Trauma care systems in Spain

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Introduction: the national health system in Spain (observations by Francisco Vallejo Serrano, Secretary of Health of the Junta de Andalucia)

In Spain, orthopedic and trauma surgery is a medico-surgical speciality to which medical professionals may proceed after the first 6 years of their degree course, and is one of the specialities that exist within the national hospital network in its various categories of complexity. The Trauma Services Portfolio is a part of those provisions completely financed by the Spanish National Health Service (SNS).

The SNS is made up of the joint health services provided by the regional health services of the 17 autonomous communities into which the Spanish state is divided. The process of decentralizing responsibilities for health to all of the autonomous communities was completed in January 2002, so complying with the provisions contained in the ‘General Sanitary Law’ of 1986. [Note: The word ‘sanitary’ is a near-literal translation of the Spanish word. Though now less frequently used in this way in English, it implies ‘health’ in the broadest sense of the term and incorporates the connection between public hygiene and public health; ‘health’ has occasionally been substituted for ‘sanitary’ in the colloquial parts of this text.] [Subeditor’s note: I would prefer the above note, which I have created, (a) to be a footnote with a suitable indicator symbol after the word ‘1986’, and (b) to be seen, understood and approved by the senior author and the editor].

Andalucia was the second of the autonomous communities to assume political and management responsibilities for health services. It is the largest autonomous community of the Spanish territory, with a population of 7.5 million (more than the 18% of the entire population). Its executive powers for health-care reside within the government of the Junta de Andalucia (in the Consejería de Salud), which assumes powers over public health and health promotion, and the public provision of emergency assistance and management.

The Consejería de Salud assumes directly the functions of health authority, health economic planning, and the regulation of public health and health promotion. It also has responsibilities for the higher management, coordination and funding of...
the entire public health service of Andalucia (regulated by the 'Andalucian Sanitary Law' 2/1998), which, at the same time, comprises various sorts of health services’ provision that can be of a public nature or private but linked to the public sector.

The most important agency providing health services (around 90% of the resources) is the Andalucian Health Service [Servicio Andaluz de Salud (SAS)], an autonomous body of the Junta de Andalucía, with title and direct public management, which provides health services essentially from its own resources.

Hospital care is provided in the 32 public hospitals, 29 of which are dependent on the SAS. The other three are public hospitals constituted as single entities in the form of a public utility company of the Junta de Andalucía directly approved by the Consejería de Salud. These were the three latest hospitals to be created in Andalucia (Hospital Costa del Sol in Malaga, Hospital de Poniente in Almeria, and Hospital de Andujar in Jaen). The objective of their creation is to develop a strategy of diversification in health provision under a different sort of public management that may be speedier and more flexible, and offer opportunities for a better quality of service with maximal efficiency.

Citizens, it should be said, have the right freely to choose which doctor will treat them and the hospital where they want to be treated, within the ambit of the entire autonomous community.

Together with the SAS and the public hospital companies, there is another public company, the Public Sector Company for Health Emergencies [Empresa Pública de Emergencias Sanitarias (EPES)] also known as '061', which manages, in coordination with other bodies, all health-related emergencies in Andalucia as well as the health telecommunications network and transport.

The public health system covers the entire population of Andalucia, meeting equally the needs for health and medico pharmaceutical care.

In this context, in the last few years, the SAS has embarked on a policy that puts particular emphasis on the principle of ‘assistance quality’. Its activities have been organized around a plan for quality in the health system. Among others, a project for the horizontal management of care processes (GDR) has been prioritized. This project has attempted to construct a precise definition for every clinical process, in each of its phases, and for the standards of quality required in each phase, as well as for the skills needed by the various professionals involved.

This concept opens new challenges and opportunities for improvement in the trauma field that should be of great benefit to the patient, especially those with severe polytrauma, for whom the coordinated action of the emergency services and hospitals is the key to good prognosis and survival. The implementation of this type of process management is producing very satisfactory results because it combines the use of practical clinical guidelines based on evidence related to standards of quality, time and patient satisfaction, so improving prognosis, survival and quality of life.

I am aware that there is a long way to go, but I think that the right start has been made. We still have to improve the overall quality of care in severe polytrauma from the patient’s arrival at hospital, whereas prehospital care, with the operation of the EPES, has improved spectacularly in recent years.

Our country can count on highly reputable specialists with international scientific recognition. Its level of professional excellence is very high and its surgical knowledge is at the same level as that of the most well-known specialists of the developed EU countries. Future improvements must come, as always, by the path of development, but they will not be sufficient if we do not promote organizational reforms that favor best practice in each model of the care process, and if they are not accompanied by an individual and firm commitment from the professionals, both to the patient and to the public health system as a sociopolitical organization serving the citizenry.

Specific geographical and demographic constraints

Health-care organization in Spain is a National Health Service (NHS) defined in the 'Health National Law’ as of public status and universal coverage, integrated in a number of ‘Sanitary services’ that cover the whole population, financed from the general state budget. The system’s providers are, mostly, the system’s servants and the distribution of resources is managed by the system’s political directors and/or non-professional managers.24 Much of the hospital chain is administered by the NHS (41%), accounting for 68% of the total national hospital beds.\(^1\) In accordance with the level of care they can offer, hospitals in Spain are classified as (1) basic general hospitals, which, among other services, offer general surgery, anesthesiology and resuscitation 24 h a day, 365 days a year; (2) general hospitals with the same services as well as intensive-care units (ICU), besides other medicosurgical specialities; and (3) regional hospitals or ‘sanitary cities’, which as well as the aforementioned services must have departments of neurosurgery, thor-

\(^{12}\)http://www.msc.es.
acic and plastic surgery as well as other specialities. The hospitals, irrespective of their assistance services, are assigned a predetermined population in a defined geographical area. For hospital accreditation there exist only certain criteria based on a hospital’s individual structure, founded fundamentally in activities relevant to its educational/teaching accreditation. There is no governmental agency concerned with accreditation. ‘Credited hospitals’ accredited by independent agencies are very few: one is accredited by the ISO 9002 norm, two by the Accreditation Joint Commission of Accreditation Health-Care Organizations and another two by the EFQM.¹²

Spain is structured as an autonomous state (Estado de las Autonomías), similar to a federal state in which the various regions manage public resources. So, health-care is, to some extent, decentralized, because this responsibility has been transferred to the autonomous communities from the central state. These communities are Andalucía, Canarias, Cataluña, Comunidad Valenciana, Navarra, País Vasco, Aragón, Asturias, Baleares, Cantabria, Castilla-La Mancha, Castilla y León, Extremadura, Madrid, Murcia, La Rioja and Ceuta y Melilla.

Prehospital care

Emergency-response systems

The EPES, which began its activities in 1994, is responsible in the area of the Andalusian autonomous community (there are other similar ‘public sector companies of sanitary emergencies’ in the other Spanish autonomous communities) for looking after the health of its citizens in relation to medical and trauma emergencies. It is a service extended over community’s entire territory and available to any Andalusian citizen without geographic exclusion.

To exercise these powers it draws on a wide range of resources, both technical (communications, its own specific information systems, special vehicles for the care and transport of the severely injured by land and air, advanced coordination teams, GPS, and others that will be explained below) and human, though the latter are probably its greatest asset: professionals highly qualified to accomplish the tasks of managing emergency calls, on-the-spot care, the treatment and stabilization of the critical patient, as well as the transfer to the ‘most appropriate end hospital’; and the continuing development of appropriate plans for health and technical professionals, and also for the general population, by the EPES Formation and Research Center (FRC). The FRC also takes an active part in the development of plans for various university programs of distance learning (JUST). During the year 2001 it organized a total of 490 courses, taught a total of 8474 trainees, most of them medical and nursing professionals, as well as health managers and other groups involved in emergency care. It imparted 16,775 teaching hours. The FRC, in its commitment to quality, began in 1999 the process of implementation of a quality system based on the ISO 9001 norm. This project ended in November 2001 with external recognition by AENOR certification. The EPES actively participates in highly innovative research projects such as the ‘Integral telemedicine system of the government of Andalucía’, which allows direct transmission of voice, images (telediagnosis and data between medical professionals in different areas (interconsultation), improving diagnosis and final treatment. There are 32 assistance centers in Andalucia that now participate in this project.

There has also been created a specific means of communication with hearing- and speech-impaired users via a fax line, which permits direct and immediate contact with a coordination center to alert its staff of any emergency (the auditory-deficit population telephonic access to the health emergency services ‘061’ project).

The network of emergency health communications in Andalucia begins with the coordination centers, eight in total, one in every Andalusian province. These centers are responsible for the management and coordination of both the emergency calls and the patient transfer services of the ‘Network of emergency health transfer in Andalucia’ and the ‘Critical patients secondary transfer’. The centers have their own information systems, designed, developed and constructed specifically to enable integration of the entire communications system, GPS, and databases of all patients previously treated and discharged from hospital ICUs, as well as of those considered at high risk, such as patients with a history of coronary disease. Within its ‘Heart program’, the EPES has developed a special card, which can identify those patients who may require very urgent assistance as well as accessing all their records. The mean age of patients with a heart card is 64 years and they are mostly men.

In the coordination centers, which function 24 h a day, 365 days a year, are the tele-operators, who are responsible for managing the emergency calls under close and direct supervision by the coordinating doctors. There are ‘specific question schemes’,

¹²http://www.secalidad.es.
each aimed at various existing pathologies, so that any life-threatening situation can be identified in less than 3 min. Any citizen is able to access the emergency system through a telephone number that in Andalucia is ‘061’, through the European emergency number 112, or through the unique emergency number (902-505-061), created in 2001, which has integrated the more than 1300 numbers for urgent health calls that previously existed in our country autonomous community. These last two lines are complementary to ‘061’. During 2001 the emergency coordination centers of the EPES received a total of 1,565,503 calls through the ‘061’ lines, an increment over the previous year of 10%.

The distribution of the calls received through the ‘061’ emergency lines during 2001 is shown in Table 1. Fig. 1 shows the various causes of these calls.

### Evacuation and paramedical resources

Once identified as an emergency, the most appropriate resource is provided according to the patient’s condition and needs, alerting the most appropriate and closest team to the place of the accident. If the case is distant, with expected delays of more than 30 min, difficult access, etc., a medical helicopter will be activated. Heliports have been created in hospitals and in the villages of the community provinces to enable ‘061’ helicopters to land (Fig. 2).

### Emergency-response teams

The teams for the diagnosis, treatment and transfer of the critical patient are divided as follows:

1. **Ground teams:**
   - Mobile ICU: Equipped with a medical doctor, a university-qualified nurse (UQN) and an sanitary-transfer technician (STT).
   - Advanced coordination teams: Equipped with a UQN and an STT, which have worked with great success since 1999. In the province of Malaga in 2001, 2335 cases were successfully attended without need for more-qualified resources.
   - Interhospital transfer of critical patients: Equipped with a medical doctor, a UQN and an STT.

2. **Air teams:** equipped with a pilot, a flight engineer, a doctor, a UQN and an STT.

   The '061' emergency ground and aerial teams attended 38,892 patients in 2001. In Andalucia, these teams had an average response time of 10.21 min (Table 2).

### Table 1 Breakdown of the distribution of emergency ‘061’ calls in Andalucia in 2001

<table>
<thead>
<tr>
<th>City</th>
<th>Calls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almería</td>
<td>49804</td>
</tr>
<tr>
<td>Cádiz</td>
<td>96960</td>
</tr>
<tr>
<td>Córdoba</td>
<td>45759</td>
</tr>
<tr>
<td>Granada</td>
<td>63926</td>
</tr>
<tr>
<td>Huelva</td>
<td>33194</td>
</tr>
<tr>
<td>Jaén</td>
<td>30662</td>
</tr>
<tr>
<td>Málaga</td>
<td>188130</td>
</tr>
<tr>
<td>Sevilla</td>
<td>145412</td>
</tr>
</tbody>
</table>

### Table 2 Average response times to ‘061’ emergency telephone calls in 2001

<table>
<thead>
<tr>
<th>City</th>
<th>Time (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almería</td>
<td>8.44</td>
</tr>
<tr>
<td>Cádiz</td>
<td>9.35</td>
</tr>
<tr>
<td>Córdoba</td>
<td>9.28</td>
</tr>
<tr>
<td>Granada</td>
<td>11.00</td>
</tr>
<tr>
<td>Huelva</td>
<td>8.16</td>
</tr>
<tr>
<td>Jaén</td>
<td>7.26</td>
</tr>
<tr>
<td>Málaga</td>
<td>10.47</td>
</tr>
<tr>
<td>Sevilla</td>
<td>12.38</td>
</tr>
<tr>
<td>Andalucia (total)</td>
<td>10.21</td>
</tr>
</tbody>
</table>

Fig. 1 Chart and tabulation of the reasons for calling the emergency ‘061’ number in Andalucia in 2001; the percentages in the chart correspond to those in the explanatory table.
On-site care

Once at the accident, and always in coordination with other public teams that might be working there (fire, police, civil defence, etc.), the team begins with an appropriate approach to the site and signposting of the danger zone. It then proceeds to the assessment/triage of the victims and the beginning of the definitive on-site assistance. The procedure for a severely injured patient is outlined by the action plans of the Andalusian Plan for Emergencies (PAUE).

If the patient is trapped, the team works jointly with the Fire Brigade at the time of releasing them. Once the patient is freed, and after making every possible attempt to protect the cervical spine (for which all available means are used, such as cervical collars, short and long boards, scissor-type cervical immobilization stretchers, complete cervical immobilizers, etc.), the team proceeds to an immediate assessment of the level of consciousness and the patency of the airway, followed by the appropriate management, and thereafter to a neurological evaluation and finally an assessment of the...
remainder of the lesions. The equipment routinely available is:

1. **Diagnostic**: Cardiac monitor/defibrillator; non-invasive blood-pressure monitor; pulse oximeter; portable electrocardiograph;
2. **Transfer and immobilization**: Scissor-type stretcher; short and long boards; cervical collars; Elche-type cervical immobilizer; vacuum and pneumatic splints; traction splints for the extremities; transfer chair; conventional stretcher;
3. Intubation material;
4. Oxygen;
5. Solutions’ heater;
6. Medicine preservation cooler;
7. Dressings;
8. Specific material for children;
9. Thermal blankets;
10. Individual protection equipment;
11. Signpost and security material;
12. Triage material;
13. **Communications**: Mobile phones, red tracking.

### Choice of destination hospital

Once the patient is stabilized the transfer to the most 'appropriate final hospital' is made. This must be a third-level hospital with multidisciplinary trauma teams able to treat the trauma patient correctly. The coordination center is contacted to provide its staff with information on the patient’s present condition. The center is in charge of contacting the receiving hospital to describe the patient’s clinical state in order for the teams to be prepared for reception. The transfer is made by land or by air, depending on the distance to the hospital, the patient’s clinical state, the condition of the roads, etc. Particular attention is paid to the correct immobilization of the injuries in a way that should avoid further damage during transfer.

Once in the hospital, the definitive patient transfer is carried out, as well as the handing over of the accompanying documentation, which includes the clinical history and injuries’ report, and the patient’s personal belongings.

### The trauma patient: prehospital clinical history

The '061' clinical history (a multicopy clinical history sheet on which appears a series of defined fields that facilitate its completion, requiring only the marking of the corresponding box) includes the following data:

- Personal information;
- Exact address/place of the event;
- Cause of the demand for emergency assistance;
- The various times of the demand (calling time, resource activation time, resource arrival time, time of patient delivery to the hospital, end time and complete availability of the team);
- Respiratory state;
- Circulatory state;
- Neurological data;
- Injury mechanism; glasgow trauma score;
- Summary description of the traumatic lesions present;
- Serial collection of vital signs (blood-pressure, heart rate and rhythm, respiratory rate, oxygen saturation, blood sugar, temperature);
- Electrocardiographic description, if necessary;
- Management of the cervical spine;
- Management of the airway;
- Management of the circulatory state (cannulated vessels, zone of cannulization, blood extraction for analysis);
- Medication administered;
- Intravenous solutions administered;
- Details of cardio-pulmonary resuscitation (if relevant);
- Provisional diagnosis, with its coding based on the CIE-9 classification;
- Names of the team members who attended the emergency; the name of the receiving hospital and reception doctor.

### Hospital care (hospital emergency organization)

#### Management in the emergency hospital unit (EHU)

The care of medical emergencies, despite being assigned in the 'General Sanitary Law' to both important groups into which such assistance is divided, primary care and specialized care, is in reality on the borderline between the two, given the futility and difficulty of defining specific demands, and the fact that citizens consult without distinction and lacking identical problems. The demand for emergency assistance has, in Spain, like other neighboring countries, an ascending line (in Andalucia, in 1998, 48.78% of the population consulted some part of the emergency health services (EHS), and the incremental rate of increase is nearly 4%).
With the lack of defined standards for the further development of the EHS, this progressive growth in demand, as well as in the complexity of the conditions attended, has promoted the coexistence of multiple organizational and structural systems, forming a complex group of services that it is difficult to describe in general terms. Nevertheless, most of them have the following structures and functions: (1) an area for triage (where the request for help is assessed to prioritize patient management); (2) a resuscitation room (for the immediate attention of patients at critical risk), although 11% of emergency hospital unit (EHU) do not have this item; (3) an outpatient area (where most people are treated); and (4) an observation area (where patients with uncertain diagnoses or unstable conditions are treated), though 22% of EHU do not have such an area. 

There is no defined, uniform model across the entire Spanish state for the integration of these areas into the hospital structure and hierarchy. Despite the management complexities of the EHS, only 45% of EHU are structured in the same way as any other hospital department; the remainder are considered a separate functional unit (35.8%), a section of another department (18.4%) or another hierarchical structure (1.1%).

Despite the efforts of the Spanish Society of Emergency Medicine [Sociedad Española de Medicina de Urgencias y Emergencias (SEMES)], the specialty of emergency medicine does not exist in Spain. The medical doctors in full-time attendance on hospital emergency services and units are of diverse professional origins and development: general practitioners, family doctors, specialists in internal medicine, intensive-care specialists and other specialty doctors. Some 14% of EHU do not have full-time emergency doctors, assigning such responsibilities to other doctors such as specialists in training, specialists and general practitioners.

The mortality caused by trauma in Spain is recorded in Epigraph XX of the *International Classification of Diseases*, external causes of mortality (V01–Y89), which includes poisonings (http://www.ine.es). In 1999, for all ages and both sexes, deaths from trauma were in fifth place, preceded only (in descending order) by cardiocirculatory diseases, tumors, respiratory diseases and digestive diseases.

In the same year, among patients under 40 years old of both sexes, deaths from external causes occupied first place, representing 40.99% of all causes of death. Similar figures are present in previous years.

From 1980 to 1996, car ownership doubled in Spain, but, in the same period, the mortality rate per 10,000 vehicles and the deaths per 1000 accidents dropped significantly: in 1980, 6.4 and 96.19, and in 1996, 2.81 and 64.06, respectively. France, a neighboring country, had in 1994 3.11 deaths/10,000 vehicles and 66.87 deaths/1000 accidents; in comparison, in Spain during the same period the figures were 3.05 and 68.8, respectively. However, the mortality rate for traffic accidents has not maintained that falling trend, as can be seen in Fig. 3.

### Mortality caused by trauma and traffic accidents

![Mortality rate per 10,000 inhabitants in Spain from traffic accidents involving motor vehicles (1980–1995).](unavailable)


Fig. 3 Mortality rate per 10,000 inhabitants in Spain from traffic accidents involving motor vehicles (1980–1995).
research, all with the prime goal of making available the resources and requiring the needs of the citizenry in an optimal and efficient way.11 From this point of view, there is not a trauma care system in Spain.12

Even though, long ago, there was a demand that the EHS should be involved in accident prevention and health promotion,25 such powers are not only outside of the EHS but also outside of the responsibility of health authorities in general. They fall to a governmental body, the Traffic General Management (Dirección General de Tráfico), which periodically organizes advertising campaigns, some of them with great impact, and announce rules for traffic regulation and the obligatory use of passive security elements such as helmets and seatbelts. Only occasionally has a learned scientific society made recommendations for accident prevention—at the beginning of the summer holidays.

Mass education is also outside of the powers of the health authorities. Instead it is developed by the Ministry of Education, Culture and Sports (Ministerio de Educación, Cultura y Deportes), which, in the ‘Organization Law of the Educational System’ introduced road-safety education as one of the curricular subjects.

Initial care of the trauma patient in the EHS

In Spain, the hospitals, irrespective of the assistance resources at their disposal, are not categorized in relation to trauma management. The initial assistance offered to trauma patients in any particular EHU therefore sometimes depends more on administrative criteria, such as the hospital’s geographical area of influence in relation to the place of the patient’s residence, than on principles founded in the severity of the injuries the patient may present. Crucial decisions are in many cases made by the first doctor to attend the patient.

The material resources of most EHS comply with a large number of the essential requisites of the American College of Surgeons (ACS) for level II trauma centers,11 bringing to mind the fact that, despite this compliance, 11% of the EHU do not have a defined area in which to attend to patients at critical risk (in which place, we believe, those with severe or potentially severe trauma should be assisted) and 30.5% do not have special emergency operating rooms.19,21 It is difficult to specify the existence of other material resources, because of the lack of published data, but there is also little likelihood of the availability in most of the EHU of thoracotomy equipment, temperature- and fluid-control devices, as well as of capnographs. Regarding the profile of the doctors attending trauma patients in the EHS, they are, mostly, general practitioners (as are those who first assist the trauma patients), other trauma specialists (18.6%) and other professionals (3.2%) (see footnote 2). Given that the acquisition of general practitioner skills does not include specific training in attending trauma patients and neither is there a national teaching program (the ATLS course has recently been initiated in Spain; only in Andalucia is there imparted, in a systematized way and from the health system, a course, developed and designed by the Emergency Medicine Spanish Andalusian Society and the EPES ‘061’, which includes the principles of initial care for the trauma patient), it is difficult to specify the exact trauma care training obtained by the EHS doctors who attend patients in the first hour. In the initial assistance for trauma processes, other specialists usually intervene (general surgeons, trauma surgeons, radiologists, neurosurgeons and ICU specialists, etc.), summoned by the EHS doctor, but they cannot be considered to constitute a ‘trauma team’ as conceived of by the ACS.11 In 76.3% of the EHU there are specific protocols for urgent assistance, although the degree of compliance with these is not known, or if all of them include specific protocols for initial trauma care.20

As there are no effective trauma registries, and owing to the partiality of the published data, it is difficult to be precise about the exact burden imposed on the EHS by assistance for the trauma patient. In three multicenter studies that analyze the assistance provided in Catalonia, the community of Aragon and the community of Madrid in the years 1987, 1988, 1990, traumatic processes represented 33.9, 40.8 and 29.41%, respectively.5,13 There are no data on teaching or research in relation to trauma care.

Finally, it is worth mentioning the absence of a National State Trauma Registry, although there is evidence of certain initiatives in this regard in some autonomous communities (the Grupo Interdisciplinar del Trauma en Andalucía (GITAN) group in Andalucia; see below), and there is the Proyecto Poliguitania in the province of San Sebastian,3 without being a reality yet.17

We conclude that, in Spain, (1) an integral trauma care system that could offer optimal resources to the patient does not exist; (2) there is a lack of an approved speciality in emergency and urgent medicine that could allow a regulated training structure for emergency doctors; and (3) that the diversity of ruling bodies in the NHS makes the care of trauma patients in the EHS subject to sig-
nificant variability. The absence of a trauma registry limits the research efforts of the professionals attending patients in the different phases of traumatic disease, so preventing evaluation of the efforts that without any doubt are being made to change this state of affairs.

Intrahospital organization

Interdisciplinary relations: trauma-response teams (who does what?)

In the hospital there are two areas differentiated to receive trauma patients: the casualty department and the EHU.

In the casualty department there are two or three general practitioners as well as other auxiliary personnel. The doctors, although they are general practitioners not trauma surgeons, have some qualification in relation to the treatment of trauma victims, and are in any case supported by the hospital's on-call 'trauma team'. In this area are treated minor injuries (ankle sprains, slightly or non-displaced fractures, displaced fractures that can be managed easily by simple reduction and immobilization, skin wounds with or without superficial tendon lesions, etc.).

In this area are also received low-energy fractures such as hip fractures in elderly persons, forearm, patella, ankle fractures, etc. If the patient must be admitted for an operation or a major orthopedic procedure under general anesthesia, the orthopedic surgeons on duty will relieve the general practitioners and take care of the patient in preparation for treatment or surgery.

In the EHU, all severely and multiply injured patients are treated where they are received, as previously stated, by the emergency hospital doctors, first in the triage or resuscitation areas and after, when stabilized, they are passed to the observation area or to the ICU. From there, the EHU or ICU doctors call the appropriate specialists: the first to attend the patient is usually the orthopedic surgeon, unless the patient has no musculoskeletal lesions and only cerebral, thoracic, abdominal or vascular injuries, which will be attended to by the respective surgical specialists. There is close collaboration and coordination between the orthopedic surgeon, the EHS doctors and the other speciality surgeons in order to comply with treatment prioritization protocols. Sometimes the orthopedic surgeon must apply urgent external fixation of a pelvic fracture or of multiply fractured long bones, which can be done at the same time as the general surgeon is performing a laparotomy. If the patient is not stable or does not need an immediate operation, he or she is transferred to the ICU, where the IC doctor in charge of the patient coordinates the whole treatment.

When the patient is considered to be stabilized and needs an operation the coordinated teams decide if it must be done urgently or can be postponed 1, 2 or more days.

In most of the levels II and III hospitals there are coordinated teams available 24 h a day, 365 days a year (EHS doctors, ICU doctors, orthopedic surgeons, general surgeons, etc.) to treat the severely injured and polytraumatized patient, although there are no properly organized and independent polytrauma departments.

Intensive-care issues (assistance continuity)

The polytraumatized patient has a 'golden hour' for survival, as more than half of such patients who die after a traffic accident do so before they could have been transferred to a hospital or reach an ICU. The greatest chance of success is guaranteed by continuity in the assistance process, which includes accurate clinical evaluation, optimization of secondary preventative measures for those organic lesions associated with the greatest mortality (cerebral edema, uncal herniation, multi-organ failure syndrome, etc.) through adequate oxygenation and haemodynamic stabilization from the outset, and the decision to transfer the trauma patient to the most appropriate hospital in regard of the sites and severity of the injuries.

The pluri-aetiological lesion constitutes the prime cause of mortality in the prehospital environment and the second inside the hospital. Once the patient has been transported, the evaluation, beginning of treatment and decision to transfer to the most appropriate hospital, usually taken out of the ICU, can offer the greatest chance of success if the continuity of the assistance process is guaranteed.

Once the patient has been transferred, if there are adequate resources for ATLS in the EHU, an entire process of assistance continuity must be developed, based on interdisciplinary teams formed in the hospitals from all the services and areas involved in trauma assistance: EHS, radiology, orthopedic surgery, laboratories, general surgery, anesthesiology, neurosurgery, thoracic surgery, cardiovascular surgery and the ICU. From this platform can be elaborated the registry of admitted patients, the diagnostic and therapeutic guidelines, the initiatives to increase the level of investment to
improve hospital resources, and the level of training of the various professionals involved. Communication and coordination between the different specialities are important in any assistance process, but in the care of the trauma patient they are essential if the agreed objective is to guarantee high-quality assistance that may assure the patient has the least possible adverse sequelae, to favor professional qualification, and to optimize the available resources (as much material as human) and their development in accordance with the results of research into new technologies available for the treatment of trauma pathology. From this open and receptive concept of collaboration, dialogue, assurance and coordination with other specialists arises a clearer understanding of the function of the ICU, which offers the monitoring of vital constants, highly qualified nursing care, specific medical knowledge and essential therapeutic support. The early assistance of the ICU in diagnosing and treating the polytrauma patient, as in other critical conditions, is essential to obtaining good clinical results. Therefore, the leadership of hospital interdisciplinary teams by the ICU doctors is now encouraged, as is their intervention (assessing, advising and deciding) wherever the severely injured patient is contained within the hospital, because of the added value they can contribute in critical conditions. The guidelines for the coordination, evaluation and management of intensive-care medicine recommend that its development be carried out in accordance with the concept of focusing on the assistance to the critical patient, which implies the need for intervention by ICU doctors beyond the limits of the ICU itself. From this wider overview we can understand the intention to assign the emergency areas of hospitals to the ICU, as has happened in many cases in Andalucía, and the formation of critical patients’ departments, as has happened in some hospitals in Catalonia, combining the emergency areas and the ICU, where the common denominator in assisting the critical patient will be the patients’ needs and not the physical location. Precocity in interventions for the critical patient is therefore associated with effective and appropriate communication and coordination between assistance resources.

Avoidable mortality in the polytrauma patient and ICU

Polytrauma has three peaks of mortality. The first occurs at the moment of the accident or in the first seconds or minutes thereafter. It is usually caused by severe lesions of the nervous central system or great vessels at the thoracic or abdominal level, with cardiorespiratory arrest and slim chances of reversibility and no possibility of survival, even if the patient had received appropriate assistance. The second peak of mortality is produced in the first hours after the accident and is usually caused by multiple cranial, thoracic and abdominal lesions with the development of shock and respiratory failure. The third peak occurs days or weeks after, in relation to septic complications and multi-organ failure. It is in these last two situations that the ICU have their most important involvement.

An assistance registry of trauma patients

An analysis of the assistance provided to polytraumatized patients, based in registries, is of a great utility in detecting existing problems. The GITAN project was developed initially with the support of the Andalusian Society of Intensive Medicine and Coronary Units (SÄMIUC), the Andalusian Society of Urgent and Emergency Medicine and the EPES ‘061’ of Andalucía, during the year 2001. The results of the pilot phase (March and April 2001), and the preliminaries of the development phase, have and will allow improvements in the assistance provided.

The evaluation of assistance quality by applying the objective and global criteria of the American College of Surgeons has facilitated, in a preliminary way, our understanding of weak points and a consideration of some new strategies for the future, which involve qualifying centers and services, given the differences in results between the various participating hospitals related to compliance with the quality criteria.

ICU professional training in the ATLS

The National Plan for Cardio-Pulmonary Resuscitation (CPR) of the Spanish Society of Intensive Medicine and Coronary Units (SEMICYUC) has made a great effort to systematize knowledge and experiences in relation to trauma assistance, and published a book, ‘Trauma vital advanced support’, in 2000, which has facilitated the diffusion of the course throughout the entire State. In Andalucía in the last 3 years a total of 30 ATLS courses have been organized, with near 1000 participants. The National Plan for CPR has also designed ATLS instructors’ courses, to teach the teachers, a total of six courses having taken place, with the attendance of 150 trainees.

The ATLS courses have been extended intensive-care specialists and residents, and to the general practitioners working in primary-assistance EHU and the EHS.
Future guidelines for trauma care in the ICU

Epidemiological studies carried out in both the North Spanish Group\textsuperscript{2,27} and the Southern one\textsuperscript{14,23} show the need to promote development in the following areas:

1. Participation of scientific societies with the community administration in the primary prevention of accidents; this is the only possible way of trying to diminish mortality at the site of the accident, with special attention to the avoidance of traffic accidents among the younger population and of being run over among the elderly population.

The parallel increase in deaths and injury severity in traffic accidents leads to the hypothesis that speed has an important impact on lesion severity. So, it seems obvious that primary prevention during the times of greatest risk, speed, with, at the same time, all other fundamentally toward controlling excessive speed, with partially reversible lesions may be avoided, to all the professionals in the extra-hospital and hospital areas.

A comprehensive program of road-safety education from childhood to adulthood may constitute one of the most efficient tools, which should be promoted.

2. Optimization of assistance across all phases of trauma care, through which some of the deaths with partially reversible lesions may be avoided, with the development of inter- and multidisciplinary groups in the health districts.

3. Continuous registration of the quality of integral trauma assistance (from prehospital assistance to discharge) in every health center, which could allow the introduction of specific adjustments to improve it.

4. Guaranteeing, from the scientific societies, the provision of continuous training in ATLS, and in the pathology of the organs most frequently injured and producing most adverse sequelae, to all the professionals in the extra-hospital and hospital areas.

5. Updating the management guidelines for trauma care.

6. Hospital grading in accordance with the resources available to assist the trauma patient.

7. Accreditation of the professionals associated with the trauma care area.

8. Guaranteeing a satisfactory level of rehabilitation assistance in the process of recovery from an injury.

9. To favor research, both at the clinical and the experimental level, which may promote diminishing mortality from trauma pathology.

References


