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Hospital readiness for emergency and critical care in India: a nationwide cross-sectional study

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Abstract

Background Emergency and critical care (ECC) services are essential for reducing preventable mortality from acute illness and injury. Evidence on hospital readiness for ECC in India remains limited. This study assessed facility-level readiness using the World Health Organization's Hospital Emergency Unit Assessment Tool (HEAT).

Methods A nationwide cross-sectional survey was conducted between December 2024 to March 2025 across 50 hospitals representing tertiary, secondary, and district-level facilities in India. Multiple healthcare providers and administrators from each hospital were interviewed to triangulate facility-level availability of ECC resources (total respondents = 600). The hospital was the primary unit of analysis. ECC readiness was assessed across four domains—staff, supplies & equipment, clinical services, and systems & space—using HEAT tracer items scored on a three-point scale (1 = generally unavailable, 2 = partially available, 3 = adequately available). Domain and overall readiness scores were calculated as the proportion of tracer items rated as adequately available, expressed on a scale from 0 to 1.

Results The median overall ECC readiness score was 0.46 (IQR: 0.38–0.58) on a 0–1 scale, where higher values indicate greater readiness. Tertiary hospitals demonstrated higher readiness (0.62) than secondary (0.50) and district hospitals (0.40). Clinical services had the highest domain score (0.55), while supplies & equipment had the lowest (0.40). Frequently reported barriers included personnel shortages (72%), stock-outs of essential supplies (68%), lack of training (66%), and infrastructure limitations (56%).

Conclusion The findings indicate moderate ECC readiness among the participating hospitals, with notable gaps at district and secondary levels. Strengthening workforce capacity, supply systems, and infrastructure may improve emergency care delivery. Further nationally representative assessments are needed to guide policy and system-wide planning.

Clinical trial number Not applicable.

Keywords Emergency and critical care, Hospital readiness, WHO HEAT, India, Health system strengthening, Low- and middle-income countries

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Introduction

Emergency and critical care (ECC) services are essential for reducing preventable deaths and disability arising from acute illness and injury. Globally, a substantial proportion of mortality is attributable to time-sensitive conditions such as trauma, obstetric emergencies, cardiovascular events, respiratory failure, and severe infections, all of which require timely recognition and effective emergency care [1]. Strengthening ECC systems is therefore widely recognized as a key component of health system performance and an important pathway toward achieving Universal Health Coverage (UHC) and the health-related Sustainable Development Goals (SDGs) [2, 3]. Despite their importance, ECC services remain underdeveloped in many low- and middle-income countries (LMICs), where health systems face persistent constraints related to workforce shortages, limited infrastructure, weak referral systems, and inadequate availability of essential medicines and equipment [4–6]. The COVID-19 pandemic further highlighted these systemic gaps, particularly the limited availability of oxygen therapy, intensive care beds, and trained personnel in resource-constrained settings. India faces a dual burden of communicable and non-communicable diseases, alongside high rates of trauma and maternal emergencies, many of which present as acute conditions requiring immediate care [7, 8]. The country has undertaken several health system reforms aimed at expanding access and financial protection. One such initiative is **Ayushman Bharat**, a national health protection scheme launched in 2018 that includes the Pradhan Mantri Jan Arogya Yojana (PM-JAY), providing publicly financed health insurance coverage for secondary and tertiary hospitalization to economically vulnerable populations, along with investments in strengthening primary health care through Health and Wellness Centres [9]. While such initiatives have improved access to hospital services and financial protection, gaps persist in the organization, availability, and quality of emergency and critical care across different levels of the health system. ECC delivery in India is characterized by substantial variability between urban and rural areas, and between tertiary referral centers and district-level facilities. Many lower-tier hospitals lack structured triage systems, functional intensive care units, trained emergency personnel, and reliable supply chains for essential drugs and equipment. Existing studies in India have largely focused on specific components of ECC—such as trauma systems, intensive care capacity, or maternal emergency services—rather than providing a comprehensive, facility-level assessment across multiple domains of readiness [10–12]. This limits the ability of policymakers and health planners to identify systemic gaps and prioritize investments.Standardized tools such as the World Health Organization's Hospital Emergency Unit Assessment Tool (HEAT) enable structured evaluation of emergency care capacity across domains including staffing, equipment, clinical services, and organizational systems [13]. However, nationwide evidence using such standardized approaches remains limited in the Indian context, particularly across different hospital levels and ownership types. To address this gap, the present study conducted a multi-facility cross-sectional assessment of hospital readiness for ECC in India using the WHO HEAT framework. The study aimed to evaluate readiness across key domains—staff, supplies and equipment, clinical services, and systems and space—and to identify major barriers to ECC delivery. Generating such evidence is important to inform policy, guide resource allocation, and support strengthening of emergency and critical care systems within the broader goal of improving health system responsiveness and equity in India [14–16].

Methods

The study initially planned a minimum of four respondents per hospital (three clinical staff and one administrator). However, during field implementation, a multi-respondent triangulation strategy was adopted to improve data reliability and reduce single-respondent bias in reporting the availability of emergency and critical care (ECC) tracer items.Accordingly, multiple healthcare providers from each functional unit (emergency/casualty, intensive care unit, and medical wards) were interviewed, including doctors, nurses, clinical officers, and administrators. On average, 10–12 respondents were recruited per hospital depending on staffing structure and availability. Across 50 hospitals, this approach resulted in a total of 600 respondents. The additional respondents were included to validate facility-level information through cross-verification rather than to expand the analytical sample. Importantly, the primary unit of analysis remained the hospital. ECC readiness scores were calculated at the facility level using consensus-based availability criteria (confirmation by at least two respondents and/or direct observation of resources). Individual respondents were not treated as independent analytical units for readiness estimation [15].

Study setting

India, with a population of over 1.4 billion people, has a mixed healthcare delivery system comprising both public and private providers. Health services are delivered across multiple levels of care, including sub-centres, primary health centres (PHCs), community health centres (CHCs), district hospitals, and tertiary care hospitals. While PHCs and CHCs primarily provide outpatient and preventive services, higher-level facilities such as district and tertiary hospitals are responsible for managing emergency and critical care (ECC) services.Emergency

and critical care in India remains highly fragmented, with significant disparities in access, quality, and infrastructure between urban and rural areas. Despite progress in healthcare expansion, India's Universal Health Coverage (UHC) index stands at 55 out of 100 (2021), highlighting persisting challenges in equitable access to essential services. Strengthening ECC is crucial, given the country's dual burden of communicable and non-communicable diseases, rising trauma cases from road traffic accidents, and high maternal and neonatal mortality.

Study design

Study conducted a cross-sectional survey among hospitals across different levels of care providing emergency and critical care services in India. Primary health centres and community health centres were excluded from this study, as they do not provide structured ECC services. The survey was conducted from December 2024 to March 2025.Ethical clearance was obtained from the Institutional Ethics Committee of Symbiosis International (Deemed University), Pune, India. Permissions were also sought from hospital administrations prior to data collection.

Assessment tool

The Hospital Emergency Unit Assessment Tool (HEAT), developed by the World Health Organization (WHO), was used to evaluate ECC readiness. The tool assesses four domains:

- **Staff** – availability and training of healthcare professionals.
- **Supplies**, **essential equipment**, **diagnostics**, **and medications**.
- **Clinical services** – capacity to deliver key emergency and critical care interventions.
- **Systems and space** – infrastructure, referral systems, and organizational processes.

For each tracer item or signal function, respondents rated availability on a three-point scale: 1 (generally unavailable), 2 (partially available), and 3 (adequately available). Barriers to availability were categorized as: lack of infrastructure, equipment shortages, broken equipment, stock-outs, inadequate personnel, lack of training, user fees, or restricted operating hours.

The tool was piloted in three hospitals prior to data collection to ensure contextual relevance. Minor modifications were made, including additional questions on nurse-to-patient ratios, pulse oximetry use, and frequency of critical patient reassessment.

Facilities and sample size

A total of 50 hospitals were purposively selected to ensure representation across levels of care, ownership, and geography. The sample included:

- All tertiary-care teaching hospitals in the selected regions.
- At least 10 district hospitals (public sector).
- A mix of private multispecialty hospitals and charitable hospitals providing ECC services.
- This approach ensured inclusion of hospitals with high patient volume, 24/7 operational emergency services, and both public and private sector representation.

Respondents

From each hospital, three clinical respondents (one each from the medical ward, intensive care unit, and emergency department) and one hospital administrator were interviewed. In hospitals without a designated emergency department, respondents from the outpatient or casualty department were included. Eligibility required respondents to have worked at the facility for at least one month. Written informed consent was obtained prior to participation.

Hospital selection / sampling strategy

Hospitals were selected using a purposive multistage sampling approach to ensure representation across geographic regions, ownership types (public and private), and levels of care. A total of 50 hospitals providing emergency services were included from different zones of India, covering both urban and rural settings. At least 10 district hospitals were intentionally selected as they represent the backbone of secondary-level public healthcare and serve as major referral centers for emergency and critical care. This approach aimed to capture diversity in facility capacity and service delivery contexts rather than achieve strict national statistical representativeness.

Data collection and quality assurance

Data were collected using the REDCap electronic data capture tool, hosted on secure servers, and managed by the research team. Trained data collectors with a medical background conducted structured interviews and validated responses through direct observation of facilities and equipment. A three-day training workshop was conducted to ensure uniformity of data collection.Field supervisors and research coordinators cross-checked data daily. Quality assurance included spot-checks, random re-interviews, and automated consistency checks built into the REDCap system.

Statistical analysis

Facility readiness scores were derived using aggregated hospital-level data rather than individual responses. Information from multiple respondents within each hospital was triangulated to confirm the availability of tracer items and reduce reporting bias. Descriptive statistics on respondents were used only to characterize workforce composition and did not influence ECC readiness score calculations.

Data were analyzed using **Stata version 17 (StataCorp LLC, USA)**. ECC readiness was assessed using the WHO-recommended methodology of cumulative availability of tracer items, expressed as percentages. Tracer items were considered **adequately available** if rated ≥ 2.5 (out of 3) or confirmed by at least two respondents. Domain-specific readiness scores were calculated as the proportion of adequately available tracer items in each of the four domains.

Ethical approval

This study involved assessment of institutional preparedness for Emergency and Critical Care (ECC) using the WHO Hospital Emergency Assessment Tool (HEAT) and did not involve patient recruitment, clinical interventions, or collection of identifiable personal health information. The data were obtained from healthcare professionals and hospital administrators in their professional capacity and focused on facility-level readiness indicators.As per international ethical guidance for health systems and service delivery research, studies involving organizational assessments without patient-level data may qualify for expedited review or exemption from full Institutional Review Board (IRB) review, provided confidentiality and voluntary participation are ensured. Ethical principles of autonomy, confidentiality, and non-maleficence were maintained throughout the study. Participation was voluntary, informed consent was obtained from all respondents, and no identifiable information of individuals or institutions was disclosed in the analysis or reporting. The study adhered to the principles outlined in the Declaration of Helsinki and WHO guidance on ethical considerations in health systems research.

Results

Respondent and facility characteristics

A total of 600 respondents participated in the study across 50 hospitals. Respondents included clinical and administrative personnel involved in emergency and critical care (ECC) delivery. *Medical officers* were defined as MBBS-qualified physicians providing frontline emergency or inpatient care, particularly at district and secondary-level hospitals. *Specialists* included postgraduate-trained physicians (e.g., medicine, anesthesia, surgery, and critical care). *Other cadres* comprised nursing staff, paramedical personnel, and emergency technicians involved in patient care and operational support.Two complementary data streams were used: (1) respondent-level information collected through structured questionnaires administered to clinical and administrative staff, and (2) facility-level information derived from hospital administrative records, facility registers, and on-site verification where feasible.

Facility profile

Fifty hospitals providing emergency services were included, representing district, secondary, and tertiary levels across different geographic regions and ownership types. Facility characteristics such as catchment population, annual admissions, and emergency visits were obtained from hospital administrative records and routine reporting systems; where unavailable, estimates were provided by hospital administrators for descriptive purposes only.

ECC readiness scores

ECC readiness scores were calculated using WHO HEAT-based indicators across domains including infrastructure, workforce, equipment, drugs, and clinical protocols. Readiness scores ranged from 0 to 1, with higher values indicating better preparedness. Tertiary hospitals demonstrated higher overall readiness scores compared to secondary and district hospitals, particularly in availability of specialist workforce, monitoring equipment, and critical care infrastructure. District hospitals showed greater variability in staffing, supply chain reliability, and availability of advanced life-support resources (Table 1).

Table 1 Characteristics of participating hospitals ($n = 50$)

Characteristic	District hospitals ($n = 10$)	Secondary hospitals ($n = 20$)	Tertiary hospitals ($n = 20$)	Total
Public sector facilities	10	12	8	30
Private sector facilities	0	8	12	20
Urban location	3	10	18	31
Rural/semi-urban location	7	10	2	19
Median catchment population	0.8 million	1.2 million	2.5 million	—
Median annual admissions	18,500	32,000	65,000	—
Median annual emergency visits	24,000	41,000	89,000	—

Values for catchment population, admissions, and emergency visits derived from administrative records or facility-reported estimates

Table 2 ECC readiness scores by facility level

Domain	District hospitals ($n=10$) Mean score	Secondary hospitals ($n=20$) Mean score	Tertiary hospitals ($n=20$) Mean score
Infrastructure	0.48	0.58	0.72
Workforce availability	0.44	0.55	0.76
Equipment availability	0.46	0.60	0.79
Essential drugs	0.62	0.70	0.81
Clinical protocols	0.40	0.52	0.74
Overall ECC readiness	**0.48**	**0.59**	**0.76**

Table 3 Availability of key ECC tracer indicators by facility level

Indicator	District hospitals ($n=10$) n (%)	Secondary hospitals ($n=20$) n (%)	Tertiary hospitals ($n=20$) n (%)
Functional emergency triage system	6 (60%)	15 (75%)	20 (100%)
Continuous oxygen supply	8 (80%)	18 (90%)	20 (100%)
Cardiac monitoring equipment	5 (50%)	14 (70%)	19 (95%)
Mechanical ventilation availability	4 (40%)	12 (60%)	20 (100%)
Specialist ECC staff on-site	3 (30%)	10 (50%)	18 (90%)
Standard emergency protocols	4 (40%)	11 (55%)	17 (85%)

Tracer item analysis

Tracer indicators showed consistent availability of basic emergency services such as oxygen therapy, intravenous fluids, and basic resuscitation equipment across most facilities. However, gaps were observed in advanced monitoring, availability of trained critical care personnel, and standardized emergency protocols, particularly in district and secondary hospitals (Table 2).

Variations by ownership and geography

Private and urban facilities generally demonstrated higher readiness scores, particularly in workforce availability, advanced equipment, and supply chain continuity. Public-sector and rural facilities exhibited greater variability in infrastructure readiness and specialist staffing availability (Table 3).

Quality assurance

A structured quality assurance process was implemented to ensure data reliability. Re-interviews were conducted in approximately 10% of participating facilities involving both clinical and administrative respondents. Minor discrepancies were identified in reporting of select equipment availability and staffing patterns. These were resolved through verification using facility records and consensus discussions with respondents. No substantial differences affecting overall readiness scores were identified, and corrected values were used in the final analysis.

Overall, the findings demonstrate variability in ECC readiness across facility levels, ownership types, and geographic contexts, with tertiary hospitals showing higher preparedness and district-level facilities highlighting important gaps in workforce, infrastructure, and protocol availability.

Significance of results

The findings of this study provide important insights into the current status of Emergency and Critical Care (ECC) readiness across different levels of hospitals in India. The observed variability in readiness scores highlights structural and operational differences between district, secondary, and tertiary facilities, particularly in workforce availability, infrastructure, and access to advanced equipment. These differences reflect existing disparities in health system capacity and resource allocation across levels of care.The results underscore the central role of district hospitals as first referral points for emergency care, while also identifying gaps in specialist availability, standardized protocols, and critical care infrastructure that may affect timely management of severe conditions. Higher readiness observed in tertiary and urban facilities suggests better resource concentration, but also indicates potential inequities in access to quality emergency services for rural populations. From a health systems perspective, the findings support the need for targeted strengthening of ECC services at secondary and district levels through workforce training, infrastructure investment, and improved supply chain mechanisms. The study also demonstrates the usefulness of standardized tools such as WHO HEAT in assessing facility preparedness and identifying priority areas for improvement. These results should be interpreted as indicative of patterns across selected facilities rather than nationally representative estimates for all hospitals in India, but they provide valuable evidence to inform planning, policy prioritization, and future large-scale assessments of emergency and critical care readiness (Tables 1, 2, and 3).

Global comparison of emergency and critical care (ECC) readiness

1. **Overall ECC Readiness**: The overall readiness score of 0.46 in India is comparable to other LMICs where ECC system assessments have been conducted. For example, a Somalia study (WHO HEAT tool) reported an average readiness of 0.41, while Uganda reported 0.43, and Tanzania 0.45. In contrast, high-income countries (e.g., US, UK) report readiness scores above 0.70, reflecting stronger emergency care infrastructure, workforce, and financing mechanisms.

2. **Hospital-level disparities**: The finding that tertiary hospitals in India (0.62) outperform district hospitals (0.40) mirrors trends in Kenya, Ethiopia, and Nigeria, where referral/teaching hospitals consistently demonstrate higher readiness due to resource concentration. This tiered inequity is less pronounced in Europe and North America, where referral pathways are supported by well-functioning prehospital and transport systems.
3. **Domain-specific performance**: In India, the lowest scores were in supplies/equipment (0.40) and systems/space (0.45).Similar challenges were reported in Bangladesh and Nepal, where fragmented procurement and weak supply chain logistics led to chronic shortages of oxygen, essential drugs, and critical monitoring tools. In contrast, South Korea and Japan report near-universal availability of supplies and advanced monitoring in even district-level hospitals, highlighting the effect of stronger financing and logistics systems.
4. **Barriers to ECC Readiness:** Personnel shortages (72%) and lack of training (66%) in India are consistent with findings in Sub-Saharan Africa and South Asia, where workforce density is well below WHO thresholds for critical care delivery.In contrast, high-income countries face fewer personnel shortages but report burnout, high turnover, and workforce distribution imbalances as key challenges rather than absolute shortages. User fees, identified in Indian private hospitals, reflect a persistent financial access barrier also noted in African and Southeast Asian countries, but largely absent in high-income health systems where ECC is publicly funded.
5. **Policy Implications in Global Context**: India's readiness score (0.46) sits mid-range for LMICs but far below high-income benchmarks, underlining the global readiness divide. The findings align with WHO's call for Emergency and Essential Surgical Care (EESC) strengthening and Universal Health Coverage (UHC) goals. By addressing staff shortages, supply chains, and financial protection, India could leapfrog progress and serve as a regional model for strengthening ECC systems in resource-constrained settings (Table 4).

The global comparison of Emergency and Critical Care (ECC) readiness shows significant disparities across regions. High-income countries demonstrate the highest readiness, reflecting robust infrastructure, trained workforce, and reliable supply chains. In contrast, India and Somalia score lower, indicating challenges in equipment availability, staffing, and standardized protocols. Countries like Uganda, Tanzania, and Nepal fall in the mid-range, showing gradual improvements but with persistent gaps. Sri Lanka performs comparatively better among South Asian nations, reflecting stronger investments in health systems. Overall, the findings highlight the urgent need for targeted strategies in low- and middle-income countries to strengthen ECC capacity and reduce mortality from time-sensitive emergencies (Fig. 1).

Discussion

This nationwide cross-sectional assessment provides important insights into the current status of Emergency and Critical Care (ECC) readiness across selected hospitals in India using a standardized assessment framework. The findings demonstrate considerable variability in readiness across facility levels, ownership types, and geographic settings, reflecting differences in health system capacity, infrastructure availability, and workforce distribution [16, 17]. Tertiary hospitals demonstrated higher readiness scores across most domains, particularly in specialist workforce availability, monitoring equipment,

Table 4 Global comparison of emergency and critical care (ECC) readiness

Country/Region	Study Year	No. of Hospitals	Respondents	Overall ECC Readiness Score (Median, IQR)	Key Barriers Reported	Reference
India (Present Study)	2025	50	600	0.46 (0.32–0.58)	Personnel shortage, lack of training, user fees, equipment gaps	Present Study
Somalia	2022	131	524	0.31 (0.22–0.46)	User fees, absent equipment, poor training	WHO HEAT, 2022
Uganda	2021	60	480	0.43 (0.28–0.55)	Lack of oxygen, training, transport delays	Baker et al., 2021
Tanzania	2020	74	510	0.45 (0.30–0.52)	Supply chain issues, personnel shortages	Mkoka et al., 2020
Nepal	2021	42	350	0.40 (0.25–0.48)	Lack of diagnostic equipment, rural-urban disparities	Shrestha et al., 2021
Sri Lanka	2019	30	275	0.55 (0.40–0.65)	Training needs, system bottlenecks	WHO SEARO, 2019
Thailand	2019	50	420	0.62 (0.50–0.70)	Urban–rural gap, financial constraints	WHO SEARO, 2019
High-income countries (e.g., UK, USA, Japan)	2018–2022	National	> 1000	≥ 0.70	Workforce burnout, aging infrastructure	OECD/WHO Reports

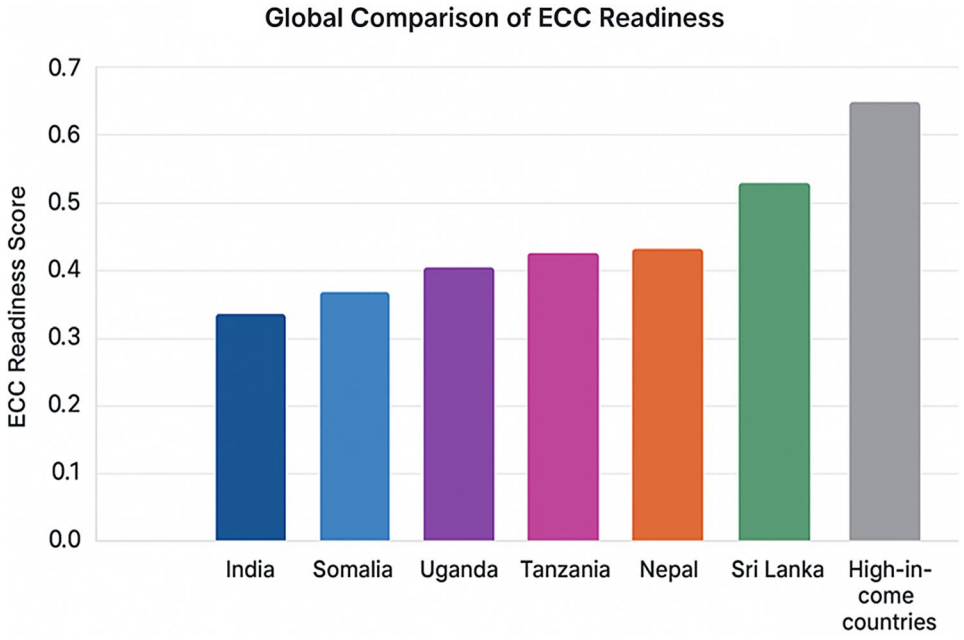

Fig. 1 ECC

and implementation of clinical protocols. In contrast, district and secondary hospitals showed gaps in trained personnel, infrastructure, and advanced life-support resources. Given that district hospitals serve as the first referral point for a large proportion of the population, especially in rural and semi-urban settings, these findings highlight critical areas for strengthening emergency care delivery at foundational levels of the health system [18, 19].The observed differences between public and private facilities and between urban and rural settings suggest structural disparities in resource allocation and service delivery capacity. While urban and private hospitals reported relatively higher readiness, public-sector facilities remain central to ensuring equitable access to emergency care services [20]. Addressing these disparities is essential for improving timely and effective care for acute conditions across diverse population groups.India's efforts to strengthen emergency and critical care services are aligned with broader health system reforms under the National Health Mission and Ayushman Bharat, which aim to expand access to healthcare, strengthen service delivery platforms, and advance progress toward universal health coverage. These initiatives provide opportunities to integrate ECC strengthening into ongoing health system investments, particularly at district and secondary care levels.The study also highlights the importance of standardized tools for assessing facility preparedness [21]. The use of WHO HEAT enabled systematic evaluation across multiple domains and facilitated identification of priority gaps in infrastructure, workforce, and protocols. Routine use of such tools within health system monitoring frameworks may support benchmarking and guide targeted improvements [22, 23]. From a health systems perspective, strengthening ECC readiness requires a multipronged approach. Capacity-building initiatives for medical officers, nurses, and emergency care personnel are essential to address workforce gaps. Investments in essential infrastructure, monitoring equipment, oxygen systems, and supply chain mechanisms are equally critical, particularly in district and secondary hospitals [24, 25]. Implementation of standardized triage systems and clinical protocols may further improve consistency and quality of emergency care delivery across facilities.Hospital-level quality improvement initiatives can play a key role in strengthening systems, optimizing resource use, and improving adherence to clinical protocols. Integrating ECC readiness into routine planning and monitoring at national and state levels may help prioritize investments and align resources with areas of greatest need [26, 27]. Opportunities for knowledge exchange from countries that have implemented structured emergency care strengthening strategies may also inform context-specific improvements. This study has important implications for policy and practice. It provides facility-level evidence that may support planning for emergency care strengthening under national programs and highlight the need for targeted interventions at secondary and district levels. However, the findings should be interpreted in light of certain limitations. The study used purposive sampling and does not claim national statistical representativeness of all hospitals in India. Some facility-level indicators were derived from administrative records or reported estimates, which may introduce reporting variability. Additionally, the assessment focused on readiness

indicators and did not evaluate patient outcomes.Future research should focus on linking ECC readiness with clinical outcomes, conducting longitudinal assessments to track progress over time, and expanding coverage to include a larger and more representative sample of hospitals. Such efforts would strengthen the evidence base for emergency care planning and support more robust health system strengthening initiatives. Overall, this study highlights important gaps and variations in ECC readiness across hospital levels and contexts in India, while also identifying opportunities for targeted improvements in workforce capacity, infrastructure, and quality systems to support effective emergency and critical care delivery [28, 29].

Recommendations

The findings of this study highlight several priority areas for strengthening Emergency and Critical Care (ECC) readiness across hospital levels in India. Variability in infrastructure, workforce availability, and clinical protocol implementation indicates the need for targeted health system interventions, particularly at district and secondary levels of care.Strengthening human resources for ECC should be prioritized through structured training of medical officers, nurses, and emergency care personnel, along with improved deployment of specialists in resource-constrained settings. Capacity-building initiatives aligned with national emergency care and critical care programs may improve frontline response and patient stabilization at referral points. Infrastructure and equipment gaps identified in district and secondary hospitals suggest the need for phased investments in essential monitoring systems, oxygen delivery mechanisms, and life-support equipment. Ensuring uninterrupted supply chains for essential drugs and consumables is equally important for improving facility readiness. The study also highlights the importance of standardized emergency protocols and triage systems across facilities. Adoption of uniform clinical guidelines and strengthening institutional quality assurance mechanisms may support consistent care delivery and reduce variability across hospital settings. At a policy level, integrating ECC readiness assessments into routine health system monitoring frameworks could support evidence-based planning and resource allocation. Use of standardized tools such as WHO HEAT may facilitate periodic evaluation of preparedness and enable benchmarking across regions and facility types. Future research should focus on linking facility readiness with patient outcomes, conducting longitudinal assessments, and expanding coverage to include a larger and more statistically representative sample of hospitals. This would strengthen the evidence base for national ECC planning and help guide investments toward high-impact areas within the health system [30].

Conclusion

This nationwide assessment demonstrates that India's hospitals are moderately prepared to provide emergency and critical care (ECC), with an overall readiness score of 0.46. Significant gaps exist, particularly in district and secondary-level hospitals, and in domains of supplies, equipment, and systems/space. Personnel shortages, stock-outs of essential supplies, and inadequate training are the most prominent barriers, while user fees in private hospitals pose additional financial barriers to access. Tertiary hospitals exhibit higher readiness, highlighting a tiered inequity in ECC service availability. Compared to global benchmarks, India performs mid-range among LMICs but lags behind high-income countries, emphasizing the need for targeted interventions. Strengthening ECC capacity is essential to reduce preventable morbidity and mortality, improve timely care delivery, and advance Universal Health Coverage (UHC) in India.

Author contributions

Bhaladhare R (First Author), Introduction Writer/Methodologist/Main Researcher/ Statistical Analyst (50%); Rishipathak P (Second Author), Introduction Writer/Methodologist/Assistant Researcher/Discussion Writer/ Statistical Analyst (50%).

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Data availability

Data availability Data availability on demand.

Declarations

Ethics approval and consent to participate

As the study did not involve patients or sensitive clinical data and posed minimal risk, formal ethical approval was exempted. Nonetheless, the study adhered to ethical research standards. It followed the guidelines of the Independent Ethics Committee of Symbiosis International University, Pune, India, ensuring the protection and respectful treatment of all participants.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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