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Research Article

Pharmacist Interventions Regarding Cancer Patient-Related Medication Issues at RSUP Dr. Kariadi Semarang

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ABSTRACT

Cancer has been a global health issue. In 2018, cases related to cancer reached 18.1 million and the number of cancer-related deaths was 9.6 million. Pharmacists, play a crucial role in preventing and addressing Drug-Related Problems (DRPs) through pharmaceutical services. This research aims to examine the overview of DRPs in inpatient cancer patients undergoing chemotherapy and to define the pharmacist's interventions regarding DRPs in patients with cancer at RSUP Dr. Kariadi Semarang. This study employed a retrospective data collection approach. The materials were obtained from pharmacist prescription reviews and the medical records of cancer in patients undergoing chemotherapy in January 2022. The classification of DRPs followed PCNE V9.1 guidelines. A total of 239 DRPs were identified. The main issues were related to treatment effectiveness (44%), treatment safety (43.9%), and others (12.1%). Common causes of DRPs included dosing selection (63.7%), drug selection (28.4%), and treatment duration (0.4%). Pharmacists' interventions were carried out at the prescription writing level in 376 cases (61.4%) and at the drug utilization level in 294 cases (38.6%). The verification of prescriptions by clinical pharmacists before drug preparation is a crucial step to reduce the potential occurrence of DRPs.

INTRODUCTION

According to data from the Global Burden of Cancer (GLOBOCAN) published by the World Health Organization (WHO), in 2018 cancer cases reached 18.1 million and the number of cancer-related death was 9.6 million. It is projected that deaths related to cancer will continue to rise, exceeding 13.1 million by the year 2030. Data from the Riset Kesehatan Dasar (Riskesdas) for the years 2013 and 2018 indicate an increase in cancer prevalence in Indonesia from 1.4% to 1.49% (Pangribowo, 2019).

Drug-Related Problems (DRPs) are defined as any case involving drug therapy that potentially affects the desired therapy outcome. The identified types of DRPs include therapy effectiveness, therapy safety, and other issues (Pharmaceutical Care Network Europe, 2020). Pharmacists have an important role in identifying and preventing DRPs by intervening with doctors, patients, or nurses according to the anticipated DRPs (Blix *et al*., 2006).

The Regulation of the Minister of Health of the Republic of Indonesia Number 72 of 2016 states that pharmacists, as healthcare professionals with comprehensive knowledge and expertise in drug therapy, play a crucial role in preventing and addressing DRPs through pharmaceutical care. Interventions to manage DRPs are done by providing information, recommendations, or consultations with patients and healthcare professionals involved in drug therapy. Subsequently, the outcomes of these

interventions are evaluated (American College of Clinical Pharmacy, 2008).

A study by (Sisay *et al*., 2015) identified 474 drug-related problems among 274 out of 367 patients. The most common category of drug-related problems was medication side effects (45.5%), followed by dosage issues (37.9%). In another study on DRPs in elderly cancer patients receiving outpatient chemotherapy conducted by Yeoh *et al*. (2015), common DRPs detected included potential drug-drug interactions (DDI) (398 cases, 36.4%), medication side effects (346 cases, 31.7%), and non-compliance (97 cases, 8.9%). Meanwhile, in a study titled "Drug-Related Problems in Oncology Patients: What Pharmacists Should Pay Attention to?" by (Titiesari *et al.*, 2022), there were 146 reports of DRPs related to cancer patients. The most frequently occurring DRP issues were treatment safety (63.7%) and treatment effectiveness (17.81%). The common causes of DRPs included drug selection (38.06%), drug dosing selection (21.94%), and drug therapy duration (14.84%). These previous studies showed that, most of DRPs experienced by the patients and the pharmacists' role was very important to prevent the DRPs. For instance, pharmacist can give education to patients, so that patients will have the good compliance. In case of treatment safety and treatment effectiveness, the pharmacist must monitor patients' condition after being treated by medications. This role is very important, due to the patient safety and cost issues.

Thus, we conducted this study about pharmacist' intervention, to examine the overview of DRPs in inpatient cancer patients undergoing chemotherapy and to define the pharmacist's interventions regarding DRPs in cancer patients at RSUP Dr. Kariadi (RSDK) Semarang.

METHODS

This descriptive study employed a retrospective data collection approach. It is considered retrospective because the data used were obtained by tracing historical documents, specifically the medical records of patients and pharmacist prescription review notes. The subjects of this study consisted of 901 cancer patients who underwent all chemotherapy cycles at RSDK in January 2022 and met the inclusion criteria.

The materials used in this study include pharmacist prescription review notes containing potential DRP reports and the medical records of cancer patients undergoing chemotherapy at RSDK Semarang in January 2022. The data collection instrument consists of a patient medical record data retrieval form, which includes the patient's medical record number, name, gender, age, chemotherapy details, diagnosis, DRPs, and pharmacist interventions.

The data analysis was conducted using the descriptive analysis method, which involves presenting the data obtained from the pharmacist prescription review notes and patient medical records to describe the categories of potential DRPs in chemotherapy patients. Data completeness and accuracy were ensured, and then the data were classified using the PCNE V9.1 method. The classification of DRPs based on PCNE is a validated classification system that can be used by pharmacists as a tool for documenting and measuring the outcomes of pharmaceutical services provided.

This study has been approved by Health Research Ethical Committee of RSDK No 1186/EC/KEPK-RSDK/2022.

RESULTS AND DISCUSSION

We collected data from 214 subjects with the characteristics described in Table 1.

In January 2022, the majority of inpatient cancer patients at RSDK were female, accounting for 50.5%. Based on the results of Riskesdas, it is evident that the prevalence of cancer is higher among women compared to men. This pattern was observed in both the 2013 and 2018 Riskesdas data. This could be attributed to specific types of cancer that predominantly affect women, such as breast cancer and cervical cancer, which are the most frequently reported cancer types in Indonesia. Additionally, these types of cancer also benefit from better early detection practices compared to other types (Pangribowo, 2019). The majority of cancer patients were in the age group of 18-65 years, accounting for 167 patients (78.03%), while those aged 0-17 years comprised 29 patients (13.55%), which according to WHO categorization includes youth and children. The highest prevalence of cancer, as indicated by the 2018 Riskesdas results, shows that advanced age is one of the risk factors for cancer (Pangribowo, 2019). According to research by (Mustapha *et al*., 2018) involving 65 female cervical cancer patients, the majority (27.69%) were in the 40-49 age group, with an average age of 48.3 ± 4.2. Furthermore, in the study conducted by (Sisay *et al*., 2015) with 367 chemotherapy patients, most patients (30.2%) were in the 50-59 age group.

Table 1. Cancer patients' charactersistics in RSDK Semarang

Characteristic	Number	Percentage (%)
Sex		
Female	106	49.5
Male	108	50.5
Age (years old)		
0-17	29	13.6
18-65	167	78.0
66-79	18	8.4
Diagnosis of cancer		
Colorectal	29	13.6
Acute Lymphoblastic Leukemia	26	12.1
Ovarium	24	11.2
Cervical	22	10.3
Breast	29	8.9
Others	94	43.9
Chemotherapy agents		
5-Fluoruracil	64	13.5
Cisplatin	59	12.5
Carboplatin	50	10.6
Paclitaxel	38	8
Vincristin	34	7.2
Doxorubicin	29	6.1
Oxaliplatin	24	5.1
Others	175	37

The majority of cancer patients undergoing chemotherapy at RSDK Semarang were diagnosed with colorectal cancer, with a total of 29 patients (13.6%), followed by Acute Lymphoblastic Leukemia (ALL) with 26 patients (12.1%). Colorectal cancer is a cancer that occurs in the colon (large intestine) and rectum. Colorectal cancer ranks second as the leading cause of cancer in developing countries with a high mortality rate (Dewi and Widya Suksmarini, 2018). This is often due to unhealthy lifestyle habits such as poor dietary choices, lack of physical activity, and smoking, which are often associated with high birth rates, particularly in developing countries. In the study conducted by (Sisay *et al*., 2015) involving 367 chemotherapy patients, gastrointestinal (GI) cancer was the most common type, diagnosed in 108 patients (29.4%).

In this study, the frequency of drug use in cancer patients leading to DRPs was highest with 5-fluorouracil therapy. 5-fluorouracil (5-FU) is an anticancer drug used for the treatment of breast tumors, GI cancers, and advanced colorectal cancer. In a study conducted by (Sisay *et al*., 2015) titled "Drug-Related Problems in Chemotherapy of Cancer Patients," the most commonly prescribed chemotherapy regimens were cisplatin + 5-fluorouracil 103 (28%), 5-fluorouracil + leucovorin 65 (17.7%), paclitaxel + cisplatin 55 (15%), VAC (vincristine, adriamycin, and cyclophosphamide) 36 (9.8%), and others 108 (36.3%).

Patients with cancer have more complicated problems during their treatment. First, there is long treatment duration for cancer patients which shows significant problems to the patients, such as productivity lost, medical and non-medical cost and treatment's side effects. Second, there is the delay effect of cancer treatment's side effect, which may cause the decrease of quality of life and patient's compliance. Third is about the treatment effectivity, which may need combination treatment. Thus, the pharmacist' s role in the oncology area is very important, due to the side effects, treatment effectivity and treatment compliance.

The descriptive data in Table 2 indicate the classification of potential DRPs by problem category that occurred in cancer inpatient at RSDK Semarang. These classifications include treatment effectiveness in 105 cases (44%), treatment safety in 105 cases (43.9%), and other issues in 29 cases (12.1%) out of a total of 239 DRPs that occurred. In a study conducted by (Titiesari, Nursalim and Nathania, 2022), out of 146 classified DRPs, the problem categories

identified included treatment effectiveness in 38 cases (26.03%), treatment safety in 93 cases (63.7%), and other issues in 15 cases (10.27%). The effectiveness of treatment is highly anticipated to achieve optimal treatment outcomes. Potential occurrences of DRPs due to poor pharmacotherapy effects can affect the therapy's effectiveness (Pharmaceutical Care Network Europe, 2020). DRPs that can affect treatment effectiveness include dosage or drug selection and patient-related factors such as patient compliance or drug interactions (Blix *et al*., 2006). Treatment effectivity and safety are the most issues related to the DRPs. Pharmacists are the only health professionals who work directly with medicine; thus, pharmacists have greater responsibility to ensure the effectivity and safety of the treatment. The activities of clinical pharmacist, such as administrative, pharmaceutical and clinical screening, patients' counselling, health promotion and ward pharmacist can be done to overcome the DRPs.

As Table 5 indicates, DRPs related to effectiveness in this study accounted for 105 cases (44%). Suboptimal drug therapy related DRPs can result from improper dosing intervals or incorrect timing of drug administration (Silva *et al*., 2015). In this case, there were 67 cases (28.1%) categorized as issues with suboptimal therapy effects, primarily dominated by patients gaining excessive weight beyond a tolerable range (21 cases) and discrepancies between the prescribed drug dosage on the prescription compared to the protocol for chemotherapy administration (15 cases). Weight changes in patients can occur, especially if the interval between the patient's control visit to the clinic before chemotherapy is too long compared to the drug administration interval. This can be addressed by reevaluating the patient's weight when they come in for drug administration and verifying the patient's chemotherapy records when necessary.

As Table 2 shows, there were 38 cases (15.9%) of DRPs related to symptoms or indications not being treated. DRPs related to untreated indications involve situations where there is a medical indication for treatment, but the patient does not receive the necessary medication. This can also occur in patients who require additional therapy to treat or prevent the progression of the disease (Priyanto, 2009). Some drugs that were missed in prescriptions include premedication and chemotherapy prophylaxis drugs (11 cases). Additionally, the complexity of chemotherapy protocols can result in the omission of some key drugs listed in the chemotherapy regimen (24 cases). Therefore, it is crucial to perform a thorough verification of chemotherapy records by pharmacists to avoid missing indications in prescriptions before administering the medication. The double check-system must be conducted during the compounding and dispensing procedures.

Verification of chemotherapy records is conducted by pharmacists before administering medication. Therefore, as Table 2 indicates, it can prevent potentially harmful drug events accounting for 43.9%, mainly dominated by dose adjustments due to decreased kidney function

Table 2. Drug Related Problems of cancer patients in RSDK

Code V9.1	Problem	Number (n= 239)	Percentage (%)
P1	Treatment Effectiveness	105	44
P1.2	Potential suboptimal therapy	67	28.1
P1.3	Presence of symptoms or indications not treated	38	15.9
P2	Treatment Safety	105	43.9
P2.1	Occurrence of (potentially) harmful drug events	105	43.9
P3	Other	29	12.1
P3.1	Unnecessary drugs	29	12.1

Table 3. Causes of Drug Related Problems of cancer patients in RSDK Semarang

1	Cause	Total (n= 239)	Percentage (%)
C1	Drug Selection		
C1.1	Drug not in accordance with guidelines/formulary	25	10.5
C1.2	No indication for the drug	2	0.8
C1.4	Duplication of therapeutic group or inappropriate active ingredient	2	0.8
C1.5	Drug not prescribed or incomplete despite having an indication	39	16.3
C3	Dosage Selection		
C3.1	Drug dosage too low	44	18.4
C3.2	Drug dosage too high	100	41.9
C3.4	Dosage regimen too frequent	8	3.4
C3.5	Incorrect, unclear, or missing dosing instructions	18	7.5
C4	Treatment Duration		
C4.1	Therapy duration too short	1	0.4

during chemotherapy (55 cases) and patient weight loss (16 cases). As shown in Table 1, the use of platinum-based chemotherapy drugs, such as cisplatin and carboplatin, is relatively high. This aligns with the findings in Table 2, indicating the need for dose adjustments related to kidney function to avoid adverse effects. Some of the cytostatic agents could cause nephrotoxicity and hepatotoxicity. Accordingly, doing the monitoring of kidney and liver function is very important during the cancer treatment.

In addition to clinical condition-based verification, a pharmacist is also required to check drug administration in relation to medication claims. It was found that 12.1% of patients received unnecessary drugs, mainly characterized by discrepancies between the prescribed drugs and the national formulary for patients with health insurance (15 cases). The study conducted by (Sisay *et al*., 2015) identified 474 DRPs in 274 patients. The most common category of drug-related problems was drug side effects (45.5%), followed by dosage issues (37.9%). In the research conducted by (Mustapha *et al*., 2018), 224 cases of DRPs were identified in 65 cervical cancer patients. The majority of DRPs were related to treatment effectiveness (28.1%), adverse reactions (29.0%), and cost (26.8%). The main causes were drug selection (28.1%) and dosage selection (29.0%).

Unnecessary Drug Therapy (UDT) refers to instances where patients may experience complications due to receiving unnecessary medication, or when there is no valid medical indication requiring the patient to undergo treatment. Wrong medication involves the administration of incorrect drugs that do not align with the patient's condition. Insufficient drug administration occurs when the quantity of medication provided is insufficient or less than what should be given.

Table 3 depicts the causes of drug related problems of cancer patients in RSDK Semarang. Drug Therapy without Indication (DTI) occurs when medication is administered to a patient without a valid medical indication for the disease or condition. The DTI use of medication without a clear indication or when a patient does not require drug therapy can increase the cost of treatment and burden the patient (Kemenkes RI, 2011). In this study, there were 2 (0.8%) cases of DRPs where there was no indication for the medication. According to (Kundiman, 2015) providing unnecessary drug therapy without a clear indication can increase the risk of drug side effects or toxicity. Drug therapy is considered unnecessary when there is no clear indication in the patient.

Duplication of Drug Therapy (DDT) refers to the combination of two or more drugs which can have beneficial effects in the treatment of a condition. However, unwanted effects from drug combinations are possible and can disrupt treatment outcomes. The DRPs related to DDT can occur in patients who receive two or more

drugs from the same therapeutic group or with the same active ingredient. Therapeutic duplication can lead to serious side effects (Wright, 2013). In this study, there were 2 (0.8%) cases of DRPs related to duplication within therapeutic groups or inappropriate active ingredients.

Failure to provide therapy when there is a clear medical indication can disrupt or even delay the healing process or worsen the patient's condition (Hepler and Strand, 1990). The study also found 39 (16.3%) cases of DRPs where drug therapy was not given or was incomplete despite a clear indication. Under-dosing refers to the administration of a medication at a dosage that is lower than the therapeutic dose, resulting in drug levels in the blood not reaching the minimum level required to achieve a therapeutic effect (Kemenkes RI, 2011). This can occur due to variations in a patient's physical condition between the time of assessment and the actual therapy. Factors such as changes in body weight can influence dosage adjustments during treatment. In this study, the results showed 100 (41.9%) cases of DRPs related to excessive drug dosage. This can also be attributed to changes in a patient's physical condition between the time of assessment and treatment, such as changes in body weight. These changes can affect the required dosage of the medication. If a patient's weight decreases during treatment, the prescribed drug dosage may become too high, potentially leading to side effects that may require additional medical attention. Pharmacists are required to ensure that a patient's actual body weight is verified, which can be done through the most recent medical records or by directly contacting the nurse or patient.

It was found that there were 18 (7.5%) cases of DRPs related to incorrect, unclear, or missing dosing instructions. Errors such as the absence of concentration in the formulation can be detrimental to patients because it can lead to treatment failure when the patient uses the medication. If the drug concentration is lower than what the patient needs, the treatment goals may not be achieved. However, if the drug dosage administered is higher, it can be very dangerous, leading to toxicity and even death (Susanti, 2013). There was 1 (0.5%) case of DRPs related to the treatment duration being too short, where the prescription of 6-MP was only for 1 week of use, whereas it should have been prescribed for 2 weeks of use according to the patient's chemotherapy protocol. The duration of a treatment should match the patient's specific medical condition. Administering medication for either too long or too short a duration can affect the success of the treatment (Kemenkes RI, 2011).

Based on the research conducted at RSDK Semarang, pharmacist interventions regarding the overview of DRPs in patients with cancer can be observed in the Table 4.

Table 4. Pharmacist Intervention towards DRPs' experienced by cancer patients in RSDK Semarang

Code V9.1	Intervention	Total	Percentage (%)
I1	At the level of the prescribing doctor		
I1.3	Intervention is proposed to the prescribing doctor	164	27.1
I1.4	Intervention is discussed with the prescribing doctor	208	34.3
I3	At the level of drug use		
I3.2	Dosage is adjusted	137	22.6
I3.4	Usage instructions are adjusted	15	2.5
I3.5	Medication is postponed or discontinued	50	8.2
I3.6	Medication is initiated	32	5.3

There were 606 interventions carried out by pharmacists out of 239 identified DRPs. This is because for a single patient, a pharmacist may perform one or more interventions to prevent and address DRPs. The interventions conducted by pharmacists include: at the level of the prescribing doctor (I1): there were 372 (87.4%) interventions. The most frequently performed intervention was discussing with the prescribing doctor, with 208 (48.8%) cases, followed by proposing interventions to the prescribing doctor in 164 (38.5%) cases.

The research conducted at RSDK Semarang showed the potential for DRPs due to inappropriate drug use, and pharmacist interventions at the drug use level, including modifying drug usage rules or instructions. At the drug use level (I3), there were 204 (54.9%) cases, with the most common interventions being dosage adjustments in 137 (32.2%) cases, postponing or discontinuing medication in 50 (11.7%) cases, initiating medication in 32 (7.5%) cases, and adjusting medication usage instructions in 15 (3.5%) cases.

CONCLUSIONS

DRPs related to category, treatment effectiveness, treatment safety, and cases fall under other categories were presence in RSDK Semarang. Most of the problems related to drug selection, dose selection, and treatment duration. Pharmacist interventions which were conducted at the prescription writing level and at the drug use level were an essential step to reduce the potential for DRPs.

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CONFLICT OF INTEREST

The Authors have no conflict of interest.

REFERENCES

American College of Clinical Pharmacy. 2008. The definition of clinical pharmacy. *Pharmacotherapy.* 28(6), 816-7.

Blix, H. S., Viktil, K. K., Moger, T. A., and Reikvam, A. 2006. Use of renal risk drugs in hospitalized patients with impaired renal function: An underestimated problem? *Nephrology Dialysis Transplantation*, 21(11), 3164–3171.

Dewi, N. N. A., and Widya Suksmarini, N. M. P. 2018. Metilasi DNA dalam perkembangan kanker kolorektal. *Intisari Sains Medis*, 9(2), 124–130.

Hepler, C. D., and M. Strand, L. 1990. Opportunities and responsibilities in pharmaceutical care. *American Journal of Hospital Pharmacy*, 47(3), 533–543.

Kemenkes RI. 2011. Modul Penggunaan Obat Rasional 2011, Modul Penggunaan Obat Rasional, 3–4.

Kundiman, E. M. S. 2015. Evaluasi kerasionalan penggunaan antibiotik pada pasien lansia dengan bronkitis kronik eksaserbasi akut yang dirawat jalan di RSUP Prof. Dr.R.D. Kandou Manado periode Juli 2013-Juni 2014. *Ejournal.Unsrat.ac.id*, 4(3), 1–8.

Mustapha, S., Mohammed, M., Mustapha, L., Yunusa, I., and Basgut, B. 2018. A survey on drug related problems in cervical cancer patients receiving chemotherapy in Ahmadu Bello University Teaching Hospital Zaria. *Bayero Journal of Pure and Applied Sciences*, 10(1), 489.

Pangribowo. 2019. Beban Kanker di Indonesia. Pusat Data Dan Informasi Kesehatan Kementerian Kesehatan RI.

Pharmaceutical Care Network Europe. 2020. Classification for drug related problems. *Word Journal Of The International Linguistic Association*, 9.1, 3–7.

Priyanto. 2009. Farmakoterapi dan Terminologi Medis, Leskonfi, Jakarta

Silva, C., Ramalho, C., Luz, I., Monteiro, J., and Fresco, P. 2015. Drug-related problems in institutionalized, polymedicated elderly patients: opportunities for pharmacist intervention. *International Journal of Clinical Pharmacy*, 37(2), 327–334.

Sisay, E. A., Engidawork, E., Yesul. T. A., Ketema, E. B. 2015. Drug related problems in chemotherapy of cancer patients. *Journal of Cancer Science and Therapy*, 07(02), 55–59

Susanti, I. 2013. Identifikasi Medication Error pada fase Prescribing, Transcibing dan Dispensing di Depo Farmasi Rawat Inap Penyakit Dalam Gedung Teratai, Instalasi Farmasi RSUP Fatmawati Periode 2013, Skripsi, UIN Syarif Hidayatullah, Jakarta.

Titiesari, Y. D., Nursalim, H. Y., and Nathania, J. 2022. Masalah Terkait Obat pada Pasien Onkologi: Apa yang Harus Diperhatikan oleh Apoteker? *Majalah Farmaseutik*, 18(1), 51–56.

Wright, B. M. 2013. Medication Errors in Adults-Case #3: Duplicate Therapy. https://www.patientcareonline.com/view/medication-errors-adultscase-3-duplicate-therapy, was accessed on January 02, 2022.