

Advancing Public Health: The Latin American Coalition for *Escherichia coli* Research

Promoviendo la salud pública: la Coalición Latinoamericana para la Investigación de *Escherichia coli*

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ABSTRACT

The Latin American Coalition for *Escherichia coli* Research (LACER) is an interdisciplinary, collaborative initiative aimed at advancing the understanding of *E. coli*. LACER brings together researchers, scientists, and healthcare professionals from various Latin American countries, in order to foster cooperation, the exchange of knowledge, and innovative research aimed at tackling the challenges posed by *E. coli* infection. Through a collaborative approach, LACER members engage in joint research projects, data sharing and capacity building activities. By promoting scientific dialogue and fostering international collaboration, the coalition seeks to enhance the region's research capabilities, bridge knowledge gaps, and provide evidence-based recommendations to policymakers and healthcare providers. LACER also plays a crucial role in raising awareness concerning *E. coli* infection, promoting educational and training programs, and advocating for improved surveillance systems and public health interventions. By actively involving stakeholders from academia, government agencies and the private sector, the coalition aims to promote a holistic approach to *E. coli* research and control in Latin America. Through its diverse membership and comprehensive approach, LACER strives to improve prevention, diagnosis and treatment strategies, with the ultimate goal of mitigating the impact of *E. coli* on public health and agricultural systems in Latin America.

Keywords: *Escherichia coli*, Latin America, LACER, pathogenic *E. coli*, One Health

RESUMEN

La Coalición Latinoamericana para la Investigación de *Escherichia coli* (LACER, por su título en inglés) es una iniciativa interdisciplinaria y colaborativa que tiene como objetivo promover la comprensión del *E. coli*. LACER reúne a investigadores, científicos y profesionales de la salud de varios países de América Latina, con el fin de fomentar la cooperación, el intercambio de conocimientos y la investigación innovadora orientada a abordar los desafíos que plantea la infección por *E. coli*. A través de un enfoque colaborativo, los miembros de LACER participan en proyectos conjuntos de investigación, intercambio de datos y actividades de desarrollo de capacidades. Al promover el diálogo científico y fomentar la colaboración internacional, la coalición busca mejorar las capacidades de investigación de la región, cerrar las brechas de conocimiento y proporcionar recomendaciones basadas en evidencia a los formuladores de políticas y proveedores de atención médica. LACER también juega un papel crucial en la concientización sobre las infecciones por *E. coli*, la promoción de programas de educación y de capacitación, y la promoción de mejores sistemas de vigilancia e intervenciones de salud pública. Al involucrar activamente a las partes interesadas de la academia, las agencias gubernamentales y el sector privado, la coalición tiene como objetivo promover un enfoque holístico para la investigación y el control de *E. coli* en América Latina. A través de su membresía diversa y su enfoque integral, LACER se esfuerza por mejorar las estrategias de prevención, diagnóstico y tratamiento, mitigando en última instancia el impacto de *E. coli* en los sistemas agrícolas y de salud pública en América Latina.

Palabras clave: *Escherichia coli*, Latinoamérica, LACER, *Escherichia coli* patogénico, Una salud

Introduction

In recent years, the Latin American region has faced significant challenges related to the management and control of infectious diseases (Gomes *et al.*, 2010; Torres, 2011, 2017a, 2022; Torres *et al.*, 2018). Among these diseases, *Escherichia coli* infections have been a cause for concern, due to their impact on public health (Torres, 2017a). To combat this issue, the Latin American Coalition for *Escherichia coli* Research (LACER) has emerged as a collaborative initiative aimed at promoting research, surveillance and the implementation of preventive measures across the region (da Silveira & Torres, 2010). This article explores the significance of LACER, its objectives, and its potential impact on *E. coli* management and public health in Latin America.

Despite the fact that the 21st century has seen significant changes in public health practices, due to the emergence of the SARS-CoV-2 coronavirus responsible for the COVID-19 pandemic, diarrhea diseases and other extra-intestinal infections caused by *E. coli* remain an area of concern. *E. coli* is a bacterium commonly found in the gastrointestinal tract of humans and animals. While most strains are harmless, certain types of *E. coli* can cause severe illness, leading to a range of symptoms such as diarrhea, urinary tract infections, and even life-threatening complications. In Latin America, *E. coli* infections continue to be a health problem in tropical and subtropical areas and have been linked to foodborne outbreaks, contaminated water sources and inadequate hygiene practices (Torres, 2010, 2016).

The need for collaboration

Given the transnational nature of infectious diseases, it is imperative that collaboration and information sharing be fostered among those countries facing similar challenges. The Latin American Coalition for *Escherichia coli* Research (LACER) was established in 2009 in order to address this need, bringing together researchers, public health agencies and stakeholders from several Latin American countries. Initially, the coalition was founded with a membership of 40 research groups (currently the network incorporates more than 70 laboratories) distributed across different countries in Latin America and North America, all working on different aspects of *E. coli* research (da Silveira & Torres, 2010; Torres, 2017a, 2017b).

By pooling resources and expertise, LACER aims to enhance the region's capacity to prevent, detect and respond to current *E. coli* challenges, through a One Health approach (Torres, 2017a) involving a broad community of specialists with different areas of expertise (veterinarians, physicians, public health officials, bacteriologists, vaccinologists, epidemiologists, etc.). The fear that antibiotics will not continue to be effective due to the widespread multi-drug resistance problem observed in diverse *E. coli* strains isolated from human cases, and the increased risk of acquiring such infections due to the consumption of contaminated food products with the potential to spread rapidly across different countries, called for the attention of a coordinated team of experts. In this context, it was evident to the members

of LACER that a regional team should respond to current challenges by identifying, diagnosing and combating the pathogenic *E. coli* strains responsible for the different diseases affecting the American continent.

Objectives of LACER

Once the network was established, LACER and its members agreed to work together in areas that benefit their research programs, while at the same time supporting the next generation of young scientists trained in different laboratories throughout the region (Torres, 2010). The working objectives of LACER were defined as follows:

Research and surveillance

LACER promotes collaborative research initiatives in order to better understand the epidemiology, transmission patterns and risk factors associated with *E. coli* infections in Latin America. By sharing data and conducting joint studies, LACER aims to facilitate the identification of regional trends and emerging strains (Navarro & Estrada-García, 2010; Torres, 2010, 2016).

Capacity building

LACER focuses on strengthening laboratory capacities and training healthcare professionals and the next generation of scientists, while disseminating best practices for *E. coli* prevention and control. This includes the enhancing of diagnostic capabilities, the implementation of standardized protocols among the members of the network, and the improving of surveillance systems with the potential to eventually achieve early detection and timely responses to outbreaks.

Public awareness and education

LACER aims to raise public awareness regarding *E. coli* infections through targeted educational campaigns conducted by members in their home countries. By providing accurate information on hygiene practices, food safety and water sanitation, LACER aims to empower communities to protect themselves and prevent the spread of *E. coli*; however, the impact of such public health initiatives would benefit from the participation of the different governmental health departments and ministries.

Policy development and advocacy

One of the goals of LACER is to actively engage with policymakers in order to influence public health policies and guidelines related to *E. coli* prevention and control. By advocating for evidence-based approaches and sharing research findings, LACER is striving to contribute to the development of effective strategies for mitigating the impact of *E. coli* infection.

***E. coli* challenges for the Latin American region**

In common with many other infectious diseases that were ignored during the COVID-19 pandemic, *E. coli* infectious diseases have re-emerged as a public health concern and researchers in the field will need to pay particular attention to certain areas of concern and emerging or re-emerging threats, such as:

Foodborne illnesses

E. coli continues to be a major cause of foodborne illness in Latin America. In this context, challenges include the improvement of food hygiene practices, the control and monitoring of the food supply chain, and the raising of awareness among the general population of the importance of food safety.

Resistance to antibiotics

Resistance to antibiotics is a global problem, and in recent years *E. coli* has developed resistance to multiple antibiotics in different parts of Latin America. LACER members must promote the One Health strategy for the prudent use of antibiotics in clinical practice and in agriculture, as well as the strengthening of antimicrobial resistance surveillance.

Public health and basic sanitation

In some parts of Latin America, sanitation conditions are inadequate and lack of access to potable water continues to be a major problem, contributing to the spread of *E. coli* and other diarrheal diseases. Overcoming these challenges will require investment in sanitation infrastructure, improved access to drinking water, and public health education.

Research and surveillance

Among the most important tasks for LACER members is the continuous monitoring of *E. coli* outbreaks. At the same time, the conducting of research into new serotypes and strains is essential to our understanding of the epidemiology of the bacterium, and in the development of effective prevention and control strategies. LACER has been given the task of promoting research and collaboration in the region in order to address these challenges.

The impact that LACER should be having in the region

The Latin American Coalition for *Escherichia coli* Research has immense potential for the improving of public health outcomes in the region. While it is true that LACER has fostered collaboration and the exchange of knowledge, progress slowed as a result of the pandemic. At the same time, there are areas in which LACER needs to focus more and make greater progress:

Enhanced preparedness

The collaborative nature of LACER's efforts has the potential to strengthen the region's ability to respond effectively to *E. coli* outbreaks, including measures such as early detection, rapid response and efficient communication among countries in order to prevent the spread of infections and minimize their impact on public health.

Standardized practices

Through the development and dissemination of standardized guidelines, LACER has the ability to promote uniformity in laboratory testing, surveillance methodologies and outbreak response protocols. Such standardization would facilitate the comparability of data and ensure a coordinated regional approach to *E. coli* management.

Improved outcomes

By promoting research and capacity building, LACER can facilitate the development of new diagnostic tools, treatment strategies and preventive measures. Such advances have the potential to significantly improve patient outcomes and reduce the burden on healthcare systems in the Latin American region.

Education

LACER members actively disseminate their knowledge, be it through seminars, workshops, published articles or in the classroom. One major achievement for the network has been the publication of three books addressing different aspects of *E. coli*. The first book, "Pathogenic *Escherichia coli* in Latin America", was published in 2010 (Torres, 2010) and was intended to help epidemiologists in this region to better understand the molecular mechanisms of *E. coli* pathogenesis, host immune responses, animal reservoirs and epidemiology, and to improve diagnosis. This book also discussed the *E. coli* situation in countries including Argentina, Brazil, Chile, Mexico and Peru. The second book, "*Escherichia coli* in the Americas", was published in 2016 (Torres, 2016) and was aimed at trainees and students seeking to learn more about the basic and clinical aspects of *E. coli* pathogenesis, as well as experts around the globe interested in learning more about the public health impact of this bacterium in the Americas. Finally, "Trending Topics in *Escherichia coli* Research: The Latin American Perspective" was published in 2023 (Torres, 2023). It provides an introduction to recent advances in all aspects of *E. coli*, utilizing the One Health approach, from the environment, to animals, to humans. Furthermore, this book serves as a critical resource for scientists, clinicians managing associated infections, and trainees and students studying basic and clinical aspects of *E. coli* pathogenesis.

Conclusion

LACER serves as a crucial network for collaboration, research and the prevention of *E. coli* infection. By harnessing the collective expertise and resources of Latin American countries, LACER members have the potential to make significant strides in the management and control of *E. coli* outbreaks. Through research, capacity building, public awareness and policy advocacy, LACER's goal is to safeguard public health, protect communities and strengthen the region's ability to respond effectively to infectious diseases.

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