



## Electronic health record use in an affluent region in India: Findings from a survey of Chandigarh hospitals



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### ARTICLE INFO

#### Keywords:

Electronic health record  
EHR  
Electronic medical record  
EMR  
ICT  
Health information system  
India  
Chandigarh  
Technology adoption

### ABSTRACT

**Objectives:** To characterize the electronic health record (EHR) systems in use in an affluent region of India in order to understand the state-of-the-art within the Indian market.

**Methods:** A survey on EHR features was created by combining an instrument developed by the Organisation for International Cooperation and Development and an instrument developed by an American team of researchers. An interviewer directly administered the survey to leaders from hospitals in greater Chandigarh which possessed electronic health information systems. Summary statistics from the survey are reported.

**Results:** 24 hospitals offering multi-specialty inpatient care were identified in greater Chandigarh. 18 of these hospitals had electronic health information systems, 17 of which were interviewed. Of the hospitals with systems, 17 (100%) could access patient demographic information internally, but 12 (71%) could not access vital sign, allergy, or immunization data internally. 11 (65%) of the systems were capable of sharing patient summaries internally, but 13 (76%) could not send electronic referrals internally. Among organizations which have adopted systems, major barriers tend to have been around financial and staff matters. Concerns over interoperability, privacy, and security were infrequently cited as barriers to adoption.

**Conclusions:** EHRs are ubiquitous in at least one region of India. Systems are more likely to have capabilities for intra-organizational information sharing than for inter-organizational information sharing. The availability of EHR data may foster clinical research.

### 1. Background

India is a country of great extremes. Focus on India's status as the world's seventh biggest economy – a nation with a GDP of over US\$2 trillion – masks the fact that India's median income of US\$616 is the lowest among the BRIC economies [1,2]. While there is poverty in India, there are also pockets of great wealth. In the northern Union Territory of Chandigarh, the success of local industrialists has facilitated the opening of a Rolls Royce dealership and watch shops with offerings from Jaeger-LeCoultre, Omega, and Rolex. While these Veblen goods are prevalent, the masses in Chandigarh still utilize auto rickshaws, and the cost of most luxury watches exceeds the local annual per capita income of INR 129,000 (US\$ 1900) [3]. Similar contrasts exist within the local healthcare system, with some hospitals utilizing state-of-the-art facilities, and other hospitals utilizing more rudimentary facilities. As a result of its relative affluence, Chandigarh represents an ideal location for studying the adoption of new technol-

ogies by hospitals. The presence of technologies in Chandigarh indicates that they can be adopted in their present form within India, and that a potential market exists.

It is furthermore an opportune time to study electronic health record (EHR) adoption in India, as such adoption has received increased investment and governmental support. In August 2013, the Ministry of Health and Family Welfare released EHR standards for India [4]. A draft of a revised version of the standards was subsequently released in February 2016 [5]. Although the Indian government has brought clarity to standards for EHR adoption, the government has not launched a national push for adoption through funding, as was the case with the HITECH Act [6] in the United States and the National Programme for Health IT [7] in the United Kingdom. As a result, hospitals must individually decide whether they wish to adopt EHRs, and if so, to what extent.

The presence of a business case for many EHR features is ambiguous within India. Unlike many European countries, which operate hospitals

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under fixed budgets or capitation, and the United States, which has a combination of complicated health insurance plans and emerging value-based payments, Indian hospitals largely operate on a straightforward, fee-for-service basis [8]. There is less of an incentive to reduce waste or to comply with health insurance documentation requirements in India than there is in other nations. The lack of quality-based incentives from most payers and internal hospital governance structures has contributed to this ambiguity. The presence of electronic health record features for population health management, inter-provider communication, and computerized physician order entry have a clearer business case in contexts where profit decreases with volume than in a fee-for-service environment where increased volume – both necessary and unnecessary – are tied to increased revenue. If there are some Indian hospitals which have adopted advanced electronic health record features, it suggests that a business case can be made. In an affluent environment such as Chandigarh, hospitals can potentially make EHR investments to increase their prestige, pricing power, and perceived quality, even if such investments reduce the short-run volume of care provided by reducing unnecessary care or slow the pace of the care process. Patients who are not budget-conscious while seeking healthcare, such as the purchasers of Veblen goods, have the potential to pay more for quality.

As multiple countries have sought to characterize their level of EHR adoption, a standardized survey has been developed by the Organisation for International Cooperation and Development (OECD) for doing so [9]. The survey was produced to be generalized enough that it is applicable to all OECD member nations. While India is not a member of the OECD, the OECD members have a wide range of incomes and healthcare system designs which include both capitalistic and socialistic structures. After minor localization, the OECD instrument offers a validated approach for assessing EHR adoption in India.

In order to characterize state of EHR use, the Max Institute of Healthcare Management at the Indian School of Business (ISB) commissioned two surveys using a localized version of the OECD's survey instrument. Minor changes were made to the survey so that the vocabulary used would be more familiar to an Indian audience. In the first survey, a convenience sample of students from ISB's Healthcare Management Programme (executive MBA) were surveyed on the use of EHRs in their own facilities. The survey was successfully completed by the students, and the majority responded that there were EHRs used in their facilities. The success of the pilot enabled the survey to be deployed without modification to all the hospitals in Chandigarh and its two primary suburbs, Mohali and Panchkula.

## 2. Methods

### 2.1. Sample selection

Web-based searches were conducted to identify all hospitals offering inpatient care in Chandigarh, Mohali, and Panchkula. The resulting list of 30 hospitals was reviewed by a leader of the Max Institute of Healthcare Management with executive experience at a local hospital in order to ensure its completeness. The services offered by all hospitals on the list were reviewed by viewing their websites, or if no website was available, by contacting the hospitals. Single-specialty hospitals (e.g. maternity hospitals) were eliminated from the list, as the goal was to survey hospitals offering general inpatient care. Among the 24 hospitals which were identified as offering multi-specialty inpatient care, interviews determined that 18 hospitals utilized some form of electronic health information systems, and the remaining 6 hospitals did not. The interviewer was successful in interviewing 17 of the 18 hospitals which had electronic health information systems.

### 2.2. Survey development

Two pre-existing survey were combined to form the survey. An

OECD instrument was merged with a series of questions on barriers to adoption from a separate instrument which had previously been administered to American hospitals [10]. This was done to ensure that the survey covered topics that have been of interest to other researchers. The survey was localized so that Indian hospital leaders could respond to it more intuitively. After these modifications were made, the survey was reviewed by three different people with experience in healthcare. Points of confusion were noted by a research assistant, and adjustments in wording were made to reduce ambiguity. The survey was then administered to executive education students in a pilot. The pilot demonstrated that the survey was appropriate for the Indian context, and no questions were removed from the instrument after the pilot was completed. The survey from the convenience sample pilot was subsequently administered to the Chandigarh-area hospitals without modification. A copy of the survey is provided in Appendix.

### 2.3. Survey administration

A research assistant from the Max Institute was enlisted to interview hospital executives regarding their hospital's use of information technology during the spring of 2016. The research assistant was from Chandigarh, and as a result, was familiar with local customs and healthcare facilities. The research assistant called hospitals and requested to interview a leader with oversight over information technology. Hospitals which declared that they did not use electronic information systems were noted and not interviewed. During interviews, respondents were guided through each of the questions of the survey. The research assistant noted responses and asked the questions in a systematic fashion in order to ensure consistency and completeness. As a result, responses were not omitted.

### 2.4. Analysis

For each of the survey questions, the distribution of responses was noted. Given the small sample size, statistical analyses were not conducted to compare subpopulations of respondents. Findings are purely observational, and are presented in tables.

## 3. Results

### 3.1. Sample demographics

Of the 17 hospitals with electronic health information systems which were interviewed, 10 (59%) were private standalone facilities, 3 (18%) were members of corporate chains, 3 (18%) were public or governmental, and 1 (6%) was charitable. The respondents to the survey all had senior roles in leadership of their respective institutions; 6 (35%) were IT managers, 5 (29%) were in general executive roles, and the remainder were in other leadership positions. Out of the 6 hospitals without electronic health information systems, 5 (83%) were primarily private standalone facilities, with one facility (17%) public or governmental. Hospitals with electronic health information systems tended to be larger than those without. Among hospitals with systems, 5 (29%) had under 100 beds, 10 (59%) had 100–399 beds, and 2 (12%) had 400+ beds. Those without systems tended to be smaller; 5 of the 6 (83%) had under 100 beds, and 1 of the 6 (17%) had 100–399 beds. All of the hospitals considered had inpatient and outpatient departments. However, 16 of the 17 (94%) of those with systems had emergency departments, while only 2 of the 6 (33%) of those without systems had emergency departments. None of the hospitals without systems offered short courses or degrees, while 5 of the 17 (29%) of those with systems offered short courses and 2 of the 17 (12%) offered degrees.

As not all system capabilities which have been implemented are used in practice, hospitals with electronic health information systems were asked about the frequency with which various capabilities were used for data generated within the hospital. Findings from this section

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