



Editorial

Cardiac rehabilitation underutilization: Missed opportunities in comprehensive cardiac care



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In the US, half of the population has either prediabetes or diabetes (DM); current figures predict 1 in 3 individuals will have DM by 2050. About 25% of patients with DM and 90% of those with prediabetes are unaware of their diagnosis, a gap which delays management [1].

Using 4 behaviors (smoking, diet, body mass index, physical activity), and 3 health factors (hypercholesterolemia, hypertension, diabetes), ideal CV health (CVH) is defined as achieving all 7 at goals [2]. CVH scores correlate with coronary artery calcium progression and CV outcomes in a graded fashion. In 2013–2014, 62% of adults satisfied ≤ 3 of the metrics, 13% met 5 criteria, 15% met 1, and $\sim 0\%$ attained all 7 criteria, the last figure not having materially improved in a decade [4]. Overall, $\geq 60\%$ of adults >60 years met ≤ 2 metrics [4,5]. Achieving an ideal diet and maintaining a healthy BMI pose the greatest challenges.

Allocating treatments according to global risk scores has been modified according to what RCTs have shown to be effective in specific groups. The concept that CV outcomes are a function of the presence of risk factors, and their intensities and duration, remains fundamental and is evidence-based [3,4]. The corollary is that all risk factors should

simultaneously be at goal levels for optimum outcomes. Even within goal ranges, the reversal of pathophysiology is incomplete, when compared to absence of particular risk factors prior to their appearance [3]. Such residual risk is higher in patients with diabetes than in patients without DM.

The Euroaspire V Registry reported 19% tobacco use, 38% obesity, 59% visceral obesity, 42% hypertension, 29% diabetes (48% uncontrolled, and, in 16%, inadequately), 71% hypercholesterolemia, with 34% of patients reporting <150 min of moderate activity/week, typically a multiple of what is actually performed [5]. Just 46% of patients were referred for cardiac rehabilitation, and many did not complete the sessions. In secondary prevention, risk factors in the US are also far from ideal [1,2,4,6]. These numbers indicate much opportunity to fulfill the immense potential that exists, simply by improving risk factors alone.

Patients with DM face earlier and stronger risks for coronary heart disease (CHD), and over 68% of them age ≥ 65 years die from CVD, the majority from myocardial infarction (MI). Conversely, patients with CHD have a higher prevalence of both diagnosed and undiagnosed DM. Coexistence of the two is accompanied by a 2–4 fold increase in the risk of CHD and stroke, and from 2 to 6 fold higher risk of CV mortality. In patients with DM, diffuse coronary involvement, excessive hospital mortality, greater numbers of unstable plaques, exuberant and aggressive progression, higher complication rates after revascularization, and greater need for coronary artery bypass surgery (CABG). Prevalence approximately 20% of patients admitted with MI have diabetes and are not aware of their diagnosis, and of all patients being referred for revascularization, up to 30% have diabetes.

There is a linear relationship between risk factor control (glycated hemoglobin, low-density lipoprotein cholesterol (LDL-C), systolic blood pressure, exercise, smoking) and the risk for MI [6]. Although weights differ, the same is true for risk factors and stroke. Physical activity in the general population has been low and a “straight line” for >2 decades. Accelerometer data indicate only $\sim 35\%$ – 45% of recommended exercise goals claimed are achieved. Hence, promotion of physical activity requires a fresh approach.

Cardiac rehabilitation (CR) provides services to improve risk factors, emphasizing prescriptive exercise, education, and support for behavioral modification. Indeed, CR was associated with 42% lower risk of a combined end-point of CV mortality and hospitalizations [7]. Early referral is best: for every day between discharge and referral to CR,

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participation fell 1%. These and other compelling data form the basis for the Class 1A recommendation of CR by the AHA/ACC and European Society of Cardiology Guidelines in patients with stable angina, heart failure, percutaneous coronary intervention, CABG, heart valve surgery, cardiac transplantation, and symptomatic peripheral arterial disease. Despite strong evidence, widespread acknowledgement of efficacy, and repeated calls for action, striking underutilization of CR persists. In the US over 80% of eligible patients do not participate in CR, with shortfalls in adoption, referral, and persistence. While variable across states and insurers, it is noteworthy that in a Medicare cohort, just 16.3% of patients participated in CR, and in a Veterans Administration Hospital cohort, 10.3% participated [8]. In Europe, CR also remains underdeveloped and underused, with participation rates of ~30%–40% of eligible patients [5]. Thus, only a quarter of qualifying patients in America receive any form of CR, compared to a third in the EU.

In this issue of the *Journal*, Wallert et al. examined 47,907 patients from the national cohort study (SWEDEHEART) with first-time MI (mean age 62 years, 27% women, 15% with DM) [9]. Patients with and without DM were compared for attainment of 4 CR goals. Using propensity score matching and logistic regression, those having MI and DM had lower odds of reaching the 1-year goals of smoking cessation and attendance at exercise sessions, higher odds of attaining the LDL-C target, but equal odds of attaining the systolic blood pressure goal. Low attendance of women at exercise sessions prompted the recommendation to further examine this relationship. Some suggestion of gender bias in CR referral patterns was noted, and a general need for greater granularity. Nonetheless, the strengths of the study (size and minimization of threats) buttressed both the conclusions and suggestions.

The importance of lifestyle intervention throughout the long natural histories of patients with CHD and DM cannot be overemphasized. This study adds to a large evidence base supporting simultaneous correction of all risk factors in such patients. A view that behavior modification, improvements in the social determinants of health, optimum medical therapies, invasive techniques, and surgical options are all partners, not competitors, will be most productive. In the future, it may be that the advantages of home-based CR may prove fruitful in raising the referral and attendance rates of CR, although challenges and knowledge gaps remain [10]. Current trends indicate that to forestall the looming epidemiological reckoning of the “diabesity epidemics” upon CV outcomes, improvements in prevention will be imperative.

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