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Review Article

Management of High Blood Pressure in Those without Overt Cardiovascular Disease Utilising Absolute Risk Scores

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Increasing blood pressure has a continuum of adverse risk for cardiovascular events. Traditionally this single measure was used to determine who to treat and how vigorously. However, estimating absolute risk rather than measurement of a single risk factor such as blood pressure is a superior method to identify who is most at risk of having an adverse cardiovascular event such as stroke or myocardial infarction, and therefore who would most likely benefit from therapeutic intervention. Cardiovascular disease (CVD) risk calculators must be used to estimate absolute risk in those without overt CVD as physician estimation is unreliable. Incorporation into usual practice and limitations of the strategy are discussed.

1. Introduction

Physicians treat diseases. For this reason when increasing blood pressure was recognized as a risk factor for coronary artery disease and stroke, it was dichotomized into a disease state "hypertension" and a nondisease state "normotension" by creating an arbitrary cut point. This cut point has generally become lower over time as evidence of benefit in treating blood pressure levels lower than the contemporary accepted cut points accumulated. Recognition of other risk factors such as dyslipidemia, higher risk groups such as the aged [1, 2], and those with comorbid conditions such as diabetes [3] has led to differential treatment thresholds and target blood pressures resulting in confusing or conflicting guideline recommendations, depending on which peak body produced them. Is there a simpler way to identify those most likely to have a major adverse cardiovascular event who do not have overt disease, and therefore who needs rigorous therapeutic intervention for their blood pressure and other CVD risk factors?

2. Absolute Cardiovascular Risk

Increasing blood pressure has a log-linear relationship with adverse risk for cardiovascular events [4]. Using this figure alone in clinical decision making risks overtreatment ("medicalization" where medication adverse events likely to exceed benefit, and adverse cost-effectiveness) and undertreatment (failure to act where medication benefit is likely to exceed adverse events and be cost effective). Estimating absolute risk, the risk of having an adverse cardiovascular event over a specified period of time (usually 5 or 10 years), is a superior method to measurement of blood pressure alone to identify who is most at risk of having a cardiovascular event and therefore who would most likely benefit from intervention [5, 6]. It does this because the figure derived is more holistic, incorporating other CVD risk factors that explain almost all risk including blood pressure, and directly estimates why we treat blood pressure in any population without CVD, to prevent its onset and complications. Guidelines are increasingly recognizing the benefit of utilizing absolute risk scores rather than blood pressure measurements alone [7–12].

3. Cardiovascular Disease Risk Calculators

CVD risk calculators are based on algorithms derived from observational prospective cohort studies such as the Framingham study [13, 14]. CVD risk calculators must be used to estimate absolute risk in those without prior CVD events

as physician estimation is unreliable [15]. Physicians can reliably estimate relative risk, the risk of an individual having a myocardial infarction or stroke relative to others of the same age and gender. The problem with relative risk is that by its very nature it excludes the two most important drivers of CVD risk, age and gender. There are validated algorithms specifically derived from hypertensive populations available [16] but such scores would tend to fragment absolute risk scores back into their constituent risk factor classification rather than unify and simplify the process. Similarly there have been many validated algorithms using other than the "classic" risk factors used in the Framingham risk score (age, gender, blood pressure, serum cholesterol, smoking status, and presence of diabetes) but the benefits of this increase in complexity is marginal.

Absolute risk scores (ARS) derived from these algorithms have proven to have good discrimination in their source population (e.g., Framingham risk score C statistic 0.763 (males), 0.793 (females) [13]) but do have problems in subgroups not adequately represented in the study population. For example, calculators derived from the Framingham risk score have an upper age limit because no persons over 74 years were included in the study population [17]. Obviously, from an international perspective, not only subgroups but whole populations were missing. For example, Australian aborigines, an important high adverse CVD risk ethnic minority in Australia, have resisted all attempts to be reliably and validly incorporated into Australian algorithms derived from the Framingham risk score [11, 18].

Limitations in ARS use include the following.

(1) It should not be utilized in those with overt CVD. They are by definition at high risk and should be aggressively managed.

(2) Those with target organ damage due to elevated blood pressure such as left ventricular hypertrophy and hypertensive retinopathy or nephropathy. Such individuals have progressed from a risk factor to a disease state.

(3) Those with blood pressure ≥180/100 mm Hg.

(4) Those from a non-Caucasian population unless the risk score utilized has been derived from and/or validated in this population or has been recalibrated.

Once identified and the decision has been made to treat based on absolute risk score, then management reverts to that of the individual risk factor. The concept of treating absolute risk *per se* is supported by clinical trials such as the HOPE study [19], but the hypothesis needs to be formally tested in studies such as ongoing and planned "polypill" trials [20]. This management strategy promises simpler treatment regimens, lower direct costs, and superior clinical outcomes. Outside of the "polypill" approach it would give physicians therapeutic flexibility. If adverse effects prevent drug therapy of a particular risk factor then intervene on another.

4. Conclusions

Management of persons with elevated blood pressure is best done through an absolute risk approach including the use of absolute risk scores. This promises better targeted therapy, simpler more flexible management regimens, and superior clinical outcomes.

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