

Geographic Diversity in Clinical Problem-Solving Exercises



J Gen Intern Med 38(12):2841–2
DOI: 10.1007/s11606-023-08180-w
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Medicine 2023

INTRODUCTION

Clinical problem-solving (CPS) exercises are a powerful teaching tool that allows expert diagnosticians to showcase their reasoning through the diagnostic journey of a complex clinical case. CPS exercises can impact the discourse, dissemination, and development of Clinical Reasoning (CR), a core competency, globally [1].

Geographic diversity is lagging in the published scientific literature [2], and the status of the geographic diversity among CPS exercises is unknown. In this report, we sought to determine the proportion of authors from high (HIC), upper-middle (UMIC), lower-middle (LMIC), and low-income countries (LIC) in the published CPS exercises.

METHODS

Our methods were adapted from previous research [3]. We selected CPS series from US-based general medicine journals with recurring CPS articles from their inception through 2021: *The Journal of General Internal Medicine* (JGIM) Exercises in Clinical Reasoning series, *The Journal of Hospital Medicine* (JHM) Clinical Care Conundrums series, and *The New England Journal of Medicine* (NEJM) Clinical Problem-Solving series. For all articles, we identified all authors' names, country, and affiliated institution(s). We used the World Bank Classification for country income and analyzed the proportion of authors from LIC, LMIC, UMIC, and HIC. Authors affiliated with more than one institution from different countries and/or with different income levels were counted twice during the country and income level analysis.

RESULTS

We identified 465 articles: 309 from NEJM, 111 from JHM, and 45 from JGIM. There were 1857 authors from 15 countries (Table 1). Our analysis (Table 2) identified 0 authors from LIC, 6 (0.32%) authors from LMIC, and 1 (0.05%) author from UMIC. The other 1850 (99.62%) authors were from HIC. Every article had at least one author affiliated with an institution from HIC.

DISCUSSION

Our results show that published CPS exercises have a low degree of global collaboration as nearly all authors are affiliated with institutions from HIC. This represents a missed opportunity to elevate the educational reach of CPS exercises and negatively impacts the adoption of CR outside HIC.

The lack of geographic diversity is not limited to CPS exercises. Investigators analyzed 24 medical education journals' authorship over 20 years and found that only 11.4% of authors were affiliated with institutions in the Global South (which includes most of the LIC/LMIC) [2]. Similarly, the medical research landscape is biased towards HIC authors. Factors contributing to these adversities faced by LIC and LMIC authors include article processing charges, fewer research opportunities, and language barriers [4].

Lack of geographic diversity creates a missed opportunity to increase the educational reach of CPS exercises. For example, clinicians around the world have different diagnostic challenges unique to where they practice. For instance, in one of the few CPS exercises affiliated with an institution in a LMIC, authors described that scrub typhus, a neglected tropical disease, is endemic in the areas of the "Tsutsugamushi triangle." Expanding the geographic diversity of authors can amplify the reader's exposure to endemic diseases from LIC and LMIC and their diagnostic process.

Increasing diversity and collaboration can also increase CR awareness and adoption outside its established communities [5]. Sudacka et al. demonstrated that there is a perception of a lack of qualified individuals to teach CR. If more clinicians around the world show their reasoning through CPS exercises, it may increase the perception of the availability of CR experts outside HIC, while encouraging the development of new CR communities worldwide. Heredia et al. showed an increase in representation within a CR organization improved the penetration of CR among Spanish-speaking UMICs [6].

Our study has some limitations. We only reviewed adult/US-based internal medicine journals; broadening the scope of review could impact the number of authors outside HIC. We also did not measure the overall rate of submissions/acceptance rate from authors of the Global South. Future studies should include both factors to better clarify the current panorama of diversity in CPS exercises.

Medical journals publishing CPS exercises should consider enhancing global collaboration in future editions. For example, developing special editions that highlight the

Table 1 Countries and Number of Authors Reported in the Clinical Reasoning Exercises

Country	Authors (%)
USA	1673 (89.95)
Canada	73 (3.92)
Israel	45 (2.42)
Japan	20 (1.08)
Australia	13 (0.70)
UK	7 (0.38)
Italy	6 (0.32)
Denmark	6 (0.32)
Ireland	5 (0.27)
India	4 (0.22)
Singapore	3 (0.16)
Philippines	2 (0.11)
France	1 (0.05)
Sweden	1 (0.05)
Thailand	1 (0.05)

CR applied when encountering diseases that are endemic to LIC/LMIC countries could be a way to open the forum for discussants everywhere while making CPS exercises an inclusive and impactful teaching exercise for learners globally.

Franco A. Murillo Chavez, MD^{1,2} 

Marcela Araujo de Oliveira Santana, MD³

Seymanur Yildirim, MD candidate⁴

María Jimena Alemán, MD⁵

Saman Nematollahi, MD⁶

¹Sinai Hospital of Baltimore, Baltimore, MD, USA;

²Facultad de Ciencias de La Salud, Carrera de Medicina Humana, Universidad Científica del Sur, Lima, Peru;

³Federal University of Uberlândia, Uberlândia, Minas Gerais, Brazil;

⁴Charité Universitätsmedizin, Berlin, Germany;

⁵School of Medicine, Universidad Francisco Marroquín, Guatemala City, Guatemala;

⁶Department of Medicine, University of Arizona College of Medicine, Tucson, AZ, USA

Corresponding Author: Franco A. Murillo Chavez, MD; Sinai Hospital of Baltimore, Baltimore, MD, USA (e-mail: jmurillochavez@lifebridgehealth.org).

Table 2 Number of Total Articles, Total Authors, and Authors from LMIC and HIC Among First, Last, and All Authors

	Total number of articles	Total number of authors	No. of first authors from LMIC (%)	No. of last authors from LMIC (%)	No. of authors from LMIC (%)	No. of first authors from HIC (%)	No. of last authors from HIC (%)	No. of authors from HIC (%)
NEJM	309	1165	0	0	1 (0.09)	310 (100)	282 (100)	1163 (99.91)
JHM	111	496	2 (1.8)	1 (0.9)	5 (1.01)	109 (98.1)	110 (99)	491 (98.99)
JGIM	45	196	0	0	0	45 (100)	45 (100)	196 (100)
	465	1857	2 (0.43)	1 (0.23)	6 (0.32)	464 (99.57)	437 (99.77)	1850 (99.62)

Bold entries are the total count of each row

Abbreviations: HIC, high-income country; JGIM, *Journal of General Internal Medicine*; JHM, *Journal of Hospital Medicine*; LMIC, lower-middle-income country; NEJM, *New England Journal of Medicine*

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