



Treatment of the hypertensive patient in 2030

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Abstract

Sarah Bingham, a 45 year old carer for her grandmother who suffered a stroke 4 months ago, feels a buzz on her wrist. It's time for them both to take their medications. Sarah makes dinner and leaves for her evening run. Her smartwatch detects her exit and turns off her TV as advertisements for incentivised private health insurance commence.

Introduction

Half a century ago, hypertension was not treatable. Today, it is the most prevalent non-communicable chronic disease worldwide [1]. Over this period, we have learned much about its pathophysiology, diagnosis and treatment. This essay speculates what the next decade in the story may hold, illustrated in relation to the above hypothetical patient, Sarah Bingham.

Demographics and diagnosis

Sarah, a female, was intentioned to challenge the gender stereotypes that engulf cardiovascular disease; shifting focus away from the typical high-risk overweight diabetic male smoker. With regards to myocardial infarction, British Heart Foundation funded research found that unconscious biases are limiting the survival chances of women [2]. However, changes in education and societal views should ensure equality not only in the treatment of cardiovascular disease and hypertension but more broadly to health in 2030.

In the past decade, increasing numbers of young adults, like Sarah, partake in regular physical activity [3]. Although this may be driven by the pursuit of a societally dictated desirable body image, it will likely breed a “gym generation” with better cardiovascular health than its predecessors. This change ought to be fostered as this generation will

become the next economically independent group, supporting the nation's ageing population for longer than ever before.

Starting with the basics of diagnosis, blood pressure monitoring devices must be standardised. The Lancet Commission on Hypertension have outlined how all stakeholders; from patients to governments and journal reviewers can help achieve this. An advisory group will help to implement this aim in alignment with the World Health Organisation's policy to improve diagnostic accuracy and treatment of hypertension, decreasing the disease burden worldwide [4]. Realistic recommendations, for example, promoting only the use of quality-assured trademarked devices, are achievable by 2030.

Technology

If the current technology trajectory continues, wearable cuff-less blood pressure monitoring may be a reality within 10 years. Many current methods require regular calibration to cuff measurements which limit practicality. Machine learning offers improved accuracy of continuous non-invasive measurements by combining physiological and mathematical modelling but this is some way from clinical application due to issues such as data storage. However, with integration of artificial intelligence into other clinical settings, for example radiographical analysis, such logistical matters may be overcome [5].

Smartphones automatically capture health data such as daily steps. Technology is likely to generate even more bioinformatic data in the future. A legal framework which facilitates innovation but clearly identifies the responsibilities of all parties for safe and controlled progress must be established.

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Pharmacological treatments

Asymptomatic and usually preceding more serious cardiovascular disease, it can be challenging to convince hypertensive patients that they need treatment. Compliance is a related issue and area for improvement. Our limited objective tests assessing compliance such as urinalysis are unlikely to become common practice in the future.

Hypertension and treatment responsiveness are considered to involve a range of genes likely modulated by environmental factors. A candidate gene sequencing study identified variants in kidney solute transporters, all diuretics targets, which were associated with low blood pressure in the Framingham Heart Study [6]. In the future, such information may be incorporated into personalised medicine, a long-debated concept that has been pioneered in oncology. The recent introduction of the NHS Genomic Medicine Service may see expansion into other clinical areas including hypertension over the next decade.

INVEST, a randomised study comparing verapamil and trandolapril in patients with coronary artery disease, found TCF7L2 polymorphisms were associated with diuretic-induced diabetes [7]. Therefore, genomic data may reduce the large number of admissions related to adverse effects of medications by identifying susceptible individuals.

Considering the duration of drug development, new agents are unlikely to dramatically change treatment in the near future. More likely to be fruitful are developments of existing drugs into new preparations. Interestingly, sonophoresis, the transcutaneous application of ultrasound has been shown to increase the permeability of penbutolol sulphate in an animal study [8]. This may improve compliance, particularly in certain populations such as those with an unsafe swallow, including Sarah's grandmother after her stroke, but cost may be a limiting factor.

Healthcare system

Funding is a significant factor in provision of healthcare. In this uncertain political climate, as service pressures increase, we may observe increasingly privatised care. Sarah's TV is broadcasting an advert for private healthcare. Those who wait to be seen may be treated at a more severe stage of illness which, in the case of hypertension, can be severely disabling. Unfortunately, lower socioeconomic groups will suffer most, thus widening the inequality gap.

A larger burden of treatment for hypertensive patients will likely fall to primary care. Telehealth has gained popularity, particularly during the covid-19 pandemic. As a quantifiable disease, hypertension is amenable to this.

In Australia, exercise physiologists reinforce healthy lifestyle habits and prescribe appropriate training. They

therefore have an important role in helping to achieve blood pressure control [9]. With rises in social prescribing, such healthcare professionals may be increasingly utilised or existing professionals such as community physiotherapists may diversify their roles.

Public health

Sarah makes dinner in this case, highlighting the ongoing importance of diet and lifestyle in the management of the hypertensive patient. Public health has a role here, for example, with taxation on sugar and salt.

Legislative changes have fortunately caused a reduction in the number of people smoking. It is important for health promotion to ensure people do not start smoking.

With climate increasingly on the agenda of policy change, single-use plastics are going out of favour. We may see different packaging for anti-hypertensives if the pharmaceutical industry bow to public pressure and ethical obligation.

Conclusion

The future is uncertain. Considering the points discussed, it will likely be a change in treatment delivery, both individually and nationally, rather than the treatments themselves that change over the coming decade. I hope to see an improvement in care for patients like Sarah with a reduction in complication rates, although funding will clearly be a pivotal factor.

Given Sir Stanley Peart's significant contribution to our understanding of hypertension on a molecular level, I anticipate his scientific legacy will combine with technology to improve patient care in the future.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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