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EDITORIAL

Climate change and sustainability in intensive care medicine

Cambio climático y sostenibilidad en medicina intensiva

The floods associated with the Isolated Depression at High Levels (DANA) of October 2024 in the Valencian Community are a recent example of the health consequences of natural disasters, especially in Intensive Care Medicine. The multicenter study conducted in nine Intensive Care Units (ICUs) shows that the healthcare burden following the floods was not attributable mainly to direct victims but to indirect effects in vulnerable patients. Most admissions were related to the decompensation of chronic conditions, diagnostic delays, or difficulties in accessing the healthcare system - evidencing that the interruption of healthcare continuity is one of the main determinants of clinical deterioration in disasters of this kind.[1]

This pattern is not exclusive to the local context. International experiences have consistently shown that natural disasters are not only associated with direct morbidity-mortality but also generate an increase in deferred healthcare demand, increasing mortality in patients with chronic diseases, and worsening the long-term outcomes.[2] In this regard, the World Health Organization considers preparation and management in the face of emergencies to be one of the key components to protect healthcare systems against climate change, particularly in settings characterized by increased vulnerability.[3]

The consequences of disasters depend not only on the number of patients but also on the capacity of the system to respond. Management of the capacity of the ICU is based on the balance between the available resources and the healthcare demand. Alterations of this balance generate tensions that can adversely affect the quality of care. Thus, adequate preparation in facing such scenarios is the cornerstone of the organization of modern ICUs.[4]

An effective response is not limited to increasing the number of beds, but moreover requires the guaranteed availability of qualified personnel, equipment, monitoring systems, and organizational structures capable of adapting dynamically to the existing demand. This was already evidenced on the occasion of the SARS-CoV-2 pandemic, when structural expansion without adequate support revealed important limitations of the system. In natural disasters, this situation can become aggravated, for while the infrastructure may remain intact, the operability of the system can be compromised by logistic problems or difficulties related to transport or the availability of professionals.[5]

The need to make decisions in contexts characterized by scarcity furthermore adds to this organizational complexity. The international guidelines specify that in situations of crisis, it may prove necessary to establish triage mechanisms to prioritize access to intensive care, though the evidence orienting these decisions is still limited. This reality exposes professionals to a heavy ethical burden and to moral stress, particularly when the assignment of resources implies the need to limit access for certain patients.[6]

In this line, a recent review has identified multiple obstacles to critical patient care during disasters, including the scarcity of resources, infrastructural failures, and planning deficiencies. It also highlights problems referred to coordination, triage, and ethical management, together with the impact of increased demand and exhaustion of the healthcare personnel. As actions for improvement, the study proposes reinforcing hospital preparation through specific training, clear legal specifications, and more effective communication among the different levels of care.[7]

In parallel to this, climate change not only increases the frequency and intensity of natural disasters but is also modifying the epidemiological profile of critically ill patients. An increase in emerging infectious diseases, vector-transmitted infections, and antimicrobial resistance has been observed,

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as well as an increase in the severity of viral infections favored by air pollution. The rise in temperatures also results in an increased incidence of cases of thermal stress and heatstroke, which in turn are associated with high in-ICU mortality. Likewise, extreme heat favors the appearance of cardiovascular complications, acute renal failure, water-electrolyte imbalances, and respiratory exacerbations. On the other hand, air pollution contributes to the development and aggravation of respiratory and cardiovascular disorders, increasing the risk of critical events such as myocardial infarction, stroke, or acute respiratory distress syndrome, and moreover has a growing impact on mental health.[8]

The challenge facing intensive care medicine is even more profound, however. Within the current anthropogenic context, the healthcare system itself contributes to climate change to a significant degree. It is estimated that the healthcare system accounts for approximately 5% of global greenhouse gas emissions, with the ICU being one of the settings with the greatest consumption of resources and production of waste.

This situation poses a fundamental ethical conflict: how to balance the provision of care that is highly technological and dependent upon resources with the need to reduce its environmental impact. In this regard, sustainability ceases to be an optional target and becomes an ethical and professional imperative, constituting an essential dimension of care quality.

The integration of sustainability in the practice of intensive care medicine implies action at multiple levels: optimized resource utilization, reduction of waste, improved energy efficiency, and the reconsideration of clinical practices of little value.[9] These strategies not only contribute to reducing the carbon footprint but can also improve the efficiency of the system and strengthen its resilience in situations of crisis. Different scientific societies have started to define conceptual frameworks and recommendations seeking to facilitate this transition in ICUs.[10]

Natural disasters linked to climate change are thus redefining the challenges in intensive care medicine, affecting not only the direct victims but also healthcare organizations and decision-making in contexts characterized by scarcity, in a scenario where the healthcare system itself also contributes to the problem.

In the face of this new paradigm, intensive care medicine constitutes a cornerstone in the response to disasters, and must evolve towards a more resilient, efficient, and sustainable model. Intensivists must be prepared not only to face the consequences but also to take on an active role in reducing the causes, thereby guaranteeing the viability of critical patient care in the present century and also in the future.

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Declaration of competing interest

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References

1. Sancho E, Martín R, Abejaro B, Zaragoza R, Carrasco C, Ramírez P. Critical care during natural disasters: ICU insights from Valencia's October 2024 floods. Med Intensiva (Engl Ed). 2026:502395, http://dx.doi.org/10.1016/j.medine.2026.502395.
2. Fussell E, Burrows K, Sastry N. Learning from natural experiments to accelerate demographic research on climate-related threats to human populations. Wiley Interdiscip Rev Clim Change. 2025;16:e70031, http://dx.doi.org/10.1002/wcc.70031.
3. Morris K, Pasha A, Li X, Qiao S. Disaster preparedness of health systems in LMICs in the face of climate change: a systematic mapping review of vulnerabilities and response strategies. BMC Public Health. 2025;26:217, http://dx.doi.org/10.1186/s12889-025-25873-5.
4. Nates JL, Manjappachar N, Botdorf J. ICU capacity management and surge preparedness. Crit Care Clin. 2026;42:361–78, http://dx.doi.org/10.1016/j.ccc.2025.12.003.
5. Hossain T, Ghazipura M, Dichter JR. Intensive care role in disaster management critical care clinics. Crit Care Clin. 2019;35:535–50, http://dx.doi.org/10.1016/j.ccc.2019.06.004.
6. Nates JL, Jayaprakash N, Carayannopoulos KL, Honarmand K, Anesi GL, Bartlett Davis L, et al. Society of critical care medicine guidelines for the allocation of critical care resources to adults during crisis-level shortages. Crit Care Med. 2026;54:619–29, http://dx.doi.org/10.1097/CCM.0000000000006998.
7. Masbi M, Tavakoli N, Dowlati M. Challenges of providing of special care services in hospitals during emergencies and disasters: a scoping review. BMC Emerg Med. 2024;24:238, http://dx.doi.org/10.1186/s12873-024-01160-1.
8. Koch S, Klitzman R. Reliance on fossil fuels: ethical implications for intensivists. Intensive Care Med. 2023;49:330–3, http://dx.doi.org/10.1007/s00134-023-06994-0.
9. Gabiña IS, José Pita López M. GREEN ICU: responsible and sustainable ICU. Med Intensiva (Engl Ed). 2024;48:231–4, http://dx.doi.org/10.1016/j.medine.2023.11.008.
10. De Waele JJ, Hunfeld N, Baid H, Ferrer R, Iliopoulou K, Ioan AM, et al. Environmental sustainability in intensive care: the path forward. An ESICM Green Paper. Intensive Care Med. 2024;50:1729–39, http://dx.doi.org/10.1007/s00134-024-07662-7.

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