



Value-Based Critical Care

**Value-Based Outcomes in Critical Care Recovery:
The Voice of Relatives**, MMC van Mol, E Berger,
JM Latour

Palliative Care AI: Creation to ICU Implementation,
RC Mack, PM Wilson, AC Spaulding, R Corro, A Pareek,
TL Menser, DK Sanghavi, P Moreno Franco, R Diaz Milian,
SA Helgeson, MT Robinson

Humanising the ICU Through Thoughtful Design, S Prodor,
K Francis, L Tobin, L Tsotsos

ABCDEF-MT: Music Therapy and ICU Liberation, K Devlin,
J Shegogue, S Sahetya, SR Kudchadkar

Status Asthmaticus: The Art of Ventilating,
A Fajardo-Campoverdi, A Medina Villanueva, P Vivanco,
V Modesto i Alapont, C Chica-Meza

Making Paediatric and Neonatal Transport Safer,
C Alejandre, P González-Álvarez, M Navarro, A Delgado,
N Millan, J Peiró, O Rodríguez, M Jabalera, E Esteban

**What if Patients or Families Are 'One of Us'? Equity in
Critical Care**, E Peschel, S Krotsetis, A-H Seidlein,
P Nydahl

**Airway Management in Patients with Acute Traumatic
Brain Injury: An Evidence-Based Approach**,
I Rodríguez-Guevara, RA Reyes-Monge,
HA Toledo-Palacios, S González-Sotelo, OR Pérez-Nieto,
AS Henales-Ocampo

**Traumatic Rhabdomyolysis in Critically Ill Patients:
Current Concepts and Clinical Strategies**, J Peña-Juarez,
DE Ledesma-López, MdC García-Pantoja,
J Beauregard-Mora, OR Pérez-Nieto, E Deloya-Tomas





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Introduction

“It’s not enough to keep people from dying. We have to save the life they want to return to, the one they had before they came to us.” - Mary Ann Barnes-Daly (Critical Care Nurse)

The Intensive Care Unit (ICU) is a complex area of critical care that depends on advanced technology and a team of highly trained professionals, including intensivists, nurses, respiratory therapists, and other specialised staff. These individuals work together to monitor patient status

Humanising the ICU Through Thoughtful Design

As advanced technology increasingly plays a role in monitoring critical biometrics and assessing care, sometimes in favour of personalised interventions, machines can overshadow the patients they are meant to support. Individuals arriving in the ICU often lose their choice, control, and ability to communicate. This paper explores ways to humanise the ICU experience through thoughtful design and communication that focuses on the person within the patient.

and perform vital, life-saving procedures with efficiency, accuracy, and compassion.

As remote monitoring technology evolves and we increasingly rely on machines to enhance critical patient care, this technology can sometimes overshadow individual patients. The gap between focusing on patients’ clinical metrics and recognising the person behind those metrics, who may be unable to express their fears, confusion, pain, or wishes, can significantly negatively impact their healing process in the ICU and even after they leave the unit.

This paper highlights how the built environment’s design and communication modes significantly influence patient outcomes. It also provides design strategies and actionable items to address these challenges.

The Human Factors of the ICU

*“Illness is the night side of life, a more onerous citizenship. Everyone who is born holds dual citizenship, in the kingdom of the well and in the kingdom of the sick. Although we all prefer to use the good passport, sooner or later, each of us is obliged, at least for a spell, to identify ourselves as citizens of that other place.” — Susan Sontag, *Illness as Metaphor**

An intensive care unit (ICU) is a complex environment characterised by productive tensions and interactions among patients, their care teams, and the ICU setting. Achieving a delicate and crucial

balance between providing urgent care and sustaining human life is essential. Healthcare professionals are driven by a strong desire to help patients in critical need. In contrast, patients and their families rely on the skills and professionalism of the care system to navigate their challenging health journeys. Ultimately, the goal is for patients to regain their health and well-being with dignity and again hold and enjoy the ‘good passport’.

ICU [Eye: See: You]: Seeing and Feeling the Person Within the Patient

“Patients don’t care how much you know until they know how much you care,” — Theodore Roosevelt.

The vision of humanising the ICU—ethically, practically, and experientially—does not suggest that physicians (intensivists), nurses, respiratory therapists, and other specialised staff are not already making efforts to humanise care, nor does it imply that the ICU is not designed to save and sustain lives humanely. Instead, it focuses on enhancing the patient experience and care in ways that honour their dignity, individuality, and autonomy.

The Hippocratic Oath serves as a foundation for ethical practice, emphasising the importance of patient care, respect for life, and confidentiality. However, humanising suggests that the traditional biomedical model of care can be further enriched

through interdisciplinary innovation. This approach, which is already yielding promising results in healthcare design, highlights the value and integral role that healthcare professionals, the environment, and patients play as co-designers in the process.

The healthcare sector is rapidly evolving with advancements in technology, particularly the rise of Artificial Intelligence (AI). This technology has a significant impact on decision-making and enhances patient engagement. However, as beneficial as these advancements are, healthcare must ensure that they do not come at the expense of human experiences.

The design of healthcare environments such as the ICU should prioritise human experiences, recognising how patient surroundings influence behaviour. It is well-established that elements such as lighting, colour, and natural views, when thoughtfully incorporated, can affect mood, lower anxiety, and enhance psychological well-being. These factors can promote feelings of vitality, support recovery, and help reduce post-traumatic memories.

This understanding of these relationships has led to incorporating the humanities within the sciences and innovative contributions to healthcare design. Notable thinkers in this field include those who study phenomenology, which examines consciousness and direct experiences (e.g., Aho and Aho 2008; Merleau-Ponty 1962; Crossley 2012; Pallasmaa 2012; Day 2017; Bachelard 2014). Additionally, neuroaesthetics explores how the brain perceives and responds to beauty and artistic expressions, such as colours, music, and art, which can alleviate anxiety, depression, and physical symptoms like high blood pressure and respiratory issues. These experiences can trigger the release of neurotransmitters like dopamine, serotonin, and oxytocin (Zeki et al. 2025; Ulrich 1984; Magsamen and Ross 2024).

Solutogenesis focuses on what makes people healthy (Antonovsky 1979), while biophilia highlights the restorative benefits of nature and living organisms. Engaging with nature can shift the brain into a

state of soft fascination, and even brief, 40-second views of greenery have been shown to gently stimulate sub-cortical arousal (Basu et al. 2019; Lee et al. 2015). These diverse concepts underscore the importance of integrating such insights into healthcare design.

These novel interventions have provided much-needed introspection, enhancing healthcare's understanding of environment-behaviour relationships. As healthcare environments require greater sensitivity in accommodating the range and diversity of human experience, it is crucial to remember that how patients experience the ICU along the continuum of care can also affect post-recovery. This patient-centred and patient-directed approach should always be at the forefront of our efforts, fostering empathy and a deep understanding of the patient's journey.

Productive Tensions in the ICU

Can rational thinking coexist with empathy (matters of the heart)?

Dr E Wesley Ely, a critical care pulmonologist and a Professor of Medicine at Vanderbilt University Medical Center, talks about re-humanising (Ely 2021) the ICU as a renewed commitment to humanism in medicine. "Re-humanising" means restoring the focus on the human aspects of care, such as empathy, understanding, and respect, alongside the technical aspects. However, the healthcare community must acknowledge and address the productive tension that exists between patients and caregivers when adopting a humanistic approach in the ICU.

Phenomenology suggests that humans are not merely passive recipients of reality but active agents who shape their understanding of the world through interactions and experiences. However, when patients are seriously ill and in urgent need of intensive care, their active participation can shift to a state of passive witnessing—in this situation, choices, control, independence, and autonomy often become secondary to the urgency of care, leading to feelings of fear, anxiety, confusion, and

disembodiment (a decoupling of mind from body). In this prolonged state of vulnerability, the desire to recover is often the only defensible position. Furthermore, patients may find the idea of being reliant on machines menacing, as they feel they have little control over their bodies and mind, with decisions increasingly dictated by data metrics.

Conversely, for healthcare professionals—intensivists, nurses, respiratory therapists, and other specialised staff—adopting a humanistic perspective while maintaining high performance levels with little margin for error means that the concept of control is felt to be fundamental and necessary. It is perceived as essential for maintaining clear reasoning and taking decisive action, allowing them to make critical decisions in crisis situations. As Hawryluck (2025) noted, "It is only when a person is fully under our control and responding to our attempts to stabilise their illness that we feel some degree of comfort, some degree of release from anxiety and stress, and some ability to relax."

These contrasting human factors lead to a fundamental question: Can rational thinking and empathy (matters of the heart) coexist to benefit patients and caregivers? Can thoughtful design help mediate these productive tensions, resulting in positive experiential outcomes for both groups?

The Efficacy of Design Thinking in the ICU

Why would you design something if it didn't improve the human condition? — Niels Diffrient

Medicine is described as both an art and a science. This duality also applies to the design of healthcare environments. The art of design, is a reconceptualisation from form-following function to form-following feeling, recognising the role of lived experiences (psychological, physiological, behavioural, or emotional) that has provided insight into human reactions to stimuli while optimising or reducing environmental stressors for patients include lighting, noise and thermal

comfort, which can also impact staff. If the physical environment is stressful, the patient at the centre of this environment cannot relax, trust, heal, or understand what is happening to them. By decreasing stressors, the environment will be better suited to pick up on subtle non-verbal communication.

Adopting design thinking considerations for the ICU could be a powerful tool in a) understanding and aiding the patient experience, especially providing forms of control for mediating or communicating physical or psychological discomfort or pain, b) improving the physical environmental aesthetic, and c) enhancing positive outcomes and human flourishing beyond the ICU theatre and post-recovery.

The following provides examples of the efficacy of design interventions to aid communication between patients, medical professionals and the physical environment in the ICU.

Lighting

Lighting in intensive care units plays a crucial role in supporting both patient recovery and staff performance. Jonescu et

al. (2025) states that inadequate or poorly managed lighting has been associated with disrupted circadian rhythms, leading to poor sleep quality, which can delay physiological healing and extend recovery times. Suboptimal lighting conditions also impair clinician performance, compounding the negative effects on patient care. To counter these issues, it is recommended that daytime light levels in ICUs reach 1000–2000 lx to align with natural circadian patterns, while nighttime illumination should be kept below 30 lx to promote restful sleep (Jonescu et al. 2025). Access to natural light should be a priority for all inpatient rooms, secondary to this would be tunable artificial lighting that mimics the natural sequence of light through the day.

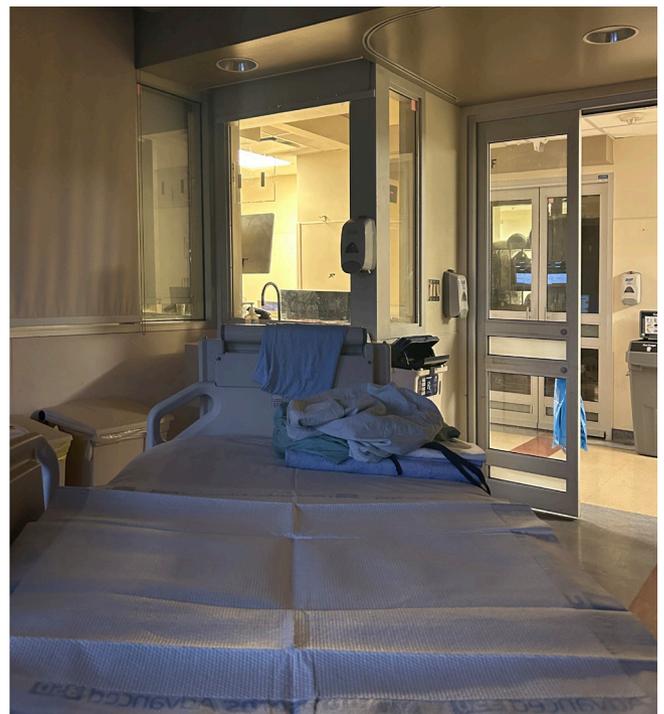
There are several ways to improve lighting conditions in an existing ICU that better support the patient's circadian rhythm:

- At night, consider how the corridor lights and well-lit staff station affects the patient's ability to sleep. Put in place policies to dim corridor lights or close privacy curtains at night, where possible.

- Use low level red or amber night lights in the room which are less disruptive to the patient's sleep cycle than leaving ceiling lights on.
- Include dimmable task lighting that the family/guests can use, away from the patient zone so that it doesn't disturb the patient if they're sleeping.
- Incorporate overbed light control into the nurse call/pillow speaker so that patients who are able, can adjust their own lighting environment.

Design strategies that should be incorporated in a more significant renovation to improve the patient environment include:

- Maximise access to natural daylight through windows that include automated shading systems that manage glare and light exposure.
- Include a tunable white lighting system or circadian lighting that automatically adjusts the colour temperature and brightness to mimic the natural progression of sunlight—from the cool, bright light of morning to the warm, dim light of evening, to support the patient's circadian cycle



Images 1 and 2. Left Image: Day image of view from the patient bed. Right image: Night image from the patient bed showing how much light spills in from the corridor and staff charting station. Image Credit: Dr Laura Hawryluck, 2025.

- Where windows are not possible consider installing an artificial skylight.

When selecting new equipment, priority should be given to companies that provide screens that can be turned off when the patient is resting and have remote monitoring with wave activation technology. Equipment with an 'on' light should be directional, glowing down and not out into the patient's view and the LED light should mimic circadian flow from blue in the morning to red or amber in the evening. The 'on' light should have an off switch for when the patient is resting.

Noise Reduction

Noise is a persistent challenge in ICU environments, often disrupting patient rest and negatively impacting recovery. The cumulative effect of noise disturbances, particularly during admissions or procedural transitions, can contribute to longer hospital stays and decreased patient satisfaction. These disturbances are not only detrimental to patients but also impair concentration and performance among healthcare staff, indicating a need for targeted acoustic interventions (Jonescu et al. 2025). Efforts should be made to educate staff and families about the negative effects of noise levels on the unit and provide actionable solutions to lowering noise levels while maintaining effective communication.

Strategies to support a quieter and more healing ICU environment in an existing facility could include:

- Change older or poor quality acoustic ceiling tiles with highly absorptive versions in the corridor and at staff charting areas to reduce corridor noise that filters into the room.
- Implement unit-level policies such as designated sleep-protected time and reducing the use of overhead paging by using hand-held devices to contact staff instead.
- Install a noise-monitoring system that indicates when noise reaches above a certain decibel for day and for night. Training and participation of all staff is required.



Image 3. The blue light emitted by most equipment impacts the patient's circadian rhythm and their ability to sleep and heal. Consideration should be given to selecting equipment with screens that can be dimmed or turned off at night. Image Credit: Blue Light by Kiryl Lis/Adobe Stock.

- Choose equipment that has a volume setting for alarms. When the patient is sleeping, alarms should ring directly to a nurse and nurse station, rather than in the room.

When undergoing a more significant renovation:

- Consider noise levels when selecting HVAC systems and integrate building management systems for real-time monitoring of equipment noise.
- Install sound masking systems to reduce the impact of disruptive sounds.
- Select medical equipment with adjustable noise volumes or alarms that can be turned off in the room and monitored remotely.

Thermal Comfort

Thermal comfort is another critical environmental factor influencing outcomes in the ICU. Inappropriate temperature settings have been shown to increase patient stress, reduce psychological well-being, and compromise overall satisfaction with care (Jonescu et al. 2025). Optimal thermal conditions support sleep quality and are essential for recovery processes. Additionally, poorly regulated temperature can

degrade working conditions for clinicians, adding strain and reducing efficiency. To address these concerns, it is recommended that HVAC systems allow for precise temperature and humidity control, as well as the use of smart thermostats equipped with occupancy sensors to maintain ideal conditions automatically (Jonescu et al. 2025). As facilities age, HVAC systems require continual maintenance and prompt replacement to meet the thermal needs of the patients and staff.

When renovations or new builds are being considered, consultants and clinicians should determine the thermal needs of all occupants. Occupancy sensors in patient rooms where the patient is immobile may not be ideal but occupancy sensors in staff areas could be beneficial. Priority should be given to HVAC control systems that give choice and control back to the patient and their families, such as an adjustable thermostat in the patient room. These design considerations are integral to creating ICU environments that are comfortable, supportive, and conducive to healing.



Images 4 and 5. Left image: A standard ICU room which, typical of its age, lacks patient-focused design features. Right image: The patient's view from the bed looks straight up into a light and offers little comfort or interest for alert patients. Image Credit: Dr Laura Hawryluck, 2025.

Biophilia as a Healing Tool

As early as 1984, research by Roger Ulrich illustrated that surgical patients with views of nature had shorter postoperative stays, took less pain medication, and experienced fewer minor postoperative complications than those with an urban view. And yet, many ICUs continue to be designed without significant thought to the patient experience and how biophilia can support patients' healing. Particularly in older ICUs, patients may spend a significant amount of time in a windowless room with no ability to sense the time of day, largely hidden behind medical equipment, and with nothing but beige or white walls and ceilings around them.

The role and effectiveness of biophilia, which involves viewing and immersing oneself in natural environments and its restorative benefits, are well documented in Attention Restoration Theory (ART) Basu et al. (2019). This theory describes a way of engaging with natural settings, such as gardens, forests, or green spaces, that do not require sustained concentration or cognitive effort. The restful qualities of these environments help counterbalance the stress associated with managing demanding tasks. This benefits both caregivers, who can use micro-breaks to mitigate stress and burnout, and patients, to reduce negative thoughts and emotions,

ultimately fostering a sense of calm and well-being that can promote faster recovery.

It's crucial to emphasise that biophilia benefits both patients and caregivers under stress. Biophilic interventions provide essential moments of respite and recovery, reducing burnout and fatigue.

When considering the complexities of biophilic interventions in sterile environments, it's important to note that biophilia can still be effective when optimised for exterior visual engagement. A study by Lee et al. (2015) highlighted the positive impacts of 40-second views, sustained attention and restoration. For example, green roofs and interior designs that prioritise fenestration—the arrangement of windows and doors on a building's facade—can enhance the experience of natural light, which offers health-promoting benefits. Additionally, an appreciation of the passage of time may help alleviate forms of delirium and disconnection during prolonged ICU recovery.

Even small adjustments can help improve the patient environment without significant renovation:

- Paint a wall the patient can see from the bed in an accent colour.
- Install a large biophilic/nature image on an existing wall in the patient's field of vision. This can easily be printed on

vinyl and installed over a light-coloured drywall wall.

- Give the ability to personalise the room by having family upload images to the TV screen (placed where the patient can see it) or select music played in the room.
- Include a large high-contrast analogue clock positioned so the patient can see it. If a digital clock is required for staff use, locate it behind the patient's head so the lit display won't impact the patient's sleep cycle.
- When updating the room's finishes, use biophilic and wood-look materials where possible since they have a positive impact on not only the patient's well-being, but also family, visitors and staff.

Supporting Patient, Family and Visitor Engagement

Families and visitors play a vital role in the ICU communication ecosystem. When patients are nonverbal or cognitively impaired, support persons can offer essential context and interpretation, helping healthcare providers better understand subtle cues or pre-existing communication preferences (Jonescu et al. 2025). Including families in communication and care decisions reduces their anxiety and

strengthens trust in the healthcare team. Establishing consistent, open communication can help align expectations and reduce the likelihood of confrontation. Moreover, involving family in the adoption or selection of assistive communication tools may also improve usage rates and empower relatives in the care process (Yavuz and Gursoy 2022).

To ensure that family and visitors are comfortable and encouraged to stay, these are some design features to consider:

- Include guest furniture that is comfortable and folds out into a sleep surface to allow guests to nap or stay the night, if the facility permits. Provide electrical outlets in the family zone for personal electronic device charging.
- Include dimmable task lighting that family can use when the patient is resting and room lights are dimmed.
- Include a family nourishment area where familiar foods can be stored for the family and the patient. Discussion with the IPAC team during design will determine if these family areas can be inside the room or if a nourishment alcove in a family area can be provided outside the direct patient care area. This area could include comforts such as an ice and water dispenser, microwave, fridge and toaster.

Once patients have recovered from their initial crisis, many will also benefit from simple infrastructure that helps make their stay more comfortable while they remain in the ICU on life support:

- Provide outlets next to the patient so that they can plug in their personal electronic devices. Some patients may want to use an iPad or phone to watch movies or shows, FaceTime, or text.
- For those that are able to read, provide focused task lighting that doesn't create glare.

Communication

Communication with ICU patients, particularly those who are voiceless due to intubation or sedation, remains a critical

but often underdeveloped area of clinical care. Many ICU patients are unable to speak, leading to heightened isolation and emotional distress (Happ et al. 2011; Jonescu et al. 2025). Positive ICU team behaviours, such as making eye contact, using gestures, addressing patients by name or touch, and asking open-ended questions, can significantly improve patient experience, while negative behaviours like mumbling, speaking too quickly, or failing to gain attention can worsen communication barriers (Happ et al. 2011). Despite the prevalence of nonvocal indicators like facial grimaces or vital sign fluctuations, ICU team members often struggle to accurately interpret these signals as expressions of pain or discomfort or to understand what the patient is trying to say or request, leading to significant frustration (Happ et al. 2011).

Assistive tools such as communication boards, printed cards, and computer-based systems like AyMeSES or CommuniCare ICU are increasingly available and can dramatically improve interaction quality and efficiency (Yavuz and Gursoy 2022). Yet, these tools are underutilised, and writing was observed in fewer cases than expected, with no communication boards in use in the Happ et al. (2011) study. Happ et al. (2011) found that the care team often failed to use facilitative strategies such

as repeating patient responses, offering communication choices, or suggesting alternative communication methods, skills that can be easily taught. Implementing multilevel interventions, including assistive materials, staff training, and technology, has shown promise in improving communication frequency and success rates among nonspeaking patients (Happ et al. 2011).

Staff Communication Practices

Effective interprofessional communication is crucial in the ICU to ensure high-quality care, team cohesion, and emotional resilience among staff. ICU clinicians frequently operate in high-stress conditions where miscommunication can lead to clinical errors or interpersonal strain. Vincent (1997) identifies several core communication strategies including: working as a team, be simple, make time, instil confidence, accept lack of trust, be honest and tell the truth, and employ educational tools that can relieve stress in a frequently intense working environment. Educational tools for inter-staff communication should be taught in medical and nursing schools as this would assist in facilitating contact with patients and their families (Kleinpell 2014). Communication teachings need to be reiterated, built upon, and frequently discussed so the team has current knowledge and understanding of what is expected



Image 6. A modern ICU room that includes biophilic materials, windows with views from the patient bed, circadian lighting, memory/communication features, and comfortable furniture for family & guests. Rendering by Cumulus Architects, 2025.

of them, and what to expect from each other. Good communication between all members of the team including ICU staff, patient, and relatives, can avoid unnecessary confrontation, and can help to focus efforts on achieving the best possible outcome for all.

As technology advances, the ease of relying on digital communication has potential negative effects on multidisciplinary team connection and cohesion. In stressful situations, the team needs to work together and communicate efficiently. A balance is required for in-person and digital communication to connect the team. Regular communication audits and the use of protocols may help embed these practices into daily routines (Jonescu et al. 2025). There are a variety of technologies like AyMeSES and other digital applications that offer scalable solutions for improving communication efficiency and accuracy across teams (Yavuz and Gursoy 2022). The best-interest of the patient should be top of mind when choosing a digital communication system.

In order to support patient, family and staff communication we would recommend:

- To support staff interaction - provide a screen to cue staff of the patient's name, photos, and identify some of their interests (as provided by family/visitor) to help staff identify the patient as a person. This will help remind staff to greet the patient by name and reference a topic of interest (i.e. gardening, dogs, etc.), particularly if patients are able to speak.
- To support the patient and their family - provide a patient/family communication screen in the patient room with names and photos of staff that routinely treat the patient as a memory-aid for patients. This can be achieved through appropriate software linking the hospital's data network and the screen in the patient room. There are also smart technology systems that exist that could identify staff by their badge as they enter the room, but this requires a significant amount of infrastructure typically found only in smart hospitals and has been

met with mixed reactions including fears of privacy and staff performance metric collection that would need to be overcome with staff.

- A patient/family communication screen could also be used to describe daily progress, health issues of concern, tests that are pending and test results, so that the patient and family feel informed.
- Consider including an area on the patient chart where staff can indicate a communication code for non-verbal patients (i.e. eye blinks or finger taps) that's been established either with the family or the patient to convey yes/no responses or pain levels so that staff on subsequent shifts can refer to it.
- Encourage family and guests to add communication techniques to a whiteboard or screen to indicate how they have communicated with the patient so a common technique can be used by all caregivers and staff.

Communication is critical to understanding. When patients and families lack understanding they experience fear, hopelessness, stress, anxiety and confusion. Implementing education for staff in finding, documenting, and practicing alternative ways to communicate to non-verbal patients will improve well-being of patients and families. If the goal of critical care is stability, comfort and ultimately wellness, that cannot occur without communication.

Conclusion

"A lot of criticism of physicians has centred on the tension between our actions and our presence. Actions are often easier than bearing witness, and, in fairness, we are taught to show we care by what we do, not by our simple presence. Yet I can attest to the fundamental truth that being present for someone who is struggling conveys a much deeper level of empathy and caring than doing, especially if the actions are done simply by rote" - Laura Hawryluck, Professor, Critical Care Medicine, University of Toronto, Canada

Humanising the ICU is not a distant vision; the possibilities are already here. According to Malnar and Vodvarka (2004) in "Sensory Design," "What if we designed for all of our senses? Suppose for a moment that sound, touch, and odour were treated as equals of sight and emotion considered as important as cognition. What would our built environment be like if sensory response, sentiment, and memory were critical design factors, the equals of structure and program?"

Innovation thrives when the collaboration between the humanities within science, facilitated by design thinking, creates endless opportunities for meaningful, holistic interactions among patients, technology, the environment, and medical staff.

Humanising the ICU involves adopting a human-centred ethos and, more importantly, empowering a human-directed approach that considers the lived experience of sickness and illness while anticipating the emotions of persons in crisis. It hears what isn't explicitly said and recognises the person within the patient, giving equal importance to the body and the mind. It also humanises technology and acknowledges that experiences of the present shape what patients and families experience and can reclaim in the future. It considers the potential of the ICU as a mobilising force to transform care and ensure well-being and human flourishing.

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Conflict of Interest

None.

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