

Publications in paediatric critical care medicine: Trends from Pakistan

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Abstract

Objective: To analyse the characteristics of research published from Pakistan on paediatric critical care medicine.

Method: The exploratory study was conducted at the Aga Khan University, Karachi from July 2021 to March 2022, and comprised a comprehensive search on MedLine, Google Scholar and PakMediNet databases for literature from Pakistan pertaining to paediatric critical care medicine published between January 2010 and December 2021. The search was done using appropriate key words. Conference abstracts and papers authored by paediatric intensivists with unrelated topics were excluded. Data was extracted on a structured spreadsheet, and was subjected to bibliometric analysis. Data was analysed using SPSS 20.

Results: Of the 7,514 studies identified, 146(1.94%) were analysed. These were published in 51 journals with a frequency of 13.3 per year. There were 107(73.3%) original articles, 96(65.8%) were published in PubMed-indexed journals, and 35(24%) were published in locally indexed journals. Further, 100(69.4%) papers were published from 5 paediatric intensive care units in Karachi, and 81(56%) were contributed by a single private-sector hospital. The total citation count was 1072, with 2(1.4%) papers receiving >50 citations. There was a linear trend with some skewing and an annual growth rate of >15%.

Conclusion: Publications from Pakistan related to paediatric critical care medicine showed positive linear growth. There was a paucity of multicentre studies, randomised controlled trials, and high-impact publications.

Keywords: Bibliometric analysis, Paediatric critical care medicine, Publications, Pakistan, Research. (JPMA 74: 934; 2024)

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Introduction

Over the last few decades, there has been an exponential growth in scientific literature globally.¹ As the volume of available data has grown, so has the need to organise and critically analyse it.² Methods, such as meta-analysis, systematic literature reviews and bibliometric analysis, are commonly utilised to evaluate and give nuanced structure to the published literature. While systematic reviews tend to focus on qualitative approaches, meta-analysis and bibliometric analysis rely on quantitative techniques.³ Of the two, meta-analysis emphasises the amalgamation of existing data to provide consolidated evidence to address existing scientific conundrums. The bibliometric analysis aims at summarising bibliometric data to identify emerging trends in a given research field.⁴

In 2019, Mahdiyoun et al. published the first bibliometric analysis of literature in critical care medicine.⁵ These efforts highlighted novel and essential information in the field and provided a gateway for researchers to build and expand upon.⁵ Compared to adult critical care medicine, paediatric critical care medicine (PCCM) remains a relatively nascent field, particularly in low- and middle-income countries

(LMICs). PCCM is a high-acuity discipline encompassing a broad spectrum of pathologies and age ranges from infancy to adolescence. Since its emergence in the 1960s, PCCM has helped make vital advances in managing conditions, such as lung injury, traumatic brain injury (TBI), sepsis and post-operative care.⁶ In 2018, Caffarelli et al. reported on some of the advances made in PCCM, such as the Paediatric Emergency Care Applied Research Network (PECARN) algorithm in evaluating the need for computed tomography (CT) scanning in children with TBI.⁷ With continuing advancements in PCCM and the field's evolution, reliable reporting of these developments remains of utmost importance.

As the scientific world continues to experience its 'publish or perish' research boom, academic centres have churned out literature. This data is key to providing effective care, especially in resource-limited settings.⁸ In India, for example, establishing formal training programmes and national critical care medicine (CCM) societies has led to tremendous growth accompanied by a surge in publications in the field.^{9,10} This is reflected in Bhalala et al.'s paper documenting an increase from 19 randomised controlled trials (RCTs) and 2 multicentre studies nationwide in 1990 to 198 RCTs and 92 multicentre studies in 2016.¹¹ Bhalala et al. further acknowledged "obvious differences in profiles of critical illnesses and patients between the Indian subcontinent and the West", thereby highlighting the importance of regional data.¹¹

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In Pakistan, PCCM is a young and dynamic field, albeit impaired by a shortage of trained personnel, overwhelming strain on limited resources, and a lack of widespread formal training programmes. Abbas Q et al. in their survey of paediatric intensive care units (PICUs) across the country, highlighted the issues.¹² Despite the hurdles, a steady output of literature has persisted.¹³

The current study was planned to analyse the characteristics of PCCM research published from Pakistan.

Materials and Methods

The exploratory study was conducted at the Aga Khan University, Karachi from July 2021 to March 2022, and comprised a comprehensive search on MedLine, Google Scholar and PakMediNet databases for literature from Pakistan pertaining to PCCM published between January 2010 and December 2021. The period was specifically chosen since the first PCCM fellowship programme in Pakistan started in 2010. The search strategy key words “paediatric critical care medicine Pakistan” OR “Paediatric Intensive Care Unit Pakistan” OR “critically ill children Pakistan” OR “critically injured children Pakistan” OR “children Pakistan”.

Pertinent studies with free text availability were included, while published conference abstracts and papers authored by paediatric intensivists with topics unrelated to PCCM were excluded. Ethics review board approval was not sought as no patient identifiers or patient-related data was included.

Data was extracted independently by two researchers on a spreadsheet, and included three main categories: Journal, which included the year of publication, journal’s name, and PubMed indexing status; Authors, which included the number of authors and institutional affiliation of the first author; and Publication characteristics, which included study type, study design, topics, and frequency of citation.

Data was analysed using SPSS 20. Quantitative data was expressed as mean \pm standard deviation, while qualitative data was expressed as frequencies and percentages. Linear regression was used to determine the differences over time. $P < 0.05$ was considered statistically significant. Frequency network was mapped using VOSviewer version 1.6.18.¹⁴

Results

Of the 7,514 studies identified, 146(1.94%) were analysed. These were published in 51 journals with a frequency of 13.3 per year. There were 107(73.3%) original articles, 96(65.8%) were published in PubMed-indexed journals, and 35(24%) were published in locally indexed journals.

The total citation count was 1072 with mean value being 7.34 ± 11.4 (range: 0-63). There were 2(1.4%) papers that received >50 citations (Table 1). There was a linear trend with some skewing and an annual growth rate of $>15\%$ (Figure 1). Linear regression analysis of publication trend over the study period showed a significant positive trend ($p < 0.001$) (Table 2, Figure 2).

The frequency and network of common key words present in the literature analysed were mapped (Figure 3).

The mean number of authors per publication was 4 ± 2.5 (range: 1-12), and 99(67.8%) papers had <5 authors.

Table-1: Characteristics of the publications analysed (n=146).

Variables	n (%)
Study Design	
- Retrospective	100 (68.5)
- Prospective	26 (17.8)
- Cross-sectional	7 (4.8)
- Case report	10 (6.8)
- Audit	5 (3.4)
- Survey	3 (2.1)
- Randomized control trials	1 (0.7)
- Original articles	107 (73.3)
- Quality improvement project	3 (2.1)
Topic	
- Cardiovascular system	15 (10.3)
- Neurological system	14 (9.6)
- Respiratory system	12 (8.2)
- Renal system	16 (11)
- Infectious diseases	25 (17.1)
- Oncology	11 (7.5)
- Miscellaneous	33 (22.6)
Journal	
- PubMed indexed	96 (65.8)
- Paediatric journals	35 (24)
- Critical care journals	16 (11)
Authors	
- Paediatric intensivist present	50 (34.2)
- Fewer than five	99 (67.8)
Mean number of citations	7.34 ± 11.4

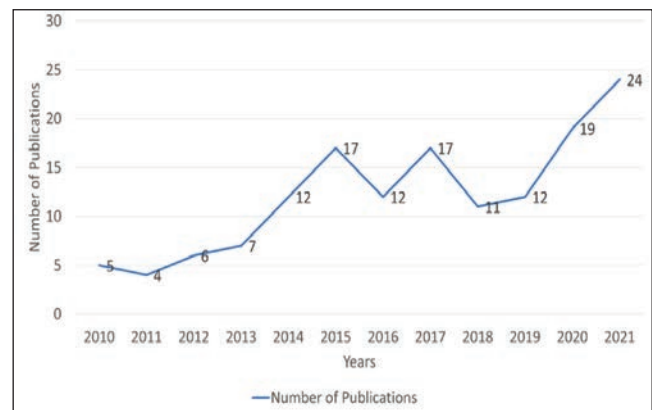


Figure-1: Trend of publications over the study period.

Table-2: Linear regression analysis of publication trends.

No of publications	Coefficient	Std. Error	t-test	p-value	95% Confidence Interval
Year	1.454545	0.2837329	5.13	0.000	0.8223492–2.0866742
Control	2.712121	2.088217	1.30	0.223	-1.940717 – 7.36496

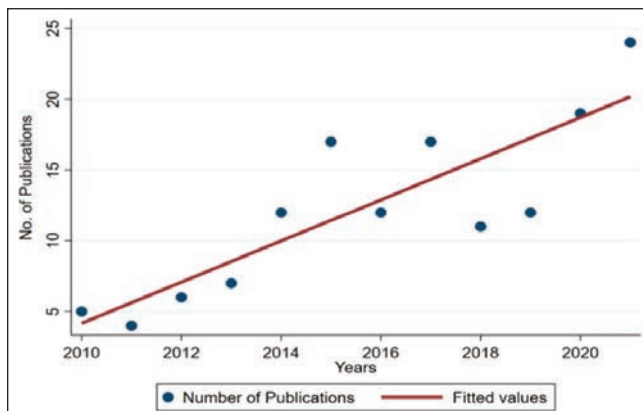


Figure-2: Linear regression analysis of the publication trend.

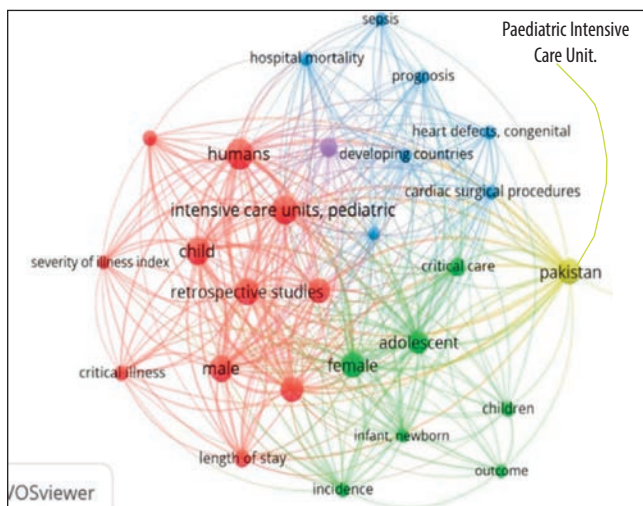


Figure-3: The frequency and network of common key words present in the literature analysed. Additionally, 50 (34.2%) papers had a paediatric intensivist as a first, last, or corresponding author.

Further, 100(69.4%) papers were published from 5 PICUs in Karachi, and 81(56%) were contributed by a single private-sector hospital.

Discussion

PCCM is a well-established discipline in most developed nations across the globe, and it has played a significant role in reducing child mortality.^{6,15} A large volume of PCCM-related literature from various centres worldwide can be found, including some from LMICs. Following the establishment of formal training programmes, increased availability of skilled personnel, and PCCM-related infrastructure, India conducts some of the highest numbers of PICU-related RCTs globally, thereby contributing

enormously to the advancement of the field in general, and highlighting regional, LMIC-related data in specific.^{16,17}

In Pakistan, however, PCCM remains a relatively nascent field. To the best of our knowledge, this current study is the first bibliometric effort assessing the contribution of Pakistani researchers to the field of PCCM. Abbas Q et al. reported that of all the PICUs surveyed in the country, only 30% were staffed by paediatricians with training in PCCM.¹² Despite these documented barriers, the specialty has seen significant growth in recent years^{13m} which is reflected by the linear growth of research output from the country noted in the current study. Several reasons come to mind for this increased output. Formal training programmes in PCCM require postgraduate trainees to publish two papers or a dissertation to be eligible for a final certifying examination. This indicates the necessity of early incorporation of training on conducting good quality research into the curricula for young paediatric intensivists and emerging PCCM fellows. Additionally, in line with global practices, faculty promotions go hand-in-hand with research productivity, thereby incentivising scientific endeavours for the community.¹⁸

The vast majority of published articles included in the current analysis focussed on clinical profiles and outcomes. Of these, most focussed on paediatric infectious disease, a finding likely attributable to the high burden of infectious diseases in developing countries, which remain a significant cause of morbidity and mortality.¹⁹⁻²¹

Most studies were single-centre with a distinct lack of multicentre clinical projects, except one. This indicates a lack of collaboration among Pakistani researchers with international efforts. There has been a significant increase in global research collaborations in the past decade. Such a collaboration has been demonstrated to generate quality scientific research of more significant impact, produce data with greater external validity, highlight healthcare disparities and provide direction for future intervention and policy.¹⁶

For every 500,000 Pakistani children age <14, there exists only 1 PICU bed compared to 1 bed/10,000 children in the United States and 1/1000 children in the United Kingdom.¹² This translates to a severe shortage of trained PCCM personnel. Those that exist experience an overwhelming volume of clinical work, especially in public-sector hospitals. These statistics, coupled with a scarcity of systems supporting and rewarding scientific endeavours in public-sector hospitals in Pakistan, result in little to no protected time for research.

According to the Canadian Paediatric Society (CPS), health research is a moral duty because it is the foundation for evidence-based care by all health care practitioners.²² Zimmerman et al. identified PICUs to be uniquely suited to the needs of clinical research, thanks to the availability of resources necessary to foster an environment of evidence-based, iterative work to improve the quality of care.²³ However, academic work in the field still needs to be improved. Due to the fast-paced environment, complex patient presentation, and ethical dilemmas, PCCM research represents a challenging niche. Most practice in the PICU remains empirical and experiential rather than evidence-based.^{24,25}

Despite these barriers, its inculcation in the standard of care for critically ill children is the need of the hour. High-quality research on common clinical practices and regional trends in the presentation and management of diseases is indispensable in improving the standard of care and clinical outcomes of patients, particularly in LMICs.

The current study has limitations as there was a marked deficiency of RCTs in the cohort and an overall lack of high-quality, impactful publications. A lack of emphasis on, and training on how to conduct quality research work is partly to blame. In a system that employs a checklist-based approach to merit, and where publishing for the sake of publishing and survival remains the norm, it is hardly surprising that most output has little clinical impact.

Conclusion

PCCM-related publications from Pakistan showed a positive linear growth. Most publications were descriptive clinical studies with a paucity of multicentre studies, RCTs and high-impact publications, highlighting the need for quality and impactful research and rigorous research training for fellows.

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Author Contribution:

QA: Study concept and design, data search and collect, performed analysis, drafting, writing, editing, final approval.

MS, NUR, ARA: Study design, data search and collect, writing, editing, final approval.

ZC: Performed analysis, drafting, writing, editing, final approval.

AUH: Study concept and design, drafting, writing, editing, final approval.