Patients referred with type 2 diabetes remain in specialist care for a long period

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ABSTRACT

INTRODUCTION: Patients with uncomplicated type 2 diabetes are usually managed in general practice. The aim of this study was to describe the duration of contact for patients referred from primary care to a diabetes outpatient clinic.

MATERIAL AND METHODS: The present study is a retrospective study with follow-up of at least 12 months or until discharged. Risk stratification was performed at referral and when patients were returned to primary care. A total of 154 patients with type 2 diabetes were referred to the clinic in the 2004-2009 period. The main outcome measure was the duration of contact with the diabetes clinic.

RESULTS: In all, 105 patients were returned to primary care after a median of ten months (range 1-64 months) and six visits (1-25 visits). Half of the patients were returned to primary care after 18 months, and 20% were still in contact with the diabetes clinic after six years. The majority were classified as high-risk patients with no difference in risk level between patients followed ≤ 12 or > 12 months.

CONCLUSION: The complication level was high even among discharged patients. The long duration of the contact for the patients who were returned to primary health care should stimulate initiatives leading to a faster course in the secondary care setting.

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The increasing number of type 2 diabetes patients calls for an efficient, evidence-based organisation of health care which correctly identifies patients who may benefit from referral to a diabetes outpatient clinic and those who can be followed in primary care. In order to allocate the restricted economic resources prudently, it is a key issue that most patients referred to secondary level of diabetes care should be returned to primary care within a specified time period which is set to six months in our region [1]. Elements of the chronic care model [2, 3] and risk stratification (**Table 1**) have been adopted by the Danish National Board of Health in 2009 to serve as a guideline for national and regional planning of diabetes care and clinical management pathways [4]. Patients with no complications should be managed in primary care only (level 1), while patients who do not reach treatment targets (level 2) should be referred to an outpatient clinic for a limited period of time. Patients with established diabetic complications or severe co-morbidities (level 3) should be followed permanently in the outpatient clinic. We have applied these risk stratification criteria to a cohort of patients referred to our diabetes centre in order to describe the severity of their disease and its development in generally accepted terms. The aim of this study was to describe the duration of contact with an outpatient clinic for type 2 diabetic patients previously managed in primary care.

MATERIAL AND METHODS

All type 2 diabetic patients referred in the six-year period 2004-2009 to the diabetes outpatient clinic at Regional Hospital Silkeborg, Denmark, were identified from an electronic record of all new referrals. The patients were included if: 1) they were referred from general practice, 2) had a diabetes duration > 2 years, 3) diabetes had been managed in general practice exclusively for the last two years, i.e. no contact with medical departments or diabetes outpatient clinics, 4) the patient had been a resident in the admission area of the hospital > 2 years, 5) the general practitioner (GP) used the laboratory service of Aarhus County allowing access to previous biochemical results, and 6) the written referral from the GP could be identified.

Demographic and clinical data are based on a review of patient files and searches in the laboratory database. Process data concerning eye examination were extracted from a data acquisition programme at the national indicator programme's office in Central Region Jutland, which searches hospital departments and specialist registrations for diabetes eye examination results. The vibration threshold was analysed by biothesiometry (Bio Medical Instruments, Ohio).

The patients were risk-stratified according to a slight modification (Table 1) of the model presented by the Danish National Board of Health [1]: Impaired renal function (P-creatinine > 160 micromol/l), heart failure and presence of co-morbidity with the need of contact to other specialists than endocrinologists were parameters allocating the patient to risk level 3.

SPSS version 18.0 was used for statistical analysis. The distribution according to risk stratification levels and normo-albuminuria were analysed using the χ^2-test.

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TABLE 1

Risk stratification model for diabetes patients.

	Level 1: good glycaemic control without diabetic complications	Level 2: high risk for or early diabetic complications	Level 3: complicated diabetes or multiple diseases
Glycaemic control, HbA_{1c}, %	< 7	7-9	> 9 despite attempts to improve for 6 months
Blood pressure, clinic, systolic/diastolic, mmHg	< 130/80	130/80-160/90	> 160/90 despite attempts to improve for 6 months
Metabolic complications	No	Severe insulin resistance (> 100 U/day)	Hypoglycaemic unawareness or very fluctuating P-glucose
Cardiovascular disease	No	Present	Cardiac failure
Diabetic foot disease	No	Peripheral neuropathy or arterial insufficiency	Ulcer, Charcot foot or amputation
Renal disease	Normo-albuminuria	Micro-albuminuria	Macro-albuminuria
U-albumin/creatinine, mmol/l	< 2.5 men < 3.5 women	2.5-25 men 3.5-35 women	> 25 men > 35 women or P-creatinine > 160 µmol/l
Retinopathy	Normal		Macula oedema or proliferative retinopathy
Co-morbidity	No		Severe co-morbidity involving specialist other than endocrinologist
Final level classification	All parameters in level 1	At least one parameter in level 2, none in level 3	At least one parameter in level 3

Paired data including level of risk stratification fraction and fraction of patients treated with insulin, lipid-lowering drugs, platelet inhibitors and antihypertensive drugs at referral and on return to primary care were compared using McNemar's test. HbA_{1c}, blood pressure and low-density lipoprotein (LDL) cholesterol at referral and on return were compared using student's test (paired) and Wilcoxon's signed rank test for parameters with skewed distribution (P-creatinine). The half-life of the duration of contact with the diabetes clinic was estimated by Kaplan-Meier analysis.

Regional Hospital Silkeborg serves approximately 100,000 residents. A total of 839 diabetes patients were referred to the outpatient clinic and 685 patients were excluded for the following reasons which were not mutually exclusive: 1) n = 165: type 1 diabetes or other forms of diabetes than type 2 diabetes, 2) n = 169: not referred from general practice, 3) n = 186: diabetes duration less than two years, 4) n = 138: contact with diabetes outpatient clinic or medical department within the past two years, 5) n = 9: living in the admission area for less than two years, 6) n = 17: general practice used laboratory service located outside Aarhus county, or 7) n = 1: written referral could not be found. Thus, 154 patients were included in the study and served as the basis for estimation of the transit time in the outpatient clinic. All patients were followed until referred to primary care or for a minimum of 12 months with the exception of three patients.

Of these, one was diagnosed with disseminated cancer, one got pregnant and one started participating in a clinical trial after less than two months of affiliation with the outpatient clinic.

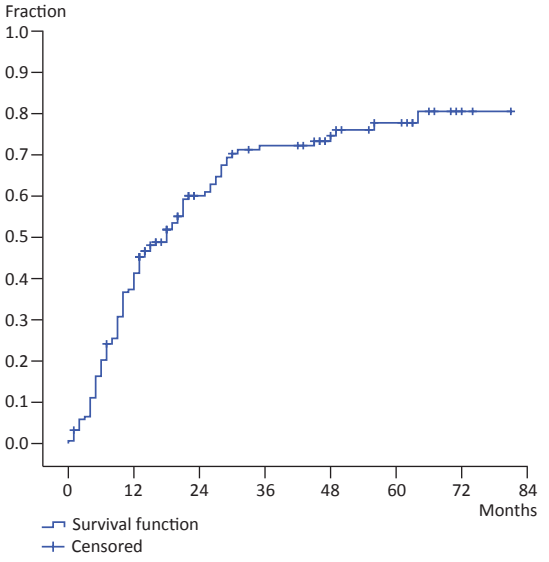
RESULTS

A total of 135 patients (88%) had at least one measurement of fractionated blood lipids performed in the period 0-24 months prior to referral to the outpatient clinic, 94 patients (64%) had at least one measurement of urinary albumin excretion performed and 93 (60%) had at least one examination by an ophthalmologist.

The first HbA_{1c} measured in the period 12-24

FIGURE 1

Kaplan-Meier curve of fraction of all type 2 diabetes patients returning to primary care at follow-up as a function of the duration in months of contact with the diabetes clinic.



months before referral to the outpatient clinic was a mean of 8.4% (range 5.3-15.6%). This value was measured a median of 22 months before referral (n = 132). The first HbA_{1c} measured in the period 0-11 months before referral was 8.8% (range 5.4-15.1%) which was measured a median of eight months before referral (n = 148).

The written referrals were scrutinised for comments from the GPs indicating a low attending frequency among the patients, previous referral recommendations which had been denied, reluctance to receive insulin or similar indications of poor compliance. Such statements were found in 40 referrals (26%). Ten patients (7%) were discharged because they stopped attending the clinic (defaulters).

The Kaplan-Meier plot of all patients at follow-up (**Figure 1**) showed that 50% of the patients had been referred to general practice after a median of 18 months (95% confidence interval (CI) 13-23) and that around 20% of the patients still had contact with the outpatient clinic after six years. There was no significant difference in allocated risk level (1, 2 or 3) between patients with a duration of contact ≤ 12 months (5, 25, 32 patients) and patients with a duration of contact of more than 12 months (3, 29, 57 patients) at follow-up (p = 0.08).

A total of 105 patients were discharged from the outpatient clinic after a median duration of ten months (range 1-64 months) and a median of six visits (range 1-25 visits). According to the written information from the GPs, the most frequent indications for referral in this group (not mutually exclusive) was poor glycaemic control (94 patients, 90%), hypertension (18 patients, 18%), renal complications (12 patients, 11%) and a wish for a general "diabetes status" (15 patients, 14%). The distribution of risk level (1, 2, and 3) when returned to primary care was 7, 44 and 54 patients, which is significantly different from the distribution at the initial visit (3, 27 and 75 patients) (p < 0.01). The reasons for allocation to risk level 3 at referral and when returned to GP are shown in **Table 2**.

The development of risk stratification among the patients who were referred back was as follows: From level 3 (n = 75): 50 patients remained unchanged, 21 shifted to level two and four to level 1. From level 2 (n = 27): 22 remained unchanged, four increased to level 3 and to level 1. From level 1 (n = 3): Two remained unchanged and one shifted to level 2.

A total of 46 patients (30%) were followed for more than 12 months (a median of 38 months, range 13-81 months) and were still in contact with the outpatient clinic at follow-up. Normo-albuminuria at baseline was more frequent among patients who were discharged than among those who were not (71 versus 48%, p < 0.01). Baseline clinical data at the first visit to the outpatient clinic and the last value before discharge are shown in **Table 3**. The fraction of patients who were treated with insulin, platelet inhibitors, lipid lowering- and antihypertensive drugs increased significantly during the follow-up in both groups of patients (p < 0.001). For patients who were discharged, HbA_{1c} was significantly reduced by 1.5 percentage points (CI 1.1-1.8) and LDL cholesterol was reduced by 0.4 mmol/l (CI 0.2-0.6) (p < 0.001 for all). Ambulatory blood pressure (BP) monitoring (a total of 71 examinations) was performed in 35 of 105 patients (33%). Systolic and diastolic clinic blood pressure was reduced by 9 mmHg (CI 4-13) and 6 mmHg (CI 3-8), respectively (p < 0.001). The median P-creatinine level was significantly increased from 73 to 80 micromol/l (p < 0.01).

TABLE 2

Distribution of parameters for risk stratification at referral and when returning to general practitioner (n = 105). Total number of patients at all levels is 105 except for renal disease (n = 103 at referral, n = 102 when returning) and retinopathy (n = 90 both at referral and when returning) due to missing values. For retinopathy and co-morbidity, patients are allocated to either risk level 1 or 3.

	At risk, level 1/level 2/level 3, n (%)	
Risk stratification parameter	**at referral**	**when returning to general practitioner**
Glycaemic control	19/50/36 (18/48/34)	58/43/4 (55/41/4)
Blood pressure	32/31/42 (30/30/40)	45/43/17 (43/41/16)
Metabolic complications	97/5/3 (92/5/3)	97/5/3 (95/5/3)
Cardiovascular disease	81/23/1 (77/22/1)	82/22/1 (78/21/1)
Diabetic foot disease	66/36/3 (63/34/3)	65/36/4 (62/34/4)
Renal disease	75/23/5 (73/22/5)	78/20/4 (76/20/4)
Retinopathy	84/-/6 (93/-/7)	84/-/6 (93/-/7)
Co-morbidity	76/-/29 (72/-/28)	73/-/32 (70/-/30)

DISCUSSION

Half of the patients were returned to primary care after 18 months. This result is far from the six months which are recommended as the maximum duration of a diabetes course in our region. In a recently published study from Canada, 193 type 2 diabetic patients referred to a tertiary care diabetes clinic in 2005 were followed for approx. 3.5 years [5]. The fraction of patients discharged (23%) after a median follow-up of ten months was much lower than in our study (80%) despite the fact that the baseline diabetes duration (six years), HbA_{1c} (8.5%) and the fraction with complications were comparable. This discrepancy can primarily be explained by the very large fraction of defaulters recorded in the Canadian study (44%). The defaulters were not discharged. 30% of the patients were retained in the clinic which is in the same order of magnitude as in our study (20%). Non-attenders have been shown to have a high rate of complications [6]. It is reassuring that only 7% of the referred patients

TABLE 3

Clinical characteristics at referral to the diabetes clinic (baseline) and at last follow-up for those who returned back to the general practitioner.

	Baseline			
	all patients	patients returned to primary care	Follow-up, 10-month (1-64)	p-value, follow-up vs baseline
Total (male/female), n	151 (98/63)	105 (59/56)	–	–
Age, yrs, mean ± SD	62 ± 12	63 ± 11	–	–
BMI, kg/m^2, mean ± SD	31.7 ± 5.7	31.9 ± 6.0	–	–
Diabetes duration, yrs, mean (range)	7.4 (1.9-34.5)	7.3 (1.9-32.8)	–	–
Vibration threshold > 30 U, n (%)	43 (30)	36 (35)	–	–
Normo/micro/macro-albuminuria, n (%)	96/40/11 (61/27/7)	74/24/4 (71/24/4)	–	–
P-creatinine conc., µmol/l	74 (40-179)	73 (40-156)	80 (43-156)[a]	< 0.01
HbA_{1c}, %	8.8 ± 1.7	8.7 ± 1.7	7.2 ±1,0[b]	< 0.001
Insulin users, n (%)	30 (20)	17 (16)	52 (50)	< 0.001
LDL chol conc., mmol/l	2.3 ± 0.9	2.3 ± 0.9[c]	2.0 ± 0.8[d]	< 0.001
Lipid lowering drugs, n (%)	96 (64)	70 (46)	91 (87)	–
Platelet inhibition, n (%)	62 (41)	48 (46)	77 (73)	< 0.001
Systolic BP, mmHg, mean ± SD	143 ± 22	142 ± 21	133 ± 16[e]	< 0.001
Diastolic BP, mmHg mean ± SD	84 ± 11	83 ± 10	77 ± 9[e]	< 0.001
Patients with antihypertensive drugs, n (%)	115 (76)	80 (76)	93 (89)	< 0.001

LDL chol = low-density lipoprotein cholesterol; SD = standard deviation.
a) n = 92; b) n = 102; c) n =100; d) n = 80; e) n = 98.

in our study were discharged because of repeatedly missed appointments.

Several strategies for reducing the period of contact to the diabetes clinic can be suggested. Tele-monitoring of key parameters such as blood glucose and blood pressure may be one way to shorten the titration period of glycaemic and antihypertensive medication [7]. There is a strong need for a simple, common IT platform for both patient and care providers. Easy access to share clinical data can facilitate optional telephone or e-mail advising [8] from the diabetes centre after returning to primary care and this may also provide a basis for an earlier discharge and for prevention of re-referral. In addition, monitoring of indicators of quality and benchmarking [9-11] may improve surveillance of these complicated patients. A shorter duration in the outpatient clinic presupposes an active role for follow-up in primary care for a difficult group of patients. A survey among primary care physicians has rated structural discharges letters, individualised plans, patient education support tools and telephone access to an endocrinologist as the most valuable tools to facilitate patients' transition from secondary to primary care [12].

Information about the flow of patients between the primary and secondary sector and the period of contact with the outpatient clinic is important knowledge when dimensioning the diabetes health-care system. For benchmarking, it is necessary to have strict inclusion criteria. To avoid inclusion of newly diagnosed patients who often have a very short period of contact with the diabetes clinic, primarily for educational purposes, we have focused on type 2 patients with a disease duration exceeding two years who have been followed exclusively in primary care for at least two years.

Given the increase in insulin and lipid-lowering drugs, and the intensified antihypertensive treatment, it is not surprising that a significant reduction in HbA_{1c}, LDL cholesterol and blood pressure was noted. Still, the majority of patients were at a high risk when referred back to primary care. Improvement of glycaemic control and blood pressure were the most frequent reasons why patients shifted from a high-risk to a lower-risk level. P-creatinine was significantly increased; this was most likely a haemodynamic consequence of intensified antihypertensive treatment. No difference in risk level was seen between patients with a "short" (< 12 months) or a more long-term contact with the out-patient clinic. Other criteria than the presence of complications may have influenced the decision of when to refer patients to primary care. Such criteria include the impression that the results if not optimal are the "best obtainable", or the patient's wish. Finally, patients may have been returned to primary care with suggestions for intensified treatment without obtaining the results at return.

The present study cohort displayed a short 20-month latency period observed before referral among patients with poor glycaemic control from primary care to the outpatient clinic and a low frequency of eye examination and measurement of urinary albumin excretion as also observed for the 2004-2007 period [13]. It is unknown if the latency in referral for optimising diabetes control is due to physicians' delay, patients

Patients do pass through the outpatient clinic, of course. But what's their transit time?

who are unwilling to accept early referral or both. However, our finding that the GPs explicitly mentioned poor compliance in about one quarter of the cases indicates that the patients referred were highly selected and do not reflect the overall quality in primary care. In addition, this aspect is probably underreported. It was striking that reluctance to initiate insulin therapy was frequently mentioned. The strength of our study is its well-defined inclusion criteria which restrict the study to patients previously handled exclusively in primary care and the tracking of patient flow from secondary to primary diabetes care in a defined admission area during a prolonged period of time.

Our study is limited by its retrospective design; we are unable to describe a detailed time course in the development of the risk profile since we only have data on classification at referral and when patients returned to primary care. Even though risk stratification as a guide for the flow of patients between primary and secondary health care seems rational and commonsensical, we recognize that our population was recruited before the official risk stratification model was presented in Denmark. This facilitates a long follow-up period, but our results obviously cannot indicate if active use of risk stratification is useful or not. However, when risk stratification was applied for an exploratory and descriptive purpose only, it was clear that the transition from secondary to primary care in the study period did not respect the principle of the risk stratification model.

New studies should describe if clinical practice has changed. Any risk stratification model is established on the basis of the best evidence-based clinical practice at a given point in time and therefore needs to be revised regularly. Otherwise, the model will soon lose its applicability as is the case for the model presented by the Danish National Board of Health since both recommendations for glycaemic control and optimal blood pressure have recently been changed. Furthermore, individualised goals complicate the presentation of simple risk stratification criteria.

In conclusion, the half-life of contact with the outpatient clinic was 18 months, which should stimulate strategies for a more expedient treatment course. The majority of patients were high-risk patients, even when discharged from the outpatient clinic. Glycaemic control and blood pressure were significantly improved, but nevertheless the patients nevertheless returned to primary care which receives patients back whose treatment courses are complicated by co-morbidities.

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