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Trauma care systems in France

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Abstract

The French Republic includes approximatively 60 millions inhabitants for almost 550,000 km^2. Prehospital management is organised at departement level (96). This management involves a regulatory system initiated from a unique phone number (15 national). The medical regulator sends either first-aid providers or a medical team. On-site care is highly developed and prehospital medically assisted care is really the first phase of the treatment of the injured. The team ensures that the victim is in the best condition for transport and participates in monitoring. Intra-hospital care begins either in an emergency room, with a physician qualified in Emergency Medecine, or in a recovery room, with a surgical intensive-care team. There is no specialisation in trauma in France. All specialist surgeons treat those aspects of trauma pathology that concern them. All surgeons operate on trauma patients and with regard to the organ concerned: digestive, orthopaedic,. . . . The challenge nervertheless remains that of maintaining facilities at a sufficient level to deal with everyday pathology, known for the seriousness of its consequences in both human and financial terms, within an increasingly sparse hospital infrastructure. Suggestions are emerging in response to these preoccupations. Organisation at the European level of hand emergency units (FESUM) is a targeted exemple.

Keywords: Prehospital care; Emergency response system; On-site care

1. Specific geographical and demographic constraints

The French Republic includes metropolitan France, i.e. continental France and Corsica, four overseas *départements* (Guadeloupe, Guyane, Martinique and Réunion), each of which also constitutes a region, four overseas territories (Wallis-and-Futuna Island, New Caledonia and Dependences, French Polynesia, Terres Australes and French Antarctica) with a special status, and two territorial *collectivities* (Mayotte and Saint-Pierre-et-Miquelon). The total surface area of metropolitan France is 549,691 km^2, distributed between 96 *départements*. As of 1 January 2002, there were 61.1 million inhabitants, including 1.7 million in overseas *départements*. With a birth rate of 13.1 per thousand and a mortality rate of 8.9 per thousand, population growth is 4.2.

A member of the European Union, France is second in that Union in terms of wealth creation. The Ile de France region has the highest internal product in Europe. The road system of metropolitan France is evaluated at 3 million km. The wearing of helmets by motorcyclists is compulsory. The consequences of road accidents are estimated at 8000 deaths and 170,000 injuries a year, including 34,000 seriously injured. By virtue of their severity, these accidents dominate traumatology in comparison with domestic accidents, which are more common (4,500,000 a year, with 12% leading to hospital admission) but less serious, work accidents, attempted suicide, gunshot wounds and knife attacks. In Europe, closed injuries are the most common (80–90% of multiple injuries), in contrast to the United States of America where penetrating injuries are far more frequent (70–90%).

According to the French General Medical Council, there are 159,542 doctors, including 14,164 surgeons, orthopaedic surgeons and traumatologists accounting for 11.75%, and gastrointestinal and general surgeons for 28.8% of the total [6].

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2. Prehospital care and emergency response systems

Prehospital management is organised at *département* level. Apart from disasters, which are covered by a specific plan ("whiteplan"), this management involves a regulatory system initiated from a telephone switchboard with a single number (15 national or 112 European), the *Service d'Aide Médicale d'Urgence* [Emergency Medical Assistance Service] (SAMU), Command Centre (Centre 15). This number provides telephone access to a physician supervisor who, on the basis of information provided by the caller, will decide what resources are required. The response of the physician supervisor is in two main forms: sending a team of first-aid providers in an ambulance or sending a medical team in a resuscitation ambulance (Mobile Hospital Unit). These ambulances are most often despatched from the *Service Mobile d'Urgence et de Réanimation* [Mobile Emergency and Resuscitation Unit] (SMUR), a civil organisation based in a hospital and distributed throughout the country. SMUR staff consists of ambulance crews, nurses and physicians, with at least one resuscitation ambulance (helicopter in mountains, difficult access areas or wide plains) and at least one duty room, telecommunications system between the SAMU and SMUR, a garage, an equipment storage room and a secure place for medicines. Fire services participate in this response by sending ambulances, medically assisted or not. Similarly, some charitable organisations, e.g. Red Cross, Order of Knights of Malta, and private ambulance companies provide services for non-medical transport [4].

3. Responsibility and evacuation

The Mobile Hospital Unit intervenes under the medical responsibility of a physician intensivist or holder of an Emergency Medicine diploma. A nurse, often specialising in anaesthesia, and an ambulance driver usually complete the team. Physicians in training may accompany this team during their practical assignments. During the intervention, the team remains in constant telephone contact with the Command Centre that initiated it.

Ordinary ambulances are manned by experienced first-aiders, who even so are not allowed to administer medicines.

The following are present at accidents:

- police officers in towns and *gendarmes* in the country, responsible for maintaining orderly traffic flow and collecting information for enquiry into the circumstances of the accident;
- firemen when there is a fire or risk of a blaze, and in all situations where release from wreckage is required.

At the completion of this initial management, a first assessment is sent to Centre 15, which can forward information to the hospital team who will take over the management. The stabilisation of vital functions and rapid evaluation of lesions and their therapeutic priority enable the evacuation of the injured person to a team suited to their management and warned about what to expect. Injured persons are evacuated by the vector (land or helicopter) used to bring help. Reinforcements or specific resources can be requested at any time from Centre 15.

4. Paramedical resources

Paramedical resources consist of state-registered nurses. Some may have recognised skills in anaesthesia/intensive care. After 2 years of practical work, access to the anaesthesia/intensive-care speciality take 3 years.

In large hospitals, a triage nurse enables the despatch of patients to appropriate units within the emergency department [medicine, surgery or generic outpatient (deferred emergency)].

5. On-site care

Prehospital management of the injured by medically assisted teams is highly developed in France, in correspondence with the types of trauma at present seen in Europe, and is a prerequisite link in our trauma care organisation. The alarm raised by calling the single telephone number (15 or 112) results in medically assisted (Mobile Hospital Unit) or non-medically assisted (first-aiders) help being sent to the site. Medically assisted help consists of a hospital team (physician intensivist, nurse anaesthetist, ambulance driver), which proceeds as quickly as possible to the accident in a specially equipped ambulance appropriate for the geography of the terrain (land vehicles or helicopter).

The goal is to stabilise vital ventilatory, circulatory and neurological functions, and identify obvious lesions or those suspected because of the circumstances of the injury, so as to direct the injured person to the hospital facility most suitable for their management. The team ensures that the victim is in the best possible condition for transport and participates in monitoring. In this way, prehospital medically assisted care is the first phase in the treatment of the injured.

In less serious situations, a team of first-aiders, in contact with the Command Centre, goes to the accident site to pick up the injured. Here, management is based on transport under first-aid guidelines to the nearest hospital. The first-aid team can request medically assisted support at any time.

6. Choice of destination hospital

Injured persons picked up only by fist-aiders are taken to the nearest hospital.

As a general rule, cases of peripheral trauma or single injuries are sent to the nearest hospital with an accident and

emergency department. Some specific cases, such as solitary head injuries, open craniocerebral wounds or limb sections, are referred from the outset to a specialist centre, which may be some distance away.

Injury victims with vital distress or multiple injuries are sent directly to hospitals with the staff and technical infrastructure capable of treating them. In practice, such hospitals have available surgical teams from various disciplines.

7. Hospital care

Most injured persons receiving medically assisted transport whose initial assessment has revealed a compromised vital function, the unconscious and those with obvious multiple injuries are received in the majority of hospitals by the surgical intensive-care team, which will have been informed of the patient's arrival. Admission takes place in a shock treatment room, with all necessary intensive-care facilities and staff, located close to the imaging units and operating theatres. Transport to a hospital of an injured person in circulatory distress or the victim of a gunshot wound with haemorrhagic shock is subject to contact with and the agreement of the surgeon who will care for that person. In all other situations, the co-ordination of initial treatment is the responsibility in the vast majority of hospitals of a physician intensivist. The initial care team often contains a second physician intensivist, a nurse experienced in emergency procedures, a nursing aid for moving the patient and taking requests for investigations and a porter. The physician intensivist continues and adapts the intensive therapy begun during the prehospital phase and carries out an initial evaluation. In a haemodynamically unstable, multiply injured victim, this initial evaluation includes a chest and pelvic X-ray, and an abdominal and transoesophageal ultrasonogram. CT scanning with fast spiral acquisition is making an increasing contribution to this evaluation, notably for encephalic slice imaging in the unconscious. Surgery or emergency interventional vascular imaging may then be deemed appropriate. Secondary evaluation, with its known importance in terms of sequelae and disability in injury survivors, involves consultation and advice from specialist surgeons. Once again, the CT scan plays a considerable part in the secondary evaluation. This process finally leads to the planning of surgical treatment and its priorities [2,3,7].

Whether injured persons come in unaided, or are brought in by first-aiders or following a reassuring initial prehospital medical assessment, they are examined in the surgical sector of the emergency department. They are seen by an *urgentist* (a physician qualified in Emergency Medicine), who provides primary care and initial evaluation. This practitioner may decide to perform simple procedures (ordinary wounds, non-displaced fractures requiring immobilisation). This treatment is nevertheless most often monitored by the hospital's specialist surgical team. In all other situations, the urgentist calls on the specialist surgical team, which provides final surgical treatment.

8. National systems

There is no specialisation in traumatology in France. Orthopaedic surgeons treat those aspects of trauma pathology that concern them. The same applies to all surgical specialities, whose members operate on trauma patients and with regard to the organ concerned: digestive, vascular, cardiac, pulmonary, urological, plastic, maxillofacial, neurosurgery, ENT.

8.1. Orthopaedic surgery and traumatology

Medical studies take 6 years in France. Specialist training in orthopaedic and trauma surgery is available after taking the National Residency Competitive Examination. Having passed this competitive examination, residents in training must spend 5 years in a surgical residency. During these 5 years, they must spend a minimum of 1 year in general surgery, and if they wish to become an orthopaedic and trauma surgeon complete five semesters in orthopaedic and trauma surgery. Free semesters can be spent in adjuvant surgical specialities such as vascular surgery and/or cosmetic, plastic and reconstructive surgery [1].

After these 5 years of training in the form of 10 6-month assignments, the resident takes a regional examination together with the presentation of an original paper. Specialisation recognition after training is most often obtained at the age of about 30–32 years (taking account of possible military service). The now qualified surgeon must then work in a university or general hospital for at least 2 years. These posts are called 'clinical attending' in a general hospital and in a university hospital. At the end of these 2 years, the surgeon has the choice of going into private practice or remaining in a hospital.

In most instances, emergencies are managed in hospital by the duo of the orthotraumatologist and visceral surgeon, who are joined by surgeons in training (residents) and clinical students in a teaching hospital.

At national level, the speciality of orthopaedic and trauma surgery is under the aegis of the *Société Française de Chirurgie Orthopédique et Traumatologique* [French Orthopaedic and Trauma Surgery Society]. Surgeons can apply for membership of this society once their training is completed. There is also a *Collège Français de Chirurgie Orthopédique et Traumatologique* [French Orthopaedic and Trauma Surgery College], the goal of which is to develop the teaching of French orthopaedics. Membership of this college is achieved at the end of the 2 years' post-residency training by specific application with examination and the writing of a paper. Finally, as for all practising physicians in France, registration with the French General Medical Council is required.

8.2. An example of specialisation in organ pathology: hand surgery

Hand surgery is not a fully fledged speciality in France but the French General Medical Council recognises that surgeons with the right to use the title may have been come through reconstructive and cosmetic surgery or orthopaedic and trauma training. During their training, they will have worked for at least 2 years in an approved hand-surgery training unit and have diplomas in microsurgery and a diploma in hand and upper limb surgery. These surgeons work together in hospitals or clinics to create hand emergency centres. These specific centres are grouped together within a European federation of hand emergency centres. There are about 40 centres of this type in France. There are two public-hospital adult, one public-hospital paediatric and two private hand emergency centres in Paris itself.

8.3. Other surgical specialities

The training programme can be entirely superimposed on that described for orthopaedic and trauma surgery: after basic medical studies, 5 years of surgical residency training orientated towards a specialisation during its final 3 years, then 2 years' post-residency in the chosen speciality.

9. Designation of levels of emergency facilities

Most of those injured in road traffic accidents are received and treated in public-hospitals. In addition to their scheduled activities, such hospitals are organised at a regional level to deal with traumatic or other emergencies. There are no hospitals specifically and exclusively assigned to deal with injuries. Distinction is drawn between the following in the organisation of the reception and treatment of emergencies [5].

9.1. Service d'Accueil des Urgences [Accident and Emergency Departments] (SAU)

SAU receive and treat without selection, 24 h a day, 365 days a year, anybody in an emergency. Such departments may also call upon the entire establishment as necessary, which must have at the very least units in the following specialities: intensive care, internal medicine, cardiology, anaesthesia/intensive care, visceral including gynaecological surgery and orthopaedic surgery. SAU have minimal facilities of their own, with, under the supervision of a physician head of department, one physician present 24 h a day and two state-registered nurses present 24 h a day. SAU also have access to technical (imaging) units and a laboratory capable of undertaking all specific investigations, and at least two operating theatres available 24 h a day, including one aseptic, and postoperative monitoring facilities. Most of these departments are to be found in public, university or general hospitals, and only rarely in private clinics.

9.2. Pôle Spécialisé d'Accueil des Urgences [Specialist Accident and Emergency Departments] (POSU)

These are specialist departments for the reception and treatment of emergencies, approved on an exceptional basis. Their conditions of activity are the same as those of SAU. They include, for example, paediatric hospitals, which can provide overall management on a single site of injured children.

9.3. Unité de Proximité d'Accueil, d'Orientation et de Traitement des Urgences [District Emergency Reception, Despatch and Treatment Unit] (UP)

A UP (or UPATU) receives without selection, 24 h a day, 365 days a year, anyone coming in as an emergency. It provides treatment on its premises and using its own resources, to patients whose condition requires it. It dispatches elsewhere patients whose condition requires care that it cannot provide itself. The establishment in which a UP is located must have at least a full inpatient department of medicine. The UP must be able to carry out minor surgical procedures. It must have access to at least one physician present 24 h a day, a state-registered nurse, and technical facilities enabling standard imaging and laboratory tests.

10. Intrahospital organisation

10.1. Interdisciplinary relations

As described above, according to the way in which the injured reach accident and emergency units, the management and medical teams involved in their initial and final treatment may be surgeons, interventional imagers, intensivists or urgentists. The respective contribution of each varies according to individual cases. Organisation of the management of the injured of a particular degree of seriousness is controlled by one physician (and only one), who plays the part of leader funnelling all information, making decisions and co-ordinating calls upon various specialist assistance.

10.2. Traumatology teams—who does what?

Traumatology is not a specialisation in its own right in France. The specialist surgeon, in relation to the type of trauma concerning him or her, gives opinions and operates on the injured.

Surgical planning involves, in teams, dealing with all operations required in succession at the same session or, for others, treating vital lesions and deferring the treatment of lesions whose risk is to function only. The internal organisa-

tion of operating suites ensures the availability of operating theatres designated for emergencies, in particular trauma. The notion of multivalent theatres for patients with multiple injuries contrasts with that of a theatre devoted to each speciality (at least visceral and orthopaedic) within a shared suite, through which the victim of multiple injuries passes from theatre to theatre in succession.

10.3. Intensive care

Following surgical treatment, the patient is taken to the postoperative recovery room. If the condition is not life threatening, the patient can quickly be transferred to the appropriate department of surgery. If it is life threatening and/or if special monitoring is required (e.g. intracranial pressure), admission to intensive care is required.

11. Recovery

The rehabilitation begun early in the departments of surgery is most often continued on an outpatient basis. Hospitalisation in departments of physical medicine and rehabilitation is restricted to certain types of injury: spinal injury with cord damage, head, limb girdle. Injury-related temporary dependence, especially in elderly people, is dealt with in medium-term stay facilities by physical medicine and rehabilitation teams. Post-fracture follow-up is provided by orthopaedic and trauma surgeons until consolidation. Follow-up of other traumatic lesions, whether operated or not, is the responsibility of surgeons in the speciality concerned.

12. Perspectives for future development

Medically assisted prehospital management is probably of significance in avoiding death in only a numerically small group of serious injuries (2–3%). Its benefits are tempered by the complications associated with invasive procedures (central venous lines, chest drains) performed in precarious conditions. We nevertheless feel that prehospital care makes most victims more comfortable, as well as providing safe transport and above all medical evaluation of the patient's condition so that they can be taken to the care facility most suitable for their management.

Changes in medical legal liability, reflecting what has happened in the United States of America, are such that physicians may no longer be sent, but rather rescuers, who are less legally liable. We feel that this would be a backward step.

Harmonisation of European standards in work regulations is leading surgeons to take contingent and obligatory daily, weekly and annual rest periods. The number of surgeons in training has constantly decreased over the past 10 years, with a renewal rate in some surgical specialities incompatible with maintaining numbers at one-tenth of their present levels by 2010. Hospital planning therefore requires pooling within establishments of available surgical, anaesthetic and care staff so as to provide cover 24 h a day and for 365 days a year for the reception of treatment of traumatic and non-traumatic surgical emergencies.

It is reasonable to expect that such pools will improve the care of the most seriously injured patients, by teams more specifically trained in traumatology grouped within centres possessing, in large conglomerations, multidisciplinary surgical skills. The increased critical mass of treated injured justifies the hope of lower mortality and, above all, reduced post-traumatic morbidity as a source of disability that impairs the quality of life of survivors. The specificity of skills and intensification of emergency reception facilities imply selectivity in prehospital regulation and enhanced resources for medically assisted management (stabilisation, transport), alone able to bring the patient in good time to one or more surgical teams capable of providing management.

The challenge nevertheless remains that of maintaining facilities at a sufficient level to deal with everyday traumatology, known for the seriousness of its consequences in both human and financial terms, within an increasingly sparse hospital infrastructure. Loss of good fortune linked to time elapsed before management or lack of a skilled surgeon then becomes inevitable in this reduced infrastructure. Suggestions are emerging in response to these preoccupations. Organisation at European level of the *Fédération Européenne des Services d'Urgence Mains* [European Federation of Hand Emergency Units] (FESUM) is a targeted example of prehospital orientation and treatment by specialist teams, the sponsors of which expect an improvement in the quality of functional results.

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