PARTICULARITIES REGARDING THE USE OF EMERGENCY HOSPITALS

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Introduction

A proper health policy must take into account the fact that the hospital system presents both particularities as a whole (including here also the resources* involved in supporting numerous activities), and complementarily with other levels of health care services (preventive, primary, ambulatory); for Romania, the evidence at hospital level is not very numerous, and in this respect, the present article (which is part of a series of articles devoted to hospital care activity) tries to provide an overview, focused mainly on the utilization of 'emergency' hospitals.

In terms of health care services, the hospital can be considered the focal point of the health care system, and in this context, hospitals are considered an important public symbol being seen as an evidence of a good health system.

Overall trend in terms of hospital reforms in European countries is to redesign the hospital and includes the adoption and adaptation of new management models and new ways for payment based on performance.

Thus, at present, different models of hospital systems exist throughout Europe, with features related to the political priorities set at national level but also on economic and / or cultural factors etc. Much of the

* Hospitals are fixed assets, hard to change which often represents the cumulative legacy of decisions over decades; hospitals are large consumers of resources, taking up a large proportion of the health budget (> 70% in some Eastern European countries); hospitals employ more than half of the doctors and nearly ¾ of the average nurses [1].

Hospital is the focal point of the health care system. Within the hospital sector, emergency hospital is a major component, and we can provide statistical evidence useful for health planning policy by highlighting territorial particularities. The level of hospital utilization can be appreciated by measuring the activity, and also, the population accessibility to hospital care services can be indirectly estimated through measuring the solicited healthcare services by population. In Romania, the hospital system meet an older territorial layout, which largely covers the needs of population, but which should take into account the current Romanian context characterized by the need of a European standards harmonization and by regional development.

Keywords: emergency hospital utilization, addressability to emergency healthcare services, territorial particularities.
Metodology
This analysis is a cross-sectional study about the activity of hospitals reporting primary data at the patient level (included in DRG National database) in 2007.

Inclusion criteria: all hospitals that have reported data regarding hospital activity (in this regard, all the 487 hospitals comprised in the DRG Romanian system were selected, some of which are funded according to the tariff per case (TPC), while others only report data without being funded by TPC).

Due to the fact that in Romania there is no clear classification precisely defining and identifying the hospitals providing emergency healthcare services, in the case of objective 2 and 3 of this study, we have analyzed only hospitals comprising in their name the term "emergency". In this respect, for this study, we have classified as 'emergency' hospitals only those being defined as emergency hospitals as they appear in the request of approval for the order of minister on the classification of public hospitals in Romania [2]; besides this list (40 hospitals) we have added 8 local hospitals with "emergency" profile and also the 14 emergency military hospitals reporting data at patient level (in total 62 "emergency" hospitals were analysed).

In order to classify the hospitals in this category, we used the definition existing in the Law 95/2006 regarding the health reform under which emergency hospitals are "hospitals that have a complex organizational structure of specialties, proper medical equipment and appropriate and specialized staff. The organizational structure of this type of health unit must contain a special unit for admitting emergencies" [3].

To identify the typical profile of the territorial inequities in terms of volume of "emergency" hospital activity we have appealed to an analysis of the frequency distribution of all districts by the value of some indicators which define the adresability of the population to the services provided in these hospitals (no. of discharges, the gross and specific discharge rates, the proportion of discharges in "emergency" hospitals from the total discharges, correlation coefficient, etc.). The most handy indicator which indirectly measures the volume of hospital activity is represented by the “No. of discharges” which is an indicator whose value can be cumulated at hospital, district, region level. But for an accurate assessment, in this study was also used a correction indicator for the district population which express No. of discharges per 100 inhabitants (discharge rate). Thus, the hospital utilization (volume activity) was assessed by the gross rate of discharges (GRD = No. of discharges per 100 inhabitants) calculated for the district of the examined hospitals, while the adresability (the area of patients provenience, residence) was assessed by specific rate of discharges calculated by the patient's residence (SRD = no. of discharges of patients from district X per 100 inhabitants in district X).

The methods used are represented by the analysis of frequency distribution, correlation analysis, calculation of indicators measuring the central tendency and dispersion of values, calculation of the confidence interval for mean; for the graphical representation was used cartograms. The identification of the adresability patterns have been accounted by the mean of these indicators, for which the confidence interval for a probability of 95% was calculated.

Cartograms were used in order to better highlight and report district/areas where local specificities were identified.

RESULTS. DISCUSSIONS.
1. Description of current situation of the hospital system in Romania
In the year 2007, the DRG National database has included 487 hospitals that reported monthly data at the patient level. The territorial distribution of these hospitals was fairly uniform, with most districts being better numerically covered and districts in which the territorial hospital availability seems to be rather limited (the border districts and the Carpatho curvature area) [4].

In a first overview on the district frequency distribution of discharge rate, one can see that the two histograms (figured for GRD and SRD) are slightly different and the adresability curve is more symmetrical compared to the hospital utilization curve; also, the districts’ distribution by patient residence (SRD) is much homogeneous (variation coefficient is smaller); this difference firstly shows a lower dispersion of the SRD in comparison with GRD (lower standard deviation, lower amplitude, etc.; see Table 1).

In other words, although patients come from all over the country, they use certain hospitals (București, Cluj). This finding determines the need of a separate analysis of hospital activity both by the hospital location, and by the patient's residence.

2. Highlighting the particular utilization of the „emergency” hospitals, in territorial profile
To define a profile that characterizes the use of services by the population and the provenience of patients using hospital emergency services in Romania, we used the number of discharges reported to the management unit of the DRG Romanian system.

Table 1. Statistical indicators of discharges rate, for 487 Romanian hospitals, indifferent of their specificity

<table>
<thead>
<tr>
<th>DRG database variable</th>
<th>No. Of discharges per 100 inhabitants</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hospital District</td>
<td>Patient District</td>
<td></td>
</tr>
<tr>
<td>No. of districts</td>
<td>42</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>21,99</td>
<td>24,74</td>
<td></td>
</tr>
<tr>
<td>Median</td>
<td>21,49</td>
<td>24,51</td>
<td></td>
</tr>
<tr>
<td>Modal</td>
<td>10,26(a)</td>
<td>19,53(a)</td>
<td></td>
</tr>
<tr>
<td>Standard deviation</td>
<td>6,82747</td>
<td>3,05409</td>
<td></td>
</tr>
<tr>
<td>VARIATION COEFFICIENT</td>
<td>31%</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Minim</td>
<td>10,26</td>
<td>19,53</td>
<td></td>
</tr>
<tr>
<td>Maxim</td>
<td>51,49</td>
<td>31,16</td>
<td></td>
</tr>
</tbody>
</table>
To identify the districts where there is a level of utilization occurring at national level and the national GRD; the illustration of this indicator allows a better visualization of district classification in relation with the confidence interval of the average rate. Thus, as can be seen in Figure 1, three different patterns of use of emergency hospitals can be identified:

a) over-utilization (the values over UL of CI);
b) average utilization (the values within the confidence interval);
c) under-utilization (the values under LL of CI).

This indicator reflects quite accurately the hospital admissions and the volume of activity at emergency hospital level.

The Romanian 'emergency' hospitals represent about 13% of the total analyzed hospitals (62 hospitals with declared "emergency" profile). Across the 62 'emergency' hospitals it was recorded an average level of activity between 7.6 - 10.6 discharges per 100 inhabitants.

At national level, the average value was 9.1 discharges from 'emergency' hospitals per 100 inhabitants, and the confidence interval of the average rate, calculated for 95% is limited to the following values:
- Upper Limit (UL95%) = 9.1 + 1.5 = 10.6 discharges / 100 inhabitants
- Lower Limit (LL95%) = 9.1 - 1.5 = 7.6 discharges / 100 inhabitants.

The admission in a hospital is dependent on many factors. Some of them are related to conditions existing at national level, while others are specific to local conditions. Health planning policies are based on identifying the needs of the population, identifying the areas with existing deficiencies in the organization and functioning of the health system.

To identify the districts where there is a level of utilization situated above/below the national average (over-and under-utilization of services provided at national level) it was calculated an indicator measuring the difference between the GRD at district level and the national GRD; the illustration of this indicator allows a better visualization of district classification in relation with the confidence interval of the average rate. Thus, as can be seen in Figure 1, three different patterns of use of emergency hospitals can be identified:

a) over-utilization (the values over UL of CI);
b) average utilization (the values within the confidence interval);
c) under-utilization (the values under LL of CI).

**Average utilization**

An optimal/average level of use corresponds to the situation that the indicator value is within the confidence interval of the average rate (values between UL and LL of the confidence interval). Thus, the graph 1 highlights the 10 districts* (25%) with an average use of hospital emergency services; the positioning within this interval was made on account of factors absolutely happening. *Arad, Iași, Caraș-Severin, Prahova, Suceava, Bihor, Dolj, Brăila, Mureș, Botoșani.

**Over-utilization**

As can be seen in the graph 1, the over-utilization at district level in comparison with the national average is found especially for the population in districts having emergency hospitals. Thus, the concordance index value is 16/17, that means that these districts represent 94% of districts where over-utilization of these type of services was recorded.

Concordance Index = No. of districts having emergency hospitals / No. of districts** falling in the category of districts with an upper-utilization of emergency hospitals

** Constanța, Maramureș, Alba, Cluj, Ialomița, București, Timiș, Bucău, Vâlcea, Călărași, Brăila, Vâlcea, Galați, Neamț, Tulcea, Vâlcea.

** Under-utilization**

Similarly, in the graph 1 can be seen that there is a pattern of under-utilization of this type of services by the population having residence in the district with no emergency hospital (12 of the 13 districts with no emergency hospitals and an under-utilization of emergency hospital services): Giurgiu, Sălaj, Bistrița-Năsăud, Teleorman, Dâmbovița, Olt, Gorj, Mehedinți, Buzău, Satu Mare, Covasna, Harghita. This finding highlights the fact that the absence of a specialized hospital in this case with "emergency" specialisation in an area is a determining factor for a difficult territorial access to such services. The concordance index* is about 12/15, that means that these districts represent 80% of districts where under-utilization was recorded.

The questions and activities derived from these observations are related to how the over-and under-utilization is induced by the existence/absence of an emergency hospital in that geographical area and also to the necessity to investigate what is the area for the provenience of population soliciting this type of specialized hospital services.
But maybe the most consistent analytical approach to be taken is the investigation of the effectiveness of work in these emergency hospitals in terms of cost, and the identification of diverse patterns and correlation between the patterns of pathology and severity for diseases being cared in "urgency" conditions and the pattern of over- or under-utilization of these hospitals (will be addressed in future articles).

3. Highlighting the particular territorial patterns on the population adresability to specialized emergency services

The emergency medical status is a medical condition which probably affects to a lesser extent the level of population’s accessibility to a medical service and in comparison with other pathologies.

Also, keeping in mind the fact that, in Romania, emergency healthcare is granted free of charge, we can thus exclude or minimize the influence of the economic factor on the level of adresability of population to this type of service, and by default on the level of accessibility. At least in the theory, in terms of medical emergency, the patient often appeals to the nearest medical unit allowing a prompt intervention by providing specialized services.

Given the above, the population adresability to emergency hospitals is a parameter that estimates very well the population accessibility to emergency services provided in the emergency hospitals.

Also, by analyzing the adresability of population, we can identify patterns of hospital solicited by population, and by comparative analysis, we can suggest some regional reference centres regarding the provision of emergency hospital services. The analytical approach considered for addressing this objective has been initiated by the elaboration of two research questions:

a) In order to answer to the question “To what extent the population is addressed the emergency hospitals?”, it was used the calculation of the specific proportion of the discharges in emergency hospitals depending on the patient’s residence (No. of discharges in emergency hospitals for patients residing in the district X/Total no. of discharges in district X * 100) and the estimation of the confidence interval for the mean of this indicator.
The mean of this proportion, calculated at national level was about 37% (CI95% = 37 + / - 5.8%).

Upper Limit (UP95%) = 37 + 5.8 = 42.8%
Lower Limit (LL95%) = 37 - 5.8 = 31.2%.

Correlation between the two parameters under which this proportion was calculated (Total no. of discharges and No. of discharges in the emergency hospitals) is high, direct and statistically significant (correlation coefficient = 0.854, p-value <0.05). One can see, also, a linear aggregation tendency of districts by the two parameters, as a cloud of points which extends over an imaginary line that connects the 2 districts located on the graph’s extremes: Iași and București (graph 2).

From graph 3 it can be seen a similar pattern previously determined in the analysis of emergency hospital utilization (objective 2 of this study), and this finding leads to the conclusion that the population from districts with no emergency hospital solicits in a less extent the emergency hospitals. This finding, linked to the previous one that these districts presents an under-utilization of emergency hospitals, argues that the absence of an "emergency" hospital in a geographical area (district) determines an under-utilization of services; most likely, the need of people living in these districts to appeal for 'emergency' services is partially satisfied by the existing of other emergencies treatment solutions (continuing healthcare units, ambulance stations, emergency rooms).

**Graph 2. Correlation between no. of discharges in emergency hospitals and total no. of discharges, at district level**

**Graph 3. Population addressability to services provided in emergency hospitals, Romania 2007** (expressed by proportion of the discharges in emergency hospitals from total discharges)

Source: DRG National database, 2007; NSPHHS Bucharest
Cartogram 1. Residence areas of population soliciting services provided in emergency hospitals, Romania 2007; DRG National database.
b) In order to answer to the second research question: "What is the area of the provenience of population soliciting the services provided in the emergency hospitals?", it was examined the percentage distribution of hospitalized patients who live in the same district or in another district than the district where the hospitals being addressed are situated. Patients were included in 2 categories: Territorial (the districts of residence and hospital correspond); Extra-territorial (the districts do not correspond).

Since in the previous analysis it was observed an aggregation of patients turn to hospital services, particularly to hospitals in university centres cities, extra-territorial patients were divided into patients who turn to hospitals in these university centre districts and patients who turn to hospitals in other districts.

The cartodiagram 1 synthetically shows the percentage structure of discharges, depending on patient status (territorial or extraterritorial).

To identify patterns of aggregation around a university centre district, cartodiagram 1 presents also the pie charts divided into sector areas having colour and shading equivalent to those representing the academic centre district. The image reveals the existence of regional models around six academic centres: NV - Cluj, V - Timişoara, SE - Craiova, S - Bucureşti, C - Tg. Mureş, NE - Iaşi.

Thus, besides this pattern, at least one pattern is highlighted and is specific to districts with no emergency specialized hospital; the characteristics of this model are:
- preference for hospital and medical staff reputation to the detriment of an easily access to these services;
- soliciting to other hospitals in the limitary districts;
- under-utilization of these specialized services (in each of the 13 districts without emergency hospitals were registered less than 100000 discharges);
- soliciting to other types of emergency services (continuing healthcare units, ambulance stations, emergency rooms).

Conclusions:
The analysis of emergency specialized hospitals carried out for 2007 shows that there is a clear association between the utilization of healthcare services provided by these hospitals and the existence of these hospitals in a district. The factors influencing the utilization of these emergency hospitals are numerous, and this analysis should be continued and adjusted by identification of these factors and their contribution to the over-/ under-utilization of these specialized services. This type of analysis explains to which extent the level of inequities in resource allocation influences by amplifying the inequities in accessibility to healthcare specialized services. This is why the health policies should foresee and plan a series of concerted measures regarding aspects such as: demographic and resource estimation, with needs assessment results; only in this context, the decision-makers have to establish integrated and coherent strategies. Also, this analysis highlights the dependence between the population adre-sability to emergency specialized ser-vices and both the easily geographical access (proximity to a hospital), and the capacity and competence of existing resources in that hospital.

These findings relieve the need for such organizational structures capable to equitably ensure the provision of high quality at (district, or regional level). The existence of local "emergency" hospitals can be argued by the need to provide services in time and balancing and stabilizing the patient's disease status; outsiders of these ones, hospitals assuring the treating critical cases (district emergency hospitals) must coexist in the overlapping area with these hospitals, along with the reference emergency hospitals (regional hospitals) which provide high quality and specialized services for all traumatic, surgical and medical emergency pathology.

In this sense, a classification system of emergency hospitals according to the urgency of the case and the existing capa-city, and the complexity of cases that can be solved, and the existence of the transport infrastructure could be opportune to balance the current situation.

The role of an emergency hospital system is firstly to be able to receive and resolve medical urgencies. Their classification must take into account the estimation of existing resources, and timely intervention and the level of case treating. The efficiency of this system must be relied on the modality in which the whole healthcare system is organized (interrelation and efficient organization of the integrated system: ambulance sector, emergency services units/rooms etc.) but also on how these hospitals are classified (to ensure an efficient flow and cases delivery for most effective and efficient services), and on how the territorial inequi-ties are resolved (equitable and appropri-ate allocation), and on a declared political will.

The new rebuilding of health systems are argued by aspects such as: the development of new technologies (which allowed the decreasing of the average of length of stay and consecutively of the overall hospitalization expenditures), the increasing of the proportion of elderly people and the need to control the expenditures. These have resulted in imagining new healthcare solutions: day hospitalization, homecare hospitalization, homecare services, community care, healthcare networks. Evolution is towards: general hospital for acute care having the capacity to treat many patients; economic merger units and integration in managerial groups of several hospitals. Nowadays, the focus is on planning, designing the structures and systems enough flexible to adapt itself to the population and professionals demands.

References