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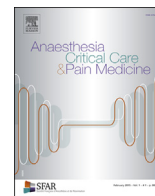
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Letter to the Editor

French intensive care unit organisation



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ABSTRACT

Anaesthesia, Critical Care and Pain Medicine is the journal of the French Society of Anaesthesia and Intensive Care Medicine (*Société Française d'Anesthésie et de Réanimation*), aimed at promoting the French approach to anaesthesiology, critical care and perioperative medicine. Here, the Intensive Care Committee of the French Society of Anaesthesia and Intensive Care Medicine provides an overview of the organisation of the 400 French Intensive Care Units (ICU), which are polyvalent (50%), surgical (20%), or medical (12%). Around 150,000 patients are admitted to these units each year. Law Decrees govern the frame of practices, including architecture, nurse staffing – two nurses for five patients and one nurse-assistant for four patients – and 24/7 medical coverage. The daily cost of ICU hospitalisation is around 1425 €, entirely ensured by the National Health System. The clinical practices are variable but guidelines produced by intensivists are invited to adhere to guidelines available and freely accessible. End-of-life practices are framed by a Law Decree (Claeys Léonetti) aiming at protecting patients against stubbornly and unreasonable cares. The biomedical research plays a critical role in the French ICU, and practices are performed under the supervision of the Jardé Law. An Institutional Research Board approval is required for prospective studies. In conclusion, the French ICU practice is surrounded by a legal frame.

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1. Introduction

Since 2015, Anaesthesia, Critical Care and Pain Medicine (ACCPM), the journal of the French Society of Anaesthesiology and Intensive Care Medicine (*Société Française d'Anesthésie et de Réanimation*) aims at promoting and diffusing around the globe the French approach to anaesthesiology, critical care and perioperative medicine. Due to its novelty, the main sources of submissions come from French teams, whereas the journal is increasingly read around the world. In this context, the Intensive Care Committee of the French Society of Anaesthesiology and Intensive Care Medicine decided to present the organisation of the French Intensive Care Unit (ICU).

2. Distribution of intensive care unit beds

In France, about 950 public hospitals including university and general hospitals, 700 mixed public-private hospitals and about 1000 private hospitals are distributed on the territory. Among them, around 400 ICU are located in 320 institutions, representing approximately 4700 beds. The number of beds in private hospitals is around 12%. The median number of beds per unit is estimated at about 10 [1].

The ICUs are polyvalent (50%), surgical (20%), or medical (12%) and admit around 150,000 patients per year. The departments of anaesthesiology also include 8433 post-anaesthesia care unit beds. The organisational model for French ICUs are closed units that have shown their efficiency in terms of patient's outcomes and costs

[2,3]. The ICU team manages the patients in relation with medical or surgical consultants, keeping the final decision.

3. Legal frame

The ICU is governed by Law Decrees (2002-466; 2003-45; 2006-72) framing the practices. The architecture of ICUs should include 3 areas: reception, hospitalisation, and technical. A minimal level of equipment is demanded with large discrepancies yet reported according to geographical regions.

The ICU team includes physicians, nurses, physiotherapist and psychologist. The head of ICU is a physician certified for ICU. Two trainings deliver this certification: an anaesthesiology and ICU course and a medical course. For anaesthesiology, the residents are trained for 5-years, including at least 2-years in ICU.

Intensivists should be in-house 24/7. A junior can be in-house on-call under the supervision of a senior on-call at-home. There is no ratio defining the number of intensivist by bed, but generally, at daytime, about 4 full-time seniors are required for 10 beds. Wide variations are reported, due to the variable number of residents [1].

Regarding the nurse team, each unit includes a chief-nurse. The Law Decree imposes a ratio of 2 nurses for 5 patients and 1 nurse-assistant for 4 patients. The nurses are responsible for the drug administration and the quality of care, the prescription being under the responsibility of physicians. There is no formal training for ICU nurses. Optional university diplomas are available on a volunteer basis.

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4. Cost of ICU hospitalisation

The cost of hospitalisation is covered by the national social security agency. In routine, there is no interaction about hospitalisation fees between patient's relatives and the medical team. Each public ICU belongs to an administrative entity including several departments, based on thematic or geographical features. A financial statement is presented at least once a year at the level of those entities. The daily cost of ICU care per patient is around 1425 ± 520 €, varying according to the patient severity and the time of patient stay course. The staff resource represents 43% of total costs [4]. For each ICU stay, the hospitals receive a lump sum, making difficult to determine the specific cost of an individual stay.

5. Admission criteria and outcome

By definition, ICU admission is based on the presence of at least 2 organ failures with a risk of death. The patients with a single organ failure are directed to specialty acute care units, and those stable with potential organ failure are admitted to intermediate care units, which details are provided elsewhere [5]. The mortality rates range from 15 to 25%, and 21% of patients discharged alive does not survive at 1-year [6]. A longitudinal study highlighted a trend toward increasing proportions of elderly patients between 2008 and 2014 [7].

6. The drivers for clinical practice

The practices are framed by national guidelines, mainly produced by *Société Française d'Anesthésie et de Réanimation* and *Société de Réanimation de Langue Française* and published in ACCPM [8]. The routine practices are quite difficult to define. We can propose few examples highlighting them. The consumption of antibiotics in a large network of French ICUs is estimated at 1468 defined daily dose per patient day (<http://invs.santepubliquefrance.fr/Publications-et-outils/Rapports-et-syntheses/Maladies-infectieuses/2017/Surveillance-de-la-consommation-des-antibiotiques>), which is close to that reported in Germany or Sweden [9,10]. However, the rate of multidrug resistant bacteria remains high, around 16% for bacteria producing extended spectrum beta-lactamase. Regarding haemodynamics, an observational study including 777 patients showed that fluid bolus was triggered by hypotension, low urine output, skin mottling and hyperlactatemia, suggesting that improvements can be made for the monitoring of patients [11]. A snapshot study on 1954 ICU patients reported that ultrasounds were used in 36% of patients, but wide variations were found between the different units. This finding suggests a good device entry for ultrasound [12].

7. Ethics and end-of-life

In a recent observational study, 24% of French ICUs were opened for relative visitations on a 24-h-a-day basis [13]. In the remaining ICUs, the time period allowed for visits was approximately 4 hours. Children were allowed to visit a patient in 87%, regardless of their age in 59% of ICUs.

End-of-life is framed by the Claeys-Léonetti Law of February 2, 2016. This Law aims at protecting the end-of-life patient against stubbornly and unreasonable cares. A right to a deep and continuous sedation until death for patients whose prognosis for survival is committed at short term was introduced. The decision to withhold or withdraw care must be consensual and reported in the patient's file. This decision is shared with the relatives, albeit being under the responsibility of the physician in charge [14]. A procedure for advance directives has also been

implemented, but their use remains marginal in the French ICUs [15].

8. Research in the ICU environment

The 2012-300 Jardé Law, enacted after the Huriet-Serusclet Law, improved the frame for the biomedical research practice. In brief, an independent Institutional Research Board approval is required for prospective studies. A signed informed consent is required for interventional studies, whereas an information letter is sufficient in most non-interventional studies. Emergency procedures are possible, requiring a post-inclusion consent. The protection of data requires the approval of a specific committee in most cases. Funding for research is provided at the national level and at the regional level by yearly call for tenders. Local calls for tenders are organized by public hospitals. Scientific societies, charitable organisations and industrials also support clinical research. Clinical research is an asset for French intensivists with synergic and competitive networks, producing high-level studies [6,13,16–24].

9. Conclusion

In conclusion, the French ICU practice is surrounded by a legal frame. The role of scientific societies is critical for ICU guidelines production. Public funding remains the first source for the ICU clinical research.

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The other authors declare that they have no competing interest.

References

- [1] Constantin JM, Leone M, Jaber S, Allaouchiche B, Orban JC, Cannesson M, et al. Activity and the available human resources working in 66 French Southern intensive care units. *Ann Fr Anesth Reanim* 2010;29:512–7.
- [2] Cassell J, Buchman TG, Streat S, Stewart RM, Buchman TG. Surgeons, intensivists, and the covenant of care: administrative models and values affecting care at the end of life. *Crit Care Med* 2003;31:1263–70.
- [3] Ghorra S, Reinert SE, Cioffi W, Buczko G, Simms HH. Analysis of the effect of conversion from open to closed surgical intensive care unit. *Ann Surg* 1999;229:163–71.
- [4] Lefrant JY, Garrigues B, Pribil C, Bardoulat I, Courtial F, Maurel F, et al. The daily cost of ICU patients: a micro-costing study in 23 French intensive care units. *Anaesth Crit Care Pain Med* 2015;34:151–7.
- [5] Ecoffey C, Beaussier M, Kerever S, Perrigault PF, Heyer L, Leone M, et al. Intermediate care units and perioperative medicine. *Anesth Reanim* 2018;4:263–4.
- [6] Gayat E, Cariou A, Deye N, Vieillard-Baron A, Jaber S, Damoisel C, et al. Determinants of long-term outcome in ICU survivors: results from the FROG-ICU study. *Crit Care* 2018;22:8.
- [7] Duclos G, Zieleskiewicz L, Antonini F, Mokart D, Paone V, Po MH, et al. Implementation of an electronic checklist in the ICU: Association with improved outcomes. *Anaesth Crit Care Pain Med* 2018;37:25–33.
- [8] Lefrant JY, Lorne E, Asehounne K, Ausset S, Beaulieu P, Biais M, et al. Determining the editorial policy of Anaesthesia Critical Care and Pain Medicine (ACCPM). *Anaesth Crit Care Pain Med* 2018;37:299–301.
- [9] Remschmidt C, Schneider S, Meyer E, Schroeren-Boersch B, Gastmeier P, Schwab F. Surveillance of antibiotic use and resistance in intensive care units (SARI). *Dtsch Arztebl Int* 2017;114:858–65.

- [10] Erlandsson M, Burman LG, Cars O, Gill H, Nilsson LE, Walther SM, et al. Stramalicu study group. Prescription of antibiotic agents in Swedish intensive care units is empiric and precise. *Scand J Infect Dis* 2007;39:63–9.
- [11] Boulain T, Boisrame-Helms J, Ehrmann S, Lascarrou JB, Bouglé A, Chiche A, et al. Volume expansion in the first 4 days of shock: a prospective multicentre study in 19 French intensive care units. *Intensive Care Med* 2015;41:248–56.
- [12] Zieleskiewicz L, Muller L, Lakhal K, Meresse Z, Arbelot C, Bertrand PM, et al. Point-of-care ultrasound in intensive care units: assessment of 1073 procedures in a multicentric, prospective, observational study. *Intensive Care Med* 2015;41:1638–47.
- [13] Garrouste-Orgeas M, Vinatier I, Tabah A, Misset B, Timsit JF. Reappraisal of visiting policies and procedures of patient's family information in 188 French ICUs: a report of the Outcomerea research group. *Ann Intensive Care* 2016;6:82.
- [14] Ledorze M, Veber B. le Comité éthique de la société française d'anesthésie et de réanimation. Therapeutics limitation and discontinuation: impact of Claeys Leonetti law and of changes in the medical ethic code on anesthesiology and intensive care practices. *Anesth Reanim* 2017;3:394–8.
- [15] Andreu P, Dargent A, Large A, Meunier-Beillard N, Vinault S, Leiva-Rojas U, et al. Impact of a stay in the intensive care unit on the preparation of Advance Directives: Descriptive, exploratory, qualitative study. *Anaesth Crit Care Pain Med* 2018;37:113–9.
- [16] Annane D, Renauld A, Brun-Buisson C, Megarbane B, Quenot JP, Siami S, et al. hydrocortisone plus fludrocortisone for adults with Septic Shock. *N Engl J Med* 2018;378:809–18.
- [17] Asehnoune K, Seguin P, Lasocki S, Roquilly A, Delater A, Gros A, et al. Extubation success prediction in a multicentric cohort of patients with severe brain injury. *Anesthesiology* 2017;127:338–46.
- [18] Chanques G, Conseil M, Roger C, Constantin JM, Prades A, Carr J, et al. Immediate interruption of sedation compared with usual sedation care in critically ill postoperative patients (SOS-Ventilation): a randomised, parallel-group clinical trial. *Lancet Respir Med* 2017;5:795–805.
- [19] Jabaudon M, Belhadj-Tahar N, Rimmelé T, Joannes-Boyau O, Bulyez S, Lefrant JY, et al. Thoracic epidural analgesia and mortality in acute pancreatitis: a multicenter propensity analysis. *Crit Care Med* 2018;46:e198–205.
- [20] Jaber S, Paugam C, Futier E, Lefrant JY, Lasocki S, Lescot T, et al. Sodium bicarbonate therapy for patients with severe metabolic acidemia in the intensive care unit (BICAR-ICU): a multicentre, open-label, randomised controlled, phase 3 trial. *Lancet* 2018;392:31–40.
- [21] Kentish-Barnes N, Duranteau J, Montlahuc C, Charpentier J, Martin-Lefevre L, Joseph L, et al. Clinicians' perception and experience of organ donation from brain-dead patients. *Crit Care Med* 2017;45:1489–99.
- [22] Montravers P, Tubach F, Lescot T, Veber B, Esposito-Farèse M, Seguin P, et al. Short-course antibiotic therapy for critically ill patients treated for postoperative intra-abdominal infection: the DURAPOP randomised clinical trial. *Intensive Care Med* 2018;44:300–10.
- [23] Orban JC, Walrave Y, Mongardon N, Allaouchiche B, Argaud L, Aubrun F, et al. Causes and characteristics of death in intensive care units: a prospective multicenter study. *Anesthesiology* 2017;126:882–9.
- [24] Reignier J, Boisramé-Helms J, Brisard L, Lascarrou JB, Ait Hssain A, Anguel N, et al. Enteral versus parenteral early nutrition in ventilated adults with shock: a randomised, controlled, multicentre, open-label, parallel-group study (NUTRIREA-2). *Lancet* 2018;391:133–43.

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