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.

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 χ²-test.
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. HbA1c, 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 2.5-25 men 2.5-25 men >25 men or P-creatinine >160 µmol/l <3.5 women 3.5-35 women >35 women 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

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 HbA1c, measured in the period 12-24
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 HbA1c 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 anti-hypertensive drugs increased significantly during the follow-up in both groups of patients (p < 0.001). For patients who were discharged, HbA1c 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).

**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), HbA1c (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 have been shown to have a high rate of complications [6]. It is reassuring that only 7% of the referred patients...
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 healthcare 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 HbA1c, 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 outpatient 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

### 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.

<table>
<thead>
<tr>
<th></th>
<th>Baseline all patients</th>
<th>patients returned to primary care</th>
<th>Follow-up, 10-month (1-64)</th>
<th>p-value, follow-up vs baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total (male/female), n</td>
<td>151 (98/63)</td>
<td>105 (59/56)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Age, yrs, mean ± SD</td>
<td>62 ± 12</td>
<td>63 ± 11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>BMI, kg/m², mean ± SD</td>
<td>31.7 ± 5.7</td>
<td>31.9 ± 6.0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Diabetes duration, yrs, mean (range)</td>
<td>7.4 (1.9-34.5)</td>
<td>7.3 (1.9-32.8)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Vibration threshold &gt; 30 U, n (%)</td>
<td>43 (30)</td>
<td>36 (35)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Normo/micro/macro-albuminuria, n (%)</td>
<td>96/40/11 (61/27/7)</td>
<td>74/24/4 (71/24/4)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>P-creatinine conc., µmol/l</td>
<td>74 (40-179)</td>
<td>73 (40-156)</td>
<td>80 (43-156)</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>HbA1c, %</td>
<td>8.8 ± 1.7</td>
<td>8.7 ± 1.7</td>
<td>7.2 ±1.0</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Insulin users, n (%)</td>
<td>30 (20)</td>
<td>17 (16)</td>
<td>52 (50)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>LDL chol conc., mmol/l</td>
<td>2.3 ± 0.9</td>
<td>2.3 ± 0.9</td>
<td>2.0 ± 0.8</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Lipid lowering drugs, n (%)</td>
<td>96 (64)</td>
<td>70 (46)</td>
<td>91 (87)</td>
<td>-</td>
</tr>
<tr>
<td>Platelet inhibition, n (%)</td>
<td>62 (41)</td>
<td>48 (46)</td>
<td>77 (73)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Systolic BP, mmHg, mean ± SD</td>
<td>143 ± 22</td>
<td>142 ± 21</td>
<td>133 ± 16</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Diastolic BP, mmHg mean ± SD</td>
<td>84 ± 11</td>
<td>83 ± 10</td>
<td>77 ± 9</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Patients with antihypertensive drugs, n (%)</td>
<td>115 (76)</td>
<td>80 (76)</td>
<td>93 (89)</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

LDL chol = low-density lipoprotein cholesterol; SD = standard deviation.

- a) n = 92; b) n = 102; c) n = 100; d) n = 80; e) n = 98.
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, indi-

visualised 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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LITERATURE