ACADEMIC HOSPITAL JOURNAL

Volume 7, No. 2, September 2025

ISSN 2615-6253 (ONLINE)
ISSN 2615-6245 (PRINT)

The Impact Of Adding Notifications For Drug Restriction Information And Digitalization Of Chemotherapy Protocols In Sistema On The Success Of Claiming Oral Antineoplastic Drugs For JKN Outpatients At The Academic Hospital Of Universitas Gadjah Mada

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Submitted: Januari 2025 **Reviewed: Maret 2025** **Published: September 2025**

Abstract

Background: Chemotherapy services in the Rumah Sakit Akademik UGM have collaborated with BPJS Kesehatan so that service costs and drug costs can be covered. The success of submitting claims for service and drug costs to the BPJS Kesehatan depends on the compliance of health workers in selecting a treatment regimen based on national formulary guidelines and clinical service guidelines, and taking action for the benefit of establishing a diagnosis and laboratory examination. Electronic prescribing innovations, the addition of drug restriction information notifications based on the Formularium Nasional, and the digitalization of chemotherapy protocols are expected to help reduce problems related to delays in billing costs to BPJS Kesehatan.

Method: The method used in this research is an observational method with a cross-sectional research design. The data collected will then be analyzed by comparing the data before and after the addition of national formulary drug restrictions to electronic prescriptions and protocol digitization with the help of Sistema and claim reports.

Result: Research on the impact of adding drug restriction notification information and digitizing chemotherapy protocols in the Sistema system on the success of claims for oral antineoplastic drugs for outpatient JKN patients at Rumah Sakit Akademik Universitas Gadjah Mada found that 95.7% of the submitted cases were successfully verified by BPJS, while 4.3% of oral antineoplastic cases were pending from January to August 2024.

Conclusion: The addition of notification for drug restriction information has proven effective in reducing pending oral antineoplastic claims caused by non-compliance with drug restrictions.

Keywords: drug restriction, chemotherapy protocol, oral antineoplastic, claim, BPJS Kesehatan

1. INTRODUCTION

Cancer is a disease caused by the abnormal and uncontrolled growth and spread of cells, which can affect almost all body tissues. The most common types of cancer worldwide are lung cancer, colorectal cancer, breast cancer, and prostate cancer. Over 19.3 million new cancer cases were diagnosed in 2020, making it the second leading cause of death globally, with approximately 9.6 million deaths annually (1). According to Globocan data from 2020, an estimated 60% of cancer-related deaths occurred, with a total of 396,914 cancer cases and 234,511 deaths. The highest mortality rate was recorded for lung cancer at 13.2%, followed by breast cancer at 9.6%, cervical cancer at 9.0%, liver cancer at 8.9%, nasopharyngeal cancer at 5.7%, and leukemia at 4.9% (2,3).

According to BPJS Kesehatan data in 2021, cancer treatment costs ranked second after heart disease, amounting to IDR 3.5 trillion. BPJS data from 2015 to 2018 showed that cancer treatment costs were highest in Central Java, Jakarta, East Java, West Java, and South Sumatra, while eastern provinces tended to have lower costs. Treatment costs were highest among non-wage earners, wage earners, and non-workers (4)

Cytotoxic drugs are a type of medication used for cancer therapy; however, these drugs are highly toxic, with carcinogenic, teratogenic, and mutagenic properties. Chemotherapy and antineoplastic drug classes have been widely used for decades to treat cancer and other malignancy-related diseases. Currently, nearly 100 types of cytotoxic drugs are available for clinical use, with several others under development. Cytotoxic drugs work by interfering with the growth and proliferation of cells, either through direct interaction with the genetic material in the cell nucleus or by affecting protein synthesis. However, the primary limitation of these drugs is their inability to distinguish between healthy cells and cancerous cells (5).

Cytostatic drugs also have a narrow therapeutic index, increasing the risk of toxicity even at therapeutic doses. The use of these drugs requires adjustments based on the patient's characteristics and prognosis (6). The complexity of cytostatic drug regimens often leads to medication errors, which can occur during prescribing, dispensing, or administration. Such errors can have serious consequences, ranging from adverse events to sentinel events that compromise patient safety (7). Medication errors that occur in hospital patients are not properly documented (8). Studies have shown that an average of 7.1% of adult outpatients and 18.8% of pediatric outpatients experience medication errors, with most occurring during the administration stage. Furthermore, errors during the prescribing stage contribute to significant adverse events, with one-third of these errors leading to sentinel events (9).

The implementation of technology in healthcare services, such as computerized provider order entry (CPOE), wireless infusion pumps, and automated dispensing systems, has become a significant innovation in hospitals worldwide, particularly in the United States (7). The use of CPOE in U.S. hospitals increased from 5% in 2005 to over 90% in 2014 (10). CPOE systems allow doctors to electronically write and send prescriptions, thereby minimizing prescribing errors and enhancing patient safety. Studies have shown that the widespread implementation of CPOE can reduce adverse events and medication errors in both outpatients and inpatients compared to manual prescribing methods. Although the use of CPOE for chemotherapy is still limited, it has facilitated the management of complex drug regimens with the support of multidisciplinary expertise (10). Additionally, CPOE improves the efficiency of the drug ordering process, reduces the risk of transcription errors caused by illegible prescriptions, and supports compliance with clinical guidelines and national formularies.

A study by Harshberger et al. found that the use of CPOE for chemotherapy prescriptions increased the completeness of regimen documentation to 92%, compared to 67% for handwritten prescriptions. This improvement also enhanced the satisfaction of healthcare professionals, including doctors, nurses, and pharmacists (10).

This study aims to develop innovative electronic system applications for prescribing antineoplastic drugs. The addition of notification features regarding restrictions related to the national formulary and the digitalization of chemotherapy protocols in the SISTEMA is expected to assist healthcare professionals in oncology services by improving the compliance of doctors, pharmacists, and nurses with the national drug formulary as a reference for selecting antineoplastic drug regimens.

2. MATERIALS AND METHODS

This study is observational research with a cross-sectional design. Data collection was conducted in two stages. The first stage was carried out retrospectively by analyzing the submission documents and the verification results of oral antineoplastic drug claims at the Pharmacy Department of Universitas Gadjah Mada Academic Hospital. The second stage

involved concurrent data collection by reviewing the submission documents and verification of results of oral antineoplastic drug claims after the addition of drug restriction notifications and the digitalization of chemotherapy protocols in the SISTEMA.

3. RESULTS

Research on the impact of adding drug restriction notification information and digitizing chemotherapy protocols in the Sistema system on the success of claims for oral antineoplastic drugs for outpatient JKN patients at Rumah Sakit Akademik Universitas Gadjah Mada found that 95.7% of the submitted cases were successfully verified by BPJS, while 4.3% of oral antineoplastic cases were pending from January to August 2024.

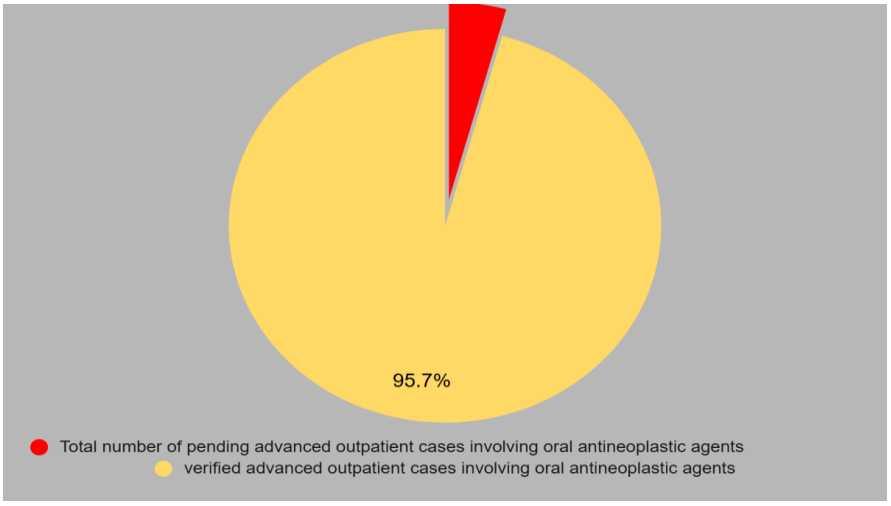

Figure 1. Pending Cases versus Submitted Cases for Outpatient Oral Antineoplastic

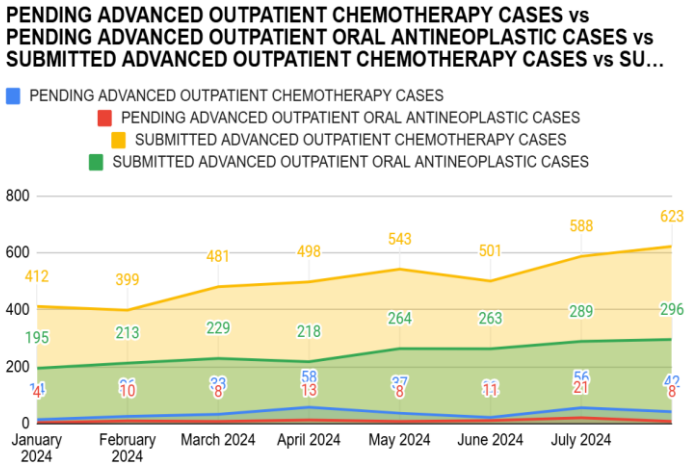

Figure 2. Pending Outpatient Chemotherapy Cases versus Pending Outpatient Oral Antineoplastic Cases

Line graph 2 shows that the number of outpatient chemotherapy case submissions (RJTL) increased from January 2024 to August 2024. Similarly, the submissions for outpatient oral antineoplastic cases also showed an upward trend. The highest number of pending outpatient chemotherapy cases (RJTL) occurred in April 2024, with 58 cases, while the highest number of pending outpatient oral antineoplastic cases occurred in July 2024, totaling 21 cases out of 56 pending cases in that month.

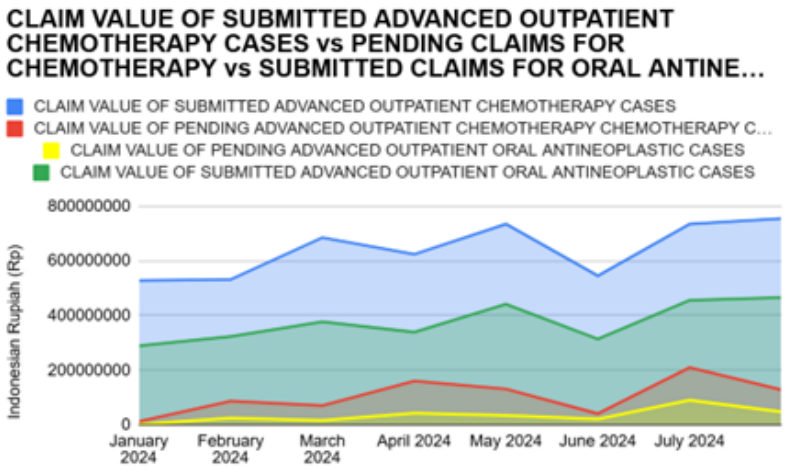

Figure 3. Value of Outpatient Chemotherapy Claims versus Pending Chemotherapy Claims versus Oral Claims versus Pending Oral Antineoplastic Claims

From Line graph 3 above, it can be seen that the highest claim submission values for outpatient chemotherapy and outpatient oral antineoplastic cases occurred in August 2024. However, the highest value of pending claims was observed in July 2024, not August 2024.

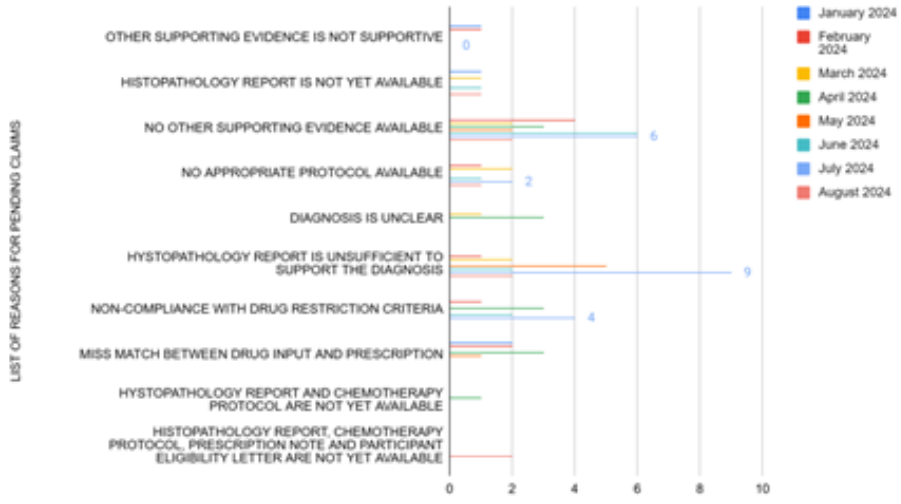

Figure 4. List of Reasons for Pending Claims

Several reasons for pending oral antineoplastic drug claim submissions are illustrated in Line graph 4 above. From January to December 2024, the most common cause of pending claims occurred in July, with 9 cases due to insufficient support from pathological anatomy (PA) results. This was followed by 6 cases in July caused by the absence of other supporting evidence. Additionally, the highest number of issues related to non-compliance with drug restrictions was 4 cases in July, while 2 cases in July and March 2024 were due to the lack of appropriate protocols.

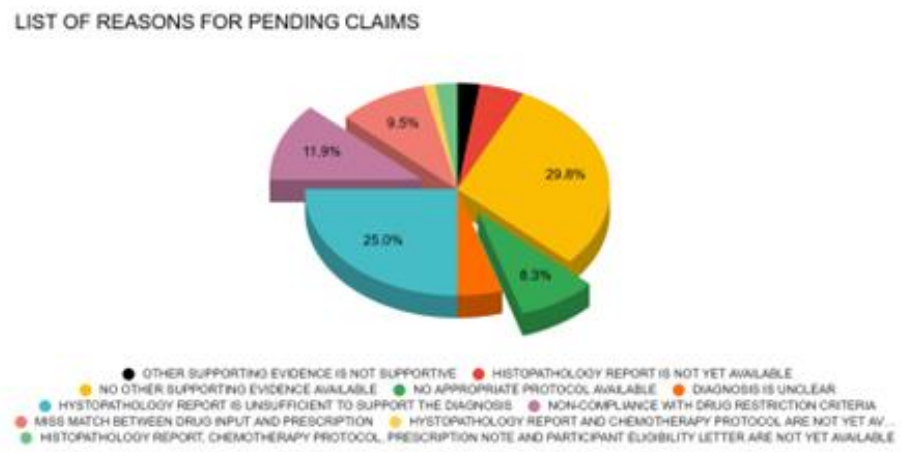

Figure 5. List of Reasons for Pending Claims

Several reasons for claims pending by BPJS, along with their percentages as shown in pie chart 5, were observed from January to August 2024. The largest percentage of pending claims was due to the absence of other supporting evidence, followed by insufficient support from pathological anatomy (PA) results and discrepancies between the attached documents and the required restrictions. The least common causes of pending claims were the lack of PA results and the absence of attached protocols.

Some cases were found to have multiple reasons for being pending, such as:

- Absence of PA results and chemotherapy protocols.
- Absence of PA results, chemotherapy protocols, SEP, and drug prescription receipts.

The minimum supporting documents required for claim submissions include drug billing receipts, chemotherapy protocols, PA results, and a Participant Eligibility Letter (SEP).

Table 1. Value of Pending Claims for Oral Antineoplastic RJTL Due to Non-Compliance with Restrictions

Month	The Pending Claim Value of Oral Antineoplastic RJTL due to non-compliance with drug restrictions	Average
Before the research intervention		
January	0	15,514,418.000
February	13,757,184.00	
March	0	
April	17,271,652.00	
After the research intervention		
May	0	5,524,948.00
June	4,200,000.00	
July	6,849,896.00	
August	0	

From Table 1, a statistical test using the T-test was conducted on the two data groups: the group before the research intervention and the group after the research intervention. The results showed a p-value of 0.02. Since the p-value is less than 0.05, it indicates a statistically significant difference.

Table 2. Value of Pending Claims for Oral Antineoplastic RJTL Due to the Absence of an Appropriate Protocol

Month	The Pending Claim Value of Oral Antineoplastic RJTL due to the absence of an appropriate protocol	Average
Before the research intervention		
January	0	Average 552,551.33
February	104,820.00	
March	1,552,834.00	
April	0	
After the research intervention		
May	0	Average 1,313,097.67
June	1,152,760.00	
July	2,368,150.00	
August	418,383.00	

From Table 2 above, the pending claims for RJTL oral antineoplastic cases due to the absence of appropriate protocols were analyzed using a T-test on two data groups: the group before the research intervention and the group after the research intervention. The results showed a p-value of 0.12. Since the p-value is greater than 0.05, it indicates no statistically significant difference.

4. DISCUSSION

The prescription of antineoplastic drugs at Rumah Sakit Akademik Universitas Gadjah Mada for JKN patients is carried out by oncology specialists. Prescriptions, including antineoplastic drugs for JKN patients, are made using the SISTEMA e-prescribing system, and only drugs listed in the National Formulary can be prescribed for JKN patients.

Claims for antineoplastic drugs submitted to BPJS must be accompanied by a soft copy of the chemotherapy protocol, prescription, Patient Eligibility Letter (SEP), invoice or receipt for drug administration, pathological anatomy results, or other supporting documents as per the drug restriction requirements in the National Formulary (11).

BPJS Health claims involve the collective submission of healthcare costs for BPJS Health participants by hospitals to BPJS Health, which are billed monthly. Healthcare financing is a crucial component of the implementation of the National Health Insurance (JKN) program, facilitated by BPJS Health through claim submissions. However, the final result of a claim submission is categorized as either an eligible claim or a non-eligible claim (pending claim). Therefore, not all submitted documents are claimable, and a claim will be deemed non-eligible or pending if the documents submitted by the hospital are incomplete (12).

Based on Figure 2, it can be illustrated that most claim submissions have been verified, although some remain unverified. This is due to increasingly strict verification processes by BPJS Health verifiers. Several reasons for pending claims, as depicted in Figure 3, include the following:

1. Lack of histopathology anatomy reports is often missing or not attached. This is partly because the PA results from outside RSA UGM are not brought by patients when receiving chemotherapy drugs for the first time, or because staff overlook attaching them as a primary supporting document.
2. Insufficient histopathology report to support the diagnosis. The attached pathological anatomy results do not adequately support the clinical diagnosis, particularly for solid tumors and diagnostic aids for hematologic cancers, such as bone marrow punctures.
3. Absence of an appropriate protocol for chemotherapy: The chemotherapy drug administration protocols are incomplete or unclear. Examples include:
    a. Variations in protocol formats between oncology doctors.
    b. Changes in dosage or regimens are not documented in the protocol.
    c. Drug administration dates are not well-documented.
    d. Additional details, such as diagnoses and verification signatures from oncology doctors, are incomplete.
4. Lack of other supporting evidence to support the diagnosis, and it does not meet the restriction requirements. Examples include:
    a. Immunohistochemistry test results.
    b. Radiology support results such as ultrasound, chest X-ray, MSCT, MRI, MRCP, or bone surveys.
    c. Other supporting evidence of metastasis.
5. The chemotherapy protocol, which chemotherapy drugs administration written is not clearly or comprehensively written. Examples include: (a) Variations in protocol formats among oncology doctors. (b) Changes in dosage or regimens that have not been documented in the protocol. (c) The drug administration date was not being properly documented. (d) Additional information, such as the diagnosis and verification signatures from oncology doctors, is incomplete.
6. Unclear Diagnosis. The diagnosis established by the oncology doctor for cancer is the result of a discussion among a multidisciplinary team and is a clinical conclusion based on various examination results. However, the golden diagnostic standard, which comes from pathological anatomy results for solid cancers, plays a crucial role in confirming the cancer diagnosis. Therefore, the conclusion from pathological anatomy results is an important consideration for verifiers in approving claim submissions according to the restrictions. Unfortunately, this often does not align with the clinical diagnosis established by the oncology doctor.
7. Non-compliance with Drug Restrictions. The National Formulary not only requires supporting evidence of the diagnosis but also specifies restrictions related to the maximum drug dosage or cumulative dosage, the maximum number of cycles, and the maximum frequency and duration of drug administration. However, discrepancies with these restrictions are still found, such as:(a) The prescribed drug quantity does not match the specified quantity in the National Formulary. (b) The drug administration does not comply with the combinations specified in the Formulary. (c) The patient's treatment history does not meet the requirements for the current drug regimen. (d) The duration of drug administration does not align with the required number of days/weeks/months for each cycle as specified in the National Formulary restrictions.
8. Inconsistent Drug Input with Prescription. The drug dosage in the manual prescription does not match the dosage specified in the protocol. Additionally, the dosage or amount of the drug entered into the system does not align with what is stated in the protocol or prescription.

The primary cause of pending claims for oral antineoplastics is the absence of supporting evidence, with only 8.3% attributed to discrepancies in chemotherapy protocols.

This study focuses on two key areas: the addition of drug restriction notifications and chemotherapy protocols. Before this research, drug restrictions were not integrated into the hospital's information system (Sistema). As a result, when doctors prescribe antineoplastics to JKN patients, they are required to know and memorize the drug restrictions. Moreover, the staff conducting claim document screening must verify the alignment between the National Formulary restrictions and the attached supporting documents before dispensing the medication. Chemotherapy protocols, which serve as supporting documents in antineoplastic claims, were previously managed manually—either handwritten or printed—but were not systematically integrated into Sistema, leading to format inconsistencies between doctors.

The integration of antineoplastic drug restrictions into Sistema and the development of a systematic and integrated chemotherapy protocol, from prescription to Sistema, were interventions aimed at reducing the number of pending claims.

From the T-Test results presented in Table 1 and Table 2, it can be concluded that the addition of drug restriction notifications for oral antineoplastic drugs in Sistema showed a significant difference in reducing pending claim values. However, regarding the intervention of digitizing chemotherapy protocols into Sistema, there was no significant change in reducing pending claims. This is because the transfer of manually written protocols into Sistema has not yet fully captured the protocols used in the chemotherapy drug prescription process.

In addition, other contributing factors include:

1. Percentage of Oral Antineoplastic Claims: Oral antineoplastic claims accounted for 48.6% of the total outpatient chemotherapy claims (RJTL), which is slightly lower than the claims for injectable antineoplastics.
2. Pending Cases for Antineoplastic RJTL: Pending cases for injectable antineoplastics dominate, with oral antineoplastic pending cases accounting for only 29.2% of the total pending antineoplastic RJTL cases.
3. Primary Cause of Pending Claims for Oral Antineoplastics: The largest cause of pending claims for oral antineoplastics is the absence of other supporting evidence, with only 11.9% of pending cases attributed to non-compliance with drug restrictions and 8.3% due to discrepancies in chemotherapy protocols.
4. Limitations of the Research Duration: The limited duration of the research resulted in a constrained dataset, which may not fully represent the overall picture.

5. CONCLUSION

From the research conducted using claim submission and pending claim data from January to August 2024 at the Academic Hospital of Gadjah Mada University, it can be concluded that:

a. The addition of notification for drug restriction information has proven effective in reducing pending oral antineoplastic claims caused by non-compliance with drug restrictions.
b. The implementation of chemotherapy protocols in the SISTEMA has shown limited effectiveness in reducing pending oral antineoplastic claims compared to the previous approach.
c. The development of integrated prescription and protocol creation within the SISTEMA still requires further refinement and research for improvement.
d. The increase in oncology prescriptions for JKN outpatient cases corresponds directly with the increase in the number of pending cases.

REFERENCES

1. Menteri Kesehatan Republik Indonesia: Keputusan Menteri Kesehatan Republik Indonesia tentang Formularium Nasional nomor 01.07/MENKES/SK/2197/2023. Jakarta: Menteri Kesehatan Republik Indonesia; 2023.
2. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, and Bray F. Global

cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA Cancer J Clin 2021: 71: 209–249 terlampir dalam ISOPP Standard J Oncol Pharm Practice 2022, Vol. 28 3 (Supplement) 1–126.

3. Sung H, Ferlay J, Siegel RL, Laversanne M, Soerjomataram I, Jemal A, Bray F.Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: A Cancer Journal for Clinicians, 2021, Vol 71, Issue 3; 209 - 249. https://doi.org/10.3322/caac.21660.
4. Pusat Kebijakan Manajemen Kesehatan. 2021. Penyakit Jantung dan Kanker 25 Persen Duduki Pembiayaan BPJS Kesehatan. Fakultas Kedokteran Kesehatan Masyarakat dan Keperawatan UGM. Yogyakarta.
5. Chabner BA, Allegra CJ, Curt GA, et al. Antineoplastic drugs. Hardman JG and Limbird LE, eds. Goodman & Gilman's The Pharmacological basis of therapeutics. Ninth ed. New York, NY: McGraw-Hill, 1996; 1233–1287 cited from ISOPP Standard J Oncol Pharm Practice 2022, Vol. 28 3 (Supplement) 1–126.
6. ISOPP Standard J Oncol Pharm Practice 2022, Vol. 28 3 (Supplement) 1–126.
7. Pedersen CA, Schneider PJ, Scheckelhoff DJ. ASHP national survey of pharmacy practice in hospital settings: dispensing and administration – 2011. Am J Health Syst Pharm. 2012;69:768–785.
8. Gandhi TK, Bartel SB, Shulman LN, et al. Medication safety in the ambulatory chemotherapy setting. Cancer. 2005;104:2477–2483.
9. Bates DW. Preventing medication errors: a summary. Am J Health Syst Pharm. 2007;64(14 Suppl 9):S3–S9.) (Keers RN, Williams SD, Cooke J, Ashcroft DM. Causes of medication administration errors in hospitals: a systematic review of quantitative and qualitative evidence. Drug Saf. 2013;36:1045–1067.
10. Harshberger C, Harper A, Carro GW, et al. Outcomes of computerized physician order entry in an electronic health record after implementation in an outpatient oncology setting. J Oncol Pract. 2011;7:233 237 cited from Elsaid KA, Garguilo S, Collins CM. Chemotherapy e-prescribing: opportunities and challenges. Integr Pharm Res Pract. 2015 May 21;4:39-48. Doi: 10.2147/IPRP.S84232. PMID: 29354518; PMCID: PMC5741026.
11. Kementerian Kesehatan Republik Indonesia. (2013). Peraturan Menteri Kesehatan Republik Indonesia No. 71 Tahun 2013 tentang Pelayanan Kesehatan pada Jaminan Kesehatan Nasional. Jakarta: Kementerian Kesehatan RI.
12. Firmanto, Yuki. Early Warning System: Solusi Klaim Negatif Rumah Sakit Program Jaminan Kesehatan Nasional; 2021.