Understanding Mental Health for the Prevention and Control of Cardiovascular Diseases

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As a group, mental disorders are the leading cause of disability worldwide, accounting for approximately 21% of the global burden [1]. The GBD (Global Burden of Disease) studies [1—3] have consistently reported a significant contribution of mental disorders to morbidity around the world. In the most recent study [1], published this year, the GBD Study Collaborators reported an increase in the years of life lived with disability around the world, corresponding to changing population age structures and reductions in loss of life due to communicable diseases. Years lived with disability for mental and substance use disorders increased 45% from 1990 to 2013 worldwide [1]. In 1990, mental disorders accounted for 135 million disability-adjusted life years (DALY), which increased by 37% to 185 million DALY in 2010, representing 7.4% of global DALY that year, that is, more than the contribution from human immunodeficiency virus/acquired immunodeficiency syndrome or cerebrovascular disease or chronic respiratory diseases [2].

Moreover, these disorders occur commonly. In a recent review and meta-analysis of 174 prevalence studies from 63 countries, Steel et al. [4] found that over the course of a lifetime, the prevalence of any mood, anxiety, or substance use disorder was 29.2%. Nearly 18% of study participants reported symptoms that met criteria for a mental disorder in the 12 months prior to assessment. These studies remind us that mental disorders are a global phenomenon and not solely conditions of high-income countries.

In the most recent GBD study, major depressive disorder is the second leading cause of disability worldwide and the leading contributor in many countries—high, middle, and low-income [1]. Anxiety disorders, schizophrenia, dysthymia, bipolar disorder, and other mental and substance use disorders are among the 20 leading causes of disability globally. Current projections suggest that by 2030, depression will be the leading cause of disability worldwide. Importantly, the impact on disease burden is likely greater because depression frequently co-occurs with other noncommunicable diseases (NCD). By itself, depression is about 3× more common in patients after a myocardial infarction than in the general population [5]. Additionally, about 15% to 30% of patients with cardiovascular disease (CVD) have clinical depression; however, in the setting of an acute myocardial infarction, the prevalence may be as high as 40%, especially in women younger than 60 years [6]. In the PREMIER (Prospective Registry Evaluating Outcomes After Myocardial Infarction: Events and Recovery) study of persons hospitalized for acute myocardial infarction, the adjusted odds of depression for women 60 years or younger were significantly higher than for the other sex-age groups and were 3-fold greater than in men over 60 years [6].

Mental disorders are also an important contributor to global mortality, and this association is not limited to mortality due to suicides. An estimated 14.3% of global deaths (approximately 8 million deaths annually) are attributable to mental disorders [7]. The presence of mental disorders confers a pooled relative risk of 2.22 (95% confidence interval: 2.12 to 2.33) for death from all-causes [7]. Co-occurring NCD, including CVD, figure prominently among the causes of death for people with mental disorders. The association is bidirectional: people with CVD are at greater risk for depression, and people with mental disorders are at greater risk for certain NCD. The end result is that people with mental disorders live, on average, 8 to 20 years less than the general population [8,9] and die from commonly occurring NCD such as CVD, cancer, and pulmonary disease [9]. Some of these deaths could be averted by addressing preventable causes of CVD (among others) and by addressing the elements that likely put people with mental illness at risk: poor health behaviors; limited access to quality care; poverty; and reduced social connectedness [7].

MENTAL HEALTH AND THE PATHOGENESIS OF CARDIOVASCULAR DISEASE

The impact of mental health on the pathogenesis of CVD can begin in childhood, with ramifications through young adulthood and well into old age [10—12]. Maternal depression, which is associated with low birth weight and stunting in some populations [13], may indirectly contribute to heart disease in adult children of depressed mothers, given the link between metabolic disorders and low birth weight [14]. Adverse childhood experiences, social isolation, loneliness, lack of support, low socioeconomic status, chronic psychosocial stress, marital stress, work-life imbalance, perceived general stress, and chronic anger and hostility have all been associated with the pathogenesis of CVD, especially coronary artery disease, with varying effect sizes and impacts [10,12,15—25].

Chronic repeated exposure to psychosocial stress is also a well-established factor in the pathogenesis of coronary heart disease [25]. Proposed mechanisms include chronic activation of the sympathetic nervous system with raised blood pressure, heart rate, and increased cardiac work; predisposition to cardiac arrhythmias; insulin resistance and metabolic dysregulation; autonomic dysregulation;

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endothelial dysfunction; cardiovascular reactivity; and impaired regulation of inflammatory responses [19,20,22,24,26].The precise pathophysiological relationships between many of these factors and atherogenesis in the setting of mental disorders remain incompletely understood. A recent comprehensive review of the mechanisms by which schizophrenia and patients with severe mental illness develop increased CVD risk demonstrated that in addition to lifestyle risk factors, the direct and indirect effects of antipsychotic medications play a role [27].

MENTAL ILLNESS AND IMPACT ON CVD PREVENTION, TREATMENT, AND REHABILITATION

Nonadherence to prescribed medication, health care provider recommendations in clinical management, and health-promoting practices may result from depression and other mental disorders and may be an important contributor to the increased morbidity and mortality seen in CVD and comorbid mental disorders. In a cross-sectional study of 940 outpatients with stable coronary heart disease, Gehi et al. [28] demonstrated that compared with participants who had no symptoms to minimal depressive symptoms, those with severe depressive symptoms had 3-fold odds of not taking medications as prescribed, and this association remained strong and significant even after adjustment for potential confounding variables. Similarly, in the setting of secondary prevention in patients who survive an acute myocardial infarction, Rieckmann et al. [29] showed that among patients with depressive symptoms nonadherence occurred along a gradient, with increasing nonadherence to an aspirin regimen corresponding to greater severity of depression. Provider behavior also plays a role: people with severe mental illnesses can receive unequal care in non—mental health treatment settings [30].

In addition to nonadherence and inadequate care, the presence of some mental disorders may be associated with increased prevalence of traditional CVD risk factors complicating the prevention, treatment, and control of CVD. In a critical literature review of studies published between 1986 and 2013 on the prevalence of CVD risk factors in patients with schizophrenia-spectrum and bipolar disorders, Carliner et al. [31] found evidence of increased obesity and diabetes mellitus among African Americans, and to a lesser degree for Hispanics, than in non-Hispanic Whites [31]. A recent systematic review and meta-analysis that included data from both cross-sectional and cohort studies also demonstrated a significant correlation between depression and metabolic syndrome in cross-sectional studies, and a bidirectional association in prospective cohort studies [32].

GAPS IN IMPLEMENTATION OF EVIDENCE-BASED INTERVENTIONS

The World Health Organization's World Mental Health Survey showed that few people with severe mental disorders receive treatment, and fewer receive adequate care [33]. In the study sample, the majority of participants sought care in general medical sectors (rather than specialist mental health services) [33]. Yet, fewer than one-half of patients with depression and chronic diseases such as CVD are recognized by nonpsychiatric physicians as being depressed [34]. In fact, although the American Heart Association considers it reasonable to screen for depression in patients with CHD, fewer than 15% of patients with depression are identified during an admission for acute myocardial infarction.

In a prospective cohort study of the psychosocial trajectory of 212 patients with coronary heart disease who were screened for depression after an acute hospital admission to major metropolitan hospital and assessed up to 12 months after discharge, Ski et al. [35] demonstrated that patients who screened at "moderate to high" risk of depression at baseline had higher levels of depression and anxiety, and lower levels of well-being and social support at follow-up, than did those at "no to low" risk of depression at baseline. Importantly, they showed that levels of depression and well-being remained relatively constant over the 12-month trajectory. Most importantly, they showed that a screening and referral tool alone is not sufficient to achieve optimal disease management and that a collaborative care model with integrated pathways to primary care was necessary [35].

INTEGRATING MENTAL HEALTH INTO CHRONIC DISEASE CARE: A GRAND CHALLENGE

Over the last decade, grand challenge initiatives have helped the global health community identify priorities and focus research, implementation, and policy activities on tough and persistent problems [36,37]. More than 400 individuals from 60 countries participated to identify the Grand Challenges in Global Mental [38]. The initiative identified the leading barriers, that if removed, could significantly improve the lives of people with mental, neurological, and substance use disorders. One of the top 25 challenges was to "redesign health systems to integrate mental disorders with other chronic disease care and create parity between mental and physical illness in investment into research, training, treatment, and prevention." The global health community is far from achieving this goal, but a growing body of research is informing health systems in high-, middle-, and low-income countries on how best to deliver care to people with mental disorders and co-occurring NCD, including CVD [39].

National Institute of Mental Health investments have supported studies of collaborative care, an evidence-based model of chronic disease care that, at its core, uses a collaborative treatment team and a structured disease management plan to deliver evidence-based treatment for the management of depression in primary care [40]. More recently, investigators have demonstrated that guideline-based collaborative care management of patients with depression, diabetes, and coronary artery

disease yields improved outcomes for each of these conditions [41].

The evidence base for use of collaborative care in low- and middle-income countries is expanding, though studies to date have focused primarily on depression care [39]. Significantly, these studies have demonstrated that even in resource-constrained settings, evidence-based interventions for depression can be delivered [42—47]. Furthermore, where specialist mental health care providers are scarce, key tasks can be shifted or shared with less specialized providers to good effect [42—47].

In 2013, the National Institute of Mental Health published a funding opportunity announcement, "Grand Challenges in Global Mental Health: Integrating Mental Health Into Chronic Disease Care Provision in Low- and Middle-Income Countries," in order to "promote the establishment of an evidence base on contextually relevant, cost-effective integrated care interventions for the treatment of patients with co-morbid mental disorders along with other chronic illnesses in low- and middle-income countries (LMICs)" [48]. This initiative invited applicants to build research on existing research infrastructure, such as that provided through the National Heart, Lung, and Blood Institute/UnitedHealth Collaborating Centers of Excellence [49]. New research in South Africa, India, and China explores the use of nonspecialists in the identification and/or management of depression. These studies examine a range of treatment models–from the integration of nurse-coordinated depression care into care for people with acute coronary syndrome in China to the reduction of CVD risk factors among people with diabetes and depression in India. This work has the potential to provide insights into managing mental illness and CVD in vastly different health care systems and cultural contexts. As NCD play a growing role in global mortality and disability, integrating care for depression and CVD could conceivably reduce suffering and loss of life substantially.

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