

# Hospitalization for General Medical Conditions among Diabetic Patients in Israel

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**Key words:** diabetes mellitus, hospitalization, expenditure

## Abstract

**Background:** Diabetes mellitus is a serious, costly and growing public health problem. Very few studies have been published on the economic impact of diabetes in Israel.

**Objective:** To estimate health fund expenditures and rates of hospitalization for general conditions among the diabetic population in Israel.

**Methods:** The total number of hospitalizations in Israel in 1998 of beneficiaries of the General Sick Fund (Kupat Holim Clalit) was obtained from its bureau of statistics. The diabetic and general populations were compared for age and gender distribution, days of hospitalization and cost of hospitalization. All hospitals in Israel were included.

**Results:** There were 618,317 general admissions for a total of 3,005,288 hospitalization days. The diabetic population accounted for 11.5% of all admissions and 13.7% of all hospitalization days. Analysis by age revealed that diabetic patients over age 45 represented 18.3% of all admissions and 17.5% of all hospitalization days. The average stay in hospital was 4.8 days per patient for the general population and 5.3 days for diabetic patients. The overall hospital expenditure of the GSF for general medical conditions among diabetic patients in 1998 was estimated at US \$173,455,790, of which 57% accounted for the daily hospitalization cost. Of the total hospital expenditures for that year, 13.3% was allocated to patients with diabetes of whom 96.4% were over 45 years old. No significant difference was found between males and females.

**Conclusion:** Hospital expenditures for diabetic people increase with patient age and represent one-fifth of the total health insurance expenditure for the middle-aged and elderly population.

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Diabetes mellitus is a serious, costly and growing public health problem [1]. The World Health Organization has recently published reports on the prevention of diabetes [2], and on the development [3] and implementation [4] of national diabetes programs. The per capita annual health care expenditure in the United States in 1992 was more than three times greater for persons with diabetes than for those without, and nearly 15% of the national health expenditure was directed to the treatment of diabetics [5]. In the United Kingdom and probably other European countries, diabetes mellitus accounts for 4–5% of the health services costs, with 80% of the budget going to the 10% of patients with diabetic complications [6].

In Israel, the prevalence of diabetes mellitus is slightly lower in women (3.5%) than in men (4.3%). It rises with age, and is highest in people over the age of 60 (10.3%) [7]. The reported hospitalization rate for diabetes in 1990 was 28.5 per 100,000 population for ages 15–44, and 265 per 100,000 population for age above 75 [8]. There is very little information, however, on the impact of diabetes mellitus on the economy of health care [9]. The aim of the present study was to estimate the rates and expenditures of hospitalization for general medical conditions among the diabetic population of Kupat Holim Clalit, the major health maintenance organization in Israel that represents 58% of all health insurance in the country.

## Methods

The total expenses and hospitalization data for 1998 for the GSF were obtained from the central computer of the fund's bureau of statistics. All hospitals across the country were included. The number and duration of hospitalizations were compared between patients with diabetes mellitus as the primary or secondary diagnosis (defined by the ICD-9 diagnostic codes) and the total population. All forms of diabetes mellitus were considered, and admissions for both diabetes-related complications and general medical conditions were included. The cost of hospitalization was calculated by the daily rate of the GSF and estimated at US \$341 per patient for that year. Since some hospitalizations are not charged according to a daily rate but per in-hospital procedure regardless of the duration of the hospitalization (differential tariff), these figures were also taken into account.

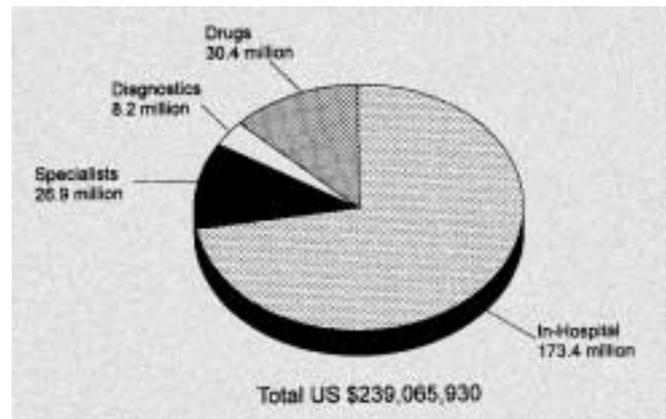
GSF = General Sick Fund (Kupat Holim Clalit, major health maintenance organization in Israel)

## Results

Of the 386,061 GSF beneficiaries who were hospitalized at least once during 1998, 43,207 (11.3%) were diabetic patients. Since some patients could have been admitted more than once in this period we based our estimates on the total number of admissions. Overall, there were 618,317 general admissions for a total of 3,005,288 hospitalization days. These included 78,202 admissions for a total of 413,829 hospitalization days for general conditions of people with diabetes mellitus. Thus, patients with diabetes mellitus accounted for 11.5% of the total admissions and 13.7% of the total hospitalization days. Ninety-five percent of the hospitalized diabetic patients were over 45 years old compared to 65.7% of the general population. This diabetic subgroup represented 18.3% of the total admissions and 17.3% of the total hospitalization days. The data by age and gender distribution are shown in Tables 1 and 2.

Among patients with diabetes, both the number of admissions and days of hospitalization increased with age, peaking in the group older than 65. Although there was no difference by gender for these parameters in the younger group, those aged 45–64 showed a slight male predominance, which was reversed in those over 65. The average stay in hospital was 4.8 days per patient for the general population and 5.3 days for patients with diabetes. When only those over age 45 were considered, the length of stay was 5.57 days in the general population and 5.35 days among diabetics.

The GSF general budget for 1998 was estimated at US \$3,756,097,500; 6.6% of it (US \$239,065,930) was allocated to the diabetic population, according to the distribution shown in Figure 1. The total hospital expenditure of the GSF for diabetic



**Figure 1.** Expenditure for diabetes mellitus by Kupat Holim Clalit in 1998

patients in 1998 was estimated at US \$173,455,790. The daily rate of hospitalization accounted for 68.7% of this sum and represented 13.3% of the daily rate of hospitalization for the general population [Table 3]. Other hospital expenditures in the diabetic population were accounted for by the 13,437 admissions whose costs were based on rates of specific in-hospital procedures (differential) rather than on flat daily rates.

**Table 3.** Cost of hospitalization for GSF beneficiaries during 1998.

Age (yr)	Diabetic patients				General population
	Female	Male	Total	(%) *	
0–24	612,777	255,409	868,186	(0.6)	136,057,120
25–44	2,168,760	1,802,526	3,937,186	(3.9)	98,685,340
45–64	16,111,227	16,699,111	32,810,338	(18.4)	177,409,960
+ 65	47,338,984	34,576,377	81,915,361	(17.0)	480,847,380
<b>Total</b>	<b>66,231,748</b>	<b>53,333,423</b>	<b>119,180,540</b>	<b>(13.3)</b>	<b>892,999,980</b>

Data are based on an average daily rate of US \$341 and do not include hospitalizations for specific regulated procedures

\* Percent of the general population

## Discussion

The overall prevalence of diabetes in Israel had been reported to be 4.1–8.1%, with a slight male predominance [7,8]. Despite the extensive epidemiological data available on the occurrence of diabetes in Israel and in its various ethnic groups [10–14], very little is known about the economic impact of the disease [9,15,16]. In an earlier study, we reported on the GSF hospital expenditure for general conditions among diabetics in 1993 [15]. In that analysis our estimates were based solely on the daily rate of hospitalization and took into account only eight major GSF-owned medical centers. Also, from 1993 to 1998, the cost of hospitalization increased considerably from a daily rate of US \$246 to \$341. The present study included all Israeli hospitals and other hospital expenses in addition to the daily rate of hospitalization. Thus, the figures reported by us now are higher and represent a more accurate estimation of the economic impact of diabetes mellitus on health fund budgets.

**Table 1.** Number of admissions for GSF beneficiaries during 1998

Age	Diabetic patients				General population
	Female	Male	Total	(%) *	
0–24	366	220	586	(0.5)	118,010
25–44	2,085	1,364	3,449	(3.6)	93,856
45–64	11,150	13,145	24,295	(17.6)	137,592
+ 65	26,938	22,934	49,872	(18.5)	268,859
<b>Total</b>	<b>40,539</b>	<b>37,663</b>	<b>78,202</b>	<b>(11.5)</b>	<b>618,317</b>

\* Percent of the general population

**Table 2.** Days of hospitalization for GSF beneficiaries during 1998

Age (yr)	Diabetic patients				General population
	Female	Male	Total	(%) *	
0–24	2,253	758	3,011	(0.7)	422,388
25–44	6,781	6,564	13,345	(4.2)	319,755
45–64	54,789	60,303	115,092	(18.2)	631,747
+ 65	160,461	121,920	282,381	(17.3)	1,631,448
<b>Total</b>	<b>224,284</b>	<b>189,545</b>	<b>413,829</b>	<b>(13.7)</b>	<b>3,005,288</b>

\* Percent of the general population

We considered only hospitalizations for general conditions since the investigation of specific diabetes-related conditions was beyond the scope of the present study. Data for diabetic foot in Israel in 1993 were recently reported by our group [16]. Diabetic foot accounted for 3,422 hospital admissions in the eight major GSF hospitals for a total of 20,322 hospitalization days. The hospital expenditure by GSF for this complication was estimated at US \$4,559,575, or 12.6% of the total hospital expenditure for diabetes for the same year [16].

Interestingly, the average stay in hospital for the GSF diabetic population decreased over the 5 years since our 1993 report, from 6.6 to 5.3 days, whereas it increased slightly for the general population, from 4.1 to 4.8 days. Since most health funds in Israel adopted Saint Vincent's declaration in 1995 some amelioration of the financial burden of diabetes was expected, but we found that the number of admissions and total days of hospitalization had not changed considerably over this period. However, it may be too soon to assess the economic consequences of Saint Vincent's declaration.

Another interesting finding was the very low hospitalization rate among diabetics younger than 44 years. This is in accordance with previously reported data on the very low incidence of type 1 diabetes among Israelis [7,8]. Moreover, ambulatory treatment for diabetic children is strongly supported by health professionals in Israel [17].

In a study conducted in 1991 in the United States, Ray et al. [18] estimated that of the total admissions for general medical conditions among the middle-aged and elderly population, people with diabetes accounted for 36%, far more than the 18.3% observed by us. While the rate of underdiagnosed diabetes among hospitalized patients was estimated to be 40% in one study [19], the magnitude of this problem has not been well characterized in Israel. Interestingly the average hospital stays for middle-aged diabetics and non-diabetic patients in the study of Ray et al. [18] were 8.1 and 6.1 days respectively, compared to 5.3 and 4.8 days in our study. The annual inpatient expenditures for general medical conditions of diabetic people in the United States were estimated by Ray and co-workers [18] at 4.12 billion dollars. Taking into account that 58% of the entire Israeli population were insured in 1998 by the GSF (3.8 million out of 6.6 million residents), we estimated by inference that the overall hospital expenditure by health funds for the diabetic population in Israel was US \$301,265,680. However, this analysis has two limitations. First, use of the GSF data for the inference may lead to an overestimation because the GSF beneficiaries are on average older than those of other Israeli health funds. Second, as mentioned before, the extent to which the diagnosis of diabetes mellitus is missed upon discharge in Israel is unknown.

Our data indicate that health fund expenditures for hospitalization of diabetic patients in Israel increases with age and parallels the increases in the incidence of diabetes among

the general population. Among the patient population older than 65, diabetics account for one-fifth of the total hospitalization expenditure. Improved primary care in the middle-aged and elderly diabetic populations might ameliorate the economic impact of diabetes.

## References

1. Vinicor F. Is diabetes a public health disorder? *Diabetes Care* 1994;17(Suppl 1):22-7.
2. WHO study group. WHO technical report series No. 844. Geneva: World Health Organization, 1994.
3. Rieber G, King H. Guidelines for the development of a national program for diabetes mellitus. WHO/DBO/DM 91.1. Geneva: World Health Organization, 1991.
4. King H, Gruber W, Lander T. Implementing national diabetes programs. Report of the WHO meeting. WHO/DBO/DM 91/1. Geneva: World Health Organization, 1991.
5. Rubin RJ, Altman WM, Mendelson DN. Health care expenditures for people with diabetes mellitus, 1992. *J Clin Endocrinol Metab* 1994;8:809A-F.
6. Apfel J. The implementation of the St Vincent declaration for people with diabetes. *G Ital Diabet* 1993;13(Suppl):17-19.
7. Stern E, Blau J, Ruseski Y, Rafaclovski M, Cohen MP. Prevalence of diabetes in Israel. Epidemiologic survey. *Diabetes* 1988;37:297-302.
8. Health Status in Israel 1999. Israel Center for Disease Control. Publication No. 209
9. Stern Z, Levy R. The direct cost of type 1 diabetes mellitus in Israel. *Diabetic Med* 1994;11:528-34.
10. Cohen AM, Fidel J, Yodfat Y, Eisenberg S. Late onset diabetes in Israel. *Isr J Med Sci* 1979;5:1003.
11. Bar-On H, Friedlander Y, Kidron M, Kark JD. Serum glucose and insulin characteristics and prevalence of diabetes mellitus and impaired glucose tolerance in the adult Jewish population in Jerusalem. *Nutr Metab Cardiovasc Dis* 1992;2:75-81.
12. Cohen AM. Prevalence of diabetes among different ethnic Jewish groups in Israel. *Metabolism* 1961;10:50.
13. Cohen MP, Stern E, Rusecki Y, Zeidler A. High prevalence of diabetes in young adult Ethiopian immigrants to Israel. *Diabetes* 1988;37:824-8.
14. Donchin M, Kark JD, Abramson JH, Epstein L, Hopp C. Prevalence of diabetes among ethnic groups in Jerusalem: The Kiryat HaYovel community health study. *Isr J Med Sci* 1984;20:578-83.
15. Stern E, Benbassat C, Blum I. Israel studies hospital cost. *Diabetes Voice* 1999;44:26-8.
16. Stern E, Hershkovits T, Blum I. Diabetic foot in Israel. Rate and cost of hospitalization. Third International Diabetes Federation Western Pacific Regional Congress, Hong Kong 1996;171.
17. Laron Z, Amir S, Galatzer A, Gil R, Blum I, Mironi M. The advantage of ambulatory multidisciplinary treatment program for diabetic children. *Klin Pediatr* 1977;79:63-73.
18. Ray NF, Thamer M, Taylor T, Fehrenbach SN, Ratner R. Hospitalization and expenditure for the treatment of general medical conditions among the US diabetic population in 1991. *J Clin Endocrinol Metab* 1996;81:3671-9.
19. Levitan C, Ratner R, Jablonski K, Kass M. Unrecognized diabetes mellitus among hospitalized patients. *Diabetes* 1996;45:5147A.

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