Facebook for Telemedicine Applications

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Abstract
This paper deals with preliminary attempts and results about the use of the well-known Facebook social network for telemedicine purposes. In fact, it is described how to use social network and smartphone apps for telemedicine purposes, the method capabilities and guidelines for a remote medical visit supported by Facebook.

Keywords: telemedicine, Facebook, app, smartphones, mobile devices, remote medical visits, social networks

INTRODUCTION
The most recent trend toward the massive use by people of any age of the social networks, Facebook above all (www.facebook.com), and of the smartphone apps and web apps, appears to give the right support to create a platform electronic and informatics, useful for homecare purposes. Moreover, the developments in the field of electronics, informatics and telecommunications let imagine, in a few years, applications in the field of telemedicine and home care that could mark a turning in the quality of the services for sanitary assistance and care [1]. In fact, the home monitoring of the health status can often substitute the hospitalization with significant advantages in terms of the patient’s quality of life and of the sanitary expense saving.

Although there are already available instruments for the remote monitoring of the ElectroCardioGram (ECG) [2], the need is felt of reliable and valid telemedicine instruments allowing medical examinations with a doctor in a different place, far from the patient, using the most popular smartphones and tablet PC [3]. Therefore, the author has developed an experimental design and study to prove the suitability of Facebook social network, apps and web apps, for telemedicine purposes, by using also mobile devices. Preliminary results are the object of this paper.

GUIDELINES OF THE EXPERIMENT
In order to prove the effectiveness of Facebook for telemedicine purposes, the author has developed a proper app, named Care-app, allowing the doctor to carry out a complete medical visit on remotely located patients in real time.

More and more details about Care-app will be provided in another paper in review. This paper aims at explaining the idea and the method.

In fact, a powerful social network like Facebook supplies the right platform to connect the doctor and the patient each other, and to allow them to communicate quickly and to exchange privately, thanks to the privacy settings options, any kind of information, files, documents, and so on.

If preferred, it is possible to use any other social network but this study has been performed with Facebook.

Care-app allows the doctor to receive the data simultaneously at the acquisition, i.e. in real time. The main hardware parts needed are two mobile devices, for the patient and the doctor respectively, equipped with the proper managing app. Therefore, the newly developed app has two sides: the Care-app doctor side and the Care-app patient side.

Moreover, the patient position is equipped with portable diagnostic instruments, suitable also for smartphone to perform medical examinations. Technical details about the most significant devices suitable for telemedicine applications and managed by Care-app are in [4-6].

The social network Facebook provides the audio/video communication utility but also it is possible to use other apps as Skype (www.skype.com), for example.

THE MAIN STEPS TO PERFORM A REMOTE MEDICAL VISIT BY USING FACEBOOK
Care-app is a managing app of other apps and utilities. This means that Care-app makes the doctor and the patient very quick and easy to launch or kill apps; to start and to end medical examinations; to switch from an app to another one; to come back to any previous step or to continue in the next step of the medical visit. Most importantly, Care-app manages the Facebook utilities: “share”, “message”, “connect”, “call”, “friend”, and so on.

The figure 1a shows the main interface of Care-app, doctor side, and the figure 1b shows the main part of the interface of Care-app, patient side.

Fig. 1
Figure 1: Care-app interface for the doctor (a) and (partially) for the patient (b)

Translate the insets as follows:
(a) “Scrivania” desk; “Localizzazione paziente” patient location (map); “Inizia visita” Start medical visit; “Aggiungi paziente” add patient (to the medical database); “Archvio web” Cloud web-service.
(b) “Le mie pillole” my pills; “Promemoria vocale” voice memo (reminder); “Richiedi visita medica” Request urgently a medical visit (examination); “Prenota visita medica” Book examination (medical visit); “Consulta medico” Consult doctor; “Chiedi soccorso” Ask urgent rescue; “Automedicazione” self-medication; “Trova clinica vicina” find nearby clinic

The patient has many other very useful apps and facilities linked to its own main app interface: the pills diary, the rescue request, the find clinic utility, and so on.

The patient can ask for urgent remote medical visit, as shown in figure 2, by sending an SMS to the doctor, or by calling (telephone) the doctor, or by mailing him, or by Facebook utilities. Then, the remote medical visit can start by doctor clicking onto the button “Inizia visita”, i.e. start visit (see fig. 1a).

The doctor, as shown in figure 3, has a number of different options at the beginning of the remote medical visit. He should establish a Facebook connection with the patient if it is not yet running; otherwise, he should skip to the next step.

The doctor and the patient must be very careful, to properly adjusting the privacy settings in Facebook in order to prevent someone from seeing the content shared privately between them.

Once the Facebook connection is running, the doctor should click onto the button “Osservazione del paziente”, i.e. Observation of the patient (see figure 3), to connect with a high-resolution IP camera located nearby the patient, to see the patient in high-resolution video.

Moreover, as in figure 3, the doctor should click onto the button “Apri cartella visita paziente”, i.e. “Open Electronic Health Record”, in order to open a medical record relevant to the current medical visit (TemporaryEHR, TEHR) for the visiting patient.
Then, the doctor has to click onto the button “Visita medica in remoto”, i.e. “Remote medical visit”, to continue.

At the beginning of the remote medical visit session, it suddenly runs on the doctor device the tele-stethoscope app for the real-time auscultation of the lung sounds and the cardiac tones.

The doctor, by a video chat by Facebook or skype, has to guide the patient or someone assisting him to the correct positioning of the tele-stethoscope on the chest. It is also possible for the patient to record the auscultation in a wav file and then send it to the doctor via Facebook.

The auscultation via web by using mobile devices has been already described and widely validated by the author [4-5]. Once the doctor has completed the auscultation step, he should open the TEHR by a click onto the button “Apri cartella visita paziente”, i.e. “Open TEHR”, shown in figure 3.

Then, the doctor should continue the remote medical visit by a menu like that in figures 4a and 4b.

For example, to perform a real time electrocardiogram, the doctor has to click onto its own “Elettrocardiogramma”, i.e. ECG, button, shown in figure 4a, starting the Care-app utility for the acquisition of the ECG. Care-app allows also to record and store the ECG file in a cloud web service accessible to the doctor, or to send it as a Facebook’s message or status attached file.

It is possible to perform a single derivation ECG by an electrocardiograph connecting the smartphone wireless or wired, by the microphone/headphone input. See for example the AliveCor Heart Monitor (www.alivecor.com) suitable for smartphones using as iOS as Android operating system. It simply rests on your fingers or chest to record an ECG. AliveCor’s proprietary technology converts electrical impulses from user’s fingertips into ultrasound signals transmitted to the mobile device’s microphone. This makes the smartphone a real electrocardiograph having a single derivation.

For the arterial pressure measurements and storage it is possible also to use apps that send the measured values directly in the healthvault file of the patient under visit, and in cloud folders. See for example SmartBP tracker [7]. Other apps managed by Care-app to perform other examinations are in the following.

Heart Fitness [8] is suitable to perform the measurement of the heart rate and of the blood oxygen saturation. Moreover, Pacer [9] is an app suitable for physical activity monitoring. Runtastic is the app launched by Care-app to perform the heart rate measurement. Using this app or others like this (instant heart rate, for example [11]), the camera on the back of the smartphone carries-out the heart rate measurement with no need adding other medical devices.

The patient can share with the doctor the heart rate value, via Facebook, and/or may send to the doctor the measurement via e-mail. Care-app easily manages all these sharing and sending options.

Moreover, the Facebook’s share button used together with a proper app, for example Vueme [12], allows the patient to send medical images (x-ray, for example) to the doctor. Alternatively, it is possible to use a cloud service as google drive (www.google.com/drive) or Dropbox.
The patient also may use the Facebook share button or private message button, to send the doctor any other kind of information he may acquire and store with its own smartphone, concerning its own health status.

Care-app manages all these steps, apps and operations, performed by the doctor and by the patient during the remote medical visit.

At the end of the medical examinations, the doctor has to update the TEHR and the HEHR files of the patient.

The doctor has to send the TEHR to the patient (that is a report of the performed medical visit containing all diagnostic notes, measured values and suggestions, diagnosis and therapy), clicking onto the “send” button on the TEHR form, as shown in figure 5a.

Finally, he can click onto the button “End visit” at the bottom of TEHR form, shown in figure 5b, and then return to its home page.

It is noteworthy that the links provided in this paper to apps of third parts are suitable for smartphone and tablets using iOS as operating system, but the same apps are in google play store, for smartphones and tablets using android as operating system.

CONCLUSIONS AND FUTURE DEVELOPMENTS
This paper describes a method making the well-known social network Facebook suitable for telemedicine purposes, by using a properly developed managing app by the author, which name is Care-app.

The telemedicine session can be performed by all kind of devices (smartphones, tablets, notebook and desktop computers) and operating systems. The managing app behaves as some sort of virtual manager of other apps, software, web services, social networks and drivers of PC-based medical devices, and of the internal resources of the smartphone in order to use them for medical measurements.

It has been verified that by using Care-app, it is possible to maintain with reasonable and proven certainty that the Facebook social network, smartly used with apps and web apps properly chosen, and managed by a properly developed high-level software (as Care-app) turns out very useful for
telemedicine purposes. It still is true also if both of them, the doctor and the patient, use smartphones and not only the more performing personal computers. This could permit a significant saving of the health care expenses and an improvement of the quality of chronic patient’s life. In fact, it offers patients frequent and easy check-up in the privacy of the home and by avoiding expensive hospitalization.

REFERENCES


