Making the Myocardial Infarction Mortality Iceberg Visible in Argentina

Para hacer visible el iceberg de la mortalidad por infarto en la Argentina

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Cardiovascular diseases have a high incidence in our country, historically leading the causes of death registered in death certificates. Myocardial infarction (MI) is one of the most frequent and aggressive forms of presentation, with significant morbidity and mortality. (1) Since 1987, scientific societies have undertaken periodic surveys that have granted us the access to epidemiological data on presentation and mortality outcomes, as well as epidemiological and clinical data regarding patients' treatment. (2) (3) The greatest limitation of these surveys is their representativeness, given that participation is voluntary and, as a result, reflects the practice of institutions with academic or community motivation. There are very few attempts to review MI from a population perspective. Some years ago Caccavo et al. published a registry carried out in the City of Coronel Suarez, Province of Buenos Aires, with the intention of assessing the incidence of MI in the population. (4) Their results allowed estimating an incidence of 90 ST-segment elevation myocardial infarction (STEMI) per 100,000 inhabitants in 2005, which, corrected for the population between 35 and 64 years of age, resulted in an incidence of 41.9 STEMI per 100,000 inhabitants. The number of hospitalized patients with STEMI projected annually for the whole country was 31,435, and including non-ST segment elevation myocardial infarction (NSTEMI) with the criteria considered at that moment, the total number of hospitalized patients with MI amounted to 42,025. (5)

This issue of the Journal of Cardiology publishes the REGIBAR study, whose aim was to know the incidence and lethality of infarction in the City of Bariloche. (6) The REGIBAR study differs greatly from the study of Coronel Suárez because, following the recommendations of the MONICA registry promoted 30 years ago by the World Health Organization, (7) it was oriented towards the detection of all MI and not only in hospitalized patients. They recorded all the MI admitted based on the discharge diagnosis; this number was then corrected by a guided examination of patients with high troponin levels reaching a total of 80 confirmed MI in a year. The first finding was that as a result of this exploration based on troponin levels, one out of five inpatients with myocardial infarction would not have been registered considering only the discharge diagnoses. Unlike the study of Caccavo et al. and of historical infarction registries, only 54% of patients had STEMI or left bundle branch block, and 46% were considered NSTEMI. Myocardial infarction that clinicians and cardiologists could detect in their offices, though in small number (3 cases), were added. The biggest novelty of this study is that they systematically reviewed all the deaths in that year, to establish the possibility of fatal myocardial infarction diagnoses that had not been hospitalized. With a great organizational effort, they interviewed relatives and professionals in doubtful cases using the verbal autopsy scheme proposed in the PRISMA study. (8) As a result of the analysis of the 506 deaths recorded during the study period, 16 were classified as definitive or possible MI and another 45 as unclassifiable deaths due to other causes. Following the recommendations of the MONICA study, these deaths were included as fatal MI.

Thus, two very different realities arise questioning our view of population infarction. From the registries' perspective, hospitalized patient mortality as a result of MI is currently 8%, and coincides with that observed in the REGIBAR study (6/80: 7.5%). But, including the cases from the outpatient consultation, death certificates and verbal autopsies, the incidence of infarction increases greatly and mortality is much higher: the annual number of MI rises from 80 to 144 and mortality is 67/144, i.e., 46.5%. In other words, 9 out of 10 deaths due to MI had not been hospitalized.

These data are intended to generate a great controversy on the real performance of our acute ischemic heart disease care system, and consequently, we will raise some questions for discussion.

Is this infarction diagnostic approach valid?
The first challenge to the results is the 45 death cases with unclassifiable diagnosis that were included as fatal MI for analysis purposes. The relevance of the information is of such magnitude that perhaps it deserves an external data review to consolidate the conviction of its accuracy. As the authors point out, in different country

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series the percentage of unclassifiable cases included as MI was on average 22% and in the largest series 46%, while in the REGIBAR study it reached 73%. This high percentage in the absence of autopsies suggests that perhaps this number is overestimated in our country. Making a quantitative exercise to reduce by half the number of fatal MI from unclassifiable causes, from 45 to 23 cases, would result in a total number of 121 MI cases per year instead of 144, a reduction of 15% that does not change much the general vision of the death incidence. It would certainly generate a marked variation in the estimation of mortality, resulting in 29/121 (24%), much lower than the referred 46.5%. Yet, 23 out of 29 deaths (80%), or four out of five cases, were out-of-hospital deaths.

How many MI are there in Argentina based on this projection?
By including all MI with the MONICA criteria, the crude projection is 128 infarctions per 100,000 inhabitants. If out-of-hospital MI are excluded, the figure drops to 87.7 per 100,000 inhabitants, which is very similar to that projected by previous studies. Standardized by age, the REGIBAR authors estimated an annual incidence of 111 per 100,000 inhabitants between 35 and 64 years of age. In the 2005 study, considering only hospitalized MI, a rate of 55.9 per 100,000 inhabitants was estimated for that age group, which is a very similar projection if we take into account that in the REGIBAR study 44% of MI were not hospitalized. If we consider the crude projection of the study with 128 MI per 100,000 inhabitants, and a population of 43,400,000 inhabitants in Argentina for 2015, the expected number of annual MI would be 55,500, of which, 31,000 would be hospitalized and 54% of them (16,800) would be STEMI or have left bundle branch block. Given that the survey was based on a small population, the confidence intervals of these projections are wide and do not rule out the previous 2005 estimation of 42,000 inpatients with MI, 32,000 of which presented with STEMI. To approach the real population figure will undoubtedly require larger population studies performed with the same thoroughness of the REGIBAR study.

What does the REGIBAR study teach us about reperfusion in Argentina?
Based on the surveys of centers with residence or academic activity, the perspective seems satisfactory in some aspects: 80% of STEMI receive reperfusion treatment in a 3: 1 ratio in favor of primary angioplasty vs. thrombolysis. Mortality is 8%, higher than that desired, but easily explained by the effect of treatment delay which reduces the effectiveness of all strategies. In the REGIBAR study, only 56% of patients with STEMI received reperfusion therapy, and the main cause of non-reperfusion was late consultation. In the hospital network linked to Hospital El Cruce in Southern Greater Buenos Aires, the percentage of non-reperfusion before the network coordination strategies was 40%, in most cases due to late consultation and emergency system

delays to identify the disease. It is possible that this percentage is closer to the Argentine global reality than the 20% emerging from the surveys. But, in both cases, the number of MI registered is very small and the confidence intervals are very wide.

How could we lower the incidence of infarction mortality in Argentina?
Cardiologists participating in infarction registries are focused on characterizing the current mortality rate close to 8%, estimating that it could be reduced to the 4% achieved in other countries if the care system were optimized with universal access and lower delays. If, simplifying the calculation, we estimate 30,000 STEMI, 8% mortality would imply about 2,400 deaths per year, which could be reduced to 1,200 if the strategies were optimized; no doubt an ambitious and relevant population target.

When expanding our view towards the dimension of the MI dilemma, including prehospital deaths, a quite different and even more complex reality appears. The REGIBAR study estimated that 90% were out-of-hospital MI deaths, and that overall MI mortality was actually 46.5%. The population death rate due to MI would be 59.4 per 100,000 inhabitants projecting a total of 25.800 deaths in 2015. Ten-fold the initial mortality figure reported when analyzing hospitalized patients. Even when we correct from 90% to 80%, the percentage of out-of-hospital deaths still remains very high. According to national statistics related to cause-of-death diagnoses taken from death certificates, there were 17,120 deaths due to MI in 2015 and 18,228 in 2016, which should make us think that the figures projected by the REGIBAR study are close to reality

The prospect is not encouraging. In a first analysis, we could consider that even when we optimize the entire infarction care system we can only impact the patients who arrive at the hospital, which represent only one out of every 5 or 10 deaths due to MI. However, reality is perhaps somewhat different. If all out-of-hospital mortality were attributable to sudden short-duration or during sleep events, the possibility of reducing it would depend on cardiovascular prevention policies, which have been partially successful, and on the proliferation of cardiosafe locations with greater training of the population in resuscitation techniques. But it is very likely that a great number of out-of-hospital deaths are attributable to an inaccessible care system, with untrained and unmotivated personnel. This contributes to consultation delays, or to a wrong diagnosis in the population with symptoms, an experience that we live every day with MI that reach referral centers after several days of contact with emergency structures that did not make an adequate diagnosis. In that sense, the implementation of an "infarction code" for emergency systems has been very successful in the communities where it has been put into practice (9) and should be a necessary step, accompanied by further and better training of emergency departments, together with the support of a diagnostic network by means of telemedicine and the creation and strengthening of local

networks for the care of acute MI. The strengthening and generalization of the National Registry of Infarction promoted by the Argentine Society of Cardiology (SAC) and the Argentine Federation of Cardiology (FAC) will also allow having relevant epidemiological information to evaluate the quality of these programs and their results.

The authors of the REGIBAR study should be recognized for their contribution to help evaluating a problem of great magnitude for public health in our country, showing us a part of the reality that we should know but usually ignore. The cardiological community is left with the hard task of convincing the authorities of what seems obvious, the need of a health policy that collaborates in improving acute ischemic heart disease treatment to allow overcoming the fragmentation of an over-equipped system with very deficient care results.

Conflicts of interest

None declared.

(See authors' conflicts of interest forms on the website/Supplementary material).

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