Social Determinants of Health on Cardiovascular Disease Prevention in Special Populations: An Overview

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Abstract

Social determinants of health interfere significantly in the health-disease process. This article examines the impact of these determinants on the main pathologies addressed by the internist and the family doctor in medical care. The World Health Organization defines social determinants of health (SDH) as the circumstances in which people are born, grow, work, live and age, including the broader set of forces and systems that influence conditions of daily life. These forces and systems include economic policies and systems, development programs, social norms and policies, and political systems. The above conditions can be very different for various subgroups of a population and can lead to differences in health outcomes. It may be unavoidable that some of these conditions are different, which is considered inequalities. These social determinants influence and modify the development and course of the disease. In the pathologies exposed in this review, we found that adequate management involves a sizeable non-pharmacological component that refers to intervention in eating habits, healthy living, management of traditional cardiovascular risk factors, and monitoring disease activity. In support of the evidence, we review several meta-analyses of observational studies that allow us to infer what is the significant impact of the social determinants of health in the control or exacerbation of the pathologies described and how we can positively interfere in their evolution and outcome of disease through increasingly effective comprehensive interventions according to the current evidence described.

Major social determinants include access to health care, economic mobility, affordable housing, and safe learning environments for children. Based on an extensive review of the evidence, several reports recommend maintaining policies at the federal and state levels to improve health outcomes, promote health equity, and reduce health care spending associated with increased cardiovascular risk. It is estimated that nearly half of all Americans are at high cardiovascular risk, and this number is increasing. Furthermore, the COVID-19 pandemic has demonstrated the extent to which socioeconomic conditions and inequalities significantly affect the health and burdens of specific population groups.

Keywords: Social determinants of health; Cardiovascular Disease Prevention; Hypothyroidism; HIV; Post-COVID Population; Rheumatic disease; Pregnant Population

Abbreviations: SDoH: Social Determinants of Health; CDC: Centers for Disease Control; ; WHO: World Health Organization; CVD: Cardiovascular Disease; AHA: American Heart Association; SAM: Sympatho-adrenomedullary; HPA: Hypothalamic-pituitary-adrenal; SEP: Socioeconomic Position; TSH: Thyroid-Stimulating Hormone; T4: Thyroxine; SH: Subclinical Hypothyroidism; NHANES: National Health and Nutrition Examination Survey; HIV: Human Immunodeficiency Virus; ASCVD: Atherosclerotic Cardiovascular Disease; PWH: Persons With HIV; COVID-19: Coronavirus disease; APO: Adverse Pregnancy Outcomes; CVH: Cardiovascular Health; DASH: Dietary Approaches to Stop Hypertension; ACOG: American College of Obstetricians and Gynecologists

Introduction

The social determinants of health (SDoH) constitute the structural factors and conditions present in the environments where people inhabit that affect a wide range of health risks and outcomes. These factors include income, education, employment, culture, language, healthcare access, social support, race, ethnicity, structural racism, discrimination, neighborhood characteristics, and other variables as defined by the Centers for Disease Control (CDC) and the World Health Organization (WHO) [1,2]. SDoH manifests as persistent inequalities in cardiovascular disease (CVD) risk factors, contributing to increased rates of morbidity and mortality related to this condition [3].

According to the American Heart Association (AHA), the risk of developing CVD throughout life is determined by cardiovascular risk factors. These include core health behaviors (smoking, physical activity, nutrition, overweight, and obesity) and health factors (dyslipidemia, high blood pressure, diabetes, metabolic syndrome, adverse pregnancy outcomes, kidney disease, and sleep disturbances) [4]. The SDoH complements those parameters by incorporating a main structural domain that considers a sociopolitical and economic context, as described in a study by Powell et al. [5]. In addition, this significantly impacts an intermediary domain constituted by a social and community context, defining social risk according to housing stability, food security, financial strain, access to transportation, implicit bias, discrimination, sexism, and violence [5]. The AHA reports a total prevalence of CVD of approximately 126.9 million people in the United States with one or more forms of the disease in individuals ≥20 years of age. Overall mortality in 2019 was estimated to be 874,613 adults of all ages, with coronary heart disease attributing up to 41.3% of the deaths. Others were linked to stroke (17.2%), hypertension (11.7%), heart failure (9.9%), arterial disease (2.8%), and other causes (17.3%) [4].

CVD represents the primary cause of death of all ages in the US (equivalent to 2,396 deaths per day), followed by cancer, traumatic events, and chronic lower respiratory diseases. CVD mortality trends in the US have experienced a consecutive increase in mortality for the last five years. The last represents a significant burden for the US economy that has escalated from $103.5 billion in the 1990s to 226.2 billion from 2017 to 2018. According to the most recent data from 2019, CVD-related expenditures have increased to $378.0 billion [4].

In the model proposed by Powell et al. [5] the interaction of the SDoH (economic stability, neighborhood, education) and its effect on CVD represent sources of chronic psychosocial stressors in individuals with unfulfilled needs, leading to a pathway to chronic inflammation as a consequence of dealing with regular adversity in daily life [5]. Moreover, stressful life events increase the effects of the sympatho-adrenomedullary (SAM) and hypothalamic-pituitary-adrenal (HPA) axis, which are responsible for the synthesis of catecholamines (dopamine, norepinephrine, epinephrine) and glucocorticoids, resulting in epigenetic changes on their biological receptors. In addition, these life events might trigger the stimulation of the amygdalae and the neuro haematopoetic axis, activating a crucial pathophysiological pathway resulting in the formation of atherosclerotic plaques (leukopoiesis) [5]. Overall, the underlying pathogenesis and progression associated with nearly all CVDs are predominantly of atherosclerotic origin, leading to the development of coronary disease, cerebrovascular disease, venous thromboembolism, and peripheral vascular disease, subsequently causing myocardial infarction, cardiac arrhythmias or stroke [6].

General Population

Even though mortality from CVD has been declining for the last 50 years in the US, the implication continues to be high. The prevalence of CVD has been predicted to increase by approximately 10% in 2030 [7,8]. Therefore, it is essential to highlight SDoH to prevent CVD, including socioeconomic position (SEP), race/ethnicity, social support, culture, and access to health care. SEP is one of the most important SDoH with a high impact on the risk of CVD [3,7,9]. Income, education, and occupational status are the three leading indicators of SEP in the risk of CVD and should be assessed concomitantly. In the United States, low SEP has been associated with increased risk factors for CVD and with an elevated incidence and mortality rate. Data from multiple studies have correlated low educational levels, low income, and unemployment with a higher prevalence of risk factors for CVD [3,7,9].

A significant public health issue that influences the risk of CVD is race and ethnicity's impact on health care. Racial and ethnic minorities, black, and Latino individuals were associated with poor health care access. In addition, the black population has a higher prevalence and mortality due to CVD than Caucasians [3,7,8]. Although low social support has been linked with increased cardiovascular risk, high social support has not ameliorated cardiovascular complications [3,7,9,8]. Language and cultural beliefs can also be barriers to access to health care and, consequently, risk factors for CVD. Latino population and ethnic minorities are the most affected in the US due to their limited English proficiency. Therefore, numerous interventions have been created that can improve cardiovascular outcomes, including language assistance services [3,7,9]. Impediment to access health care can be considered one of the most critical risk factors for CVD. There is a direct relationship between the risk of CVD and access to health care. Several studies have reported that individuals without health insurance severely affect health, including increased mortality from CVD [3,7,9,8]. Some interventions that might help decrease the risk of CVD are improvements in education and the health system, enabling access to health care for everyone, actions against racial discrimination, and equality of health care delivery. Furthermore, some individuals may benefit from weight loss and healthy food programs.

Hypothyroidism

Hypothyroidism is one of the most common hormone deficiencies worldwide [1,2]. Overt hypothyroidism is characterized by thyroid-stimulating hormone (TSH) levels above the reference range and free thyroxine (T4) below the reference range. Subclinical hypothyroidism (SH) is characterized by TSH levels above the reference range with normal free T4 levels [10,11,12,13]. Thyroid hormones are fundamental for the normal functioning of the cardiovascular system. Therefore, it is well-known that hypothyroidism increases the risk of CVD and has also been associated with worsening the condition [2,3]. Several studies have shown that hypothyroidism can significantly alter the cardiovascular system, decreasing cardiac output, heart rate, and arterial compliance and increasing systemic vascular resistance and atherosclerosis [11,14,12]. In addition, SH with TSH levels greater than 10 mlU/L increases the risk of ischemic heart disease and mortality due to CVD [11,14,15]. According to the National Health and Nutrition Examination Survey (NHANES), the prevalence of hypothyroidism in the US is 4.6% [10,11,13]. Other studies conducted in the US reported a prevalence of overt hypothyroidism and SH of 0.4% and 10%, respectively [10,11,12,13]. Multiple studies have associated some SDoH with hypothyroidism, including age, sex, race/ethnicity, socioeconomic status, and education. Since the world's most common cause of thyroid diseases (hyper- and hypothyroidism) is environmental iodine deficiency, iodine status is another principal SDoH to consider as a risk factor for hypothyroidism [12,13]. The prevalence of hypothyroidism is higher in non-Hispanic, white, and women compared to Hispanic, black, and men, respectively [4,5,7]. Moreover, an aging population has been related to an increased risk of hypothyroidism as well as the risk of CVD. In the USA, hypothyroidism appears more prevalent in women older than 60 [11,12,13]. Socioeconomic status and educational level play an important role in diagnosing and treating hypothyroidism [15]. Individuals with high income and educational levels have access to health care and a high understanding of the importance of annual health check-ups [15]. Therefore, hypothyroidism is diagnosed and treated more commonly in these individuals than in those with low income and education [15]. Furthermore, poor access to health care and low-educated individuals were correlated with low adherence to treatment and iodine supplementation programs [15]. There is adequate data to support that treatment of hypothyroidism can reverse some cardiovascular effects [10,11,14,16]. In patients with SH and TSH levels >10 mIU/L, levothyroxine treatment reduced cardiovascular morbidity and mortality [10,11,16]. Undiagnosed and untreated hypothyroidism have significant public health and economic impacts, primarily due to the high costs that come with the complications of the disease [12]. Therefore, screening for hypothyroidism in older women and newborns, treatment, and prevention programs (universal salt iodization) is mandatory in many countries [10,12,17]. Moreover, screening for thyroid disease is beneficial because overt hypothyroidism has non-specific symptoms, and patients with SH are asymptomatic [10,15].

Human Immunodeficiency Virus (HIV)

The associations between HIV and cardiovascular events are multifactorial and include inflammation and immune function changes related to chronic infection and metabolic dysregulation associated with HIV [18]. The social determinants of health reflect the impact of the social environment on the well-being of people sharing a particular community. Imbalances in the social determinants of health have been attributed to the inequities in health observed between and within countries. CVD is the leading cause of morbidity and mortality in high-income countries of the industrialized world, accounting for more than one-third of total deaths [18,19]. Additionally, CVD is the leading cause of noncommunicable morbidity and mortality among low- and middle-income countries, accounting for almost 25% of total deaths. By 2030, it is projected to be the leading cause of death worldwide (2). Potentially modifiable risk factors contributing to these statistics include sedentarism, hypertension, smoking, diabetes, and obesity [18].

From the perspective of health services, it is essential to examine the impact of atherosclerotic cardiovascular disease (ASCVD) on primary prevention outcomes among persons with HIV (PWH) in order to improve ASCVD risk reduction in this high-risk population [20]. A higher-than-expected rate of chronic health conditions, including cardiovascular disease, is commonly diagnosed among PWH. Medical management of these chronic conditions frequently occurs in HIV specialty clinics by providers trained in general internal medicine, family medicine, or infectious disease. More research is needed to assess the impact of primary and secondary cardiovascular disease prevention among HIV-positive individuals [21].

Post-COVID Population

A study involving 153,760 subjects showed that survivors of acute COVID-19 disease (COVID-19) have an increased risk and 12-month burden of cardiovascular complications such as cerebrovascular disorders, arrhythmias, ischemic and non-ischemic heart disease, pericarditis, myocarditis, heart failure, and thromboembolic disease. These risks and burdens are present beyond the first 30 days of infection, even among individuals with a mild COVID-19 infection. Xie et al. [22] highlighted the need for continued improvement of primary prevention strategies against SARS-Cov-2 infections, as that would be the best way to prevent Long COVID and its cardiovascular complications [23].

The COVID-19 pandemic resulted in changes at the systemic level and individual lifestyle behaviors. Social Determinants of Health have a crucial impact on cardiovascular health and disease. Therefore, it is necessary to understand the effect of the pandemic on SDoH to develop plans of action and decrease the risk of cardiovascular complications in patients after SARS-Cov-2 infection

[22]. Individuals who experience Long COVID present debilitating and disabling symptoms that interfere with the ability to work and consequent loss of employment income. This leads to insufficient health insurance, skipping doctor's appointments, medication nonadherence, and poor dietary habits. Stay-at-home mandates during the pandemic affected healthcare access, decreasing preventive care such as blood pressure assessment, cholesterol levels, and treatment visits for diabetes. Racial and ethnic minority populations and low-income groups were significantly affected as these families are less likely to use telemedicine health services due to a lack of internet-accessible devices. Moreover, home confinements caused a decrease in physical activity levels, and social isolation augmented psychological stress [24].

Opportunities for cardiovascular disease prevention could include 1) Designing environments to promote alternate transportation methods and facilitate physical activity, 2) Universal health care to address the disparities of the minority groups that are more likely to be uninsured and unemployed due to the pandemic, and 3) Strengthening primary health care for the effective management of Long COVID as a primary care clinician who knows the patient and their life circumstances and barriers can coordinate a plan of action to better health [24].

Rheumatic Disease

Rheumatic diseases increase cardiovascular risk as they have a large inflammatory component [25]. Furthermore, it is known that traditional cardiovascular risk factors such as hypertension, diabetes, and obesity have a great socio-cultural impact on managing rheumatic conditions [25]. In addition, rheumatologic disease-specific risk factors must be taken into account. For example, in a patient with lupus nephritis, elements that significantly impact CVD risk are the disease activity/severity, the duration of the condition, and the use of corticosteroids at high doses or for a long time [26].

Several studies support that the inflammatory state of rheumatic disease associated with the cardiovascular, inflammatory burden increases the risk of coronary heart disease, among other health issues [26]. A meta-analysis including 14 studies demonstrated that more than 41,000 patients with rheumatoid arthritis (RA) were at risk of cardiovascular events [27]. Results from an observational study demonstrated that patients with positive cyclic citrullinated peptide (CCP) and rheumatoid factor have the highest risk of CVD among patients with RA [28]. Accordingly, stating the importance of adequate control of the disease activity [27,28]. In a series of 1,200 patients followed for more than 40 years, patients with RA presented a significant increase in coronary heart disease and sudden death [26,27]. Multiple factors could cause these outcomes, including that patients with RA with chest pain are often classified as having a usual symptom of the disease rather than being diagnosed with underlying coronary disease [27]. Moreover, these patients receive acute reperfusion therapy and secondary prevention less frequently after myocardial infarction than the general population [4,5]. As a result of the early misdiagnosis of coronary artery disease, they are not offered the same reperfusion therapy as the general population, increasing the recurrence of cardiovascular events [21].

Given the above, it is essential to remember that patient with the rheumatological disease has at least twice the cardiovascular risk as the general population, which can be significantly reduced if multifactorial risk factors are intervened by managing the social determinants of health with non-pharmacological and pharmacological measures over time [28,29].

Pregnant Population

Approximately one-third of all pregnancy-related deaths are caused by cardiovascular diseases [30]. Maternal Mortality in the United States has increased steadily from 7 per 100,000 live births in 1987 to nearly 17 per 100,000 live births in 2016 [30]. Non-Hispanic black women are 3 to 4 times more likely to die from pregnancy-related causes than white women [30]. Preeclampsia, gestational diabetes, preterm delivery, and small-for-gestational-age infants have seen a proportional increase in adverse pregnancy outcomes (APOs), which are associated with severe maternal morbidity and premature coronary artery disease, heart failure, and stroke [30,31]. Underlying Cardiovascular Health (CVH) is an important predictor of maternal and fetal outcomes [30]. Maternal cardiovascular risk factors (Hypertension, obesity, physical inactivity, and smoking) are well-recognized risk factors for APOs [30]. Some studies have linked three indicators of unfavorable SDoH, such as low income, education, and unemployment, with increased prenatal smoking behavior [30]. Physical activity during pregnancy has been reported as suboptimal, with a significant decline in later trimesters. Insufficient physical activity during pregnancy was a common risk factor (63.1%) in the overall population, with a 74% high prevalence in participants with the most unfavorable SDoH risk profile [30]. Obesity in body mass index and gestational weight gain is associated with poor pregnancy outcomes such as cesarean section and preeclampsia [30]. Lifestyle modifications for CVD risk factors among women with APOs include healthy dietary patterns, which are fundamental up to three years before pregnancy. The DASH (Dietary Approaches to Stop hypertension) diet was associated with better pregnancy outcomes [31].

The impact of poor maternal health CVH lasts beyond pregnancy [32]. Focusing on clinical care during prenatal and post-partum care is a critical first step to preventing maternal mortality [32]. Pregnancy complications, such as hypertensive disorders, affect a woman's long-term health and require specific attention [32]. Early post-partum visits should evaluate complications from pregnancy and common post-partum medical complications [33]. Family physicians can provide prenatal care, labor and delivery, post-partum care, and primary care before and after pregnancy

[33]. The American College of Obstetricians and Gynecologists (ACOG) recommends a post-partum evaluation within the first three weeks after delivery in person or by phone, with a complete bio-psychosocial assessment completed within 12 weeks post-partum [32]. The World Health Organization recommends visits at three days, seven to 14 days, and six weeks post-partum, including newborn care [32]. It is crucial to recognize the broad intervention needed for all levels, including patient, provider, health system, and public health policy. There is a need for expansion for pre-pregnancy assessment of cardiovascular risk factors, such as lipid screening implementation during the first trimester before expected lipid metabolism changes and management during pregnancy—racial and ethnic disparities education on clinicians and impact SDoH maternal outcomes [33]. Being able to prioritize and improve healthcare access at all levels of care, including in low-income communities, is an excellent opportunity for preventing CVD risks before, during, and after maternal pregnancy care.

Conclusion

The social determinants of health (SDoH) contribute directly to CVD-related morbidity and mortality. The risk of developing CVD throughout life is determined by cardiovascular risk factors, including health behaviors, health factors, and sociopolitical and economic context. The AHA reports a total prevalence of CVD of approximately 126.9 million people in the United States, with one or more forms of CVD in individuals ≥20 years of age representing the primary cause of death of all ages in the US. Furthermore, the prevalence of CVD has been predicted to increase by approximately 10% in 2030. Therefore, it is important to highlight SDoH to prevent CVD, including socioeconomic position, race/ethnicity, social support, culture, and access to health care.

There is a direct relationship between the risk of CVD and several medical conditions where socioeconomic status, health care access, and educational level play an important role in diagnosis and treatment. It has been demonstrated that patients with hypothyroidism are more prone to cardiovascular disease due to the dysregulation of thyroid hormone levels, which increases the risk of CVD. It worsens the disease once it has developed. Multiple studies have associated some SDoH with hypothyroidism, including age, sex, race/ethnicity, socioeconomic status, and education. The associations between HIV and CVD events are multifactorial and include inflammation and immune function changes related to chronic infection and metabolic dysregulation associated with HIV. Moreover, HIV is associated with adverse social determinants of health, increasing cardiovascular disease risk. The survivors of acute COVID-19 have an increased risk and 12-month burden of cardiovascular complications. People can suffer debilitating and disabling symptoms that interfere with the ability to work and consequent loss of employment income, leading to insufficient health insurance, skipping doctor's appointments, medication nonadherence, and poor dietary habits. Patients with rheumatologic disease have at least twice the cardiovascular risk as the general population. This can be significantly reduced if traditional and non-traditional risk factors are intervened by managing the social determinants of health with non-pharmacological and pharmacological measures over time. During pregnancy, CVD remains the leading cause of death. Some studies have linked three indicators of unfavorable SDoH, such as low income, education, and unemployment, with increased prenatal smoking behavior. Interventions that may help reduce the risk of CVD include improving education and the health care system, enabling access to health care for all, combating racial discrimination, and ensuring equal access to healthcare. Nevertheless, further research is required to understand the relationship between CVD and SDoH comprehensively.

References

1. WHO Commission on Social Determinants of Health, World Health Organization (2008) Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health: Commission on Social Determinants of Health Final Report. World Health Organization; Geneva, Switzerland.

2. (2020) Centers for Disease Control and Prevention. Social Determinants of Health: Know what affects health.

3. Mannoh I, Hussien M, Commodore MY, Michos ED (2021) Impact of social determinants of health on cardiovascular disease prevention. Curr Opin Cardiol 36(5): 572-579.

4. Tsao CW, Aday AW, Almarzooq ZI, Alonso A, Beaton AZ, et al. (2022) Heart disease and stroke statistics–2022 update: a report from the American Heart Association. Circulation 145(8): e153-e639.

5. Powell TM, Baumer Y, Baah FO, Baez AS, Farmer N, et al. (2022) Social Determinants of Cardiovascular Disease. Circ Res 130(5): 782-799.

6. Flora GD, Nayak MK (2019) A Brief Review of Cardiovascular Diseases, Associated Risk Factors and Current Treatment Regimes. Curr Pharm Des 25(38): 4063-4084.

7. Havranek E, Mujahid M, Barr D, Blair I, Cohen M, et al. (2015) Social Determinants of Risk and Outcomes for Cardiovascular Disease. Circulation 132(9): 873-898.

8. Powell WT, Baumer Y, Baah F, Baez A, Farmer N, et al. (2022) Social Determinants of Cardiovascular Disease. Circulation Research 130(5): 782-799.

9. Jilani M, Javed Z, Yahya T, Valero EJ, Khan S, et al. (2021) Social Determinants of Health and Cardiovascular Disease: Current State and Future Directions Towards Healthcare Equity. Current Atherosclerosis Reports 23(9): 55.

10. Chaker L, Razvi S, Bensenor I, Azizi F, Pearce E, et al. (2022) Hypothyroidism. Nature Reviews Disease Primers 8(1).

11. Udovcic M, Pena R, Patham B, Tabatabai L, Kansara A (2022) Hypothyroidism and the Heart. Methodist Debakey Cardiovasc 13(2): 55-59.

12. Chiovato L, Magri F, Carlé A (2019) Hypothyroidism in Context: Where We've Been and Where We're Going. Advances in Therapy 36(S2): 47-58.

13. Taylor P, Albrecht D, Scholz A, Gutierrez BG, Lazarus J, et al. (2018) Global epidemiology of hyperthyroidism and hypothyroidism. Nature Reviews Endocrinology 14(5): 301-316.

14. Decandia F (2017) Risk factors for cardiovascular disease in subclinical hypothyroidism. Irish Journal of Medical Science 187(1): 39-43.

15. Olmos R, Figueiredo R, Aquino E, Lotufo P, Bensenor I (2015) Gender, race and socioeconomic influence on diagnosis and treatment of thyroid disorders in the Brazilian Longitudinal Study of Adult Health (ELSA-Brasil). Brazilian Journal of Medical and Biological Research 48(8): 751-758.

16. Inoue K, Ritz B, Brent G, Ebrahimi R, Rhee C, et al. (2020) Association of Subclinical Hypothyroidism and Cardiovascular Disease With Mortality. JAMA Network Open 3(2): e1920745.

17. Douglas P, Umbleja T, Bloomfield G, Fichtenbaum C, Zanni M, et al. (2021) Cardiovascular Risk and Health Among People With Human Immunodeficiency Virus (HIV) Eligible for Primary Prevention: Insights From the REPRIEVE Trial. Clinical Infectious Diseases 73(11):2009-2022.

18. Pamela SD, Triin U, Gerald SB, Carl JF (2021) On behalf of the REPRIEVE Investigators, Cardiovascular Risk and Health Among People With Human Immunodeficiency Virus (HIV) Eligible for Primary Prevention: Insights From the REPRIEVE Trial, Clinical Infectious Diseases 73(11): 2009-2022.

19. Kreatsoulas C, Anand SS (2010) The impact of social determinants on cardiovascular disease. Can J Cardiol 26 Suppl C (Suppl C): 8C-13C.

20. Okeke NL, Schafer KR, Meissner EG, Jan O, Ansal DS, et al. (2020) Cardiovascular Disease Risk Management in Persons With HIV: Does Clinician Specialty Matter?. Open Forum Infect Dis 7(9): ofaa361.

21. Webel A, Schexnayder J, Rentrope CR, Hayden BB, Hileman CO, et al. (2020) The influence of healthcare financing on cardiovascular disease prevention in people living with HIV. BMC Public Health 20(1): 1768.

22. Xie Y, Xu E, Bowe B, Al Aly Z (2022) Long-term cardiovascular outcomes of COVID-19. Nature Medicine 28(3): 583-590.

23. Triant V (2013) Cardiovascular Disease and HIV Infection. Current HIV/AIDS Reports 10(3): 199-206.

24. Russo RG, Li Y, Đoàn LN, Ali SH, David S, et al. (2021) COVID-19, Social Determinants of Health, and Opportunities for Preventing Cardiovascular Disease: A Conceptual Framework. J Am Heart Assoc 10(24): e022721.

25. Berger Z, Altiery De JV, Assoumou SA, Greenhalgh T (2021) Long COVID and Health Inequities: The Role of Primary Care. The Milbank Quarterly 99(2): 519-541.

26. Hansildaar R, Vedder D, Milad B, Anne KT, Martjin G, et al. (2020) Cardiovascular risk in inflammatory arthritis: rheumatoid arthritis and gout. Lancet Rheumatol 3(1): e58-e70.

27. Avina JA, Thomas J, Sadatsafavi M, Lehman AJ, Lacaille D (2012) Risk of incident cardiovascular events in patients with rheumatoid arthritis: a meta-analysis of observational studies. Ann Rheum Dis 71(9): 1524-1529.

28. Gottenberg JE, Ravaud P, Cantagrel A, Combe B, Flipo RM, et al. (2012) Positivity for anti-cyclic citrullinated peptide is associated with a better response to abatacept: data from the 'Orencia and Rheumatoid Arthritis' registry. Ann Rheum Dis 71(11): 1815-1819.

29. Maradit KH, Crowson CS, Nicola PJ, Ballman KV, Roger VL, et al. (2005) Increased unrecognized coronary heart disease and sudden deaths in rheumatoid arthritis: a population-based cohort study. Arthritis Rheum 52(2): 402-411.

30. Goodson NJ, Wiles NJ, Lunt M, Barrett EM, Silman AJ, et al. (2002) Mortality in early inflammatory polyarthritis: cardiovascular mortality is increased in seropositive patients. Arthritis Rheum 46(8): 2010-2019.

31. Kozhimannil K, Westby A (2022) What Family Physicians Can Do to Reduce Maternal Mortality.

32. Sharma G, Grandhi GR, Acquah I, Msza R, Mahajan S, et al. (2022) Social Determinants of Suboptimal Cardiovascular Health Among Pregnant Women in the United States. J Am Heart Assoc 11(2): e022837.

33. Paladine HL, Blenning CE, Strangas Y (2019) Postpartum Care: An Approach to the fourth trimester. Am Fam Physician100(8): 485-491.

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