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who stand to benefit the most from specific, low-cost prevention interventions, including screening for and treatment of hypertension and elevated cholesterol. Simple, low-cost interventions, such as the “polypill”—a regimen of aspirin, a statin, and an antihypertensive agent—now show trial data with reductions in events for both primary and secondary prevention and have been added to the WHO Essential Medicines list. Third, resources should be allocated to acute, as well as secondary, prevention interventions. For countries with limited resources, a critical first step in developing a comprehensive plan is better assessment of cause-specific mortality and morbidity, as well as the prevalence, of the major preventable risk factors. In the meantime, the HICs must continue to bear the burden of research and development aimed at prevention and treatment, being mindful of the economic limitations of many countries. The concept of the epidemiologic transition provides insight into how to alter the course of the CVD epidemic. The efficient transfer of low-cost preven tive and therapeutic strategies could alter the natural course of this epidemic and thereby reduce the excess global burden of preventable CVD. ■ ■FURTHER READING Boutari C et al: A 2022 update on the epidemiology of obesity and a call to action: As its twin COVID-19 pandemic appears to be reced ing, the obesity and dysmetabolism pandemic continues to rage on. Metabolism 133:155217, 2022. Clerkin KJ et al: COVID-19 and cardiovascular disease. Circulation 141:1648, 2020. Gaziano T, Gaziano JM: Global burden of cardiovascular disease, in Heart Disease: A Textbook of Cardiovascular Medicine, 12th ed, Braunwald E (ed). Philadelphia, Elsevier, 2022. Mensah G et al: Global burden of cardiovascular diseases and risks, 1990-2022. J Am Coll Cardiol 82:2350, 2023. Tsao CW et al: Heart disease and stroke statistics–2022 update: A report from the American Heart Association. Circulation 145:e153, 2022. Section 2 Diagnosis of Cardiovascular Disorders

Physical Examination

of the Cardiovascular

System Patrick T. O’Gara, Joseph Loscalzo The approach to a patient with known or suspected cardiovascular disease begins with the time-honored traditions of a directed history and a targeted

physical examination. The scope of these activities depends on the clinical context, ranging from an elective ambulatory follow-up visit to a more urgent bedside encounter. There has been a gradual decline in physical examination skills over the past few decades at every level, from student to faculty specialist, a development of great concern to both clinicians and medical educators. Classic cardiac find ings are recognized by only a minority of internal medicine and family practice residents. Despite popular perceptions, clinical performance does not improve predictably with experience; instead, the acquisi tion of new examination skills may become more difficult for a busy individual practitioner. Less time is now devoted to mentored cardio vascular examinations during the training of students and residents. One widely recognized outcome of these trends is the progressive utilization of noninvasive imaging studies to establish the presence and

severity of cardiovascular disease even when the examination findings imply a low pretest probability of significant pathology. Proponents of the use of hand-held ultrasound devices to identify and character ize structural cardiac disease have called for its incorporation into educational curricula. Techniques to improve competency in bedside examination skills include repetition, patient-centered teaching con ferences, visual display feedback of auscultatory events using Doppler echocardiographic imaging, and simulation-based training. The use of digital stethoscopes may enhance learning and is foundational to the application of computer- or artificial intelligence–assisted evaluation of auscultatory events.

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The findings from the history and physical examination can help establish the presence, severity, and prognosis of several cardiovascular diseases. For example, observations regarding heart rate and blood pressure, signs of pulmonary congestion, and the presence of mitral regurgitation (MR) contribute importantly to bedside risk assessment in patients with acute coronary syndromes and can inform clinical decision-making before the results of cardiac biomarker testing are known. The prognosis of patients with heart failure can be predicted on the basis of the jugular venous pressure (JVP) and the presence or absence of a third heart sound (S3). Accurate characterization of car diac murmurs provides important insight into the natural history of many valvular and congenital heart lesions. Finally, the important role played by the physical examination in enhancing the clinician-patient relationship cannot be overstated. ■ ■THE GENERAL PHYSICAL EXAMINATION The examination begins with an assessment of the general appear ance of the patient, with notation of age, posture, demeanor, and overall health status. Is the patient in pain or resting quietly, dyspneic or diaphoretic? Does the patient choose to avoid certain body posi tions to reduce or eliminate pain, as might be the case with suspected acute pericarditis? Are there clues indicating that dyspnea may have a pulmonary cause, such as a barrel chest deformity with an increased anterior-posterior diameter, tachypnea, and pursed-lip breathing? Skin pallor, cyanosis, and jaundice can be appreciated readily and provide additional clues. The appearance of a chronically ill-appearing emaci ated patient may suggest the presence of long-standing heart failure or another systemic disorder, such as a malignancy. Various genetic syndromes, often with cardiovascular involvement, can also be rec ognized easily, such as trisomy 21, Marfan syndrome, and Holt-Oram syndrome. Height and weight should be measured routinely, and both body mass index and body surface area should be calculated. Knowl edge of the waist circumference and the waist-to-hip ratio can be used to predict long-term cardiovascular risk. Mental status, level of alert ness, and mood should be assessed continuously during the interview and examination. Skin Central cyanosis occurs with significant right-to-left shunt ing at the level of the heart or lungs,

allowing deoxygenated blood to reach the systemic circulation. Peripheral cyanosis or acrocyanosis, in contrast, is usually related to reduced extremity blood flow due to small vessel constriction, as seen in patients with severe heart failure, shock, or peripheral vascular disease; it can be aggravated by the use of β-adrenergic blockers with unopposed α-mediated vasoconstriction. Differential cyanosis refers to isolated cyanosis affecting the lower but not the upper extremities in a patient with a large patent ductus arterio sus (PDA) and secondary pulmonary hypertension with right-to-left to shunting at the great vessel level. Telangiectasias on the lips, tongue, and mucous membranes, as part of the Osler-Weber-Rendu syndrome (hereditary hemorrhagic telangiectasia), resemble spider nevi and can be a source of right-to-left shunting when also present in the lung. Malar telangiectasias also are seen in patients with advanced mitral ste nosis (MS) or scleroderma. An unusually tan or bronze discoloration of the skin may suggest hemochromatosis as the cause of the associated systolic heart failure. Jaundice, which may be visible first in the sclerae, has a broad differential diagnosis but, in the appropriate setting, can be consistent with advanced right heart failure and congestive hepatomeg aly. Various hereditary lipid disorders sometimes are associated with

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