EDITORIAL

Equity and Variability in the Use of Medical Technologies

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Published in this issue of the REVISTA ESPAÑOLA DE CARDIOLOGÍA, "Variations Among Spanish Regions in the Use of Three Cardiovascular Technologies," by Fitch-Warner, García de Yébenes, Lázaro and de Mercado, and Belaza-Santurde.[1] The authors highlight a statistical finding in their article: the linear dependency of the use of three therapeutic cardiovascular technologies (percutaneous coronary intervention, implantable cardioverter-defibrillators, and cardiac resynchronization therapy) with the wealth of the region where they are implemented. They also stress that this linear relationship is very weak in relation to disease burden, that is, with the epidemiological variables. Taking this as the starting point, their article points out that the differences in access are still explained by socioeconomic inequalities and not by health needs or disease burden. Thus, they draw our attention to the principle of equity defined as "equal access for equal needs" and point out that, in the case of the technologies studied, inequity exists (although they also emphasize that this statement should be taken with caution because of the way access and need indicators have been defined).

This kind of research belongs to a line of studies investigating other areas in the field of cardiology, both in national and international contexts. This is the case with studies focusing on technologies such as angioplasty,[2] coronary angiography,[3] and defibrillators,[4] and analysis studies that assess variations in medical practice in treating acute myocardial infarction[5,6] and heart failure.[7] Studies on equity of access to other programs or technologies have also been undertaken in other fields such as early breast cancer detection and access to mammography.[8,9] The results obtained from such studies allow healthcare authorities and healthcare service managers to become aware of these situations and their possible causes, so that healthcare policies can be readjusted whenever necessary to correct inequalities and unjustified variations in medical practice.

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Having briefly introduced these issues, we address some of the more outstanding points of the article, at least from the point of view of economists, concerning equity and variations in medical practice:

1. Equity is a rather elusive concept. Practically everyone has an opinion about it, as in the case of quality, but it is both difficult to define and find empirical evidence such that it can be categorically stated whether equity exists or not. Therefore, we need to agree on what is understood by equity, just as we need to establish a standard or framework when measuring quality whereby we can establish whether something is of quality or not. Thus, since the 1970s, some criteria for measuring equity have been defined in the healthcare economics literature, which have become more accurate over time but also more difficult to apply.[10] It would be useful to recall such criteria when interpreting the findings of the article discussed: *a)* equity in per capita health expenditure: under this criterion, we can state that there is equity if, after measuring healthcare expenditures, these are similar in the different geographical settings where they are measured. This measure is simple to apply, although it is not very reliable, since it would suffice for healthcare workers to be better paid in a given region to yield a lack of "equity" between the regions compared (even if no differences were found in the healthcare services received by the public). Thus, another criterion was established: *b)* equity was measured and analyzed via the number of healthcare resources per capita (eg, physicians per thousand population, coronary angiographies per thousand population, etc.), since equity is really concerned with the number of resources available to the population and not with the costs associated with such resources. This criterion, however, is more complicated to measure, especially because the units are not homogeneous and there are thousands of healthcare resources which have to be agreed on before making any comparisons. In addition, one region may have more resources of one kind than another and vice versa, making it difficult to establish if equity exists between them. Thus, another criterion was defined: *c)* equity relates to access to healthcare resources, regardless of the amount; equity exists if they can be accessed on equal terms (eg, under universal public coverage access to health services is free). We can quite easily envisage the "everybody is welcome" scenario in theory, or as a legal right, but we all know that there are waiting lists, some resources are not available to everyone,

some patients must travel more than 2 h by road to access healthcare resources, etc. As we can see, the matter of measuring equity becomes increasingly complicated especially when attempting to discover if there is equity or not. For these reasons, equity of access is not a relevant issue for some authors, and their actual aim is to verify if equality occurs in the use of healthcare resources in the light of a similar health need: *d)* this concept (which the authors of the article refer to) is more satisfactory, again, in theory, but in actual practice its measurement is complicated. This is because there are factors that hinder it being accurately calculated, such as epidemiological variations or disease burden, variations in medical practice with all their idiosyncrasies and subtle differences, patient mobility during a healthcare event, or the actual definition of the healthcare context itself where equity is going to be measured, country, health region, autonomous region, province, county, etc.

2. As applied to healthcare, equity is a constitutional principle in many western countries, but is modulated by efficiency and by budgetary restraints related to its application. There is often a negative correlation between equity and efficiency, in the sense of correct use of healthcare resources. For example, La Rioja, our region, has the greatest per capita health expenditure in Spain (according to Table 1 in the article by Fitch-Warner et al.[1]). However, the region has none of the technologies analyzed in the article, because the maintenance costs of a catheterization laboratory is high bearing in mind the low number of potential patients, who are usually transferred to neighboring regions. Going deeper into the matter of efficiency and equity, it must be made clear that the use of the technologies discussed not only depends on the existence of centers, and catheterization interventional cardiologists, but on their level of work load. Thus, it could happen that the volume of potential services such centers might provide to the population in each of the autonomous regions analyzed would be enough to handle the annual disease burden in each of them, but that the real use of these services would be lower than that proposed in the guidelines and expert recommendations. Such a scenario would yield data in this regard as disparate as those found by the authors. The study by López-Palop et al.[11] could provide a solid basis for further research along the lines indicated. They analyzed the registries of activity at cardiac catheterization laboratories and highlighted the increase in activity reported in recent years. They provided information not only on the use of the technologies, but also, indirectly, on the potential capacity for their use given a certain amount of healthcare resources. Thus, the reasons for underuse should perhaps not only be associated with the least wealth or lowest income in the autonomous regions, but with others such as medical practice, since this can differ between centers and professionals despite the existence of guidelines like those on percutaneous coronary intervention.[12] The underuse of technologies in other areas of cardiology has already been analyzed, such as magnetic resonance imaging in patients with heart disease,[13] and various causes have been found. Thus, there can be a linear dependency, although weak, such as that found by Fitch-Warner et al.[1] (recall the R^2 of the regression between the number of cardiovascular procedures and the per capita gross domestic product, at around 25%). However, such different uses of the procedures indicated can also be explained by other variables which are very difficult to define and measure, such as those concerning medical culture. In this regard, Marion et al.[14] offer a detailed description of the factors influencing variations in medical practice (inaccurate data, sociodemographic factors, supply factors such as the available resources and their funding/financing, and factors involving the direct supplier, such as the physicians uncertainty regarding the technologies or ignorance itself regarding some therapies), the relationships between these factors and the confusion that can rise when the aggregate statistical data are analyzed.

Furthermore, the way of the actual health services are organized when providing care to patients is another variable that can have a different impact on the final data used or on the use of resources. Thus, the cardiac catheterization laboratory´s location, population density of the autonomous regions, working timetable, and clinical management of the patients, among other factors, can lead to a given autonomous region being more efficient than another region in providing healthcare services to patients. From the perspective of equity used in analyzing the linear dependency model, if such a region had a high per capita GDP this would appear as a statistical observation that would support the "more wealth, more use of the technology" relationship, whereas what we would really have is several concatenated statistical relationships.

These efficiency factors in patient management have important effects on the results. The authors themselves recognize that the measurement of patient transfers is flawed due to a lack of data, and that these transfers between autonomous regions might be relevant due to the reasons cited regarding revascularization in unstable patients, especially when the distances to centers within the region itself are large. Again, equity would be in conflict with efficiency and even with efficacy in the clinical management of the patients. The silo mentality of most departments of health in regional governments is not the best administrative context in which to treat some diseases because this rather isolated way of adopting decisions generates unnecessary costs in order to guarantee equity (although not equity of access measured by isochronals or time/distance, which is what most concerns the public). Thus, when analyzing the technologies aimed at low-incidence healthcare problems, a more accurate analysis of equity would involve addressing the matter from the perspective of distances to centers as a way of studying equity of access/use: however, normal data tend not to provide this kind of information.

3. Finally, the consequences of healthcare policies deserve some comment. It is worth noting that these can be very different according to the criterion of equity used and the factors that identify it. The article cited[1] studies the use of

certain technologies; thus, if a difference between regions is confirmed and is due to different per capita income, healthcare policies aimed at promoting interregional equity should increase the provision of such healthcare resources, or redistribute those already available. This is not always viable due to the budget issues involved in applying certain technologies and because "the redistribution of healthcare resources between Spanish regions is an infrequently applied policy". Furthermore, although equity is pursued in the complex process of implementing medical technology, from another perspective it can be understood as a means of guiding management: this is the so-called equity of fulfilled marginal need between the units being compared, which in our case are the autonomous regions. This concept is based on the idea that there is a hypothetical ranking among all healthcare needs, eg, the treatment of appendicitis, hepatitis B, etc, and limited healthcare resources. Thus, the diseases would be ranked and when the resources reached their limit treatment would be stopped or less expensive technologies used. If it is assumed that this ranking has to be the same for all the regions, equity would have to guarantee that the last in this rank would be similarly treated in all regions or with the same technology. In relation to our field, we have no information regarding the position of cardiac treatment technology within this hypothetical ranking, and thus, in some Spanish regions other needs may be put before the ones cited in the established priority list. Thus, healthcare resource availability would be suitable for a given region because in its preset ranking it would take care of the established needs with the means available up to a cut-off point, but not in comparison to the cut-off point of others. Therefore, equity, understood as equality, has to be based on the fact that the ranking of all the technologies is the same "by chance" in all the research units, ie, the autonomous regions in the article discussed. However, if we assume, as seems to be the case in reality, that the Spanish regions have autonomy over healthcare management, there is no reason to assume their rankings would be identical. In such a case, the concept of equity itself would stop making sense regarding its application to the internal management of those further from the average or standard set by this theoretical equity. In other words, every region would apply their healthcare budget according to a collective decision criterion in line with the established ranking and even with the regional principles of equity and efficiency, even if, in a broader context, such as the country as whole, the end result could be described as not being particularly equitable. Another beautiful example of how reality changes depending on the color of the glass one is looking through!

Overall, diagnosing the situation precedes applying policies. The article by Fitch-Warner et al.[1] highlights a statistical finding in the use of cardiovascular therapies among the Spanish autonomous regions. According to its framework of analysis, the lack of equity of access found –in their words, although this actually refers to an unequal use of resources– would have to overcome the lack of wealth, with which it has a linear relationship, to obtain the appropriate number of cardiac catheterization centers with their corresponding human personnel and materials, ie, equity. However, before creating a policy aimed at reducing variations in medical practice or increasing equity in the use of certain technologies, Marion et al.[14] suggest we need a more detailed analysis to assess the list of possible causes, if the data permit this.

In this context, the results may have been different if the equity analysis had included, for example, the workload supported by each center in relation to their potential capacity, and the latter with the disease burden in the reference Spanish region, or the population potentially served. In such a scenario, the policy deriving from such a study should probably include the following: reporting the existence of the services available in such catheterization units to cardiologists; reinforcing the use of medical practice guidelines given a specific health condition; establishing criteria for the selection of potential patients for revascularization using the techniques discussed (on this point, recall the differences found in the treatment of the patients affected by acute myocardial infarction or heart failure, when up-to-date action protocols have been in place for years[5,6]); promoting increases in efficiency as a way to achieve greater equity (in the sense that by reorganizing the services or implementing incentives we could achieve greater activity in centers with the same healthcare resources); and even using economic assessment instruments to aid in formulating such policies, as Borrás Pérez has recently suggested[15] in the same context. All this depends on assuming that, when hypothetically ranking the healthcare needs described above, the Spanish regions would envisage healthcare using these procedures as a priority. Otherwise, their relationship to equity and efficiency would indeed be appropriate for them, but would not match the standards of other analysts.

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