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### State of Critical Care in France

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#### Authors

**Yen- Lan Nguyen, MD,PHD**

*MICU, Cochin Academic Hospital, APHP*

*Paris, France*

*& INSERM U707*

**Bertrand Guidet, MD**

*INSERM U707*

*MICU, Saint Antoine Academic*

*Hospital, APHP*

*Paris, France & Université Pierre et Marie Curie*

*Paris, France*

#### Access to Critical Care

##### • The French Healthcare System

The French social security system was formalised by the Ordinance of October 4th 1945 and has the particularity of being funded both by employers and employees (Chevreul et al. 2010). It is divided into five branches: health, retirement, family allowances, work-related illness and elderly. The main advantages of the statutory health insurance are universal coverage, access without waiting lists and patient choice. Total expenditure on healthcare represents 11.6% of GDP, of which 77% is publicly funded. The average government expenditure on health per capita is US\$4,952 (World Health Organization). An increasing number of French people apply to complementary private assurances in order to obtain reimbursements for copayments and coverage for medical goods and services. This system suffers from geographical disparities (a medical heliotropism is observed), and is facing chronic increasing deficits.

##### • Acute Care in France

Acute care includes pre-hospital care, organisation of emergency departments and availability of appropriate hospital beds. The European emergency number 112 is linked to call centres, either from medical emergency centres (SAMU: Service d'Aide Médicale d'Urgence), or from fire brigades (depending on the department) (SAMU de PARIS 2013). If the patient request requires intensive care, a mobile Intensive Care Unit (ICU) will be sent, which includes at least an intensivist or emergency physician and a nurse anaesthetist, and the patient will be transferred to the closest ICU. In some areas there is also a mobile paediatric ICU. There are 630 emergency departments in France, of which 97% are public (Mouton 2009). Patients in the emergency departments, who require invasive mechanical ventilation or vasopressors, are directly transferred to an intermediate or intensive care unit. Since 2004 acute care is paid following a diagnosis-related group payment model (Tarification à l'activité (T2A)).

##### Acute Care in France

Acute medical care is mainly provided by public hospitals. Some treatments, such as auto- or allografts, are only conducted in public or non-profit hospitals. Two-thirds of surgical procedures are conducted in private hospitals, but most complex procedures such as transplants are only performed in public or non-profit hospitals.

##### • Critical Care Organisation

The geographical distribution of ICUs is regulated by the Agence Régionale de Santé through the Schémas Régionaux d'Organisation des Soins. The density of critical care beds in France is 11.6/100,000 inhabitants (in comparison to 29.2/100,000 in Germany and 6.4/100,000 in the

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Netherlands) (Rhodes et al. 2012). A national census conducted in 2009 reported 409 ICUs (204 mixed, 79 surgical, 49 medical and 77 undefined) with a total of 4,769 beds, of which 85% are in public hospitals (Mouton 2009). Large academic hospitals are more likely to have larger and specialised ICUs whereas smaller hospitals are more likely to have a mixed ICU. In 2009, 624 hospitals reported at least one intermediate care unit, with a total of 5,311 beds (of which 51% are in public hospitals). The presence of intermediate care beds within the ICU is common. There are 8,433 post-anaesthesia care unit (PACU) beds, of which 46% have the possibility to ventilate. There are 45 paediatric ICUs with a total of 329 beds and 460 PACU pediatric beds.

According to French law, an ICU should have at least eight beds, a minimum of two nurses to five patients and a minimum of one helper to four patients (Décret n°2002-465). An on-site medical presence 24/7 is mandatory. Each ICU has a head of ICU who often has a lifetime position and at least one head of nurses. In a recent survey of 215 medical French ICUs, the average number of beds was around 12 per unit. 32%, 58% and 9% of ICUs respectively reported a patient to nurse ratio of 2-2.5, 2.5-3 and >3 (Annane et al. 2013). 3%, 46%, 43% and 8% of ICUs respectively reported a patient to helper ratio of <3, 3-4, 4- 5, >5. The presence of a physiotherapist within the ICU was inconstant (7% of ICUs did not have one). The presence of a social worker or psychologist within the unit was uncommon. In this survey, conducted 4 years ago, information technology was scarce. Fewer than half of respondent ICUs had an electronic medical record system. There is no medical emergency team within French hospitals. Usually, each day, one senior intensivist is in charge of emergency calls from the floor and calls from the emergency medical call centres.

There is a regionalised system for perinatal and trauma care. There are regionalised systems with telemedicine use in some regions (e.g. acute neuro-vascular care).

#### • Heterogeneity of Care

Several French studies suggest that selected patients cared for at ICUs with a larger number of annual admissions are more likely to survive than those hospitalised in ICUs with a smaller volume of annual admissions (Darmon et al. 2011; Lecuyer et al. 2008; Zuber et al. 2012; Dres et al. 2013). This positive volume-outcome relationship has been observed not only for patients requiring invasive or non-invasive mechanical ventilation, but also for haemato-oncologic patients with acute respiratory failure or severe sepsis. On the other hand, some data do not suggest any survival benefit for critically ill patients requiring renal replacement therapy (Nguyen et al. 2011).

#### Healthcare Providers

##### • Intensivists

According to a recent survey of 1795 intensivists working in 290 ICUs, more than threequarters of French intensivists are male, and are on average 42 years old (Annane 2013). Nearly half of them are trained in anaesthesiology and critical care medicine. The others have usually an internal medicine background (mostly cardiology) and a sub-specialty of critical care. The prescription of mechanical ventilation, renal replacement therapy or antibiotics is performed by the intensivists. An increasing number of intensivists are trained in echocardiography. Shift lengths longer than 16 hours remain common in French ICUs.

##### • Nurses

Despite the technical complexity of critical care nursing, there is currently no critical care nurse specialty in France. Critical care nurses' training is done within the ICU. Beyond the 'regular' tasks of other nurses, critical care nurses take care of the establishment and surveillance of renal replacement therapy and non-invasive ventilation. They are allowed to measure blood gases, but cannot insert arterial lines. Depending on the unit, they may have the responsibility for protocols such as glycaemic control, sedation analgesia or vasopressors management. They are not allowed to prescribe drugs. Very few critical care nurses have the possibility to do research. They work 35 hours per week either in 8 hour or 12 hour shifts. There are no nurse-practitioners or physician assistants in France.

##### • Other Allied Healthcare Professionals

Helpers (or nurse-assistants) work in collaboration with nurses, and take care of nursing, feeding and room hygiene. There is no clinician pharmacist in France. The majority of ICUs have a physiotherapist, but most of them have to share it with other wards. Physiotherapists take care of general rehabilitation, not only respiratory, and also manage non-invasive mechanical ventilation. If the ICU has dieticians and psychologists, they are often shared with other wards within the hospital. The concept of infectious consultant or renal consultant does not exist in France. Surgeons work in close partnership with intensivists but they are not trained in critical care.

#### Academics in Critical Care

After high school, all students may apply to the first year of PACES (a course for those applying for medicine, dentistry and midwifery). At the end of this year, an examination test (with a numerus clausus) controls access to the second year of medical schools. At the end of the sixth year, a national competitive examination allows medical students to choose their specialty and the location of their residency, according to their national ranking.

Anaesthesiology and critical care medicine residencies last for five years. In academic centres, after their residency, young physicians have the possibility to do a two year contract of 'Chef de Clinique' (often traduced by fellows), during which their schedule is shared between resident and

medical student supervision at the bedside, teaching and research projects. Becoming a Professor in a French medical school requires at least a PhD degree and one year experience outside the unit to which you are applying (not necessarily abroad). The main characteristics of this position are lifetime employment and no obligation to obtain research grants or a minimum annual number of publications. Consequently, academic positions are scarce and such a system may turn away young ambitious physicians from an academic career.

## **French Touch**

### **• Clinical Research**

French intensivists are very active in clinical research. Due to the lack of clinical research nurses, interns or fellows usually take care of inclusions, consent and data collection. On the other hand, the patients to resident ratio is usually very high - between 3 to 6 patients per resident. Similarly to other countries, the current economic crisis has led to a significant reduction in the amount of academic research grants.

### **• Decision-Making Patterns**

The traditional paternalistic approach remains common in France. It is only since 2002, and the promulgation of the Kouchner law, that the consent (oral consent is sufficient) of patients is requested before conducting any invasive treatment or procedure (Loi n°2002- 303 du 4 mars 2002). Concerning end-of-life care, the Leonetti law, voted in 2005, clarified the decision-making process (with the notion of surrogate designation and advance directives) when the patient is incapacitated or not (Loi n° 2005-370 du 22 avril 2005). Similarly to other Northern European countries, around half of deaths in French ICUs are preceded by decisions to forgo life-sustaining therapies (Ferrand et al. 2001; Azoulay et al. 2009). These decisions to withdraw or withhold therapies are preceded by multidisciplinary meetings, including nursing staff and sometimes a consultant from another ward, during which the detailed modalities are discussed and written in the medical report.

### **• Quality and Safety of Care**

The Haute Autorité de Santé, an independent public authority that contributes to the regulation of health system quality, has conducted since 1996 a periodic certification in all healthcare institutions, which includes an external evaluation of quality and safety of the infrastructure and processes of care (Haute Autorité de Santé). However, this institution does not evaluate outcomes or provide benchmarking. There are currently only part-time dedicated medical staff for quality and safety of care in French hospitals. The organisation of morbidity-mortality conferences is mandatory in critical care, but there is currently no regular evaluation of their impact on quality and safety within the unit (Pelieu et al. 2013).

### **• Health Economics**

The chronic increasing deficits of the French healthcare system have led to reduced budgets and reduction in numbers of healthcare providers. The use of expensive therapies prescriptions (e.g. anti-fungal agents) is controlled on the level of evidence-based medicine but never restricted or benchmarked. To our knowledge, there is no cost-effectiveness study in our area in France.

### **• Burnout**

The level of burnout among critical care healthcare providers is very high in France. Nearly one-half of intensivists suffers from a high level of burnout. The identified risk factors of burnout for physicians are workload and impaired relationships (Embriaco et al. 2007). One-third of nursing staff suffers from a high level of burnout. The risk factors for nurses are age, the relationship with head nurses and physicians, ICU organisation and endoflife care policy) Poncet et al. 2007).

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