



ENSEMBLE APPROACHES IN PROMOTING WOMEN'S HEART HEALTH: PIONEERING AND PRAGMATIC CONTRIBUTIONS OF DR. GOPIKRISHNA VADLAMUDI

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Each year, a large proportion of US women, approximately 2.5 million, are hospitalized for diseases of the heart, which also claims the lives of 500,000 women annually; half these deaths are due to heart diseases related to deficient circulation. This problem also arises on a global scale. Despite the huge nature of this problem and its adverse repercussions on the national public health, there is only limited information about preventive strategies, diagnostic testing, responses to medical and surgical therapies, and other aspects of cardiovascular illness in women. This lack of information is compounded by the less frequent participation of women in research studies and clinical trials; the difference has been due in part to the exclusion of women of childbearing age and in part to the exclusion of elderly women because of their frequent coexisting illnesses and their non-inclusion in clinical studies. Also, immigrant populations are often excluded from these clinical studies due to multiple barriers in communication, including cultural and language barrier due to polylinguism.

Characteristics of patients and physicians that limit the participation of women in clinical trials and sex-specific psychosocial or economic factors remain largely unexplored. There is increasing evidence that women undergo intensive or invasive evaluations and treatments for cardiac diseases substantially less frequently than do men with symptoms of similar or lesser severity; this is particularly true for the evaluation of chest pain. It is in this regard that Dr. Gopikrishna Vadlamudi, Medical Director at Monongahela Valley Hospital in Pittsburgh (Pennsylvania) is demonstrating leadership on how to address this important problem. Dr. Vadlamudi serves as a Consultant on the Board of Advisors of *Talk2All*, a novel smartphone application that translates several languages in real time. Dr. Vadlamudi has led the efforts of utilizing this android device, which can be very simply downloaded on one's phone, to encourage participation of all cohorts of subjects, especially women, in clinical trials, without the hassles of exclusive communication in English.

Coronary heart disease is the most frequent cause of death among U.S. women, for whom it entails a worse prognosis than for men with both medical and surgical therapies. The rate of early death after myocardial infarction is higher among women than among men, even when coronary thrombolytic therapy is used, and the in-hospital mortality rate among women who undergo coronary angioplasty, coronary atherectomy, and coronary bypass surgery is substantially higher in comparison to men. It is uncertain whether this excess mortality reflects the older age, smaller body size, or more frequent and severe coexisting illnesses of women when symptomatic coronary disease occurs, or whether it results from suboptimal or delayed care.

Education is of key significance to heighten awareness on the part of both health professionals and women that the misperception of angina pectoris as a benign problem in women may lead to bias in the evaluation of women with chest pain. In women, as in men, chest pain compatible with angina pectoris warrants thorough evaluation for coronary heart disease. Preliminary estimation of the risk of coronary heart disease, derived from a careful clinical history that differentiates typical angina from other causes of chest pain

and from the assessment of coronary risk factors, is equally important for women and men; corrections for the prevalence of coronary disease (pretest likelihood) and other variables contributing to false positive exercise tests in women result in comparable diagnostic accuracy of exercise-based tests for men and for women. Dr. Vadlamudi is using the web to create such awareness. This is an elegantly simple, but tantalizingly effective methodology to reach out to the wider mass. The Web and other Internet-based systems like smartphone applications are optimal for persuasive communication because they can combine the positive attributes of interpersonal and mass communication. In fact, there are certain areas where persuasive technology could be especially useful. For example, healthcare software applications can motivate people towards adopting healthy behavior, and thereby possibly delay or even prevent medical issues as well as ease the economic situation in public healthcare. Any change in behavior may be explained on the basis of *Fogg's triad*: Behavior (B) = Motivation (M). Prompt (P). Action (A). Dr. Vadlamudi is practically incorporating these concepts on a population level. Though somewhat reported, we still know that there is considerable inertia in reaching out for regular medical and health check-ups, especially in women. This is all too more common in developing countries including India. Dr. Vadlamudi, being well aware about such priorities and issues, takes a libertarian approach to inculcate positive health behavior. His website, *matrihriday.com*, is a reverence and prompt for the care of the "mother's heart" (*Matri*, mother; *Hriday*, heart, in Sanskrit, the root of all Indo-based languages). Because of the underrepresentation of women in previous clinical trials of secondary prevention, few comparisons of the long-term outcomes of women and men with coronary heart disease have been made. Physicians refer less women than men with coronary disease for exercise rehabilitation, despite that the functional benefit of such therapy is gender comparable. Because risk factors for coronary heart disease are highly prevalent among women, physicians should educate their women patients that coronary risk factors can be prevented or altered by behavioral strategies. Dr. Vadlamudi takes a step forward to motivate. He urges through his contributions that physicians should focus on serially assessing risk factors that include blood pressure, weight, waist-to-hip ratio, dietary history, enhancement of physical activity in whatever small measures it might be, cholesterol levels, status of diabetes, and importantly smoking status, both in women as well as men.

Dr. Vadlamudi provides an ensemble of contributions in eHealth: *Matri Hriday* encourages for aggressive awareness about maternal heart health. *Takesmallsteps.org* (also the android app *Take Small Steps*) prompts for physical activity. He also takes the bold step of increasing awareness about the issue of smoking, especially in adolescent girls and college-goers and its complex relationship with social image, teenage depression and other teenage mental health issues, especially in relation to the women's health. The prevalence of smoking among adolescent girls is significantly greater than among boys. In particular, smoking has increased among young and disadvantaged women, groups often specifically lured by cigarette advertising; cigarette advertising is further targeted to women's greater use of cigarettes for weight control.

Women also appear to smoke more of the highly advertised “low-yield” brands, despite research evidence that the risk of myocardial infarction of such women is similar to that of women who smoke “high-yield” brands. Dr. Vadlamudi raises awareness about obstructive lung diseases, a cause of major illnesses in the elderly including women and a major cause of readmissions in US hospitals through his website *rhythmofbreath.org*. Dr. Vadlamudi's comprehensive approaches are interesting and significant, as improvements in risk factors have a cascading effect, leading to improvement in other risk characteristics; for example, weight loss leads to improvements in blood-pressure levels and glucose tolerance. Because childhood risk factors persist into adult life, clinicians caring for children should implement family-based treatments, which can be more effective than those instituted later in life. These comprehensive contributions in raising public health literacy using the principles of *captology* (“computer assisted persuasive technology”) sets Dr. Vadlamudi apart as a pioneer in his practice of primary Care and Hospital Medicine, practicing a culture of preventive medicine that is the hallmark of high-value care.

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