



Factors That Influence the Development of an Organ Donation Program

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ABSTRACT

The shortage of cadaveric donors is a universal problem that imposes a severe limit on the number of patients who can benefit from transplantation. At the same time, there is an ever-increasing demand for cadaveric solid organs all over the world. The organ shortage is not due to a lack of potential donors, but rather to a failure to turn many potential into actual donors. Spain is the only example in the world of continuous improvement in cadaveric organ donation registered in a large country during more than 10 years. This success is due to a proactive donor detection program performed by well-trained transplant coordinators, introduction of systematic death audits in hospitals, and the combination of a positive social atmosphere, an adequate management of mass media relations, and on adequate economic reimbursement for the hospitals. This model can be partial or totally adapted to other countries or regions, if basic conditions are guaranteed. A careful study of local characteristics, which influence organ donation in a direct or indirect way, should be performed before planning specific actions to improve organ donor rates. The principle factors that influence the development of this type of program are described in this article.

IN MANY COUNTRIES partial strategies to improve cadaveric organ donation have resulted in no, in small or in transient increases in organ donation.¹ In the early 1990s, Spain started an original integrated approach mainly designed to improve cadaveric organ donation.^{2,3} The Spanish National Transplant Organization (ONT) was created in 1989, creating a national network of specifically trained, part-time, dedicated, and strongly motivated hospital physicians in charge of the whole process of organ donation.^{4,5} Spain went from 14 to 33.7 organ donors per million population in 2002 (a 140% increase), by far the highest donor rate ever reached by a country.⁶ This is the only example in the world of a large country (41 million inhabitants) with a continuous increase in cadaveric organ donation sustained over more than 10 years⁵ with parallel increases in the numbers of all solid organ transplants.

DESCRIPTION OF THE SPANISH MODEL

All the actions in Spain to improve cadaveric organ donation during the 1990s are known at an international level as the "Spanish Model" of organ donation²⁻⁵ as extensively described in the medical literature. The points that (altogether) define the Spanish Model are as described below.

The Spanish Model consists of a transplant coordination network at 3 levels: national, regional, and hospital. The first 2 levels nominated by and paid for by the national and regional authorities are real interfaces between the political and the professional levels. All the technical decisions about transplants are taken by consensus in a Regional Council formed by the National and Regional authorities responsible. The third level, the hospital coordinator, should be a medical doctor (although helped by nurses in the big hospitals), working preferably on a part-time basis, and located inside the hospital. They are nominated by, and report to, the hospital director (not the head of the transplant units), although functionally linked with the regional and national coordinators. Most hospital coordinators are anesthesiologists/intensivists, which means an active participation of these physicians in organ donation. Part-time dedication allows them to continue with their

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previous jobs and especially to be present even in the smaller hospitals.

Continuous brain death audit is performed by the transplant coordinators.⁷ The central office of the ONT acts as the support agency in charge of organ sharing, transport, waiting list management, transplant registries, statistics, general and specialized information, and action that can improve the whole process of organ donation and transplantation. As a significant percentage of organs are retrieved in small hospitals without neurosurgery (up to 15% in the national 2001 brain death audit,⁷ regional and national offices give external support to those centers where the whole process cannot be performed.

The Spanish Model also includes a great effort in continuous medical training and education for new and old transplant coordinators financed and directed by the central Health Administration, including various training programs for health professionals, specifically dedicated to every step of the process (donor detection and management, legal aspects, family approach, organizational aspects, management of resources, and so on).

Hospital reimbursement by the regional or national health administrations adequately finances the procurement and transplant activity. Otherwise, the sustained procurement activity, especially of small nonuniversity, non-transplant hospitals becomes practically impossible.

Attention is devoted to the optimal role of the mass media to improve the information level of the Spanish population on these topics. A 24-hour transplantation hot line, periodic meetings held between journalists and opinion leaders, training courses in communication for hospital and regional coordinators, and management of adverse publicity combined with adequate and systematic spread, via the media to the medical and lay community,⁸ have been implemented.

The legal background is technically similar to that of other Western countries and includes the following concepts⁹: definition of brain death, organ retrieval after obtaining the consent of the family, and no compensation either for donation or for grafted organs. Spain has a theoretical presumed consent law, but, from a practical point of view, family consent is always requested and the wishes of the relatives are always respected, as happens in practically all European Union countries. In fact, family refusal rates have remained stable between 20% and 25% during the last few years.^{5,7} What is clear is that the increased organ donation during the 1990s cannot be attributed to any change in Spanish legislation, which has remained unmodified since 1979

These measures are, of course, far more than just putting transplant coordinators in place and these facets are not easy to join. The results are deeply influenced by the special attention paid to any factor or structural difference from country to country. Furthermore, when we try to adapt this model of organization to other countries or regions, structural characteristics must be analyzed first.

FACTORS THAT INFLUENCE THE TRANSLATION OF THE SPANISH MODEL

Public National Health System

An almost sine qua non condition is to have a Public National Health System with full coverage of the population. Organ donation can hardly be a matter of interest for private medicine (although this is not the case for transplantation). The development of a national program like the Spanish one needs a public health background, which is difficult to find in countries without a National Health System. This assessment does not mean that part of this model cannot be implemented in selected hospitals or regions, as has been the case of some Latin American countries,¹⁰ but not the model as a whole. The fragmentation of health care provision presents a greater difficulty to develop an integrated system.

Economic Resources

Economic resources dedicated to health care are usually measured in percentage of the gross national product,^{11,12} or more graphically in \$/inhabitant/year. As stated before, the ratio of public:private financing is also important when considering the translation of the Spanish Model. Spain is in the middle-low range of Western countries when considering the first index, but clearly in the lower range of European Union countries when considering the second one. This means that, although adequate finances are clearly necessary and there is a minimum level under which it is not possible to develop such a system, transplantation medicine cannot be considered a luxury restricted to the richest countries. The most important economic point is by far adequate reimbursement of the hospitals for procurement and transplant activity, according to the local estimated costs.

Number of Doctors

Other factors are the number of doctors available in every country^{11,12} and the average basic pay per year for these professionals.¹³ It is easy to understand that a system like the Spanish one, based on a network of medical doctors, would be difficult or expensive to implement in countries like United Kingdom that have a low ratio of physicians: 1000 inhabitants, or like United States (or some European countries) with high incomes for doctors. The Spanish (and the Italian) situation are probably the most adequate because there are many doctors with a low base pay, but with the possibility of a significant increase linked to objectives. Few doctors with high incomes not related to objectives, but linked to the concept of "availability," is probably the worst possible scenario. The number of nurses is also important,^{11,12} not just for their possible work as coordinators, but also for availability of intensive care unit (ICU) beds (see next section). More important than absolute figures or index 1000 inhabitants seems to be the ratio of nurses to acute public beds as the best measure of nurses available to care for potential donors.

Number of Acute Beds and ICU Facilities

Other factors are the number of acute beds and the ICU facilities available. It is not easy to compare the number of acute beds (ie, those hospital beds not dedicated to chronic patients) because the criteria to count them are different from country to country. Besides, trends in modern medicine seek to reduce these facilities by using daycare hospitals, ambulatory surgery, and so on. Official national statistics often reflect total hospital facilities, including chronic patients who are not relevant for organ donation. The same can be said for comparing data on ICU facilities. From a practical point of view, mechanical ventilation seems to be the crucial point that characterizes an ICU bed capable of generating organ donors.

Among the rates that are relevant for organ donation, the number of ICU beds per million population and the ratio ICU beds: total acute beds seem to be most relevant.^{7,14} Differences from country to country can explain some of the difficulties in detecting potential donors and maintaining them adequately until the full process of brain death diagnosis and organ procurement has been completed.

Age Distribution of the Population

The results of an integrated approach to increase cadaveric organ donation like the Spanish one show an expansion of the organ donor pool thanks to the acceptance of older, more difficult donors.^{1,5,7} The percentage of Spanish donors older than 60 years increased during the last 10 years from 10% to 33.9%, significantly higher than that reported by other European countries. Most organ donors are due to cerebral bleeds, whereas traffic deaths accounted for 17.5% of all donors during 2002.

So, marked differences in the age distribution of the population from country to country or even region to region may explain relevant differences in organ donor potential. These age differences are explained by and are also the consequences of, other epidemiological data (cerebral bleedings, tumor deaths, etc). All of these data, together with traffic accidents and perhaps some other, provide a clear definition of the basal state of a country/region which is necessary when considering an approach like the Spanish Model. In Table I, the structural indices of Spain, Italy and the region of Tuscany are compared.

Other Factors

Other relevant factors, which are not easy to standardize, such as concentration/dispersion of the population, access to computed tomographies, and access to neurosurgery facilities, are important when considering organ donation.

CONCLUSION

Italy has probably been the country that has adopted more elements of the Spanish Model and worked more seriously in this direction, together with the fact that the structural

Table 1. Comparison of Structural Data That Influence Organ Donation, Corresponding to Spain, Italy, and Tuscany

	Spain	Italy	Tuscany
Population older than 60 y (%)	22	24.37	28.7
Mortality/100,000 inhabitants/y	915.7	983.5	1176.9
Mortality due to cerebral bleeding/ 100,000 inhabitants/y	96.8	123.5	170.2
Mortality due to accidents/100,000 inhabitants/y	33.3	46.8	52.2
Mortality due to neoplasias/100,000 inhabitants/y	227.5	268.5	337.5
"Tumor deaths" (%)	24.9	28.5	28.7
Acute hospital beds/1000 inhabitants (not included facilities for chronic patients)	2.4	5.33	4.83
ICU beds/million inhabitants	66.3	60.4	73.4
ICU/acute hospital beds (%)	2.76	1.13	1.71

variables described above are similar. Not unexpectedly, Italy has been together with Spain, the country with the greatest increase in organ donation during the last 10 years. In fact Italy is the only country that at this moment shows a significant increase,⁶ which has allowed regions such as Tuscany,¹⁵ Emilia Romagna, Liguria, and Veneto to reach a level of organ donors well over 25 to 30 donors pmp during the last few years.¹⁴

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