

Clinical Update

Lower target blood pressure for patients with diabetes mellitus

Adler AI, Stratton IM, Neil HA, Yudkin JS, Matthews DR, Cull CA, et al. Association of systolic blood pressure with macrovascular and microvascular complications of type 2 diabetes (UKPDS 36): prospective observational study. *BMJ* 2000;321:412-9.

Background

Current Canadian guidelines advise treating hypertension in diabetic patients to a target blood pressure of less than 130/80 mm Hg.^{1,2} However, that recommendation was based on limited evidence.

Question

What is the relation between systolic blood pressure and the risk of macrovascular and microvascular complications among patients with type 2 diabetes mellitus?

Design

The UK Prospective Diabetes Study (UKPDS) is an ongoing prospective observational study of a cohort of patients aged 25–65 years with newly diagnosed type 2 diabetes who were enrolled through 23 centres in the United Kingdom between 1977 and 1991. Exclusion criteria included severe vascular disease, myocardial infarction or stroke within 1 year before recruitment, or major systemic illness. Blood pressure was measured 2 and 9 months after a diagnosis of diabetes, then annually thereafter. The clinical end points include all-cause mortality, death related to diabetes, complications related to diabetes, myocardial infarction, stroke, amputation or death from peripheral vascular disease, microvascular complications and heart failure. In this analysis of UKPDS data, 6 categories of mean systolic blood pressure

were defined: < 120, 120–129, 130–139, 140–149, 150–159 and > 160 mm Hg. The proportional-hazards (Cox) ratio was used to assess the potential association between mean systolic blood pressure and clinical end points, adjusted for potential confounding risk factors.

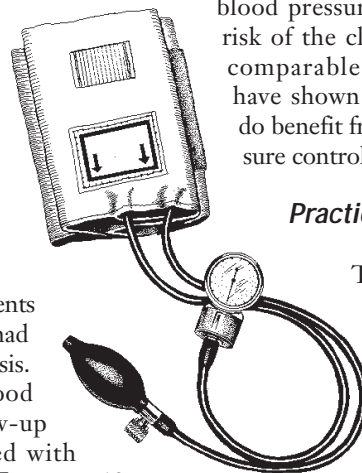
Results

Only 3642 of 4801 patients recruited to the study had complete data for analysis. The mean systolic blood pressure during follow-up was strongly associated with each clinical end point. For every 10 mm Hg elevation in mean systolic blood pressure above 120 mm Hg, there was approximately a 15% increase in all-cause mortality (95% confidence interval [CI] 9%–16%, $p < 0.0001$), deaths related to diabetes (95% CI 13%–21%, $p < 0.0001$), complications related to diabetes (95% CI 9%–14%, $p < 0.0001$), myocardial infarction (95% CI 7%–16%, $p < 0.0001$), stroke (95% CI 14%–24%, $p < 0.0001$), amputation or death from peripheral vascular disease (95% CI 9%–23%, $p < 0.0001$), microvascular complications (95% CI 9%–26%, $p < 0.0001$) and heart failure (95% CI 4%–19%, $p < 0.0001$). The clinical end points were similarly associated with each 10 mm Hg increase in baseline systolic blood pressure.

Commentary

UKPDS is the largest prospective study of patients with type 2 diabetes. Its 36th report shows a strong association between systolic blood pressure and the macrovascular and microvascular complications of diabetes, even within what

is considered the “normal” ranges of systolic blood pressure. Although this observational study cannot tell us whether active lowering of systolic blood pressure would decrease the risk of the clinical end points to a comparable extent, recent trials have shown that diabetic patients do benefit from tighter blood pressure control.^{3,4}



Practice implications

The risk of macrovascular and microvascular complications of type 2 diabetes rises steadily above a systolic blood pressure of only 120 mm Hg. It is likely that patients with type 2 diabetes and hypertension who otherwise are medically stable (see exclusion criteria in “Design”) would benefit from more aggressive lowering of blood pressure. — Benjamin H. Chen

The Clinical Update section is edited by Dr. Donald Farquhar, head of the Division of Internal Medicine, Queen's University, Kingston, Ont. The updates are written by members of the division.

References

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