

# Urgent interhospital transfers from regional hospitals

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**Objectives:** To analyze the resources available for urgent transfer of patients from regional hospitals and the organization of those resources, and to determine the variables related to the presence or absence of resources.

**Methods:** Descriptive, analytical study of 12 hospitals chosen by stepwise nonprobabilistic sampling. We determined the human resources available for patient transfers, the organization of those resources, distance to the referral hospital, the number of urgencies attended, the number of transfers accomplished, and the time spent in each transfer.

**Results:** We detected excessive variation between regional hospitals with regard to the resources available to them, the volume of urgencies attended, and size. Outside suppliers of transport services were always used by 8.3% of the hospitals, whereas internal resources were used by 58.3%. The remaining 33.3% used a combination of their own services and outside suppliers. The hospitals that had their own staff for transferring patients used different models to organize them. Some used on-call doctors and nurses, who were located as needed, whereas others used staff in the course of their regular duties. The availability or not of human resources was influenced by hospital size and distance from the referral hospital.

**Conclusions:** Hospitals do not organize their human resources for patient transfers following similar models, creating the impression that a model is lacking. The variability cannot be explained by differences in resources and volume of urgencies attended in the hospitals. The use of on-call personnel who are located to assist with urgent patient transfers seems to be related to hospital size and distance from the referral hospital, but not by the average time the transfer takes, the volume of urgencies attended, or even the number of transfers required. [Emergencias 2008;20:245-250]

**Key words:** Ambulance. Transportation Emergency Mobile Units. Hospital Planning, Regional.

## Introduction

Interhospital transportation consists in the delivery of patients from one healthcare centre to another with the aim of providing both complementary diagnostic and therapeutic healthcare resources lacking in the remitting hospital<sup>1</sup>.

The lesser resources available in county hospitals often make it necessary for these centres to carry out this type of transportation. Nonetheless, this is not exclusively performed by these hospitals since those of higher levels may also find the need to do so. In addition, prehospital emergency

teams who are experts in primary transportation, often assume interhospital land transportation<sup>2,3</sup>.

The Study Group of Emergency Medicine of County Hospitals (GEMUHC) is a group of interest in the Spanish Society of Emergency Medicine (SEMES)<sup>4</sup>. This group was founded with the aim of analysing the different aspects of the emergency departments of the county hospitals. One of the aspects is precisely, interhospital transportation, a common element in all of these centres.

Marked heterogeneity has been described in the organisation of emergency departments<sup>5,6</sup>, although this has not been demonstrated in the

group of the smallest centres, the county hospitals. Since organisational models can only be exported to centres of similar characteristics, it was of interest to determine a possible marked variability in relation to the size and the hospital resources or with respect to the activity of the services or the system of organisation of healthcare transport of the emergency departments of our county hospitals.

We hypothesised that the organisation of human resources for transportation is influenced by the size of the county hospital, the presence or absence of an intensive care unit (ICU), the intensity of the emergency department activity and the distance or length of transfer time to the reference hospital. The objective of the study was to therefore analyse the hospital and human resources available for transportation as well as the organisation of these and their relationship with the above mentioned variables and with the volume of transfers undertaken.

## Methods

A descriptive, analytical study was performed using a non probabilistic sample of convenience by stages. First, different autonomic communities were selected followed by the inclusion of 12 county hospitals belonging to the GEMUHA (Table 1).

For the hospital to be included in the GEMUHC database, it should be a county hospital, have less than 200 beds and be represented by at least one physician in this centre. At the time of the study, the GEMUHC was represented in 30 national county hospitals.

The emitting hospital resources were evaluated by analysis of two variables: the presence or absence of an ICU and the number of hospital beds.

The human resources available for transportation and their organisation as well as the distance to the reference hospital were determined by interview with the head of the GEMUHC of each hospital analysed. The activity of the emergency department was determined in a 2-month prospective study of the following variables: the number of emergencies attended and the number of transfers carried out in addition to the time required for each transfer.

To determine the time required for each inter-hospital transfer the time from the activation of the transportation (time at which the formal request for transfer was received) to the end of the reactivation (time at which, after return to the hospital, the preparation of the material for preparing for a new transfer was completed) was considered.

Finally, statistical analysis with the SPSS v.12.0 for Windows statistical package was performed. The Kolmogorov-Smirnov test was used to determine goodness of fit to the normal distribution of the interval variables. Comparison of means was carried out with the Student's t test and the Pearson correlation was used for correlations between scale variables.

Quantitative variables are expressed as mean  $\pm$  standard deviation (SD) while the qualitative variables are shown as percentages. Significance was considered with a  $p < 0.05$ .

## Results

Twelve county hospitals of different sizes and resources and belonging to different autonomous communities of Spain were included in the study (Table 1).

The number of beds in each hospital varied from 80 to 180 with a mean of 116 ( $\pm 37$ ) and a mode of 80 beds.

**Table 1.** Group of county hospitals belonging to the GEMUHC who participated in the study

	Community	N° of daily emergencies*	N° of beds	ICU
H. Sant Pau i Santa Tecla	Catalonia	128	180	Yes
H. de Melilla	Melilla	121	172	Yes
H. de Motril	Andalucia	230	162	Yes
H. Puerta del Rosario	Canary Islands	85	120	Yes
H. San Eloy	Basque Country	102	104	No
H. Campos Arañuelo	Extremadura	63	100	No
H. Los Arcos	Murcia	265	104	No
H. Santiago Apóstol	Castilla and León	83	125	No
H. do Barbanza	Galicia	69	80	No
H. do Salnes	Galicia	75	80	No
H. Verín	Galicia	33	80	No
H. La Seu D'Urgell	Catalonia	38	80	No

\*Mean number of emergencies attended daily during the study period. GEMUHC: Study Group of Emergency Medicine of County Hospitals; H: hospital; ICU: intensive care unit.

Twenty-five percent of the hospitals had an ICU. The factors related to the presence of absence of an ICU are shown in Table 2.

The activity of the emergency departments studied varied greatly, with each centre attending 108 ( $\pm$  72) emergencies daily and the number of transfers performed was 15 ( $\pm$  9) per hospital per month. No correlation was found between the number of hospital beds and the volume of emergency transfers.

The distance to the reference centres varied from a minimum of 2 Km up to a maximum of 164 Km with a mean value of 60 Km ( $\pm$  50). The length of transportation ranged from 39 minutes to 6 hours and 18 minutes with a mean value of 154 minutes ( $\pm$  98).

An excellent correlation was found between the distance to the reference centre and the time required to arrive ( $r = 0.978$ ;  $p < 0.01$ ).

Each hospital organised their human resources for the transfers differently. Thus, some centres always used external suppliers for transportation, while others always used their own resources. A third group of centres used their own or external suppliers based on the circumstances (Figure 1).

The centres with human resources for transportation also followed different organisational models. Thus, some used on-call medical and nursing personnel localised for performing the transfer when required while other centres arranged for working personnel to undertake the transfers. Table 3 shows the different models used during the study period in each centre.

Lastly, Table 4 shows the variables related or not to the availability of healthcare personnel on-call localised for undertaking the transfer.

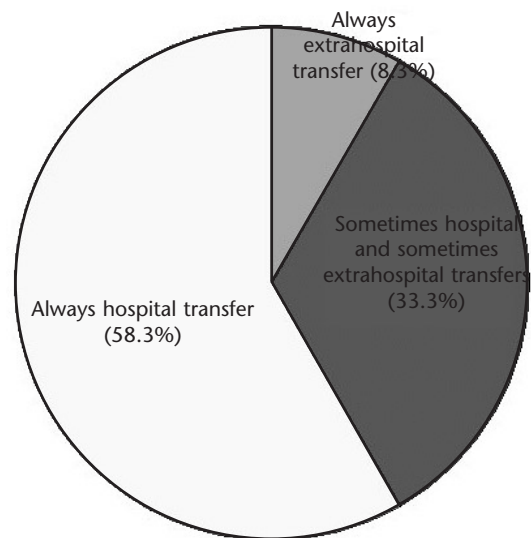
## Discussion

The GEMUHC is made up of a heterogeneous group of national hospitals whose unifying feature is that of being a county hospital, with less than 200 beds and requesting membership in the group.

**Table 2.** Factors related to the presence of an ICU in a county hospital

	Hospital with ICU	Hospital without ICU	<i>p</i>
Number of emergencies daily	141 ( $\pm$ 62)	91 ( $\pm$ 74)	> 0.05
Number of beds	158 ( $\pm$ 27)	94 ( $\pm$ 17)	< 0.001
Number of transfers monthly	11 ( $\pm$ 4)	18 ( $\pm$ 10)	> 0.05

Data expressed as mean  $\pm$  standard deviation. ICU: intensive care unit.



**Figure 1.** Organisation of the human resources for undertaking transfers.

At the time of the study 30 county hospitals belonged to the GEMUHC and 12 were selected through a non probabilistic sample by stages. This system was chosen to ensure a national distribution including especial areas such as Melilla or Fuerteventura with very particular characteristics and which also ensured representation of the autonomous communities with the greatest presence in the group which could not have been achieved with a random selection system.

The organisational variability is demonstrated on analysis of the results. Despite all being county hospitals, their size varied widely from 80 to 180 beds.

The volume of emergency services was also characterised by its versatility, showing a great standard deviation over the mean emergencies attended (108  $\pm$  72). The same occurred with the volume of transfers (15  $\pm$  9 per month), the length of the transfer (154  $\pm$  98 minutes) and the distance to the reference centre (60  $\pm$  50 Km).

The same variability was observed in the resources related to transport, with great differences in the organisation models (Table 1 and Figure 1).

This variability has previously been reported by other authors<sup>5,6</sup> and by our own group<sup>7,9</sup>, not only in relation to human resources but also to the diseases which were most susceptible to transfer based on the structural resources (presence or absence of ICU) of the county hospital. However, the factors which may be related to the organisation of human resources have yet to be determined.

**Table 3.** Organisation of the human resources in the different hospitals

	Localised physician on-call	Localised RN on-call	Hospital transport team	Extrahospital transport team
H. Sant Pau I Santa Tecla	No	No	Yes	Yes
H. de Melilla	No	No	Yes	No
H. de Motril	Yes	Yes	Yes	Yes
H. Puerta del Rosario	No	No	Yes	Yes
H. San Eloy	No	No	No	Yes
H. Campos Arañuelo	Yes	Yes	Yes	Yes
H. Los Arcos	Yes	Yes	Yes	No
H. Santiago Apóstol	No	No	Yes	No
H. do Barbanza	Yes	Yes	Yes	No
H. do Salnes	Yes	Yes	Yes	No
H. Verín	Yes	Yes	Yes	No
H. La Seu D'Urgell	Yes	Yes	Yes	No

H. Hospital; RN: registered nurse.

The presence of an ICU was related to the number of beds in the hospital but not with the volume of emergencies attended or with the volume of the transfers (Table 2).

On analysing the behaviour of the County Hospital of Verín, also included in the present study, Alvarez et al<sup>11,12</sup> reported independence between the number of emergencies attended and the number of ICU admissions in the reference hospital. With this finding it would not be logical to create an ICU only based on the volume of emergencies attended. However, on studying the distribution of the diseases transferred from the same hospitals included in the present study, our group found that most transfers corresponded to the acute coronary syndrome, which is mainly managed in the ICU, distantly followed by other processes such as cranioencephalic traumatism all of which were transferred to the reference hospital.

The volume of transfers should, logically, therefore, be taken into account at the time of providing a county hospital with an ICU.

With regard to the organisation of human resources to guarantee urgent healthcare transport, the marked heterogeneity between the different hospitals was once again of note. In 1998, Millá Santos<sup>5</sup> described the extraordinary variability in the organisation of the hospital emergency departments attributed to the improvisation with which these services have historically been structured.

This was also found in the present study with respect to the organisation of human resources for transportation. We found that 8.3% of the hospitals included did not perform any transfer with personnel from their own hospital, and they always used external suppliers, specifically 061. In 33.3% of the hospitals the transfers were carried out by both hospital and extrahospital personnel (061 and private companies) and most hospitals (58.3%) only used hospital personnel (Figure 1).

It may therefore be deduced that 93.6% of the hospitals have personnel for interhospital transportation. However, in only 64% of these this personnel is on call and localised for the transfer and in the remaining 36% the transfers are carried out by physicians and nurses who are working or on duty in the emergency department. When these staff are required to participate in a transfer there is evidently a deficit in human resources for emergency care in addition to a work overload for the personnel remaining in the department which is generated by two mechanisms: the transfer of the patients who had been attended by the professionals who must abandon their department to make the transfer and the increase in the percentage of patients which the personnel must attend with the consequent reduction in personnel in the department during the time of the transfer.

It is evident that this situation can only be justified by the argument of a superdimensional workforce, something which is not a characteristic

**Table 4.** Influential variables in the disposition of sanitary personnel located for the sanitary transport

	Presence of located physician	Absence of located physician	<i>p</i>
Number of emergencies daily	111 (± 95)	104 (± 20)	> 0.05
Number of beds	98 (± 30)	140 (± 34)	< 0.05
Number of transfers monthly	19 (± 11)	11 (± 4)	> 0.05
Average time in which the transport was realized	190 (± 92)	70 (± 48)	> 0.05
Distance of the center of reference	83 (± 45)	15 (± 23)	< 0.05

Data expressed as mean ± standard deviation.

**Table 5.** Variables influencing the creation of personnel on-call who are localisable for patient transportation

Influences	Does not influence
Size of hospital	Volume of emergencies attended
Distance from reference hospital	Total volume of monthly transfers
	Mean time required for transfer

of the national emergency departments in recent years<sup>12-15</sup>.

It is of note that in one of these hospitals, the emergency department lacked an emergency physician for nocturnal patient transfers with the emergency department remaining under the responsibility of a medical resident and perhaps, another staff member on duty from another department.

Within the context of this variability, it should be remarked that in some hospitals in which physicians on call may be localised for transfers, this is not a 24-hour service.

It may, subsequently, be deduced that the versatility in the organisation of resources is not, apparently, clearly justified. To this end, in reference to the organisation of emergency departments, Millá Santos<sup>5</sup> indicated that differences were logical in accordance with the different healthcare levels, the characteristics of demand and even the determined geographical particularities. However, these sometimes very significant differences between hospitals with similar levels and characteristics did not seem so logical.

Salmerón et al remarked that the variability was still greater with respect to medical human resources, with a great difference not only in regard to their number and distribution but also in relation to their professional qualification and the organisation of their work. These authors stated that it was practically impossible to find two institutions which were the same. It would therefore have been very interesting to have studied professional qualification and the experience of the healthcare personnel participating in the transfers.

Nonetheless, what factors might influence some hospitals having localisable physicians on call while others do not?

It can evidently be expected that the larger county hospitals would have greater resources for transportation. However, the contrary was found. The hospitals with fewer beds more often had personnel on call who were localisable for patient transfer.

This could be justified by the availability of an ICU in the larger hospitals (Table 2) which, a pri-

ori would suggest that fewer transfers would be made from these hospitals. However, this was not so, since no significant difference was found in the number of transfers between the hospitals with an ICU compared with those without this unit (Table 2).

The distance to the reference hospital was related, as expected, to the presence of personnel localised for the transfer, with the most distant hospitals having these personnel while the closer centres did not.

The number of emergencies attended did not influence the availability of localisable on-call personnel.

Table 5 shows that the availability of localisable personnel on-call for transportation was more common in the smaller hospitals and in those farther from the reference centres, although no relationship was found with the time required to perform the transfer. The volume of emergencies attended or the volume of transfers carried out did not show any influence.

For all of the above, it can therefore be concluded that:

1. Since these departments significantly differ amongst themselves, there is no prototype model of emergency department for a county hospital either in relation to the size of the hospital to which they pertain or with respect to the structural resources available to these hospitals (presence or absence of an ICU) or the intensity of the activities performed in relation to the volume of emergency care and transfers or the time required to carry out the transfer.

2. Neither does the organisation of the human resources for the transfer follow a similar model with an apparent lack of human resources for this task and the different methods of organisation cannot be justified because of the previously mentioned variability.

3. The availability of personnel on-call, who may be localised for urgent healthcare transportation in a determined county, seems to be influenced by the size of the hospital and the distance to the reference centre but not by the volume of emergencies attended or the volume of transfers undertaken or the mean time required to carry out a transfer.

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## Transporte interhospitalario urgente desde los hospitales comarcales

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**Objetivos:** Análisis de los recursos disponibles para el transporte sanitario en los hospitales comarcales, de su organización y de las diferentes variables relacionadas con la presencia o ausencia de dichos recursos.

**Método:** Estudio descriptivo y analítico, mediante un muestreo no probabilístico por etapas, seleccionando 12 hospitales comarcales. Se determinaron los recursos humanos disponibles para el transporte, su organización, la distancia al hospital de referencia, el número de urgencias atendidas, el número de traslados realizados y el tiempo que duraba cada traslado.

**Resultados:** Se observó una excesiva variabilidad, entre los diferentes hospitales comarcales, en lo relativo a su tamaño, recursos y actividad de los servicios de urgencias. En el 8,3% de los centros siempre se utilizaron recursos externos al hospital para el transporte sanitario, mientras que el 58,3% siempre fueron recursos propios. En el 33,3% restante se usaron tanto recursos propios como ajenos. Los centros que disponían de recursos humanos para el transporte seguían diferentes modelos de organización. En unos se utilizó al personal médico y de enfermería de guardia localizada para poder realizarlos, mientras que en otros se manejó al personal que estaba efectuando su labor ordinaria. El hecho de disponer o no de dicho personal estaba influenciado por el tamaño del hospital y la distancia al centro de referencia.

**Conclusiones:** La organización de los recursos humanos para el transporte no sigue un modelo semejante entre los diferentes hospitales, dando la sensación de su carencia. Este hecho no se puede justificar en base a la variabilidad de recursos y actividad de los centros. La existencia de personal de guardia localizada para el transporte sanitario urgente parece estar influenciada por el tamaño del hospital y la distancia al centro de referencia, pero no por el tiempo medio en el que se tarda en realizar el transporte, por el volumen de urgencias atendidas, ni tal siquiera por el volumen de traslados realizados. [*Emergencias* 2008;20:245-250]

**Palabras clave:** Transporte interhospitalario. Transporte secundario. Urgencias en hospitales comarcales.