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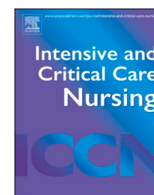

Editorial

Reconsidering the presumed acoustic benefits of single-patient rooms in the ICU

Over the past two decades, intensive care units have been renovated, with traditional multi–bed wards increasingly converted into single–patient rooms, reflecting a broader commitment to patient-centered care. This shift is well supported: single-patient rooms have been shown to enhance privacy, facilitate family participation, and reduce nosocomial infections [1]. From these perspectives, the case for single occupancy is compelling. Yet one assumed benefit has received surprisingly little scrutiny — the soundscape. Alarms, ventilators, and continuous clinical activity persistently generates sound that disrupts patient sleep and recovery while straining caregiver concentration and safety [2,3]. Whether single-patient rooms genuinely address this problem, however, has remained an open question [3].

In this issue of Intensive and Critical Care Nursing, Bader and colleagues address this question directly [4]. Using high-resolution acoustic monitoring across architecturally identical single- and double-bed ICU rooms over more than a year, their study yields a counterintuitive result: contrary to prevailing assumptions, single-bed rooms exhibited significantly higher average sound levels (LAeq: 51.85 vs. 50.29 dBA) and baseline sound levels (LAmin: 41.22 vs. 35.34 dBA) than double-bed rooms. Only peak sounds (LAmax) were lower in single rooms. This nuanced acoustic profile, i.e., a quieter ceiling but a louder floor, challenges assumptions that have shaped major capital investments in ICU infrastructure. It reflects a meaningful distinction in the drivers of ICU sound: peak levels are largely determined by human behavior and alarms, and are therefore modifiable. However, the acoustic floor is set by continuous technical systems such as heating, ventilation, and air conditioning (HVAC) systems and medical equipment, and is far less responsive to architectural change alone. It is time to reconsider the notion of architectural design alone as a sufficient solution for ICU noise control, and to situate sound (and sound reduction) within its full clinical and behavioral complexity.

However, these remaining questions highlight the importance of adopting a broader perspective on the ICU soundscape. The study relies primarily on decibel measurements, which provide only a partial representation of the acoustic environment. Objective sound levels alone do not capture how noise is experienced by patients and staff, as subjective and perceptual dimensions—such as perceived disturbance or annoyance—are not addressed. Exploring potential correlations with clinical outcomes, such as sleep quality or delirium, could further strengthen the understanding of noise impacts [5]. Moreover, it remains unclear whether room type influences other important aspects of the ICU noise landscape. For example, alarms are a well-known contributor to ICU noise, and it would be valuable to examine whether different room configurations affect nursing staff responsiveness to these alarms.

These omissions do not diminish the contribution of the study; rather, they highlight opportunities for future research to develop a more comprehensive understanding of the ICU acoustic environment, thereby broadening the perspective on the noise problem and helping to inform potential interventions.

These findings highlight a broader challenge in the ICU: architectural solutions alone are unlikely to resolve ICU noise if staff behavior and clinical workflows remain unchanged. This conclusion is consistent with prior evidence. A systematic review showed that noise reduction in the ICU is most effectively achieved through multicomponent interventions that combine staff education, targeted alarm management, and environmental modifications [3]. Architectural redesign, including noise-absorbing materials and dedicated staff workspaces, can contribute meaningfully, but its effect is substantially amplified when embedded within an organizational and behavioral strategy. Single-patient rooms, whatever their acoustic profile, cannot substitute for this broader approach.

Moving forward, effective noise management in the ICU demands a multimodal approach structured around three priorities. First, assessment should move beyond average decibel levels to incorporate percentile-based descriptors of the soundscape (L5, L95), peak noise (Lmax), psychoacoustic parameters that reflect the human perception of sound, such as Zwicker loudness, and both patient- and healthcare professional-reported annoyance, which together better reflect clinical impact. Second, staff awareness and shared responsibility for noise reduction should be cultivated as an explicit component of ICU safety culture; conversations, alarm responses, and care routines are the primary modifiable drivers of sound, and addressing them requires both leadership commitment and cultural change. Third, alarm management deserves priority attention: unnecessary alarms are the most disruptive and preventable source of acoustic annoyance and distraction (more than absolute levels). Architectural and technical measures, including single rooms, remain valuable as enabling conditions, but lasting impact requires embedding them within organizational strategy.

While single-patient ICU rooms contribute meaningfully to patient comfort, privacy, and infection control, their acoustic advantages should not be taken for granted. As healthcare systems continue to invest in new critical care facilities, these findings warrant careful consideration. Unless the underlying drivers of ICU noise, i.e., alarm overload, staff conversations, and clinical workflows, are addressed alongside design choices, the acoustic burden on patients and staff will shift rather than shrink.

Ethical statement

This editorial is an original work and has not been published or

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CRediT authorship contribution statement

Jeanette Vreman: Conceptualization, Project administration, Writing – original draft, Writing – review & editing. **Cris Lanting:** Writing – original draft, Writing – review & editing. **Mark van den Boogaard:** Writing – original draft, Writing – review & editing.

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