

Infective endocarditis: a deadly consequence of medical progress?

Pedro Marques-Vidal, MD, PhD, FESC

Department of medicine, internal medicine, Lausanne university hospital and University of

Lausanne, 46 Rue du Bugnon, 1011 Lausanne, Switzerland

Email: Pedro-Manuel.Marques-Vidal@chuv.ch

ORCID: 0000-0002-4548-8500

Address for correspondence and reprints

Pedro Marques-Vidal

Office BH10-642

Department of medicine, internal medicine

Lausanne university hospital

Rue du Bugnon 46

1011 Lausanne

Switzerland

Phone : +41 21 314 09 34

Fax : +41 21 314 09 55

Email : Pedro-Manuel.Marques-Vidal@chuv.ch

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Infective endocarditis is the infection of the endocardium, a native or artificial heart valve, or an intracardiac device such as the rods of a pacemaker ¹. Infective endocarditis is a serious disease, with one out of five patients dying from it ². While in the mid-twentieth century the disease was mostly due to *Streptococcus* bacteria and occurred in young adults, the disease has shifted to elderly people, with *Staphylococcus* being the most frequent germ ³. Several studies indicated that the occurrence of the disease is increasing ^{4,5}, but most focused on a single centre ⁴ or a single country ². Only one study ³ included a large number of countries, but developing countries were underrepresented.

In this issue of the EJPC, Yang et al ⁶ used the data from the Global Burden of Disease to map the prevalence and trends of infective endocarditis in 204 countries from 1990 to 2019. While some findings such as the shift from young to old patients was expected, other findings deserve attention. For instance, incidence rates were generally higher in industrialized countries than in lesser-developed ones. The authors explain this finding by the older age of patients and the increased number of heart or invasive interventions in industrialized countries. Notably, among the 11 countries with the most rapid increase in incidence rates, six were from South America. Although the authors provide no explanation for such finding, an Argentinian study reported an increase in intracardiac device-associated disease ⁷. Hence, it is likely that part of the increase in infective endocarditis in developing (and developed) countries is due to the increase in invasive interventions among older, frail patients ⁸. One might be tempted to infer that the rising cases of infective endocarditis among industrialized countries is solely due to the increase in heart or invasive interventions among older people. The true picture might be different; defective oral hygiene has long been identified as a risk factor for infective endocarditis. Switzerland, one of the 11 countries with the greatest increase in incidence rates, is also where one tenth of the population forgoes dental care for economic reasons ⁹. Whether this lack of dental hygiene fuels the increase in infective endocarditis cases remains to be assessed. Indeed, future studies on the causes of infective endocarditis in industrialized countries might have to go back to classical risk factors thought to be almost extinct. Randomized trials on antibiotic prophylaxis to prevent infective endocarditis in people at high risk are also needed.

Other findings deserve careful interpretation: among the top ten countries with the highest incidence rates, seven had a population of less than half a million. Hence, incidence rates rely on a small number of cases (i.e. less than 20 for Monaco and Bermuda), and it takes very little to flip those rates up or down. For example, two cases less would lead to an incidence rate of 21.00 and 22.71 per 100,000 in Monaco and Bermuda, respectively (vs. 26.13 and 25.91 per 100,000 as reported), exiting those countries from the top ten group. Conversely, the incidence rates in Costa Rica, Uruguay and Jamaica, countries with populations over two million, would be little impacted by such minute modifications, indicating that the disease is a significant threat in those countries.

Five of the thirteen countries with the lowest incidence rates of infective endocarditis come from Central Asia. Again, the reasons for this clustering are unclear, and there is little if no published studies on prevalence of infective endocarditis conducted in those countries. Still, most of those

thirteen countries also rank among the poorest worldwide, and it is likely that those low prevalence rates are due to lack of facilities to prevent, diagnose and report the disease. A similar interpretation could be drawn for the nine countries with the biggest decrease in incidence rates: apart from South Korea, all other countries are located in Africa and rank low in GDP per capita; whereas the decrease is real or due to a disaggregation of the health system leading to lower reporting rates is to be assessed. The decreasing rate in South Korea should be compared to other studies reporting an increase in incidence rates ¹⁰. Overall, most peculiar findings can be easily explained by issues related to the patient, the health professional, the health system, or the country itself (Figure).

Building on the aphorism of George Box “all models are wrong, but some are useful”, we can conclude that the data reported by Yang et al. might sometimes be wrong, but are so much useful to make us aware of the burden of infective endocarditis worldwide. The work of Yang et al. also highlights the risks incurred by invasive procedures and the need of preventive measures against the possibly fatal consequences of the disease.

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Figure legend: some of the multiple causes affecting incidence and prevalence rates of infective endocarditis.

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