

A STUDY ON THE USE OF A COMMUNITY HOSPITAL EMERGENCY ROOM BY DIABETIC PATIENTS

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In order to find out the frequency and cost of diabetic patients visited the emergency room (ER) of a community hospital, we collected data of Provincial Tao-yuan Hospital from July 1, 1986 through June 30, 1987. There were 332 visits of diabetic patients, which occupied 1.05% of the total ER visits. The mean age of patients was 63.6 years and 34.9% of them were above the age of 70. About 43.0% of diabetics in this study resided in Tao-yuan and Chung-li cities, where the transportation between these two cities and the hospital was very convenient. The true emergency rate was extremely high among diabetic patients (84%), especially in the older age group. It reminded the doctors to pay more attention to the diabetic patients in the ER service. Among the diabetics, except 15 cases (4.5%) of surgical problem, the remaining 317 cases (95.5%) were related with problems of internal medicine. Metabolic, gastrointestinal and urological disorders were the three most important disease categories led diabetic patients to visit ER. Hypoglycemia was the first leading diagnosis of visits and 65.1% of them occurred in the patients treated with oral hypoglycemic agents. Health education in this field including prevention, recognizing symptoms, early detection and management should be strengthened. About 33.4% of patients were admitted to ward for further care and their medical cost was significantly higher than those treated at ER only. Among the diabetics visited ER, 18.7% did not receive any treatment before, and 40.1% of the diabetic patients having treated with oral hypoglycemic agent or insulin did not receive regular follow-up. How to upgrade the compliance of diabetic patients is a challenging issue to all of the medical personnels.

Key words: *diabetes mellitus, emergency service, community hospital.*

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Introduction

Emergency Room (ER) visiting in Taiwan has increased greatly in the last 30 years [1-5]. This trend was also noted in the Western countries [6-10]. The reasons for this increase are suggested as follows: (1) The ER is better equipped than the offices of private physicians and opened to service 24 hours a day. (2) Medical expense at ER is usually covered by the insurance plans. (3) Hospital ER has become the medical care center for those patients who have no other source of care [1, 2, 6]. These factors have led to an increase in ER visiting by those patients even without emergent illness. In fact, truly emergent cases accounted for 20-30% and 50-70% of all ER visits in the Western countries and Taiwan, respectively [3, 4, 9, 11].

The acute and chronic complications of diabetes mellitus frequently drive the patients to visit ER. This survey was undertaken to figure out the nature of ER visit of diabetic patients, the true emergency rate and the medical cost of their visits. In addition, hospital admission through ER was studied to investigate the role of ER service in diabetes-related admission.

Materials and Methods

ER visiting was studied at the Provincial Tao-yuan General Hospital in Tao-yuan, Taiwan from July 1, 1986 through June 30, 1987. The Provincial Tao-yuan General Hospital is a 500-bed community hospital that provides emergency service for approximately 1.2 million inhabitants of Tao-yuan county. During the period of this study, there were another two large ER run by private general hospitals in this area.

Based on Dr. Gibson's suggestion that the ER questionnaire should take as less time, resources, and expertise as possible, we designed a comprehensive simple-choice

questionnaire to collect basic information of patients [12]. Before conducting this study, communication with ER nurses was held several times to make sure that they all understood the purpose of this study and the content of questionnaire. The remaining data included cost, time of visit, outcome of patients, discharge and etc. were traced by two assistants.

In order to compare daily visiting time between diabetic patients and the remaining patients, a modified random sample of 20 days, which fulfilled the criteria of U.S. Public Health Service, was analyzed [12]. Medical records of all diabetic patients were reviewed and divided into true emergency and nonemergency cases. Those fitted the emergency criteria of Taoyuan General Hospital were deemed as true emergency cases. It was audited by a participating physician and then rechecked by the other physician.

The case definition of diabetes mellitus was a statement of the presence of diabetes by the patients or the attending physician and further verified by the determination of blood glucose. The medical records of new cases were re-evaluated by a physician using WHO criteria.

The diagnosis of all diabetic patients was abstracted from medical records and coded according to International Classification of Disease 9-Clinical Modification.

The mean duration of stay at the hospital and the comparison of medical cost between the patients admitted to ward via ER and those treated at ER only were also conducted. The data were analysed by student's t-test and chi-square test.

Results

1. Basic features of patients

During the period of study, there were 332 visits of diabetic patients, which accounted 0.91 visit per day. The mean age of the patients was 63.6 years and 34.9% of them were above the age of 70. Table 1 shows the basic characteristics of patients.

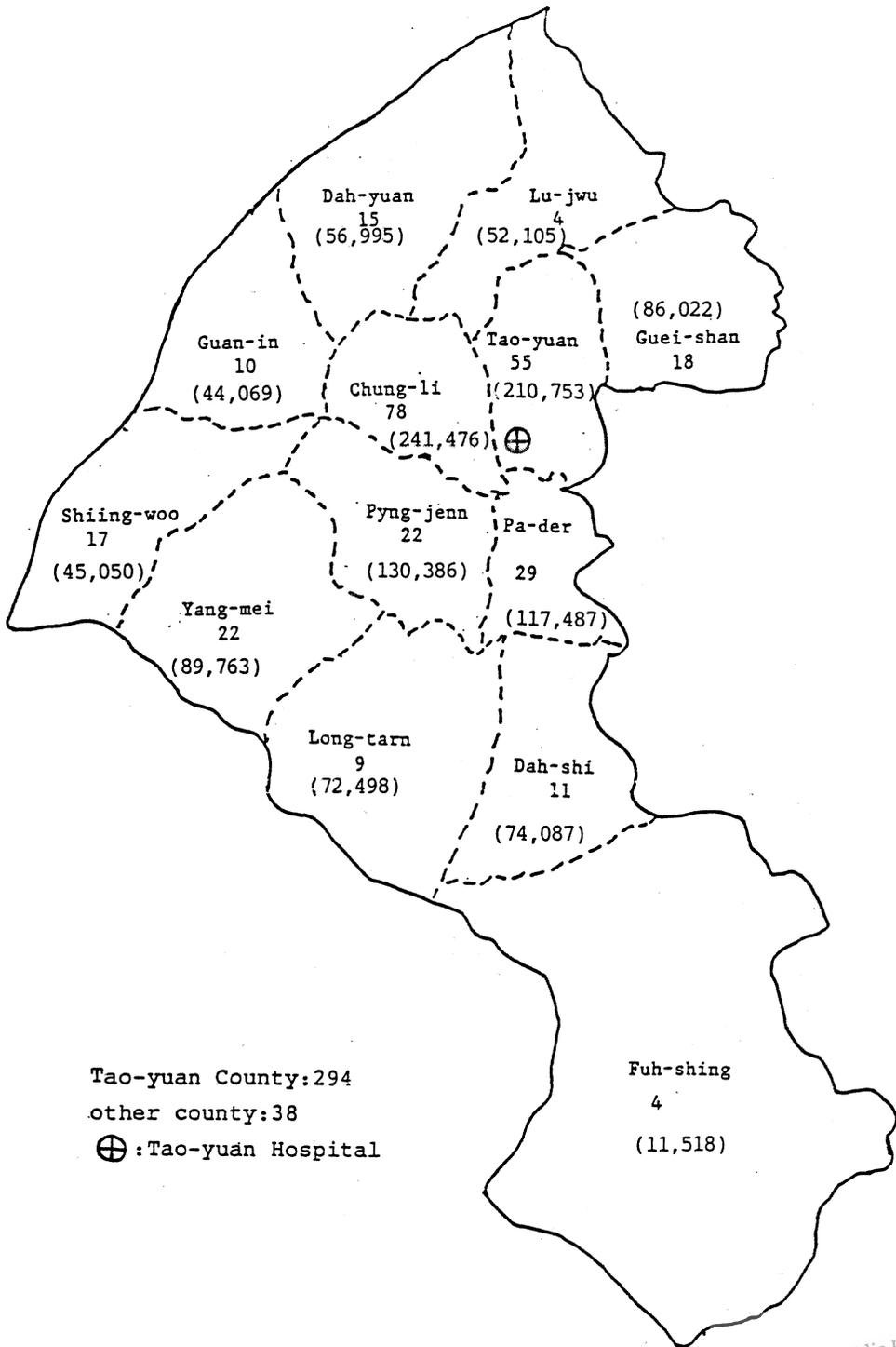


Fig. 1. Number of Visits at Emergency Room and Total Population in Geography Map of Tao-yuan County (figure in parentheses means the population in that area)

Table 1. Basic Features of Diabetic Patients Visited ER

	Total No.	Cases %
Sex		
F	201	60.5
M	131	39.5
Age (yr)		
<40	18	5.4
40-49	22	6.6
50-59	60	18.1
60-69	116	34.9
70-79	93	28.0
≥80	23	6.9
Education		
illiterate	168	50.6
semi-illiterate	38	11.4
elementary school	76	22.9
junior high school	27	8.1
above junior high school	23	6.9
Insurance		
governmental	8	2.4
laborious	58	17.5
elderly	104	31.3
self-paid	143	43.1
other	19	5.7
Occupation		
farmer	16	4.8
labor	37	11.1
merchant	10	3.0
officier	5	1.5
housewife	58	17.5
soldier	2	0.6
unemployed subject	195	58.7
unknown	9	2.7
Treatment		
diet	3	0.9
oral hypoglycemic agent	195	58.7
insulin	57	17.2
herb drug	15	4.5
none	62	18.7
Total	332	

The ratio of sex was 2:3 in favor of females. Sixty-two percent of the patients were illiterate and 34.3% were graduated from the elementary school. Medical expense in the 19.9% of total patients was covered by insurance plans and 31.3% were conferred with discount under the plan of geriatric social welfare.

2. Geographic distribution

About 43.0% of diabetics in this study resided in Tao-yuan and Chung-li cities, where the transportation between these two cities and the hospital was very convenient (Fig. 1).

3. Time of visits by hour

Fig. 2 shows the percentage of ER visits in each hour by one day for diabetic patients and 11928 patients of a random sample from all other patients. Diabetic patients had relatively lower percentage of ER visit at night especially from 02:00 to 06:00 AM, but they had higher percentage in the daytime from 7:00 AM to 4:00 PM.

4. True emergency cases and non-emergency cases

The true emergency rate was 84% as given in Table 2. True emergency rate of females was lower than that of males (81.6% vs 87.8%), but the difference was not significant. The difference of educational level, regularity of treatment, duration of

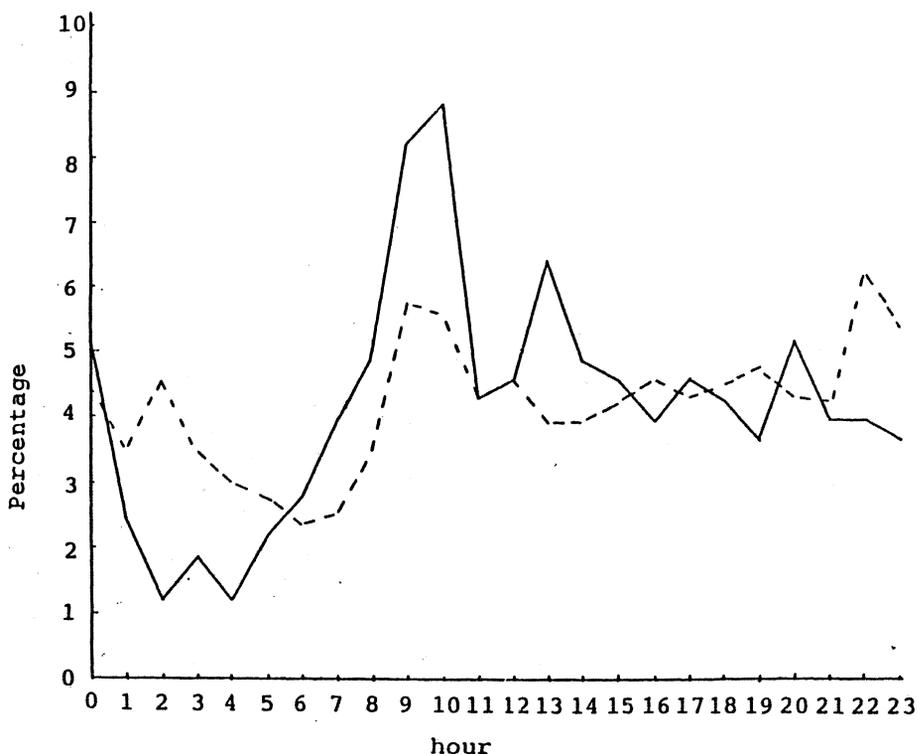


Fig. 2. Percentage of Emergency Room Visits in Each Hour by One Day between Diabetic Patients and a Random Sample from Total Patients
 ————— : total patients - - - - - : diabetic patients

Table 2. Basic Features of True Emergency and Non-emergency Cases

	True Emergency No. (%)	Non-emergency No. (%)	
Sex			NS *
F	164 (58.8)	37 (69.8)	
M	115 (41.2)	16 (30.2)	
Age (yr)			
mean \pm SD	63.9 \pm 13.0	62.1 \pm 11.8	NS
Education			
Illiterate	171 (61.3)	35 (66.0)	NS
Educated	108 (38.7)	18 (34.0)	
Insurance			
Yes	162 (58.1)	27 (50.9)	NS
No	117 (41.9)	26 (49.1)	
Occupation			
Yes	61 (21.9)	9 (17.0)	
No	211 (75.6)	42 (79.2)	NS
Unknown	7 (2.5)	2 (3.8)	
Treatment			
Diet	2 (0.7)	1 (1.9)	
Oral hypoglycemic agent	168 (60.2)	27 (50.9)	
Insulin	46 (16.5)	11 (20.8)	NS
Herb drug	9 (3.2)	6 (11.3)	
None	54 (19.4)	8 (15.1)	
Total	279	53	

* No significance, $P > 0.05$, by Student's t-test or χ^2 test

diabetes, and duration of chief complaint between true emergency and nonemergency cases were not significant either. As depicted in Fig. 3 the distribution of true emergency cases by visiting hour was similar to the pattern of total diabetic patients.

5. Disease categories

ER visit of 332 diabetic patients occupied 1.05% of the total 31,730 ER visits. Except 15 cases (4.5%) of surgical problem, the remaining 317 cases (95.5%) were related with problems of internal medicine. The latter occupied 3.0% for those visited ER

because of the problems of internal medicine. Table 3 shows the disease categories of diabetic patients who sought ER service. Metabolic impairments including hypoglycemia, hyperglycemia, hyperglycemic hyperosmolar nonketotic coma (HHNK), and diabetic ketoacidosis (DKA) were the leading category, followed by gastrointestinal and urological disorders. Table 4 details the five leading diagnoses that made diabetic patients visit ER. Among them, hypoglycemia was the most frequent one. Among hypoglycemic patients, 51.1% were above the age of 70, 58.1% uneducated, 65.1%

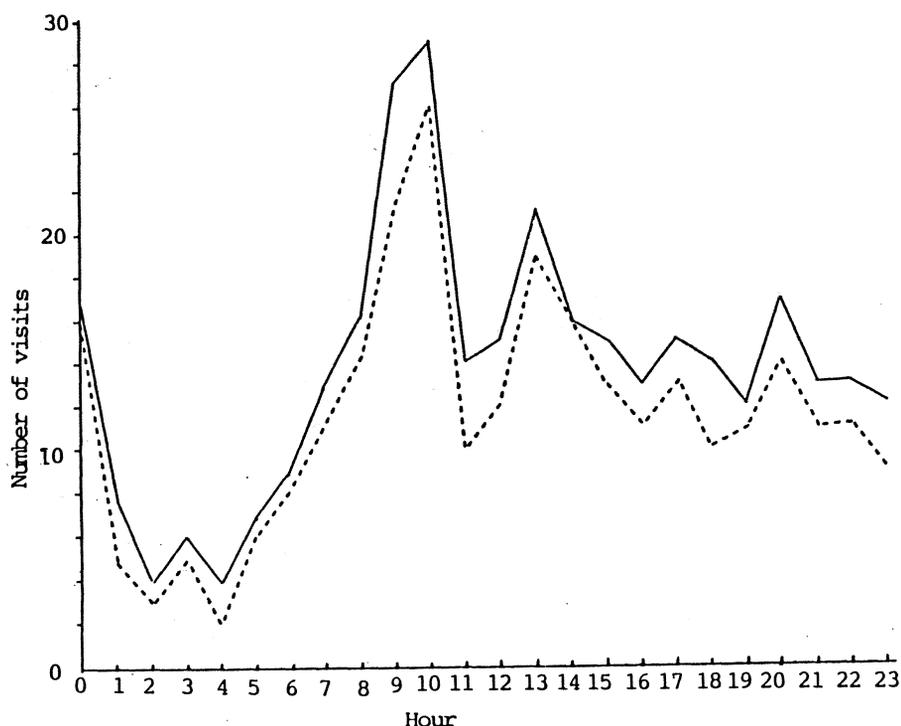


Fig. 3. Number of Diabetic Patients Visits and True Emergency Visits by Hour by one day.
 — : diabetic patients visits - - - - : true emergency visits

Table 3. Major Disease Categories of Diabetic Patients Visited ER

Disease categories (disorders)	Rank	No. of cases	%
Metabolic	1	79	23.8
Gastrointestinal	2	57	17.2
Urological	3	55	16.6
Cardiovascular	4	52	15.7
Neurological	5	31	9.3
Respiratory	6	30	9.0
Dermatological	7	18	5.4
Musculo-skeletal	8	8	2.4
Drug allergy	9	2	0.6
Total		332	100.0

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Table 4. Five Leading Diagnoses for ER Visits among Diabetic Patients

Diagnosis	No. of cases	%	Rank
Hypoglycemia	43	13.0	1
UTI	31	9.3	2
Hypertension	28	8.4	3
Azotemia	24	7.2	4
Hyperglycemia	24	7.2	5

UTI : urinary tract infection

Table 5. Basic Data of Diabetic Patients Treated at ER Only or Admitted to Ward via ER

	Admitted to ward	Treated at ER
Age (yr)	66.0 ± 11.4 (111)#	62.4 ± 13.3 (221)
Duration of diabetes (yr)	6.5 ± 5.6 (111)	5.8 ± 5.2 (221)
Chief complaint (day)	6.1 ± 13.4 (111)	2.9 ± 5.6* (221)
Hospital stay (day)	21.4 ± 17.1 (111)	2.3 ± 1.8* (221)
Medical cost (NT)**	83,856 ± 92,318(97)	3,634 ± 4,838*(216)

The results are expressed as mean ± SD, figure in parentheses denotes number of diabetics.

* P<0.005, by Student's t-test.

** 19 cases were excluded because their receipts were lost.

treated with oral hypoglycemic agent, and 16.3% admitted to ward for further management.

6. Medical Cost

There were 111 cases (33.4%) admitted to ward via ER for further treatment. Table 5 shows mean duration of hospital stay and the total cost of diabetics treated at

ER only and those admitted to ward via ER for further treatment. Nineteen cases (5.7%) were excluded from the analysis of medical cost because their receipts were lost. Patients further admitted to ward spent more money than those treated at ER only.

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Discussion

In accord with other study [11], our results revealed that female diabetics visited ER more frequently than males. A slight preponderance of female in epidemiological survey could not explain this phenomenon [13]. The weak role of women in the society, as suggested by Weissman might result in more frequent ER visits of females [14].

There were 33.4% of the diabetic patients admitted to ward for further management in our study, which was higher than the rate mentioned by Murphy (27.5%) [11]. This might result from looser criteria of admission or the lack of experience of the ER staffs in managing diabetic emergencies at this hospital. The ER of the hospital is staffed by residents and interns based on short-term rotating program. They might be more willingly to admit diabetic patients to the ward to lessen their loading and to ensure solution of problems.

The true emergency rate of 84% in our study was evidently higher than 50% [2] or 67.4% [4] of other reports. This high true emergency rate reminded the doctors to pay more attention to diabetics when they were on duty in ER.

In keeping with the statement of Scott [15], diabetes-related disorders costed much to the hospital expense. In our study, the mean total cost of diabetic patients who were admitted to ward was NT\$83,856 which was much higher than NT\$3,634 of those treated at ER service only. Because other diabetic patients might be admitted through outpatient clinic, the impact of this disorder on hospital use was greater than that suggested by this study.

In comparison with those reported by Scott, the hospital stay of our diabetic inpatient was evidently longer (21.4 ± 17.8 vs 13.6 ± 17.5 days) [15]. This might be accounted for the older in our patients or the differences in hospital operation system.

The major metabolic disorders of diabetes included hypoglycemia, hyperglycemia, DKA,

and HHNK. They represent 23.4% of visits of diabetic patients. Those complications could be prevented in most cases if they were adequately educated and managed. Hypoglycemia was the first leading diagnosis in our patients. It means that our health education should be reinforced in the field of hypoglycemia including prevention, recognizing symptoms, early detection and management. About 51.1% of hypoglycemic patients were above the age of 70. The symptoms of sympathetic overactivities among old diabetics are usually vague, thus the existence of hypoglycemia is frequently neglected until the onset of conscious disturbance. Therefore, the health education should be provided to the patients and their family.

Among the diabetics visited ER, 18.7% did not receive any treatment before, and 40.1% of the diabetic patients having treated with oral hypoglycemic agent or insulin did not receive regular follow-up. How to upgrade the compliance of patients is a challenging issue to all of the medical personnels.

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糖尿病患在社區醫院急診處的使用情形之分析

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爲了明瞭糖尿病患在一個社區醫院急診處的使用情形及醫療費用，我們從民國七十五年七月一日至民國七十六年六月三十日，在省立桃園醫院急診處收集了全部糖尿病急診個案的資料，總共有332位，占有急診個案的1.05%，病患以中老年人居多，平均年齡爲63.6歲，其中34.9%爲七十歲以上老人；所有病患以距離醫院最近且交通方便的桃園市及中壢市居民最多占43.0%。332個病例中，真急診的比例非常高，占84%，所以臨床醫師在急診處碰到糖尿病患時應該特別留意病人情況。

糖尿病患的急診，除了4.5%屬於外科

，其餘皆爲內科；急診問題以新陳代謝、腸胃和泌尿系統的問題最常見、其中低血糖是病患來診最常見的原因，有65.1%是發生在服用口服降糖劑的病人，未來對於病人的衛教應加強這一方面的預防及症狀的認知與處理。在所有病患中，有33.4%由急診轉入病房接受進一步治療，而其平均醫療費用也比只在急診處接受治療的病患高出甚多(83856元比3634元)。來急診的糖尿病患中，有18.7%根本沒有接受藥物治療，即使是接受治療的患者，高達40.1%沒有規則治療，因此醫護人員應努力研究如何提高病患的遵囑性。

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