

Analysis of Drug Related Problems in Five Hospital Conducted in 2010

(Analisis Masalah Terkait Obat di Lima Rumah Sakit Tahun 2010)

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Abstract: Drug prescribing and drug use become more complex, as the number and potency of available drugs increase, leading to a variety of Drug Related Problems (DRPs). From 15 studies conducted in several countries, 7.1% of the overall hospital admissions were related to DRPs and 59% of them might be prevented. For the last few decades, attention to DRPs in some countries like USA, Australia and England have increased. A study on pediatric inpatients was carried out in 2007 by monitoring medical records detected nearly 60% DRPs with an average of 3 DRPs per patient and other study done showed that more than 78% of geriatric patients had in average 3 DRPs. A retrospective study to identify morbidities related to DRPs has been conducted in 2010 in 5 hospitals having clinical pharmacy unit. Data were collected from medical records or clinical pharmacy documents and interviews with the head of pharmacy unit and clinical pharmacist. DRPs data were then analyzed and categorized according to a combination of American Society of Hospital Pharmacists (ASHP) and Pharmaceutical Care Network of Europe (PCNE) classifications. Results of the study revealed that there were 266 DRPs identified with an average of two DRPs per patient and anti-infection drugs were mostly involved. Duration of a treatment longer than necessary was found in 17.3% cases and had resulted in high cost drug treatment (32.7%), whilst poly-pharmacy, inappropriate drug form and new indication for drug treatment presented were hardly found. Pharmacist was the most likely who made intervention in DRPs (61.3%) and 48.9% intervention was proposed, but was rejected by prescriber.

Key words: Drug Related Problems (DRPs), morbidity, drug prescribing, hospital.

Abstrak: Dengan meningkatnya jumlah dan potensi obat yang ada, persepsian dan penggunaan obat makin bertambah kompleks dan dapat menimbulkan berbagai Masalah Terkait Obat (DRP). Hasil 15 penelitian di beberapa negara menunjukkan sebanyak 7,1% perawatan di Rumah Sakit berhubungan dengan DRP dimana 59% daripadanya sesungguhnya dapat dihindari. Beberapa dekade terakhir ini di negara-negara seperti Amerika, Australia dan Inggris perhatian terhadap DRP meningkat tajam. Suatu penelitian pemantauan catatan medik pada pasien anak yang dirawat inap pada tahun 2007 menemukan hampir 60% DRP dengan rerata 3 DRP per pasien, demikian pula suatu studi lain menunjukkan lebih dari 78% pasien geriatri mengalami rata-rata 3 DRP. Telah dilakukan penelitian retrospektif untuk mengidentifikasi morbiditas yang berkaitan dengan DRP pada tahun 2010 di lima Rumah Sakit yang memiliki unit farmasi klinis. Data dikumpulkan dari catatan medik pasien atau dokumen farmasi klinis dan wawancara dengan Kepala Instalasi Farmasi serta farmasis klinis. Data DRP dianalisis dan dikelompokkan menurut kombinasi klasifikasi dari American Society of Hospital Pharmacists (ASHP) dan Pharmaceutical Care Network of Europe (PCNE). Hasil studi menunjukkan bahwa ada 266 DRP yang teridentifikasi, dengan rerata 2 DRP tiap pasien dan sebagian besar menyangkut obat anti-infeksi. Kejadian terapi lebih lama dari yang sesungguhnya dibutuhkan ditemukan pada 17,3% kasus dan menimbulkan biaya pengobatan tinggi (32,7%), sedangkan kejadian polifarmasi, bentuk sediaan obat yang tidak tepat dan indikasi baru untuk pengobatan jarang ditemukan. Farmasis yang paling mungkin dan banyak melakukan intervensi dalam hal DRP (61,3%), akan tetapi 48,9% intervensi yang disarankan tidak disetujui oleh penulis resep.

Kata kunci: Masalah Terkait Obat (DRP), morbiditas, persepsian obat, rumah sakit.

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INTRODUCTION

DRUG is an essential element in healthcare either in preventive, curative, rehabilitative or promotive efforts and now becomes a major weapon for successful prevention and treatment of many illnesses. The objective of drug therapy is the achievement of therapeutic outcome, which is the improvement of patients' quality of life with minimal risks to health. Drug prescribing and use becomes more complex as the number and potency of available drugs increases, leading to a variety of DRPs. From 15 studies conducted in several countries, 7.1% of the overall hospital admissions were related to DRPs and 59% of them might be prevented⁽¹⁾. For the last few decades, attention to Drug Related Problems (DRPs) in some countries like USA, Australia and England have increased. DRPs is an umbrella term describing 'an event or circumstance involving drug therapy that actually or potentially interferes with desired health outcomes'⁽²⁾.

The effects of a drug include pharmacodynamic effects which are of interest for treating diseases and side effects that exist in addition to the selected pharmacodynamic effects.

Pharmacovigilance focuses on adverse drug reactions which are unwanted side effects and may occur whether or not the recommendations relating to the product characteristics are followed.

Phase IV of the evaluation of a drug starts when the marketing license is granted and extends over many years. It consists of pharmacoepidemiological studies to evaluate the effectiveness, safety and utilization of the drug in population under real life conditions. The results confirm or disprove the therapeutic effect, determine whether approved uses should be expanded or restricted, provide data on the incidence and clinical relevance of adverse events and untoward drug interactions, and clarify the pharmacoeconomic consequences⁽³⁾.

Therefore, pharmacovigilance is needed in every country as there are differences in the occurrence of adverse drug reactions and other drug-related problems because of differences in diseases and prescribing practices, genetics, diet, traditions, medicine manufacturing processes, medicine distribution and use (e.g., indication, dose, availability), and traditional and complementary medicines⁽⁴⁾. The WHO defines pharmacovigilance as 'the science and activities relating to the detection, assessment, understanding and prevention of adverse effects or any other possible drug related problems'. An important clinical responsibility of the pharmacist is in the early detection of ADRs and other DRPs as

well as monitoring the effectiveness of the medicines. As a part of the healthcare team, the pharmacist is a source of both information and critical evaluation of drug information⁽⁵⁾.

Medication errors occur in all health-care settings, no matter how good the health-care staff are at prescribing, dispensing and administering medicines. Even if there is no error on the part of health-care staff, patients may take drugs incorrectly. Causes are numerous and include lack of knowledge, tiredness of staff, careless work attitudes, poor procedures, lack of policies, unfamiliar dosage forms and human error⁽⁶⁾. The Institute of Medicine reported in 1999 that 44,000-98,000 people die each year at least in part due to medical errors. Errors occur in about 5% of medication orders for adult patients and approximately 1 out of 7 of these errors has significant potential for harm. The baseline rates of serious medication errors per 1000 patient days were 29 for the ICU, 8 for the general medical unit, and 7 for the general surgical unit. With unit-based clinical pharmacists the ICU rates dropped to 6 per 1000 patient days⁽⁷⁾. A study on pediatric patients in RSUPN Dr Cipto Mangunkusumo carried out in 2007 by monitoring medical records starting from the first 24 hours, detected nearly 60% DRPs with an average of 3 DRPs per patient⁽⁸⁾. Another study carried out retrospectively by Arsyanti in 2006 showed that more than 78% of geriatric patients had in average of 3 DRPs⁽⁹⁾. To identify morbidities relating to DRPs, a retrospective study was conducted in 2010 in 5 hospitals which have clinical pharmacy unit.

MATERIALS DAN METHODS

MATERIALS. A retrospective study was done on 30 latest DRPs documented in medical records or clinical pharmacy documents from in-patients in one big hospital from each cities of Jakarta, Bandung, Yogyakarta, Malang and Medan in the year of 2010.

METHODS. Data were collected from medical records or clinical pharmacy documents and by interviews with the head of pharmacy unit and clinical pharmacist. DRPs data were then analyzed and categorized according to a combination of ASHP⁽¹⁰⁾ and PCNE classifications⁽¹¹⁾ (Table 1). Every identified DRP was consulted to and confirmed with the clinical pharmacist involved. Descriptive data was presented as frequency distribution tables.

RESULTS AND DISCUSSION

In this study patients' status have been audited, particularly regarding diagnosis by the hospital medical committee. Some cases have also been

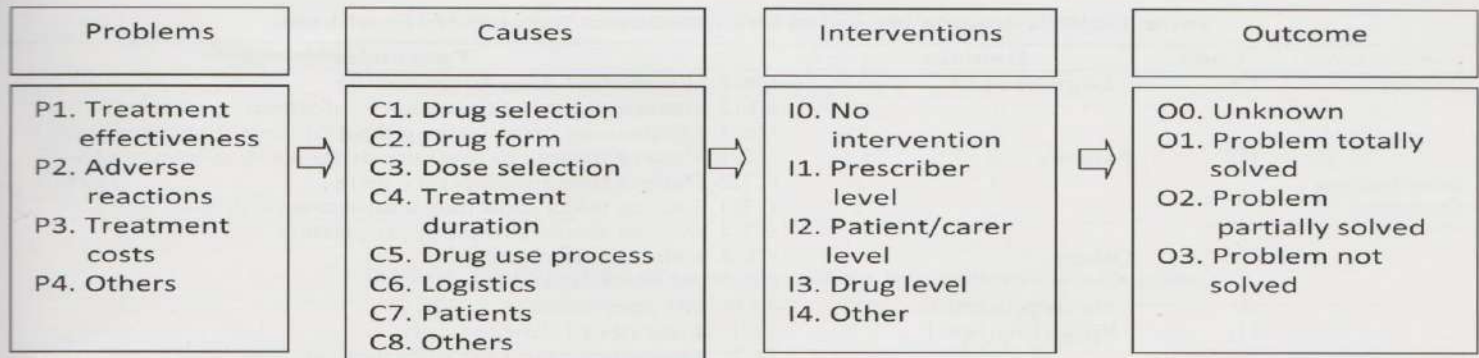


Figure 1. Conceptual framework.

Table 1. DRPs domain identified and assessment parameters.

Assessment	Code	Domain	Parameter		
Problems	P1	Treatment effectiveness	P1.1 No effect of drug treatment/therapy failure		
			P1.2 Effect of drug treatment not optimal		
			P1.3 Wrong effect of drug treatment		
			P1.4 Untreated indication		
P2	Adverse reactions	P2.1 Adverse drug event (non-allergic)			
		P2.2 Adverse drug event (allergic)			
		P2.3 Toxic adverse drug-event			
P3	Treatment costs	P3.1 Drug treatment more costly than necessary			
		P3.2 Unnecessary drug-treatment			
P4	Others	P4.1 Patient dissatisfied with therapy			
Causes	C1	Drug selection	P4.2 Unclear problem/complaint		
			C1.1 Inappropriate drug (incl. contra-indicated)		
			C1.2 No indication for drug		
			C1.3 Inapprop combination of drugs, or drugs and food		
			C1.4 Inappropriate duplication of therapeutic group or active ingredient		
			C1.5 Indication for drug-treatment not noticed		
			C1.6 Polypharmacy		
			C1.7 More cost-effective drug available		
			C1.8 Synergistic/preventive drug required and not given		
			C1.9 New indication for drug treatment presented		
			C2	Drug form	C2.1 Inappropriate drug form
					C3
			C3.1 Drug dose too low		
			C3.2 Drug dose too high		
	C3.3 Dosage regimen not frequent enough				
	C3.4 Dosage regimen too frequent				
	C3.5 No therapeutic drug monitoring				
	C3.6 Pharmacokinetic problem requiring dose adjustm				
	C3.7 Deterioration/improvement of disease state requiring dose adjustment				
	C4	Treatment duration	C4.1 Duration of treatment too short		
			C4.2 Duration of treatment too long		
	C5	Drug use process	C5.1 Inappropriate timing of administration and/or dosing intervals		
			C5.2 Drug underused/ under-administered(deliberately)		
			C5.3 Drug overused/ over-administered (deliberately)		
			C5.4 Drug not taken/administered at all		
			C5.5 Wrong drug taken/administered		
			C5.6 Drug abused (unregulated overuse)		
			C5.7 Patient unable to use drug/form as directed		

Table 1. DRPs domain identified and assessment parameters (continue).

Assessment	Code	Domain	Parameter
Causes	C6	Logistics	C6.1 Prescribed drug not available
			C6.2 Prescribing error (necessary information missing)
Intervention Outcome	C7	Patients	C6.3 Dispensing error (wrong drug or dose dispensed)
			C7.1 Patient forgets to use/take drug
			C7.2 Patient uses unnecessary drug
			C7.3 Patient takes food that interacts t
	C8	Others	C7.4 Patient stored drug inappropriately
			C8.1 Other cause; specify
	I0	No intervention	C8.2 No obvious cause
			I0.0 No intervention
	I1	Prescriber level	I1.1 Prescriber informed only
			I1.2 Prescriber asked for information
			I1.3 Intervention proposed, approved by Prescriber
			I1.4 Intervention proposed, not approved by Prescriber
			I1.5 Intervention proposed, outcome unknown
			I2.1 Patient (medication) counseling
I2	Patient/carer level	I2.2 Written information provided only	
		I2.3 Patient referred to prescriber	
I3	Drug level	I2.4 Spoken to family member/caregiver	
		I3.1 Drug changed to	
		I3.2 Dosage changed to	
		I3.3 Formulation changed to	
		I3.4 Instructions for use changed to	
I3.5	Other	I3.5 Drug stopped	
		I3.6 New drug started	
I4	Other	I4.1 Other intervention (specify)	
		I4.2 Side effect reported to authorities	
0	Unknown	O0.0 Outcome intervention not known	
1	Problem totally solved	O1.0 Problem totally solved	
2	Problem partially solved	O2.0 Problem partially solved	
3	Problem not solved	O3.1 Problem not solved, lack of cooperation of patient	
		O3.2 Problem not solved, lack of cooperation of prescriber	
		O3.3 Problem not solved, intervention not effective	
		O3.4 No need or possibility to solve problem	

audited by means of discussion with existing clinical pharmacist. Thus, every diagnosis has been confirmed and standard therapy applied. Yet, this study has a limitation in the case of DRPs caused by pharmacist's error and patient's error cannot be assessed from retrospective data.

Problems associated with drug therapy.

A number of 266 DRPs with an average of two problems per patient was detected during the analysis of drug treatment from 150 patients consisting of 76 males and 74 females with ages ranged between 0-95 years old. Each problem related to drug therapy was categorized according to a combination of ASHP and PCNE classifications. Based on their age group, DRPs were mostly experienced by the adults (52.7%) and the diagnosis was infection (Table 2 and 3). The most common identified DRPs were drug treatment more costly than necessary (32.7%), effect of drug treatment not optimal (20.7%), and untreated indication (12.4%), just like shown in Table 4.

Table 2. Distribution of patients with DRPs according to the age group.

Age group	No. of patients	Percentage
Children	22	14.6
Adult	79	52.7
Elderly	49	32.7
Total	150	100

The causes of DRPs found starting from the highest to the lowest frequency were consecutively duration of treatment too long (17.3%), inappropriate drug (incl. contraindication) and/or other cause (drug not prescribed) (10.5%), deterioration/improvement of disease state that requiring dose adjustment (8.3%), no indication for drug (7.5%), drug dose too high (7.1%) and other causes lower than 7% in frequency, as shown in Table 5.

Here anti-infection drugs were the ones related to DRPs (Table 3) just like the result of Wang's study¹² though with a lower percentage. This may be caused by their better health care system and lack of knowledge

Table 3. Age group distribution according to diagnosis.

Diagnosis	Age group			Total (%)
	Children	Adult	Elderly	
Infection	11	22	6	39 (26.0)
Cancer	8	18	5	31 (20.7)
Cerebrovascular diseases	0	13	6	19 (12.7)
Vertigo	0	4	5	9 (6.0)
Cardiovascular diseases	0	3	5	8 (5.3)

Table 4. Distribution of cases according to problem classification.

DRPs		N (266 cases)	%
P1.1	No effect of drug treatment/therapy failure	24	9.00
P1.2	Effect of drug treatment not optimal	55	20.70
P1.3	Wrong effect of drug treatment	14	5.30
P1.4	Untreated indication	33	12.40
P2.1	Adverse drug event (non-allergic)	6	2.30
P2.2	Adverse drug event (allergic)	2	0.80
P2.3	Toxic adverse drug-event	6	2.30
P3.1	Drug treatment more costly than necessary	87	32.70
P3.2	Unnecessary drug-treatment	26	9.80
P4.2	Unclear problem/complaint	13	4.90

on rational prescription. The cause of DRPs identified is dominated by longer duration of treatment (Table 5). This fact may in turn resulted in higher cost more than necessary for drug treatment (Table 4), like for example the case of a fourteen years old patient who was treated with cefotaxime for 15 days instead of 10 days and culture which was obtained after fifteen days showed that resistance to cefotaxime had developed; then, ceftazidime was given. The next DRP was untreated indication and happened to a 44 years old woman with breast cancer. The patient also had hyperglycemia with GDP: 158 mg/dL and GD2jPP: 321 mg/dL. She should be treated for hyperglycemia with adjusted dose of sulfonyl urea along with monitoring of hypoglycemic effect. Another study

from Prot, *et al*⁽¹³⁾ did not mention prescribing or dispensing error at all due to computerized and unit dose system, much different from our study where drugs were prescribed and documented in medication record manually and the prescriptions were given to the patient or his family to be filled.

Classification of intervention to DRPs. In these DRPs cases there were interventions proposed but not approved by the prescriber as many as 130 cases (48.9%), no intervention 45 cases (16.9%), patient (medication) counselling 17 cases (6.4%), intervention proposed, outcome unknown 16 cases (6.0%), intervention proposed, approved by prescriber 15 cases (5.6%), drug stopped 11 cases (4.1%) and others not more than 4% in number (see Table 6).

Table 5. Distribution of cases according to cause classification.

Causes of DRPs		N (266 cases)	%
C1.1	Inappropriate drug (incl. contraind.)	28	10.50
C1.2	No indication for drug	20	7.50
C3.2	Drug dose too high	19	7.10
C3.7	Deterioration/improvement of disease state that requiring dose adjustment	22	8.30
C4.2	Duration of treatment too long	46	17.30
C8.1	Other cause (drug not prescribed)	28	10.50

Table 6. Distribution of cases according to intervention classification.

Intervention to DRPs		N (266 cases)	%
I0.0	No intervention	45	16.90
I1.3	Intervention proposed, approved by prescriber	15	5.60
I1.4	Intervention proposed, not approved by prescriber	130	48.90
I1.5	Intervention proposed, outcome unknown	16	6.00
I2.1	Patient (medication) counseling	17	6.40
I3.5	Drug stopped	11	4.10

Most of these interventions were done by pharmacist without prescriber's approval (61.3%), followed by interventions with approval (20.7%) and no one to do intervention (16.2%), pharmacist together with prescriber and nurse (0.8%), only nurse (0.8%) and prescriber only (0.4%) (see Table 7).

Table 7. Distribution of cases according to intervention doer.

Intervention doer	N (266 cases)	%
No one	43	16.20
Pharmacist without prescriber's approval	163	61.30
Pharmacist with prescriber's approval	55	20.70
Pharmacist together with prescriber and nurse	2	0.80
Prescriber	1	0.40

In some cases to solve DRPs interventions were proposed but not approved by the prescribers (48.9%) and even for some DRPs there were no intervention at all (16.9%). According to interviews with respondents, although clinical pharmacy relating to DRPs had been conducted, many DRPs still occur in hospitals and even without any intervention. Hospitals play an important role in improving public health status, yet support from and empowerment of hospital pharmacy unit was not considered appropriately. Regional government policy to support standard of pharmacy services stated by the Ministry of Health was not optimal and even lacking.

Outcome intervention. Outcome intervention per DRP case was mostly identified as unknown (50.8%), followed by problem not solved, lack of cooperation of prescriber (26.7%), problem totally solved (19.5%), problem partially solved (2.6%), and no need or possibility to solve problem (0.4%) (Table 8).

More than half outcome of DRPs were unknown (50.8%), because as the patient was discharged from the hospital they also took their medicine home and no monitoring was done anymore either by the physician, nurse or pharmacist from the hospital. Outcome cannot be traced further because we only used retrospective data. The next outcome was problem not solved, lack of cooperation of prescriber (26.7%). Pharmacist said that the decision was on the prescriber, so the pharmacist should have good communication skill and ability to collaborate with the prescriber, nurse or other health personnel.

Table 8. Distribution of cases according to outcome intervention.

Outcome	N (266 cases)	%
O0.0 Unknown	130	50.80
O1.0 Problem totally solved	52	19.50
O2.0 Problem partially solved	7	2.60
O3.2 Problem not solved, lack of cooperation of prescriber	71	26.70
O3.4 No need or possibility to solve problem	17	6.40

CONCLUSION

There were 266 DRPs identified with an average of two DRPs per patient and anti-infection drugs were mostly involved. Too long duration of a treatment was found in 17.3% cases and had resulted in high cost drug treatment (32.7%), whilst poly-pharmacy, inappropriate drug form and new indication for drug treatment presented were hardly found. Pharmacist was the most likely who did make intervention in DRPs (61.3%) and 48.9% intervention proposed but not approved by prescriber.

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