

This is the author's accepted manuscript: for the version of record for "Managing hypertension: the role of diet and exercise", see The Pharmaceutical Journal, February 2020, Vol 304, No 7934, online | DOI: 10.1211/PJ.2020.20207659

Exercise and diet in managing hypertension

Philip Crilly, Senior Lecturer, School of Life Sciences, Pharmacy and Chemistry,
Kingston University, Penrhyn Road, KT1 2EE

Author for correspondence: p.crilly@kingston.ac.uk

Standfirst: It is well-known that high blood pressure increases the risk of heart attacks and strokes. However, what lifestyle interventions are recommended to reduce this?

Community pharmacy is essential in helping to deliver public health campaigns and can support Public Health England's (PHE's) call-to-action to reduce the number of people living with hypertension[2]. Each year the management of hypertension costs the NHS upwards of £2 billion, with the complications associated with the condition contributing to further costs, particularly relating to hospital stays and recuperation.(1) According to PHE, more than one in four adults in England are affected by high blood pressure (BP) (representing 12.5 million people), with more men than women living with the condition (31% of men vs 26% of women).(1) Worryingly, nearly six million people in England are believed to have undiagnosed hypertension.(1)

There are several lifestyle factors that increase a person's risk of hypertension. This article will discuss the evidence base for how diet and exercise could support patients in the self-management of their condition, and what the role of the pharmacist is delivering this health message.

What is hypertension?

BP is a measure of how much force the heart uses to pump blood around the body.(2) When patients have their BP measured, the reading comprises of two numbers. The higher number represents the systolic blood pressure (SBP), which is an indicator of the pressure exerted when the heart contracts. The lower number represents the diastolic blood pressure (DBP), which is the pressure when the heart muscle relaxes.(1) Hypertension is when a patient's BP is too high.

BP is measured in millimetres of mercury (mmHg) and optimal BP for any one aged over 18 years is between 90/60mmHg and 120/80mmHg.(3) A reading of between 120/80mmHg and 140/90mmHg is deemed to be high-normal BP, while an in-clinic reading of 140/90mmHg or higher may indicate hypertension. This, however, would need to be accompanied by an ambulatory blood pressure (ABP) or home blood pressure (HBP) reading to confirm the diagnosis (see Diagnosis below).(4)

Causes and risk factors

Non-modifiable risk factors for hypertension include gender, age, ethnicity and genetics. For example, people from a Black Afro-Caribbean background have a higher risk of hypertension than other ethnicities.(1) Although the risk of developing hypertension increases with age, over 2.1 million people under the age of 45 have high BP.(1) Adults over the age of 40 are advised to have their BP checked by a healthcare professional at least once every five years, or more often if their BP is considered to be high-normal.(5) Depending on a person's blood pressure reading a community pharmacist will either advise them on diet and lifestyle changes to manage their blood pressure or will refer them to their GP for further checks. A community pharmacist should only share confidential patient information with a person's GP with their consent.

Modifiable risk factors include:

- Dietary salt intake;
- Being overweight or obese;
- Lack of exercise;
- Excess alcohol;
- High consumption of caffeine.(1,6,7)

Elevated BP that cannot be linked to an identifiable cause is termed primary hypertension, while secondary hypertension, which accounts for 10% of hypertension cases, is caused by an underlying medical condition or the use of particular medications.(8) Most commonly, secondary hypertension is associated with conditions such as renal disease, obstructive sleep apnoea and thyroid disorders, as well as the use of medications (e.g. nonsteroidal anti-inflammatory drugs or decongestants).(8)

Symptoms

Hypertension is often referred to as the 'silent killer' because, for many people, it is an asymptomatic condition.(9) For some people, the only way to determine if they have hypertension is by measuring their BP. For others, certain symptoms can indicate raised BP, such as shortness of breath, headaches, nosebleeds, and issues with vision.(5) Anybody experiencing these symptoms should be referred to their GP for further tests.

Diagnosis

Patients must have their BP measured in a clinical setting by a healthcare professional, such as a pharmacist, nurse or general practitioner.(4) The National Institute for Health and Care Excellence (NICE) suggests that if a clinic BP reading is 140/90mmHg or higher, a second BP reading should be taken during the same consultation. If there is a big difference between the first and second measurements,

a third reading should be taken. The lower of the second and third BP readings should be noted as the clinic reading.(4) It is often important to take the BP reading on both arms to identify any differences between the two.

Clinic testing of BP can be associated with the 'white coat effect' (i.e. the process of having their BP measured causes the patient's BP to be raised). Therefore, patients who have a clinic BP measurement of between 140/90mmHg and 180/120mmHg should then be offered ABP monitoring or HBP monitoring.(4) These involve taking multiple BP readings over the course of the patient's waking day and an average value of these is noted as the patient's BP.(4)

During the process of confirming whether or not a patient has hypertension, NICE recommends diagnosticians investigate any target organ damage and to use a validated tool (e.g. the QRISK tool[10]) to carry out a cardiovascular risk assessment on the patient.

A patient is confirmed as having hypertension if they have a clinic BP of 140/90mmHg or higher and an ABP or HBP average of 135/85mmHg or higher.(4) Their condition is then categorised into one of three stages:

- **Stage 1** – clinic BP of between 140/90mmHg and 159/99mmHg and an ABP or HBP average of between 135/85mmHg and 149/94mmHg;
- **Stage 2** – clinic BP 160/100mmHg or higher, but less than 180/120 mmHg and subsequent ABP daytime average or HBP average BP of 150/95mmHg or higher;
- **Stage 3** – clinic BP of 180mmHg or higher, or clinic diastolic BP of 120mmHg or higher(4).

For patients over 40 years old, not diagnosed as being hypertensive, their BP should be re-measured within the next five years.

Management

In general, patients with Stage 2 and 3 hypertension will require drug therapy alongside lifestyle changes, while those with Stage 1 hypertension may be able to manage their condition with lifestyle changes alone.(4) Factors that mean someone with stage 1 hypertension requires drug therapy include having co-morbidities (e.g. diabetes or renal disease), being under the age of 40 and having a 10-year cardiovascular disease risk of 10% or more.(4)

Non-pharmacological interventions

According to NICE guidelines, in the first instance, when a patient is hypertensive or pre-hypertensive, a change in diet and exercise is recommended(4). Interventions

that address diet, exercise and weight have been found to be effective in reducing SBP and DBP by 12.5mmHg and 7.9mmHg, respectively.(11)

Eat healthily

Diet has a large impact on BP with high salt, caffeine and alcohol intake in particular being linked to high BP. Current recommendations regarding salt suggest that it should be limited to 6g per day.(12) Caffeine consumption should not exceed four cups of coffee per day(6,7) and alcohol consumption should be within the recommendations of 14-units per week, which includes two alcohol-free days.(13)

According to the NHS, diet should be based around the Eatwell guide[ADD IN TEXT LINK:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/528193/Eatwell_guide_colour.pdf], which suggests that the biggest portion of a person's diet should include slow-release carbohydrates (e.g. wholegrain bread), as well as fruit and vegetables(14). In addition, the public are encouraged to eat protein and a small amount of dairy. Foods that are high in salt or sugar are not essential for a balanced diet, therefore, are only recommended as treats (e.g. chocolate).

The public are also encouraged not to forget about liquid calories.(14) High sugar drinks (e.g. fizzy drinks) and alcohol all have a major impact on waistlines, for example, data suggests that a large glass of red wine contains 263 calories, while a pint of beer contains 173.(15) Choosing reduced calorie drinks (e.g. zero sugar alternatives) can help with weight loss. In addition, the Eatwell guide recommends eight glasses of water per day.(14)

In addition, the Eatwell guide aims to improve health literacy by trying to educate the public on how to interpret information on food and drink labels.(14) Recent research has shown that the public often have low levels of health literacy, meaning that they find it difficult to interpret whether something is healthy or not.(16) Challenges with checking food and drink labels means that the public often choose unhealthy options, even if their intention is to try and be healthy.

To reduce issues with health literacy, tools such as the Change4Life food scanner app allows members of the public to scan food and drink items.(17,18) The app indicates whether a product is high in calories, fat, salt and sugar, and suggests healthier alternatives. Pharmacists can recommend simple tools like this to help the public to make informed decisions about what is healthy.

Exercise regularly

Increasing public levels of physical activity is a priority for PHE.(19) Current guidelines suggest that the public should aim to achieve 150 minutes of moderate intensity exercise each week (e.g. brisk walking or volleyball) or 75 minutes of

vigorous intensity exercise (e.g. running or playing football)(20). In addition to these types of exercises, which are often referred to as 'cardio', the public should also aim for two days per week of muscle-building exercises to support strong bones and joints.(20) PHE indicate that the benefits of exercise do not only reduce the risks of cardiovascular disease but also many other health risks (see Figure 2).

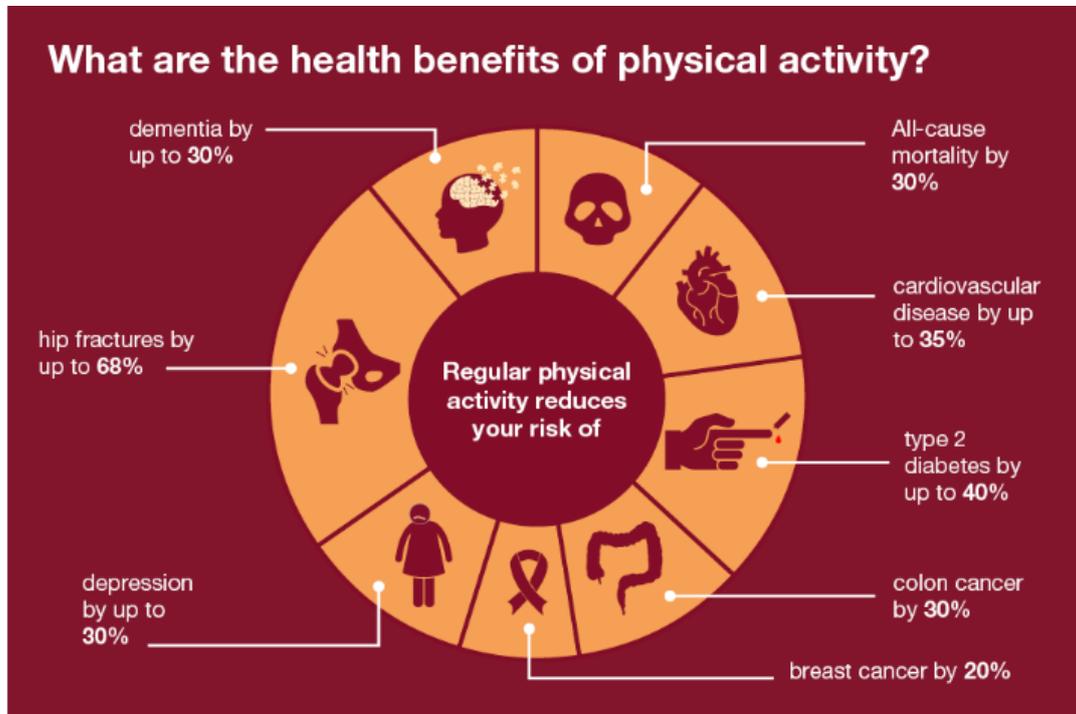


Figure 2: The health risks that can be reduced by regular physical activity (19)

Lose weight

The NHS has developed a free 12-week weight loss programme that aims to support the public to lose weight in line with NICE recommendations.(21) Users of the programme are encouraged to stay within a defined daily calorie intake that is specific for them. Following the programme should result in weight loss of between 0.5kg and 1kg each week. The aim of the programme is to help users to lose between 5% and 10% of their body weight over a 12-week period.

As mentioned previously, health literacy can be a challenge for many people, therefore, tools to help them to count their calories while doing this programme are important(16). The NHS recommends a website to help or there is also the MyFitnessPal app, which allows users to keep track of their calorie intake and record their weight weekly.(22,23)

Other recommendations

Factors including the amount of sleep someone gets and how much stress they are under can also have an impact on their BP. Finding ways to relax and unwind can

support patients to improve their lifestyle and feelings of general wellbeing, as well as reduce their BP.(1)

Patients who smoke should be encouraged to stop and referred to smoking cessation services [ADD IN TEXT LINK <https://www.pharmaceutical-journal.com/learning/learning-article/smoking-cessation-services-how-nicotine-replacement-therapy-and-counselling-through-pharmacy-can-support-adherence-and-quitting/20204033.article>]

Role of the pharmacist

PHE has issued a 'Call to action' for community pharmacy teams to support its agenda to reduce the number of people living with hypertension (see Figure 3).(1)

The call focuses on three areas:

1. Pharmacy teams should offer opportunistic BP testing to their patients;
2. Pharmacy teams should provide advice and support to encourage healthy lifestyles;
3. Pharmacy teams should deliver the NHS Health Check Service.(1)



Figure 3: A call to action by Public Health England for different sectors to work together to reduce the number of people living with hypertension.(1)

Support public health campaigns

Given that one of the essential pharmacy services is to deliver public health campaigns each year, there is great scope for pharmacy teams to work with local

commissioners to prioritise campaigns that encourage optimal BP(24). Campaigns that involve taking a patients' BP; demonstrating the salt, sugar, calorie and fat content of foods and drinks; and carrying out free customer weigh-ins can start conversations between the pharmacy team and those who need support to change to a healthy lifestyle. These techniques can allow pharmacy teams to overcome the stigma of approaching someone with the suggestion that they may need to change their lifestyle.

Support behavioural change

In addition, it is important that pharmacy teams understand the process of behaviour change to best support their patients to make lifestyle changes.(25) The transtheoretical model of behaviour change,(26) used most commonly by pharmacy teams in the smoking cessation service, points out that when making lifestyle changes patients go through a process of several stages (e.g. planning, taking action and relapsing) (see Figure 4). Pharmacy teams can support such patients by helping to motivate them, through the use of motivational interviewing techniques[ADD IN TEXT LINK <https://www.pharmaceutical-journal.com/acute-pain/using-motivational-interviewing-to-improve-medicines-adherence/20200954.article>] and positive encouragement.

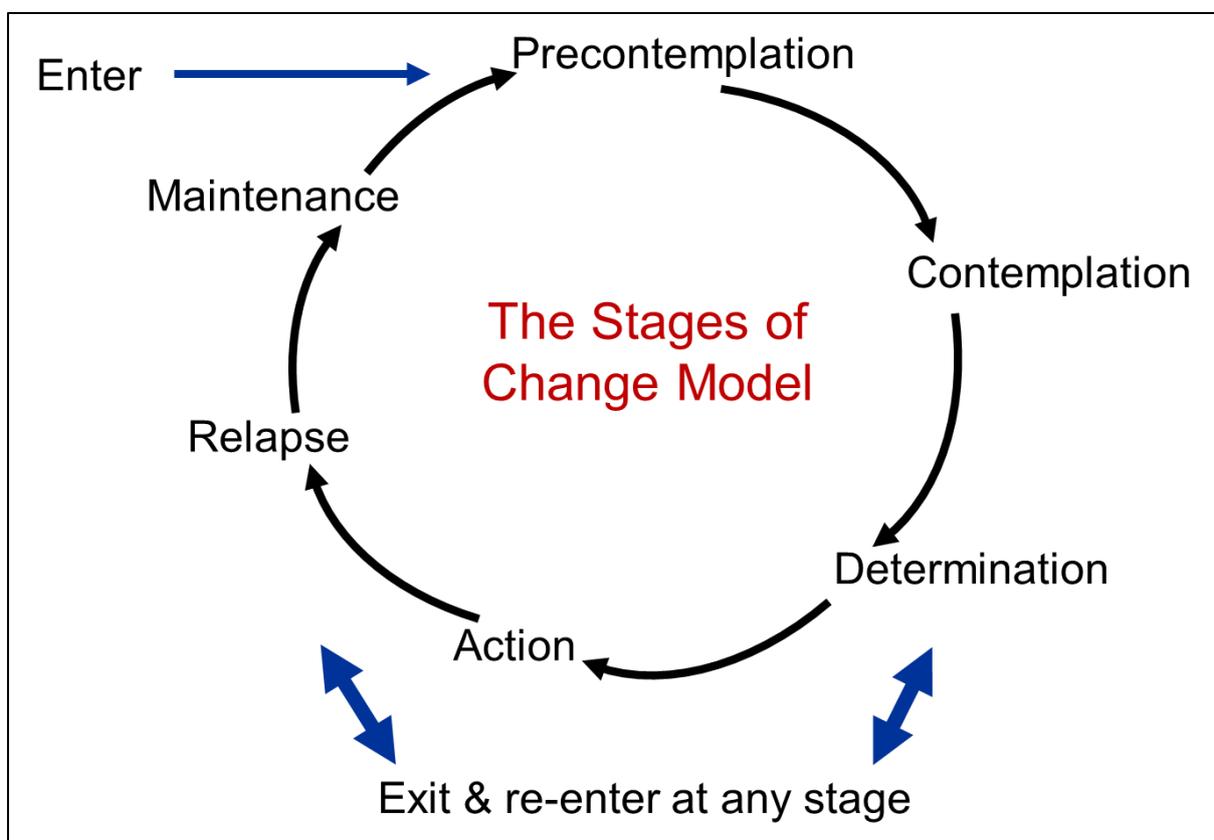


Figure 4: The Transtheoretical (stages of change) model(27)

As the model for community pharmacy evolves and as more community pharmacies become accredited as healthy living pharmacies (HLPs),(28) the role of the pharmacy team in supporting patients to reduce their BP will become increasingly more important.

References

1. Gov.uk. Combating high blood pressure. Heal Matters [Internet]. 2017 [cited 2019 Dec 17];1–15. Available from: <https://www.gov.uk/government/publications/health-matters-combating-high-blood-pressure/health-matters-combating-high-blood-pressure>
2. NHS. What is blood pressure? [Internet]. NHS. 2019 [cited 2019 Dec 22]. Available from: <https://www.nhs.uk/common-health-questions/lifestyle/what-is-blood-pressure/>
3. Blood Pressure UK. Blood pressure chart [Internet]. Blood Pressure UK. 2020 [cited 2020 Jan 8]. Available from: <http://www.bloodpressureuk.org/BloodPressureandyou/Thebasics/Bloodpressurechart>
4. National Institute for Health and Care Excellence. Hypertension in adults: diagnosis and management management [Internet]. 2019 [cited 2019 Dec 17]. Available from: www.nice.org.uk/guidance/ng136
5. NHS Inform. High blood pressure (hypertension) [Internet]. NHS Inform. 2019 [cited 2019 Dec 22]. Available from: <https://www.nhsinform.scot/illnesses-and-conditions/heart-and-blood-vessels/conditions/high-blood-pressure-hypertension#symptoms-of-high-blood-pressure>
6. Hartley TR, Sung BH, Pincomb GA, Whitsett TL, Wilson MF, Lovallo WR. Hypertension risk status and effect of caffeine on blood pressure. *Hypertension*. 2000;36(1):137–41.
7. NHS. High blood pressure (hypertension) - Prevention [Internet]. NHS. 2019 [cited 2019 Dec 22]. Available from: <https://www.nhs.uk/conditions/high-blood-pressure-hypertension/prevention/>
8. Puar THK, Mok Y, Debajyoti R, Khoo J, How CH, Ng AKH. Secondary hypertension in adults. *Singapore Med J*. 2016 May 1;57(5):228–32.
9. Forouzanfar MH, Alexander L, Bachman VF, Biryukov S, Brauer M, Casey D, et al. Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks in 188 countries, 1990-2013: A systematic analysis for the Global Burden of Disease Study 2013. *Lancet*. 2015 Dec 5;386(10010):2287–323.
10. QRISK3 [Internet]. [cited 2019 Dec 17]. Available from: <https://www.qrisk.org/>
11. Bacon SL, Sherwood A, Hinderliter A, Blumenthal JA. Effects of exercise, diet and weight loss on high blood pressure. Vol. 34, *Sports Medicine*. 2004. p. 307–16.
12. Department of Health. Salt reduction – onwards and downwards! [Internet]. Gov.uk. 2017 [cited 2019 Dec 17]. Available from: <https://webarchive.nationalarchives.gov.uk/20180201175801/https://responsibledeal.dh.gov.uk/salt-reduction-onwards-and-downwards/>
13. Blood Pressure UK. Blood Pressure : Drink less alcohol to avoid high blood pressure [Internet]. Blood Pressure UK. 2019 [cited 2019 Dec 22]. Available from:

- <http://www.bloodpressureuk.org/BloodPressureandyou/Yourlifestyle/Eatingwell/Alcohol>
14. NHS. The Eatwell Guide - NHS [Internet]. NHS. 2019 [cited 2019 Dec 22]. Available from: <https://www.nhs.uk/live-well/eat-well/the-eatwell-guide/>
 15. Drinkaware. Calories in alcohol [Internet]. Drinkaware. 2019 [cited 2019 Dec 22]. Available from: <https://www.drinkaware.co.uk/alcohol-facts/health-effects-of-alcohol/calories/calories-in-alcohol/>
 16. Public Health England. Improving health literacy to reduce health inequalities [Internet]. 2015 [cited 2019 Dec 22]. Available from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/460710/4b_Health_Literacy-Briefing.pdf
 17. Google. Change4Life Food Scanner – Apps on Google Play [Internet]. Google Play App store. [cited 2019 Dec 22]. Available from: https://play.google.com/store/apps/details?id=com.phe.c4lfoodsmart&hl=en_GB
 18. Apple. Change4Life Food Scanner on the App Store [Internet]. Apple App Store. 2019 [cited 2019 Dec 22]. Available from: <https://apps.apple.com/gb/app/change4life-be-food-smart/id1182946415>
 19. Gov.uk. Getting every adult active every day [Internet]. Health Matters. [cited 2019 Dec 17]. Available from: <https://www.gov.uk/government/publications/health-matters-getting-every-adult-active-every-day/health-matters-getting-every-adult-active-every-day>
 20. NHS Inform. Types of exercise [Internet]. NHS Inform. 2019 [cited 2019 Dec 22]. Available from: <https://www.nhsinform.scot/healthy-living/keeping-active/getting-started/types-of-exercise>
 21. NHS. Start the NHS weight loss plan [Internet]. NHS. 2019 [cited 2019 Dec 22]. Available from: <https://www.nhs.uk/live-well/healthy-weight/start-the-nhs-weight-loss-plan/>
 22. My Fitness Pal. Calorie Counter - MyFitnessPal [Internet]. Apple App Store. [cited 2020 Jan 22]. Available from: <https://apps.apple.com/us/app/myfitnesspal/id341232718>
 23. My Fitness Pal. Calorie Counter - MyFitnessPal [Internet]. Google Play. [cited 2020 Jan 22]. Available from: https://play.google.com/store/apps/details?id=com.myfitnesspal.android&hl=en_GB
 24. Pharmaceutical Services Negotiating Committee. Public Health (Promotion of Healthy Lifestyles) : PSNC Main site [Internet]. PSNC webpage. [cited 2018 Sep 10]. Available from: <https://psnc.org.uk/services-commissioning/essential-services/public-health/>
 25. NICE. Behaviour change: general approaches [Internet]. NICE Guidance. 2007 [cited 2019 Dec 22]. Available from: <https://www.nice.org.uk/guidance/ph6/chapter/1-Public-health-need-and-practice>
 26. Prochaska JO, Velicer WF. The Transtheoretical Model of Health Behavior Change. *Am J Heal Promot* [Internet]. 1997 Sep 26 [cited 2019 May 19];12(1):38–48. Available from: <http://journals.sagepub.com/doi/10.4278/0890-1171-12.1.38>
 27. Wayne WL. The Transtheoretical Model (Stages of Change) [Internet]. Boston University School of Public Health. 2018 [cited 2020 Jan 8]. Available from: <http://sphweb.bumc.bu.edu/otlt/MPH->

Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories6.html#headingtaglink_1

28. Donovan GR, Paudyal V. England's Healthy Living Pharmacy (HLP) initiative: Facilitating the engagement of pharmacy support staff in public health. *Res Soc Adm Pharm* [Internet]. 2015;44. Available from: <http://linkinghub.elsevier.com/retrieve/pii/S1551741115001138>