POLYPHARMACY AND UNNECESSARY DRUG THERAPY ON GERIATRIC HOSPITALIZED PATIENTS IN YOGYAKARTA HOSPITALS, INDONESIA

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ABSTRACT

The elderly population in Indonesia continues to rise. The pharmacologic management of many acute and chronic conditions and the aging population have contributed to increase medication use among elderly patients, these situation may lead to drug related problem (DRPs) especially unnecessary drug therapy. The aim of this study was to identify unnecessary drug therapy on hospitalized geriatric patients, to calculate the waste of cost spent on unnecessary drugs and to investigate whether polypharmacy is a suitable indicator for occurrence of unnecessary drug therapy in a hospital sitting.

Research type was observational. Data taken through medical record in 100 geriatric patients hospitalized in two hospitals in Yogyakarta Indonesia. The study was conducted by accidental sampling with inclusion criteria: patient with 65 year and above, complete medical record, patient admitted to Internal Medicine Department during 2006 - 2007. Unnecessary drug therapy was identify through discussion forum involve clinical pharmacist and senior geriatric consultant. Comparison were made between patients received five drugs or less/day (group A) and with more than five drugs/day (group B) during the hospital stay.

Our research found unnecessary drug therapy occurred in 63 cases (63 %) with total 117 incidences. Total expense of unnecessary drug therapy equal to Rp.12.553.349,00 (US$ 1.046, 11). Of the 100 patients, 24 % received more than five drugs/day during the hospital stay. Number of unnecessary drug therapy incidence in patients with five drugs or less/day was lower than patients with more than five drugs/day during the hospital stay: 0.78 vs 1.91 respectively (P = 0.000).

Prevention of unnecessary drug therapy problem can be conducted through reduction of drug use (it is recommended to eliminate all medications without therapeutic benefit, goal or indication). Prevention of unnecessary drug therapy will also contribute in cost saving among elderly patients.

Keywords: Geriatric; polypharmacy; unnecessary drug therapy; cost saving

INTRODUCTION

The field of ageing and health has become a dominant area of concern in the 21st century. This is due to an increase in the absolute and relative numbers of older people in both developed and developing countries. In the year 2000, there were an estimated 600 million people aged 60 years and above in the world. By 2025, this would double to about 1. 2 billion people; and by 2050 there will be 2 billion, with 80 percent of them living in developing countries [1]. The number of elderly in Indonesia estimated to increase up to 414 % in 2025 compare to 1990 [2].

The rapidly growing numbers and proportion of elderly mean that more people will be entering a period of life where the risk of developing certain chronic and debilitating disease is significantly higher. A survey in Indonesia showed that 78 % of elderly suffered up to 4 medical illness, 38 % of them had more 6 diseases and 13 % suffered more than 8 diseases [3].

People over the age of 65 years are more likely to be on medication than younger

people. They are often taking several drugs at once to treat concomitant disease processes [4]. A recent survey of 2590 non-institutionalized older adults in the United States showed an increased usage of all medications with advancing age, the highest prevalence of drug use being in woman 65 years of age and older with 12 % taking 10 or more medications and 23 % taking at least five prescribed drug therapies [5]. General practitioners' prescribing rates are 1.6 drugs per patient aged 10-20 years and 2.8 per patient aged 80 years and over; 14% of elderly patients take five or more drugs concurrently. During hospital admission, elderly patients prescribed a mean of 5 to 6 different drugs [6].

The use of several drugs concomitantly is justified in the treatment of multiple chronic disease may cause polypharmacy. Polypharmacy has been variously defined. It has been defined as the concurrent use of multiple drugs, and some researchers have discriminated between minor (two drugs) and major (more than four drugs) polypharmacy. Others have defined it as the use of more drugs than are clinically indicated or too many inappropriate drugs, as two or more medications to treat the same condition and as the use of two or more drugs of the same chemical class [7].

Polypharmacy is known to increase the risk of adverse drug reaction (ADRs), drug-drug and drug-disease interaction. It has been claimed that patients taking two drugs face a 13% risk of adverse drug interactions, rising to 38 % when taking four drugs and to 82 % if seven or more drugs are given simultaneously. With polypharmacy, duplicative prescribing within the same drug class is prevalent and unrecognized drug adverse-effects are often treated with more drugs thus leading to prescribing cascades.

Polypharmacy also makes compliance with medications more challenging. Non-compliance with prescribed medications can result in sub-optimal therapeutic effectiveness and can have major clinical consequences. If the existence of non-compliance is not recognized, the physician may increase the dose of the initial medication or add a second agent, increasing both the risk and the cost of treatment[4].

The unnecessary drug therapy problems frequently tend to be overlooked in polypharmacy prescribing. Drug therapy is considered unnecessary for the patient if there was not or there is no longer a valid medical indication for a particular drug. Unnecessary drug therapy can arise from several common causes, including the following: no medical indication, additive/recreational drug use, nondrug therapy more appropriate, duplicate therapy, and treating an avoidable adverse drug reaction [8]. Research goal was to identify unnecessary drug therapy on hospitalized geriatric patients in both government and private hospitals in Yogyakarta, Indonesia and to calculate the waste of cost spent on unnecessary drugs. The research also to investigate whether polypharmacy is a suitable indicator for occurrence of unnecessary drug therapy in a hospital sitting.

MATERIALS AND METHODS

Research type was descriptive observational. This study involved two hospitals in Yogyakarta, Indonesia. We conducted the data through review medical record in 100 geriatric patients hospitalized with inclusion criteria: patient with 65 year and above, complete medical record, patient admitted to Internal Medicine Department during 2006-2007.

Unnecessary drug therapy identified through assess the medical record especially compare

of data symptoms, diagnosis, laboratory findings with drug prescription. Unnecessary drug therapy classified as following: no medical indication, additive/ recreational drug use, nondrug therapy more appropriate, duplicate therapy, and treating an avoidable adverse drug reaction. Unnecessary drug therapy was identifying through discussion forum involve clinical pharmacist and geriatric consultant. The medications which included in unnecessary drug therapy were classified and encoded according to MIMS Indonesia 105th Ed.

In our research, use of more than five drugs has been used to describe polypharmacy. We compared two groups, group A (patients received five or less drug/day during hospitalization) and group B (patient received more than five drugs/day) with regard to number of unnecessary drug therapy. SPSS 11.5 was used to run statistical analysis. T-test independent between the two groups performed to access differences between the two group.

RESULTS AND DISCUSSION

Of the 100 selected hospitalized geriatric patients, 66 % were women and their ages range from 60 to 90 years. The majority of patient's ages were between 60-79 years old, with the average age was 71.24 $\pm$ 5.87 ($\pm$ SD) (Figure 1).
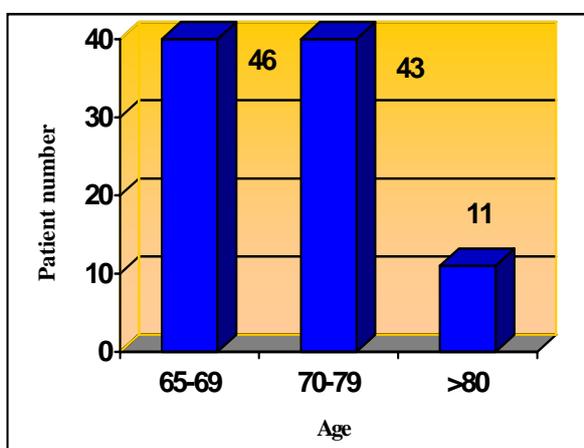
Fig. Distribution of geriatric patient age

With increasing age comes an increasing vulnerability to develop diseases and, in the elderly, the tendency to acquire multiple and chronic diseases. This population therefore is prescribed and uses more drugs than younger populations. In addition, multiple complaints, atypical disease presentation and physician prescribing habits and practices have resulted in the use of multiple drugs in these people, particularly in institutions [9]. Our study showed a total of 784 drugs were prescribed for geriatric patients during hospitalized, with range 2-20 drugs. There were 31 patients in total who were taking 10 or more medication. A lot of medication used during hospitalized might cause of changes both symptom and patient's diagnosis during hospitalization, and also large of diagnosis in elderly patients.

Elderly people receive a higher number of prescriptions in hospital and in the community than do younger patients. This research showed of the sampled geriatric hospitlalized patients, 36 patients taking more than five drug/day during hospitalization, with range 0.3 – 8.5 drug perday (Table 1). Polypharmacy is one of variables often associated with ageing, were found to be the independent predictors of adverse drug reactions (ADRs) [10]. Similar research, Larson found the potential of ADRs occurrence equal 6 % among patient who got two kinds of drug, 50 % among the patient accepting five kinds of drug, 50 % among the patient accepting five kinds of drug and 100 % at the patient accepting eight or more kinds of drug [11].

Table 1. Number of average drug prescribing /day

Average of medication used/day	Number of patients
< 1	1
1 – 1.9	4
2 – 2.9	17
3 – 3.9	19
4 – 4.9	23
5 – 5.9	11
6 – 6.9	12
7 – 7.9	9
8 – 8.9	4
Total	100

This study showed that unnecessary drug therapy occurred in 63 cases (63%) with total 117 events of unnecessary drug therapies. Frequency of unnecessary drug therapy per patient ranged from 0-6 problems. Table 2 showed the mayority causes of unnecessary drug therapy were no medical indication 89 incidences (76.0 %). Patients who are exposed to unnecessary drug therapies can only realize the toxic potential of that drug and have little or no chance of realizing any positive outcome associated with such unnecessary treatment[8].

Table 2. Types of unnecessary drug therapy on geriatric hospitalized patients

Causes of unnecessary drug therapy	Number of incidences	
	N	%
No medical indication	89	76.0
No drug therapy was more recommended	5	4.3
Duplication therapy	23	19. 7
Total	**117**	**100.0**

The agent most commonly associated with unnecessary drug therapy were drug for gastrointestinal & hepatobilliary system (ranitidine, omeprazole), antibiotics (ceftriaxone, cefotaxime, ceftazidime, ciprofloxacin), and cardiovascular and hematopoietic system (Table3).

Table 3. Distribution of medication associated with unnecessary drug therapy

Class of medication	Number of incidences	
	N	%
Cardiovascular and hematopoietic system	35	29.9
Gastrointestinal and hepatobiliary system	34	29.1
Antibiotics	20	17.1
Vitamins and minerals	8	6.8
Neuro-muscular system	6	5.1
Endocrine and metabolic system	6	5.1
Respiratory system	4	3.4
Corticosteroid hormones	3	2.6
Nutrition	1	0.9
Total	117	100

The example of unnecessary drug therapy was ranitidine prescribed to prevent side effect/prophylactic therapy in low dose aspirin in patient without peptic ulcer history. This problem classified into "prescribing cascade". The "prescribing cascade" begins when an adverse drug reaction is misinterpreted as a new medical condition. Another drug is then prescribed, and the patient is placed at risk of developing additional adverse effects relating to this potentially unnecessary treatment. To prevent the prescribing cascade, doctors should always consider any new signs and symptoms as a possible consequence of current drug treatment. Before any new drug treatment is started, the need for the drug should be re-evaluated and a non-drug treatment should be considered [12].

Unnecessary drug therapy also was caused by no medical indication for antibiotic prescribing in patient with suspect urinary tract infection and chronic obstructive pulmonary disease. In this cases antibiotic gave to patient with normal white blood count (WBC), afebrile, normal urinalysis, normal Thorax X-ray. While duplication therapy occured in usage of the same group of laxantia combination, and also antihypertension.

Our research found total expense of unnecessary drug therapy equal to Rp.12.554.279,00 (US$ 1.046,00). The majority cost of unnecessary drug therapy was antibiotics, cardiovascular-hematopoietic system, and gastrointestinal-hepatobiliary system (Table 4). The cost of unnecessary drug therapy should also be considered, because the patients must pay the direct expenses associated with the consumption of unnecessary drug therapies[8].

Table 4. Distribution of cost of medication related with unnecessary drug therapy

Class of medication	Cost of the drug (IDR)
Antibiotics	Rp. 4.701.814,00
Cardiovascular and hematopoietic system	Rp. 4.571.044,00
Gastrointestinal and hepatobiliary system	Rp. 2.486.343,00
Corticosteroid hormones	Rp. 254.344,00
Endocrine and metabolic system	Rp. 193.028,00
Respiratory system	Rp. 148.050,00
Neuro-muscular system	Rp. 131.774,00
Vitamins and minerals	Rp. 66.028,00
Nutrition	Rp. 924,00
Total	Rp. 12.553.349,00

Occurrence of unnecessary drug therapy for five drugs or less /day was less than with more than five drug/days. T test among mean of unnecessary drug therapy for five drugs or less/day (0.78 ± 0.98) with more than five drugs drug use/ day (1.91± 1.37) showed the existence of significant difference (P=0.000). The finding of our research indicates that the risks of having unnecessary drug therapy will increases with each additional drug supplied. In a prospective study, Viktil et al. reported the number of DRPs per patient was linearly related to the number of the drug used on admission[7].

Harm reduction, or risk reduction associated with all drugs, is the mandate of pharmacists

practicing pharmaceutical care. So, it is the pharmacist's responsibility to see that people are not exposed to potent drugs for which there is no valid medical indication. Data from the Minnesota Pharmaceutical Care Project indicate that 7 percent of the drug therapy problems identified and resolved by pharmacists arose when patients took medications that were not necessary[8].

CONCLUSION

Prevention of unnecessary drug therapy problem can be conducted through reduction of drug use (it is recommended to eliminate all medications without therapeutic benefit, goal or indication). Prevention of unnecessary drug therapy will also contribute in cost saving among elderly patients.

REFERENCE

1. Chin CY. The Geriatric Conference 2006. Kuala Lumpur.

2. Darmodjo RB. Trough Healthy and Active Ageing to Successful Ageing, Proceeding of National Congress III and National Scientific Meeting II PGMI (Perhimpunan Gerontologi Medik Indonesia / Association of Indonesian Medical Gerontology), Yogyakarta; 2004. p. 2-10.

3. Mustofa. Drug Use in Elderly. ISFI Bulletin Yogyakarta 1995; 2 (2) : 1-10.

4. Gallagher P, Barry P, O'Mahony. Review Article Inappropriate prescribing in the elderly. Journal of Clinical Pharmacy and Therapeutics 2007; 27: 113 – 21.

5. Kaufman DW, Kelly JP, Rosenberg L, et al. Recent Patterns of Medication Use in the Ambulatory Adult Population of the United States: The Slone Survey. JAMA 2002; 287(3):337-44 (doi:10.1001/jama. 87.3.337), accessed http://jama.ama-assn.org/cgi/content/full/287/3/337 (June 9, 2008).

6. Nolan L, O'Malley KO. Prescribing for the elderly. Part I. Sensitivity of the elderly to adverse drug reactions. J. Am Geriatr. Soc, 1998; 36: 142-49.

7. Viktil KK, Blix HS, Moger TA, Reikyam A. Polypharmacy as commonly defined is an indicator of limited value in the assessment of drug-related problems, Br J Clin Pharmacol 2006; 63 (2): 187-95

8. Cipolle RJ, Strand LM, Morley PC. Pharmaceutical Care practice. New York: McGraw-Hill; 1998. p. 85-87

9. Giron MST, Claesson C, Thorslund M, Oke T, Winblad B, Fastbom J. Drug Use Patterns in a Very Elderly Population: A Seven-Year Review. Clin Drug Invest 1999; 17(5) : 389-98

10. Hohl CM, Dankoff J, Colacone A, Afilavo M. Polypharmacy, adverse drug-related events and potential adverse drug interaction in elderly patients presenting to an emergency department. Annals of emergency medicine 2001;38: 666-71.

11. Larsen PD, Martin JH. Polypharmacy and elderly patient, AORN Journal 1999. www.findarticles.com. accessed on December 18 th , 2004.

12. Rochon PA, Gurwitz JH. Education and debate : optimising drug treatment for elderly people: the prescribing cascade. BMJ 1997; 315: 1096-99.