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Quality of Documentation in Medical Reports of Diabetic Patients

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In a retrospective analysis of 752 consecutive medical reports of patients with insulin- or non-insulin-dependent diabetes mellitus, we investigated the completeness of documentation of indicators of quality of care. The medical reports are the currently used form of documentation which is sent to the General Practitioner after the patient's discharge from hospital. The indicators of care were data on clinical history, physical examination, laboratory results and secondary complications.

The documentation was incomplete; e.g. in 8.0% of insulin-dependent (IDDM) and in 26.4% of non-insulin-dependent diabetics (NIDDM), HbA1c was missing. In 7.6%, the type of diabetes was not stated. The frequency of recorded secondary complications was lower than it has to be expected considering metabolic control and duration of diabetes of the studied group. Documentation was more complete for IDDM patients. The reports of NIDDM patients with incipient or overt diabetic nephropathy revealed less frequent recordings of data on lipid metabolism and blood pressure compared to the group without nephropathy.

The documentation of indicators of quality of care in medical reports for general practitioners is incomplete for many diabetic inpatients. Standardized methods of documentation are required urgently. Copyright © 1996 Elsevier Science Ltd.

Key words: Quality assurance, St Vincent Declaration, insulin-dependent diabetes mellitus, non-insulin-dependent diabetes mellitus, general practice, hospital care, integrated care, diabetes mellitus, optimizing care by knowledge-based quality assurance, quality of care.

INTRODUCTION

The improvement of quality of care for diabetic patients is at the core of the St Vincent Declaration [1]. In Germany, the care is shared between physicians, either generalists or specialists, in private practice and hospitals. Numerous studies have examined the quality of care in general practice and hospitals in the UK [2–7], but comparable evidence is scarce in Germany [8]. The Sheffield study [6] demonstrated that only 23% of diabetic patients discharged from hospital without plans for routine follow-up were seen at routine appointments by their general practitioner and that 20% thought they were cured.

In Germany, medical reports are sent from the hospital to the general practitioner after discharge of the patient from hospital. Medical reports are non-standardized documents designed to state the diagnostic conclusions and therapeutic recommendations, to advise optimal treatment and to alert the physician of impending complications. We conducted a retrospective study involving the analysis of 752 medical reports of diabetic patients to investigate the quality of documentation relevant to diabetes the general physician obtains from our hospital.

PATIENTS AND METHODS

We included 843 consecutive medical reports

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of diabetic patients from October 1992 to April 1994. Patients were referred to our department by their general practitioner for stabilization of metabolic control or for acute complications of diabetes. If a patient was readmitted in the time period observed, only the first medical report was included in the study. Therefore, 752 reports were obtained for final analysis. Patients were grouped according to the type of diabetes stated as type 1, type 2, secondary diabetes or as "unclassified" if no specification of the type of diabetes was given.

Medical reports

In Germany, medical reports are sent from the hospital physician to the general practitioner after discharge of the patient from hospital. Medical reports are non-standardized documents designed to state the diagnostic conclusions and therapeutic recommendations, to advise optimal treatment and to alert the physician of impending complications. Furthermore, they should document the stage of the disease process by explicitly listing key indicators of quality of care. The indicators of quality of care listed in this paper (see below) are recorded routinely for each patient and represent a subset of routine examinations we regard as a standard diagnostic program for diabetic patients. The study therefore focuses on the clinical activity which is subsequently reported to the general physician outside the hospital. A copy of each medical report is attached to the patient's file at discharge from the hospital. It provides a summary of the patient's clinical history when s/he is readmitted to the hospital and the file is claimed from the record office.

Indicators of quality of care

The indicators of quality of care refer to different sections of the medical report and comprise data on clinical history, physical examination, laboratory results and diagnoses. Data on clinical history included age at onset of diabetes, duration of diabetes and year of manifestation of diabetes. Data on physical examination included weight, height, systolic and diastolic blood pressure. Laboratory results included HbA1c, fasting blood glucose, total cholesterol, HDL, LDL, VLDL and triglycerides. Only the explicit statement of the numeric value of the indicator in question was counted as correct occurrence. If the indicator was referred to as being normal, e.g. "normal weight", this was not accepted as correct documentation. The recording of diagnoses of secondary complications is explained below.

Secondary complications

The diagnoses nephropathy, neuropathy, retinopathy or coronary heart disease were accepted if they were stated explicitly in the medical report. The diagnosis neuropathy comprised peripheral and autonomous forms of the complication. Autonomous neuropathy was investigated by analysis of the heart beat variability, whereas the degree of peripheral neuropathy was determined by the threshold for cold/warm sensation of both feet. Retinopathy covered background and proliferative forms as well as maculopathy and was diagnosed by an opthalmologist. Nephropathy comprised incipient and overt forms and was diagnosed by urinary protein analysis (see below).

Urinary protein analysis

The complete urinalysis reports for all 752 patients were added to the database to check for correctness of the stated diagnosis "diabetic nephropathy". The urinalysis included measurements of albuminuria, creatinine and examinations for erythrocytes, leukocytes and protein. Albuminuria was measured as the albumin/creatinine ratio of 24 hour urine collections. The diagnosis of diabetic nephropathy was accepted if albuminuria exceeded 2.26 mg/mmol creatinine (=20 mg/g creatinine) and examinations for erythrocytes and leukocytes were negative.

Patient characteristics

The patient characteristics were calculated on a subset of 440 type 1 and 2 diabetic patients, as only reports containing complete data were considered. As the duration of diabetes was missing in 40% of patients it was not considered in the analysis. No characteristics are shown for patients with secondary or "unclassified" forms of diabetes due to the small number.

TABLE 1. Patient characteristics of a subset of 440 patients with records complete for all items listed

Type	IMM	NIDDM
n	183	257
Age (years)	35±15* (8–84)	67±13 (16–94)
BMI (kg/m^2)	23.2±3.1* (16.8–34.9)	27.0±5.3 (16.4–46.1)
HbA1c (%)	8.6±2.4 (4.1–16.1)	8.8±2.4 (3.2–16.1)
Systolic blood pressure (mm Hg)	127±21* (80–200)	151±29 (90–300)
Diastolic blood pressure (mm Hg)	78±11 (50–110)	83±14 (35–120)

*$p<0.01$ for difference between IDDM and NIDDM.

A *t*-test for independent samples was used.

Data presented as arithmetic means with standard deviation and minimum and maximum values given in brackets underneath.

TABLE 2. Frequency of documentation (%) of laboratory results of 237 insulin-dependent (IDDM) and 439 non-insulin-dependent (NIDDM) patients

	IDDM	NIDDM
HbA1c	92.0* (218)	73.6 (323)
Fasting glucose	3.0* (7)	14.4 (63)
Total cholesterol	49.4 (117)	513 (234)
HDL	35.9 (85)	31.0 (136)
LDL	26.2 (62)	23.2 (102)
VLDL	14.5† (58)	8.0 (79)
Triglycerides	20.3* (48)	37.8 (166)

*$p<0.0001$ for difference between IDDM and NIDDM.

†$p<0.05$ for difference between IDDM and NIDDM.

Chi-squared test was used.

Data are represented as percentages with the number of patients in brackets.

Statistical analysis

PC-Statistik 3.04 statistical software (Top-Soft, Hannover, Germany) was used. The chi-squared test was applied for comparing distributions of categorical variables. Differences in arithmetic means of continuous variables were tested with the two-tailed *t*-test.

RESULTS

Patient characteristics

The 752 medical reports comprised 237 (31.5%) insulin-dependent (IDDM), 439 (58.4%) non-insulin-dependent (NIDDM) and 19 (2.5%) secondary forms of diabetes. In 57 (7.6%) cases, no type of diabetes was stated. Group characteristics of IDDM and NIDDM patients are listed in Table 1. In a subset of 444 patients where the duration of diabetes was recorded, we calculated a mean of 16±11 years for IDDM and 12±9 years for NIDDM (data not shown).

Documentation of clinical history and physical examination

The age at onset, duration of diabetes or year of manifestation was recorded more frequently for IDDM patients compared to the NIDDM group (86.7 and 59.7% respectively, $p<0.0001$). A marginally better documentation of body mass index for IDDM (86.9 vs 80.9%) was observed ($p<0.05$). Systolic and diastolic blood pressure was recorded for 88.6% of IDDM and 86.8% of NIDDM patients (data not shown).

Documentation of laboratory results

HbA1c and VLDL were more frequently documented for IDDM, whereas triglycerides and fasting glucose were found more often in reports of NIDDM patients (Table 2).

Documentation of secondary complications

The frequency of recording of secondary complications as stated in the medical reports is listed in Table 3. A higher recorded prevalence of retinopathy and neuropathy in IDDM and of nephropathy and coronary heart disease in NIDDM was observed.

Documentation of diagnosis "diabetic nephropathy"

The correctness of the diagnosis "diabetic nephropathy" stated in the medical reports was checked for by comparison with the actual urinalysis reports (Table 4). In 34.6% of IDDM and 45.2% of NIDDM patients, the diagnosis

TABLE 3. Frequency of recording (%) of secondary complications as diagnosis in the medical reports of 237 IDDM and 439 NIDDM patients

	IDDM	NIDDM
Coronary heart disease	3.8* (9)	32.3 (142)
Retinopathy	30.8* (73)	17.1 (75)
Neuropathy	34.6† (82)	23.0 (101)
Nephropathy	19.0† (45)	29.2 (128)

*$p<0.01$ for difference between IDDM and NIDDM.

†$p<0.0001$ for difference between IDDM and NIMM.

Chi-squared test was used.

Data are represented as percentages with the number of patients in brackets.

TABLE 4. Frequency of documentation (%) of diagnoses for 56 IDDM and 140 NIDDM patients with incipient or overt diabetic nephropathy (DNP)

	IDDM	NIDDM
DNP correctly identified	65.4 (34)	54.8 (74)
DNP false positive	1.2 (2)	2.6 (4)
Retinopathy in microalbuminuric patients	54.8 (17)*	41.1 (30)
Retinopathy in macroalbuminuric patients	95.2 (20)†	45.2 (28)

DNP, diabetic nephropathy.

Values are given as percentages with the number of patients in brackets.

*$p=0.09$ for difference between IDDM and NIDDM.

†$p<0.0001$ for difference between IDDM and NIDDM.

Chi-squared test was used.

Data are represented as percentages with the number of patients in brackets.

was established by interpretation of the urinalysis report, but was not listed explicitly in the corresponding medical report. In a few cases, the diagnosis was established although the urinalysis was normal.

Documentation of cardiovascular risk factors

For the subgroup of patients with diabetic nephropathy, we analysed the occurrence of cardiovascular indicators of quality of care (Table 5). No differences for the IDDM group were found. For NIDDM patients, a significantly worse frequency of recording for lipid profiles, weight and blood pressure was found in patients with nephropathy compared to those without.

TABLE 5. Frequency of documentation (%) of cardiovascular risk profile for NIDDM patients with ($n=140$) and without ($n=102$) diabetic nephropathy according to urinalysis results

	Nephropathy	No nephropathy
Systolic blood pressure	82.9 (116)	92.4* (94)
Diastolic blood pressure	819 (116)	92.4* (94)
Weight	82.8 (116)	90.2* (92)
HbA1c	72.1 (101)	75.5 (77)
Total cholesterol	57.1 (80)	63.7 (65)
HDL	32.9 (46)	44.1† (45)
LDL	21.4 (30)	36.3* (37)
VLDL	17.9 (25)	29.4* (30)
Triglycerides	45.0 (63)	57.6* (43)

*$p<0.05$.

†$p=0.07$ for difference between patients with and without diabetic nephropathy.

Chi-squared test was used.

Data are represented as percentages with the number of patients in brackets.

DISCUSSION

The major finding of the study is that the recording of certain key features of IDDM and NIDDM in medical reports for general practitioners are often incomplete due to the lack of standardized documentation protocols. Although there is a high rate of recording for data on physical examinations and HbA1c, the situation is considerably worse for data on lipid metabolism, clinical history and secondary complications.

Yudkin *et al.* [2] demonstrated that details of diabetic complications often are not recorded in general practice and hospital notes. Nevertheless, they were more often documented for hospital patients.

The medical reports sent out to the physicians are important documents for basic data on the patient's stage in a chronic condition. Hospital physicians cannot rely on the generalists to update incomplete examinations. In a study by Day *et al.* [5], more than 40% of diabetic patients in general practice had no biochemical evaluation, eye or foot examination. In a randomized

controlled trial, Hayes *et al.* [4] reported that routine care in general practice for NIDDM patients is less satisfactory than care by the hospital diabetic clinic. Concentrating on the metabolic control of diabetic patients, Singh *et al.* [3] revealed that general practitioners providing care on an organized basis can reach a degree of glycaemic control equal to that reached by a hospital clinic. Mellor *et al.* [7] reported that more than 65% of general practitioners prefer their patient's urine not to be free of sugar and that almost 80% see no necessity to refer patients with maculopathy for laser treatment.

The frequency of documented retinopathy (any stage) in our NIDDM (17.1%) and IDDM (30.8%) patients was considerably lower than expected. The prevalence of retinopathy in NIDDM in study populations of comparable metabolic control and duration of diabetes was reported to be over 50% [9] whereas, in IDDM, Krolewski *et al.* [10] demonstrated more than 90% of diabetic retinopathy after 14 years of diabetes. Previous studies suggest that when diabetic nephropathy is also present only 1% of macroalbuminuric and 14% of microalbuminuric patients with IDDM are free of retinopathy [11]. According to the medical reports examined, 4.8 and 35.2% of the respective IDDM groups were free of retinopathy. Although the currently quoted studies for the prevalence of retinopathy date from the early 1980s, this emphasises the need to screen and document the condition of the retina more frequently, particularly in NIDDM.

The frequency of recording of coronary heart disease in NIDDM agrees with prevalence data from previous studies [12]. The EURODIAB initiative [13] revealed a prevalence of 8% of coronary heart disease in IDDM patients compared to 3.2% of documented cases of coronary heart disease in our IDDM group. This difference is expected due the low average age of our IDDM group. The EURODIAB data is supported by a study from Nabarro [14], though in both cases metabolic control was not stated.

The documented number of patients with neuropathy (34.5 vs 23.0% for IDDM and NIDDM, respectively) is difficult to interpret as the prevalence data in the literature is controversial. Boulton *et al.* [15] found a prevalence of symptomatic, diabetic neuropathy of 10.7% in the studied population of insulin-treated patients, whereas the Rochester Diabetic Neuropathy Study [16] reported almost 60% of neuropathy of any form in IDDM an NIDDM. Nevertheless, symptomatic neuropathy only occurred in about 15 and 13%, respectively. Duration of diabetes was comparable to our group, but metabolic control was not assessed. Differences can be explained by inclusion of electrophysiological screening methods in the latter study. In our study groups, symptomatic and asymptomatic patients were classified as having neuropathy according to tests which are more sensitive than clinical examination alone, but less sensitive than electrophysiological studies. As we have to assume a comparable prevalence of neuropathy in both types [16], more vigorous screening, particularly for NIDDM patients, is required.

We identified about 40% of medical reports of patients with abnormal urinalysis suggestive of incipient or overt diabetic nephropathy, where no such diagnosis was stated in the medical report. This implies that, in the absence of the diagnosis in the medical report, the general practitioner cannot be sufficiently sure that the patient is free of this complication. The frequency of elevated albuminuria according to the urinalysis reports was comparable to prevalence data in the literature [17].

Patients with incipient or overt diabetic nephropathy are particularly at risk for cardiovascular complications. It was surprising to see that the documentation of key features of the cardiovascular risk profile for this subgroup in the NIDDM patients was worse compared to those without nephropathy. This underlines the need to examine and document results on the background of the individual patients risk profile.

In our study, the documentation for the IDDM group was more complete compared to the NIDDM group on common core issues as HbA1c, duration of disease and secondary complications. These findings might reflect the tendency to view non-insulin dependent diabetes as a "less severe" disease. This emphasizes the need to shift more attention to the care of NIDDM patients.

The comparison of our study with previous work, particularly from Britain, has to keep structural differences in medical care in mind for interpretation, but trends will be similar.

Drawbacks of the study design were the limited number of indicators of quality of care which did not cover areas like physical examination for neuropathy and peripheral vascular disease. Moreover, we have to be cautious about the interpretation of the results, as the documentation cannot be equated with the actual diagnostic and therapeutic procedures that took place in the hospital. Nevertheless, we think that the explicitly stated information in a medical report is important to the further treatment and prognosis of each patient.

These observations underline the need for more structured documentation for diabetic patients, particularly of type 2, in order to improve quality of care. Initiatives like "Diadoq" (Diabetes Mellitus: Optimising Care by Knowledge-Based Quality Assurance) in Germany and "Staged Diabetes Management" in the United States [18] are currently working on computer-assisted documentation in diabetes care that can help the general practitioner and hospital physicians to monitor the quality of care delivered to their patients.

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