A global travelers' electronic health record template standard for personal health records

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ABSTRACT

Tourism as well as international business travel creates health risks for individuals and populations both in host societies and home countries. One strategy to reduce health-related risks to travelers is to provide travelers and relevant caregivers timely, ongoing access to their own health information. Many websites offer health advice for travelers. For example, the WHO and US Department of State offer up-to-date health information about countries relevant to travel. However, little has been done to assure travelers that their medical information is available at the right place and time when the need might arise. Applications of Information and Communication Technology (ICT) utilizing mobile phones for health management are promising tools both for the delivery of healthcare services and the promotion of personal health. This paper describes the project developed by international informaticians under the umbrella of the International Medical Informatics Association. A template capable of becoming an international standard is proposed. This application is available free to anyone who is interested. Furthermore, its source code is made open.

'Simplicity is the ultimate sophistication'
—Leonardo da Vinci

Tourism is one of the booming industries, expected to encompass 1.6 billion travelers by 2020.[1] Tourism as well as international business travel creates health risks for individuals and populations both in the host societies and home countries. The emergence of superbugs[2] has made it crucial for health providers to know the past medical history of the patient, including their travel history. One of the strategies to reduce health-related risks to travelers is to provide travelers and relevant caregivers timely, ongoing access to their own health information. A global standard for an accessible electronic personal health record with a minimal dataset of health information is desirable. In some nations, patients are demanding to have access to their own health records and laws support access explicitly.[3] There are many websites offering health advice for travelers. For example, the WHO and US Department of State offer up-to-date health information about countries relevant to travel.[4][5] At the same time, little has been done to assure travelers that their relevant medical information is made available at the right place and at the right time when the need might arise.

The WHO's mHealth global observatory reports that there are approximately five billion mobile phone subscriptions, with over 85% of the world's population now covered by a commercial wireless signal.[6] The Consumer Technology Survey showed that approximately 85% of frequent business travelers use smartphones. With the emerging economic subscribing plans of 3G/4G by the telecom companies the numbers of smartphone users are rising constantly.[7] One of the bloggers from Intel Corporation posts 'according to a new report, patient self-care and updating personal health records may be the next big opportunity'.[8]

A summary record suitable for use by a traveler's caregiver who most likely will not have convenient access to either the complete medical record or personal physician is very desirable. Maximal interoperability is essential, both to comply with existing universally adopted standards and so that it can be read and/or accessed by computers virtually worldwide. As it is not intended to be a record capable of longer term care coordination, at least initially, the traveler's record set need not be as extensive as the continuity of care record or the continuity of care document.[9][10] In addition, such a traveler's record may prove to have its greatest value in low-resource settings where it may substitute for a more robust clinical record until better record systems are available.

There is a wide spectrum of personal health record systems available on the market such as the Microsoft HealthVault, Health Record Banks and Revolution Health that offer a platform for consumers for storing and maintaining lifetime health records. There are hundreds of mobile applications available to store personal health information.[11] However, this project is focused on providing standardized template and minimal dataset fields for the essential health information content of the personal health record; furthermore, providing access to health records where there is no or limited internet accessibility.

Beginning in 2008, an international group of medical informaticians representing Asia, Europe, North America and South America began to develop a template capable of becoming such a standard under the umbrella of the International Medical Informatics Association (IMIA). As work progressed, the travelers' electronic health record template (TrEHRT, pronounced treat) emerged as a name both to reflect the nature of the standard template and also its purpose. A full list of participants is acknowledged at the end of this paper (see Acknowledgments). The team focused on high-value relatively static information (eg, blood group,

medication list, allergies, and immunizations) because this information does not have to be updated oo frequently while providing an emergency room physician or international physician or nurse with key information to support urgent treatment. Box 1 describes the TrEHRT elements.

A working prototype allows for the use of cell phones, thumb drives, and/or the internet. At http://www.TrEHRT.com one can not only get useful information to the traveler, but also allow access to the traveler's medical information whenever and wherever on their mobile phone. In short, TrEHRT is a portable personal health summary that stores a minimal dataset of health information on travelers' mobile phones using mainstream international standards to support good interoperability. As
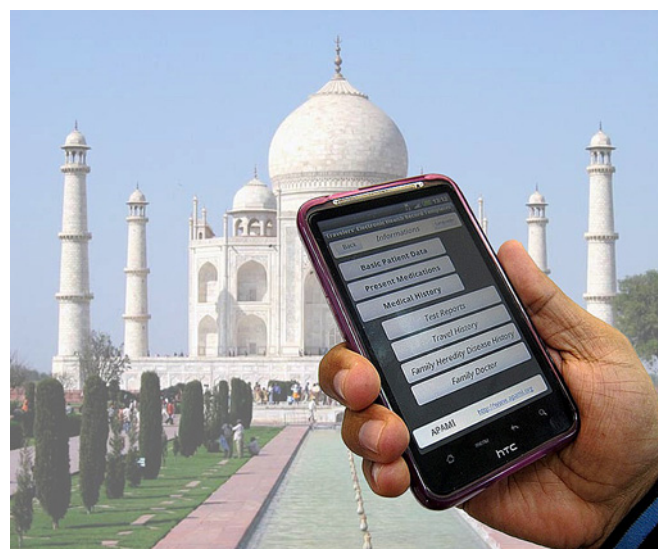

Figure 1 Screen shot of the travelers' electronic health record template (TrEHRT) viewer displaying offline mode of user interface to access basic patient data, present medication and medical history on the mobile phone.

such, the information can be viewed both by a computer or mobile phone virtually worldwide. Figure 1 shows the TrEHRT viewer screen shot of the user interface.

HOW DOES THE PROTOTYPE WORK?

The model includes a web-based interface to enter the information and an application on a mobile phone to view it. The TrEHRT viewer is installed on the mobile phone either directly from the web free of cost or from the Android market. One can also use it from different registered account holders' phones, meaning that a single phone may be used for a family. Regardless of this, each user must log in using her/his username and password. In addition, one's health information may be accessed without a phone by logging into a personal account at the TrEHRT website. The TrEHRT viewer will provide up-front essential information such as blood group, allergies and the contact number of the consumer's physician without login. However, if more information is needed, it will require ID/password login. In this manner, one is only a few steps away from having access to his or her travelers' electronic health record (TrEHRT).

HOW TO GET STARTED USING TREHRT?

Five simple steps are involved. (1) For first-time users, one (patient/caregiver) must register an account at the TrEHRT website. Thereafter, the user can log into their account as desired. (2) The template of basic information and medical information (current medication, travel histories, allergies and vaccination history) is entered. (3) The TrEHRT application software has to be installed on the mobile phone. (4) If the user is willing he/she can log in to his/her account using the same username and password as registered at the TrEHRT web site. (5) Finally, the information entered at the web site is accessed and once the information is viewed in online mode, it will be automatically stored in the phone's memory card for the next offline mode view. In short, the user does not need an internet connection every time to view the health record. This greatly enhances utility when traveling to sites without an internet or mobile communications network. Encryption of data, HTTPS and MD5 security technologies are applied to protect the information of the consumers. Finally, international standards such as the

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Box 1 Description of the TrEHRT element

Basic patient data
▸ Full name
▸ Country code(s)
▸ Blood group and type
▸ Allergen
▸ Marital status
▸ Mother language
▸ Insured
▸ Emergency contact—name, relationship to individual and contact information
▸ Passport/ID number
▸ Language
▸ Body weight and height
▸ Occupation
▸ Spouse name
▸ Religion
▸ Employer name

Present medication
▸ Medication name
▸ Prescription period (from—to)
▸ Medication (ATC code)
▸ Frequency

Medical history
▸ Diagnosis (ICD-10 preferred or ICD-9 moving to SNOMED when and if available)
▸ Allergy (free text now; RxNorm when available)
▸ Smoking and drinking status
▸ Vaccination history

Test report
▸ Major operation history
▸ Laboratory report
▸ Examination report

Travel history
▸ Country code(s)
▸ Date from—to
▸ Status

Family heredity disease history
▸ Father, mother disease

Physician contact
▸ Source of regular medical care, eg, physician, clinic and contact information

International Classification of Disease (ICD) version 9 CM codes and Anatomical Therapeutic Chemical (ATC) codes are utilized to enhance a better understanding of the information. This allows the prototype to include an automatic translation functionality that offers the same medical content when the data are read in different languages.

TrEHRT is available for free to anyone who is interested. Furthermore, its source code is open. Projects such as TrEHRT should attract interest not only from travelers but also from global health researchers and health insurers. Applications of Information and Communication Technology (ICT) utilizing mobile phones for health management are promising tools both for the delivery of healthcare services and the promotion of personal health.[12]

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