FOR HOW LONG IS DATA FROM PREVIOUS ADMISSIONS ACCESSED BY HOSPITAL DOCTORS?

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Abstract: Distinguishing relevant information enables for better user interfaces, as well as better storage management. However, it is hard to distinguish between information really important to clinical care and only occasionally desirable. We aim to answer for how long are clinical documents useful for health professionals in a hospital environment considering its' content and the context of information request. We have studied the databases of a Virtual Electronic Patient Record that included (1) patient identification and the list of clinical documents integrated, (2) the visualization logs; and (3) a hospital encounters database that includes the list of encounters since 1993. Our results show that some clinical reports are still used after one year regardless of the context in which they were created, although significant differences exist in reports created in distinct encounter types. The half-life of reports by encounter type is 1.7 days for emergency, 3.9 days for inpatient and 27.7 for outpatient encounters. We conclude that the usage of patients past information (data from previous hospital encounters), varied significantly according to the setting of healthcare and content.

1 INTRODUCTION

Patient records exist to memorize and communicate the data existing on a particular individual, to help deliver care to him or her. Records are not only an information system but also a communication system that enables communication between different health professionals and between the 'past and present' (Dick & Steen, 1997; Nygren, Wyatt, & Wright, 1998).

Currently there are great quantities of stored data regarding patients. Although great advances have been made over the years (Cruz-Correia et al., 2007), on-demand access to clinical information is still inadequate in many settings, contributing to duplication of effort, excess costs, adverse events, and reduced efficiency (Feied et al., 2004). While it is widely accepted that full access to integrated electronic patient records and instant access to up-to-date medical knowledge significantly reduces faulty decision making resulting from lack of information (Dick & Steen, 1997; Miller & Sim, 2004; Overhage et al., 2002), there is still very little evidence that life-long Electronic Health Records (EHR) improve patient care (Clamp & Keen, 2007).

Distinguishing between relevant and useless information enables for better user interfaces by highlighting most relevant information, as well as better storage management by choosing storage devices with better performance for relevant data. However, it is hard to understand what information is really important to clinical care, and what is simply occasionally desirable (Coiera, 1997).

Data age is usually one of the factors used to assess importance, making new information more relevant to the current search. But different data ages differently according to its type, i.e., some clinical reports describe situations less ephemeral than other and so are found useful longer than others. Also, the context of healthcare (e.g.: hospital environment,

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primary care, oncology) probably influences the way information maintains its relevance.

We aim to study for how long are clinical documents useful for health professionals in a hospital environment.

2 BACKGROUND

In May 2003, the Department of Biostatistics and Medical Informatics implemented a Virtual Electronic Patient Record (HSJ-VEPR) (Cruz-Correia et al., 2005) for the Hospital S. João (HSJ), a university hospital with over 1 350 beds. The system integrates clinical data from 12 legacy departmental IS and the Diagnosis Related Groups and Hospital Administrative databases, aiming to deliver the maximum information possible to health professionals. Over 700 medical doctors use the system on a daily basis and the HSJ-VEPR retrieves an average of 3000 new reports each day (in PDF or HTML formats) (Cruz-Correia et al., 2005; Cruz-Correia et al., 2006), adding up to 2 million reports collected so far.

Each health professionals may access clinical information either by reading the paper patient record, using the HSJ-VEPR or using other IS available on the hospital.

3 METHODS

3.1 Participants

This study is concentrated in the report visualizations occurred in a two years period (2005 and 2006). In this period the hospital had 978 553 outpatients visits, 464 683 emergency visits and 82 444 inpatient visits. Reports' half-life by feeder system is analysis is based on the 3rd quarter of 2006 view results.

3.2 Data Preparation

The data considered in this study existed in three different Oracle schemas: (1) the HSJ-VEPR patient database, which included patient identification and the list of clinical documents integrated and; (2) the visualization logs including sessions, health professionals' identification and category and document views; (3) a hospital encounters database that includes patient identification, the list of encounters since 1993. These schemas use slightly different patient identification numbers, so transformation of these values was necessary to create relations between the tables.

HSJ-VEPR system does not know in what context (inpatient, outpatient or emergency) is the user accessing each report. The context was induced by confronting the date of view and the dates of the different patient encounters. When the date of view matches an encounter, that encounter is associated with the visualization. When no match is made no assumption is made regarding the encounter.

3.3 Clinical Report Half-life

Clinical reports' percentile is calculated by grouping all report views by type of encounter, ordering all visualizations by date, and calculating its relative position (current visualization position / number of visualizations). This technique allows us to compare the different encounter type groups by standardizing the position of each view. Reports half-life refers to the age of the report in percentile fifty.

4 RESULTS

Table 1 shows the number of visualizations taking in consideration the context of report creation and the context of report visualization. It should be noted that more than a half of the reports seen in 2005/2006).

Table 1: Number and *percentage* of visualizations grouped by context of visualization and report creation in 2005 and 2006.

Year	Report viewed in	Concomitant encounter		Previous encounter: Emergency		Previous encounter: Inpatient		Previous encounter: Outpatient		Total
2005	Emergency	861	*40*	334	*16*	511	*24*	447	*21*	2 153
	Inpatient	18 929	*62*	4 794	*16*	3 337	*11*	3 352	*11*	30 412
	Outpatient	154	*1*	1 158	*4*	5 150	*18*	22 043	*77*	28 505
	Total	19 944	*33*	6 286	*10*	8 998	*15*	25 842	*42*	61 070
2006	Emergency	2 973	*49*	743	*12*	1 129	*19*	1 202	*20*	6 047
	Inpatient	43 328	*65*	9 618	*14*	6 453	*10*	7 432	*11*	66 831
	Outpatient	290	*0*	2 543	*4*	10 804	*18*	46 874	*77*	60 511
	Total	46 591	*35*	12 904	*10*	18 386	*14*	55 508	*42*	133 389

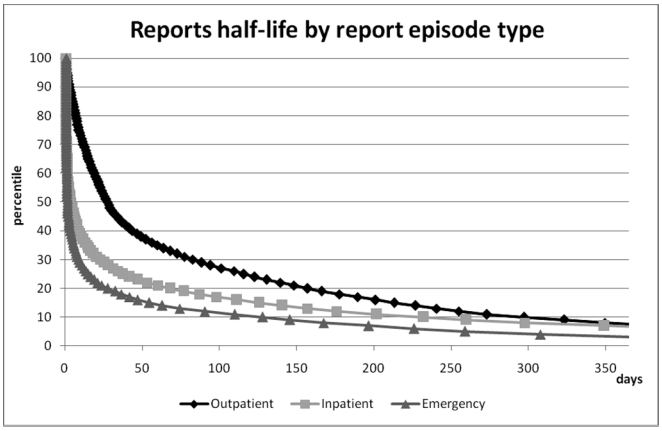

Figure 1: Reports half-life grouped by episode type according to views in 2005 and 2006.

In inpatient encounters more than 35% (38/35%) report views regard previous encounters, without any clear distinction of which are found more relevant (previous emergency 16/14%, inpatient 11/10% and outpatient 11/11%).

In outpatient encounters almost all of the report visualizations were of reports created in previous encounters (99/100%). Most of them created in a previous outpatient encounter (77/77%).

Figure 1 illustrates reports' half-life by the type of encounter when report was generated. It shows that some clinical reports are still used after one year regardless of the context in which they were created. Nevertheless, outpatient reports are in average more durable than inpatient reports and emergency reports. The half-life of reports (percentile 50) by encounter type is 1.7 days for emergency, 3.9 days for inpatient encounters and 27.7 days for outpatient encounters.

Table 2 describes the reports' half-life (median of report age when viewed) group by department of feeder system in the 3rd quarter of 2006. It should be noticed the great difference in reports' half-life regarding feeding system (e.g. half-life of the pathology lab is 10 times greater than the clinical pathology lab).

Table 2: Reports half-life (median of report age when viewed) by department of feeder system in the 3rd quarter of 2006.

Feeder system	Views (n)	Half-life (days)
Clinical Pathology	18 261	4.4
Imuno-hemotherapy	23 691	4.6
Obstetrics	241	8
Pneumology	457	15
Intensive Care	141	26
Gastroenterology	1 773	38
Gynaecology	100	44
Pathology	16 567	47

5 DISCUSSION

Our results show than many report visualizations refer to previous encounters. Although the Hospital has not a unique patient record (in paper or electronic form), it is obvious that doctors which to access to previous encounter reports. It is also relevant that even older reports (more than one year) are still found useful by doctors.

As more and more patient information is stored, it is very important to efficiently select which one is more useful and promote it in a scenario where the scarceness of resources (screen space, disk space, bandwidth and doctors' time) is very real.

We intend to take in consideration reports' half-life in the next version of our system replacing the first patient record screen, reports collected in the last 24 hours, by a table in which the time interval is different for each type of report. Outpatient reports will be maintained in the list of last reports longer than inpatient and emergency reports.

This study rises new questions regarding what type of characteristics help maintain a report useful over the years.

6 CONCLUSIONS

We conclude that the usage of patients past information (data from previous hospital encounters), varied significantly according to the setting of healthcare and content.

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