The influence of elevated cardiometabolic risk factor levels on treatment changes in type 2 diabetes

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ABSTRACT

Undertreatment of risk factors in patients with type 2 is common. We assessed the influence of elevated levels of blood pressure, total cholesterol and HbA1c on decisions of Dutch general practitioners to change drug treatment in a cohort of 3029 patients during a 1-year period.

Respectively 58%, 71% and 21% of patients remained untreated despite poor blood pressure, lipid levels and glycemic control. Of poorly controlled but already drug-treated patients, 52% did not receive intensification for antihypertensive medication, 81% not for lipid-lowering medication, and 43% not for glucose-lowering medication. We observed a significantly lower treatment intervention rate in moderately controlled than in poorly controlled patients for blood pressure. This was not seen for decisions on cholesterol or HbA1c results.

The low overall action rates observed for blood pressure and especially lipid management cannot sufficiently be explained by the use of higher treatment thresholds than indicated by guidelines.
Considerable progress has been achieved regarding the quality of diabetes care but undertreatment remains a topic of concern (1-3). Low rates of starting and intensifying treatment in patients with type 2 have been observed (4-7). Although accepting higher risk factor levels than indicated by guidelines has been reported as a reason for not changing treatment, few studies have looked at differences in treatment intervention rates for moderately and poorly controlled patients (8-11). Results from two provider survey studies suggest that physicians treat near-goal HbA1c levels more aggressively than near-goal blood pressure levels (10,12). Our aim was to assess the influence of moderately and highly elevated levels of cardiometabolic risk factors on the decision to change antihypertensive, lipid-lowering and glucose-lowering treatment in primary care.

**RESEARCH DESIGN AND METHODS**

We conducted a cohort study including 3029 type 2 patients managed by 62 general practitioners (GPs). Clinical measurements and prescriptions were gathered from electronic patient records at the GPs’ offices and a regional facility (13). Of the GPs, 20% practiced in a rural area, 18% worked in a solo practice, and 16% were allowed to dispense drugs at their practice.

We assessed treatment status and risk factor level at baseline (1 October 2003), using the most recent measurements in the preceeding year. Thresholds for moderately and highly elevated levels were set following national guidelines at ≥140 mmHg and ≥160 mmHg for systolic blood pressure; ≥85 mmHg and ≥95 mmHg for diastolic blood pressure; ≥5 mmol/l and ≥7 mmol/l for total cholesterol; ≥7% and ≥8.5% for HbA1c. Treatment changes were determined during a follow-up period of one year. Patients receiving maximal medication at baseline, as defined by national guidelines for GPs and the Dutch Pharmacotherapy Compendium, were excluded (14).

Treatment change was defined as the start or intensification of drug treatment for antihypertensive, lipid-lowering and glucose-lowering treatment. Patients were considered to start treatment when they received a first prescription during the study period after receiving no prescriptions for this therapeutic group during the previous six months. A treatment change was considered intensification when a new drug class was added or the medication dosage was increased. A switch to another drug class without continuation of the original medication was not considered treatment intensification. A prescription was considered discontinued when it was not repeated within 120 days from the calculated end date.

Results are presented as proportions of patients with treatment changes with 95% confidence intervals, and differences were tested by means of z approximation to the binominal distribution.

**RESULTS**

The patients were aged 66.4±12.3 years and 56% were female. At baseline, 14% had a recorded history of coronary disease, and 13% suffered from other macrovascular or microvascular complications. The number of concurrently prescribed chronic drugs was 4.7±3.1. Annual testing rates were 81.8% for blood pressure, 74.8% for total cholesterol, and 76.9% for HbA1c. The average risk factor levels were 147±20 mmHg for systolic blood pressure, 81±10 mmHg for diastolic blood pressure, 5.1±1.0
mmol/l for total cholesterol, and 7.3±1.3% for HbA1c.

**Treatment status.** Of the 3029 patients, respectively 63%, 31% and 80% were using antihypertensive, lipid-lowering and glucose-lowering medication at baseline, and 22%, 16% and 36% of untreated patients started treatment during the study period. Of patients treated at baseline, respectively 25%, 1% and 17% were already on maximal treatment. Of patients not on maximal treatment, 32% received intensification for antihypertensive, 17% for lipid-lowering, and 45% for glucose-lowering medication.

The figure shows percentages of patients starting and intensifying treatment according to their control status. Medication change was significantly more likely in patients with elevated HbA1c levels than with elevated blood pressure or cholesterol levels. Of the patients with poorly controlled systolic or diastolic blood pressure, 58% and 50% remained untreated. This was the case for 71% with poorly controlled total cholesterol levels (68% in patients <75 years), and for 21% with poorly controlled HbA1c levels. For patients already treated, 52% of the poorly controlled for systolic blood pressure did not receive intensification for antihypertensive medication, while this was observed in 81% for lipid-lowering medication, and 43% for glucose-lowering medication.

Only for blood pressure, we observed a significant difference in treatment intervention rate between moderately and poorly controlled patients. Furthermore, in patients with moderately controlled blood pressure intervention was less likely in untreated than treated patients.

**CONCLUSIONS**

This study showed that GPs were more likely to change glucose-lowering treatment than antihypertensive or lipid-lowering medication, especially in moderately controlled patients. Regarding blood pressure management, we confirmed previous findings that treatment changes are less likely in moderately controlled than in poorly controlled patients, and that there is more reluctance to start than to intensify treatment (10). For lipid management, action remained low even at high cholesterol levels. A reluctance to prescribe lipid-lowering medication has been observed before in patients with diabetes (15), and might be explained by concerns about medicalization and cost-effectiveness of such treatment (16).

The strength of our study is that it is based on actual practice patterns, and therefore not biased by recall or Hawthorne effects that may be present in provider survey studies. The results may be limited by the completeness of medical record data. Prescribing data and test results are generally well-recorded in primary care (17). All GPs in our study use electronic patient records and prescribe electronically. Furthermore, the GPs in our study may not be representative of GPs in other settings or countries. Guideline recommendations on treatment thresholds are changing over time and differ slightly between countries, and there can be differences in the health care system that influence the treatment intervention rates. However, similar low rates have been observed in other recent studies (6,7,18,19).

This study shows that the use of higher thresholds than recommended for starting and intensifying treatment cannot sufficiently explain the low rates of treatment intervention observed for blood pressure and especially lipid management. Other factors, such as compliance concerns or postponing treatment changes because of achieved progress or expected transient events...
might be more important in these cases (10-12).

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REFERENCES

FIGURES

Figure 1. Percentages of treatment changes (95% confidence intervals) during a 12-months period in patients with controlled, moderately controlled, and poorly controlled risk factor levels at baseline. Thresholds for moderate and poor control were set at ≥140 mmHg and ≥160 mmHg for systolic blood pressure (SBP); ≥85 mmHg and ≥95 mmHg for diastolic blood pressure (DBP); ≥5 mmol/l and ≥7 mmol/l for total cholesterol; ≥7% and ≥8.5% for HbA1c.