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Electronic Health Record Use in Hospital Care in Spain

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Investment in information technologies in healthcare is justified because they will help to achieve higher standards in terms of efficiency, quality, safety, and a closer engagement of patients and their families (Pagliari C et al. 2007), as well as the potential benefits of health information sharing (Jha et al. 2009).

However, the association between resource investment and performance improvement has not yet been demonstrated with sufficient evidence (De Lone & McLean 1992; Department of Health 2004; Restuccia 2012). It is said that the inclusion of key functions of electronic records such as computerised requests and electronic referrals between different healthcare service providers and healthcare levels, enables a more efficient and

safer management of healthcare resources and it avoids duplications for patients due to a lack of integration (Poissant et al. 2005). In this sense, there is also a broad consensus about the potential benefits of the EHR and the incorporation of information coming from medical devices (Jha et al. 2006).

Electronic health records (EHRs) are being introduced variably in the different levels of the healthcare systems around the world (Institute of Medicine 2007). A recent study published in the United States concluded that only 10% of hospitals had a basic level of electronic medical records, at least in one clinical unit. This percentage rose to 59% if we look at one of the key functions of many that should have the EHR (Jha et al. 2009).

	Al Signo hospitals (n=214)	Respondents n(%)
Size		
Small (0-99 beds)	60(28%)	2 (3.1%)
Medium (100-399 beds)	98(45.8%)	16 (25%)
Big (> = 400 beds)	56(26.2%)	46 (71.9%)
University		
Yes	–	35 (54.7%)
No	–	29 (45.3%)
Location		
Rural	–	8 (12.5%)
Urban	–	25 (39.1%)
Urban - Regional capital	–	31 (48.4%)

Table 1. Hospital description

Requirements	Exhaustive EHR	Basic EHR
Clinical documentation		
Patient's demographic characteristics	x	x
Physicians' notes	x	
Nursing assessment	x	
Discharge report	x	x
Radiology and laboratory results		
Laboratory results	x	x
Radiology results	x	x
Additional test results	x	
Radiology images	x	
Laboratory results report	x	
Computerised provider-order entry		
Laboratory	x	
Radiology	x	x
Medications	x	x
Medical consultants	x	
Medical orders	x	
Support and alerts system		
Clinical practice guidelines		
Clinical order reminders		
Drug alerts		
Results		
Number of hospitals	25	23
Adoption percentage	39.1	35.9

Table 2. (above)
Electronic requirements for classification of hospitals according to a basic or exhaustive electronic-records system.

Requirements	Fully implemented in all units	To initiate soon	There are no resources but there is intention	Not planned
	Hospitals percentages (n = 64)			
Clinical documentation				
Patient's demographic Characteristics	87.4	1.6	1.6	
Physicians' notes	34.3	6.3	12.5	3.1
Nursing assessment	43.6	7.8	14.1	1.6
Discharge report	75	1.6	1.6	
Surgical report	46.8	14.1	7.8	3.1
Radiology and laboratory results				
Laboratory results	84.4	3.1		
Radiology results	84.4	3.1		1.6
Additional tests results	42.2	10.9	6.3	3.1
Radiology images	76.6	4.7	1.6	
Laboratory results report	75	4.7	3.1	
Electrocardiographic tracing	4.7	29.7	20.3	18.8
Incorporation of external digital information	25	20.3	12.5	9.4
Computerised provider–order entry				
Laboratory	39.1	23.4	4.7	
Radiology	40.6	20.3	9.4	1.6
Medications	50	10.9	4.7	
Medical consultants	37.5	18.8	9.4	3.1
Medical orders	46.9	18.8	7.8	6.3
Supply chain	39.1	9.4	3.1	6.3
Support and alerts system				
Clinical practice guidelines	7.8	17.2	14.1	15.6
Clinical order reminders	12.5	6.3	6.3	17.2
Drug alerts	23.4	14.1	4.7	10.9

Table 3. (above)
Selected electronic functionalities and its implementation level in Spanish hospitals.

	Hospitals with EHR	Hospitals without EHR
Technical support for the implementation and maintenance	87.5	62.5
Security certification and warranty	81.3	62.5
Objective third-party evaluations of EHR products	77.1	56.3
Incentives for implementation	62.5	50
Exempt physicians from all responsibility in confidentiality	39.6	25

Table 4. (above)
Perceived facilitators to adopt Electronic Health Records (EHRs) among hospitals with and without electronic-record systems.

The Spanish Ministry of Health published recently that the Healthcare ICT expenditure and investment in the National Health System accounted for 0.9% (544 millions of Euros) of the Regional Health Services' overall healthcare budget in 2009. It also stated that 97% of hospitals had information systems to manage admissions, beds, outpatient appointments, while 85% had radiology management, pathology and Unidose pharmacy systems. In addition, storage systems in digital imaging were available in more than 60% of Spanish hospitals and more than 90% had an Information System Laboratory (Ministry of Health and Social Policy & Red.es 2010). Despite over 30% of Spanish healthcare professionals are working with EHRs systems (de la Torre-Díez et al. 2013), the computerization level of health records in Spanish hospitals is unknown and there is not any national scientific study that has investigated this issue in depth. The goals of this study were to describe the level of adoption of electronic health records in hospital care, to identify potential facilitators to its implementation and the following steps.

Methods

For the elaboration of the questionnaire we reviewed and synthesised previous studies based on hospitals that were focused in EHR systems or related functionalities (e.g., electronic order entry, laboratory and radiology results) in the previous four years (Jha et al. 2009; Robertson et al. 2010). We developed an initial draft of the questionnaire to be reviewed by a panel of professional experts in the electronic health record field from the Public Health School f rom t he Region of Andalusia and a second group of hospital management experts were consulted, all of which are members of the Board of the Fundación Signo, which is a non-profit foundation whose goals are the promotion and financing of proposals based on management improvement and cost evaluations.

We administered the questionnaire to CEOs, managing directors and their assistants from acute care hospitals from the Fundaci ón Signo members' database. The survey was sent for the first time in September 2011, followed by two reminders. The fieldwork was completed in November of the same year.

The respondents were asked about the presence or absence of 26 clinical features of an EHR system and the extension of its implementation and whether in the future they had planned to implement any of them or not. The dimension of these features consisted of: clinical documentation, radiology and laboratory results, electronic requests and a support and alerts system. Besides that, we asked about the potential difficulties in EHR adoption (16 issues) and the solutions to overcome them.

Given the potential heterogeneity in possible responses due to different combinations of features implemented, we considered the proposal made in a similar previous study (Jha et al. 2009) of two possible categories: Basic EHR and exhaustive EHR.

Results

There were a total of 64 responses from 214 hospitals contacted (30% response rate). 97% of the respondent hospitals were medium and large-sized hospitals that belong to the National Health Service (table 1).

The presence of certain electronic individual functionalities is considered to be necessary for defining basic or exhaustive levels of electronic-record systems (table 2). We identified 48 hospitals (75.0%) with an exhaustive or basic level of EHR and 16 hospitals (25.0%) with some electronic-record functions without being totally electronic-record systems. Medium-sized (56%), urban (40%) and university (43%) are the type of hospitals that have the highest percentage of exhaustive electronic-record systems.

In terms of the adoption of different types of key EHR functionalities, we found that most clinical documentation functionalities are implemented in all units in over 40% of the hospitals, except for physicians' notes, which are only electronic in all units in 34.3% of the cases (table 3). The high percentage of affirmative responses related to the laboratory and radiology digital reports (84.3%) is also remarkable. On the contrary, only 25% of the hospitals have the option to incorporate external digitalised documents in the EHR. The computerised provider-order entry section is the least computerized, with percentages ranging from 37.5% to 50.1% in all its functionalities. It is precisely in these functionalities where the respondents expected to initiate soon its computerisation, the same as with incorporating digital external information to the EHR (20.3%) and digital electrocardiogram (29.7%). Finally, the decision support and alert systems and computerisation level are the lowest compared to other functionalities. The drug alert functionality is most implemented in this section, 23% of the hospitals have it fully implemented in all units. Whenever there were more resources, more than 20% of respondents would decide to invest in this area.

Regarding the opinion of the respondents about their main perceived facilitators, hospitals with and without EHR identified technical support during implementation and maintenance, security certification warranty and objective third-party evaluations of EHR products a s t he m ost important f or E HR adoption (table 4). Incentives for implementation or to exempt doctors from confidentiality responsibility were less likely cited as facilitators.

The following improvements for the electronic- record system (table 5) for those hospitals with basic EHR are focused on adding new data sources (48%) and digitalization of paper files (30%). For hospitals with an exhaustive EHR, the following steps are focused on adding new data sources (24%), digitalisation of paper files (28%), incorporate data analysis and performance indicators (24%) and to reduce the paper files delivery (20%). In addition, we asked their opinion about the impact of the economic crisis. The responses were different among hospitals with an exhaustive EHR from others with a basic EHR. In the former case, the economic crisis affected less as most decisions had been taken and most of the investment was already made (44%). On the other hand, in the latter, 56.5% of the respondents mentioned that the economic crisis reduced the investment in the EHR projects drastically or even paralysed them.

Discussion

According to our results, 39.1% of the surveyed hospitals had an exhaustive electronic- record system and in 32.8% of the cases it was basic. In addition, we found that 28.1% of the hospitals did not have an electronic- record system according to our parameters, but almost all of these hospitals had some electronic functionalities, especially for clinical documents, including hospital discharge reports, and electronic order entries.

If we analyse the prevalence of the different types of clinical documentation functionalities, it is significant that 34% of respondents have physicians' notes in all the clinical units. In terms of nursing assessments, the total percentage is slightly higher (43.6%), and an additional 7.8% of the hospitals have the intention to initiate this functionality soon. Jha et al. (2009) stated that nursing assessments and physicians' notes are the fundamental functionalities that determine an electronic-record system. In 2009, this author found that U.S. hospitals had 27% of electronic physicians' notes in at least one or all units and 57% had nursing assessments. Despite it being only three years of difference between the two studies, the change in the implementation level for U.S. hospitals could be significant, according to the amount of investment in this country. On the contrary, given the low investment in Information Technologies by the Spanish Government, only 1% of the healthcare budget (Ministry of Health and Social Policy & Red.es 2010), the numbers found in this study are surprisingly high. Other clinical documentation functionalities, usually easier to implement and previous to an EHR, such as electronic discharge reports and surgical reports are high, with rates of 75.4% and 46.9%, respectively.

In the group of radiology and laboratory results, it is significant that most of these electronic functionalities are highly implemented in all clinical units of the hospitals, similar to what Jha et al. found in USA hospitals in 2008 (Jha et al. 2009). He also found that diagnostic test images such as electrocardiographic tracing had a low implementation. Similarly, only 4.7% of the Spanish centres confirmed the availability of this tool in all units. The hospitals that cited having a digital radiology storage system had increased by 16% compared to the results published by the Spanish Ministry of Health in the year 2009 (Soria 2009).

In electronic order entry, functionalities such as medical orders and medications are the most prevalent, in 46.9% and 50% of cases, respectively, in all units of hospitalisation. In contrast, there are few centres that have digitalised the orders of the supply chain and few have the intention to invest in this functionality. It is a focus of concern for some managers to be too focused on the health field, leaving apart optimisation

opportunities from logistic processes and their costs, supporting the health services. The improvement potential in the supply chain management can be an important point of cost savings without consequences in the health services field (McKone-Sweet et al. 2005). This saving capability is hampered if the demand order entry is not computerised, because it makes planning more difficult, which is a basic step in the supply chain management.

Conclusions

In conclusion, this is the first scientific study in Spain that analyses the level of EHR digitalisation in hospitals, and the main facilitators to its implementation. The number of hospitals that have EHR is high but a third of the hospitals still did not have EHR in 2011, although they had launched some EHR functionalities, particularly those related to clinical documentation. The three most cited facilitators were the possibility to hire technical support during the implementation and afterwards, security certification warranty and objective third-party evaluations of EHR products. Support tools in clinical decision-making and alerts are less prevalent; with the related drug alerts being the most implemented.

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