

Health Care Utilization of Home Care Patients at an Academic Medical Center in Taiwan

Yu-Ching Chou¹, Liang-Kung Chen^{2,3}, Yu-Ju Lin⁴, Li-Fang Chou⁵,
Tzeng-Ji Chen^{2,3*}, Shinn-Jang Hwang^{2,3}

¹Department of Family Medicine, Yuan-Shan Veterans Hospital, Ilan, ²Department of Family Medicine, Taipei Veterans General Hospital, ³School of Medicine, ⁴Institute of Health and Welfare Policy, National Yang-Ming University, and ⁵Department of Public Finance, National Chengchi University, Taipei, Taiwan, R.O.C.

Background: Previous surveys of home care patients in Taiwan have primarily concentrated on patients' status and needs. The aim of this study was to review the actual health care utilization of home care patients during the course of 1 year.

Methods: Home care patients at an academic medical center in Taiwan were selected and their insurance claims data at this hospital in 2001 were analyzed. Analyses included the patients' patterns and diagnoses of visits and admissions, and their drug utilization. For diagnoses made at outpatient departments, the grouping system from the National Hospital Ambulatory Medical Care Survey in the United States was used. The Anatomical Therapeutic Chemical Classification system was applied to drug grouping.

Results: The home care agency of the hospital cared for 165 patients (66 women, 99 men) in 2001. In total, these 165 patients received 1,358 home visits, 2,751 outpatient visits, and 108 inpatient admissions. While the most frequent diagnoses for all visits were cerebrovascular disease, hypertension, diabetes mellitus, chronic and unspecified bronchitis, psychoses, and other disorders of the central nervous system, the most frequent diagnoses at discharge from the hospital were urinary tract infection and pneumonia. In all visits, 12,282 items of drugs were prescribed in 2,337 prescriptions. On average, each prescription contained 5.3 ± 2.8 items of drugs. The most frequently prescribed drugs were antacids, expectorants, laxatives, selective calcium channel blockers, and antithrombotic agents.

Conclusion: The home care agency of the hospital should pay more attention to provision of comprehensive care and review of drug prescribing. [*J Chin Med Assoc* 2006;69(11):523–528]

Key Words: academic medical centers, health care surveys, home care, long-term care, Taiwan

Introduction

The delivery of home care services is an important part of both the medical care system and the long-term care system. In Taiwan, the percentage of elderly people in the population increased from 2.5% in 1951 to 7.8% in 1996, and is expected to be 21.7% in 2036.¹ The number of dependent elderly persons with ≥ 2 impaired activities of daily living is estimated to increase from 60,900 in 1995 to 141,700 in 2020, and 252,700 in 2035.² Currently, patients served by home care agencies in Taiwan are usually bed-bound with limited self-care ability because of various underlying illnesses. On the other hand, 90% of the home

care agencies belong to hospitals, 4.3% to public health stations, 2.2% to nursing homes, and 3.2% are independent. These agencies are not equally distributed throughout large cities and rural areas.³ Previous studies of home care services in Taiwan primarily concentrated on assessment of needs,^{4,5} health status,⁶ costs,⁷ and quality of services.³ There is a lack of studies on the actual health care utilization of home care patients in Taiwan. A detailed report of the current situation would help health care providers and health policymakers identify deficiencies and develop a comprehensive plan.

The aim of this study was to survey the health care utilization of patients in a home care agency of an

*Correspondence to: Dr Tzeng-Ji Chen, Department of Family Medicine, Taipei Veterans General Hospital, 201, Section 2, Shih-Pai Road, Taipei 112, Taiwan, R.O.C.

E-mail: tjchen@vghtpe.gov.tw • Received: November 10, 2005 • Accepted: July 20, 2006

Table 1. Characteristics and health care utilization of home care patients

Age group (yr)	Patients, n (%)			Visits, n (%)	Admissions, n (%)
	Women	Men	Total		
<60	5	12	17 (10.3)	352 (8.6)	13 (12.0)
60–69	7	14	21 (12.7)	535 (13.0)	8 (7.4)
70–79	24	48	72 (43.6)	1,903 (46.3)	48 (44.4)
80–89	26	22	48 (29.1)	1,105 (26.9)	35 (32.4)
≥90	4	3	7 (4.2)	214 (5.2)	4 (3.7)
Total	66	99	165 (100.0)	4,109 (100.0)	108 (100.0)

academic medical center in Taiwan. Analyses included the diagnoses, drug use, and admissions of these patients.

Methods

The academic medical center of the current study is the largest public hospital in Taipei, Taiwan, and is a major teaching hospital affiliated with several medical schools. It has 2,800 inpatient beds and a polyclinic with an average of 10,000 outpatients daily. Nearly all patients are insured under the National Health Insurance (NHI) program in Taiwan. We enrolled all the active patients of the hospital-based home care agency from January 1, 2001 to December 31, 2001. These patients received regular home visits by physicians and nurses from the department of family medicine of the hospital.

NHI claims data of the enrolled patients in the hospital in 2001 were used for analysis. The claims included visit, admission, and prescription files. The visit file recorded encounter data such as the patient's sex, birthday, physician's specialty, date of consultation, and up to 3 diagnoses coded according to the International Classification of Disease, 9th revision, Clinical Modification (ICD-9-CM) for each visit. The admission file can include 5 diagnoses for each admission. Because the ICD-9-CM contains more than 15,000 codes, the analysis would be less feasible without prior grouping. For the outpatient sector, we adopted the grouping system specifically developed by the National Ambulatory Medical Care Survey in the USA, where all diagnostic codes were reclassified into 194 diagnosis groups.⁸ For the inpatient sector, we grouped the diagnoses according to the first 3 digits of each ICD-9-CM code. The prescription file contained data of prescribed drugs such as drug name, dosage, route, frequency, amount, and costs in each visit and admission. Drugs were classified according to the Anatomical Therapeutic Chemical (ATC) Classification system.⁹

The claims data used in the current study were not limited to the services provided by the home care agency of the hospital. They included all kinds of services provided by the health care professionals of the hospital. The insurance claims served for and did not contain information about the patient's activities of daily living.

Microsoft Access 2000 database software was used for data linkage and processing. The plain descriptive statistics including the count, mean, standard deviation (SD), and percentage were calculated. Because the annual number of visits varied from patient to patient, and a patient with more than 1 visit might be repeatedly counted in the visit-based calculation, the denominators of analyses included both total number of visits and total number of patients.

Results

In 2001, home care services of the hospital were offered to 165 patients (66 women, 99 men). Mean patient age was 72.0 ± 13.6 years (range, 23–96 years), and 9-tenths of the patients were older than 60 years (Table 1).

Apart from the 1,358 home visits provided by the department of family medicine, the patients also made 2,751 visits to other specialties of the hospital during the year. The 5 most frequent departments of outpatient visits were the departments of neurology (304 visits by 49 patients), general internal medicine (194 visits by 81 patients), dermatology (124 visits by 20 patients), cardiology (119 patients by 19 patients), and urology (79 visits by 10 patients). Diagnoses of cerebrovascular diseases were specified in 2-fifths of all visits by 2-thirds of patients. Other frequent diagnoses included essential hypertension, diabetes mellitus, chronic and unspecified bronchitis, psychoses, and other disorders of the central nervous system (Table 2).

Among the home care patients, 72 (43.6%) patients were admitted to the hospital, with a total of 108 admissions during the year. Twenty departments took

Table 2. Distribution of illnesses and visits of home care patients

Diagnosis group*	Patients (n = 165) n (%)	Visits (n = 4,109) n (%)	Visits per patient [†]
Cerebrovascular disease	110 (66.7)	1,726 (42.0)	15.7 ± 9.3
Potential health hazards related to communicable diseases	106 (64.2)	110 (2.7)	1.0 ± 0.4
Essential hypertension	75 (45.5)	768 (18.7)	10.2 ± 7.8
Diabetes mellitus	52 (31.5)	649 (15.8)	12.5 ± 9.6
Chronic and unspecified bronchitis	52 (31.5)	464 (11.3)	8.9 ± 5.3
Pneumonia	52 (31.5)	250 (6.1)	4.8 ± 5.0
Other psychoses	48 (29.1)	541 (13.2)	11.3 ± 8.1
Other disorders of the central nervous system	42 (25.5)	587 (14.3)	14.0 ± 7.7
Other heart disease	39 (23.6)	341 (8.3)	8.7 ± 5.9
Urinary tract infection, site unspecified	39 (23.6)	156 (3.8)	4.0 ± 3.9

*Grouping according to Reference 8; [†]data presented as mean ± standard deviation.

Table 3. Distribution of illnesses and admissions of home care patients

ICD-9-CM*	Diagnosis group	Admissions (n = 108) n (%)	Patients (n = 165) n (%)
599	Other disorders of urethra and urinary tract	39 (36.1)	29 (17.6)
486	Pneumonia, organism unspecified	33 (30.6)	26 (15.8)
401	Essential hypertension	32 (29.6)	27 (16.4)
250	Diabetes mellitus	32 (29.6)	24 (14.5)
438	Late effects of cerebrovascular disease	28 (25.9)	25 (15.2)
290	Senile and presenile organic psychotic conditions	13 (12.0)	13 (7.9)
331	Other cerebral degenerations	9 (8.3)	5 (3.0)
518	Other diseases of the lung	8 (7.4)	8 (4.8)
434	Occlusion of cerebral arteries	8 (7.4)	7 (4.2)
582	Chronic glomerulonephritis	8 (7.4)	6 (3.6)
348	Other conditions of brain	8 (7.4)	5 (3.0)
428	Heart failure	8 (7.4)	4 (2.4)
427	Cardiac dysrhythmias	7 (6.5)	5 (3.0)
276	Disorders of fluid, electrolyte, and acid-base balance	6 (5.6)	6 (3.6)
342	Hemiplegia	6 (5.6)	6 (3.6)
707	Chronic ulcer of skin	6 (5.6)	6 (3.6)
788	Symptoms involving urinary system	6 (5.6)	4 (2.4)
038	Septicemia	5 (4.6)	5 (3.0)
507	Pneumonitis due to solids and liquids	5 (4.6)	5 (3.0)
578	Gastrointestinal hemorrhage	5 (4.6)	5 (3.0)
496	Chronic airway obstruction, not elsewhere classified	5 (4.6)	4 (2.4)
402	Hypertensive heart disease	5 (4.6)	3 (1.8)
600	Hyperplasia of prostate	5 (4.6)	3 (1.8)

*Grouping according to the first 3 digits of the ICD-9-CM. ICD-9-CM = International Classification of Diseases, 9th Revision, Clinical Modification.

part in the inpatient care. The top 5 specialties of admissions were the departments of chest medicine (18 admissions), neurology (16), infectious diseases (12), family medicine (11), and urology (7). The most frequent diagnoses at discharge from hospital were urinary tract infection and pneumonia (Table 3).

In total, 12,282 items of drugs were prescribed in 2,337 prescriptions at the outpatient departments for all home care patients. On average, each prescription contained 5.3 ± 2.8 items of drugs. Expressed in the third

level of ATC drug classification, the most frequently prescribed drugs for all patients were antacids, expectorants, laxatives, selective calcium channel blockers, and antithrombotic agents (Table 4).

Discussion

A survey in the United States showed that family physicians did more home visits than internists.¹⁰ There

Table 4. Drug utilization at the outpatient departments by the third level of Anatomical Therapeutic Chemical (ATC) Classification

ATC code	Group name	Prescribed items (n = 12,282) n (%)	Prescriptions* (n = 2,337) n (%)	Patients (n = 165) n (%)	Prescriptions per patient [†]
A02A	Antacids	1,337 (10.9)	1,219 (52.2)	136 (82.4)	9.0 ± 4.9
R05C	Expectorants, excl. combinations with cough suppressants	856 (7.0)	784 (33.5)	105 (63.6)	7.5 ± 4.2
A06A	Laxatives	799 (6.5)	775 (33.2)	89 (53.9)	8.7 ± 4.6
C08C	Selective calcium channel blockers with mainly vascular effects	551 (4.5)	545 (23.3)	59 (35.8)	9.2 ± 4.0
B01A	Antithrombotic agents	534 (4.3)	481 (20.6)	56 (33.9)	8.6 ± 4.0
N03A	Antiepileptics	443 (3.6)	383 (16.4)	42 (25.5)	9.1 ± 4.1
A10B	Oral blood glucose lowering drugs	389 (3.2)	297 (12.7)	32 (19.4)	9.3 ± 3.8
S01A	Anti-infectives	375 (3.1)	362 (15.5)	61 (37.0)	5.9 ± 4.5
D07A	Corticosteroids, plain	336 (2.7)	325 (13.9)	56 (33.9)	5.8 ± 4.7
C04A	Peripheral vasodilators	335 (2.7)	319 (13.6)	38 (23.0)	8.4 ± 4.2
C09A	ACE inhibitors, plain	299 (2.4)	299 (12.8)	32 (19.4)	9.3 ± 3.6
N02B	Other analgesics and antipyretics	255 (2.1)	250 (10.7)	67 (40.6)	3.7 ± 3.2
C07A	Beta blocking agents	250 (2.0)	250 (10.7)	34 (20.6)	7.4 ± 4.4
R06A	Antihistamines for systemic use	250 (2.0)	198 (8.5)	45 (27.3)	4.4 ± 5.0
R05F	Cough suppressants and expectorants, combinations	247 (2.0)	245 (10.5)	56 (33.9)	4.4 ± 3.7
N05A	Antipsychotics	232 (1.9)	219 (9.4)	26 (15.8)	8.4 ± 4.7
N06A	Antidepressants	208 (1.7)	188 (8.0)	21 (12.7)	9.0 ± 4.3
A03F	Propulsives	207 (1.7)	203 (8.7)	33 (20.0)	6.2 ± 4.7
C01D	Vasodilators used in cardiac diseases	201 (1.6)	191 (8.2)	22 (13.3)	8.7 ± 4.7
R03C	Adrenergics for systemic use	198 (1.6)	182 (7.8)	25 (15.2)	7.3 ± 4.0
N05B	Anxiolytics	190 (1.5)	188 (8.0)	32 (19.4)	5.9 ± 4.3
R03D	Other anti-asthmatics for systemic use	173 (1.4)	173 (7.4)	26 (15.8)	6.7 ± 4.0
A07F	Antidiarrheal microorganisms	157 (1.3)	157 (6.7)	18 (10.9)	8.7 ± 4.1
D01A	Antifungals for topical use	150 (1.2)	140 (6.0)	28 (17.0)	5.0 ± 3.6
J01E	Sulfonamides and trimethoprim	135 (1.1)	135 (5.8)	34 (20.6)	4.0 ± 3.3
N04B	Dopaminergic agents	127 (1.0)	99 (4.2)	10 (6.1)	9.9 ± 3.3
J01C	Beta-lactam antibacterials, penicillins	124 (1.0)	120 (5.1)	39 (23.6)	3.1 ± 2.2
N05C	Hypnotics and sedatives	119 (1.0)	118 (5.0)	17 (10.3)	6.9 ± 5.1
G04C	Drugs used in benign prostatic hypertrophy	117 (1.0)	117 (5.0)	14 (8.5)	8.4 ± 4.8
J07B	Viral vaccines	105 (0.9)	105 (4.5)	105 (63.6)	1.0 ± 0.0
M02A	Topical products for joint and muscular pain	101 (0.8)	101 (4.3)	25 (15.2)	4.0 ± 4.0

*A prescription might contain several drug items from the same group; [†]data presented as mean ± standard deviation.

is no similar study in Taiwan. At the academic medical center of our study, home visits to home care patients were generally offered by physicians and nurses of the department of family medicine. Most of these home care patients were either immobile or had limited activities of daily living. But, the outpatient visits at other specialties among these patients were twice the number of home visits. Patients in Taiwan have the right to free access to specialists without referrals. Even though an outpatient visit might be a referral from the physicians and nurses of the home care agency, the total number of outpatient visits to specialists seemed too high. Besides the multi-morbidity of patients, the

competence of home care agencies in providing comprehensive care needs further examination.

The kinds of illnesses requiring medical help are associated with underlying diseases. For example, falls, urinary tract infection, and chest infection are the most common complications after acute stroke.¹¹ In our study, we could observe similar associations. Two-thirds of our patients had a diagnosis of cerebrovascular disease. Because physicians might not code the preexisting diseases in visits for other problems, the actual percentage of patients with cerebrovascular disease may have been higher. On the other hand, urinary tract infection and pneumonia were the most

frequent diagnoses of admissions. More attention should be paid to Foley care and respiratory care in home care patients.

In our study, antacids were prescribed frequently. Although antacids are not prescription-only drugs, they were reimbursed by the NHI in Taiwan before October 2005. It was reported that 2-fifths of prescriptions in Taiwan contained antacids and the percentage was as high as 87% in prescriptions with non-steroidal anti-inflammatory drugs (NSAIDs).¹² But the concomitant prescribing of antacids and NSAIDs is not a good explanation of the use of antacids in our study because oral NSAIDs were seldom prescribed to our patients. The use of antacids might be partly attributable to the fact that magnesium compounds were usually taken as laxatives.

According to previous surveys of nursing homes in other developed countries, psychotropic drugs were prescribed most frequently, and the prevalence of psychotropic drug use among nursing home residents varied from 20% to 50%.^{13,14} In our study, we calculated the use of separate groups of psychotropic drugs: anti-psychotics (15.8% of patients), anxiolytics (19.4%), hypnotics (10.3%), antidepressants (12.7%), and anti-epileptics (25.5%). These data seem to be comparable to the results of other studies. The prevalence of psychotropic drug use within the NHI in Taiwan was estimated to be 9.2% in 2000.¹⁵ It seems that the consumption of psychotropic drugs in our home care patients is higher than that in the general population.

Annual influenza vaccination could lower morbidity and mortality in high-risk elderly.¹⁶ In Taiwan, people older than 65 years, nursing home residents, and those with diabetes, cardiovascular disease, chronic pulmonary disease, chronic renal disease, and other immunocompromised diseases have been able to receive free annual influenza vaccination provided by the government since 1998. In our study, only 63.6% of the home care patients received vaccination at our hospital during the year. The cause for incomplete coverage could be either refusal by patients or vaccination at other clinics, e.g. public health station.

As a survey of the insurance claims, our current investigation had some limitations. First, patients' complaints, symptoms, or other reasons for the visit were absent in the NHI claims. They could be inferred only from the diagnoses. Second, the diagnostic codes served for reimbursement and were seldom verified. Overdiagnosing in the form of tentative diagnosis could not be ruled out. On the other hand, the outpatient claims contained only 3 diagnostic codes for each consultation and the inpatient claims only 5 for each admission. Not every underlying medical illness may have

been coded and there may have been underdiagnosis. Third, the prescription of drugs might only represent the prescribing behavior of physicians. The claims cannot differentiate between a physician's professional judgment and the patient's request. The prescription of antacids is an example. However, an approach with uniform electronic datasets remains a practical and objective method.

Our study was based on patients at an academic medical center. Our results might not be representative of the national situation in Taiwan. Besides, any change in the criteria for patient enrollment within the NHI would influence the content of home care services. Because the academic medical centers in Taiwan currently play a large part in outpatient and inpatient health care, our experiences should still be of value to co-workers in related areas.

In conclusion, there is room for improvement in the home care agency of the hospital to provide comprehensive care. More attention needs to be paid to urinary tract infection and pneumonia, as the most common diagnoses of admissions, in the care of home care patients in future. Polypharmacy is another issue that deserves further investigation. A system of routine monitoring and benchmarking might help to guarantee a high quality of care.

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