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Letter to the Editor

Use of the citizen's electronic health record by doctors and patients in a mature application throughout a district of the national health system of Italy

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In the Unified and Universal Health Systems of Western Europe countries and Brazil, the Electronic Health Record (EHR) is an important item within the e-health national agendas for strengthening the continuity of care in patient referral [1] and reducing patient medical error vulnerability [2].

EHR is defined as a "repository of information regarding the subject of care in machine-processable format" [3]. However, the meaning and representation of the EHR changes throughout the literature. Most of the reports deal only with disease-related EHR (ex. the diabetes card) [4] or health facility-related clinical card (ex. the hospital clinical card) [5].

Since 2006, under the mandate of the Marche Region Government, we have been developing and implementing the *citizen's* EHR, which is addressed far less frequently in the literature and considers at a minimum all the residents of a health district.

By means of the HL7 Health Care Interoperability Standard [6], the EHR's of the 213,603 residents who live in the 1228 km^2 of the Ascoli Piceno health district (Central Italy) were assembled by collecting and storing single citizen-related information from the records of legally validated source databases, as shown in the Fig. 1.

Access to the EHR consultation occurs by logging into an individual account through the user name (the fiscal code) and password. After twenty minutes of inactivity, the log-in session expires and the user is logged out automatically.

During the account subscription process, the profile of the applicant is established. In the case of citizens, the system gives permission to access only their own EHR. In the case of healthcare providers, permission is given according to the position and tasks of each individual provider, as per the databases of the human resources department of the health district secretary. To handle the EHR application smoothly, the healthcare providers were divided into different categories. In the present report, we focus only on the medical doctors of the primary and secondary levels of healthcare.

Abbreviations: CUD, Hospital clinic unit doctor; EHR, Electronic health record; FAD, First aid department doctor; OCS, Outpatient care specialist; PHCD, Primary health care Doctor.

Full maturity of the EHR application was achieved in 2008. From then on, the application underwent only ordinary maintenance. In such a state of maturity and in an environment of steady population and availability of health facilities and human resources, we have studied the trend of several indicators, such as EHR accessing events and navigation time (all of which are recorded and traceable by the system) over 2013–2015. In this way, we managed to determine the use by both doctors and citizens of the citizen's EHR.

The results of note were as follows.

The Primary Healthcare Doctors (PHCDs), including General Practitioners/Family Doctors, Paediatricians, Night Shift Care Doctors, have been subscribing to accounts and consulting the EHR at a rate of nearly 100%, with daily accesses. On average, they remain logged on almost continuously for as long as 72–76 min per working day. Continuity is proven in that the mean number of accesses per working day ranges from 1.3 to 1.4 and does not reach 2, which would indicate a new session log-in. However, high standard deviations in accesses and in navigation time support the idea that there are large variations within the PHCDs. As consultations of the EHR occur on a spontaneous and voluntary basis with no incentives given, we conclude that PHCDs, the core category of the internal medicine of the health systems, truly perceive the application and the EHR provided health information as very trustworthy support.

The Hospital Doctors working in Diagnostic Services, such as Radiology, Laboratory, and Pathology Departments, did not even apply as account subscribers. These doctors, who feed into the source databases, make no use of the EHR at all.

The Hospital Clinic Unit Doctors (CUDs), of whom the majority are included in the internal medicine wards and surgery wards, are increasingly making use of the EHR, as proven by the trend in the indicators studied. Over 2013–2015, the mean number of log-ins per account subscribing CUD increased from 89 to 116 per year, with the total number of accesses for the CUD rising from 20,671 to 22,474 and the total navigation time from 10,305 to 11,119 h. In conclusion, during the CUD's workday, the mean number of minutes of navigation was calculated as ranging from 19′ to 21′, being 5.0% and 5.5% of the CUD's working day, respectively.

84% of the Hospital First Aid Department Doctors (FADs) subscribed to an account. The results of note from these doctors are: a) the mean number of minutes of navigation per single access range from 161′ to 175′; b) the navigation time per working day ranges from 255′ to 280′ (67% to 74% of their workday); c) the number of log-ins, the number of accesses, and the navigation time increased by 7%, 11%, and 2% from 2013 to 2015. Since even the standard deviations in the total number of accesses and in the hours of navigation time are much lower than those of other categories, FADs have a more similar conduct as a group. On average, during a FAD's working day, the log-in session expires only once.

Thus, we conclude that FADs make the strongest and most sustained use of the EHR, which has proven to be such an indispensable a tool as to have changed their way of practicing. Moreover, since the first aid

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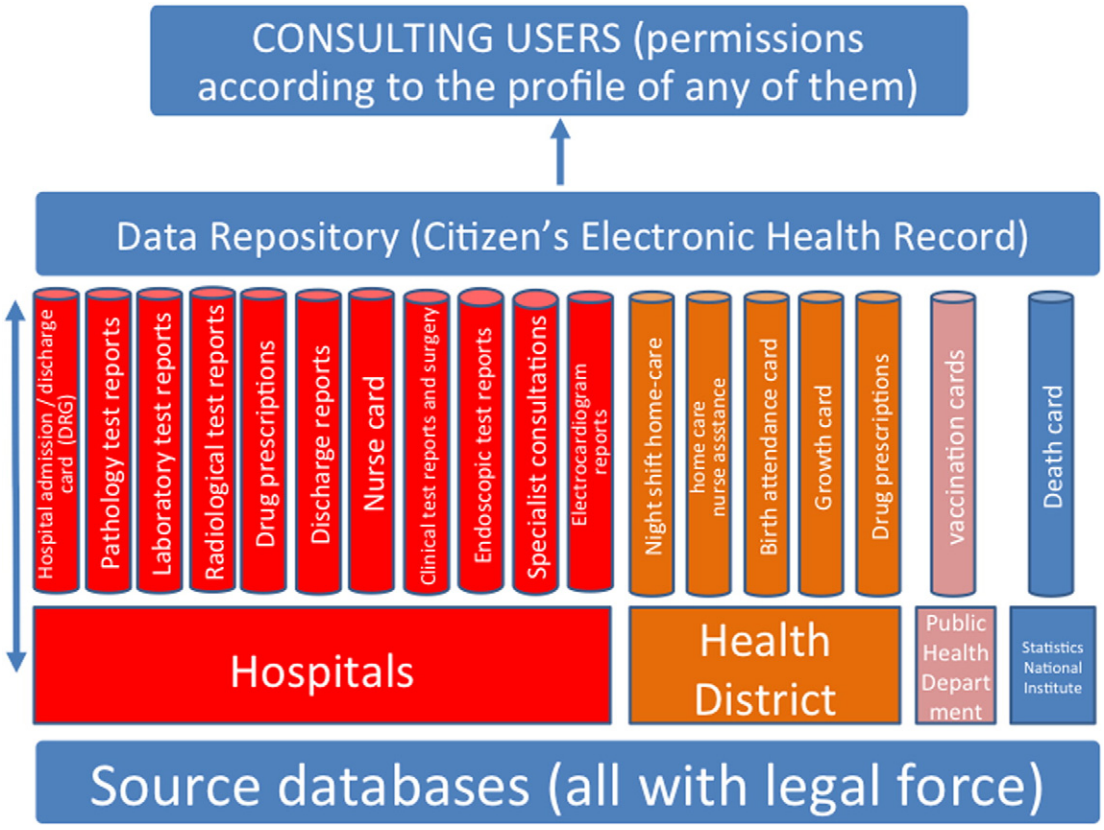

Fig. 1. Structure of the Electronic Health Record.

departments are the entry point from Primary to Secondary levels of healthcare, the EHR is an important tool in transition care.

On average, the Outpatient Care Specialists (OCS's), still at 56% as account subscribers, navigate at nearly 30′ per access, which makes up about 9% of their workday. Their use of the EHR is still an increasing trend, but variations within group are very wide. This occurs also because OCSs have no standard contract with the health system. Each OCS negotiates his own number of working hours with the health district management.

With regards to citizens, the coverage in account subscription advanced slowly from 12,873 in 2013 to 28,468 in 2015. The mean number of accesses ranged from 7 to 10 per account subscriber per year. Currently, the citizen accesses his EHR only occasionally, most likely whenever he is in the expectation of checking recent reports of newly available laboratory or radiological tests, as shown with Patel's paper on the different context of the United States [7].

To compare our results, we can mention only the Department of Veterans Affairs, who made available an EHR (Blue Button application) to be downloaded by the customer/owner and, with his consent, made available to health providers. However, the Blue Button is still a poorly interoperable application. Although having personal health information in one place enables the customer/owner to have better understanding of his clinical situation, no evidence arises that health providers improve the continuity and quality of the transition care through Blue Button [8].

Although undisputable that the ownership of health data in the EHR is the citizen's, we emphasize that the citizen's EHR was established within the national health system. It may be a support tool for improving the health system's performance if the health information originates only from legally validated and audited databases [9], with no data inputting from unaudited health providers and the patient allowed.

Conflict of interests

The authors state that they have no conflicts of interest.

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References

[1] Kwan JL, Lo L, Sampson M, Shojania KG. Medication reconciliation during transitions of care as a patient safety strategy. Syste Rev Ann Intern Med 2013;158:397–403.
[2] Campanella N, Morosini P, Sampaolo G, Catozzo V, Caso A, et al. Medical teleconsultation to general practitioners reduces the medical error vulnerability of internal medicine patients. Eur J Intern Med Nov 2015;26(9):675–9.
[3] Kohl LF, Crutzen R, de Vries NK. Online prevention aimed at lifestyle behaviors: a systematic review of reviews. J Med Internet Res 2013;15(7), e146.
[4] Adaji A, Schattner P, Jones K. The use of information technology to enhance diabetes management in primary care: a literature review. Inform Prim Care 2008;16(3):229–37.
[5] van Poelgeest R, Heida JP, Pettit L, de Leeuw RJ, Schrijver G. The Association between eHealth Capabilities and the Quality and Safety of Health Care in the Netherlands: Comparison of HIMSS Analytics EMRAM data with Elsevier's 'The Best Hospitals' data. J Med Syst 2015;39:90.
[6] Health Level Seven International. available in http://www.hl7.org.
[7] Patel V, Barker W, Siminerio E. Individuals' Access and Use of their Online Medical Record Nationwide. The office of the National Coordinator for health information technology. ONC Data Brief September 2016:20.
[8] Turvey C, Klein D, Fix G, Hogan TP, Woods S. Blue Button use by patients to access and share health record information using the Department of Veterans Affairs' online

patient portal. J Am Med Inform Assoc 2014;21:657–63. http://dx.doi.org/10.1136/amiajnl-2014-002723.
[9] Codice Civile (Italian law reference: The electronic health card being edited by a public health system officer (art.357 CP), or an in-charge of public health service is a public act (art. 2699 CC; Cass.Pen.SU n.7958/1992).

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