Use of Drugs and Adverse Reactions in Medical Inpatients

SUTTHICHAI JITAPUNKUL, M.D.*, COMSOM LERTKUPINIT, M.D.*,
AUYCHAI JONGSITIMAHAKUL, M.D.*, SUCHAI SUTEPARUK, M.D.**

Abstract

An one-day survey of 111 medical inpatients admitted to four wards of the Department of Medicine, Chulalongkorn University Hospital was conducted. Its aim was to examine the differences in medication use patterns and incidence of adverse reaction to medication between young and old patients. The mean age and its standard deviation were 43.5 and 18.2 years respectively. Common medications used by these patients were antibiotics, paracetamol, parenteral fluid, peptic ulcer and gastritis remedies, vitamin and mineral supplements, and diuretics. Compared to the young patients, the elderly patients received more prescriptions for cardiovascular drugs and diuretics while receiving fewer prescriptions for vitamin and mineral supplements. Thai elderly medical inpatients had a higher rate of adverse reaction when compared to their young counterparts. Patients who received 6 medications or more were more likely to have an adverse reaction than those who received less than 6 items. The discipline of geriatric medicine may have a role in caring for the elderly patients in medical wards. A cohort study with a larger sample for determining causes or factors associated with adverse drug reactions is needed.

Drug use in the elderly is one of the major topics in geriatric medicine. Every physician who has taken care of elderly patients has faced problems of drug use particularly a problem of adverse drug reaction. It has been well established that the incidence of adverse drug reaction is high among elderly patients[1-3]. Moreover, risk of mortality among those who have adverse reactions increases with age[2]. Exactly, why adverse drug reactions are so frequent in elderly people is a matter of some debate. Problems of adverse drug reactions in medical inpatients is not uncommon and many adverse reactions may be avoided. Although there are many studies about drug use by Thai patients, there has not been a study about adverse drug reaction among medical inpatients published[4-9]. In order to get information about patterns of drug use and adverse drug reactions in medical inpatients, a one-day survey was conducted. The present study also aimed to examine the differences in drug use patterns and the incidences of adverse reactions between young and

* Department of Medicine, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.

old patients who had been admitted to four medical wards of the department of medicine, Chulalongkorn University Hospital.

SUBJECTS AND METHOD

A one-day survey of all medical inpatients admitted to four medical wards of the department of medicine, Chulalongkorn University Hospital was conducted. All medical records were reviewed. Number and type of medications used by these patients on the day of the survey were recorded. Primary care physicians were interviewed about the adverse drug reactions of their patients which had occurred during this admission period including characteristics of adverse reactions and type of drugs. Statistically significant differences between the age groups were analyzed using chi square test or Mann Whitney-U test wherever they were appropriate. Factors associated with adverse drug reaction were analyzed. Odd's ratio and 95 per cent confidence interval were calculated to determine the strength of association[10]. SPSS-PC program was used for statistical analysis.

RESULTS

One hundred and eleven medical inpatients admitted to four medical wards were recruited for the study of which 51.4 per cent were male. Their mean age and its standard deviation (SD) were 43.5 and 18.2 years respectively. Twenty four subjects (21.6%) were aged 60 or over and classified as elderly subjects. (Table 1) The total number of medications used ranged from 0 to 17 items. Means (SD) of total, oral and parenteral medications used by these medical inpatients were 5 (3.2), 3.4 (2.7) and 1.6 (1.9) items respectively. There was no statistically significant difference between total number of medications, number of oral medications and number of parenteral medications used by the young subjects and those used by the old subjects analyzed by Mann Whitney-U test. (Table 1) The most common drug group prescribed for these medical inpatients was antibiotics. Other medications which were commonly prescribed were paracetamol, parenteral fluid, peptic ulcer and gastritis remedies, vitamin and mineral supplements, and diuretics (Table 2). Compared to the young patients, the elderly patients received more prescriptions for cardiovascular drugs ($p < 0.05$) and diuretics ($p < 0.05$) while receiving less prescriptions for vitamin and mineral supplements ($p < 0.05$).

Twenty-five subjects (22.5%) had adverse drug reactions during this admission period. The drugs which caused adverse reactions are shown in Table 3. Adverse reaction was more common among the elderly patients (33.3%) when compared with the young patients (19.5%). (Table 1) However, the difference was not statistically significant. When patients who had adverse reaction from chemotherapy and amphotericin B were excluded, there was statistical significance to the difference between the incidence of adverse reactions occurring among the elderly patients (34.8%) and those occurring among the young patients (11.7%) ($p < 0.05$). The odd's ratio and its 95 per cent confidence interval were 4 and 1.3-12.2 respectively. No association between sex and incidence of adverse drug reaction was found. Adverse drug reaction occurred more often in subjects who received 6 items of medication or more (32.4%) than in the subjects who received less than 6 items of medication (11.1%) ($p < 0.05$). The odd's ratio and its 95 per cent confidence interval were 3.8 and 1.3-11.2 respectively.

DISCUSSION

The study design used in this study was the one-day survey which had been used in our

Table 1. Characteristics and reported adverse reactions of 111 medical inpatients by age group.

	Young patients (n = 87)		Elderly patients (n = 24)	
Mean age (standard deviation)	36.1	(11.9)	70.5	(9.1)
% male	56.3		33.3	
Mean total drug use (standard deviation)	5	(3.4)	4.7	(2.4)
Mean oral drug use (standard deviation)	3.4	(2.8)	3.4	(2.5)
Mean intravenous drug use (standard deviation)	1.6	(2)	1.3	(1.3)
Number (%) of adverse reactions	17	(19.5)	8	(33.3)

Table 2. Medications used in the medical inpatients by age group.

Group of medications	Young patients n	(%)	Elderly patients n	(%)
Cardiovascular agents*	7	(8)	7	(29.2)
Anti-hypertensive agents	8	(9.2)	6	(25)
Diuretics*	12	(13.8)	11	(45.8)
Sedatives-hypnotics	13	(14.9)	0	
Anti-depressants	6	(6.9)	1	(4.2)
Major tranquilizers	1	(1.1)	0	
Amphotericin B	4	(4.6)	0	
Aminoglycosides	17	(19.5)	3	(12.5)
Other antibiotics	51	(58.6)	12	(50)
Oral hypoglycemic agents	1	(1.1)	2	(8.3)
Insulin	7	(8)	4	(16.7)
Vitamin and/or minerals*	28	(32.2)	2	(8.3
Parenteral fluids	26	(29.9)	8	(33.3)
NSAIDs	3	(3.4)	0	
Narcotics	8	(9.2)	1	(4.2)
Paracetamol	40	(46)	8	(33.3)
Peptic ulcers or gastritis remedies	26	(29.9)	7	(29.2)
Steroids	13	(14.9)	2	(8.3)
Chemotherapy	5	(5.7)	0	
Others	42	(48.2)	10	(41.7)
Total	87	(100)	24	(100)

* $p < 0.05$

Table 3. Drugs with adverse reactions used in medical inpatients by age group.

Drugs which caused adverse drug reactions	Young patients n (% of prescriptions)	Elderly patients n (% of prescriptions)
digoxin*	-	2 (50)
coumadin*	-	2 (66.7)
diuretics	-	1 (9.1)
insulin*	-	1 (25)
anticholinergics	-	1 (50)
KCl solution*	-	1 (33.3)
chemotherapy	5 (100)	-
amphotericin B	4 (100)	-
aminoglycosides*	1 (5.9)	-
others antibiotics (cloxacillin, cefazolin)	3 (5.9)	-
ACE inhibitor	1 (20)	-
packed red cell	1 (9.1)	-
steroid	1 (7.7)	-
aspirin	1 (33.3)	-

* related to overdose

previous study(11). We preferred this design to a retrospective study design in which the data about adverse drug reactions would be obtained from medical records because adverse reactions were sometimes not recorded. Although a cohort study is the best methodology, it consumes resources and time. Therefore, we hoped to get some useful information from this study and then plan a proper cohort study for the future.

In this population, no difference between number of medications used in the elderly and the young subjects were found. A probable explanation was the medical inpatients of the department of medicine, Chulalongkorn University Hospital were

admitted because of acute illnesses and the majority of the medications were prescribed for these acute illnesses. Common medications used in this population were antibiotics, paracetamol and intravenous fluids which suggested that a large portion of the subjects were treated for infections. We were surprised at the finding that fever vitamins and minerals were prescribed for the elderly subjects than for the young subjects. It has been reported that the elderly inpatients have a high risk of malnutrition during their hospitalization period[12-19] and need nutritional support including vitamins and minerals as early as possible. This might be indirect evidence of under recognition or a lack of awareness about the risk of nutritional problems among elderly medical inpatients.

Although the rate of adverse reaction in this population study was rather high, the problem of under reportage could not be excluded. It has been reported that under reporting is common[20]. The types of reaction which are probably under reported are dizziness, falls, confusional state, drowsiness, orthostatic hypotension, dehydration, electrolyte disturbances, dry mouth, constipation, upper gastro-intestinal tract upset and urinary problems.

The incidence rate of adverse drug reaction among the elderly patients was higher than that of the young patients. In the analysis, subjects receiving chemotherapy or amphotericin B were excluded because every patient who receives these medications will automatically have adverse drug reactions. Apart from age, the risk factors of adverse drug reaction among this population was the total number of drugs used which had been reported previously[2]. To determine risk factors and the outcome of adverse drug reaction in medical inpatients, a cohort study with a larger sample is recommended.

It was noted in this study that not only the number of medications used but also the overdosage of medications used, was associated with adverse drug reactions. Our findings suggested that physicians who take care of elderly inpatients in medical wards have to be concerned and must be aware of the risk of adverse drug reactions. Geriatric medicine may play a role in caring for elderly patients in medical wards which was confirmed in the previous study conducted in this institute[21, 22]. Primary care physicians in the medical department should be educated about this discipline in order to reduce the risk of serious adverse reactions and the avoidable consequences.

SUMMARY

A one-day survey of drug use and adverse reaction in medical inpatients admitted to the department of medicine, Chulalongkorn University Hospital demonstrated that the elderly patients had a statistically significant higher incidence rate of adverse drug reaction than the young patients. The number of medicines taken is associated with the risk of adverse drug reaction. Our findings suggested that there is scope for the provision of geriatric medicine at the primary care level of the department of medicine. Primary care physicians in this medical department should be educated about this discipline in order to reduce the risk of serious adverse reactions and the avoidable consequences to their medical inpatients. A cohort study with a larger sample group is recommended.

(Received for publication on September 26, 1996)

REFERENCES

1. Hurwitz N. Predisposing factors in adverse reaction to drugs. Br Med J 1969; 1: 536-9.
2. Castleden CM, Pickles H. Suspects adverse drug reactions in elderly patients reported to the Committee on Safety of Medicines. Br J Clin Pharmacol 1988; 26: 347-53.
3. Cluff LE, Thornton GF, Seidl LS, Smith JW. Epidemiological study of adverse drug reactions. Trans Assoc Am Physicians 1965; 78: 255-68.
4. Satyapan N, Lolekha S. Adverse drug reaction of Chloramphenicol in Thai patients. Ramathibodi Med J 1983; 6: 246-52.
5. Makarananda K, Sriwatanakul K, Charoonroj P, Pongprayoon U, Pothisiri P, Eamrungroj S. Prospective study of adverse drug reactions of antihypertensive drugs in Thai outpatients. J Med Assoc Thai 1985; 68: 229-36.
6. Yanapirut P, Sriwatanakul K. Prospective study of adverse reactions of anticancer drugs in Thai patients. J Med Assoc Thai 1987; 70: 448-54.
7. Suriyachan D, Satyapan N, Pulsri Y, Singhakowinta A. Adverse drug reactions of angiotensin converting enzyme inhibitors in Thai patients. Royal Thai Army Med J 1993; 46: 153-9.
8. Mek-aroonrungcharoen S. Adverse drug reaction monitoring in Chaopraya Apaiphubeth hospital. J Chaopraya Apaiphubeth 1993; 10: 9-21.
9. Weerutamasaen P. Incidence rate of couple drugs that might cause drug interactions in outpatients of Chaoprayayommaraj Hospital, Suphanburi by number of drug items. Bull Dept Med Serv 1994; 19: 460-4.
10. Morris JA, Gardner MJ. Calculating confidence intervals for relative risks, odds ratios, and standardised ratios and rate. In: Gardner MJ, Altman DG (eds). Statistics with Confidence - Confidence intervals and statistical guidelines. London, British Medical Journal 1989, p 50-63.
11. Thampreechavai S, Somerville K, Jitapunkul S, Bunnag S, Ebrahim S. Elderly bed-blockers in a Thai teaching hospital : is it a problem? J Med Assoc Thai 1992; 75: 418-22.
12. Potter J, Klipstein K, Reilly JJ, Roberts M. The nutritional status and clinical course of acute admissions to a geriatric unit. Age Ageing 1995; 24: 131-6.
13. Lipski PS, Torrance A, Kelly PJ, James OFW. A study of nutritional deficits of long-stay geriatric patients. Age Ageing 1993; 22: 244-55.
14. Friedman PJ, Campbell AJ, Caradoc-Davies TH. Prospective trial of a new diagnostic criterion for severe wasting malnutrition in the elderly. Age Ageing 1985; 4: 149-54.
15. McEvoy A, Dutton J, James OFW. Bacterial contamination of the small intestine is an important cause of occult malabsorption in the elderly. Br Med J 1983; 287: 789-93.
16. Kemm JR, Allcock J. The distribution of supposed indicators of nutritional status in elderly patients. Age Ageing 1984; 13: 21-8.
17. Friedman PJ, Campbell AJ, Caradoc-Davies TH. Hypoalbuminaemia in the elderly is due to disease not malnutrition. J Clin Exp Gerontol 1985; 7: 191-204.
18. Albin N, Asplund K, Bjermer L. Nutritional status of medical patients on emergency admission to hospital. Acta Med Scand 1982; 212: 151-6.
19. Anderson NI, Campbell AER, Dunn A, Runciman JBM. Osteomalacia in elderly women. Scott Med J 1966; 11: 429-35.
20. Somerville K, Faulkner G, Langman M. Non steroidal anti-inflammatory drugs and bleeding peptic ulcer. Lancet 1986; 1: 462-4.
21. Jitapunkul S, Nuchprayoon C, Aksaranugraha S, et al. A controlled clinical trial of multidisciplinary team approach and strengthened physician-nurse collaboration in general medical wards of a Thai acute care hospital. J Med Assoc Thai 1995; 78: 618-23.
22. Jitapunkul S, Bunnag S. Death and discharge from the Department of Medicine, Chulalongkorn Hospital. Chula Med J 1992; 36: 839-44.

การใช้ยาและผลข้างเคียงในผู้ป่วยในอายุรกรรม

สุทธิชัย จิตะพันธ์กุล, พ.บ., คมสันต์ เลิศคูพินิจ, พ.บ.*,*
อวยชัย จองสิทธิมหากุล, พ.บ., สุชัย สุเทพารักษ์, พ.บ.*,*

การสำรวจหนึ่งวันในผู้ป่วยอายุรกรรมจำนวน 111 คนที่เข้ารับการรักษาในหอผู้ป่วยจำนวน 4 หอของแผนกอายุรศาสตร์โรงพยาบาลจุฬาลงกรณ์โดยมีจุดมุ่งหมายที่จะศึกษาความแตกต่างของการใช้ยาและอุบัติการณ์ของผลข้างเคียงระหว่างผู้ป่วยอายุน้อยและผู้ป่วยอายุมาก ค่าอายุเฉลี่ยและค่าเบี่ยงเบนมาตรฐานของประชากรศึกษาเท่ากับ 43.5 และ 18.2 ปีตามลำดับ ยาที่ใช้บ่อยในผู้ป่วยเหล่านี้ได้แก่ยาปฏิชีวนะ ยาพาราเซตตามอล น้ำเกลือและของเหลวที่ให้ทางหลอดเลือดดำ ยารักษาแผลเป็ปติกและแผลในกระเพาะอาหาร วิตามินและแร่ธาตุ และยาขับปัสสาวะ เมื่อเปรียบเทียบกับผู้ป่วยอายุน้อยผู้ป่วยสูงอายุได้รับยารักษาโรคหัวใจและหลอดเลือดและยาขับปัสสาวะมากกว่าในขณะที่ได้รับวิตามินและแร่ธาตุน้อยกว่า ผู้ป่วยสูงอายุมีอุบัติการณ์ของผลข้างเคียงมากกว่าผู้ป่วยอายุน้อยอย่างมีนัยสำคัญทางสถิติ ผู้ป่วยที่ได้รับยาตั้งแต่ 6 ชนิดมีอุบัติการณ์ของผลข้างเคียงสูงกว่าผู้ป่วยที่ได้รับยาน้อยกว่า 6 ชนิด เวชศาสตร์ผู้สูงอายุน่าจะมีบทบาทในการดูแลรักษาผู้ป่วยสูงอายุในแผนกอายุรกรรม การศึกษาระยะยาวในขนาดประชากรที่ใหญ่ขึ้นเพื่อหาสาเหตุหรือปัจจัยเสี่ยงของผลข้างเคียงจากยามีความจำเป็น

* ภาควิชาอายุรศาสตร์, คณะแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย, กรุงเทพ ฯ 10330