

Wellbeing in the ICU

12 Things to Do to Improve Wellbeing in the ICU,
JL. Vincent

The Challenge of Admitting a Very Old Patient with
Sepsis to an Intensive Care Unit, *M. Ibarz, A. Artigas*

ICU Mental Health in the Ongoing Pandemic: How
Will We Be Okay? *L. Hawryluck, R. Styra*

The Essentials for a Humanised Intensive Care Unit
(H-ICU), *R. Jones-Baro, M. Martinez-Camacho, D.
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ICU is a Team Sport, *J. Darbyshire*

Compassion and Humanism in the ICU – A Clinical
Study, *S. Siddiqui, M. Hayes, A. Sullivan et al.*

Intensive Care Physiotherapists Should be
Using Point of Care Ultrasound (POCUS),
G. Ntoumenopoulos, A. Le Neindre

Top Five Priorities for a New ICU Director During
the First Year, *F. da Ramos, E. Pacheco, F. de Freitas
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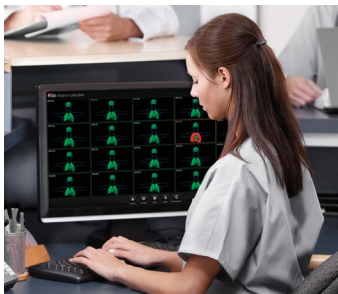
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Wellbeing in the ICU

Healthcare workers across the world have been facing significant challenges due to the COVID-19 pandemic. In particular, critical care workers have had to deal with several issues, including a surge of seriously ill patients, shortages of staff and resources, long shifts, exhaustion, risk of infection, fear of transmission to family, constant exposure to illness and the tragedy of patient deaths. In addition, they have to practice social isolation and have lost access to support from family and friends during this time. Critical care workers have also managed emotionally and ethically challenging decisions related to resource rationing and treatment provision.

There is no doubt that these factors impact the physical and mental wellbeing of critical care workers. Stress, anxiety and depression are on the rise. Burnout, which was already a problem before the pandemic, is becoming an even bigger issue. Shortage of personal protective equipment, increased workload, working in new and unfamiliar areas, and the overall stress and fatigue due to the pandemic are taking their toll on the wellbeing of healthcare workers.

In this issue, our contributors discuss **Wellbeing in the ICU**. I present an overview of strategies and measures that can be implemented to improve the wellbeing of staff and patients in the ICU. Mercedes Ibarz and Antonio Artigas discuss the challenges of managing sepsis in very old patients and the importance of early identification and treatment in this patient population.

Laura Hawryluck and Rima Styra discuss the psychological impact of the pandemic on ICU teams and provide practical guidelines to help build personal and team resilience. Robert Alexander Jones-Baro et al. provide an overview of the key elements that fall under the meaning of humanisation as part of the ICU Liberation bundle.

Julie Darbyshire highlights the importance of creating a psychologically safe workplace and the need for a shift in workforce culture and more compassionate leadership. Shahla Siddiqui et al. present findings from a clinical study on the impact and contributing factors of stress, anxiety and depression among ICU staff during the pandemic.

In our Matrix section, George Ntuomenopoulos and Aymeric Le Neindre explore the potential of point-of-care

ultrasound on clinical decision making at the bedside and the need to add it as a diagnostic tool by intensive care physiotherapists. In our Management section, Fernando Jose da Silva Ramos et al. discuss the top five priorities for a new ICU director during their first year.

It is important to support and protect critical care workers because they are our biggest assets in this battle against coronavirus. Healthcare workers also have to continue to provide care to patients who have other illnesses, and they have to do so with the same commitment and dedication. The psychological distress they are experiencing during these times requires focus and attention. It is important to address issues related to the safety of our workers and to ensure they have the support and protection they need not only for their physical wellbeing but also for their emotional and mental state.

As always, if you would like to get in touch, please email JLVincent@icu-management.org.

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(Jean-Louis Vincent)

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ICU_Management

1. Make the patient the centre of our preoccupations

This is the first principle of wellbeing in the ICU and should be written in large letters when one enters an ICU. Wellbeing must concern first and foremost the patient. The patient should be positioned, figuratively, at the centre of the ICU room, with the focus of all members of the ICU team, including close friends and relatives, directed towards them. The purpose of this whole team is, after all, to improve the patient's health and wellbeing, both physical and mental, remembering that good end-of-life care is an important aspect of ensuring patient wellbeing; not all patients will survive, but non-survivors must be allowed to have a dignified death (Figure 1).

2. Use the full potential of bedside rounds

Attending rounds for just 10 minutes can give a good overall impression of the quality of patient care on that ICU and of staff wellbeing. Rounds need to be instructive and effective. They should focus on relevant, new information, using terms that everybody, patient and family included, can understand. Rounds should be conducted at the right pace: not wasting time, but not rushing either; offering some teaching, but not too much as time is limited. The same historical elements of a patient's course do not need to be repeated every day. To improve efficiency, presentations should be structured, using a problem list and considering aspects of the SOAP construct: Subjective (how the patient feels), Objective (relevant clinical and other data, including consultant's opinion), Assessment (putting everything together), and of course Plans (where to go next). Communication within the ICU team should be

12 Things to Do to Improve Wellbeing in the ICU

An overview of strategies and measures that can be implemented to improve wellbeing of staff and patients in the ICU.

amicable and effective, with only one person speaking at a time. Bedside rounds are an occasion for all team members to express their opinion about a patient's care or management so that a coherent plan can be formed. People should look forward to the rounds, be prepared and be happy to participate.

3. Have good leadership

A good leader is essential to build and support an effective team. A good leader needs to be open-minded, enthusiastic, supportive and pleasant, but not really a friend. A good leader should not avoid conflict but be able to recognise it early and act rapidly and fairly to resolve it and prevent escalation. A good leader is readily available and accessible to talk about any work-related subject, including errors or hard feelings. He/

she should choose associates who are confident in their position and good team players. Being able to effectively delegate responsibility is important; doing everything oneself is not justifiable or sustainable and will make others feel inadequate. However, delegating does not mean abrogating all responsibility; the leader remains in overall charge of the team.

4. Include family members and close friends as part of the team

Relatives and close friends are often better placed than the ICU staff to identify problems such as delirium or behavioural changes. They can provide comfort and limit the need for restraints: it is so much better to feel the hand of your loved one on your arm! Visiting hours should be quite open as there

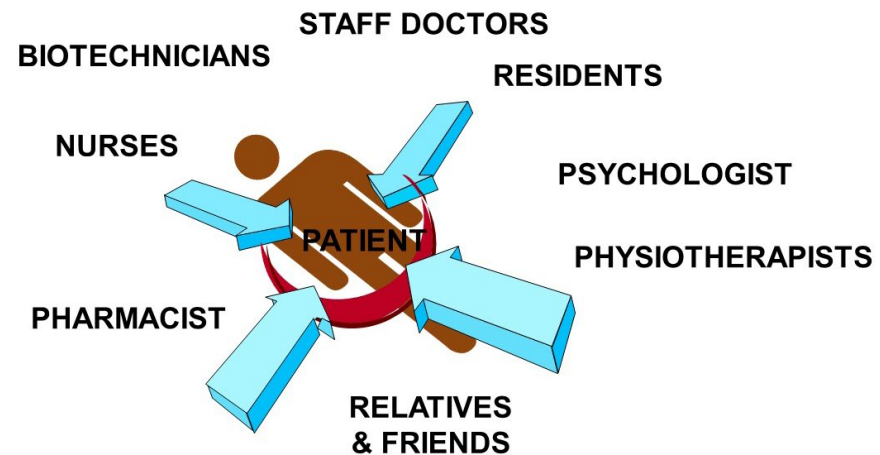


Figure 1. The patient should be at the centre of our preoccupations

early Comfort based first on Analgesia with no or minimal Sedation and always maximal Humanised care

Figure 2. The eCASH concept

is no reason to restrict them if everybody understands their rights and limitations. Relatives need to be happy with their relationship with the healthcare professionals looking after their loved one. This does not mean they are your friends and can do anything they want; family members must understand the rules. Make time to meet and talk with relatives; poor communication with family members can create bad feelings and conflict.

5. Discuss ethical decisions openly

End-of-life issues should be openly discussed and involve all team members, and the relatives and patient when possible. Making such difficult decisions using a consensus approach will help everyone feel more comfortable with the ultimate decision. Younger staff members must be encouraged to participate as this is an essential part of their training. Obviously, the autonomy of the patient should be respected whenever possible: remember principle number one above.

6. Discontinue interventions that are no longer needed

Once started, interventions are sometimes continued almost as routine, but the real necessity for any measure must be

regularly reconsidered. Antibiotics should be stopped on time; catheters, endotracheal tube, and drains should be removed as soon as they are no longer needed. Even bed rest should be abandoned whenever possible. This does not mean that less is always better, just that the need for all interventions should be carefully and regularly re-evaluated. Feeding, ECMO,

haemodynamic monitoring to guide cardiovascular support, blood transfusions, etc., must be given when needed, but not continued without good reason. The benefits must be repeatedly weighed against the risks for every intervention in every patient.

7. Use monitoring judiciously

As with interventions, the need for monitoring should be carefully considered and revised regularly. One should only monitor what needs to be monitored to ensure optimal care for that patient. Monitoring equipment can be frightening for the patient and their relatives and reduce patient mobility. It can also be distracting, with staff members focusing on the monitors rather than the patient. Some monitoring is, of course, required to ensure therapies are targeted appropriately for the individual patient - this is personalised medicine. For example, the use of fixed tidal volumes of 6 ml/kg of ideal body weight for all patients with acute respiratory failure, of X mL/kg of crystalloids over 1 or 3 hours in all patients with septic shock, or of vasopressors to target a mean arterial pressure of 65 mmHg in all patients is too simplistic as requirements can vary substantially from one patient to the other.

- | | |
|----------------------------|---|
| - Feeding | YES/NO – how many calories? |
| - Analgesia | Not too much? |
| - Sedation | Can we stop it? |
| - Thrombosis prophylaxis | Unless contraindicated |
| - Head of the bed elevated | Unless contraindicated |
| - Ulcer prophylaxis | Unless contraindicated |
| - Glucose levels | How much insulin? (long-acting preferred?) |

Figure 3. The FAST HUG checklist

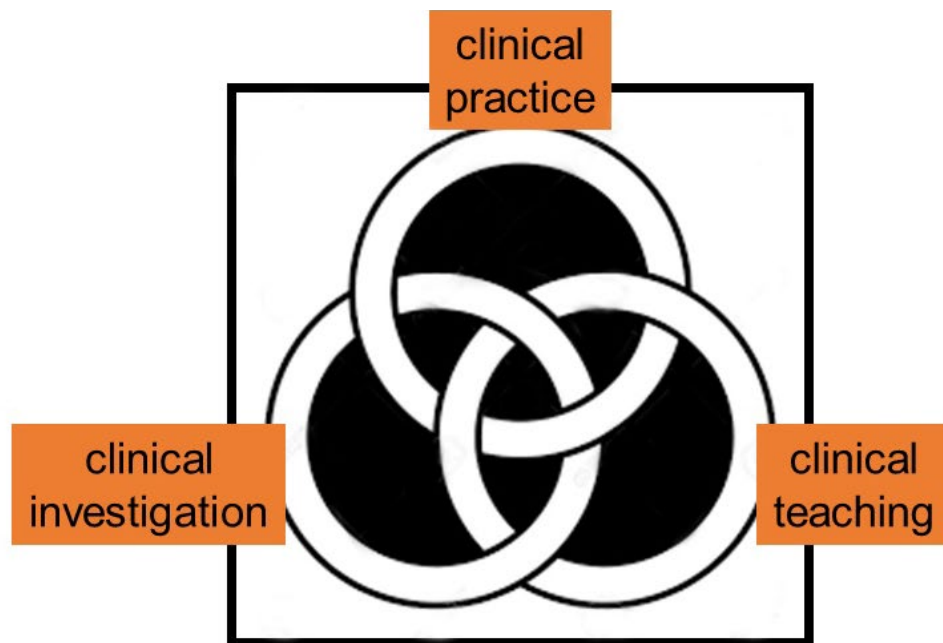


Figure 4. The trio of activities for the ideal ICU

8. Minimise or avoid sedation as much as possible

Sedation is more often prescribed for staff comfort than for patient comfort, which is in direct opposition to the number one rule for patient wellbeing. The principle that patients who are treated with mechanical ventilation should be routinely sedated to 'keep them comfortable' (as is commonly argued) is incorrect. The same applies to patients in shock, ignoring the fact that these patients are typically obtunded and that all sedative agents have unwanted haemodynamic effects. The eCASH rule (Figure 2) should be applied, emphasising good pain control and replacing 'comfort' sedation with humanised care.

9. Encourage patients to mobilise

How many patients are out of bed or even out of their room in your ICU? Patients on mechanical ventilation and even on

ECMO can be helped to move around, taking their machine with them. Even those who are bedridden can be taken outside (weather permitting). Importantly, all members of the team need to be persuaded that this approach is good for the patient, not only physically but also mentally - this is not something that should be forced. If the team members are not convinced of its value, the patients will not be encouraged to try either.

10. Don't replace intelligent care with protocolised care

Protocols can be helpful to facilitate patient management. However, some variability in the care of the acutely ill is necessary as no two patients are identical. Excessive protocolisation may reduce the intellectual aspect of ICU care, the need and ability to reflect and adapt treatment to the individual. This effect may also limit the attractiveness of intensive care

medicine to doctors and other healthcare practitioners, which could result in a vicious cycle, with fewer trained professionals leading to the use of more protocolised care to replace human input, resulting in the need for fewer staff members, and so on. Humans can sometimes forget important things, especially in the complex environment of the ICU, and simple checklists like the FAST HUG mnemonic can be useful for this purpose (Figure 3).

11. Ensure your ICU activities include the trio of clinical practice, teaching and research

Clinical practice is the most obvious aspect of critical care medicine and must be of high quality for patient and staff wellbeing. Quality of care must be audited regularly and if not good enough in one or more areas, plans put into action to improve it. Clinical teaching at the bedside is essential as it provides the optimal means of understanding the mechanisms of disease and the rationale for management in individual patients. Bedside teaching helps improve the knowledge of all the ICU team members, which will benefit current and future patients. Finally, clinical research must not be forgotten and is not limited to large university hospitals. Multicentre studies can involve all hospitals, and small studies can be conducted almost everywhere. Importantly, clinical research does not always lead to publications in major journals but is a way of helping people to be rigorous and to question a variety of aspects in the management of the critically ill. This can only be good for patient and staff wellbeing (Figure 4).

12. Smile!

I like to look at the faces of staff members when I enter an ICU for the first time. This is a good quality indicator: happiness at work creates motivation and a good atmosphere. People who feel good can provide better quality care with less stress. People should be happy to be at work to do their best to help others - this is the essence of critical care medicine.

Conflict of Interest

None. ■



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Moderator
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Nowadays, we are facing some important facts: there has been a global increase of sepsis worldwide over the last decades (Rudd et al. 2020; Angus et al. 2001), sepsis-related mortality and morbidity are major healthcare problems (Fleischmann et al. 2016; Duganiet al. 2017) and the proportion of very old patients with sepsis is increasing substantially in our hospitals due to ageing of the population (Martin et al. 2006; Ferrer et al. 2008; Flatten et al. 2017; Fernando et al. 2019). The incidence of sepsis increases with age, up to 67% of septic patients are aged > 65 years, with a particular relevance in subjects ≥80 years (Lee et al. 2018). Consequently, sepsis represents 10-14% of intensive care units (ICUs) acute admissions in very old people (Ibarz et al. 2020).

Nevertheless, despite the increased trend in incidence, observational studies have reported a decrease in mortality associated with severe sepsis (Fleischmann et al. 2016). In Spain, a large retrospective analysis of a 5-year period (2008–2012) in patients hospitalised with sepsis reported a yearly increase incidence of 7% while a relative annual reduction in length of stay and in-hospital mortality of 3.3% and 3.4% respectively (Yébenes et al. 2017). In a nationwide

The Challenge of Admitting a Very Old Patient with Sepsis to an Intensive Care Unit

Sepsis incidence in very old patients is high and related mortality and morbidity are a major health concern. Frailty and severity of illness, not just age or sepsis diagnosis, are the determinant factors in outcome. Early identification and treatment are decisive in their survival.

study in Taiwan, sepsis admissions increased from 4% (2002) to 9% (2012) while in-hospital mortality rate decreased from 24% to 14.8%; and this decrease was similar in adult, elderly and oldest old groups (Lee et al. 2018). In an Italian general hospital, case fatality rate in sepsis decreased particularly in subjects ≥80 years (Fabri et al. 2019). A quick and aggressive resuscitation plan has proven to reduce mortality in sepsis patients, not only in young ones but also in those that are usually considered for a less-intense treatment which includes our very old patients.

Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection (Singer et al. 2016). It can be lethal, but it is a continuum of disease severity and it is treatable. An early identification and timely implementation of targeted interventions improves outcomes (Seymour et al. 2017). The World Health Assembly has urged member states to strengthen efforts to identify, document, prevent and treat sepsis (Reinhart et al. 2017).

Sepsis in the Oldest Old

I am called to the emergency room to assess a patient with sepsis. The patient is an 82-year-old man with a presumed urinary tract infection. He was discharged from hospital one month ago with a permanent urinary catheter for haematuria. He lives with his wife, his cognition is adequate for his age, he goes out with his wife to do some shopping and takes care of the usual monetary affairs. He has some comorbidities (hypertension, cardiac insufficiency, arthritis, hypoacusis) but all of them are well controlled. He takes four medications. On physical exam, he is stuporous, hypertensive and tachypnoeic. His analysis shows elevated acute phase reactants, mild

kidney failure and mild hypoxaemia. **Has he got a sepsis? Should I admit him to the ICU? Would it be useful? What are his and his wife's preferences? Which items should I consider?**

The risk of dying from sepsis increases considerably with age; hospital mortality for patients >80 years of age is almost twice that of patients ≤ 50 years of age (Kotfis et al. 2019). A systematic review, including 18 studies and 4256 patients aged ≥ 80 years admitted to the ICU with sepsis reported mortality rates of 43% in the ICU, 47% in the hospital, and 68% 1 year after ICU admission (Haas et al. 2017). In a recent prospective, observational, multicentre study (Ibarz et al. 2020), ICU and 30-day mortality were 28.4% and 42%, respectively.

Early identification and treatment of sepsis are the major challenges in treating sepsis in our very old patients. First, they are at particularly high risk of developing sepsis due to pre-existing comorbidities, impaired immune function (immunosenescence), sarcopenia, decrease in reserve capacities related to ageing, and very often malnutrition and polypharmacy. Second, the oldest old often present nonspecific signs of infection, and clinical diagnosis of sepsis is usually more difficult. Confusion or falls can be the only sign; heart failure and arrhythmias are frequent, and differentiating infection from congestive heart failure can be difficult. On the contrary, few of the signs usually associated with sepsis are present; fever is absent in approximately 40% of older adults with infection. Third, emergency physicians are unlikely to refer octogenarian patients to the ICU and intensivists are reluctant to admit them due to the high morbidity and mortality and limited resources. Last but not least, we cannot forget to ask about the preferences of patients/relatives

Clinical Frailty Scale



1 Very Fit – People who are robust, active, energetic and motivated. These people commonly exercise regularly. They are among the fittest for their age.



2 Well – People who have no active disease symptoms but are less fit than category 1. Often, they exercise or are very active occasionally, e.g. seasonally.



3 Managing Well – People whose medical problems are well controlled, but are not regularly active beyond routine walking.



4 Vulnerable – While not dependent on others for daily help, often symptoms limit activities. A common complaint is being "slowed up", and/or being tired during the day.



5 Mildly Frail – These people often have more evident slowing, and need help in high order IADLs (finances, transportation, heavy housework, medications). Typically, mild frailty progressively impairs shopping and walking outside alone, meal preparation and housework.



6 Moderately Frail – People need help with all outside activities and with keeping house. Inside, they often have problems with stairs and need help with bathing and might need minimal assistance (cuing, standby) with dressing.



7 Severely Frail – Completely dependent for personal care, from whatever cause (physical or cognitive). Even so, they seem stable and not at high risk of dying (within ~ 6 months).



8 Very Severely Frail – Completely dependent, approaching the end of life. Typically, they could not recover even from a minor illness.



9 Terminally Ill – Approaching the end of life. This category applies to people with a life expectancy <6 months, who are not otherwise evidently frail.

Scoring frailty in people with dementia

The degree of frailty corresponds to the degree of dementia. Common **symptoms in mild dementia** include forgetting the details of a recent event, though still remembering the event itself, repeating the same question/story and social withdrawal.

In **moderate dementia**, recent memory is very impaired, even though they seemingly can remember their past life events well. They can do personal care with prompting.

In **severe dementia**, they cannot do personal care without help.

emptying is slowed, glomerular filtration rate is decreased, and they have a reduced lean body mass, increase body fat, and a decrease in serum albumin which could cause increases in serum levels of drugs.

Risk Factors and Frailty

Some risk factors for mortality and morbidity in old patients with sepsis have already been identified and published: frailty, pre-existing co-morbidities, pre-hospitalisation dependency, presence, and severity of acute organ failure (SOFA), non-surgical status and prompt adherence of the bundles, in particular to the resuscitation bundle.

Frailty is present in approximately 40% of old people admitted to intensive care units and it is independently related to mortality and morbidity (Fernando et al. 2019; Flatten 2017; Guidet 2020). The term clinical frailty applies to a state or syndrome of reduced physical, physiologic, and cognitive reserve (Clegg et al. 2013). It is not an exclusive condition of old-aged people, but its prevalence increases with age being 25% of those over 65 years and over 50% in patients > 80 years. Frail patients are characterised by weakness, diminished motility, reduced muscle mass, decreased cognitive function and poor nutritional status in different intensity. Their capacity to respond to disease is diminished due to a failure of compensatory mechanisms to extrinsic stressors. If we consider frailty as a syndrome, it will be composed of several items: sarcopenia, changes in endocrine system, altered cognition, and immunosenescence.

Sarcopenia is defined as the age-associated loss of skeletal muscle mass which means less protein reserves. It could be more or less evident in daily life but definitely increases post-ICU neuro/myopathy and the days to wean from ventilator. As a consequence, this contributes to a longer ICU and hospital length of stay with increased morbidity and mortality. Many factors are associated with sarcopenia. Changes in endocrine system associated with ageing as higher concentrations of cortisol, a decreased level of testosterone and a decrease of growth hormone affect the normal function of muscle, tissue, and bone.

Regarding cognition, there is a loss of neurons with age mainly in hippocampus, which is related to cognitive decline and dementia. A common complication of critical illness is an increase in psychological symptoms, sleep cycle alterations, delirium, and cognitive impairment. Delirium is an independent risk factor associated with mortality.

Figure 1. Clinical Frailty Scale. Source: Rockwood et al. 2005. Permission to use this scale was granted from Dalhousie University.

and be honest about our patient's possibilities of recovering when establishing a plan of treatment.

The overall management of sepsis is similar for everyone (Rhodes et al. 2017; Levy et al. 2018), regardless of the age of the patient. It focuses on prompt recognition, early treatment with broad-spectrum antibiotics, control of infectious sources and resuscitation with intravenous fluids and vasopressors for patients with low blood pressure or elevated lactate. However, we should consider a few specific items in the oldest old. They have a lower cardiac compliance, and the renal perfusion is more cardiac flow dependent; thus, the management of fluid therapy is more sensitive (instead of 30ml/kg we should try 250 ml or repeated 100ml bolus). Their brain and kidney are especially vulnerable to insults and, consequently, careful sedation

and prevention of delirium and acute kidney injury are mandatory. It is especially important to adopt non-pharmacological measures to prevent delirium from the very first moment they are admitted in the ICU and reduce the days of mechanical ventilation and sedation to a minimum. We cannot forget to ask if they wear glasses or hearing aids as sensory deficits create a predisposition to delirium. It is very important to maintain the circadian rhythm with daytime stimulation, time-space orientation, and a good night's sleep. Early mobilisation and respiratory physiotherapy will help to prevent or minimise muscle atrophy. Regarding antibiotics, we should consider pharmacodynamics and pharmacokinetics as oldest old have decreased systemic perfusion and are more sensitive to liver and kidney toxicities. In addition, dosing should sometimes be adjusted as their gastric

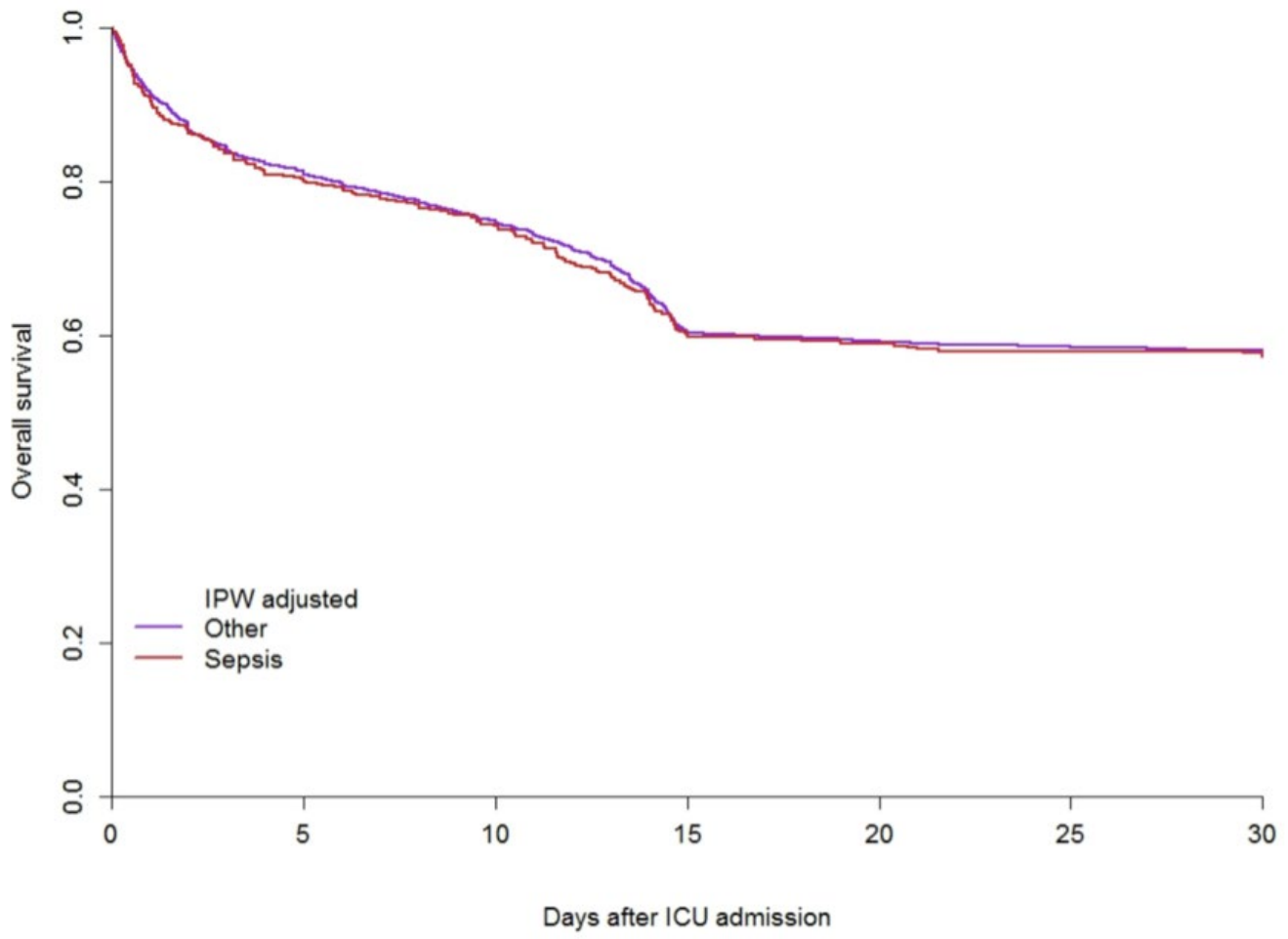


Figure 2. Inverse-probability weight (IPW)-adjusted survival curves for the first 30 days (Weights estimated using frailty, age, gender, type of admission, and SOFA score).

And, what about immunosenescence? Ageing is also associated with a gradual deterioration of the immune system and a higher level of proinflammatory cytokines secretion at baseline. The pathophysiology of this immunosenescence is complex and multifactorial (Lang et al. 2010). Due to a chronic hyperstimulation of the immune system components all immunocompetent cells are affected, mainly adaptive cell-mediated immunity. The thymus atrophies with age,

loses most of its activity within 60 years causing a shift in the T-cells, from naïve T-cells to memory T-cells. In response to antigens, these memory cells have limited proliferative capacity, express fewer co-stimulatory molecules, and lead to reduced activation of mitogen-activated protein kinase 2. Polyspecific, low affinity T-cell independent immunoglobulin levels increase with age and some of these immunoglobulins behave as autoantibodies. There is also a

decreased ability to produce specific opsonophagocytic antibodies against neoantigens. Concerning innate immunity, macrophages undergo significant functional alteration, there is reduced antigen processing and expression to T cells, a reduced bactericidal activity and the expression and function of toll-like receptors is altered. Neutrophils and natural killer cells are also impaired causing reduced recognition and destruction of infected cells.

Frailty has lastly been proposed as a good candidate tool for ICU triage and should be added to risk stratification of old patients (Fernando et al. 2019; Flatten et al. 2017). Severity scores were not designed for old people and do not consider this issue. A simple and quick score, Clinical Frailty Scale (CFS) (Rockwood et al. 2005) can assess the present frailty level before hospital admission, not affected by the acute illness, and can be a huge help in identifying those patients more likely to survive sepsis. The information is easy to collect and the interrater reproducibility is very good, confirming that this tool is robust and easy to use (Guidet et al. 2020). The information necessary to perform this assessment can be given by patients or relatives or even taken from hospital records. The scale is composed of 9 classes from very fit to terminally ill. Prefrail patients have a CFS of 4, while frail patients have a CFS of 5 or above (Figure 1).

Sepsis Related Factors

The most frequent infections are lower respiratory and urinary tract infections (Lee et al. 2018; Yebenes et al. 2019); urinary sepsis has the lowest risk of death. Alternatively, other authors remark the intrabdominal origin (Martin-Loeches et al. 2019) which frequently implies an urgent diagnosis and a surgical intervention with high mortality. Bacteraemia is present in 30-40% of the cases.

The most common pathogens are gram negative and less frequently gram-positive. The most frequently isolated microorganism in cases of urinary sepsis is *E. coli*; but *Proteus* spp., *Klebsiella* spp. and *Pseudomonas* spp. are more prevalent in patients over 65 years old. We must also consider the possibility of an infection from multidrug-resistant organism, especially in the presence of previous hospitalisation, long-term care facilities, comorbid conditions (COPD, renal failure, diabetes mellitus), previous antibiotics or permanent devices. Besides this, there is a trend in the last decade of high incidence of fungal infections which the authors suggest is associated to age-

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related physiological changes, immune status, use of indwelling catheters, prolonged use of antibiotics, use of corticosteroids and chemotherapy (Lee et al. 2018).

Regarding organ dysfunction associated with sepsis, in addition to cardiovascular dysfunction, acute respiratory failure and renal dysfunction have been reported as the most prevalent (Yebeles et al. 2019; Lee et al. 2018). Maybe, there is an interaction between pre-existing comorbidity and acute organ dysfunction. That is to say, a patient with a chronic renal failure is more likely to develop acute renal failure during sepsis and similarly a patient with a chronic pulmonary disease is more prone to develop respiratory failure or difficult weaning from the ventilator. Undoubtedly, septic shock and more than two organs failing considerably increases mortality.

Life Sustaining Treatment Limitations

Life sustaining treatment (LST) limitations, regarding withholding or withdrawing, are more frequent in very old people. In VIP 1 study (Flatten et al. 2017), LST limitation was identified in 27% of patients and was associated with age, frailty and severity of illness (SOFA score). Considering only acute admissions, LST limitations were present in 32% and in 37% of patients admitted for sepsis, both similar in VIP2 study results (Guidet et al. 2020).

Such decisions should be individualised, and some considerations are important. First, LST is not equivalent to end of life decision. Second, the timing to take the decision is arbitrary, it can be before admission or at any time during hospitalisation. An ICU trial should be offered to very old patients, according to their previous health, frailty, comorbidities, and patient/relatives' preferences. Third, the decision should probably include not only survival possibilities but also post-discharge functional capacity and quality of life. Fourth, the opinion of family members (or caregivers) is important, and we should hold a daily and sincere conversation about clinical condition and evolution (Kerckhoffs et al. 2020).

Is Sepsis an Independent Risk Factor for Mortality in Very Old Patients?

We studied the very old (≥ 80 years) septic patients in a large prospective multinational European study in 307 ICUs in 21 European countries (Ibarz et al. 2020). It was a sub-study of the VIP1 study.

The VIP (very old intensive care patients, ≥ 80 years) network has conducted and published two large prospective observational studies (Flatten et al. 2017; Guidet et al. 2020), and several sub-studies; and in 2017 published a very old research agenda in which sepsis was one of the main subjects.

Our main research question was to analyse if sepsis was a determinant factor for outcome in VIPs admitted to the ICU with the diagnosis of sepsis and secondly, to identify risk factors for 30-day mortality. Hence, we compared patients admitted for sepsis (suspected or demonstrated focus of infection and SOFA score ≥ 2) with the patients admitted for any other acute reason. Of 3869 acutely admitted VIPs, 493 (12.7%) were admitted for sepsis; 54% were male, median age was 83 and medium SOFA score was 9. Frailty was present in 54%. ICU and 30-day mortality were 28.4% and 42% respectively, similar to other acute patients. Sepsis had no impact on 30-day survival [HR 0.99 (95% CI 0.86–1.15), $p = 0.917$]. Inverse-probability weight (IPW)-adjusted survival curves for the first 30 days after ICU admission were similar for acute septic and non-septic patients [HR: 1.00 (95% CI 0.87–1.17), $p = 0.95$] (Figure 2). Age, frailty and SOFA score were the independent factors associated with 30-day survival in all acute VIPs with SOFA ≥ 2 . In a recent study on 532 septic patients from 3596 acute very old patients admitted in the ICU, the same independent factors and not sepsis were significantly associated with 6-months mortality (Haas et al. 2021). Therefore, from our point of view, sepsis diagnosis should not be a factor to limit ICU admission in this old population.

Medium and Long-Term Outcome

An increasing number of old patients survive sepsis treatment, and their care does not finish at hospital discharge. Emerging data suggest that sepsis survivors frequently experience long-term disability, worsening of chronic health conditions and new symptoms which cause frequent re-hospitalisations and enhance health care utilisation and costs (Martin et al. 2006; Iwashyna et al. 2010; Philipart et al. 2013). They are more likely to be discharged from hospital to a nursing home or alternative health care facility rather than to their home. Subsequent infections, cardiovascular events, acute renal failure, and aspiration are increased after hospitalisation for sepsis.

There is an urgent need to improve management of these vulner-

able old patients after hospital discharge. A multidisciplinary care is needed to optimise recovery and assure an adequate quality of life, both for the patient and relatives. In addition to that, as frailty usually increases with age, readmissions should be carefully considered, and palliative care-related decisions should be defined. Special attention should be paid to the medications. Frequently, the ones administered while they are at hospital are continued at home and most of them are not necessary and cause sleep cycle alterations, memory loss, and lack of attention mainly with hypnotics and antipsychotics.

Conclusion

Our population is ageing and although they can be in a particularly good condition in their usual life, an acute insult can be decisive in their outcome. The challenge is the ability for an early sepsis detection, resuscitation, antibiotic administration, and drainage of septic focus if necessary. Frailty and disease severity, not just age or clinical diagnosis, should help to guide triage. The goal of treatment and patient's wishes should be honestly discussed. Failure to respond to treatment should be followed by reassuring comfort to the patient and support to his family. Finally, further research is required regarding the care of very elderly patients who have survived sepsis.

After all these thoughts and regarding the patient I saw in the emergency room; I think he probably had a sepsis from a urinary tract infection. Given that my patient is not frail, his comorbidities are well controlled and urinary sepsis has a good prognosis in very old patients, I should admit him to the ICU and give him the chance to recover from his sepsis

Conflict of Interest

None ■

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If It's Good for Calcium Why Not Magnesium?

Reasons to Measure iMg in the ICU

An overview of the importance of getting magnesium levels right in critically ill patients and the role ionised magnesium plays.

Background

Like all electrolytes, magnesium exists in the bloodstream in “bound” states, and in “free” or “ionised” states, which is the portion that is physiologically active. This ionised component (iMg) represents approximately 55-70% of the total Mg (tMg). Magnesium’s role is protean in human physiology: it is a cofactor for > 600 enzymes, it is responsible for nerve conduction and muscle tone, it modulates inflammation by attenuating cytokine production, it is responsible for ion transport, cell signalling and protein synthesis, to name but a fraction of its functions. Yet despite its importance, it has not gotten the respect it deserves - while celebrity electrolytes such as sodium, potassium, and even chloride get invited to all the parties, magnesium stays home and just works away. When we measure these other electrolytes, most of the time we are, in fact, measuring their ionised forms by using an ion sensitive electrode (ISE). The development of an ISE for calcium was relatively recent, and we still talk about total Ca and ionised Ca (iCa), with iCa being commonly measured now. But when we measure Mg, we are still measuring tMg, because not many devices can measure iMg. So, should we be measuring iMg? (Spoiler alert: the answer is yes, especially in the ICU).

Clinical Situations Where iMg is Important

There are many clinical situations where iMg and tMg have been shown to be discrepant, and where measuring iMg is beneficial. These include critically ill patients, patients with kidney disease, asthma, cardiac surgery, stroke, head injury, alcoholism, liver disease, and eclampsia (Johansson and Whiss 2007). Scenarios where iMg and tMg are discrepant can occur during rapid changes in Mg (such as with Mg supplementation), and

in situations where acid-base disturbances, hypoalbuminaemia, medications, and other metabolic derangements exist. All of these are common in ICU patients.

There is ample evidence that iMg and tMg do not correlate well in critically ill patients. A study from Sweden (Johansson and Whiss 2007) showed that in ICU patients with normal tMg, 25% had a low iMg and almost 10% had an elevated iMg. A report from Massachusetts General Hospital noted that 30% of tMg values did not correlate with iMg values in an ICU setting (Yeh et al. 2017). In this study, 80% of low tMg values were associated with normal iMg. This led to unnecessary administration of Mg to these patients and led to unnecessary testing. Importantly, based on this data, tMg does not reliably predict iMg levels. There are consequences from dysmagnesaemia: hypermagnesaemia may lead to prolonged mechanical ventilation (Sawalha and Kakkera 2020), and a Belgian study (Soliman et al. 2003) showed that ICU patients who developed a low iMg during their ICU stay had a higher mortality than those who didn't.

A recent paper showed that in over 40% of patients undergoing continuous venovenous haemofiltration (CVVH) with citrate anticoagulation that iMg and not tMg reflected true Mg status (Hutten et al. 2021). Since citrate binds Mg as well as Ca, the Mg/citrate complex is measured in the tMg value. Thus, in this patient group, iMg is the only accurate way to assess Mg status. According to the authors: “Almost half of the samples of CVVH-treated patients showed normal tMg and decreased iMg. This points out the importance of the measurement of iMg ... in CVVH patients with citrate as an anticoagulant, iMg should be measured to determine if magnesium supplementation is needed.”

A study in cardiac surgery patients (Wilkes et al. 2002) evaluated iMg and tMg, and Mg replacement was given to

patients with low iMg. More than half the patients had low tMg, but only 13% had low iMg. Patients who received Mg supplementation for low iMg had a lower incidence of ventricular arrhythmia and were more likely to remain in sinus rhythm than those in the control group. It is well known that patients on cardiopulmonary bypass lose Mg, and it has now become routine to simply administer Mg to this patient group without measuring tMg or iMg. A more precise, goal-directed therapy may be more beneficial.

Conclusion

In critical care it is important to get the Mg level right, and the best way to do this is by measuring iMg. This will avoid complications arising from dysmagnesaemia. Inaccurate Mg measurements can also lead to unnecessary testing, overtreatment of hypermagnesaemia, or undertreatment of hypomagnesaemia. Since the ionised portion is measured for virtually every other electrolyte, it is now time that Mg joins the party. ■

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Introduction

When COVID-19 emerged as a new pathogen, the pictures and stories of the devastation it was bringing focused attention on the mental health of acute care workers, and, in the media, on ICU teams in particular (Du et al. 2020; Lai et al. 2019; Preti et al. 2020; Rossi et al. 2020). The focus highlighted the understanding of the key role these teams would have to play in the global response to save as many lives as possible -- in the face of increasingly exhausted resources and what appeared to be increasingly incredible odds. The media attention to the issues of mental health, burnout and resilience in the ICU, opened the door to discussions of the psychological and emotional impacts of struggling to deal with fear, struggling to save the lives of so many while being powerless to save the lives of so many others, and bearing witness to tremendous loss and grief. In the face of an emerging pathogen, healthcare workers experienced normal human reactions - dread in anticipation of what was to come, anxiety, distress, fear of becoming ill, even possibly

ICU Mental Health in the Ongoing Pandemic: How Will We Be Okay?

After a year of this pandemic, this article explores what we currently understand about the psychological impact experienced by ICU teams and provides practical guidance to help build personal and team resilience as the journey with COVID-19 continues with no end in sight.

dying or even worse bringing the virus home to their families (Du et al. 2020; Lai et al. 2019; Preti et al. 2020; Rossi et al. 2020). The first wave of COVID-19 saw outpourings of public support for the “heroes” on the frontlines which, while intended to show appreciation for healthcare workers, for many, added to their own psychological distress especially in the face of such a large number of patient deaths (Nielsen 2020). That was then, in March 2020. Where are we now one year later? What have we learned and what can we do to cope going forward?

After a year of this pandemic, this article will explore what we currently understand about the psychological impacts experienced by ICU teams and provide practical guidance to help build personal and team resilience as the journey with COVID-19 continues with no end in sight.

Mental Health Impacts of the Pandemic on ICU Teams: What Do We Know?

For ICU professionals around the world, the pandemic has caused significant psychological distress. Rates of anxiety range between 46-67%, depression 30-57%, symptoms of post-traumatic stress disorder 32-54% and burnout 51% (Azoulay et al. 2020a; Azoulay et al. 2020b; Crowe et al. 2020). One study reported 6.3% rates of severe depression, 39.5% PTSD, 11.3% severe anxiety and 7.2% problem drinking with 13.4% of respondents reporting frequent thoughts of self-harm or suicide in the past two weeks (Greenberg et

al. 2020)). These levels of distress are similar to those seen in previous outbreak situations such as SARS and MERS (Khalid et al. 2016; Styra et al. 2003). As also seen across non-ICU studies, female gender and nurse-professional status were consistently associated with higher levels of psychological distress (Azoulay et al. 2020a; Azoulay et al. 2020b; Crowe et al. 2020).

Currently, identified causes of psychological distress include: fears of being infected, anxiety related to rapidly changing policies and information, the need to balance patient care and personal safety, managing commitments to self and family, inability to rest, struggling with difficult emotions, difficulty in communicating and providing support to families due to the impact of restrictions in visitation policies, and finally failing to provide adequate support at the end of life and witnessing hasty end-of-life decisions (Azoulay et al. 2020a; Crowe et al. 2020).

Interestingly, increased symptoms of depression and burnout have been reported based on clinicians' ratings of the ethical climate in which they are working where ethical climate was defined as “individual perceptions of the organisation that influences attitudes and behaviour and serves as a reference for employee behaviour” (Azoulay et al. 2020b). Research prior to the pandemic revealed associations between perceptions of staffing and fair treatment in the workplace and physician and nurse burnout and identified the need for these factors to be systematically addressed (Rubin et al. 2021).

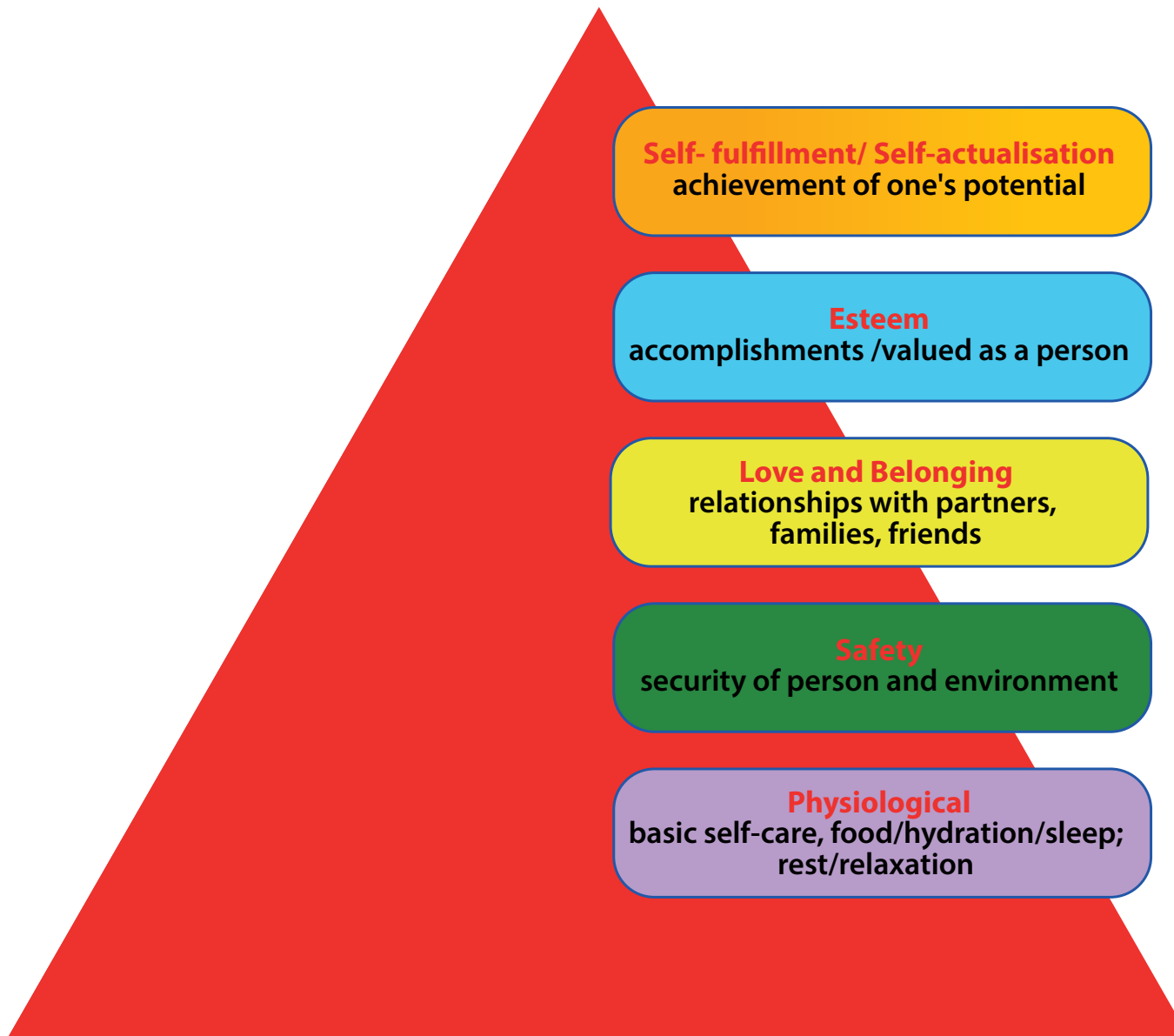


Figure 1. Maslow's Hierarchy of Needs

Unfortunately, the very nature of a pandemic will tax staffing to its limits and likely exacerbate pre-existing perceptions of unfair treatment. Others have described the importance of healthcare organisations taking steps to hear, protect, prepare, support and care for their healthcare teams to decrease staff anxiety and their ability to cope (Shanafelt et al. 2020). Such efforts include access to PPE, prevention of infection and exposing their families to risk, access to rapid testing, care for themselves or their families should they become infected, access to childcare and support for basic personal needs (e.g., food, hydration, lodging, transportation) that reflects increased work hours, school closures, and voluntary redeployment, educational support if re-deployed and access to up to date information and communication (Shanafelt et al. 2020).

An Issue of Needs

Abraham Maslow's foundational work in human psychology proposed that humans are motivated by five categories of value-based needs: physiological, safety, love and belonging, esteem and self-actualisation (Maslow 1954). These needs are described as a hierarchy with more basic needs, the ones that are most crucial for any individual to have met, located in the bottom tier and higher-level needs at the top. Maslow's theory proposes that higher level needs, those that make us feel fulfilled as individuals or, in the workplace, as professionals, cannot be achieved unless our more basic needs are met. His theory suggests that psychological harms can, or will, ensue if basic needs - physiological, safety, love and belonging, esteem - are not met. Self-actualisation needs are linked to perceived degree of happiness (Maslow 1954; Lester et al. 1983); however if unmet, they will not lead to psychological harm. Maslow's needs are commonly represented as a pyramid (Figure 1).

Maslow's Needs and the ICU Professional: Where Do We Go From Here?

In Maslow's framing of needs, it becomes apparent that much of the research in the ICU on how to mitigate the psychological impact of the pandemic engage the bottom tier of needs

Needs	Professional	Organisation
Physiological	<ul style="list-style-type: none"> -Time management to meet basic self-care needs -Promotion of “small team within ICU team” (EA ICU) concept to improve workflow -Attention to personalised respite time/downtime -Development of personalised stress management strategies 	<ul style="list-style-type: none"> -Promotion of effective workflow strategies: <ul style="list-style-type: none"> • “small team within ICU team concept”, with formation of EA groups to manage work loads • patient assignments -Non-clinical spaces for respite/sleep -Equal distribution within work schedules -Strategies to decrease overtime requests -Avoidance of pressuring staff to do more -Redistribute administrative duties -Respect worklife boundaries
Safety	<ul style="list-style-type: none"> -PPE use and policies -Rapid Testing -Rapid access to guidance re work-related exposures 	<ul style="list-style-type: none"> -PPE supply chains -Transparency for rationale and implications for changes in PPE policies -Promotion of staff safety in work related exposures and outbreaks -Policies for a clean safe work environment -Timely provision of information and guidance in event of exposure -Quick practical education for staff re-deployed to the ICU -Vaccinations
Love and Belonging	<ul style="list-style-type: none"> -Listen and Acknowledge emotions/psychological impact of pandemic -Acceptance/nonjudgmental -Mutual support and respect 	<ul style="list-style-type: none"> - Information on support services both internal and external to the organisation
Esteem	<ul style="list-style-type: none"> -Inclusion in decision making valuing each staff member’s input 	<ul style="list-style-type: none"> -Appreciation by leadership – based on staff expectations and input – “meaningful” to the staff

Table 1. Maslow’s Basic Needs in the ICU Context

in this pyramid and engage hospitals, ICU management and ICU professionals (**Table 1**).

Physiological needs for the ICU healthcare professional require a daily organised planning of patient care workflow (as much as possible) with patient assignments planned to allow

time for personal basic self-care. ICU healthcare professionals (RNs, allied health and physicians) should consider creating small intra-ICU team groupings - Equitable Activity ICU (EA ICU) teams- to assist one another with workloads. Workload management principles should be applied to ensure that there

is a process of efficiently distributing and managing work across ICU teams. The need for self-respite only increases in a pandemic situation and creative approaches (time and/or workflow based) are required to provide brief periods for people to regroup during their working hours. ICU nurses are farther ahead than most ICU physician groups in recognising the importance of such workflow structures and physicians should explore ways of changing their workflow similarly.

Quality ICU management means meeting a responsibility to promote time for self-care and respite as part of a healthy work environment and to provide sufficient, safe, comfortable respite places (Gordon et al. 2020). These places would ideally be less clinical in nature, allow ICU professionals to have a change in headspace/change of scene, to eat meals, hydrate and even sleep. The importance of the provision of such places when working long hours in PPE cannot be overstated. ICU leadership needs to acknowledge and meet responsibilities to ensure call and work schedules are equally distributed to promote rest and sleep and to provide on call spaces for staff who need to stay overnight, if these do not already exist. Within the ICU team some professionals, due to their roles and responsibilities, are asked to shoulder more work than others and this should be recognised and attention paid to ways to assist them in order not to overwhelm any individual professional. Finally hospital/ICU management need to define clear boundaries as to what constitutes an urgent issue to decrease workloads during off hours and ensure rest and respite e.g. non-urgent issues and emails should be dealt with during weekday work hours only.

In many ICUs as the pandemic continues, the struggle with staff retention is becoming an increasing challenge, placing a growing burden on those remaining and increasing requests on behalf of ICU management and hospitals to work more overtime and/or re-deployed. There is a need for ICU management teams to monitor and develop strategies to decrease overtime shifts for staff and avoid the application of pressure, with or without financial incentives, to ask any professional to do more than they can (i.e. accept that no means no - without shame). While re-deployed nurses and

Braced – by Laura Hawryluck

I hear the phone's rings
 Braced for the fear it brings
 I call from the ICU
 Braced for the news I have to share with you.

I really wish I didn't need to phone
 I really wish I could tell you he is coming home
 Now . . . your voice is on the line
 Right away you know nothing is fine.
 Sheer, horrifying dread,
 Doctor . . . Is he dead?

I try to keep my voice from breaking
 Though my heart is shredded and aching
 As you cry,
 Know my own eyes are far from dry.
 Clutching the phone, white knuckled,
 Knees buckled,
 Someone brings me a chair,
 So I don't fall into thin air.

Comfort I try to bring,
 As the ICU phones continue their infernal ring.
 There are others on their way.
 Somehow . . . I need to get through the rest of my day.
 No words.
 Grief deferred.

team might be. The development of a quick task-based-training resource for re-deployed colleagues would at least provide the ICU team with confidence in the existence of a common baseline of those they are now supervising.

From a safety needs perspective, now that we are over a year into the pandemic, most ICUs in high income countries have addressed issues of workspaces and appropriate PPE to keep team members safe. Stable supplies are generally available, though concern still exists that should the pandemic worsen, issues of supply may once again become problematic. A need for transparency remains on the part of ICU and hospital management regarding decision-making and policies around changes in PPE to maintain trust and a sense of security in the workplace. Now, rapid testing for ICU team members and their families is generally readily available as is access to appropriate information and care in the event of infection. With the vaccine roll out, most countries have already, or have made significant inroads, into vaccinating ICU professionals. In low and middle income countries (LMICs) though, supply chains of PPE are vulnerable at the best of times and face ongoing challenges placing safety needs of all healthcare workers at risk.

Moving forward, as variants cause recurrent waves, hospital and/or ICU exposures are new and ongoing sources of psychological distress that have not yet been discussed in existing literature. When an exposure is identified, Infection Prevention and Control (IPAC) team members typically place the patient on isolation. Yet information on implications for staff and precautions, if any, they need to take are not consistently nor clearly communicated. Both ICU and hospital management need to recognise that such a lack of transparency and difference in treatment of patients and staff may lead to ICU staff psychological distress, and perceptions of staff feeling less valued and less protected at times when they may actually be at higher risk. Moreover, depending on the source of exposure, recognition is needed that the ICU team can play an invaluable role in identifying both other staff at risk and specific environments that need decontamination. Such an approach will prevent outbreaks by ensuring everyone

is diligent about wearing their PPE and cleaning their work environment. Understanding the level of personal risk helps reduce fear and anxiety and possible post-traumatic stress symptoms. Misguided attempts, in the name of privacy, to not be forthcoming with timely instructions to staff, results in mistrust. The psychological impacts may then compromise staff retention. Both privacy and confidentiality standards can be met while providing key information to meet the safety needs of the ICU team.

A sense of community and belonging can be achieved if a tightly knit team is created where everyone is valued, fostered and respected. As research has revealed, the mental health impacts of a pandemic are different for different team members. Moreover professionals may experience the impacts of the pandemic differently at different moments in time. They may be able to cope better some days as compared to others. These differences are normal. The focus on mental health in the pandemic ICU should be that it is acceptable to have more open discussions of how we are feeling as ICU professionals, to share what we do to cope and what helped us get through the bad times. Critical care has traditionally been a field in which the emotional and psychological impacts of what is seen when caring for people with life-threatening illnesses are compartmentalised at work and processed in private, if they are processed at all. This risks open discussions of psychological/emotional impact being perceived as weakness or an inability to cope with the work. In a pandemic, private time for processing may not exist and breaking down thoughts and emotions may be so delayed that it risks the ability to perform professional roles. We need to listen to and acknowledge how we and our colleagues are feeling without rushing in trying to fix them which can be misperceived as diminishing their experiences or shutting down discussions. As a field, we are very skilled at providing support to families; its more than time we do the same for each other. There should never be any hesitancy in asking for help. ICU management and hospitals should provide clear information on where to turn for help whether internally or externally for those not comfortable seeking help from their place of work.

physicians can help offset workloads, the use of redeployed staff may lead to anxiety and stress if the ICU team has no understanding of their knowledge and skill level: rather than knowing how to work with them, the ICU teams must first figure out responsibilities with which they may be entrusted. The presence of EA groups would provide greater support not only to the deployed staff but also help ensure that adequate support is available to them no matter how busy their own

Esteem needs can be met quite simply by ICU and hospital management recognising the hard work, sacrifices and efforts made by each ICU professional during this pandemic in a meaningful way i.e. recognising the person in the professional and saying thank you. Particular attention to recognising staff efforts during more challenging times may help reduce stress and burnout. It is important to pay attention to the fact that pandemics can often result in new hierarchical structures which can promote siloing and discontent, rather than collaboration. Changes in organisational structure at this time should be undertaken cautiously in order not to alienate already pre-existing working teams.

Finally, self-actualisation needs can best be met by acknowledging and valuing the creativity ICU professionals can bring to critical care during such times and maximising its effectiveness in achieving our common goal of saving as many lives as we can.

Recognition of the Person in the Professional

The most obvious problem with Maslow's needs and our discussion of how these can be met in the professional context is that members of the ICU team are not only professionals, they are people. It is the person and not only the professional who experiences these mental health impacts. It is the whole person, not only the professional whose needs must be met in order for them both to survive this pandemic as intact from

a mental health perspective as possible. Meeting the basic needs in the professional context will help decrease the very human fears of bringing infection home to those we love. Yet it is not only bringing infection home that needs to be feared, it is bringing home the mental health impacts of living through the pandemic ICU, of having the most important people in our own lives see the psychological and emotional costs of the terrible moments lived, and our anxiety, depression and distress over those yet to come. In other words, it is our need for love and belonging as a person that is most at risk. Watching the professional re-become the whole person, watching them unpack all that has been compartmentalised, being unsure, or not knowing how to help, and witnessing the rebuild into the professional once more before the return to work is traumatising to those we love and who love us (Busa 2021). Yet where and how do you find the balance between love, belonging and sharing, all of which are vital in any relationship and inadvertently asking your loved ones to assume the role of counsellor? No research exists exploring what people in our lives would find helpful from us not to feel excluded from a significant part of who we are. Nor is there research to help us understand how to communicate when we are okay, when we are not and what would help us cope along our shared journey. Now is the time for it to start. It is hard enough to manage this critical aspect of our lives in normal times and the challenge has now grown

exponentially for so many of us. The loss of personal love and belonging is an extraordinarily high price to pay and frankly professional belonging, esteem and self-fulfillment needs, if achieved, are rarely enough to compensate. In view of the known psychological effects on professionals, loss of love and belonging on a personal level, would be expected to result in an exponential rise in distress and burnout. More research is needed and yet any psychological support provided by ICU and hospital management, to be successful, needs to focus on the personal and not only the professional.

Conclusion

The psychological impact of what we have lived through in the past year in the ICU can't be managed in the same way as that of the past; the experiences are too overwhelming. Attention to the mental health of ICU team members as professionals and individuals, having resources, open dialogues about meeting basic needs, how we are feeling, what we are doing to cope are both needed and welcome. By meeting the fundamental needs of the person in the professional, we can reduce the psychological impact of this and future pandemics.

Conflict of Interest

None. ■

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While Perioperative Care is Optimised, Patients Die Unmonitored in the Ward!

There is a high demand for a comfortable, small and mobile solution for affordable blood pressure and vital sign monitoring in the general ward to improve patient safety and outcome, as mortality after surgery is a thousand times higher than intraoperative death.¹ CNSystems has enhanced its non-invasive CNAP[®] technology for perioperative care with its new "CNAP[®]2GO" finger ring, suitable for ward monitoring, as outlined in a recent publication in NATURE Communications.²

Patients and their families often fear surgical interventions due to possible complications during the procedure and falsely assume to have survived the most dangerous part when reaching post-anesthetic care units.¹ However, postoperative hypotension more often occurs in the wards, causing myocardial infarction and death,^{3,4} as it largely remains undetected.⁵ 47% of postsurgical hypotensive events are missed due to doing only blood pressure spot-checks.⁶

These alarming facts have a substantial impact on healthcare budgets: representing the third leading cause of death in the world⁴, postsurgical complications can increase costs by +172%,⁷ due to complication rates ranging up to 27%⁸ and mortality of up to 12%⁷ in postsurgical patients.

Only recently, experts have confirmed the high potential of reducing risks and costs of postoperative complications by extending continuous hemodynamic monitoring throughout the hospital stay. While already successfully implemented during surgery to guide Goal Directed Therapy^{9,10,11} also for low and medium-risk surgeries, to date, continuous hemodynamic monitoring is poorly implemented on surgical wards.

Hypotension remains undetected⁶ and patients' deterioration is often overlooked³, as blood pressure is usually measured only every 4 to 6 hours. Patients are supposed to get up from their beds and move around in due course after surgery, therefore wireless technologies such as wearable sensors are needed⁵, preferably providing wearing comfort at low costs, due to the large patient population.

Only recently, CNAP[®]2GO, a new innovative sensor concept for measuring blood pressure and other vital signs using a wearable finger ring, has been introduced in the NATURE Communications Journal. With its wireless setup and high wearing comfort, CNAP[®]2GO seems able to address all major demands on the wards. Clinical accuracy against invasive reference standards

showed comparable results to its parent technology - CNAP[®] - for perioperative hemodynamic monitoring.²

With this ongoing development, CNSystems strives for a new tailor-made solution, covering the whole cycle of hemodynamic monitoring throughout the hospital stay of a surgical patient. All CNAP[®] solutions feature an easy and fast setup and well-founded clinical validation and are already established common practice.

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* sample picture of envisioned sensor

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The Essentials for a Humanised Intensive Care Unit (H-ICU)

This article highlights the key points that fall under the meaning of humanisation as part of the ICU Liberation bundle.

Introduction

How would a patient describe their stay inside an Intensive Care Unit (ICU)? Would it be cold, lonely, a place full of uncertainty? Painful, uncomfortable or scary? The length of stay (LOS) in the ICU may be the most traumatic experience a person can endure. A duel between life and death. A change in hospital infrastructure, an organised multidisciplinary team, humanised centred interventions and modified strategies to obtain higher functionality levels can have a huge impact not only on the patient but on their families as well. The ABCDEF + GH bundle represents an evidence-based guide for clinicians to approach the organisational changes needed for optimising ICU patient recovery and outcomes. Humanisation (H) may be the last letter in the bundle, but that does not make it the least important. The central aspect of this paper is to highlight all of the key points that fall under the meaning of humanisation inside the ICU Liberation bundle.

Early Mobilisation

Patients admitted to the ICU can experience long periods of immobilisation which can lead to muscular decay. However, other factors may coexist and have a negative impact on muscular health, such as long sedation periods, inflammation, malnutrition, and use of neuromuscular blockade agents (NMBAs), among others. An important percentage of these patients will develop ICU-Acquired Weakness (ICUAW), an entity that can complicate functional prognosis (Saoirse et al. 2015; Hodgson et al. 2014; Zang et al. 2020; Vanhorebeek et al. 2020).

The diagnosis of ICUAW is commonly made through the Medical Research Council Sum-Score (MRC-SS <48 points), or by hand-grip strength measured with a dynamometre (<11 kg for males and <7

kg for females). Nowadays, there are other tools that can help identify patients with a high risk of developing ICUAW (Vanhorebeek et al. 2020). However, muscular ultrasound evaluation is one of the most promising methods. In ultrasound evaluation, quality and quantity can be measured over time. The Heckmatt scale will categorise, in a progressive manner, four different muscular situations. In addition, it would be of best practice to recognise the functional status previous to the ICU admission in order to establish a realistic prognosis.

One of the most important measures to prevent functional impairments is early mobilisation (EM). It stands for the application of physical activity in the first two to five days since the onset of critical illness, and active movement (made by the patient) is preferred over assisted or passive interventions (Saoirse et al. 2015; Hodgson et al. 2014). EM must be initiated based on a patient's level of mobility (LOM) and strength. A common mistake made during EM is underestimating the patient's capacity to perform or accomplish certain exercises and prescribing exercise as if patients had a lesser functional level. Therefore, the rehabilitation process can be ominous and with poor progression.

It is vastly known that EM is a safe practice in ICU patients. In well selected patients it can be applied even during mechanical ventilation (MV), extracorporeal membrane oxygenation (ECMO), continuous renal replacement therapy (CRRT), etc. (Hodgson et al. 2014). Patient safety should always be assured at all times, as well as a profound and continuous evaluation of patient stability. EM can generate positive changes in ICU practices and outcomes for the patient and their families, with analgesia optimisation, proper sedation levels, reduction in bedtime, delirium prevention and by reducing LOS inside the ICU and total MV and hospitalisation days (Zang et al. 2020).

- a. Assessment and management of MV (ABCDEF-R bundle, where R Respiratory-drive-control): improvement in patient comfort through varied ventilatory modes must be pursued prior to the administration of new medications. Pressure or volume-set mode (AC P or V) and spontaneous breathing (CPAP/PSV) must be systematically evaluated with interprofessional collaboration; tidal volume and sensitive inspiratory trigger.
- b. Accept short intervals of moderate sedation (RASS -2/-3) to overcome ventilator asynchrony, pain or discomfort until reaching an adequate level of analgesia and/or adjusting ventilator settings
- c. Clinical assessment of levels of analgesia and sedation with validated tools, at least twice a day (SAS, RASS, BPS, CPOT +ANI + BIS)
- d. Assessment and identification of delirium with validated tools, at least twice a day. The Confusion Assessment Method in the ICU (CAM-ICU) is the preferred method, although the 4A's Test (4AT) and the Intensive Care Delirium Screening Checklist (ICDSC) can also be used.

Table 1. Non-pharmacological strategies for the optimisation of analgesia and sedation

Diverse functional scales have been validated for the critically ill patient. These allow the rehabilitation and ICU staff to understand the initial state of the patient, create an intervention strategy and continuously assess and restructure strategies over time. Regardless of the evaluation tool, functional evaluation must be protocolised as part of the physical examination in the critical patient. Measuring survival in the ICU is not enough for what today's practice can offer; functionality needs to become one of the primary outcomes in order to talk about "quality of attention". Human movement has to be the supreme therapeutic

strategy for the rehabilitation staff and the physical therapist as an expert in this domain must be a key piece in the prevention and management of functional complications inside the ICU. Time does not forgive anything, not even the muscle.

Communication

Communication is one of the toughest aspects to establish in the ICU. Due to different medical equipment attached or introduced in the patient, isolation and the lack of importance given to communicating with the patient, in conjunction

with the lack of expertise of the staff on this topic, hinders communication. Establishing solid communication lines with the patient and their family, along with good communication between the multidisciplinary team in charge of the patient's care can simplify the understanding of the approach that will be set, and, likewise minimise the inhumane effects of the ICU (Rojas et al. 2014).

During invasive and non-invasive MV, devices are placed in the patient that can provoke the impossibility to use the structures that produce the voice, anatomical and/or functional alterations, even swallowing disorders. A solution for these cases is Alternative and Augmentative Communication (AAC). AAC consists, in conjunction, resources, systems or strategies that facilitate the comprehension and expression of language in people with speaking or writing impairments (Deliyore-Vega 2018). Its objective is to enlarge the speech or substitute it so that patients can express their thoughts, feelings, needs and wishes. It is fundamental that the ICU staff develops the capacity to utilise these alternatives of communication and their way around the chosen strategy to avoid frustration. In patients undergoing tracheostomy, the utilisation of devices that allow communication between upper and lower airway are recommended as an effort to permit oral communication (Fernández et al. 2012). All of these measures will enhance effective communication with family and the multidisciplinary team. An evaluation of communication needs is necessary to choose the adequate AAC.

The patient's family is involved in the alterations suffered by critical illness and post-intensive care syndrome (PICS). Communication between the patient and their family is fundamental for the patient's well-being and can be established through phone calls, video calls, writing or the utilisation of an AAC method. Integrating an open-door ICU programme can ease the communication process. Furthermore, families must have straightforward communication with the personnel in charge for the purpose of integrating them in the decision making process. Also, staff communication has to be dynamic at all times in order to establish the same objectives and approaches while considering the family and the patient's point of view (Ayuso-Murillo et al. 2017).

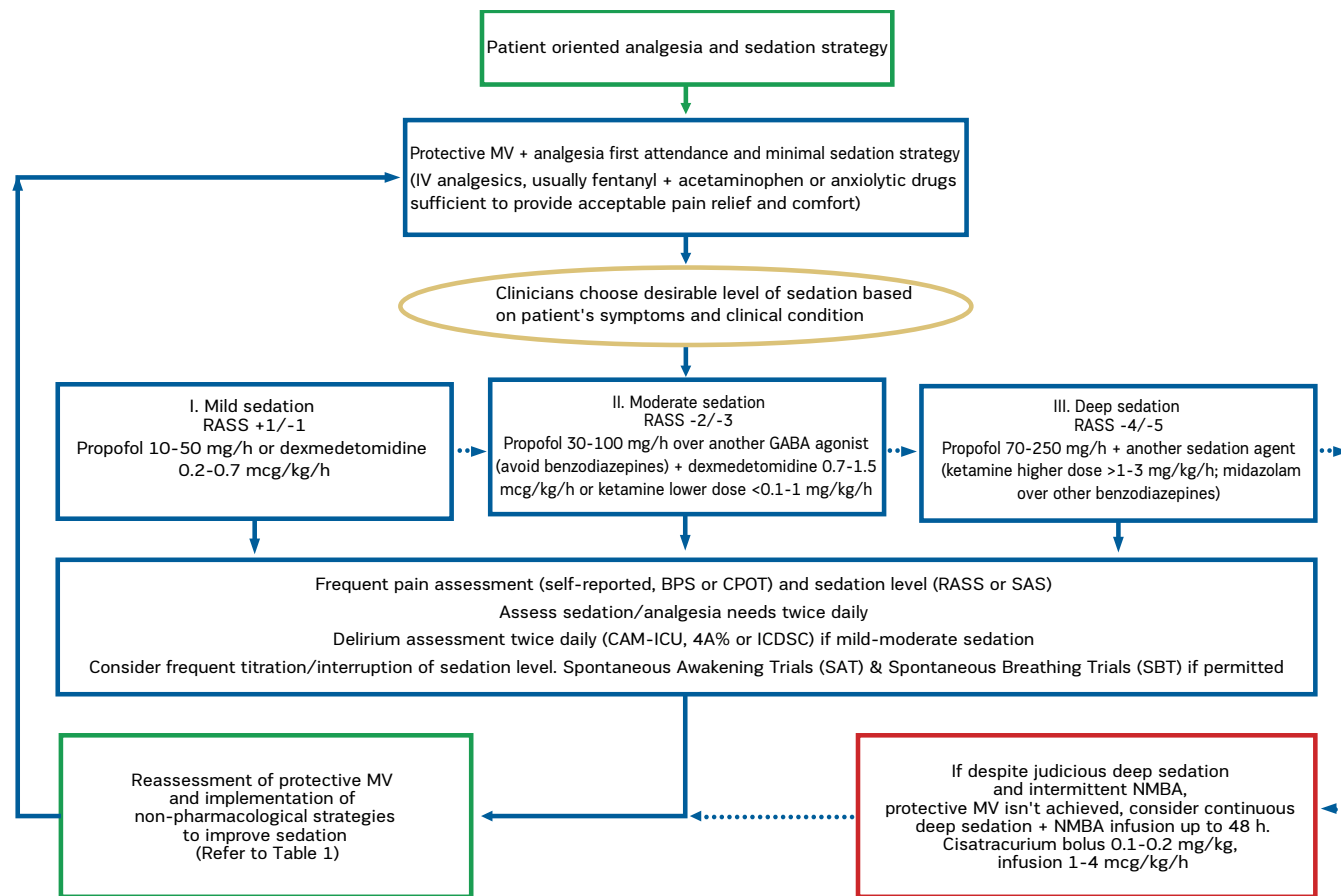


Figure 1. Patient oriented analgesia and sedation optimisation algorithm

Personal Care and Hygiene

Secondary to ICU admission, hygiene and self-care is lost in most cases and depends totally on healthcare staff and family members. Providing adequate hygiene and personal care routine, ensuring patient comfort and establishing proper hygiene habits can prompt humane practices for ICU patients. This can also make hospitalisation a more tolerant process

and can improve the patient's quality of life during this time. Respecting privacy, in some cases, is a lost habit as well. All of these practices and habits are easy to implement and can lessen some of the negative effects of the ICU (Carrascal et al. 2015; Cantón-Bulnes et al. 2019; Ross and Crumpler 2007; Estaji et al. 2015; Fields 2008). A list of hygiene and personal care measures is stated below:

- Facial and corporal hygiene (bathing, shaving, hair care, external genitalia hygiene, etc.).
- Tooth and dental prosthesis care and wash.
- Adequate bowel and urine collection and cleaning.
- Skin care; application of humectation creams and deodorant.

Recreation

Recreation in the critically ill is a forgotten aspect, but such a basic human need. "Let them concentrate on getting better" or "If the patient is having fun or laughing makes our work less professional and can seem to take away the seriousness" are some comments we can face while talking about this topic. Professional care together with making a comfortable and humane environment can be established in the same space. It's no surprise that there is such a lack of information surrounding this subject and the need for more interest is evident. Some options have been studied like Virtual Reality (VR) as a recreation, anti-delirium and pain management strategy (González-Consuegra et al. 2016). Recreation must be a therapeutic measure to support an integral progress including physical, social, mental and emotional health. Moreover, recreation can become a linkage in adherence to occupational and physical therapy (Naef et al. 2021).

In any state, including the critically ill, recreation has to be variable and individualised due the heterogeneity in preferences and desires of patients. Creating a comfortable and enjoyable environment for people to recover from critical illness, or at least for some time during the day, can help the patient feel like themselves again and help them overcome what they are going through.

Examples of recreation strategies include:

- Cognitive stimulation: math work, logical thinking, memory games.
- Didactic activities: painting or craft making.
- Musical or visual stimulation: movies, VR or preferred music.
- Space and time orientation: calendar making that could include day to day happenings and important upcoming events.

Mental Wellbeing

Undergoing critical illness is a situation that forces individuals to face diverse duels in a cognitive and emotional matter (Costigan et al. 2019). Typically, in this topic delirium would be the centre piece

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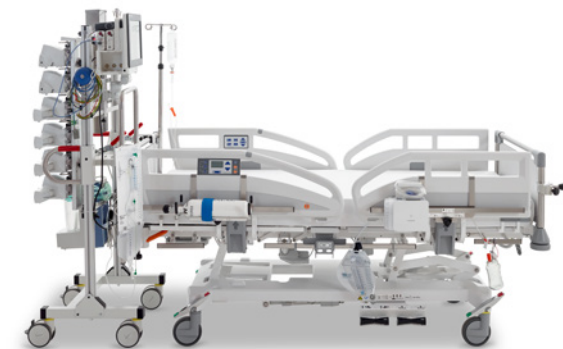


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Non-pharmacological and multicomponent interventions:

- Daily assessment of delirium (CAM-ICU, 4AT, ICDSC).
- Early recognition of high-risk factors such as age > 65 years, high acuity, sepsis, shock, dementia and MV.
- Light sedation.
- No benzodiazepines.
- Early mobilisation.
- Promotion of day-night routine.
- Environmental awareness and orientation (family engagement, good handoff communication; sensory, auditory dentures, time, events, family and music).
- Removal of devices (intravascular and airway devices).
- Early establishment of normal diet, correction of metabolic disorders, regulation of bladder and bowel function.
- Reduced nocturnal disturbances to promote sleep.
- Early identification of infection.
- Effective treatment of pain in addition to pharmacologic treatment, such as EM and exercise, massage, music, and relaxation techniques.

of discussion. Delirium is a fundamental part of mental care and if established, it can trigger many alterations. However, delirium, in many cases, is the result of poor protection of a patient's mental health (Wade et al. 2016). Adequate sedation practices, family empowerment, pain management and mobilisation are some worldwide known examples of how to overpower this condition (Slooter et al. 2017). Nonetheless, a hard pill to swallow is that delirium is not treated, it's prevented. If the personnel in charge of the ICU unite efforts in a multidisciplinary way, complications can be prevented, and so can delirium.

Many mental disorders like anxiety, depression and posttraumatic stress disorder are common while fighting critical illness and the need of personnel with expertise in this approach is undeniable (Trogrli et al. 2015). It's worth noting that the instauration of any disorder will complicate health attention, restrain functionality, and overwhelm emotional status to the point patients can develop a death wish (Trogrli et al. 2015; Kaneko-Wada et al. 2015). Alternatives such as thanatological follow-up and long-length family visits can modulate such disorders. Creating an open-door ICU would simplify these practices and could give the professionals involved in mental care a realistic perspective of what patients could face after ICU discharge.

Once the patient leaves the ICU, different cognitive problems have been observed over time. Memory loss, concentration difficulties, slow thinking and poor problem resolution are some of the most common. In fact, Pandharipande et al. (2013) found that one out of every four patients discharged underwent a similar cognitive impairment to Alzheimer's in its moderate state. More so, worse global and executive cognitive outcomes were related with the length of delirium, despite sedation levels, analgesia, age and other conditions. Therefore, taking care of patients' mental health is taking care of their future (Müller et al. 2020).

Analgesia and Sedation in Mechanically Ventilated Patients

Clinical practice guidelines for analgesia and sedation in the ICU (e.g., the Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption (PADIS) guidelines) have consistently focused on patient-oriented management of pain, minimum levels of

sedation, early mobilisation (EM) and rapid liberation from MV. To achieve these goals, clinical assessment of pain and level of sedation with validated tools such as the Behavioral Pain Scale (BPS), the Critical-Care Pain Observational Tool (CPOT), and the Sedation Agitation Scale (SAS) or Richmond Agitation Sedation Scale (RASS), respectively should be conducted at least twice a day.

An adequate management of analgesia and sedation, based on patient centred attention; protective MV, analgesia first attendance and minimal sedation strategy (RASS +1/-1) must permit higher levels of activity that will reverberate positively in the incidence of ICUAW and delirium, sedative requirements, ICU LOS, pain intensity, duration of MV and weaning process from MV. To provide comfort, safety and acceptable pain relief are the primary goals from analgesia/sedation. Once they are in communion, the implementation of non-pharmacological strategies to facilitate EM and patient interaction with staff and family can be the path to earlier physical and cognitive recovery. Non-pharmacological recommendations that may result in benefit prior to the administration of new sedatives and NMBAs for MV patients are outlined in **Table 1**.

Even though the CPOT and the BPS remain the most robust scales for assessing pain in critically ill adults unable to self-report, other technologies that may be useful in the ICU pain and sedation assessment process should be explored. Technology measuring heart rate variability (e.g., the Analgesia Nociception Index), electroencephalographic signals (e.g., the Bispectral Index), and pupillary reflex dilation using video pupillometry have shown promising results in analgesia/sedation assessment of critically ill adults, but future research is necessary to determine the benefits, harms, and feasibility of implementation in the ICU.

It is also worth mentioning that in a great number of patients, deeper levels of sedation in the first 48 hours after admission to the ICU remains frequent due to life threatening conditions (Slooter et al. 2017), like severe acute respiratory distress syndrome (ARDS), non-resolved status epilepticus (SE), intraabdominal hypertension (IAH), flail chest (FC), etc. In these cases, deep sedation level (RASS -4/-5) should be systematically achieved, as recommended in **Figure 1**, to secure lifesaving interventions without putting aside the assessment and management of analge-

Table 2. Non-pharmacological strategies for the prevention and management of delirium in the ICU for intubated and non-intubated patients

sia/sedation, non-pharmacological strategies to prevent delirium and the primal core of patient-oriented sedation and analgesia strategy, analgesia first attendance and minimal sedation (RASS +1/-1) as soon as the clinical condition of the patient allows it.

Non-Pharmacologic Interventions to Prevent Delirium

Delirium is a common acute brain dysfunction that affects critically ill patients. Even though delirium was first described 50 years ago, it still remains an underdiagnosed condition in the ICU. In a recent systematic review published by Wilson et al. (2020), delirium was defined as “a syndrome characterised by an acute change in attention, awareness and cognition, caused by a medical condition that cannot be better explained by a pre-existing neurocognitive disorder.” Multiple predisposing factors and several neurobiological processes that contribute to delirium pathogenesis are well exposed.

Evidence has been described in order to prevent, manage or treat delirium in important programmes such as the PADIS guidelines and the ICU Liberation (ABCDEF) bundle. In both of these, EM plays an important role to overpower many of the consequences of critical illness, such as delirium. Delirium prevention and management needs a multidisciplinary approach with routine delirium assessment and standardised EM protocols that are intimately related with minimising sedation, which means both spontaneous awakening trial (SAT) and spontaneous breathing trial (SBT) need to be in coordination (Trogrli et al. 2015).

Delirium has been associated with an increase in morbidity, mortality, LOS in the ICU and long-term cognitive impairment (Herling et al. 2018). Therefore, the need to assess and identify it is evident. The most common and preferred method to diagnose delirium in the ICU is the CAM-ICU. Delirium rates vary depending on the population that is studied and over the interaction of other 100 risk factors described in the literature.

The implementation of the correct measures for the prevention of delirium must be perceived with an equally reverberating power such as decrease in sedation (specially with the use of benzodiazepines), analgesic optimisation in the presence of pain (supporting non-pharmacological measures), considering physiological sleeping time (avoiding nocturnal procedures),

allowing sunlight exposure, avoiding restraints or any movement restriction and establishing effective communication channels between patient-staff and patient-family (Pandharipande et al. 2010; Devlin et al. 2018; Inoue et al. 2019; Smonig et al. 2019). A list of non-pharmacological strategies to prevent and manage delirium is described in **Table 2**.

Family Commitment and Empowerment

Frequently, it is perceived that the presence of family interferes with the work of healthcare providers (Smonig et al. 2019; Phipps et al. 2007; Weaver et al. 2012). Nonetheless, some benefits have been reported such as decrease in agitation, anxiety, confusion, clinical complications, LOS and a long-term improvement in cognitive performance. Additionally, there is a reduction in financial costs due to minimised time inside ICU and hospital, and reduction in clinical cognitive comorbidities (Heyland et al. 2016; Taneli et al. 2010). Moreover, other studies have found that the presence of a family member during CPR is associated with positive psychological effects like anxiety discount in those already mentioned. Along with this, understanding the effort being made by the personnel to preserve the patient’s life helped reduce LOS and legal conflicts were minor compared to non-present CPR (Fumagalli et al. 2006; Pun et al. 2021; Maclean et al. 2003; Compton et al. 2005; Halm et al. 2005; Terzi et al. 2008).

Methodically to have a satisfactory active participation of the family inside the ICU, instruction, education and cultural changes are needed. Also, family roles and functions, procedure explanation and possible outcomes should be explained to have an adequate dynamic. Social workers, nurses or other health care providers can serve as a bridge between ICU attendance and family if they have full understanding of the situation (Weaver et al. 2012).

Within the family roles, “decision making” is a corner stone. Basically, it’s taking the decision over receiving or not receiving certain interventions. A vast and easy understanding by the patient is needed to accomplish this properly (Weaver et al. 2012; Heyland et al. 2018). Shared family decision has to be an option to endure the stress of facing critical illness (Meyers et al. 2000; Trees et al. 2017; Buckey et al. 2012).

Accomplishing this role is tough when the patient is close to the end of their life, and an adequate coordination between the family is primordial. End of life decisions include initiating, continuing, containing or ending vital life support. The lack of family involvement in decision making is associated with unnecessary medical procedures and conflicts with the care taking staff (Meyers et al. 2000; Trees et al. 2017; Buckey et al. 2012). The key to this is exceptional communication.

A fundamental part of family empowerment is reducing the risk of PICS as much as possible. PICS will affect the family if the patient cannot overcome critical illness. Without a doubt, the patient’s family has a huge role to play and should be part of the multidisciplinary team. They are the ones who really appreciate the previous and actual state of the patient, their values, preferences and wishes. Together, decision-making and PICS prevention can improve patient outcomes and assure treatment adherence (Weaver et al. 2012; Heyland et al. 2018; Halm et al. 2005; Azoulay et al. 2003; Rodriguez et al. 2008). Henceforth, there is no place with a major need of active family participation than the ICU.

Conclusion

Providing humane practices will benefit everybody involved in the attention of a critically ill patient. The application of such practices can be easy to implement and with a low cost. The perception of the patient as a biological, psychological and social being is crucial for this matter. Opening the ICU for family members as well as accepting help from the whole multidisciplinary personnel is the only way of assuring a complete and integral approach. Humanised healthcare is a patient right, a family need and a healthcare obligation. H-ICU is the only way of structuring a high-grade ICU.

Conflict of interest

None. ■

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ICU is a Team Sport

The importance of creating a psychologically safe workplace and the need for a fundamental shift in workforce culture to foster compassionate leadership and collaborative approaches to delivering safe, supported care.

I write this almost one year to the day after the UK announced its first coronavirus pandemic lockdown. The next few months were full of confusion, uncertainty, and fear. The world was facing a threat it didn't recognise, didn't understand, and couldn't stop. People were arriving at hospitals with unusual symptoms and there was a very real risk that frontline healthcare staff would be infected by the very people they were trying to save. The outlook was bleak.

And for several months it was bleak. Daily reports of national deaths were increasing, prediction models weren't optimistic, health services in every country were treating more patients than their hospitals were ever meant to admit, and there was no signal that the virus was subsiding. But through this, through all the confusion and through all the fear, the international intensive care community came together. Online conference calls became a regular feature as teams from all over the world shared their experiences of COVID-19. Through these shared experiences we learned. We learned how to recognise patients most at risk of dying. We learned how to treat patients who were younger and sicker than we were used to seeing in the ICU. We learned about protective clothing. We learned how to set up emergency critical care units in a very short time. We learned how to save lives. But most of all we learned to cope.

A year on, the world is still reeling and it may be that things will never be entirely the same again. But some things for sure are more certain. Tens of thousands of patients have taken part in global research projects to help us understand what we are dealing with. We have evidence-based treatments that work. It is equally important that we have evidence to show which treatments don't work. After what is perhaps the most successful

scientific discovery and development programme the world has ever seen, we have several vaccines in circulation. And, despite the mutations in the virus, and the restrictions that are still in place in many countries, we have hope. We have hope because we were able to move quickly and deliver what the world needed. We have hope because we understood we were a community. We have hope because we shared.

Lessons learned through sharing experiences of the pandemic are not limited to medical care. More people than ever are finding they are struggling to sleep. Poor sleep is linked to a number of health problems including high blood pressure, low immunity, and poor mental health. Everyone should be looking for ways to maximise their sleep, aiming for 7-8 hours

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every night. It is perfectly normal for everyone to have a bad night's sleep every now and again. This is normal, and not something that people need to add to their daily worries. But some people are finding their sleep is disrupted more often, especially after the last year.

Sleep for shift-workers has always been problematic and tips for managing fatigue include short naps overnight to maintain cognitive function (drink your coffee immediately before napping for 15-20 minutes as the caffeine will just be start-

ing to take effect on waking), wearing sunglasses for the trip home after a nightshift to reduce the effects of morning light, and designing rotas that work with natural circadian rhythms.

The recent increase in sleep problems has led to the identification of Coronasomnia or COVID-somnia as the pandemic has been responsible for much of the change in sleep patterns and increased demand for sleep medications. Initially, for those in healthcare at least, this insomnia was fuelled by worries associated with the pandemic. Healthcare workers the world over were waking up in the middle of the night wondering how their patients from yesterday were doing, and how many new patients would come through the doors tomorrow. As treatments for patients admitted to hospital with COVID-19 have been identified, some of these uncertainties have been resolved but outside of the hospital, healthcare workers are still affected by all the same things that worry everyone else. Lockdown restrictions everywhere have put a strain on the economy. Job security isn't perhaps what it was. No activity is ever 100% safe but over the last year so much we have previously taken for granted now comes with an unknown risk of severe illness, or even death, from a danger we cannot control. There is a real risk of infection when mixing with others, and even with good quality PPE (which hasn't always been available), many healthcare workers have needed to use public transport to and from work where mixing with other people is unavoidable. Infection control and health protection measures mean that for many, their usual stress-relieving activities have been restricted, or even taken away altogether if they cannot be done alone. Holidays have been limited. Nothing seems normal. With all of this comes a collapse of the daily routine

and an increase in restlessness. It's no wonder our anxieties make themselves heard in the dark when we are alone with nothing but our thoughts to keep us company.

There is no silver bullet solution to chronic sleep problems. Medication is available but is really only intended to be used for short-term improvements. Understanding sleep in a more general sense is key to longer-term success and it is perhaps time to think about sleep in the same way that we do about exercise. In many ways sleep is exercise. Whilst we sleep our brains refresh themselves and revisit events to create memories. Improving sleep for patients admitted to ICU is part of the movement to humanise the ICU and, as we learn more about the healing role of sleep, we can focus more on sleep as a vital part of good health. As we encourage our patients to keep to a routine, to keep moving and to work with the natural rhythms of the day to maintain orientation we should do the same. Natural daylight is key to setting the body clock. We should all aim to spend some time every day outside, ideally in the morning. We should find the energy for exercise. It is much easier to fall asleep when we are physically tired. Good sleep hygiene practices also limit electronic screen use in the hours leading up to bedtime. Most phone/tablet screens emit a blue-tone light similar to the frequencies of natural daylight that trigger the brain to 'wake up'. The natural circadian rhythm expects a dulling of colour towards the red/orange end of the spectrum at the end of the day. Many operating systems can mimic this with 'night-time' settings but there are plenty of other good reasons why you shouldn't be working or 'doom-scrolling' just before bed.

The emotional burden that surrounds intensive care isn't something that only comes along with a pandemic. Even in the quiet times we need to remember how to care for ourselves, our friends, and our families. Even when life outside the hospital finds some kind of new normal, things may never return to normal for those who have been left with long-term effects. Recent events have highlighted just how important it is to understand mental wellbeing as well as physical health. This includes having a strong support network and a psychologically safe workplace.

A psychologically safe workplace needs to consider the system as a whole. It is not enough to focus on training the individual to manage their own wellbeing in isolation of other factors. Look after your colleagues. Ask if they are okay. The patient is not always in the bed. As we look ahead to what might be a period of respite from the relentless intensity of COVID-19, we need to take the time to reflect. As health systems around the world rebuild, now is the time to rebuild better. We have the opportunity to celebrate the incredible achievements and make permanent changes that will improve the way we care for our patients and for ourselves. There needs to be a fundamental shift in workforce culture to foster compassionate leadership

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and collaborative approaches to delivering safe, supported care to those who need it.

At the end of the summer last year coronavirus admissions to hospital and ICU were dropping and everyone was exhausted. The thought of "doing it again" was terrifying. As we head into summer again it is very clear that we have "done it again". We also know we may need to keep "doing this again" for some time. But it will be okay. It will be hard. There will always be those patients who stay with us forever but with the right support we can cope. We can face this together. We are a team.

Conflict of Interest

None. ■

Key Points

- The world is still reeling from COVID-19, and it may be that things will never be entirely the same again.
- However, some things are certain. Thousands of patients have taken part in global research projects; there is evidence of treatments that work and those that don't; there are several vaccines in circulation, and most of all, there is hope.
- Recent events have highlighted just how important it is to understand mental wellbeing as well as physical health.
- The recent increase in sleep problems has led to the identification of Coronasomnia or COVID-somnia as the pandemic has changed sleep patterns and has increased demand for sleep medications.
- There needs to be a fundamental shift in workforce culture to foster compassionate leadership and collaborative approaches to delivering safe, supported care to those who need it.


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Compassion and Humanism in the ICU – A Clinical Study

Importance and Objectives

To observe the impact and main contributing factors of stress, anxiety and depression among frontline staff in the intensive care units during the COVID-19 pandemic, and to determine if wellness resources are useful.

Design

Mixed method observational cohort study.

Setting and Participants

All frontline staff working in the intensive care units at one tertiary academic medical centre during the COVID-19 surge.

Main Outcomes and Measures

An online survey consisting of both closed and open-ended questions from validated screening instruments for generalised anxiety and depression was administered. Response rate was 33.5% (67/200), with most respondents being nurses.

Results

A majority of respondents reported excessive worry and difficult to control depressive symptoms. Women and nurses reported more of these symptoms compared with men and non-nurse healthcare workers, respectively. The predominant fears were for personal safety and for loved ones. Participants also reported moral dilemmas about patient care. Wellness resources were not found useful, especially by women and nurses. The qualitative analysis revealed compassion, communication, and empathy to be useful in mitigating the stress and depression from working on the frontlines during the pandemic.

Conclusions and Relevance

The pandemic continues to ravage populations and has a tremendous impact on the mental health of healthcare staff. Greater efforts must be made to listen to the feedback given by these workers to ensure creation and implementation of interventions with the greatest benefit.

Introduction

The COVID-19 pandemic gripped the world at the beginning of 2020, and quickly it was clear that Intensive Care Unit (ICU) staff would bear the brunt of managing thousands of critically ill and dying patients (Wu et al. 2005; CDC 2019). By March 2020, Boston was in the midst of its first surge and our hospital,

like others, was dealing with hundreds of patients in all standard ICU locations, as well as in surge ICU locations (non-traditional ICU spaces that were turned into ICUs). These surged ICUs were staffed by physicians, including residents and fellows, nurses, and certified registered nurse anaesthetists (CRNAs) deployed from non-ICU settings (Maves et al. 2020). Even before the pandemic,

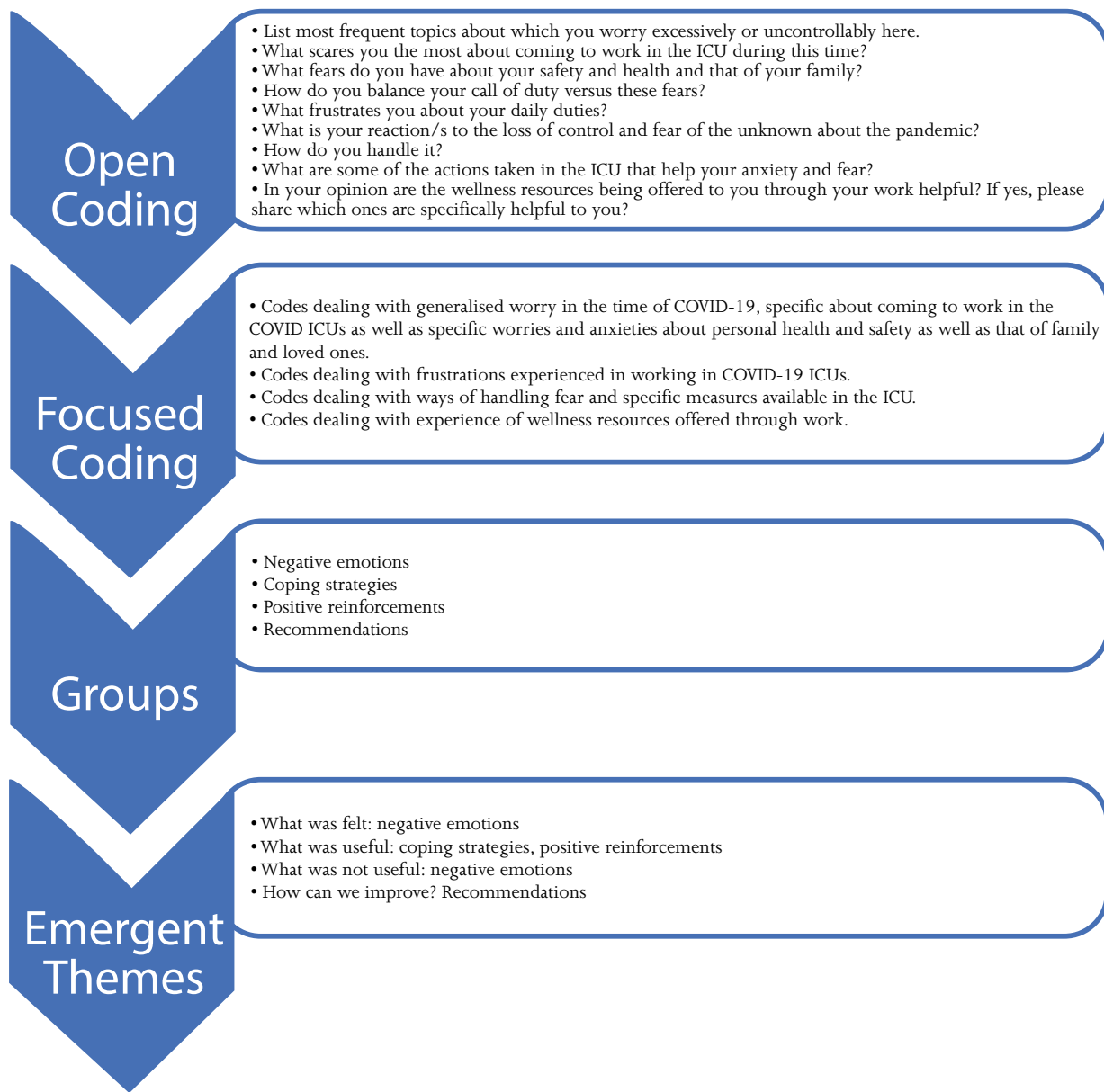


Figure 1. Qualitative analysis

there were high rates of anxiety, depression, and ethical and moral distress amongst staff in the critical care environment (Mealer et al. 2009). However, since the pandemic began, there has been an increase in reports of significant issues affecting the mental health of healthcare workers (HCWs) on the frontline of this crisis (Azoulay et al. 2020) as the pandemic has led to extraordinary amounts of stress on HCWs (Sasangohar et al. 2020). These stressors, which include increased workload, physical exhaustion, inadequate personal equipment (PPE), risk of nosocomial transmission, and the need to make ethically difficult decisions on the rationing of resources, may have dramatic effects on HCW's physical and mental well-being (French-O'Carroll et al. 2020) HCWs were also without their usual social supports due to isolation at work and home, which is required for infection control, and the sudden need to work different hours than they used to and in different locations (Epstein et al. 2019). HCWs are, therefore, especially vulnerable to mental health problems, including fear, anxiety, depression and burnout (Rossi et al. 2020). Hospitals and organisations have added a multitude of wellness programmes during the pandemic to provide staff with coping techniques, including online yoga sessions, meditation programmes, stress hotlines and other virtual group activities while maintaining social distancing (Walton et al. 2020).

The objective of this study was to describe the presence of anxiety, depression, ethical and moral distress among ICU HCWs based on job categories during the COVID-19 pandemic surge in our hospital, and to assess the value of wellness programmes offered in mitigating this stress. Our research questions were as follows: to what extent do ICU clinicians report anxiety or depression as a result of working during the pandemic? Do reports of these symptoms vary by gender or profession? How do clinicians describe specific concerns about work, family, or their personal health? Are workplace wellness programmes experienced as helpful in reducing symptoms of anxiety or depression?

Materials and Methods

This study was approved as exempt by our Institutional Review Board (obtained from BIDMC IRB protocol number 2020P000358, version 1). Between the months of March and May 2020, we

Characteristic	Number = 67
Role, No. (%)	
Resident	15 (22.4)
Fellow	0 (0.0)
Attending	3 (4.5)
Respiratory Therapist	3 (4.5)
Nursing Professional	44 (65.7)
Other	2 (3.0)
Gender, No. (%)	
Female	56 (84.9)
Ethnicity, No. (%)	
Hispanic or Latino	4 (6.1)
Not Hispanic or Latino	58 (87.9)
Prefer not to answer	4 (6.1)
Race, No. (%)	
White	54 (81.8)
Black or African American	0 (0.0)
Asian	3 (4.6)
Native Hawaiian or other Pacific Islander	0 (0.0)
American Indian or Alaskan Native	0 (0.0)
Multi-Racial	2 (3.0)
Other	7 (10.6)
Prefer not to answer	

Table 1. Self-reported characteristics of survey respondents (n=67).

conducted an online cross-sectional survey including 26 multiple choice and open-ended questions across all ICUs of the Beth Israel Deaconess Medical Center in Boston, USA. This is a 670-bed academic tertiary care hospital with 77 staffed ICU beds. Two surge ICUs were created to deal with the COVID-19 pandemic at the peak of the surge with 10 patient beds each. The survey link was advertised in all ICUs and weekly reminders were sent to all ICU staff.

We invited physicians, nurses, and respiratory therapists (RTs) as well as CRNAs who were deployed to work in ICUs due to the COVID-19 surge. A fact sheet describing the study was attached to the link for the survey and completion of the questionnaire implied their consent. The survey instrument was developed using validated questions from the generalised anxiety disorder (GAD) screening tool and the depression screening tool developed by the Anxiety and Depression Association of America (**Appendix I**). In addition, other open-ended questions, created iteratively by the authors following best practices in survey design, asked respondents how they managed fear, anxiety, loss of control and stress (Fowler 2002). Participants were asked to comment on their stress and anxiety levels felt during the pandemic surge at work and at home over two weeks immediately preceding when they took the survey. Additional survey items assessed degree of relief provided by departmental and hospitalwide wellness and stress mitigation programmes. Recognising the time sensitivity of the survey and the possible need for providing support to frontline HCWs, at the end of the survey all resources made available to hospital employees by the wellness committee were added as a link.

Statistical Analysis

Descriptive statistics were utilised to summarise the data: categorical variables were analysed by frequency count with percentage, and continuous variables were analysed using mean with standard deviation or median with interquartile range, depending on the distribution. Associations were evaluated between measures of anxiety and depression and characteristics such as gender and profession. Differences in ordinal responses created to measure anxiety and depression such as those ranging from “not at all” to “extremely” were assessed with a Mantel-Haenszel Chi-Square test or exact test, as appropriate. Differences in non-ordinal categorical responses were assessed using a Chi-Square or Fisher’s exact test, as appropriate. Statistical significance was defined as a two-sided p-value < 0.05. Statistical analysis was performed using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Qualitative Analysis

We conducted a content analysis of open-ended survey responses using a constructivist grounded theory approach. The eight open ended questions were initially analysed using open coding with colour highlights depicting various categories. These were then combined into groups using focused coding and subsequently emergent themes were developed from the focused coding categories. These themes were then triangulated with comparison to similar responses within the survey and verified by four separate authors (SS, MH, AL and TS). To ensure trustworthiness, both the quantitative and qualitative results were then discussed with a psychologist for better interpretation and understanding of the findings in light of stress from working on the frontlines during the pandemic. **Figure 1** shows the qualitative analysis and coding framework.

Results

Survey Respondents, Setting and Response Rates

The survey was conducted from March to May 2020, which was during the first surge in Massachusetts. The study was conducted in all medical and surgical ICUs, including the surge ICUs converted from post anaesthetic care units (PACU) in the hospital. Of the 200 frontline ICU staff, including physicians, nurses and respiratory therapists, we received a total of 67 responses for an overall response rate of 34%. All surveys were included in the analysis. Of the respondents, the majority (66%) were nursing professionals, including CRNAs. 27% were physicians, of which the majority were residents (22%) whilst only 5% were respiratory therapists. The normal ratio in ICUs of nurses to physicians to respiratory therapists generally follow this distribution as well. The majority of the respondents were female (85%) and mostly white (88%) (**Table 1**).

Generalised anxiety screening questions

Fifty-four percent of the participants said they felt excessive worry since the start of the pandemic, the symptoms of which included restlessness, irritability, trouble sleeping, easy fatigability, difficulty concentrating and muscle tension

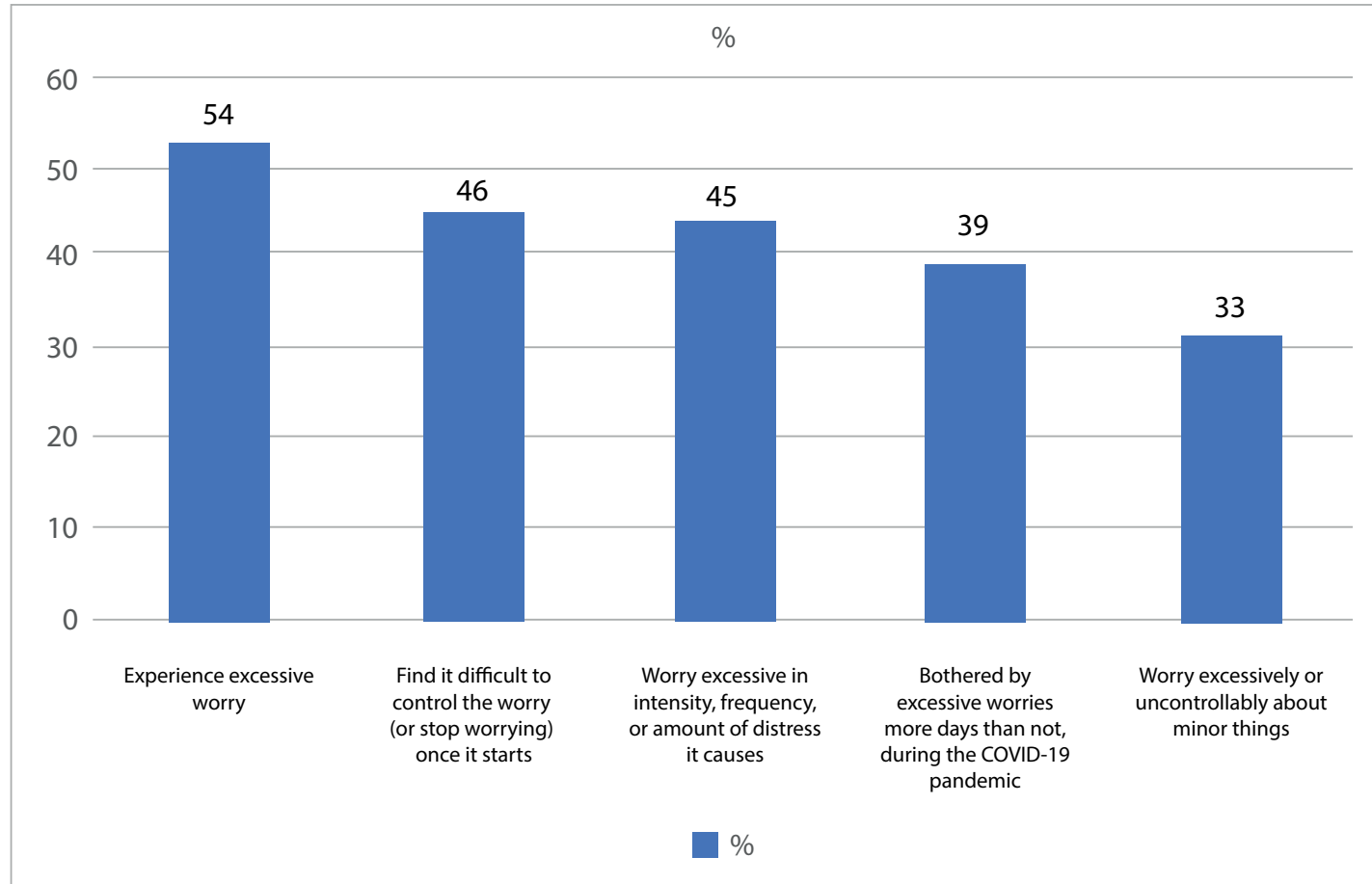


Figure 2. Responses to the question, "Are you troubled by the following since COVID 19 pandemic started?" based on the Generalized Anxiety Screening scale.

(Figure 2). Forty nine percent stated that this worry mildly or did not at all interfere with their life, work, and social and family interactions; 36% stated it moderately interfered, and 15% said that it severely or very severely interfered. When asked how much the excessive worry caused them distress, 44% stated not at all or mildly; 36% said moderately and 20% said severely or very severely.

Depression screening questions

When the participants were asked whether in the past two weeks they have been bothered by any the following problems, the responses were as follows: 39% stated they had little interest or pleasure in doing things for several days, 44% said they were feeling down, depressed or hopeless for several days; 35% felt they had trouble sleeping for several days; 41% stated they were

feeling tired or having little energy over several days; 31% were either overeating or had poor appetite over several days. However, when asked 'how difficult have the problems you experienced made it for you to do your work, take care of things at home, or get along with other people?' 55% stated 'somewhat difficult' and 15% stated 'very or extremely difficult' (**Supplemental Digital Content Figure 3**).

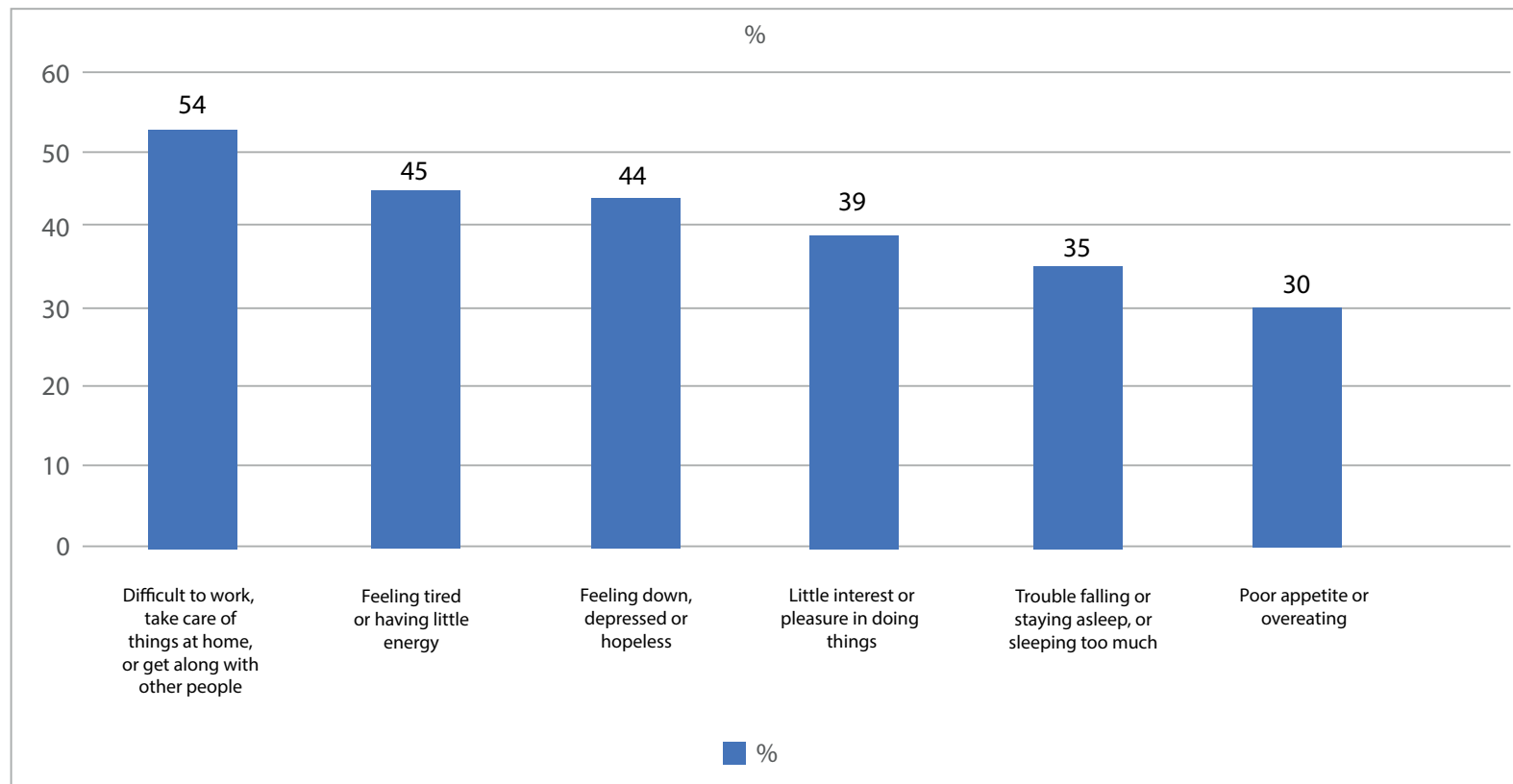


Figure 3. Percent of respondents responding they experienced depressive symptoms “several days” or more in the prior two weeks, based on the Depression Symptom Screening scale

Participant reports of helpfulness of hospital wellness resources

A specific question was asked whether the participant found the wellness resources being offered to them through their work helpful, and if so, which ones. Seventy percent of the respondents reported that these resources were not helpful.

Analysis of associations of findings with gender and profession

When feelings of worry were compared by gender, women were more likely than men to report that it was difficult to control this worry once it started (54% versus 11.1%, respectively, $p=0.027$).

Also, women were more likely to report that worry and physical symptoms interfered with their life, work social activities and family life as compared to men (56% of women felt this “moderately” to “very severely” versus 13% for men, $p=0.002$). Similarly, there is a significant difference in the number of depressive symptoms felt over several days by males and females, as 46% of women felt down, depressed or hopeless for several days, vs 25% of men ($p=0.048$) (Table 2). Women and nurses felt that wellness resources offered through work were not helpful, although this was statistically not significant. ($p=0.059$) (Table 3).

Qualitative Analysis Results

Emergent Themes as illustrated in Figure 1:

1. What was felt

Respondents reported worries and fears about their own safety, that of their families, and concerns about being able to adequately care for their patients, and these themes were frequently intertwined (Table 4). Themes included dealing with generalised worry in the time of COVID-19, specifically about coming to work in the COVID-19 ICUs, as well as specific worries and anxieties about

Characteristic	(n=56) No. (%) of women who are troubled	(n=11) No. (%) of men who are troubled	P-value
Find it difficult to control the worry (or stop worrying) once it starts	(n=50) 27 (54.0)	(n=9) 1 (11.1)	0.027
How much do worry and physical symptoms interfere with your life, work, social activities, family, etc.?	(n=50)	(n=8)	0.002
Not at all	3 (6.0)	4 (50.0)	
Mildly	19 (38.0)	3 (37.5)	
Moderately	19 (38.0)	1 (12.5)	
Severely	7 (14.0)	0 (0.0)	
Very Severely	2 (4.0)	0 (0.0)	
Feeling down, depressed or hopeless	(n=50)	(n=8)	0.048
Not at all	10 (20.0)	5 (62.5)	
Several days	23 (46.0)	2 (25.0)	
More than half of the days	13 (26.0)	1 (12.5)	
Nearly everyday	4 (8.0)	0 (0.0)	

Table 2. Comparison of anxiety and depression symptoms by gender (only significant findings shown)

personal health and safety as well as that of family and loved ones, including the prospect of death or being on a ventilator. Participants described specific safety concerns, especially in the surge ICUs which were open units with multiple COVID-19 patients. Many participants expressed personal concerns about burnout, particularly given the level of uncertainty about the future with an illness that had “no end in sight.”

Respondents expressed deep concerns about the ability to provide adequate patient care. A major concern was a lack of staff to care for more than one critically ill patient who required a high level of support. Many of the nurses were deployed from post anaesthesia care units and new to ICU protocols. Others voiced concerns of delivering futile or non-beneficial

care. One described it as “fear of harming patients by doing things to them that ultimately will not help.” Many respondents reported feelings of impotence with regard to improving patient outcomes. More than 50% of the nurses redeployed to the ICU from medical or surgical floors described this feeling of being inadequate.

One participant described the “nightmares” and “constant worry” related to her concerns for her patients, and how this could easily happen to her own family. They also frequently noted concerns about lack of resources in staffing and PPE, as well as numerous personal and professional sacrifices.

Staff also described the potential personal and professional sacrifices they experienced, or anticipated experiencing, due

to the pandemic. This included impacts on life events, such as upcoming weddings, and fears about impacts on training among residents.

2. What was useful

Themes dealing with ways of handling fear and specific measures available in the ICU

Some of the emotions reported were fear, anger, sadness, yet there was a display of teamwork, support and compassion which improved the morale of the HCWs, and increased job satisfaction. This embodiment of friendship, camaraderie, and support can be seen in this statement: “Sharing with other colleagues about them when we have the time. Teamwork: knowing that we have each other’s backs and are helping each other get through every shift. Having the extra help of redeployed “med-surg” nurses has been great. The intensivist staff has been amazing in assisting with and helping guide our care.” Another said, “Patients come first, and we need to get the job done. My fellow nurse friends build each other up!”

3. What was not useful

Themes dealing with experience of wellness resources offered through work

These were not used widely or considered useful. However, positive reinforcements such as town halls, reassurances, compassionate peer support and empathy helped a lot. One respondent mentioned the song played when COVID-19 patients were extubated, “I feel good when the ‘Sweet Caroline’ plays over the hospital speakers. It makes all the work and stress worth it that some patients are making it home.” When asked what was helpful, one said “a manager that communicates with their staff.”

4. How can we improve?

Respondents suggested better teamwork as they found the peer support helpful, as well as communication with managers and leadership. One participant stated, “being with my co-workers as we are all in this together” as a benefit. Another said, “Just seeing how my boss goes about her business is very inspiring. Also, the entire team. It motivates. Therefore, I have no time for anxiety or fear.”

Symptom	(n=23) No. (%) of non-nurses	(n=44) No. (%) of nurses	P-value
Difficulty falling/staying asleep or restless/unsatisfying sleep	(n=18)	(n=41)	0.02
Not at all	6 (33.3)	3 (7.3)	
A little bit	2 (11.1)	5 (12.2)	
Moderately	3 (16.7)	6 (14.6)	
Quite a bit	5 (27.8)	17 (41.5)	
Extremely	2 (11.1)	10 (24.4)	
Muscle tension	(n=18)	(n=41)	0.003
Not at all	8 (44.4)	3 (7.3)	
A little bit	4 (22.2)	8 (19.5)	
Moderately	1 (5.6)	8 (19.5)	
Quite a bit	4 (22.2)	14 (34.2)	
Extremely	1 (5.6)	8 (19.5)	
Trouble falling or staying asleep, or sleeping too much	(n=18)	(n=41)	0.026
Not at all	7 (38.9)	3 (7.3)	
Several days	5 (27.8)	16 (39.0)	
More than half of the days	4 (22.2)	11 (26.8)	
Nearly everyday	2 (11.1)	11 (26.8)	
Feeling tired or having little energy	(n=18)	(n=41)	0.029
Not at all	6 (33.3)	1 (2.4)	
Several days	5 (27.8)	19 (46.3)	
More than half of the days	6 (33.3)	12 (29.3)	
Nearly everyday	1 (5.6)	9 (22.0)	

Table 3. Comparison of anxiety and depression symptoms by profession (only significant findings shown)

Discussion

This study explored the feelings of stress and depression experienced during the COVID-19 pandemic by frontline staff including

physicians, nurses and respiratory therapists in the ICU. Of the 200 staff members deployed to these ICUs during the pandemic from March to May 2020 in one tertiary care hospital, 34%

responded to an anonymous online survey. The mixed methods methodology provided another dimension to understand the quantitative as well as qualitative responses on stress, worry and depression (Sharour et al. 2019).

The results suggest that women and nurses were especially susceptible to worry, depression, and feelings of despair on the frontlines as compared to other professionals. They also felt that the wellness resources offered to them through work were not helpful. The worry felt by the survey participants during the early months of the COVID-19 pandemic was about personal health and safety as well as that of their family and loved ones. The areas that were uncovered from the qualitative data also focused on personal safety and health, including burnout and mental fatigue, as well as concern for others. Participants felt worried about working outside their scope of training or experience. Another area of anxiety was staff and PPE shortage, as well as personal finances and career prospects due to disrupted training. There was evidence of work-related pressure and feelings of guilt about sacrificing personal responsibilities and those towards their families. They feared dying alone as they agonised over their patients dying without loved ones near.

When asked to discuss frustrations experienced whilst working in COVID-19 ICUs, respondents expressed moral dilemma and stress about delivering futile care at times when the prognosis of their patient was dire, anxiety about personal skills when faced with extremely sick patients, especially as some staff were redeployed from inpatient, non-ICU floors. They also feared limited resources, stretched staff, changing policies and uncertainty of the future. This was especially voiced when surge ICUs were announced, resourced and staffed within days due to rapid changes in the work environment and local peer support systems. The discomfort of wearing PPE for long hours and the heavy workload experienced was also a source of burnout. Most respondents, especially women and nurses, did not find any of the wellness resources such as yoga classes, meditation websites and online courses useful. Their main worries were not addressed by this information and offerings. What participants found immensely useful was the peer support, compassion and camaraderie felt whilst working on the frontlines

Theme	Subthemes	Example quotes
Personal and family safety and health	Fear of infection, critical illness, and death Uncertainty about the future “No end in sight”	“I worry I will get COVID and end up on a vent. I worry I will bring it home to my family.” “Infecting my loved ones with COVID. Am I going to get COVID with the lack of PPE?” “How long will this last? Will my family get the virus and die? How much longer can we work like this without losing it?” “Concern for my safety and the safety of those around me. Worry about the future.” “Having no end in sight compounded with the day-to-day risk of exposing my family.”
Patient care and working conditions	Staffing shortages Lack of resources Extreme workload Concerns about delivering futile or non-beneficial care.	“[I am frustrated about] having limited resources and feeling like I work in a third world country. Not being able to take care of my patients the way they deserve because I'm stretched so thin and my workload is so heavy.” “Being short staffed and being stretched to max, not being able to provide the proper care because of shortage of meds and staff.” “I never know what unit I will be assigned to until I arrive at the hospital. I don't know the people I am working with, where supplies are. The assignments are very heavy and there is no one to help.” “How long can I take care of these extremely critically ill patients in these atrocious staffing ratios; when will I get burned out?” “I am less scared of getting COVID than I used to be. Now I'm more anxious about the working conditions and getting an overwhelming assignment that would have once been considered inappropriate and unsafe.” “I usually worry about how to handle COVID patients properly, doing the right thing for them, and how to best protect myself from being exposed.”
Personal/professional sacrifices	Impact on personal/family life Impact on training	“I really am so freaked out about taking good care of my patients --which is completely overwhelming--that I really don't think about myself. I moved out of my house to keep my partner safe and because I couldn't cope with being around anyone when I got home.” “I also worry about effects of COVID on my personal life and my family contracting the virus.” “I worry about getting COVID or exposing others to it, whether I will get the residency training I need to be an attending. I worry about my family and when I will see them again.”

Table 4. Themes and subthemes in responses to open-ended items about participant worries, fears, and frustrations, with example quotes (n=67).

and when empathetic communication was offered by managers and leadership, in the shape of town halls or meetings. This was echoed by all professionals on the frontlines.

Supplemental Digital Content **Figure 4** depicts some of the possible ways in which such compassionate support can be offered to ICU frontline staff. These include daily sessions to listen to the staff and

hear them out, being sensitive and mindful to their feelings and emotions, compassionate communication with trained leaders and to complete the feedback loop with giving explanations on actionable points raised. This will establish trust and build an empathetic and meaningful relationship which allows staff to work with a clear message that they are cared for and their genuine worries are heard.

Limitations

Our study had several of the limitations that come inherently with survey research. One general limitation is the oversimplification of what is the reality being experienced (Jick 1983). The arbitrary design of questionnaires and multiple-choice questions with pre-conceived categories represents a biased and overly simple

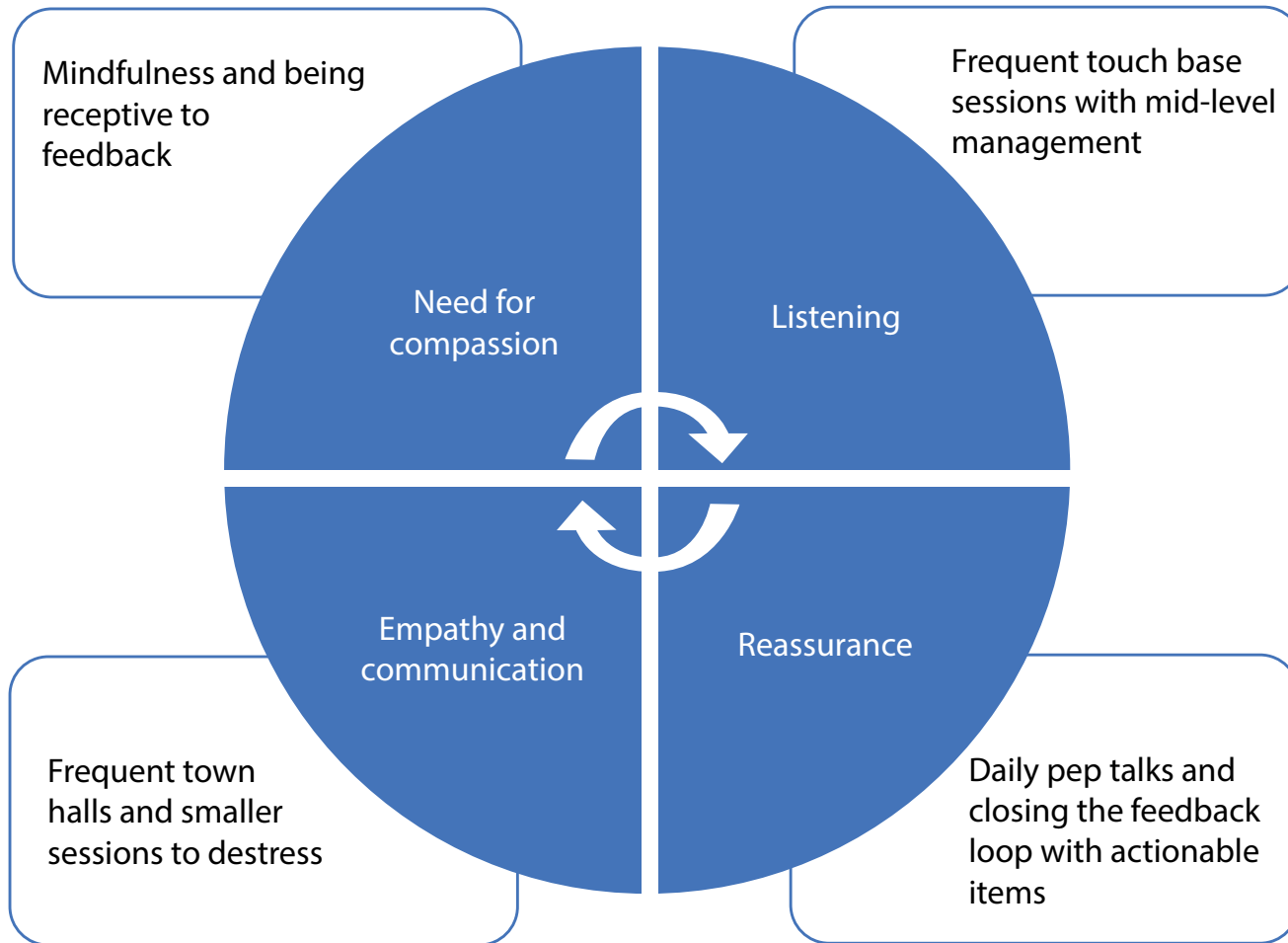


Figure 4. Possible actions taken by management to mitigate staff stress and anxiety

view of reality and capturing only a single moment rather than a period of time. However, we attempted to overcome some of this bias by using validated anxiety and depression screening questionnaires. Also, the use of qualitative methods in addition to the quantitative survey and use of triangulation attempts to reduce the

weaknesses and limitations of the cross-sectional surveys (Cook and Reichardt 1979). Our response rate was roughly the average rate surveys may yield. This is a combination of the 'survey fatigue' experienced in medicine, and the extremely busy schedules of the cohort being surveyed during the pandemic.

Conclusion

The first surge of the pandemic drained frontline workers in the ICU (Schwartz et al. 2020) They experienced anxiety, depression and stress. Numerous studies from across the world have revealed similar results (Cai et al. 2020; Hofmeyer et al. 2020). Health-care providers showed their resilience and the spirit of professional duty to overcome these difficulties (Adams and Walls 2020). Leaders need the knowledge, skills and behaviours to create and sustain cultures of compassion and kindness. Comprehensive support should be provided to safeguard the wellbeing of these healthcare providers. Our study shows that compassion and regular and reassuring communication with leaders and peers prove more useful than wellness resources in mitigating the stress of working in the pandemic and motivating the staff. This communication is vital to promote preparedness and efficacy in crisis management.

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Conflict of Interest

None. ■

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Appendix I. Survey instrument
A. Demographics:

Gender: _____ Profession: _____

B. GAD (Generalised anxiety disorder) screening tool:

1. Are you troubled by the following since the COVID-19 pandemic started?	
<input type="checkbox"/> Yes <input type="checkbox"/> No	Do you experience excessive worry?
<input type="checkbox"/> Yes <input type="checkbox"/> No	Is your worry excessive in intensity, frequency, or amount of distress it causes?
<input type="checkbox"/> Yes <input type="checkbox"/> No	Do you find it difficult to control the worry (or stop worrying) once it starts?
<input type="checkbox"/> Yes <input type="checkbox"/> No	Do you worry excessively or uncontrollably about minor things?
<p>Please list below the most frequent topics about which you worry excessively or uncontrollably. List most frequent topics about which you worry excessively or uncontrollably here.</p>	

<input type="checkbox"/> Yes <input type="checkbox"/> No	During the COVID-19 pandemic, have you been bothered by excessive worries more days than not?
--	---

During the past few weeks have you often been bothered by any of the following symptoms? Check one square next to each symptom that you have had more days than not:									
	Not at all		A little		Moderately		Quite a bit		Extremely
	0	1	2	3	4	5	6	7	8
a. restlessness or feeling keyed up or on edge	0	1	2	3	4	5	6	7	8
b. irritability	0	1	2	3	4	5	6	7	8

c. difficulty falling/staying asleep or restless/unsatisfying sleep	0	1	2	3	4	5	6	7	8
d. being easily fatigued	0	1	2	3	4	5	6	7	8
e. difficulty concentrating or mind going blank	0	1	2	3	4	5	6	7	8
f. muscle tension	0	1	2	3	4	5	6	7	8

How much do worry, and physical symptoms interfere with your life, work, social activities, family, etc.?

0	1	2	3	4	5	6	7	8
None	Mild		Moderate		Severe		Very Severe	

How much are you bothered by worry and physical symptoms (how much distress does it cause you)?

0	1	2	3	4	5	6	7	8
None	Mild		Moderate		Severe		Very Severe	

C. Depression Screening tool:
1. Over the last two weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half of the days	Nearly every day
1. Little interest or pleasure in doing things	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Feeling down, depressed, or hopeless	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Trouble falling or staying asleep, or sleeping too much	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Feeling tired or having little energy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Poor appetite or overeating	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Trouble concentrating on things such as reading the newspaper or watching television	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Moving or speaking so slowly that other people could have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. If you clicked on any problems above, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all Somewhat difficult Very difficult Extremely difficult

D. Please see some open-ended questions:

1. What scares you the most about coming to work in the ICU during this time?
2. What fears do you have about your safety and health and that of your family?
3. How do you balance your call of duty versus these fears?
4. What frustrates you about your daily duties?
5. What is your reaction/s to the loss of control and fear of the unknown about the pandemic? How do you handle it?
6. What are some of the actions taken in the ICU that help your anxiety and fear?

E. In your opinion are the wellness resources being offered to you through your work helpful?

a. Yes b. No

F. If yes, please share which ones are specifically helpful to you.



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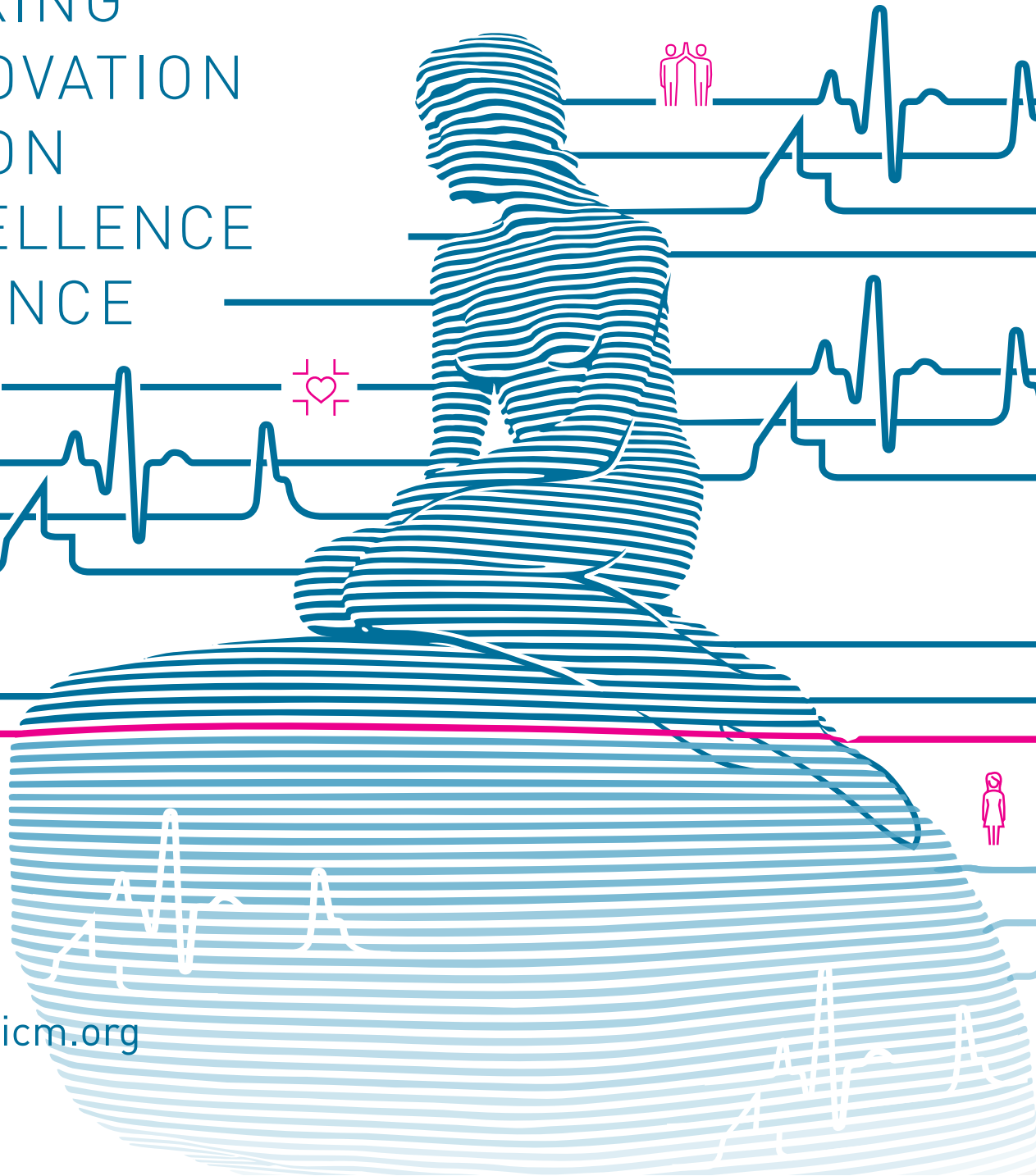
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Introduction

Intensive care physiotherapists often rely on standard assessment tools, such as measures of physiological function (arterial blood gases), adequacy/quality of lung aeration through lung auscultation and the portable chest radiograph to guide clinical decision making at the bedside (Hanekom et al. 2007). However, the reduced diagnostic accuracy of the chest radiograph and lung auscultation when compared with lung ultrasound (Xirouchaki et al. 2011; Hansell et al. 2021) may have significant impact on physiotherapists clinical decision making at the bedside (Xirouchaki et al. 2014), which must be addressed. The main reasons to add point-of-care ultrasound (POCUS) as a new diagnostic tool to the standard assessment by intensive care physiotherapists include the increasing evidence-base for its excellent diagnostic accuracy and real-time bedside non-invasive monitoring capabilities (Via et al. 2012; Volpicelli et al. 2012).

Intensive Care Physiotherapists Should be Using Point of Care Ultrasound (POCUS)

An overview of the potential of point-of-care-ultrasound on clinical decision making at the bedside and the need to add POCUS as a new diagnostic tool to the standard assessment by intensive care physiotherapists.

Relevance of POCUS to Physiotherapists for Clinical Decision Making in Chest Physiotherapy

The chest radiograph is commonly used to both identify lobar collapse and establish the response to therapeutic interventions. The chest radiographic resolution of acute lobar collapse to intensive care physiotherapy ranges from 60% when the physiotherapy intervention includes patient re-positioning (collapsed lobe uppermost), airway suctioning and manual lung hyperinflation compared with only 8% resolution when the physiotherapy intervention includes manual lung hyperinflation and airway suctioning (Stilleret et al. 1990; Stiller 1996; Stiller 2013). We however, propose that before we can select the most appropriate physiotherapy interventions, we must select the most appropriate diagnostic pathologies for therapeutic intervention. The reduced diagnostic accuracy of the chest radiograph to detect lobar collapse/consolidation compared to the gold standard of CT scan (Xirouchaki et al. 2011; Hansell et al. 2021), indicates that these earlier intensive care physiotherapy trials (Stiller 1996) may have included patients with other conditions such as pleural effusions, not expected to respond to intensive care physiotherapy. Hence, physiotherapists use of a less than optimal diagnostic tool may lead to ineffective and or inappropriate chest physiotherapy treatments (Templeton and Palazzo 2007; Patman et al. 2009; Leech et al. 2015).

Another issue that clinicians face is that the routine daily chest radiograph may no longer be the norm for intensive care, with on-demand imaging becoming a more common strategy (Lakhal et al. 2012). Hence, unless the acute lobar collapse

causes clinical deterioration (e.g. arterial desaturation) then a chest radiograph may not be ordered and remain undetected. But more importantly, as the portable chest radiograph is less accurate than point of care lung ultrasound for the detection of lung collapse/consolidation, pleural effusion, pulmonary oedema or pneumothorax (Xirouchaki et al. 2011), clinicians need to address this challenge.

POCUS shows high diagnostic accuracy for detecting pulmonary oedema with a sensitivity and specificity of 88% and 90%, respectively (Maw et al. 2019). In patients with acute respiratory failure, POCUS has a sensitivity and specificity ranging from 91 to 100% and 78 to 100%, respectively, to detect lung consolidation (Hew et al. 2015). For diagnosing pleural effusion and pneumothorax, accuracy of lung ultrasound is over 90% and 98%, in terms of sensitivity and specificity, respectively (Alrajhi et al. 2012; Youssefifard et al. 2016). So, POCUS should be of great interest to the physiotherapist to rule in pulmonary conditions which may benefit from chest physiotherapy (e.g. lung consolidation) or rule out non-indication or contra-indication for chest physiotherapy (e.g. pleural effusion, pneumothorax).

POCUS is also useful for the evaluation of diaphragmatic function and mechanical ventilation weaning suitability (Zambon et al. 2013). The physiotherapist could use diaphragm ultrasound to detect diaphragm dysfunction during the spontaneous breathing trials which may be predictive of extubation failure (Le Neindre et al. 2021). Interventions such as inspiratory muscle training (IMT) improve not only inspiratory muscle strength but may also reduce weaning time from mechanical ventilation



Figure 1. CXR report day 1 post heart/lung transplantation with oral intubation peri-hilar airspace opacification and minor blunting of left costophrenic angle which may represent a small effusion

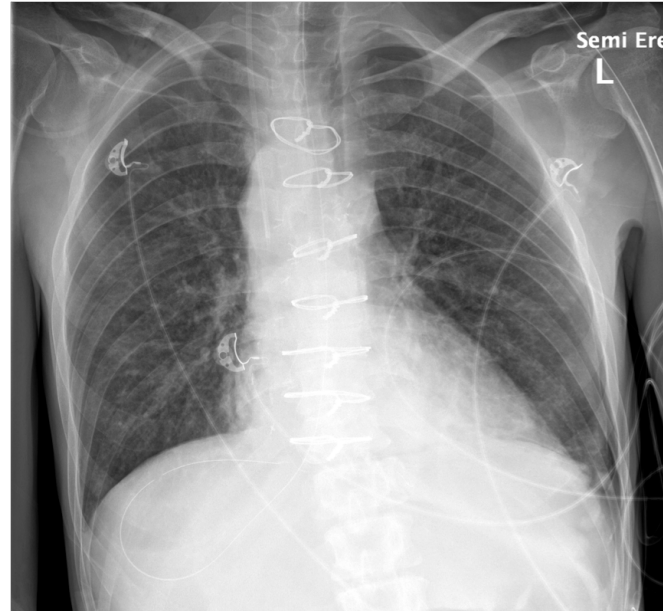


Figure 2. Chest radiograph 11 days after surgery reported by radiology as minor bilateral lower lobe atelectasis

(Elkins and Dentice 2015; Bissett et al. 2016; Vorona et al. 2018; Ahmed et al. 2019; Worrapphan et al. 2020). Hence, diaphragmatic ultrasound could be used for the assessment of the effects of IMT (Dres et al. 2017).

The assessment of the chest physiotherapy efficacy is challenging, and POCUS may provide useful information on the patient's response to therapeutic interventions and is indeed the purpose of a current trial (<http://www.anzctr.org.au/Trial/Registration/TrialReview.aspx?id=376222>).

Indeed, as POCUS is a repeatable, non-invasive and radiation-free tool it allows a real time assessment of therapies which aim to improve alveolar recruitment. Previous studies have demonstrated the capacity of POCUS to detect changes in lung aeration during alveolar recruitment by positive-end expiratory pressure, antibiotic therapy or haemodialysis (Bouhemad et al. 2010;

Bouhemad et al. 2011; Noble et al. 2009). Hence, we should be able to extrapolate that POCUS could assist the physiotherapist to monitor the impact of a chest physiotherapy intervention on lung recruitment (Cavaliere et al. 2011).

Not surprisingly, physiotherapists now advocate for the use of POCUS (Le Neindre et al. 2016; Hansell et al. 2021), especially to guide physiotherapy clinical decision making (Leech et al. 2015; Hayward and Janssen 2018; Hayward et al. 2020; Vieira et al. 2020).

Further Perspectives

The challenge we face is to try to incorporate new potentially more accurate and appropriate diagnostic tools into our clinical and research practice. A current international trial by Le Neindre et al. (<https://clinicaltrials.gov/ct2/show/NCT02881814>) may

provide guidance and impetus for physiotherapists to incorporate POCUS into clinical decision making for respiratory physiotherapy in intensive care. However, one of the key issues that must be addressed is how we best define and deliver the optimal training programmes to skill physiotherapists to become competent in POCUS (Tutino et al. 2010; Cuca et al. 2013; Hulett et al. 2014; Greenstein et al. 2017; Williamson et al. 2017; Arbelot et al. 2020). There are many other current issues around the role of physiotherapy within critical care (Ntoumenopoulos et al. 2018) (e.g. 24/7 access, respiratory versus rehabilitation focus, limited physiotherapy staffing to patient ratios, skill-mix), and hence it will be a challenge for our clinicians to feasibly incorporate another diagnostic tool with busy clinical caseloads. However, with POCUS, we have the potential for the more accurate diagnoses of conditions such as lung collapse/consolidation (as distinct from pleural effusions), to enable the more appropriate delivery of interventions and monitoring the response to therapy. This may allow physiotherapists to prioritise patients with indications for chest physiotherapy, and reduce less appropriate interventions which are time-consuming and have the potential for patient harm (Leech et al. 2015). Such tools will also enable us to determine the prevalence of acute pulmonary conditions such as lobar collapse and an understanding of its potential impact on patient outcome, in addition to the role of physiotherapy. This should expand our understanding of the pulmonary conditions that may optimally be managed through physiotherapy and hence question some of the current evidence-based recommendations (Stiller 2013).

Case Report Summary

Here we detail a case report managed in intensive care to highlight the limitations of utilising standard assessment tools such as the portable chest radiograph for physiotherapy and medical clinical decision making.

This subject, a 48-year-old male (170 cm, weight 73 kg, BMI 25.25), underwent a heart and lung transplant via median sternotomy. The subject's admission APACHE II score was 7 and relevant past medical history included severe congenital cardiac disease, with a ventricular septal defect, severe pulmonary

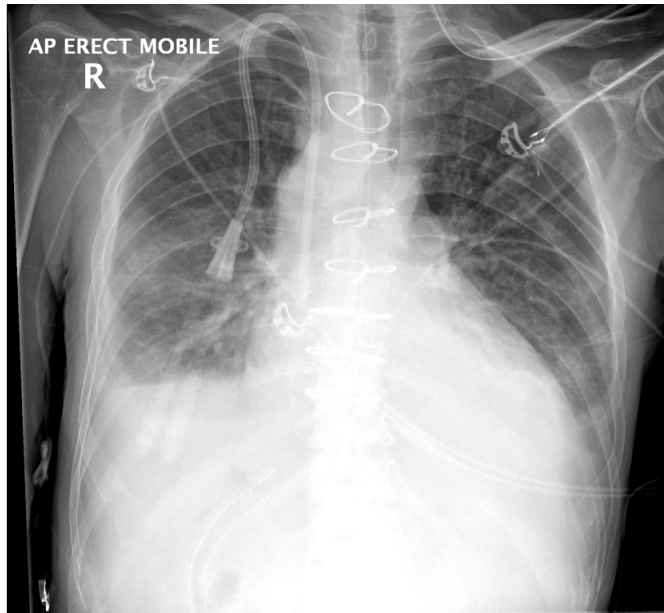


Figure 3. CXR 19 days after surgery with radiology reporting as small bilateral effusions

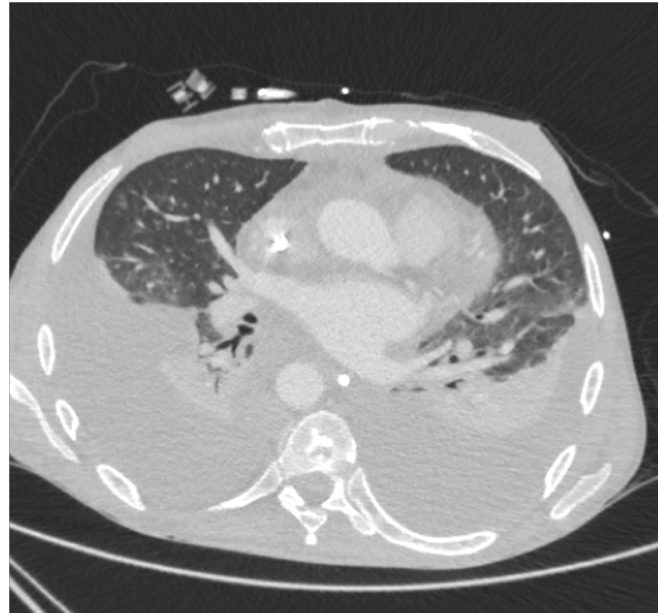


Figure 4. Thoracic CT scan 21 days after surgery of large bilateral pleural effusions with compressive atelectasis

hypertension and atrial fibrillation, complicated by a recent cerebrovascular accident with limited residual limb weakness. The subject's total intensive care length of stay was 61 days, comprising of invasive mechanical ventilation for 8.2 days and 13 hours of non-invasive ventilation. During the ICU stay, the subject required a total of 88 sessions of physiotherapy that predominantly included chest physiotherapy such as postural drainage, manual chest wall techniques, airway suctioning, saline lavage (during intubation and mechanical ventilation) and once the patient was extubated frequent multiple nasopharyngeal suctioning interventions were required due to weak ineffective coughing. The subject's total hospital length of stay was 114 days.

Considering the prolonged ICU-stay requiring intensive daily physiotherapy, for the purposes of this manuscript we have selected key clinical events (day after surgery) and two

key physiotherapy assessments/interventions (out of the total of 88 physiotherapy interventions), that highlight the role of POCUS and clinical decision making by physiotherapy and the medical team.

Physiotherapy assessment/intervention day after surgery (intubated and ventilated)

The day after heart-lung transplantation the chest radiograph was reported by radiology (**Figure 1**) as peri-hilar airspace opacification and minor blunting of left costophrenic angle which may represent a small effusion.

However, the POCUS examination indicated due to hypoxaemia was undertaken by the physiotherapist on the same day after surgery (https://www.youtube.com/watch?v=nm0AWms9_EM) and demonstrated significant right lower lobe consolidation (tissue-like pattern arising from the visceral pleura with complete

lobar consolidation, hyperechoic areas within the consolidation indicative of air bronchograms and anechoic linear forms surrounding by hyperechoic lines suggestive of fluid bronchograms). These POCUS findings were not in keeping with the chest radiograph findings and influenced the physiotherapist to provide more aggressive patient re-positioning into left side-lying and manual chest physiotherapy techniques and endotracheal airway suctioning to assist secretion clearance.

The subject was extubated 4 days after surgery but required reintubation after 10 hours due to respiratory failure and secretion retention. The subject then remained on mechanical ventilation for further 4 days and was then successfully re-extubated.

Physiotherapy assessment/interventions after endotracheal extubation

Three days after the successful second extubation (11 days after surgery), the physiotherapist reported on clinical examination with lung auscultation the subject had good breath sounds throughout associated with fine inspiratory crackles in the lower lobes. The chest radiograph was reported by radiology as minor bilateral lower lobe atelectasis (**Figure 2**). The subject also reported significant physical fatigue associated with haemodialysis leading to increased difficulty clearing airway secretions. The subject also required high flow oxygen therapy via nasal prongs (FiO₂ 0.3 at 40 Lpm).

The POCUS examination on the same day 11 days after surgery however demonstrated dense left lower lobe hypoechoic consolidation (<https://www.youtube.com/watch?v=JrH7pf5n3UQ>) with complex effusion with swirling hyperechoic particulate matter noted during respiration. The physiotherapists on this same day provided four chest physiotherapy interventions including nasopharyngeal airway suctioning during the day up to the early evening (1900 hrs, late shift) due to concerns with secretion retention presumably as a result of the dense left lower lobe consolidation evident on the POCUS examination and weak ineffective cough, with the nasopharyngeal suctioning productive of large volumes of tenacious secretions.

Nineteen days after surgery the subject was reviewed by physiotherapy during the haemodialysis session (out of the ICU), due to concerns about secretion retention and an ongoing respiratory review with the chest radiograph on this day (**Figure 3**) radiology report as small bilateral effusions.

POCUS was undertaken by the physiotherapist during this assessment on day 19 after surgery and they had identified moderate to large sized anechoic bilateral pleural effusions that approximated 4 cm in transverse depth (<https://www.youtube.com/watch?v=mQnj1xFtixs>; <https://www.youtube.com/watch?v=D9Aqhj3uYFE>). The physiotherapy treatment required at this stage still included nasopharyngeal suctioning that was productive of moderate creamy purulent secretions and the ICU medical team was updated about these POCUS findings of pleural effusions.

On day 21 after surgery the ICU team ordered a CT scan of the thorax (**Figure 4**) which had confirmed the POCUS findings of pleural effusions on day 19 after surgery (<https://www.youtube.com/watch?v=mQnj1xFtixs>; <https://www.youtube.com/watch?v=D9Aqhj3uYFE>). The following day on day 22 after surgery, bilateral chest drains were inserted by the medical team for the drainage of these pleural effusions.

In summary, the physiotherapist-initiated POCUS assessments led to changes in physiotherapy management leading to more

aggressive chest physiotherapy intervention, especially on the findings on Day 1 and 11 after surgery where the ultrasound demonstrated dense right (Day 1) and left lower lobe (Day 11) consolidation, which did not concur with the same day chest radiograph findings. In addition, physiotherapist-initiated POCUS identified significant pleural effusions (later confirmed by CT scan) that resulted in a change of medical management. Of note also vocal cord dysfunction was identified by both laryngeal ultrasound (Fukuhara et al. 2018) performed by the physiotherapist that concurred with the simultaneous fiberoptic endoscopic evaluation of speech by the speech and language pathologist on Day 43 after surgery. We surmised that the vocal cord dysfunction (severe loss of sensation of vocal cords) may have facilitated the passage of the nasopharyngeal suction catheter past the vocal cords for secretion clearance by physiotherapy.

For POCUS to be adopted by physiotherapists within intensive care (Ntoumenopoulos and Hough 2014), there are a few challenges ahead. Current international recommendations for training in point of care ultrasound, advocate a combination of theory with mentored bedside training (Volpicelli et al. 2012). A recent study reported that in addition to preliminary theory and practical based training, at least 25 lung ultrasound examinations supervised by an expert are required for novice clinicians (including non-physicians) to acquire the basic skills for diagnosing normal

lung aeration, interstitial-alveolar syndrome, and consolidation in emergency and critically ill patients (Arbelot et al. 2020).

Beyond the potential for POCUS to discern whether chest physiotherapy is indicated, it may also be of use to non-invasively assess the effect of the interventions, such as patient re-positioning, manual or ventilator hyperinflation to recruit collapsed lung (Cavaliere et al. 2011), rather than patients having to undergo repeated exposures to radiation with sub-standard diagnostic tools such as the chest radiograph. The challenges to be faced include the provision of adequate training, mentoring and support from experienced mentors for physiotherapists to acquire POCUS skills. Support from the wider multidisciplinary teams within ICU may be an ideal means to initiate this kind of support. Further research must also identify the impact of POCUS on physiotherapists clinical decision making, the ability of POCUS to determine the effect of the various physiotherapy interventions on lung re-aeration and weaning from mechanical ventilation if clinicians are to be encouraged to adopt this new and evolving diagnostic skill.

Conflict of interest

None. ■

*Patient consent was obtained for the use of clinical information and images/videos.

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Top Five Priorities for a New ICU Director During the First Year

During the first year, the ICU director should take a snapshot of the ICU situation and invest time and resources to acquire good and real data that will drive priorities of care and management. After that, implementation of basic protocols and creating a programme to engage and protect the staff against burnout should be considered. Finally, we suggest integrating research and educational activities into the ICU routine.

Introduction

The role of an Intensive Care Unit (ICU) director represents both a tremendous opportunity and a huge responsibility. One important question is “how to prioritise actions” in case you were promoted in your own institution or if you were hired and don’t know much about your new team and the new environment. In this brief review, we suggest top five priorities for a new ICU director during the first year.

A snapshot: institutional culture, your introduction, a diagnosis of ICU structure, staff, process and outcomes

The institutional culture can be defined as the purposes, actions and values that drive the organisation to meet their goals. It is crucial that as a new manager you understand the organisation’s culture and are aligned with these values. After that, if you decide to go ahead, it is important to introduce yourself to the team. A formal meeting to present your goals focusing on transparency and tangible objectives is recommended. If you are new in the institution it is important to use the first weeks to observe and learn about the environment, the unit’s business and to create connections with key stakeholders and others institutional leaders (inside and outside the ICU) (Nguyen 2018).

The next step is to take a snapshot of the ICU. A “Donabedian” approach of structure, process and outcomes is a good framework. First of all, evaluate if the ICU accomplishes the minimum requirements for critical care departments according to your local regulations. Several intensive care societies as well legislative documents (e.g., Brazil – RDC 7) were published in the last decade and should be used as a baseline (Brazilian Health Surveillance Agency 2010). This evaluation starts with a careful check of ICU design, size, availability of equipment as well as profile and quantitative evaluation of the multidisciplinary staff. During this initial evaluation, it is important to assess the operational routine and expansion capability and if the ICU team is responsible for critical ward patients in routine situations or in catastrophes or surges such as in the SARS-Cov2 pandemic (Aziz et al. 2020). Map the existing main processes of care and available patients’ outcomes. Try to understand current admission and discharge criteria, levels of care, nurse and physician patient ratio. The knowledge of your case-mix, current length of stay and mortality and ICU-acquired infection rates are the initial main concerns. Again, some national intensive care societies recommend key structure, process and outcome quality indicators (Rhodes et al. 2012). **Table 1** presents a suggestion of the minimum quality indicators to create an ICU snapshot.

European Society Intensive Care Medicine (ESICM)	Brazilian Association Intensive Care Medicine (AMIB)
ICU fulfils national requirements to provide Intensive Care	Standard mortality ratio (SMR)
24-h availability of a consultant level intensivist	ICU length of stay
Adverse event reporting system	24h readmission rate
Presence of routine multidisciplinary clinical ward rounds	The rate of ventilator-associated pneumonia
Standardised handover procedure for discharging patients	Mechanical ventilation use (rate)
Reporting and analysis of SMR	The rate of central venous catheter-related blood stream infections
ICU readmission rate within 48h of ICU discharge	Central venous catheter use (rate)
The rate of central venous catheter-related blood stream infection	The rate of catheter associated urinary tract infection
The rate of unplanned extubation	

Table 1. Quality indicators recommended to create an ICU snapshot

Create a minimum data-driven culture: establishing data collection and discussion based on data

A strong data driven culture is the foundation of modern ICU management. Although this statement may sound unattainable, there are several examples of widely implemented data-driven ICUs that rely on data abstraction and analysis as the basis of quality assurance and improvement (McClellan et al. 2017, Zampieri et al. 2017).

The first step is to establish a core dataset and while it is tempting to cover all aspects of case-mix, outcomes and process of care, it may become an impossible task if attempted all at once. Thus, establish a core dataset based on local regulations for quality of care (Flaatten 2012) or on a well-established set of indicators such as those proposed by Rhodes (Rhodes et al. 2012). The use of electronic platforms for data entry, especially

if coupled with integration with the electronic medical record (EMR) and other data sources, is a key factor to ensure timely and secure data entry (Zampieri et al. 2017). If the ICU has already an established model and database, focusing on the traditional “Donabedian” approach allows insightful analysis of efficiency and case-mix based on indicators of structure, process and outcomes (Salluh et al. 2017). Once the dataset and indicators are defined, it is crucial to democratise access to data. At this point, data availability (through online dashboards and printed reports available to the team) should be inserted in the routine of the ICU. Discussing results in specific sessions is useful, however, even more useful is to illustrate the daily rounds and patients’ cases with data from the ICU. This becomes a source of reflection and quality improvement for the team. The discussion of “actionable indicators”, i.e. usually those associated with process of care measures that can be modified by increasing the adherence to evidence-based practices, is particularly thought-provoking (Roos-Blom et al. 2015; Salluh et al. 2018). When local indicators are compared to benchmarks from top performing ICUs or the recommendations from guidelines, this allows ICU managers to use data to induce an audit-feedback loop. In this loop, data obtained from audits in the ICU are measured against benchmarks and discussed within the context of a particular patient situation (i.e. - non-adherence to DVT prophylaxis or low tidal volume ventilation) or a failure to achieve a local ICU indicator (i.e. - VAP rates or elevated SMRs or SRUs indicated lower efficiency). This can start a virtuous cycle of quality improvement that may be shaped with the PDSA (Plan, Do, Study and Act) approach.

Identifying and selecting the basic protocols for treatment and prevention

One of the responsibilities, as the new head of the ICU, is to ensure patient safety and deliver the best care. In order to accomplish this in a coordinated and sustainable way, the development and implementation of protocols are essential. The main objective of clinical protocols is to achieve a reduction of care variability. This is associated with better outcomes; and the simplification of complex tasks, which may be hindered by poorly defined workflows.

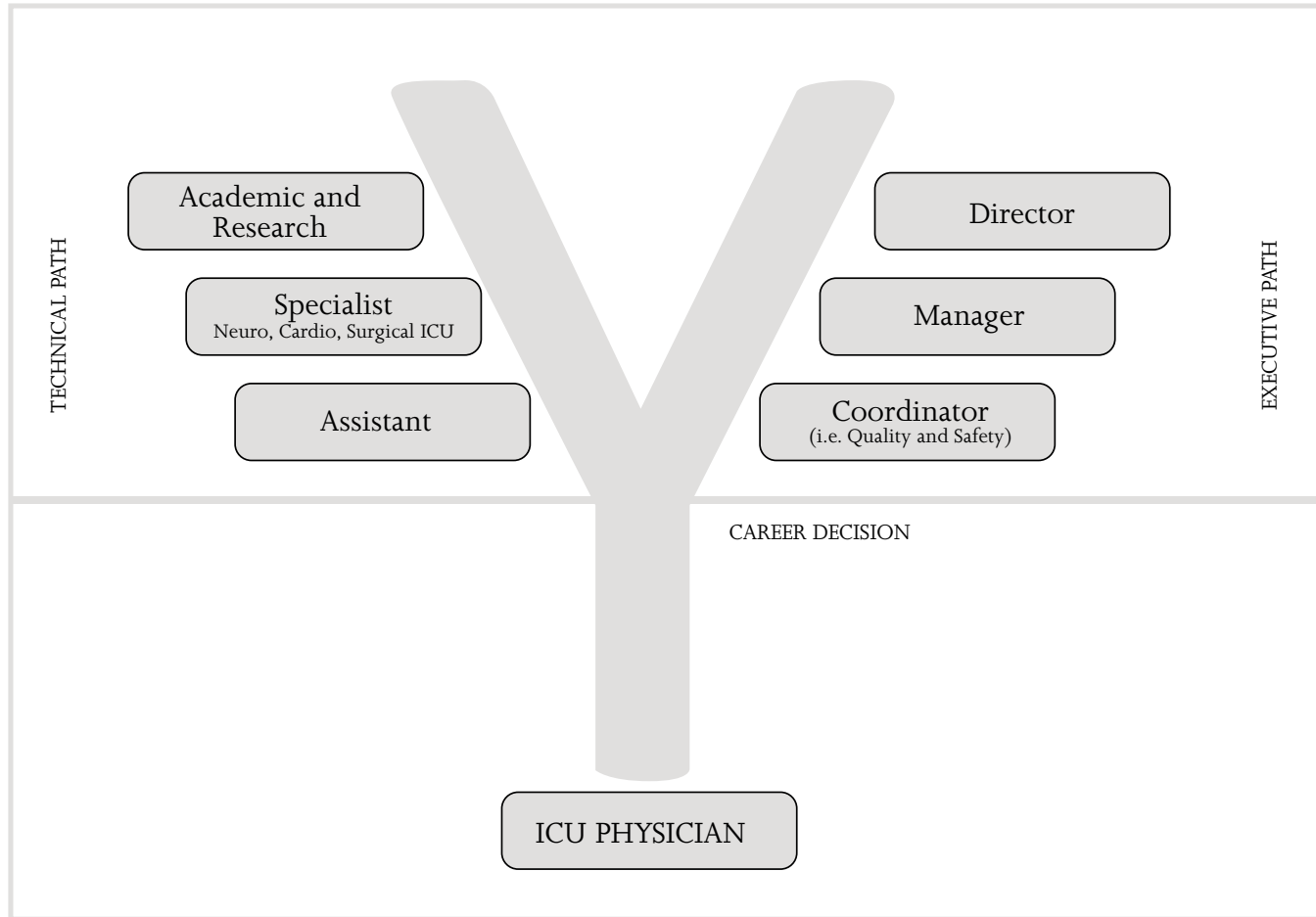


Figure 1. Intensivist career plan

Additionally, it is worth pointing out that changes always start by changing the structure and processes of care (Sinuff et al. 2013).

In order to begin protocol implementation, it is necessary to understand the case-mix and outcomes of the ICU as well as the team that will deliver the care. Besides that, it is important to identify institutional and sectorial clinical protocols already in execution

and their results (Kerlin et al. 2021).

After this initial evaluation, one should define the stages of implementation of a protocol, as it will facilitate the process. As a recommendation, these stages must contemplate: a literature review about the issue; identification and the involvement of all stakeholders; a draft of the process, describing each stage and

its goal; definition of indicators and results; a training plan; and the disclosure of metrics achieved for the team, which will allow for the reevaluation of possible points, thus generating improvement cycles. The perfect balance is found when the ICU does not reinvent the wheel, but rather tailors existing evidence-based medicine recommendations to fit the ICU's case-mix and workflow.

Some general protocols are applicable to most ICUs and cause a huge impact on the clinical outcomes. We suggest the following protocols:

- Analgesia, sedation and delirium protocol: it is known that excessive use of sedatives is responsible for longer periods of mechanical ventilation and higher rates of healthcare-associated infections (HAI) that negatively impacts clinical outcomes (Brook et al. 1999);
- Alarm adjustment protocol: several adverse events occur in ICUs, either due to inadequate monitoring or alarm fatigue, therefore having an established routine of adjustments and actions mitigates failures and increases patient safety;
- Orotracheal intubation protocol: airway management is one of the most critical procedures in intensive care. Having a described protocol that preferably uses a safety checklist considerably decreases the odds of adverse events in this context;
- HAI prevention protocol: the infections resulting from the use of invasive devices (i.e. central venous catheter) are preventable most of the time, mainly due to unnecessary and prolonged use (Pronovost et al. 2006);
- Weaning from mechanical ventilation protocol: liberating the patient from ventilatory support has to be one of the main goals of the team. In order for this to be safe and performed at the right clinical moment, it is fundamental to prepare the team (Krishnan et al. 2004).

Caring for those who care: staff management, professional development, burnout avoidance

Assess the work conditions of your staff, develop an integration programme for the new members and create a continuum medical education programme with scientific meetings and

simulation training, ICU quality and safety indicators, and morbimortality meetings.

Career development is important to keep and engage new talents. Try to understand the real situation and create a plan to avoid staff turnover. Regularly conduct individual feedback meeting to understand their interests and ambitions. Identify faculty with more interests in academic research, management, quality and safety. The job in ICU allows a lot of “Y” career development options (**Figure 1**). An individual programme development could help staff to identify the area that they have more interest.

The routine work in ICU demands from ICU staff technical knowledge and soft skills (i.e. communication, negotiation, resilience). Despite technical training most of ICU staff do not have a formal soft skills education. In the last years several studies demonstrated high levels of burnout, anxiety and depression among ICU workers (Merlani et al. 2011). The recent SARS-CoV-2 has had a devastating psychological impact on intensivists and increased the psychological burden for ICU staff. Evaluate the emotional and engagement of ICU staff and map the foremost problems to develop a plan to support and alleviate the stress (Azoulay et al. 2020).

At the end of your first year with more information about your unit and staff, prepare a meeting with clinical champions and other leaders to create a strategic plan for the next three years.

Advanced management: integrating teaching and research into the ICU routine

The challenge of integrating teaching and research into the ICU routine is to conciliate these activities with evolving demands to provide safe and high-quality care. Intensive care physicians face time pressure, high volume of patients, increasing demand for patient satisfaction scores, and administrative responsibilities daily (Joyce et al. 2017).

Beside teaching is one of the most frequently used methods for medical training, despite the lack of a clear standardised approach to critical care education (Santhosh et al. 2018). Thus, the instructor characteristics and competencies have

to receive considerable attention. The member of the support staff who leads the process has a key role in determining the success of clinical teaching in the ICU routine. Residents and fellows have a tendency to mirror the behaviour of instructors they feel are professional and competent (Natesan et al. 2020). Organisational aspects and process of care can impact the clinical management and also are important for consideration. Ensuring the application of evidenced-based practices and standardised process of care are closely link to good clinical teaching (Natesan et al. 2020).

Strategies for increasing efficiency and effectiveness in ICU education have been described, including tips for teaching under time pressure (Joyce et al. 2017, Santhosh et al. 2018). It is worth mentioning that some practical approaches can be incorporated into the routine without disrupting workflow or compromising the safety and quality of patient care (Joyce et al. 2017). ICU rounds, the application of ICU checklists, invasive procedures, handover and family communications can be used for teaching practices. The participation of the entire team in the ICU rounds ensuring the application of protocols and checklists represents a learning opportunity, and can improve teamwork, safety climate (Writing Group for Brazilian Research in Intensive Care et al. 2016) and is associated with improved patient outcomes (Kim et al. 2010, Soares et al. 2015).

The involvement of multidisciplinary team is also important to research (Francois et al. 2016). The principal investigator may not have enough time to complete all essential tasks. Sharing responsibilities with all ICU care providers is a way to incorporate clinical research as a part of daily routine care. Nurses, residents, fellows or any other healthcare worker willing to participate can be involved in the inclusions, monitor interventions and events. Specific training, local research meetings and effective communication are strategies to ensure motivation and commitment (Francois et al. 2016).

Conclusion

The role of an ICU director comes with many challenges. Being able to address these challenges is essential to create a

safe and healthy working environment. The introduction and development of a data-driven culture and clinical research is recommended as it is associated with increased ICU efficiency, improved patient outcomes and staff satisfaction.

Conflict of Interest

Dr da Silva Ramos, Dr Pacheco, Dr Freitas and Dr Machado report no conflicts of interest. Dr Salluh is founder and holder at Epimed Solutions, the provider of a cloud-based healthcare analytics and performance evaluation software. ■

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AGENDA

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MAY

5-7

EuroELSO 2021
Virtual event
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31 MAY – 4 JUN

Blood Diseases in the ICU - Advanced Training Course
Saint-Louis Hospital, Paris, France
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JUNE

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ISICEM e-DAY – Hemodynamic Monitoring
Virtual event
<https://iii.hm/18ru>

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ICEM21 - International Conference on Emergency Medicine
Virtual event
<https://iii.hm/18rv>

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Reanimation 2021
Paris, France
<https://iii.hm/18rw>

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WINFOCUS World Congress 2021
Virtual event
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ESPNIC 2021
Virtual event
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ECCC Dubai - Emirates Critical Care Conference 2021
Hybrid event
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ECCMID 2021
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9-14

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