

# Global Guideline for Type 2 Diabetes

## Chapter 11: Blood pressure control

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## Recommendations

### ■ Standard care

- BP1 Measure blood pressure annually, and at every routine clinic visit if found to be above target levels (see below), or if on treatment:
- use a mercury sphygmomanometer or validated meter in good working order and an appropriately sized cuff (large or normal depending on arm size)
  - measure after sitting for at least 5 min, with arm at heart level, using first and fifth phases of Korotkoff sounds
  - record all values in a record card held by the person with diabetes
  - use 24-hour ambulatory monitoring (ABPM) if 'white coat' hypertension suspected, but adjust targets down by 10/5 mmHg.
- BP2 Consider secondary causes of raised blood pressure if there is evidence of renal disease, electrolyte disturbance or other features.
- BP3 Aim to maintain blood pressure below 130/80 mmHg (for people with raised albumin excretion rate see *Kidney damage*).
- Add further drugs if targets are not reached on maximal doses of current drugs, reviewing the preferences and beliefs of the individual concerned, and likely adherence problems as tablet numbers increase.
- Accept that even 140/80 mmHg may not be achievable with 3 to 5 anti-hypertensive drugs in some people.
- Revise individual targets upwards if there is significant risk of postural hypotension and falls.
- BP4 Initiate a trial of lifestyle modification alone with appropriate education for 3 months (see *Lifestyle management*), aiming to reduce calorie intake, salt intake, alcohol intake, and inactivity.
- BP5 Initiate medication for lowering blood pressure in diabetes not complicated by raised albumin excretion rate, using any agent except for  $\alpha$ -adrenergic blockers, with consideration of costs, and actively titrating dose according to response:
- ACE-inhibitors and A2RBs may offer some advantages over other agents in some situations (see *Kidney damage, Cardiovascular risk protection*), but are less effective in people of African extraction
  - start with  $\beta$ -adrenergic blockers in people with angina,  $\beta$ -adrenergic blockers or ACE-inhibitors in people with previous myocardial infarction, ACE-inhibitors or diuretics in those with heart failure
  - care should be taken with combined thiazide and  $\beta$ -adrenergic blockers because of risk of deterioration in metabolic control.

## ■ Comprehensive care

BP<sub>C</sub>1 This will in general be as for *Standard care*, but with the additional option of self-monitoring of blood pressure on validated semi-automatic devices to provide additional information and educational feedback.

## ■ Minimal care

BP<sub>M</sub>1 Measurement and targets will be as for *Standard care*.

BP<sub>M</sub>2 Initiate a trial of lifestyle modification (as *Standard care*) with appropriate education (see *Lifestyle management*).

BP<sub>M</sub>3 Initiate medication for lowering blood pressure in diabetes not complicated by proteinuria, using generic diuretics,  $\beta$ -adrenergic blockers, calcium channel blockers, or ACE-inhibitors as available, increasing the number of preparations used according to drug availability locally.

## Rationale

Blood pressure is elevated in many people with Type 2 diabetes. Increasing blood pressure levels are associated with a spectrum of later health problems in people with diabetes, notably cardiovascular disease (especially stroke), eye damage and kidney damage.

## Evidence-base

Review of the evidence-base on this topic is spread among guidelines primarily addressing diabetes [1-4] or hypertension [5,6], often embedded in consideration of cardiovascular disease [7] or kidney disease (see *Kidney damage*). The evidence may derive from trials involving primarily people with diabetes [8] or people with hypertension [9].

Recommendations on thresholds for intervention and targets of therapy vary narrowly across the guidelines. Some of this variation reflects concern at setting targets that are difficult to achieve in some people, and may appear unduly daunting, especially when many drugs are required. In the UKPDS, beneficial effects on complications, in particular stroke and retinopathy, were achieved at 144/82 mmHg in the tighter control group [8], consistent with results from the HOT study [9]. However, epidemiological analysis of UKPDS suggested benefits well below this level, supported by achievement of blood pressure down to 128/75 mmHg in other studies [1]. The recommended target of <130/80 mmHg for people with Type 2 diabetes uncomplicated by nephropathy is in line with the more recent guidelines [1-3,5,6].

Evidence on methods for measuring blood pressure was reviewed by the Australian guideline [1]. A meta-analysis of use of self-monitoring of blood pressure found it resulted in a small but statistically significant reduction [10]. Lifestyle modification (including weight reduction, reducing salt intake, increasing physical activity, reducing alcohol intake) can reduce systolic blood pressure by 4-10 mmHg (see *Lifestyle management*).

Many randomized trials have shown that blood-pressure-lowering therapy reduces cardiovascular disease morbidity and mortality in people with diabetes. Many agents (ACE-inhibitors,  $\beta$ -adrenergic blockers and low-dose thiazide diuretics) have proved effective. Choice of agent for a person with diabetes may be influenced by a number of factors including their risk profile (cardiovascular, renal, end-organ damage), preferences, and previous experience of therapy, as well as costs. Thiazide diuretics may adversely affect glucose, lipid and potassium levels, and  $\beta$ -adrenergic blockers may adversely affect glucose and lipid levels, but no RCTs have shown these drugs to increase cardiovascular mortality in Type 2 diabetes [1]. Avoidance of  $\alpha$ -adrenergic blockers as first-line therapy is based on evidence from ALLHAT [2].

Cost issues, and particularly the data from UKPDS [11], were considered in the Australian guideline [1], which concluded that controlling blood pressure in people with Type 2 diabetes is cost-effective.

Achieving effective control of blood pressure, and consequent therapeutic benefits, is reported to depend

on adherence to therapy. Cultural health beliefs, complex therapeutic regimens, adverse effects, tablet number burden, and poor social support are reported predictors of poor concordance with therapy. These issues need to be discussed with the person concerned, where response to drugs is poor.

## Consideration

Blood pressure management appears to be among the most cost-effective methods of prevention of vascular complications in people with Type 2 diabetes. Lifestyle measures are generally preferred as a trial before therapeutic intervention, but alone are generally insufficient. Because individual therapies are not particularly effective even in full dosage, the experience of the need for multiple therapies found in UKPDS is reflected in the guideline recommendations. However, this also implies the need for frequent monitoring and dose titration until targets, or the limits of therapeutic effect, are reached.

## Implementation

There is need for equipment for measurement of blood pressure, maintenance of that equipment, and training of personnel in its use. Protocols using locally available drugs should be drawn up and followed to ensure drug prescription, and dose titration to target. Lifestyle education is described elsewhere (see *Lifestyle management*).

## Evaluation

A record of measurement of blood pressure within clinical records in the last 12 months should be found. Where that is elevated there should be evidence of action to lower it. The percentage of people in whom blood pressure achieves the target level 130/80 mmHg can be ascertained, and the percentage of those with blood pressure above target who are receiving treatment involving lifestyle modification and drug therapy. Availability of sphygmomanometers in working order, and appropriate cuffs can be ascertained, as can training and proficiency of staff measuring blood pressure.

## References

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