

Chapter 19

Evolution of Intensive Care Unit Nursing



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19.1 Introduction

Recently, Professor Jean-Louis Vincent (along with other luminaries in the field of intensive and critical care medicine), has published articles that consider the history and perspectives of intensive care medicine and intensive care units (ICUs) [1–3].

The fields of critical care medicine (CCM) and critical care nursing arose to provide special treatment and care for the most severely ill hospital patients [2]. These patients need high levels of surveillance, intensive nursing care, and biomedical technology to support and monitor their vital functions and failed organs/systems. This type of care is carried out in ICUs, which are specific spaces, separated from other hospital areas, set up to receive critically ill patients and provide highly specialized medical and nursing competences and skills [2, 4].

However, in the past 30 years, despite the increasing amount of research in CCM, major therapeutic progress does not seem to have been made in the field [1]. The reduction of mortality achieved in ICUs is due essentially to improvements in supportive care and in the relevant technologies [5].

Some therapeutic progress has been shown in the following fields [1]:

- Protective strategies for mechanical ventilation in acute respiratory distress syndrome (ARDS)
- Increasing employment of noninvasive ventilation (NIV)
- Reduction of (long-term) sedation use
- Enteral nutrition preferred to parenteral nutrition
- Less invasive monitoring systems
- Reduction in blood transfusions
- Reduction in anti-arrhythmic medications
- Greater attention to the use of antibiotic drugs
- Early and active patient mobilization.

However, greater steps have been made in the process of care, including all the healthcare professionals involved with the critically ill patients, the environment, the “interpretation” and organization of the work [1]. Such achievements that can positively affect patient outcomes are [1, 2]:

- Multidisciplinary outcome-oriented teamwork. The ICU staff now goes beyond critical care nurses and doctors, and includes physiotherapists, pharmacists, infectious disease consultants, nutritionists, and psychologists.
- Implementation of protocols for weaning of patients from mechanical ventilation; sedation; nutrition; glucose control; vasopressor and electrolyte-targeted infusion; patient positioning; and early mobilization/ambulation.
- Processes of cure and care driven by the “time is tissue” motto (early diagnosis and treatment of critical illnesses produces better patients outcomes).
- Utilization of continuous renal replacement therapy (CRRT) to better manage the intake and removal of fluids during the hyperacute phase of critical illnesses and the later phases, in which there can be the need to remove fluids.

- Early mobilization of patients to prevent ventilator-associated pneumonia (VAP), deep vein thrombosis (DVT), pressure ulcer (PU), and delirium.
- Increased utilization of clinical risk management tools (incident-reporting systems, morbidity and mortality reviews, and audits).
- Humanization of ICU scenarios through open visiting policies and ethical approaches to the issue of end-of-life (EOL) care.
- More awareness of the limited (or even absent) evidence for the effectiveness of many therapeutic and interventional options now used in the ICU (e.g., albumin, pulmonary artery catheter, tight glycemic control, dopamine).
- More awareness of the need to prevent cross-infections and device-related infections.
- Implementation of the concept of an in-hospital medical emergency team and an outreach team philosophy.
- Greater understanding of the role of intra-abdominal hypertension and compartment syndrome in multi-organ failure and patient outcomes.
- Establishment of multicenter and international patient registries for specific pathologies (e.g., trauma, cardiac arrest, etc.), in order to improve quality assurance programs and benchmarking.

Technology has made great contributions to the availability of monitoring and interventional options, together with providing higher standards of safety for patients, being user-friendly, and, in some cases, with devices being smaller and lighter in weight than in the past [2].

What about the future of ICUs? Vincent [2] envisions increases in the number of ICU beds relative to the number of hospital beds in other areas, even in a scenario of decreasing costs. The shortage of intensivists could be “compensated” for by computerized or nurse-driven clinical protocols, but the nursing workload would then increase, and nursing staff numbers should be adequate to deal with this increase [2].

More multicenter and international trials will be performed to test drugs and treatments, offering greater evidences to use in CCM [3]. Furthermore, pharmacological treatments for critically ill patients should be improved through strategies such as [5]:

- Selecting samples for research in critically ill populations, taking into account biological and clinical variables
- Promoting the early administration of drugs during the initial manifestations of diseases and also before the admission of patients to the ICU
- Performing phase 2 trials to test new generic drugs
- Implementing cell-based therapies and therapies that will enhance the resolution of organ failure.

Organizational strategies should involve the use of inclusive models, concentrating ICU personnel in a few large units, and promoting the concept of centralization to improve patient outcomes and to provide flexible management of healthcare workers [2]. Extracorporeal organ support technologies will be improved [1].

Information technology should cover all the bureaucratic aspects of healthcare work, improving handover, drug prescriptions, and data collection with a network consisting of patient monitoring systems, point-of-care systems, clinical records, and charts [2]. In addition, computerized systems could provide real-time calculation of staffing needs, based on the nursing workload and patient risk prediction and stratification, improving triage for ICU admission and discharge [4].

This kind of progress could be time-saving and prevent mistakes, and it could also leave more time for doctors and nurses to care for their patients at the bedside [2]. Multidisciplinary rounds should become the norm. Patient follow-up post-ICU stay could become the source of valuable information employed to direct interventions that recover the patient's quality of residual life and improve the quality of care in the ICU [2].

A better continuum of care between the pre-hospital phase, the emergency care phase, the ICU phase, and the post-ICU phase should be implemented. At the same time, adequate data collection and analysis models are needed, to accurately evaluate the effectiveness of interventions delivered to patients in the whole healthcare path of the critical illness [1].

In addition, policies should be drafted to manage increasing demands for critical care beds in the event of maxi-emergencies [3].

Discussing future perspectives in critical care nursing is not a simple issue. However, four main lines of discussion can be addressed: priorities in critical care nursing research, holistic care and humanization of care issues, specific populations of ICU patients requiring competent and expert nursing care, and ICU nurses' preparedness during outbreaks of emerging infectious diseases. Across (and beyond) all the above considerations, this chapter will provide an overview of current and more meaningful issues for critical care nursing, noting the areas that require particular consideration and further investigation.

19.2 Priorities in Critical Care Nursing Research

Nursing research plays a central role in scientific production, increasing the disciplinary body of knowledge. The main problems related to research in critical care settings are related to the small sample numbers and the large number of variables that are difficult to control. Moreover, research findings are not simple to retrieve. Hence, some large nursing associations, such as the American Association of Critical-Care Nurses (AACN) and the European Federation of Critical Care Nurses Associations (EFCCNA), have promoted the identification of priorities in

nursing research and are developing international networks to support multicenter designed studies.

According to an American professional task force, priorities in critical care nursing research should be oriented toward [6]:

- Development of methods for fast recognition of acute patients at high risk of rapid deterioration
- Minimally invasive organ support technologies
- New approaches to enhance patient comfort while reducing changes of consciousness
- Effective process and outcome measurements for critical illness research and palliative and EOL care.

The areas of nursing interest in healthcare service research should cover [6]:

- Strategies to improve communication and coordination of care
- Tools, processes, and programs to promote knowledge transfer and implementation
- Factors related to an effective learning environment
- Strategies for the application of clinical risk management concepts and methods
- Assessment of the distressing effects of interventions on the patient and their family.

On the European side, the EFCCNA, through a Delphi study design, has identified 52 research topics in 12 different domains [7]. The priorities of nursing research in critical care settings noted in that study mainly cover patient safety issues, the impact of evidence-based practice (EBP) and the workforce on patients' outcomes, the comfort/well-being of patients and relatives, and the impact of EOL care on staff and their practice [7]. The five research topics with the highest ranking scores were [7]:

- Interventions to reduce nosocomial infections in the ICU
- Pain management and pain assessment

- Exploration of the extent of anxiety, fear, and stress in ICU patients, and strategies to reduce their occurrence
- Prevalence and prevention of critical incidents in the ICU (medication errors, adverse events)
- Impact of the ICU nurse-patient ratio on patient outcomes.

Some authors have also proposed new strategies to increase effectiveness in the production and local dissemination of scientific knowledge, reducing the distance between researchers and clinicians. Such strategies involve the “tripartite model,” based on synergy among universities, hospitals, and single hospital wards [8].

19.3 Open Intensive Care Units

The American College of Critical Care Medicine guidelines for support of the family in the patient-centered ICU rely on the concept that relatives are essential resources for patients’ health [9]. These guidelines refer to major concepts such as “flexibility,” “single-case basis evaluation,” and “open ICU” [9]. The open ICU philosophy is based on the reduction/elimination of temporal (liberalization of visiting policies), physical (overcoming the imposed barriers to physical contact between relatives and patients), and relational restrictions (trust-based relationship between ICU staff and families) [10, 11]. This progressive change of view toward a “holistic” approach to the cure and the care of the patient-family as a whole, greatly challenges ICU staff [12]. Some authors promote open visiting policies as a standard, as well as promoting the adoption of patient-centered outcomes (not only survival) [13].

Evidence on the influence of programs for the implementation of open ICUs on patient mortality, length of stay (LOS), infection risk, and the mental health of patients and their relatives

is currently lacking, and the influence of such programs needs to be investigated [12]. Further, the efforts of ICU teams to improve the relationship climate inside the ICU will require addressing according to the indications arising from the research results.

Recently, some authors have hypothesized that open ICU programs and the presence of family members during cardiopulmonary resuscitation could also play a role in reducing the rates of opposition to organ donation [14, 15]. More studies are needed to confirm this hypothesis, introducing important scenarios with potential lifesaving effects for future ICU patients [14, 15].

19.4 Animal-Assisted Therapy

Animal-assisted therapy (AAT) is defined as “the use of human-animal bond to attenuate stress and improve mood” [16]. AAT works on the interaction between humans and pets, with the aim to reduce stress and feelings of isolation and depression [16]. Areas of AAT implementation range from simple social well-being to the improvement of language or motor functions [16]. Dogs are the most frequent animals used for AAT, although rabbits and cats can also be employed, under the guidance of specially trained teams. Adequate procedures that address hygiene guidelines, times of use, and safety measures are needed [16].

Although the introduction of AAT inside ICUs has been referred to in the literature since the early 1990s [17] and finds enthusiasm among staff nurses [18], experience on its implementation in ICUs is very limited.

A preliminary randomized controlled trial (RCT) conducted on 76 adult patients with advanced heart failure in the ICU showed reductions of cardiopulmonary pressure, neurohormone levels, and anxiety during the visitation of a dog and a volunteer [19].

Another pilot RCT study, performed on 40 children (aged between 3 and 17 years), showed that the employment of dog visitations in the immediate postoperative period after general surgery facilitated the recovery of vigilance and activity after anesthesia and significantly reduced the perception of pain [20].

This fascinating adjunctive therapy needs to be the target of more scientific research, to expand the areas of implementation and produce better evidence of its effectiveness than that currently available.

19.5 Work Environment Climate and Relationship Dynamics in the Intensive Care Unit

Working in an ICU is not a simple matter [21]. The ICU work environment is complex, as a result of three different determinants involved: the physical environment, emotional environment, and professional environment [21].

The physical environment is often challenging for healthcare professionals, generating stress. Unfavorable (artificial) lighting, frequent irritating noises (e.g., monitor and device alarms), clumsily placed equipment, narrow patient units, and overcrowding are the main workplace stressors generated by the physical environment [21]. Human factor engineering is a discipline that can provide some solutions to these difficulties, improving work conditions for all members of the ICU staff [21].

The emotional environment in the ICU is well portrayed by the metaphor of “a continuous hot and cold shower” [21]. The emotional stress for healthcare workers is very high, owing to the high mortality and disability rates, the need for making fast life-or-death decisions, and the need to balance the effort to save lives with the realistic limits of technologies and medical/nursing sciences [21]. These elements can easily lead to feelings of

frustration, exhaustion, and (sometimes) anger, in the personnel, particularly in critical care nurses, because they are the professionals who are always on the frontline at the patient's bedside [21]. Anger, in particular, is an emotion that needs to be adequately addressed before it develops into hostility, aggression, and violence [22]. Some studies have reported that about a quarter of workers in the United States experience anger in the workplace [22]. It is important for staff to recognize their own trigger points for anger, and to prevent negative feelings and their escalation; strategies that can be used for this are [22]:

- Be constructive and practice open listening.
- Identify the signs and causes of anger.
- Use calming techniques.
- Maintain eye contact with the person who has triggered the anger and express genuine concern.
- Try to understand elements that could resolve the anger.

The recent widespread implementation of the “open ICU” concept has exposed nurses to additional emotional stressors arising from the family's feelings and needs, because the relatives spend more time in ICU, at the patient's bedside. The consequent physical and emotional stress can cause depersonalization and/or avoidance behaviors, exhaustion, burnout, and higher turnover rates in ICU personnel [21]. Some proposed solutions rely on teamwork learning programs (with the focus on interprofessional relationships). Educational interventions and workshops aiming to provide psychological stress management tools and improve interpersonal social and communication skills have also been recommended [21].

Concerning the professional environment, work satisfaction seems to be the key to the adequate development and expression of positive potential in healthcare professionals. To increase work satisfaction, the ICU environment should promote group cohesion, effective communication, autonomy, and supportive

management [21]. When teamwork is not effective, synergistic, and harmonious, burnout and errors can easily arise. Burnout is a syndrome characterized by absenteeism, fatigue, reduced personal commitment, and low job satisfaction levels.

Team training programs and, above all, reduced staff workload can be effective in increasing work satisfaction levels, preventing the above-mentioned negative consequences [21].

It has been found that most ICU staff share the same definition of interprofessional work, that includes concepts as “shared team identity, clarity, interdependence, integration, and shared responsibility.” [23] Nevertheless, except for critical events, the most common work interactions developed in the ICU are synthesized as collaboration (interactions related to specific questions), coordination (working in parallel), and networking (acquiring skills and expertise, and consultations with others) [23].

Nurses and other ICU team members are often frustrated by doctors not listening to them [23].

It has been reported that the only event in which an ICU staff acts as a team is during an emergency code. Such behavior is well known in crisis resource management, but this behavior fails to be shown in daily practice and workflows [24, 25].

Therefore, the only way for the multidisciplinary ICU team to achieve better outcomes is to develop a high level of trust, improve communication and discussion, and share clear and structured clinical and organizational information [25].

Currently, some authors recommend that future research be focused on the mechanisms that drive learning and interactions in the ICU team, seen through the “magnifying lens” provided by the social sciences (organizational behavior, anthropology, and network science), taking into account that the composition of the ICU team can vary largely from one shift to another [4].

During the past 10 years, the AACN has recognized the positive influence of healthy work environments on nursing staff outcomes and retention [26]. The AACN has identified and

promoted six standard elements that define a work environment as “healthy”: “skilled communication,” “true collaboration,” “effective decision-making,” “appropriate staffing,” “meaningful recognition,” and “authentic leadership” [26]. Despite the efforts of the AACN to disseminate these standards and improve nursing workplace environments, the results of two surveys, performed 7 years apart, showed only a marginal improvement in communication [27].

When ICU nurses were surveyed in regard to the elements that provided them with work satisfaction, they responded that the main elements were related to nursing unit management; the relationships with and the organization of medical staff; rostering practices; nurses roles in ICU patient care; and general relationships in the workplace [28].

Nurses and physicians are the two main professionals driving the workflows inside the ICU. The relationships between the two professional groups are influenced by three components of the ICU workplace environment, their specific roles, differences in expected patient outcomes, and levels of stress and workloads. Therefore, conflicts between these two professional groups are not rare. However, to better understand this phenomenon, it is necessary to differentiate vertical conflicts (nurses-doctors) from internal conflicts among nurses (horizontal conflicts).

19.5.1 Vertical Conflicts

A large multicenter study reported that 33% of conflicts within the ICU team were nurse-physician conflicts, being the most common types of struggles within the ICU team [29]. Hostility and lack of communication were the main causes of the conflicts [29]. Most conflicts arise around two main issues: EOL decisions and communication matters [30]. Conflicts about EOL decisions are one of the most important causes of moral

distress in nursing staff, with profound effects on the workplace climate [30]. Disagreement with postoperative goals of care is another important cause of conflict between physicians and nurses [30]. The need to keep relatives adequately informed about patients' conditions can also cause some tension between ICU staff nurses and doctors [30].

Further, many nurse-physician conflicts emerge from procedural factors (related to team processes), organizational factors (related to the local unit or hospital), contextual factors (legal, social, and cultural features), relational factors (variables influencing the social relationship) [31], and, probably, anthropological factors (the idea of nursing as an oppressed discipline) [32].

A simple but effective intervention to improve communication between ICU nurses and doctors could be the introduction of a multidisciplinary daily round and daily planning of activities, to share objectives and desired clinical outcomes [30, 31]. After a conflict has happened, the best strategy is to try first to resolve the problems with the individuals, taking the discussion back to the real subject of the conflict (often the patient or the organizational problem) and depersonalizing the situation [30]. Unprofessional, offensive, or unsuitable behaviors should not be tolerated by a team that has common shared values and should be referred to the internal disciplinary authority [30].

19.5.2 Horizontal Violence Among Nurses

To really understand the “internal world” of the “nurses’ tribe” in depth (these anthropological terms can be used to describe the characteristics of nurses’ relationships), one has to observe nurses’ particular positive and negative internal relationship dynamics. Nurses colleagues show strong bonds, forged by the unique, intense, and emotional challenges shared daily at their patients’ bedsides. The shared experiences of their patients’ pain, suffering, and death, as well as shared experiences of hope

and healing, can bond nurses to their colleagues at deeper levels than those seen in other professions. But, similarly to the strong attachments between nursing colleagues, internal conflicts among nurses can be fierce. Horizontal violence (HV) is one of the terms used for behaviors ranging from verbal and emotional abuse to physical violence perpetrated by workers against their peers inside an organization [33]. The reported prevalence rate of this phenomenon among nurses ranges widely, from 5.7 [34] to 79.1% [33] and is associated with important psychosocial [35] and professional consequences. Symptoms of posttraumatic stress disorder (PTSD) have been reported in nurses, and high rates of job leaving are recorded in those with shorter lengths of service [36]. Moreover, some authors suppose that there may be a relationship between HV and patient safety, owing to changes in the flows of clinical information among nurses [37].

Various researchers have advanced explanations for the origin and development of HV. The “oppressed group behavior theory” [38], interpersonal, intrapersonal, evolutionary, and biological models offer different views about the emergence of this phenomenon [39], but, currently, none of these models has been completely validated. The key elements of these theories and models are [40, 41]:

- “Lack of self-esteem”
- “Generational and hierarchical abuses”
- “Actor-observer effect”
- “Nursing as an oppressed discipline”
- “Working practices depriving rights/privileges”
- “Aggression leading to aggression” and “development of cliques”.

Despite the high rates of the HV phenomenon and the perceived relevance of its effects by nurses, the solutions proposed have been limited to position statements [42] and guidelines

[43] released by some nurses associations, as well as ideas on team building [44] and self-esteem augmentation [45, 46], education programs, and an educational tool-kit to identify and resolve workplace bullying and harassment [47]. Interventional studies of solutions (e.g. the implementation of zero tolerance policies [48]) are lacking. Hence, there is a need to focus nursing research on HV prevention, because it is difficult to eradicate the problem once it becomes part of the structure of a group.

19.6 Challenging Patient Populations in Intensive Care Units

During the delivery of care, critical care nurses should pay attention to the particular features appropriate to specific patient populations, as shown in the framework summarized in Fig. 19.1.



Fig. 19.1 Challenging intensive care unit (ICU) patient populations

19.6.1 Morbidly Obese Patients

Recent epidemiological data has shown that about 2.1 billion people worldwide are obese (i.e., have a body mass index [BMI] higher than 25 kg/m²), with an increasing trend [49]. The fight against this harmful condition requires powerful prevention programs, and such programs need political commitment [49].

Morbid obesity (BMI >40 kg/m²) is a condition affecting about 6.6% of the United States population (data from 2010) [50]. Morbid obesity is often associated with potential complications in the ICU, such as difficult airways and/or ventilation, and challenging peripheral and central venous access [50]. Frequent comorbidities are obstructive sleep apnea, diabetes, insulin resistance, low levels of vitamin D, hyperlipidemia, and hypertension [51].

Moreover, respiratory and cardiovascular impairments can be frequent, both seen with a chronic inflammatory state. In particular, the respiration of these patients can be affected by increased work of breathing and chest wall resistance and high chest wall resistance, increased intra-abdominal pressure, CO₂ production, and oxygen consumption, and the possibility of muscle weakness [51]. Cardiovascular impairment can be caused by increasing levels of circulating blood or CO₂, risk of heart failure and dysrhythmias, hypertrophy, and other myocardial structural alterations [51]. Additionally, hypercoagulability and late wound healing can be expressions of metabolic changes due to obesity [51]. Lastly, the pharmacokinetic and pharmacodynamic characteristics of most drugs can change in these patients [50].

Currently the association between higher BMI class and patient outcomes in ICUs is still controversial (“obesity paradox”) and requires more accurate comparisons between the obese BMI classes and “normal” BMI subjects [52, 53]. However, BMI calculation alone is not sufficient to stratify patients, since it does not take into account differences in body composition (adipose tissue, lean tissue, body fluids) [52].

From the logistical and nursing care points of view, morbidly obese patients present challenges for bed and stretcher weight limits and dimensions, and for patient repositioning and transfers. Standard hospital beds can bear weights of up to 150–170 kg, but morbidly obese patients are often beyond these body weight limits [54]. Sometimes radiological examinations cannot be performed, owing to the limits of radiological stretchers. Standard radiology beds can hold weights of 158–204 kg, while in patients over these weight limits, the performance of a computerized tomography (CT) scan or magnetic resonance imaging (MRI) can require special equipment (beds bearing a weight of up to 306 kg for CT and up to 248 kg for MRI) [54].

All this information is useful for planning the nursing and medical care of these patients, considering the complex physiopathological, logistical, and safety factors that characterize their stay in critical care units.

Airway management can be very difficult. The “ear-to-sternal notch positioning” (so-called ramped position) can improve the management of intubation in these patients, when there is no suspicion of cervical spine injury. This position can be obtained by rolling layers of bedsheets under the patient’s shoulders, until the back elevation reaches the desired alignment [54].

Ventilation can be improved using the “beach chair” position or anti-Trendelenburg position at 45°. These solutions allow better diaphragmatic excursion and prevent the risk of micro-inhalation. In morbidly obese patients, the supine position and Trendelenburg must be avoided because of the risk of “obesity supine death syndrome” [54]. During mechanical ventilation (MV), tidal volume according to ideal body weight (IBW) should be used, since the size of the lungs does not depend on the real body weight of the patient. Also, for these patients the limit of 30 cmH₂O for plateau pressure has to be respected to prevent ventilator-associated lung injury [54].

It is sometimes difficult to insert vascular catheters in morbidly obese patients. Echocardiographic insertion techniques

are greatly limited owing to the large stratification of adipose tissue [54]. So arterial and venous catheters are often maintained in place for a longer time than recommended, exposing patients to a high risk of infection and other kinds of complications [53].

Hypocaloric nutrition is indicated in obese patients. In the higher BMI classes, the aim is to reach 60–70% of the patient's energy requirements. Protein supply in patients with BMI ≥ 40 should be ≥ 2.5 g/kg of IBW, except for those with renal failure [53].

Some pharmacological considerations should also be taken into account. Reduced peak serum levels and increased clearance time can be recorded for lipophilic drugs [54]. The doses of highly lipophilic medications should be calculated according to the real weight, while the doses of minimally lipophilic medications should be calculated according to the IBW. Increased creatinine clearance in obese patients can reduce the levels of medications excreted by the kidneys [54]. Altered absorption through intramuscular, intradermal, and subcutaneous pathways is typical in obese patients [54].

Beyond preventing the deterioration of vital and organ functions, nursing care has to be directed toward the provision of adequate staff numbers, special beds, and equipment to facilitate patients' repositioning and early mobilization, with particular attention paid to the development of "traditional" PU and device-related PU [53].

Finally, during their clinical practice, critical care nurses need to pay attention to aspects related to the emotional support needed by obese patients and the social stigma they experience, as obesity still has a negative social connotation. Indeed, some stereotypes and prejudices portray obese persons as being short-tempered and nasty [54]. Verbal and emotional abuse of obese patients perpetrated by healthcare workers has been reported in the literature; it is mandatory for healthcare workers to avoid behaviors that blame patients who are unable to control their unhealthy or excessive eating habits [54].

19.6.2 Elderly Patients

The percentage of the world's population aged over 60 years has increased from 8% in 1950 to 12% in 2013, and in 2050 the percentage is projected to be up to 21%, with a large proportion of people over 70 years old [55].

Older people (aged over 80 years) admitted to ICUs are the subject of complex ethical debates related to poor outcomes and the poor quality of residual life after intensive care [56]. Moreover, interest in financial issues has emerged in recent years (especially owing to the worldwide economic crisis), since medical costs rise exponentially in people older than 50 years [56]. Another factor is that, in any kind of patient, deciding to withdraw treatment and organ support is surely more difficult than deciding to apply some kind of advance care directive (such as “do not resuscitate”, or do “not intubate” orders). Therefore, discussions about the ways to offer and employ intensive care support in elderly patients are influenced by ethical, cultural, and political variables, and such discussions are far from ended [57].

In a recent Canadian multicenter prospective cohort study, conducted by Heyland et al. [58] on patients ≥ 80 years old admitted to 22 ICUs, the mortality rate in the ICU was 22% and the in-hospital mortality was 35%. Patients died at a median of 10 days after ICU admission. No predictors for prolonged time of intensive care support were found by the authors [58]. Frailty indexes or advance care directives had little influence on the decision to limit life-support measures [58]. Many other studies have shown a mortality trend of over 50% 1 to 2 years after hospital discharge in very old ICU patients [55]. Heyland et al. [59], studying recovery after a critical illness in patients aged ≥ 80 years, found that 26% of the surviving patients achieved physical recovery 12 months after hospital admission. Physical recovery was significantly associated with younger age, lower acute physiology and chronic health evaluation II (APACHE II)

score, lower Charlson comorbidity score, and a lower frailty index [59].

Comorbidities in older patients probably play an important role in survival rates and quality of life (QOL) after intensive care [55]. To improve the care of these frail patients, professional integration between intensivists and geriatricians is recommended [55].

More research in older patients is needed to explore care, life-sustaining therapies, EOL problems, ICU effectiveness, and QOL after a critical illness [55].

Critical care nursing in older patients should take into account these patients' comorbidities, with the frequent presence of chronic diseases such as diabetes, chronic obstructive pulmonary disease, congestive heart failure, and end-stage renal disease. Another typical complication seen in this population is "geriatric syndromes," including PUs, incontinence, falls, functional decline, and delirium [60]. The other big issue in the aging population is the concept of frailty. Frailty, a condition that arises owing to reduced physiological and sensorial/cognitive reserves, typically in older people, plays an important role in the occurrence of adverse events and outcomes [59].

Some authors, in discussing the consequences of nursing care in critically ill older patients, have pointed out new challenges, such as environmental modifications, the need for education and training in healthcare staff, changes in their own professional attitudes, and collaboration with experts in geriatrics [61]. Functional assessment and awareness of existing medications are two key elements on which a nursing care plan should be based, also providing an "after ICU perspective" to critical care nursing [61].

Critical care nursing assessment of vulnerability in frail elderly patients should be multidimensional [62]. Physiological assessment is directed toward the patients' sensorial status, level of mobility, and chronic pathologies. Psychological assessment should focus on the identification of cognitive changes,

dementia, and psychiatric conditions. Lastly, an evaluation of social conditions and social supports is needed [62].

The data collected can help critical care nurses to plan adequate strategies for the prevention of complications and for the support of older patients in the ICU and to draft personalized discharge planning [62]. Common negative events that should be prevented in these patients are falls, abuse, malnutrition, hypothermia, depression, fear, low levels of self-care, and loss of autonomy [62].

19.6.3 Patients with Psychiatric Disorders and Consequent Emergencies

Historically, the presence of psychiatric disorders in ICU patients was not well recognized or well managed [63]. Only in recent times has this trend been reversed. The most frequent psychiatric clinical problems in ICU patients are delirium, anxiety-panic-agitation loop, depression, psychosis, and persecution ideation [63, 64]. The causes of these problems are mainly metabolic and electrolyte disorders, infections, head injuries, withdrawal syndromes, and vascular conditions [63].

The high level of stress during an ICU stay can itself be the source of a patient's psychological impairment [64].

According to some authors, certain environmental variables trigger the establishment of these conditions. High sound levels and loud noises, lack of sleep and rest, impairment of circadian rhythms, procedure-related pain, and in intubated patients, the impossibility of speaking, are typical features of the ICU environment [63].

Care efforts should be oriented toward [63, 64]:

- Maintaining patients in single ICUs.
- Guaranteeing low levels of technological noise and quiet voices.

- Providing calendars, clocks, and other tools for patients' time and space orientation.
- Improving the quality of the patient's sleep and rest and reducing light levels at night.
- Promoting relatives' visitations and contact with patients.
- Establishing an empathetic relationship with patients (and their relatives).

Early physical rehabilitation plays a fundamental role in the prevention of conditions such as delirium [65].

For patients who survive after ICU admission and a hospital stay, PTSD symptoms are frequent and very disturbing [64].

However, except for delirium, the other psychiatric disorders noted above are rarely considered by staff nurses in the ICU.

Nurses have to be aware of the importance of promptly recognizing psychiatric emergencies, which can sometimes be deadly [66]. Psychiatric emergencies can be related to overdoses of psychotropic medications, but are not limited to overdosing [66]. In fact, the withdrawal or interruption of drug treatment can be the cause of a psychiatric emergency [66]. Delirium, drug toxicity, uncontrolled schizophrenia, agitation, and suicidal attempts are typical psychiatric emergencies [66]. Common psychiatric emergencies in the ICU are agitated delirium, overdose of psychiatric medication, neuroleptic malignant syndrome, and serotonin syndrome [65].

Often non-specific signs and symptoms, such as tachycardia, diarrhea, fever, and seizure, can hinder the rapid recognition of these emergencies [66].

Almost all of the above-mentioned psychiatric emergencies in the ICU require treatment with specific medications, and quick action by nurses [65].

19.6.4 Oncology Patients

Although deaths caused by oncological illnesses have diminished since the 1990s, cancer is still the second most common cause of death, after heart illnesses, accounting for 20% of

deaths in the United States [67]. Recent estimates from Europe, for 2012, indicated 3.45 million new cases of cancer and 1.75 million deaths caused by the disease [68].

ICU admission criteria for patients with cancer have changed over the years, from an approach excluding “do not resuscitate” patients to offering the chance to recover from an acute or chronic event owing to the illness or the toxic effects of pharmacological treatments [69].

Traditional oncology emergencies requiring ICU treatment are currently treated in oncology or medical-surgical units [70]. These emergencies, owing to the illness or its therapy, are, mainly, tumor lysis syndrome, superior vena cava syndrome, and malignant spinal cord compression [70]. Currently, oncological complications requiring assessment and support in the ICU are cardiac and respiratory failure, severe bleeding and coagulopathies, and sepsis [70]. Specifically, these complications can be pneumonia, venous thromboembolism, ARDS, pulmonary toxicity associated with chemotherapy and radiation, malignant pericardial effusions, heart failure, dysrhythmias, prolonged QT syndrome, gastrointestinal bleeding, disseminated intravascular coagulation, sepsis, and hypersensitivity reactions [70].

Admitting cancer patients to the ICU makes sense for improving short-term survival rates after a critical care illness [71]. Furthermore, some recent general achievements and progress in ICU use support the admission of these patients; such items are: more “open” admission policies, NIV, diagnostic strategies in acute respiratory failure, treatment of acute renal failure, blood component transfusion policies, diagnostic strategies in neurological complications, and treatment of organ failure in macrophage-activation syndrome [71].

However, cancer patients can also die in the ICU. The QOL of oncology patients who die in an ICU seems to be worse than that of patients who die in a hospice or at home [67]. Moreover, relatives of oncology patients who have died in an ICU can be affected by symptoms of PTSD [67].

One big challenge to the implementation of high-quality EOL care in the ICU is to incorporate palliative care early in the care plan [67]. Palliative care aims to relieve symptoms and pain related to the treatment and the illness and to take into account the spiritual and psychological spheres of the patient and his/her relatives, independently of the severity and progression of the illness [67].

There are some hindrances to the implementation of EOL care in the ICU [67]:

- Mission of the ICU (lifesaving and restoring patients' QOL)
- Culture of the ICU (death-denying and difficult-to-manage communication on prognosis)
- Goals of the ICU (technology-oriented to implement life-support treatment, relegating the holistic approach to a low priority)
- Environment of the ICU (an open space is a more frequent architectural configuration than a single patient rooms unit)
- Competing priorities for nurses' time (dying patients considered a low priority; difficulties in managing the relatives' needs and requests for information about their loved ones).

A key element in EOL care in the ICU is the nursing management of symptoms of discomfort and pain. Often these patients are treated with all the organ support that the ICU can offer (MV, hemodynamic pharmacological support, CRRT, artificial nutrition, etc.) [67]. Moreover, large numbers of invasive devices are often in place, causing procedural pain, discomfort, and delirium. The most frequent symptoms presented in these patients are dyspnea and pain [67].

The withdrawal or withholding of organ- or life-support treatments is complex, and often a long time is required for making the decision, with the involvement of the patient, the healthcare professionals, and relatives (as proxy decision-makers) [67]. At the same time, there are important implications of such decisions, related to ethical debates and influenced by religion, national culture, and national laws.

However, the key to the successful implementation of oncology patient care in the ICU can only be a real commitment to interprofessional collaboration among nurses, doctors, palliative care and oncology specialists, cultural-linguistic mediators, and spiritual care providers [69]. Without adequate information, meaningful collaboration, and realistic goals of care for the patients, the risk of moral distress for critical care nurses is quite elevated [72].

19.7 Infectious Diseases in the ICU: Challenging Critical Care Nursing in an Isolation Setting

In the past 15 years, disease outbreaks have often overwhelmed the attention of healthcare workers and ICU teams. The outbreaks were: severe acute respiratory syndrome coronavirus (SARS-CoV) (2002–2003), avian influenza H5N1 (2004 and later), pandemic influenza A (H1N1) (2009), the Middle East respiratory syndrome coronavirus MERS-CoV (2012 and later), and Ebola virus disease (2014–2015) [73].

An outbreak is defined as “a sudden increase in incidence compared with the “normal” morbidity rates for any certain disease in a given area” [74]. The consequences of the “sudden” features of an outbreak can be disruptive, causing chaos, panic, and insecurity. Increasing levels of stress and anxiety related to work can be experienced by healthcare personnel. In some extreme cases, inadequate preparedness for a disease outbreak can lead to hospital closure [74].

The term “outbreak” can also refer to the cross-transmission of multiresistant microorganisms inside hospital wards (e.g., *Acinetobacter baumannii* and *Clostridium difficile*), as well as referring to pandemic or epidemic diseases (e.g., SARS, H1N1).

Some examples of strategies to improve ICU infection control for multiresistant microorganisms, such as *Klebsiella pneumoniae* and *A. baumannii*, are [74, 75]:

- Handwashing, the first and most important intervention to prevent the spread of infectious disease [75].
- Daily surveillance cultures for all patients
- Strict surveillance of housekeeping, since the average proportion of surfaces and objects that will be disinfected in a patient's room is not more than 50% [76]
- 24-h scheduled briefings with the ICU and infection control teams
- Isolation procedures as soon as infection or contamination is suspected
- Early discharge of ICU patients
- Contaminated patients to be cared for in cohorts by designated nursing staff, with additional nurses to increase the workforce
- Particular attention to be paid to hospital surfaces, such as room door handles, and items that are transported by colonized persons, such as sterile packaging, mops, fabrics, plastics, pens, keyboards and monitors, stethoscopes, and telephones, because microorganisms easily contaminate such surfaces. In 65% of nurses caring for an infected patient, gowns or uniforms are contaminated, and in 42% of healthcare staff caring for a contaminated patient, their gloves are contaminated without the staff member having touched the contaminated patient [76].
- Closure of ICU beds, to improve the nurse-to-patient ratio.

In the case of a highly diffusive airborne infectious disease, such as H1N1, successful strategies for infection control in the ICU include [74]:

- Additional training for nurses on mechanical ventilation management
- Increasing ICU staffing, calling back the critical care nurses who previously worked in the ICU

- Weekly tracheal aspirate cultures and nasopharyngeal swabs for the early detection of patients who no longer need isolation and discharging these patients from the ICU
- Isolating patients through cohorts or private isolation rooms. Evidence suggests that transfer from semiprivate to private rooms alone can decrease hospital-acquired infection rates by up to 45% [76]
- Strengthening of collaboration levels among members of the ICU team
- Educating relatives about healthy hygienic behaviors to prevent the spread of the infection.

19.7.1 Issues Related to Standards and Precautions Related to Disease Transmission

Reaction to a disease outbreak in the ICU must be twofold: increasing the competencies and skills of the ICU staff in disease management and implementation of safety measures to contain the spread of the infection, as well as implementing adequate isolation procedures [74].

Education and training about infection control for critical care nurses should include [74]:

- Training modules about the fundamentals of quarantine and isolation, routes of infection transmission, and infectious disease prevention and control
- Basic pediatric intensive care protocols
- High-fidelity simulation of the management of high-risk and complex scenarios
- Debriefing and teach-back models
- Certification of the successful completion of education, and annual recertification.

However, the key to reaching a safe and optimal care setting depends on the availability of a robust hospital epidemiology program [77].

Many microorganisms responsible for recent outbreaks of viral infections can be deadly, not only for patients (even when they receive the best care) but also for the healthcare staff.

For infectious diseases transmitted through respiratory droplets, the ICU is a high-risk setting, owing to the performance of aerosol-generating procedures (suctioning, intubation, NIV, and bronchoscopy). Patients needing multiple procedures pose a high risk of contamination for healthcare staff [77].

The Ebola virus outbreak has set a new standard of infection control precautions (maximum isolation). Together with contact, droplet, and airborne precautions (Table 19.1), the need to prevent accidental exposure of all body surfaces emerged, with the provision of adequate protective clothing. Furthermore, a dedicated staff member, present as a trained observer, directly puts on and takes off the protective clothing and equipment from the care personnel to reduce the risk of mistakes and self-contamination [77].

Lastly, suitable protocols are needed to disinfect the care environment and to manage infected waste, and, in some cases, the architectural design of hospital areas has been modified [77].

Table 19.1 Isolation precautions for airborne diseases [80]

Isolation mode	Single room Negative pressure 6–12 Air exchanges per hour High Efficiency Particulate Air (HEPA) filtration Door maintained continuously closed Isolation sign on door
Staff members	N95, using high-level particulate respirator masks Education on use of respirator mask, fit testing, and checking the seal Healthcare worker medicine service scheduled controls
Patient	Surgical mask is mandatory if patient leaves the isolation room

Currently, the employment of full protective body suits and powered air-purifying respirators is mandatory for the care of patients infected by Ebola, MERS-CoV, and SARS-CoV [77]. This kind of equipment requires high standards of training and periodic retraining [77]. Achieving an optimal level of proficiency in donning and removing the personal protective equipment for this kind of infective threat is critical. Studies have been performed comparing the effectiveness of different training programs for the management of full protective body suits [78]. However, there are still debates about the actual adequacy and effectiveness of the protective equipment used in the prevention of Ebola transmission [79].

The special training should be conducted while the critical care nurse is performing invasive procedures typical of critical care settings: intubation, MV (closed-system endotracheal tube suctioning and placement of a bacterial filter on the expiratory side of the ventilator circuit) [80], venous access introduction (ultrasound guided), CRRT, and bedside imaging, with the nurse using the full protective equipment in a high-containment unit (negative-pressure room) under biosafety level 3–4 isolation conditions [77]. Working inside a high-containment unit requires the nurses to place their own safety before the patient's needs, to move slowly, to pay great attention to sharp objects, and always to think before acting [81]. All the nursing care and procedures should be performed in pairs: one nurse cares for the patient and the other checks for breaches in personal protective equipment, disinfects the environment, and manages the waste appropriately, covering all the containers to avoid splashing [81]. Training programs also have to cover some important psychological features of this kind of nursing care: fatigue, fear, a sense of impotence, and the social consequences of the risks the nurses are exposed to.

In regard to the prevention of disease transmission, each institution should draft protocols for the management of laboratory tests, the handling of biological specimens, and imaging testing. Surgery and specialist consultations should also be considered in the safety management procedures. Lastly, the healthcare teams that will

provide care for these high risk infected patients should be previously assigned, on either a voluntary or an obligatory basis [77].

Take-Home Messages

- In future ICUs will probably see increases in the number of ICU beds relative to the number of beds in the rest of the hospital and the staff shortages could be “compensated by” computerized and/or nurse-driven clinical protocols. More multicenter and international trials will need to be performed, and pharmacological treatments for critically ill patients should be improved through various strategies.
- Priorities in critical care nursing research are: the development of methods for the rapid recognition of acute illness in high-risk patients; new approaches to enhancing patient comfort while reducing changes of consciousness; effective process and outcome measurements for critical illness research and palliative and EOL care; focus on patient safety issues; the impact of EBP and the workforce on patient outcomes; the comfort/well-being of patients and their relatives; the impact of EOL care on staff and nursing practice.
- Critical care nursing should, in particular, take into account the special needs of different patient populations, such as oncology patients, elderly patients, morbidly obese patients, and psychiatric patients admitted to the ICU.
- Forthcoming and highly challenging issues for ICU nurses are those related to critical care management during outbreaks of emerging infectious diseases.

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