Medicines in Public Health Services and Exploration of Causal Factors and Prevention Strategies. *JURNAL FARMASIMED (JFM)*, 2026, 8.2: 684-696.