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Editorial

Acute kidney injury in Latin America in "big data" era☆

Lesión renal aguda en Latinoamérica en la era del *big data*

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Latin America includes 20 countries, with an estimated population of 625 million according to data from the Economic Commission for Latin America and the Caribbean region (CEPAL).[1]

One of the main stigmas is the prevailing social inequity: Latin America has the world's second highest level of inequality (Gini coefficient 52.9), just below that of sub-Saharan Africa (56.5).[2]

The inequalities are mainly based on gender, ethnicity, per capita income, geographic areas (rural vs urban area), heterogeneity in terms of infrastructure and asymmetry in technological development. These social inequalities determine the evolution of these populations in terms of health.

In a few years, an ageing population will be the predominant in our society. If no changes are made, this ageing population will be exposed to the prevailing inequality phenomenon in the region, with a disproportionate high risk of developing acute and chronic diseases (especially kidney diseases).

It is estimated that population growth rates for Latin America will reach 680 million by 2025 and 779 million by 2050.[1] Some organisations warn that a inversion of the ratio between individuals aged over 65 years and children younger than 5 years will be reached by 2047.[3]

In this situation, everything concerning healthcare costs is of particular importance as they will have a huge impact on national budgets. In this regard, the consulting firm Ernst & Young[4] warns about the levels of unsustainability generated by this emerging situation, which must be addressed by the healthcare systems.

In addition to inequality, an *ageing population* and *unsustainability of healthcare cost, the* heterogeneity of the population in the region complicates the situation. Population heterogeneity forces the states to attend a very different healthcare demands, given the geographic dispersion and high vulnerability, with large deficits in logistics and infrastructure in some areas.

In this context, acute kidney injury (AKI) in Latin America is important by itself, given the major impact that it generates in terms of *morbidity*, *mortality* and *costs*.[5] Nowadays, AKI is the most common reason for consultations in nephrology departments[6]: according to different publications, the

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incidence varies between 2000[7] and 15,000[8] patients per million inhabitants per year. In addition, the incidence of AKI requiring renal replacement therapy is 533 patients per million inhabitants per year.[9] This figure increases significantly if those patients requiring renal support therapy are taken into account (in the context of situations such as refractory septic shock, permissive hypercapnia, parenteral nutrition, volume overload >10% of body weight, etc.). The purpose of applying these technologies designed to treat kidney failure with support therapies is to regulate volume status, electrolyte balance or acid-base balance, without AKI necessarily being present.[10]

As stated in previous publications by Lombardi et al.,[11] currently it is very difficult to establish accurately the incidence of AKI in Latin America, given the lack of data which makes very difficult to approach this condition. The first part of the AKI 0by25[12] initiative demonstrated that the figures on AKI incidence come mostly from epidemiological studies carried out in developed countries with little participation of countries in the region. This means that these data should be interpreted with caution, as the epidemiology of AKI is different in these developed countries, where it is predominantly present in urban environments, with national epidemiological records available and a specific coding system.

It is t speculated that the incidence of AKI is significantly higher in developing countries, such as Latin America. The epidemiological situation of the countries in the region makes AKI be present in predominantly suburban and rural environments without national epidemiological records, and with a vast majority of published papers concerning single-centre studies in critical care areas, and with no uniformity in definitions.

The lack of data on the incidence of AKI in Latin America makes the planning of regional healthcare policies very difficult. Thus, scientific societies face the challenge of providing a response to the pressing demand of the generation of regional coded record of AKI.

In this context, and taking into account the latest estimations of the United Nations (UN) on the world's population (7 billion),[13] 9% of which live in Latin America (625 million). A merely speculative exercise based on these data, would indicate that the projected figures of AKI incidence in Latin America will reach 1,250,000[7] to 9,375,000[8] people per year. Of these people, 333,125 to 2,498,437 patients would require some type of renal replacement therapy.[9] This figure would also be much higher if we consider the indications for renal support therapy.[10]

Being aware of this situation, the International Society of Nephrology (ISN) has sponsored global campaigns, such as those mentioned, to address this scourge. Perhaps the most representative is the 0by25 Initiative for AKI. This recognises the medical care of AKI as a human right and sets out the challenge of eliminating all preventable deaths due to AKI by 2025.[12]

However, in the design of this campaign, different countries were classified according to their level of development, as defined by gross national income (GNI) per capita stipulated by the World Bank in 2014.[14] Based on this, the countries were divided up according to their level of development:

- High level of development (HLD) if GNI *per capita* >US$ 12,476.
- High/medium level of development (HMLD) if GNI *per capita* is between US$ 4035 and 12,476.
- Medium/low level of development (LMLD) if GNI *per capita* is between US$ 1045 and 4035.
- Low level of development (LLD) if GNI *per capita* <US$ 1045.

According to this concept, Latin American countries would be classified as follows:

- HLD: Argentina, Chile, Uruguay.
- HMLD: Brazil, Colombia, Costa Rica, Ecuador, Mexico, Granada, Jamaica, Panama, Peru, Dominican Rep. Paraguay, Suriname.
- LMLD: Bolivia, Ecuador, Guatemala, Guyana, Honduras, Nicaragua.
- LLD: Haiti.
- No data available: Cuba, French Guiana, Puerto Rico, Venezuela.

The GNI per capita refers to economic growth on its own, based on the value of all goods and services produced by the residents of a country during a specified period of time (generally one year) divided by the number of inhabitants. From this perspective, Latin American countries such as Argentina, Chile and Uruguay would share the same weighting as countries such as Germany, Australia and Sweden. However, if the healthcare costs per capita for 2014, according to the World Bank, are taken into account, the figures are very diverse for these Latin American countries: Argentina US$ 605, Chile US$ 1137, and Uruguay US$ 1442 in contrast with Germany US$ 5411, Australia US$ 6031 and Sweden US$ 6808.[15] This generates an unrealistic assessment of this GNI weighting. Furthermore, the GNI does not reveal any information on how this income is invested, or whether it is used to improve health, education or other outcomes in terms of human development.

In order to avoid this bias, it is perhaps more appropriate to use the human development index (HDI),[16] a statistical social indicator based on people and their capabilities which weighs up three parameters (*a long and healthy life, being knowledgeable and having a decent standard of living*). This is due to the fact that there is a risk of not fulfilling the premise of the initiative regarding medical care for AKI that is considered a human right, due to the loss of universality of this right.

Irrespective of the data, there are several circumstances that would explain the adverse development of AKI in these countries, which are more closely related to the weighting contained in the HDI. These include: lack of or inadequate training of healthcare personnel, lack of awareness of the consequences, limited access to healthcare services, limited diagnostic tools, lack of clinical practice guidelines and limitations in terms of the treatment offered.[17]

In this regard, the current innovative process is hugely disruptive, focussed mainly on the collection and analysis of data, a phenomenon known as "big data", from which more accurate and effective strategies to tackle AKI can be designed.

In order to take this campaign forward at a regional level, it is essential to make a significant investment in

technology. The main obstacle to this objective is *funding*, which is a serious problem, particularly in Latin America, given the prevailing socio-economic crisis. The criterium of sustainability is therefore key when it comes to evaluating and defining the scenarios. One strategy for dealing with *funding* commits to innovative ways of purchasing, which include "shared risk" schemes between the hospital and the supplying company, with the double objective of providing access to complex technology therapies and reducing the financial risk; the refund of the product is conditioned on the results of planned outcomes and those agreed in the contract (health outcomes, saving, etc.).[18]

In this regard, the 15th Acute Dialysis Quality Initiative (ADQI) Conference focussed on the growth of data regarding AKI and the unprecedented opportunity to be able to address certain knowledge gaps and plan public health strategies, developing tangible strategies to reconfigure the infrastructure, in order to improve the quality of scientific studies and characterise the AKI phenotype.[19]

Numerous virtual platforms have now been developed in order to promote and facilitate understanding of innovation in the field of healthcare technology. All agents involved in the innovation and marketing process are brought together in one single forum. An example of this is Medintech (Spain), or the National Innovation Centre of the NHS, recently transformed into The Knowledge and Information Zone (United Kingdom), etc. These types of platform appear to be a possible solution given that in a large part of Latin America the scientific and technological capabilities are concentrated in universities and frequently, the university agendas, their prevailing structures and policies and incentive schemes generate dynamics which are barely connected to the daily needs of the people. The connection of investigators and institutions with the community is not usually strong enough to promote the innovative circuits and interactive learning spaces that are required to solve such problems.

Conclusion

Technological and scientific advances are taking place at amazing speed, with a deep disruptive significance. It may be possible to exploit these to change the AKI paradigm in one of the world's most unequal regions.

The capitalisation of this opportunity should aim to integrate the AKI data on a regional basis, creating a coded base, in accordance with the guidelines of the 15th ADQI conference.[19] The objective is to establish strategic plans of action that will benefit the most vulnerable populations, regardless of the place that the country occupies in terms of level of development as estimated by the GNI given that there is a risk of losing the universality of the right to healthcare. Perhaps the measurement of the HDI or the intensity of poverty could be used to focus the care.

Public/private consortiums, regulated by scientific societies and international bodies, could perhaps meet sustainability and funding.

All efforts should be focussed on achieving the slogan of the 0by25[12] AKI campaign promoted by the ISN: medical care for AKI as a human right and eliminating all preventable deaths from AKI by 2025.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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