IJA ClinPharm
Indonesian Journal of Administrative and Clinical Pharmacy
https://journal.univpancasila.ac.id/index.php/IJACP/

Pharmacoeconomic Study Guidelines and Implementation in the Analgesic Therapeutic Class of Tangerang City Health Department Drug Formulary

Putri Siti Hawa[1*], Ratna Sumirat[2]

[1] *Panunggangan Barat Public Health Center, Tangerang City Health Department, Tangerang, Indonesia.*
[2] *Pharmacy Installation, Tangerang City Health Department, Tangerang, Indonesia.*

*Corresponding Author: putrisitihawa2303@gmail.com

Received: 27 May 2024 / Accepted: 21 June 2024

ABSTRACT: The journal details the process and content of the Drug Formulary created by the Tangerang City Health Department and discusses the pharmacoeconomic approaches used in the selection of drugs based on the Pharmacoeconomic Study Guideline. The formulary consists of 36 types of drugs and is only applicable within the regional institution. The pharmacoeconomic study was conducted using a cost-effectiveness analysis method for the proposed formulary drug list in the analgesic therapy class. The therapeutic effectiveness of each drug is expressed as a percentage, calculated by dividing the number of cases for each drug by the total number of cases in 2018. The samples analyzed were ibuprofen suppositories, paracetamol suppositories, ketoprofen suppositories, ketorolac injections, and tramadol injections. The results of the pharmacoeconomic studies on analgesic drugs indicated that ibuprofen suppositories are highly effective and cost-effective. Despite this, the Tangerang City Health Department does not currently include ibuprofen suppositories in its formulary. Instead, they have chosen ketorolac for injection. However, based on the ICER calculation, it has been determined that the procurement cost of ketorolac injection exceeds RP99.19 per case compared to tramadol injection. Only ketoprofen suppositories are deemed suitable and eligible for inclusion in the Formulary. The lack of trained personnel in pharmacoeconomic studies meant that this crucial study was not considered important. This study could help identify medications that offer superior effectiveness at lower costs, thus providing substantial cost-effectiveness.

KEYWORDS: Analgesic; cost-effective; drug formulary; pharmacoeconomic study; Tangerang city.

1. INTRODUCTION

Following the implementation of the National Health Insurance (NHI) in 2014, the government must adhere to the principles of Quality Control and Cost Control (QC-CC) when structuring the NHI program, particularly concerning drug usage and financing. Emphasis is placed on the selection of high-quality, cost-effective drugs that are used rationally. Subsequently, the National Formulary and an e-catalogue-based drug spending mechanism were established [1].

E-catalogue spending serves as the determinant for NHI drug procurement in the Primary Level Health Facility (PLHF) unit and in less than 5 percent of Public Health Centers holding the status of Regional Public Service Agency (RPSA). The procurement of NHI drugs for Public Health Centers is primarily facilitated by the District Health Department. Public Health Centers only engage in drug procurement for items that are in short supply or depleted, and in minimal quantities using capitation funds. Consequently, optimizing the cost-effectiveness of drugs at the local government level will yield a substantial impact on the efficiency of national healthcare expenditures.

The Ministry of Health issued guidelines in 2013 for the application of pharmacoeconomic studies. These guidelines aim to help health service providers implement quality and cost control (QC-CC) principles. By using pharmacoeconomic-based drugs, the goal is to make it easier to control health service costs while maintaining balanced therapeutic outcomes. This is in line with the ministry's objective of realizing an independent and healthy society.

How to cite this article: Hawa PS, Sumirat R. Pharmacoeconomic Study Guidelines and Implementation in The Analgesic Therapeutic Class of Tangerang City Health Department Drug Formulary. IJAClinPharm. 2024; 1(1): 23-29

ISSN: 0000-0000

Pharmacoeconomics is a method used to develop treatment standards. Health policymakers can make decisions related to drugs and other health interventions using this method. Choosing cost-effective drugs allows for more rational use of health service funds, leading to further improvement in the quality and coverage of services. The purpose of the Pharmacoeconomics Guideline is to specifically target policymakers at the regional level, such as Provincial and District Health Departments, who are responsible for drug selection in the context of drug procurement. These guidelines aim to conduct pharmacoeconomic studies to identify medications that offer superior effectiveness at lower costs, thus providing substantial cost-effectiveness [2].

The Tangerang City Health Department, as a policymaker at the regional level, is responsible for implementing the INH program to improve the quality of health services. This program ensures the accessibility of safe, effective, high-quality, and affordable drugs in sufficient types and quantities. As part of this initiative, the department publishes the Formulary of the Tangerang City Health Department, which contains a list of drugs not included in the National Formulary as Primary Level Health Facility drugs. The list of drugs submitted is based on case reports in 2018 of drug use in the emergency room of Public Health Center in Tangerang City with drug items dominated by the analgesic therapeutic class. The inclusion of these drugs is based on the recommendations of the expert team without background knowledge of phamacoeconomics, or consideration of cost-effectiveness [3].

In the current National Health Insurance (NHI), the proportion of drug costs allocated is a maximum 30% of health care costs. In fact, national drug consumption reaches 40% of overall health spending and is one of the highest in the world. Therefore, improving the cost-effectiveness of medicines, even at the regional government level, will ultimately have a significant impact on the efficiency of national care cost. So, by implementing increased cost-effectiveness and other efforts based on pharmacoeconomic principles in determining health policy, the increase in national health care cost efficiency achieved will be maximized [2].

The purpose of this journal is to outline the preparation process and content of the a Drug Formulary created by the Tangerang City Health Department. It will also explore pharmacoeconomic approaches that have not been utilized in the selection of drugs based on the Guidelines for the Application of Pharmacoeconomic Studies. The author will conduct a Cost-Effectiveness Analysis (CEA) using samples of analgesic drugs from the Tangerang City Health Department's Formulary.

2. MATERIALS AND METHODS

2.1. Preparation Process

In 2019, the Tangerang City Health Department proposed the implementation of the National Health Insurance (NHI) program. As a crucial step in this process, the drafting team deemed it necessary to compile a list of drugs not featured in the National Formulary, specifically for primary-level health facility drugs. This list would be designated as the Formulary of the Tangerang City Health Department. The team responsible for drafting the formulary would comprise specialist doctors and members of the implementation team from the health department.

The implementation team carefully designs, compiles, and evaluates a comprehensive list of proposed drugs for the formulary. This process involves a thorough consideration of evaluation, efficacy, and safety studies for each drug. The list of proposals encompasses drugs that are not included in the National Formulary, as well as drugs intended for use in Advanced Health Facilities. A team of experts meticulously reviews and assesses this list using scientific and technical approaches. Subsequently, the drugs recommended by procurement are carefully selected for use in primary-level health facilities.

The Tangerang City Health Department did not involve the Pharmacoeconomics Study Team or personnel who had received training on pharmacoeconomic studies in the formulary preparation process. The list of proposals was not based on a review of published scientific evidence on cost-effectiveness or consideration of drug prices and treatment costs.

2.2. Selected Drug Formulary

The Tangerang City Department Drug Formulary contains three columns with drug names, restrictions, and information, totaling 36 types of drugs. This formulary consist list of drugs that is not applicable for primary-level health facilities based on National Formulary, it is a form of legality issued by the Tangerang City Health Department for procurement at the Public Health Center. The listed drugs are only applicable within the Tangerang City regional institution.

2.3. Pharmacoeconomic Studies

The pharmacoeconomic study was conducted with an institutional perspective approach using a cost-effectiveness analysis of the proposed formulary drugs list of the Tangerang City Health Department in the analgesic therapeutic class. This therapeutic class was chosen by considering the number of selected drug items most frequently listed on the formulary so that cost-effectiveness comparisons can be made. List of proposed drugs based on the high number of cases in 2018 obtained retrospectively from drug use report in the emergency room of the Public Health Center in Tangerang City.

3. RESULTS

Table 1. List of proposed drugs of the analgesic therapeutic class.

No.	Drug Name	Category	Reason for Proposal	Number of Cases in 2018	Therapeutic Effectiveness (%)
1	Ibuprofen Supp	Non-National Formulary	As an anti-pain therapy that can work quickly through the administration of suppositories	50	29,4
2	Ketoprofen Supp 100 mg	Advanced Healthcare Facilities	Many patients with complaints of severe pain, such as nerves pain with severe injuries come to the health center	40	23,5
3	Paracetamol Supp 160 mg	Non National Formulary	In pediatric patients with febrile seizures who cannot take oral medications	50	29,4
4	Tramadol Inj 50 mg/ml	Non-National Formulary	Anti-pain medication in patients with Visual Analogue Scale > 5 scale	10	5,9
5	Ketorolac Inj 30 mg/ml	Advanced Healthcare Facilities	Many patients with complaints of severe pain, such as nerves pain with severe injuries come to the health center	20	11,8

The proposed analgesic drugs are essential for availability in the Emergency Room (ER) based on the specific cases seen at the Public Health Center. These drugs are not currently listed in the National Formulary or are not readily accessible at a Primary Level Health Facility. The aim is to ensure that these drugs can be obtained at the Public Health Center, thereby enhancing the level of care provided. The therapeutic effectiveness of each drug is expressed as a percentage, calculated by dividing the number of cases for each drug by the total number of cases in 2018, which was 170.

The clinical use of analgesic drugs is based on national guidelines for pain management in medical services [4]. For inflammatory and nociceptive pain, the most widely used drugs are nonsteroidal anti-inflammatory drugs (NSAIDs) and non-opioid analgesics. For neuropathic pain, effective therapy includes adjuvant analgesics. According to *Rondonuwu et al* (2022), the efficacy of using paracetamol with ibuprofen in infants is relatively the same, but in terms of safety, paracetamol has a low risk of side effects and is safer to use [5]. Additionally, based on *Juwita et al* (2019), the intensity of pain in patients after *cesarean section* showed a decrease from moderate to mild with a single rectal administration (suppositories) of ketoprofen [6]. Moreover, according to *Setyawan et al* (2024), patient satisfaction is high with the use of ketorolac injection in postoperative patients experiencing low to moderate pain [7].

Table 2. Management of pain therapy based on literature.

No.	Drug Name	Drug Class	Clinical Use
1	Ibuprofen Supp	NSAID	- Effective for acute pain management
2	Ketoprofen Supp 100 mg	NSAID	- Used therapeutically : Musculoskeletal pain, inflammation, toothache, and mild to moderate cancer pain - High risk of side effects irritating the gastrointestinal - There is no significant difference in efficacy between one NSAID and another
3	Paracetamol Supp 160 mg	Acetaminophen	- First-line pain management - Acetaminophen is commonly used to treat mild to moderate pain - Well tolerated with the minimum side effect
4	Tramadol Inj 50 mg/ml	Opioid	- Effective for treating moderate-severe pain - Used therapeutically : Dental pain, cancer pain, postoperative pain, postpartum pain - Has milder side effects and dependence than other opioid drugs
5	Ketorolac Inj 30 mg/ml	NSAID	- Effective for acute pain management - Used therapeutically : Musculoskeletal pain, inflammation, toothache, and mild to moderate cancer pain - High risk of side effects irritating the gastrointestinal - There is no significant difference in efficacy between one NSAID and another

4. DISCUSSION

Cost-effectiveness analysis (CEA) is to compare the cost-effectiveness of different therapies within the analgesic drug class. This involves measuring the effectiveness of each therapy concerning its cost. The CEA method involves calculating the incremental cost-effectiveness ratio (ICER), which quantifies the additional cost incurred for each unit of improvement in cost-effectiveness. By determining the ICER, decision-makers can assess the value of different treatment options and make informed choices about resource allocation and healthcare spending. This analytical approach is crucial for evaluating the economic implications of various medical interventions and ensuring that limited resources are utilized efficiently.

Table 3. Value of Cost-Effectiveness Ratio use of anti-pain medication.

No.	Drug Name	Cost of Purchasing Drugs (Rp)	Therapeutic Effectiveness (%)	Cost Effectiveness Ratio (Rp/ % Effectiveness)
1	Ibuprofen Supp	9.657	29,4	32.846,94
2	Ketoprofen Supp 100 mg	27.770	23,5	118.170,21
3	Paracetamol Supp 160 mg	15.125	29,4	51.445,58
4	Tramadol Inj 50 mg/ml	8.643,50	5,9	146.500
5	Ketorolac Inj 30 mg/ml	18.562,50	11,8	157.309,32

The listed prices represent the highest retail prices for the smallest unit, sourced from the Minister of Health Regulatory regarding Generic Drug Prices and drug prices in the E-catalogue [8]. To assess cost-effectiveness, the results of the cost-effective ratio calculation are presented in the form of a cost-effectiveness quadrant diagram, serving as a CEA tool. Based on this diagram, quadrant I and quadrant III represent trade-offs that require careful consideration of resources, for both high-effectiveness items at a high price and low-effectiveness items at a low price. Quadrant II is the preferred choice as it offers high effectiveness at a low price, while quadrant IV is not recommended due to low effectiveness at a high price.

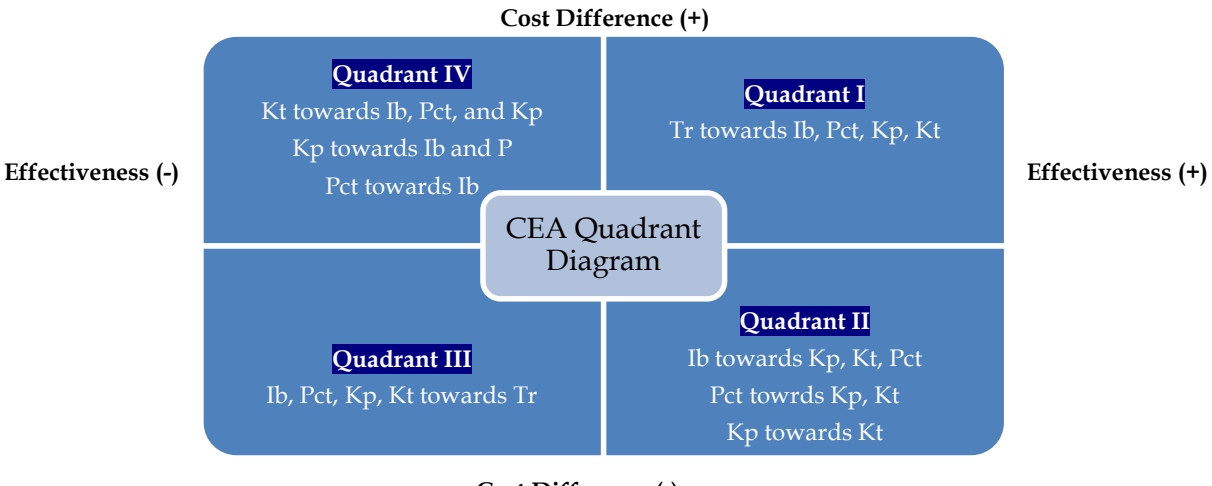

Figure 1. Single Antipain Cost-Effectiveness Quadrant Diagram.
Notes: Ibuprofen (Ib), Paracetamol (Pct), Ketoprofen (Kp), Ketorolac (Kt) and Tramadol (Tr)

Based on Figure 1, the cost-effectiveness quadrant diagram from the list of formulary drug proposals of the Tangerang City Health Department, results were obtained. Quadrant IV, which includes Paracetamol suppositories, was not feasible to select compared to ibuprofen suppositories because both were equally effective, but paracetamol suppositories had a higher price. Quadrant II, which is the main choice for anti-pain analgesics, includes ibuprofen suppositories. Ketoprofen suppositories can also be considered because they have high effectiveness at the same price as Ketorolac injection. The next step is to calculate the incremental cost-effectiveness ratio (ICER) for tramadol against all other proposed analgesic drugs, which are included in Quadrants I and III.

Table 4. ICER calculation of Tramadol Injection.

No.	Drug Name	Cost of Purchasing Drugs (Rp)	Number of Cases in 2018	ICER Ratio (Cost Difference/Case Count Difference)
1	Ibuprofen Supp	9.657	50	25,34/ 40 cases
2	Ketoprofen Supp 100 mg	27.770	40	637,55/ 30 cases
3	Paracetamol Supp 160 mg	15.125	50	162,03/ 40 cases
4	Ketorolac Inj 30 mg/ml	18.562,50	20	991,9/ 10 cases
5	Tramadol Inj 50 mg/ml	8.643,50	10	-

A comparison of ketorolac injection and tramadol injection based on ICER calculations shows that choosing ketorolac injection would require spending more than Rp 991.9 for every 10 cases, considering the same dosage form.

Table 5. List of selected drugs for analgesic therapy class in the Formulary of the Tangerang City Health Department.

No.	Drug Name	Restriction	Additional Information
1	Ketoprofen Supp 100 mg	Use for moderate to severe pain and unable to take pain medication orally.	For inpatient and emergency room only
2	Paracetamol Supp		
3	Ketorolac Inj 30 mg/ml	Use for moderate to severe pain and unable to take pain medication orally.	For inpatient and emergency room only

The Formulary of the Tangerang City Health Department has meticulously chosen a range of analgesic drugs, including 100 mg Ketoprofen suppositories, Paracetamol suppositories, and 30 mg/ml Ketorolac injections. These medications have been carefully selected based on their proven effectiveness in managing pain and their suitability for addressing the specific healthcare needs of the community. It's important to note that these drugs are only available for procurement by Public Health Centers equipped with inpatient and Emergency Room (ER) facilities, ensuring that patients receive the necessary care and supervision when using these medications. This formulary is the only one that publishes as regional drug formulary so there is no comparison of the pharmacoeconomic study result from other institutional perspective.

The results of pharmacoeconomic studies on analgesic drugs have shown that ibuprofen suppositories are highly effective and cost-effective. Despite this, the Tangerang City Health Department does not currently include ibuprofen suppositories in its formulary. Instead, they have chosen ketorolac for injection. However, based on the ICER calculation, it has been determined that the procurement cost of ketorolac injection exceeds RP99.19 per case compared to tramadol injection. The choice of ketorolac injection based on *setyawan et al* (2024) can be considered because patient satisfaction is high in postoperative patients experiencing low to moderate pain.

5. CONCLUSION

The Tangerang City Department Drug Formulary was created without using pharmacoeconomic studies. The results indicate that out of 5 analgesic drugs submitted, only ketoprofen suppositories are deemed suitable and eligible for inclusion in the Formulary. Beside, Ibuprofen suppositories should be considered include in the Formulary as it shown highly effective and cost-effective. Due to the lack of pharmacoeconomic approaches in the formulary preparation process they chosen keterolac injection instead that exceeds RP99.19 per case compared to tramadol injection based on the same dosage form. The pharmacoeconomic study was not considered important because the personnel involved were not trained in pharmacoeconomic studies. This study could help identify medications that offer superior effectiveness at lower costs, thus providing substantial cost-effectiveness. The author recommends conducting a sensitivity analysis and pharmacoeconomic evaluation of the entire list of formulary drugs.

Acknowledgments: The authors received no financial support for the research, authorship, and publication of this article

Author contributions: Concept – P.S.H., R.S.; Design – P.S.H.; Supervision – R.S.; Resources – R.S.; Materials – P.S.H.; Data Collection and/or Processing – P.S.H; Analysis and/or Interpretation – P.S.H; Literature Search – P.S.H; Writing – P.S.H.; Critical Reviews – R.S.

Conflict of interest statement: The authors declared no conflict of interest with regard to the content of this article.

REFERENCES

[1] Winda, "Formularium Nasional (FORNAS) dan e-Catalogueue Obat Sebagai Upaya Pencegahan Korupsi dalam Tata Kelola Obat Jaminan Kesehatan Nasional," Current Issues in Jurnal KPK Integritas, vol.4, no. 2, December, 2018. [Online serial]. Available: https://jurnal.kpk.go.id/index.php/integritas/article/ [Accessed May 2, 2024].

[2] Direktorat Jenderal Bina Kefarmasian dan Alat Kesehatan,*Pedoman Penerapan Kajian Farmakoekonomi*. Jakarta: Kementerian Kesehatan RI, 2013.

[3] Kepala Dinas Kesehatan Kota Tangerang, *Formularium*. Tangerang: Dinas Kesehatan Kota Tangerang, 2019.

[4] Menteri Kesehatan Republik Indonesia, *Pedoman Nasional Pelayanan Kedokteran Tata Laksana Nyeri*. Jakarta: Kementerian Kesehatan, 2019.

[5] A.P. Rondonuwu, J. L. Rompis, and D. S. Waworuntu, "Efficacy of Paracetamol Compared to Ibuprofen on Closure of Patent Ductus Arteriosus in Premature Infants," *Jurnal Ilmiah Kedokteran Klinik*, vol. 10, no. 2, pp. 190-200, 2022.

[6] D. R. Juwita, N. Faradani, and M. I. N. A. Wibowo, "Drug Utilization Studies of Analgesic for Vaginal Delivery and Cesarean Section Patients at RSU Bunda Purwokerto," *PHARMACY: Pharmaceutical Journal of Indonesia*, vol. 16, no. 02, pp. 265-277, 2019.

[7] Y. B. Setyawan, and M. Rosita, "Comparison of The Level of Satisfaction With The Use of Analgesics Ketorolac 30 mg and Paracetamol 1000 mg in Moderate Post-Operative Patients," *Scientific Periodical of Public Health and Coastal*, vol. 6, no. 1, pp. 190-198, 2024.

[8] Menteri Kesehatan Republik Indonesia, *Harga Obat Generik*. Jakarta: Kementerian Kesehatan Republik Indonesia, 2008.