EDITORIAL

Research in Latin America: opportunities and challenges

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From any possible point of view, research in general, especially medical research, can only produce immense benefits. For countries, it increases economic activity, creates skilled labor, is a source of international prestige and visibility, and, finally, is a marker of economic independence. For researchers and physicians, it is a way to increase knowledge and apply it, with the very tangible goals of improving healthcare and outcomes. And, most importantly, research generates hopefulness in patients—the ultimate recipients of all these efforts.

These advantages are well known in developed countries; thus, they allocate huge sums of their gross domestic product (GDP) for research and development. While Israel and South Korea top the list of percentage of GDP investment in these activities worldwide, the USA leads with an impressive expenditure of 2.81 % of the largest economy of the world [1], 0.7 % of which is specifically dedicated to funding biomedical and health services research [2]. With respect to publications, a “product” of research [2], the USA also leads in absolute number of scientific publications and citations ($n = 8,626,193$, period 1996–2014) followed by China and the UK [3]. A massive specialized workforce supports this system: the USA and China (4019 and 1089 workers/million people, respectively) constitute the largest universal labor force [1].

Where do Latin-American countries rank in this complex panorama? Most (54 %) are classified as upper-middle income economies; [1]; and with respect to the extent of investment in research, only Brazil allocates more than 1 % of its GDP to these activities, followed by Argentina and Chile at 0.65 and 0.36 % [1] (Fig. 1a). Needless to

say, the impact of this low share of economic resources allocated to science clearly affects all indicators: Brazil, Argentina, and Chile have the highest number of publications ($n = 598,234$; 145,416; and 90,216, respectively) with 11.73, 13.49, and 15.38 citations per article, at least exceeding the world's mean of 13.18 between them [3]. Brazilians and Argentines constitute 72 % of the researchers in Latin America; but with 698 and 1226 workers/million people [1], the comparison with developed countries is highly unsatisfactory.

What are the reasons for the poor performance of Latin-American countries with regard to research and development? Insufficient budget seems to be at the core, but even though it could increase—and here the vision of local governments is key—the absolute amount of investment would still be decidedly low, given the small size of Latin-American economies. Political instability and frequent swings in economic strategies have also taken their toll.

With reference to specific research in critical care medicine, and reflecting this discouraging scenario, publications by Latin-American investigators in specialized journals are scarce (Fig. 1b). Poor quality of research, limited originality, unclear ideas, the result of writing in a non-native language, and inability to carry out large-scale trials due to budgetary issues are some of the more obvious concerns, but there is also a lack of interest in regional data, qualified as a “lack of generalizability” by reviewers. All of these factors add to the limited presence of knowledge generated in Latin America found in specialized journals, and may explain why some Latin-American researchers feel unfairly judged as their work originates outside the main research circuits. It is worth noting that Latin America has contributed to these journals by providing patient data and national coordinators in many studies designed elsewhere. However, neither

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Latin-American researchers nor patient databases have ever been considered when establishing new definitions for worldwide ICU syndromes, such as ARDS, sepsis, and septic shock.

Despite this, the region has made important and universal contributions to clinical research in some specific areas which can be used as models for the future generations of investigators. The pioneering studies of Amato et al. [4] and Pálizas et al. [5] opened up new approaches to ARDS management and perfusion monitoring. Highly relevant epidemiological studies have provided fundamental data for the international community on ARDS [6], sepsis [7], intra-abdominal hypertension [8], as well as ICU organizational factors and patient outcomes [9]. Elegant clinical physiological studies which have contributed to universal knowledge, especially in the area of septic shock or tissue perfusion monitoring, have also been performed in the region [10–14].

Besides, the region exhibits strengths and opportunities for critical care research projects. The trend in investment in science and technology for the region is rising: from US\$27 billion in 2004 to more than US\$60 billion in 2013, an increase of 126 %.

Although minor language barriers exist between Spanish and Portuguese in this 400-million-inhabitant region, the greater issue is that cooperation is scarce. Cultivating collaborative research provides an excellent opportunity to study the influence of economical, educational, transcultural, ethnic, and geographical (e.g., high altitude) factors on critical care practices and outcomes; develop guidelines and recommendations to apply in limited-resource settings; and also deepen our

understanding of prevalent regional diseases which could be treated by intensivists, such as malaria, dengue, and zika, amongst others.

Finally, the Latin-American Research Network (LIVEN) [15] was recently established by a group of critical care experts from Chile, Argentina, Brazil, Colombia, Ecuador, and Uruguay, with the goal of fostering inter-regional research. There is a mirror in which to reflect upon: the successful PLATINO network, founded in 2001 by researchers from Brazil, Chile, Mexico, Uruguay, and Venezuela under the sponsorship of the Asociación Latinoamericana de Tórax (ALAT), which has produced an important body of regional knowledge on COPD.

LIVEN is showing promising results. To date, 257 ICUs across Latin America have responded to a LIVEN survey on human and technological resources, and processes of care for treating patients with shock around the region.

All the preceding facts open up new avenues for hope and progress. As innumerable opportunities seem to be on the horizon, it is high time to take further steps to improve the quality and quantity of research in Latin America!

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Compliance with ethical standards

Conflicts of interest

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