THE **DIAGNOSIS & MANAGEMENT OF HYPERTENSION**

 **Dr John McLEISH Revised June 2020**

**HISTORICAL PERSPECTIVE**

**THE JNC7 Guidelines**

For many years recommendations on the management of hypertension were informed by the USA guidelines of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (**JNC7**) published in **2003** (JAMA 289:2560, 2003).

The JNC7 guidelines recommended staging of BP into 4 groups (based on office readings), viz

1. **Normal BP** <**120/80** mm Hg
2. **Prehypertension** SBP **120-139** ; DBP **80-89**
3. **Stage 1** hypertension (**mild**) SBP **140-159** ; DBP **90-99**
4. **Stage 2** hypertension (**moderate**) SBP ≥**160** ; DBP≥**100**

A further category of **severe** hypertension (SBP **≥ 180**; DBP **≥ 110** mm Hg) was generally included

The recognition that **ambulatory BP monitoring** provided a far more accurate assessment of the patient’s actual BP during normal daily activities (and predicted cardiovascular events better than office readings) led to a recommended **average daytime** BP of **<135/85** and **night-time** readings of **<120/70**; average day-time limits of **<140/90** and night-time limits of **<125/80** were suggested for individuals **>65 years** of age.

**It should be emphasised that ambulatory BP monitoring should *always* be performed in a patient with suspected hypertension prior to committing the patient to long-term drug treatment with its attendant cost and potential side-effects.** ABP monitoring has several benefits, including:-

* identification of individuals with ‘**white coat**’ **hypertension** : approximately 20% of patients with elevated office BP readings have normal ABP readings (others have an elevated office BP superimposed on less severe hypertension)
* **prevention of overtreatment** : in up to 30% of treated patients with persistently high office readings ABP monitoring reveals adequate BP control or overtreatment
* **evaluation of BP during the hours of sleep** : some individuals do not show the normal drop in BP during sleep (‘**non-dippers**’) and have increased incidence of elevated aggregate BP and increased adverse cardiovascular outcomes. Arbitrarily ‘dipping’ is considered to be a drop of **15%** or more (some authorities suggest **10%** or more) in average BP during the hours of sleep. Nocturnal hypertension is particularly common in patients with **chronic renal disease**
* diagnosis of **masked hypertension** : it has been suggested that office BP readings may **underestimate** BP during usual daily activities in as many as 10% of patients, caused by work or home stresses

**Coronary artery disease mortality and stroke mortality** rates increase markedly with each increase in BP stage and the risk further increases dramatically if **target** **organ damage** is present(eg LVH, carotid plaque, decreased glomerular filtration rate or microalbuminuria) or if additional risk factors for CAD are present such as **hyperlipidaemia, diabetes mellitus or chronic renal disease**.

The JNC7 guidelines recommended a lower threshold (**130/80**) for commencing antihypertensive treatment in patients with **renal disease** or **diabetes.** Subsequently the group of patients considered to be high-risk was expanded to include individuals with:-

* established coronary artery disease
* carotid artery disease (carotid bruit or abnormal ultrasound)
* peripheral vascular disease
* abdominal aortic aneurysm
* heart failure
* high risk for CAD (10 year Framingham risk score of >10%)

**Muddying the waters** : **the JNC8 Hypertension Guidelines**

After a long gestation the JNC8 Guidelines were published in JAMA in December 2013. These guidelines surprised by relaxing the thresholds at which drug therapy should be initiated; the rationale being that there was insufficient evidence that the lower BP goals recommended by JNC7 improved patient outcomes. It was felt that the new thresholds might improve patient compliance by using fewer medications while minimizing adverse effects of low BP such as sexual dysfunction and presyncopal events. As previously the importance of **diet**, reduced **sodium intake**, decreased **alcohol intake**, regular **exercise** most days of the week and **weight loss** in controlling BP were emphasized.

Major recommendations of JNC8 included:

* in patients **<60 years** of age recommended BP was **<140/90**
* in individuals **≥60 years** recommended BP was **<150/90**
* in patients with **chronic renal disease** or **diabetes mellitus** recommended BP was **<140/90**
* first line drug therapy was limited to **4** drug classes, viz
* thiazide-type diuretics
* calcium channel blockers (CCBs)
* angiotensin converting enzyme inhibitors (ACEIs)
* angiotensin receptor blockers (ARBs)
* later-line drug alternatives included ᵦ-blockers, α-blockers, α1/ᵦ-blockers (eg carvedilol), central α2-adrenergic blockers (eg clonidine), direct vasodilators (eg hydralazine), loop diuretics (frusemide) and aldosterone antagonists (spironolactone)
* ACEIs and ARBs should not be used together
* ACEIs and ARBs were recommended in all patients with chronic renal disease except in individuals over **75** years of age in whom CCBs and thiazide diuretics are indicated due to the risk of hyperkalaemia and further renal impairment
* in patients of African descent (except those with renal disease) thiazide diuretics and CCBs lead to better outcomes compared to ACEIs and ARBs

Note that in **younger** patients **elevated DBP** is the greater cardiovascular risk factor while in patients **≥60 years** control of **SBP** is more important. Elderly patients with a **high pulse pressure,** defined as≥60mm Hg (ie high SBP and normal or low DBP; **isolated systolic hypertension**) have a particularly high cardiovascular risk.

**ESH/ESC Guidelines for the management of hypertension**

In 2013 a Task Force of the European Society of Hypertension (**ESH**) and the European Society of Cardiology (**ESC**) also released revised guidelines for managing hypertension. The taskforce produced a comprehensive document on the evaluation and management of hypertension which was published in the European Heart Journal in 2013. The document is recommended as a valuable source of information for all medical practitioners treating patients with hypertension.

The ESH/ESC classified BP as follows:-

|  |  |  |
| --- | --- | --- |
| **High Normal** | SBP **130-139** | DBP **85-89** |
| **Grade 1 Hypertension** | SBP **140-159** | DBP **90-99** |
| **Grade 2 Hypertension** | SBP **160-179** | DBP **100-109** |
| **Grade 3 Hypertension** | SBP **≥ 180** | DBP **≥110** |

Also identified by the ESH/ESC were additional risk factors, including:-

* sedentary individuals or patients with central obesity
* elevated fasting glucose and/or abnormal GTT
* raised triglycerides, fibrinogen, apolipoprotein B, lipoprotein (a) and high-sensitivity C-reactive protein levels
* family history of premature CVD, defined as <55 years in males and <65 years in females

**CURRENT RECOMMENDATIONS**

In 2017 the American College of Cardiology (ACC) and American Heart Association (AHA) released updated guidelines on normal BP which were based on the **Systolic Blood Pressure Intervention Trial (SPRINT)**. This trial studied 9000 patients 50 years or older with SBP ≥ 130mm Hg and 1 or more risk factors for coronary disease. Over a 3 year study period the researchers found that targeting an SBP of ≤ 120mm Hg reduced the risk of heart attacks, stroke and heart failure.

The revised ACC/AHA guidelines are as follows:-

|  |  |
| --- | --- |
| **Normal BP** | **<120/80** |
| **Elevated BP** | SBP 120-129 |
| Stage 1 Hypertension | SBP 130-139; DBP 80-89 |
| Stage 2 Hypertension | >140/90 |

For **Elevated BP** no medications are recommended, but healthy diet (increased vegetables and fruit, lean meat, fish), decreased salt intake, weight loss and no more than 2 alcoholic drinks a day for men and no more than 1 for women form the basis of management

For **Stage 1 Hypertension** lifestyle changes are again recommended with medication indicated if there is a >10% risk of cardiovascular events in 10 years, and for **Stage 2 Hypertension** drug therapy AND lifestyle changes are recommended.

Why is this important? Research suggests **SBP 20mm** higher than normal or **DBP 10mm** higher than normal **DOUBLES** the risk from myocardial infarction, stroke, abdominal aortic aneurysm or heart failure

The new guidelines mean that approximately **half** of USA citizens are now classified as having high BP and 70% of individuals in the 45 to 75 year age group in the US have high BP.

The new 2017 Guidelines also revised the definition of **nocturnal hypertension** as **BP > 110/65**

**NOCTURNAL BP ‘DIPPING’**

A consistent finding in individuals with a decreased or absent fall in BP during sleep is an increased risk of CV events and correlates more closely with fatal and non-fatal cardiovascular events than daytime readings. Increased night time BP **variability** confers an increased risk independently of the **average** night time readings.

Nocturnal hypertension is also associated with increased risk of subclinical organ damage eg silent cerebral infarcts, microbleeds and cognitive decline

Possible causes for an absence in nocturnal BP dipping include:-

* obstructive sleep apnoea
* disturbed sleep
* nocturia
* chronic kidney disease
* autonomic dysfunction
* orthostatic hypotension
* diabetic neuropathy
* old age

**INITIAL INVESTIGATION OF THE HYPERTENSIVE PATIENT**

Following confirmation of a diagnosis of hypertension by ABP monitoring the following investigations should be performed:-

* FBC
* UEC/Mg and calculated glomerular filtration rate (GFR)
* Fasting BSL
* Fasting lipids
* Urinalysis
* 12-lead ECG
* Echocardiogram if ECG evidence of LV hypertrophy and strain pattern

Further investigations may be indicated, eg renal ultrasound and/or renal biopsy in the presence of **renal disease**; carotid ultrasound if a **carotid bruit** is heard; urinary catecholamines if **phaechromocytoma** is suspected, plasma rennin and serum aldosterone to diagnose **primary aldosteronism**,etc.

It is further recommended that **home BP monitoring** be a routine part of the ongoing management of hypertension. The patient’s recorder should be checked in the office for accuracy and correct cuff size.

Note that LVH with strain pattern on the ECG predicts a high risk of future heart failure and of death from heart failure. Note however that the ECG is relatively insensitive in diagnosing LVH: **5 to 10%** of hypertensive patients show ECG criteria for LVH compared with an incidence of approximately **30%** on echocardiographic examination (up to **90%** in patients with severe uncontrolled hypertension).

**WHY IS IT IMPORTANT?**

The diagnosis and correct management of hypertension constitutes one of the most effective preventative health measure that can be taken to reduce morbidity and mortality in the community. In the USA **25%**of adults in the general population have hypertension while in diabetics the incidence is **75%** and in individuals with chronic renal disease the incidence is **90%**.

Hypertension contributes to many important clinical conditions, including:-

* atherosclerotic heart disease
* cerebrovascular disease, including **stroke** (responsible for 50% of cases; of which 80% are ischaemic and 20% are haemorrhagic) and **vascular dementia**
* chronic kidney disease (a risk factor secondary only to diabetes)
* abdominal aortic aneurysm
* peripheral vascular disease
* cardiac failure

**Recommended reading:**

Systemic Hypertension: Mechanisms & Diagnosis: Ronald G Victor

Braunwalds’ Heart Disease 9th ed 2012 : Ch 45 pp 935-954

The JNC8 Hypertension Guidelines: An In-Depth Guide: Michael R Page published online Jan 6 2014

<http://www.pharmacytimes.com/news/>

2013 ESH/ESC Guidelines for the management or arterial hypertension: European Heart Journal (2013) **34** pp 2159-2219

Impact of 2017 ACC/AHA guidelines on prevalence of hypertension and eligibility for antihypertensive treatment in United States and China; nationally representative cross sectional study : BMJ 2018; 362 : k2357