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COVID-19 and Cardiovascular Disease—Two Pandemics, One Success

Robert Philip Eaton[1], Barry Ramo[2], Martin Hickey[3], David S. Schade[1*]

[1]Division of General Internal Medicine, University of New Mexico School of Medicine, Albuquerque, NM, USA
[2]New Heart Fitness and Health, Albuquerque, NM, USA
[3]New Mexico State Senator, Albuquerque, NM, USA
Email: *dschade@salud.unm.edu

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Abstract

Background: COVID-19 has had a major impact on all facets of life in the United States. Its devastating effects have resulted in the mobilization of major resources, both at the national, state, and individual levels. This mobilization has resulted in vaccination, personal preventive measures, and new therapies to combat this illness. As a result, the rates of new infections, hospitalizations, and deaths have greatly diminished, minimizing the associated morbidity and mortality. **Purpose:** What has not been appreciated is that a more serious epidemic has continued unabated in the United States and the Western world. This article emphasizes the importance of a national effort to eradicate cardiovascular disease. **Methods:** Cardiovascular disease has caused more deaths than COVID-19 in almost all months since the COVID-19 epidemic was first recognized in December 2020. In fact, cardiovascular disease has caused more deaths than either all cancers combined or infections for the last two decades. The tragedy of this truth is that effective therapy is currently available for preventing and reversing cardiovascular disease at a very low cost. What is required is a concerted effort and commitment by all legislative and medical organizations to allocate the resources to abolish asymptomatic cardiovascular disease. **Results:** Recognition and mobilization of resources to combat this epidemic are much overdue with the resultant savings of lives and billions of dollars. It is past time for the medical establishment to support the national identification of asymptomatic cardiovascular disease and initiate treatment before patients become symptomatic with this deadly disease. **Conclusion:** The national experience with COVID-19 has demonstrated what can be accomplished when a national concerted effort is made to address a devastating medical epidemic. This commitment is not only feasible for cardiovascular disease, but is also necessary for the benefit of all people in the world.

Keywords

Epidemic, Cardiovascular, COVID-19, Heart Attack, Death Rate

1. Introduction

As this country is overcoming the COVID-19 pandemic in 2023, it is difficult to appreciate that atherosclerotic cardiovascular disease exceeds all cancers combined, and COVID-19 by more than twice the annual death rate (Figure 1) [1]. Since 1910, mortality from heart disease and stroke continues to be the number one cause of death in this country, as a high-priority public health challenge both

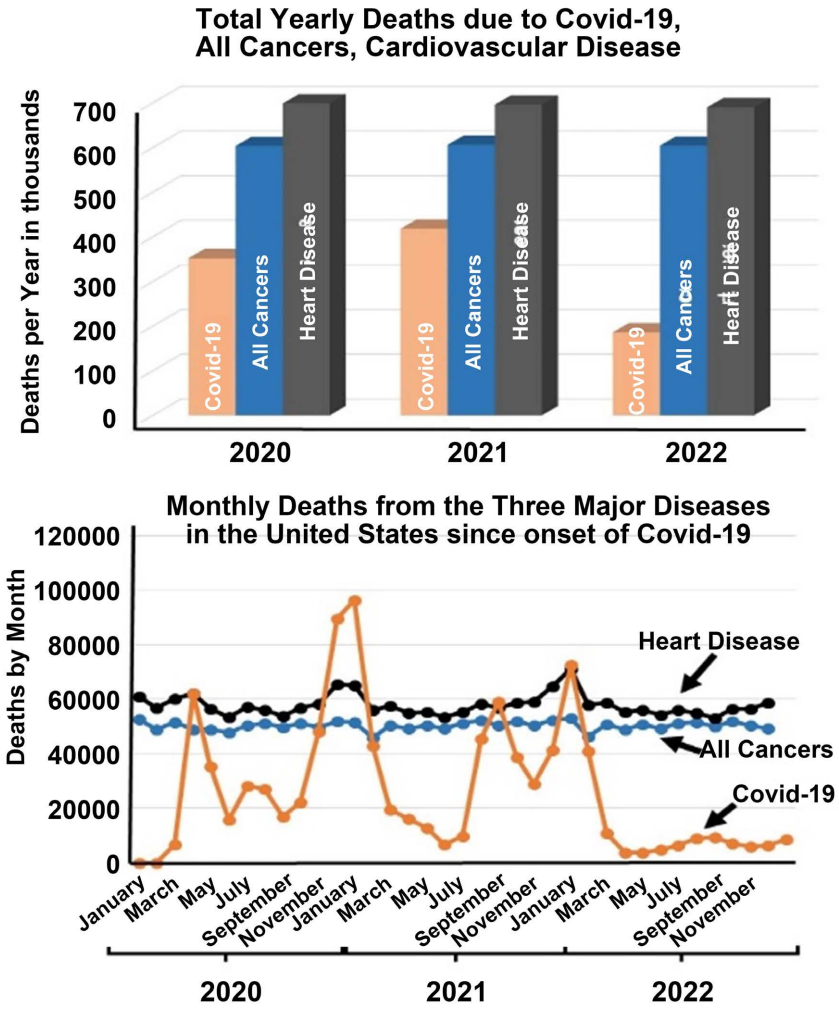

Figure 1. Top—The three major diseases in the United States since COVID-19 was first reported. Overall, heart disease is the number one cause of death each year. Bottom—Death by month for each of the major causes in the United States. Death by heart disease and cancer remain relatively constant, but death from COVID-19 is variable depending upon numerous factors including vaccination rates, personal exposure, virus variants, age, and immune status. For the last 6 months, death from COVID-19 has been significantly reduced. Data extracted from National Center for Health Statistics [1].

financially and in lives lost [2]. According to the American Heart Association, the current cost of 350 billion dollars per year will triple by 2030 [3]. This is more than twice the cost of all weather-related disasters in the United States in 2022 [4].

The Nobel Prize awarded to Adolf Windaus in 1928 established the involvement of cholesterol in vessel plaques. Thirty years later (1950's), laboratories studying sterol metabolism identified plasma lipoproteins isolated by ultracentrifugation. These discoveries assigned the cholesterol within specific flotation fractions as low-density lipoprotein (LDL) containing apo B lipoprotein, and high-density lipoprotein (HDL) containing apo A lipoprotein. The Nobel Prize then recognized Drs. Brown and Goldstein in 1985 who identified the apo B receptor on the liver as a primary regulator site of LDL cholesterol concentration in the blood. Therapeutic targeting of gene expression proteins emerged when patients with a gene mutation of apo B lipoprotein receptor were identified, and the disease designated as familial hypercholesterolemia was established. It was subsequently discovered that statins were not only HMG-CoA reductase inhibitors of cholesterol synthesis, but they also increased the hepatic LDL receptors that removed LDL cholesterol from the blood.

2. Pathogenesis

Our understanding of the pathogenesis of atherosclerotic cardiovascular disease has expanded almost exponentially in the last twenty years. In parallel with this knowledge, treatment of symptomatic cardiovascular disease has likewise advanced so that the survival of patients with heart attacks, acute coronary syndromes, and congestive heart failure is much improved. Unfortunately, 50% of people experiencing a cardiovascular event never reach a medical establishment before succumbing to the disease [5]. Even when these individuals are provided emergency treatment, many will still succumb to later comorbidities such as congestive heart failure, myocardial re-infarction, and cardiovascular surgical complications [6]. Therefore, reducing the cardiovascular epidemic must address asymptomatic cardiovascular disease if this pandemic is to be eliminated. To this end, most organizations involved with cardiovascular disease recommend control of cardiovascular risk factors including lipids, diabetes, smoking, and hypertension. Unfortunately, human behavior does not always focus on the long-term consequences of risk factor control and therefore compliance with these recommendations is suboptimal [7]. An improved approach to improving healthful lifestyle changes is early identification of atherosclerosis in asymptomatic individuals [8].

3. Diagnosis

During the last decade, radiological techniques of coronary artery imaging have been developed and refined. Both coronary artery calcium scanning and CT coronary angiography now provide an in-depth non-invasive examination of coronary plaque and thrombotic obstruction. In spite of the recent American Heart

Association liberalization of the use of calcium heart scanning, population screening for asymptomatic cardiovascular disease is greatly underutilized [9] [10]. This difficulty to change medical practice is unfortunate since effective preventive therapy is now available with therapeutic reduction in LDL cholesterol. Even when statin LDL cholesterol lowering therapy does not reach the recommended goal or is unacceptable to the patient, additional therapies including cholesterol intestinal absorption blockers, non-statin hepatic cholesterol synthesis inhibitors, and PCSK-9 protein blockers and inhibitors are available for additional treatment [11]. All therapies should include beneficial lifestyle changes and aggressive correction of major risk factors including smoking, diabetes, and hypertension. Dietary change is critical as has been shown by the beneficial effects of a Mediterranean style of diet [12]. Plant based diets, all of which are low in cholesterol, greatly contribute to the plasma lowering of LDL cholesterol [13].

4. Treatment

Following basic and clinical pathogenic discoveries, treatment guidelines were issued to prevent cardiovascular disease. More than twenty organizational written guidelines have been published, and recommendations for a target LDL-C level gradually have fallen from above 100 mg/dl to as low as 50 mg/dl or below depending upon the level of perceived cardiovascular risk [14] [15]. The clinical basis for reducing the target LDL cholesterol blood level is based on the positive relationship of a reduction in cardiac events with the lowering of LDL cholesterol [16]. The pathophysiologic basis evolves from the background that cardiovascular disease begins with a pre-ischemic phase of developing vessel inflammatory cholesterol plaques or intimal erosion that is symptom free [2]. The association of elevations in C-reactive protein in both serum and coronary artery atheroma is consistent with vasculitis, and supports the observed benefit from the anti-inflammatory role of statin therapy (in addition to its LDL-C lowering effects) [17]. If untreated, this asymptomatic state can lead to a rupture of a thin plaque cap or the intimal erosion of the endothelium, causing a thrombotic cardiovascular vessel obstruction. This can be avoided by early identification of coronary artery calcium and medical intervention to prevent progression to the ischemic phase of atherosclerosis.

5. Costs

Complaints of the high cost of medical care in the United States are frequent and demonstrate no evidence of being contained. To this end, prevention of widespread disease is almost always significantly less expensive than treatment once the disease has become symptomatic and progressive. One heart attack can cost more than $100,000 once all the hospital, physician, rehabilitation, and medication expenses are factored into the cost. In contrast, prevention of a heart attack in the majority of patients costs less than 50 cents per day, as generic medications are now widely available [18]. In addition, both Texas and New Mexico have

passed laws requiring medical insurance companies to cover the cost of a coronary artery calcium scan [19]. Even more important than the direct financial costs of cardiovascular disease are the costs related to the morbidity and mortality of individuals dying in the productive and enjoyable years of their lives. In contrast to many diseases in which many individuals need to be treated to prevent one event, one individual out of six will directly benefit from LDL-lowering therapy [20]. This number will be even more advantageous if individuals with positive calcium scores are chosen for treatment.

6. Conclusion

The epidemic of cardiovascular disease is preventable, and prevention is necessary for society to move forward with beneficence and productivity. The United State overcame COVID-19 with determination and the application of major resources. The major effort was focused on prevention with no-cost vaccinations and rapid testing procedures. It is time to approach cardiovascular disease with the same enthusiasm and determination as was done for COVID-19. Until the nation decides to address this pandemic at the asymptomatic disease level, cardiovascular disease will continue to be the number one medical destructive force in our society.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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