# CONNECTING HOSPITALS AND HEALTH CENTRES COULD BENEFIT MOST OF PORTO'S CHILDREN POPULATION
## Current Trends in Paedriatic Patients' Mobility between Institutions Requires Implementation of Electronic Patient Records

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Abstract: Nowadays, data is spread across many institutions. Aim: This study aims to establish the need for the implementation of a regional Electronic Patient Record (EPR) in Porto area, to support the mobility, and the characteristics of the population that attends Porto's Paediatric Unit (UPP) Methods: The study is crossectional with a consecutive sampling method. A questionnaire was applied during three days. The study population consisted of children attending to Paediatrics Emergency of Porto (UPP). Individuals accompanying those children were approached, in the waiting room in order to answer the designed questionnaire about the patient. Individuals who refused to answer, entered directly to the emergency room or did not complete the interview were excluded. Results: 151 patients entered the emergency room during the shifts, 126 were approached, 25 were immediately non available, 6 refused answering and 8 were incomplete – the response rate was 74%. The age mean was 4 years old, with 46% being under 2. Within children who visited UPP, 37% have been referred: 63% from health centres, 26% from other hospitals and the remaining from private care institutions; 25% of the patients went only to health centres for outpatient care; 56% attended UPP from 2 to 5 times in the last 14 months. Conclusions: Implementing an EPR accessible in health centres and the UPP is relevant for the population studied, especially those under 2 years of age.

## 1 INTRODUCTION

As information and communication technologies have advanced, interest in mobile health care systems has grown. (Yoo, Kim, Park, Choi, & Chun, 2003).

It happens that a citizen often resorts to more than one medical institution, leading to repeated medical exams and anamnesis. Thus, patient's data is spread over the places where they have received clinical services (Katehakis, Sfakianakis, Tsiknakis, & Orphanoudakis, 2001), such as hospitals, private clinics, pharmacies, etc. (Lambrinoudakis & Gritzalis, 2000). On the other hand, increasing

evidence suggests that error in medicine is frequent and may result in substantial harm. (Bates et al., 2001 )

To overcome this problem, we need solutions that integrate data (Yoo et al., 2003). Changes have been made, and nowadays, the physical location of a patient record can be replaced by a virtual one (van Bemmel, van Ginneken, Stam, & van Mulligen, 1998), by linking databases from different health institutions attended. When used, computer-based decision supports significantly improved decision quality (Sintchenko, Coiera, Iredell, & Gilbert, 2004) and helped to reduce the frequency and consequences of errors in medical care (Bates et al., 2001 ; Koppel et al., 2005).

These procedures and attempts are expected to allow coordination of information and correction of gaps in communication (considered to be vital (Branger, van't Hooft, & van der Wouden, 1995)) in cases that patients are receiving shared care, which involves more than one physician (Branger, van Hooft, Duisterhout, & van der Lei, 1994) (the number of those cases has increased along time, thanks to the rising of interdisciplinary practice and tests (Hildebrand et al., 2006)). EPRs can also prove themselves important for improvement of quality and reduction of the health's care cost (Kahn, 1997) and improvement of the safety and efficiency of clinical care (Shapiro et al., 2006). EPRs are also believed to be crucial for the creation of large databases of de-identified aggregated data for research (Overhage et al., 2002). However, some studies demonstrated that the application of these new systems may bring some problems, namely the difficulty felt by some emergency physicians to remember their passwords and the time required to search for the information, stressed as significant barriers to access clinical information online (Schneider, 2001).

As far as children are concerned, they are one of the major groups (along with elderly people) who usually request a large amount of health services (INE, 2007 ) and are involved in emergency situations probably due to the unpredictability of their behaviour. Therefore, the exchange of electronic information regarding a patient who may be unconscious or unaware of his pathological previous condition (cardiac malformation, for example) could prove to be vital in the urgent care scenario.

For that matter, assessing the number of institutions visited by children as well as the proportion that goes to a second health care centre is an issue of major importance as it may allow, in the future, concluding about the number of people that would benefit of such a method.

UPP (Urgência Pediátrica do Porto - Paediatric Unit of Porto) is a centralized healthcare institution for all emergency paediatric events in Porto district.

This study aims to establish the need for the implementation of a regional Electronic Patient Record (EPR) in the Porto area, to support the mobility and the characteristics of the population that attends UPP.

The paper is organized in several sections: a first section of introduction and objective; secondly a participants and methods section in which its described the study, the applied questionnaire and the population; thirdly a results section which presents the results concerning mobility for hospitals and mobility for other institutions; fourthly a discussion section, presenting the authors interpretation of results and study's limitations; next a conclusion section highlighting the main study conclusions; followed by acknowledgments and references.

## 2 PARTICIPANTS AND METHODS

### 2.1 Study Design and Population

This is a cross-sectional survey with a consecutive sampling method. Data collection was done in a single moment by interviews to people accompanying children attending the UPP, about events occurred since January of 2006 until the date of interview.

The study population consisted of children attending to Paediatric Emergency of Porto (children under the age of 14).

### 2.2 Data Collection Methods

The questionnaire was applied to all individuals at the waiting room of UPP, except the ones who refused to answer or those who were immediately non available (entered directly to be attended). Some of the questionnaires were incomplete because, in the mean time, the interviewee was called to receive medical care.

The questionnaire was applied on the 8th, 11th and 12th March (a Sunday and two working days), with two shifts a day, between 8 to 10 a.m. and 8 to 10 p.m. Three interviewers in the waiting room of UPP, approached people who were accompanying children and felt capable of answer our questionnaire. The first stage of the interview was to explain the purposes of the study and ask a consent declaration to be signed (elaborated by the Hospital Ethics Committee). The next stage was to proceed with the questionnaire. The interviews lasted about 5 minutes.

### 2.3 Questionnaire

Data collected from the interviews included questions about the person who was answering (profession, kinship and years of school) and about the child they were accompanying (age, address,

gender). The remaining questions were targeted to the purpose of the study - type and number of health institutions visited since January 2006 (hospitals, health centres, private clinics) as well as physicians' specialities.

The variables obtained from the questionnaire are age, gender, address, number of each type of healthcare institution attended (hospitals, health centres and private clinics) and also a description of the visited ones. Other variables obtained about the interviewee (the person accompanying the child) are: profession, kinship and years of school.

Age was categorized in age groups. The variables about the number of different healthcare institutions attended were obtained by questioning how many different health care institutions were visited, however a list was provided, being some enumerated to help the individuals remember them. Different institutions not existent in the list were also added.

## 2.4 Statistical Analysis

The data was submitted to statistic treatment with SPSS 14.0 for windows. Socio-demographic data (age, place of living, employment, qualifications) was presented in frequency distribution; other data, concerning the aim of the study (mobility, referrals, and type of institutions) was mainly submitted to cross frequency tables and absolute frequency distributions.
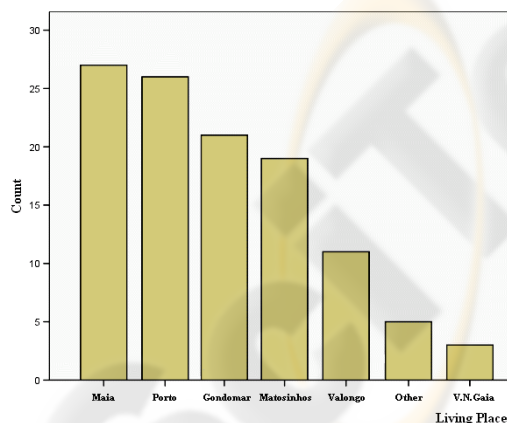


Figure 1: Living places distribution (n=112).

## 3 RESULTS

### 3.1 Sample Description

Data was collected in 4 hours shifts, for 3 days, on March 2007. A hundred and fifty one people entered the UPP and, of those, 25 (17%) went directly to the doctor's room. Only 126 (83%) stayed in the waiting room where the interviews took place: 6 (4%) refused, 120 (79%) accepted to answer it. Some of them were called to walk into the doctor's room while answering, so that we obtained 8 (5%) incomplete questionnaires and only 112 (74%) were complete (considered the valid ones). The response rate was 74% (112 out of 151).

The sample was composed by 48 (43%) female and 64 (57%) male children. Fifty one (46%) individuals were under or 2 years old and 61 (54%) were over 2 years old. The mean age was 4 years old. These individuals were living mainly in the Porto region (see Figure 1).

### 3.2 Mobility for Hospitals

In the study, the mean number of times children attended UPP is 1,74 (б = 0,61), 39 (35%) children were visiting UPP for the first time since January 2006, 63 (56%) visited it 2, 3, 4 or 5 times and the other 10 (9%) visited it more than 5 times.

Of the individuals who visited UPP, 41 (37%) were referred from other institutions: 27 (63%) from Health Centers, 11 (26%) from Hospitals and 5 (12%) from Private Clinics. The mean of the number of references is 0,49 (б = 0,76).

Crossing the number of times children attended UPP with the number of references, it's seen that the individuals who visited it more times are the ones who got a higher number of references. However the majority of individuals were not even referred (63%) to other institutions.

Twenty-seven (24%) individuals attended the emergency service of others hospitals and 85 (76%) didn't. Of those who did, 6 (22%) had been at Hospital de Valongo, 3 (11%) at Centro Hospitalar de Vila Nova de Gaia, 3 (11%) at Hospital Geral de Santo António, 1 (4%) at Hospital Pedro Hispano, 1 (4%) at Hospital Maria Pia and 13 (48%) at others.

Thirty-two (29%) of the children needed hospitalization and 80 (71%) didn't. Of the ones who needed it, only 11 (34%) were referred for it and the other 21 (66%) didn't.

## 3.3 Mobility in Other Health Institutions

Crossing the attendance of the health institutions' data analyzed in three types of institutions (Private Clinics, Health Centers and Outpatient Department) there are 12 (11%) people who attended the three health institutions and only 3 (3%) of these of people did not attend any of those, 28 (25%) of the individuals attended only Health Centers, 14 (12%) only attended Private Clinics, 26 (23%) private clinics and health centres, 17 (15%) health centres and hospitals (see Table 1).

There were 83 (74%) individuals that attended Health Centres within their residence areas. 56 (50%) had visited Private Clinics, mostly Private Consultants for paediatrics; other private clinics include: general clinics, otorhinolaryngology, ophthalmology, orthopaedics, psychology and dermatology were also attended by those children (see Table 2).

When dealing with the outpatient department, there is mobility among various institutions as may be seen in the Table 3.

The distribution of the number of visits to UPP crossed with the age of the children is described in Table 4.

## 4 DISCUSSION

The interviewees, as expected, were mainly from the Porto region.

Considering that 97% of patients that attended UPP had already gone to at least one medical consultation, it is valid to assume that these individuals would, somehow, benefit from a system that integrates data. Although this value seems to be high, it must be kept in mind that it probably accounts for mandatory vaccination consultations or seeking a second consult concerning the same issue. Comparing the attendance to health centres only (25%) to the attendance to private clinics only (15%), we realized that approximately double the individuals chose health centres over private clinics.

Our results also showed that, within patients who had been referred, a high percentage was referred from health centres (63%). Health centres are also, apart from hospitals, the type of institutions that people most visit in their residence areas (74%). It would then be of special interest to implement an EPR in health centres. Implementing an integrated EPR would allow a rapid and less error-prone

information exchange especially in an emergency situation when previous clinical information is of the up-most importance.

Table 1: Cross table of the attendance of Private Clinics, Health Centres and Outpatient Department (n=112).

| Attended a Private Clinic | Attended a Health Centre | | Attended Outpatient Department (hospitals) |
|---|---|---|---|
| | Yes | No | |
| Yes | 12 (11%) | 4 (4%) | Yes |
| | 26 (23%) | 14 (12%) | No |
| No | 17 (15%) | 8 (7%) | Yes |
| | 28 (25%) | 3 (3%) | No |

Table 2: Table of the number of visits to Health Centers and Private Clinics with its specialities.

| Institution | Cases (n) |
|---|---|
| Health Centre | 83 |
| Private Clinics | 56 |
| Paediatrics | 53 |
| General Clinics | 4 |
| Otorhinolaryngology | 2 |
| Ophthalmology | 2 |
| Orthopaedics | 2 |
| Psychology | 1 |
| Dermatology | 1 |

Table 3: Table of the different institutions attended for outpatient department.

| Institution | Cases (n) |
|---|---|
| H. São João | 14 |
| H. Pedro Hispano | 10 |
| H.G. Santo António | 9 |
| H. Maria Pia | 4 |
| Others | 5 |
| Missing | 1 |

Table 4: Distribution (number of cases and percentage) of the number of visits to UPP by age (n=112).

| Age | Number of visits to UPP | | | |
|---|---|---|---|---|
| | 1st Visit | 2-5 | >5 | Total |
| ≤2 | 14 (13%) | 36 (32%) | 1 (1%) | 51 (46%) |
| >2 | 25 (22%) | 27 (24%) | 9 (8%) | 61 (54%) |
| Total | 39 (35%) | 63 (56%) | 10 (9%) | 112 (100%) |

The age factor seems to have some influence in the number of visits to UPP, since individuals until the age of 2 have the higher frequency of 2-5 visits

(32% against 24% of the ones aged over 2). This supports the idea that these individuals should be considered as a target population for the implementation of electronic integrated databases.

Regarding the different institutions chosen by individuals for outpatient care, several are attended; Hospital Pedro Hispano, Hospital Geral Santo António, are the most visited.

When attending private clinics, the most requested speciality is paediatrics, as it was expected.

In a previous similar study done by students of the Faculty of Medicine of University of Porto on elderly population, it was shown that there should be an exchange of information between health institutions in the Porto region. Our study emphasizes this notion because children in this area visit a great number of institution but choose to one emergency care facility (UPP) only; as such, the main conclusion of the study is that integrated EPR between hospitals and health centres would most benefit of children population in Porto region.

## 4.1 Limitations

The UPP's waiting room, where interviews took place, was itself a limitation to the receptivity of the interviewees due to emotional distress associated with an emergency situation impairing their ability to answer accurately.

The current organization of Porto's paediatric emergency referrals (a centralized healthcare facility for all events), may difficult the generalization to other cities.

## 5 CONCLUSIONS

Implementing an Electronic Patient Records accessible in health centres and the UPP is relevant for the population studied, especially those under 2 years of age.

## ACKNOWLEDGEMENTS

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