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Useful Applications of Computers and Smart Mobile Technologies in the Health Sector

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Abstract

The expanding influence of computers on society is being felt in medicine as well. Essentially all hospitals and clinics depend on computers for administrative and financial procedures and for providing access to clinical data. Most physicians have been exposed to the powerful available systems for searching the biomedical literature by computer. Modern medical imaging techniques depend on computers for image generation, small computers have become mandatory elements in the research laboratory, and information systems are becoming vital topics for medical education. The clinical community has long anticipated the day when computers would be able to assist with diagnosis and with making decisions about patient treatment. One way to decide if the advantages of computers and mobile phones in medicine overcome the disadvantages to show physicians computer

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applications that may be useful to them. There are many innovative and useful applications which are described in this paper.

Keywords: Mobile Health, Electronic Health, Computers, Application, Social Networks, Computer Aided Diagnosis, Medical Education, Clinical Decision Support Systems, Telemedicine, Health Information Systems

1 Introduction

Computers play a key role in almost every sphere of life. They facilitate storage of huge amounts of data, they enable speedy processing of information and they possess an inbuilt intelligence, which if supplemented with human intellect, can work wonders. Owing to their intelligence and speed, computers function on a level close to that of the human brain. Computers can hence be employed in different fields like engineering, data processing and storage, planning and scheduling, networking, education as well as health and medicine [1].

In the field of medicine, computers allow faster communication between a patient and a doctor. Doctors can collaborate better over the Internet. Today, it is possible to obtain experts' opinions within seconds by means of the Internet. Medical professionals sitting on opposite sides of the globe can communicate within minutes with the help of the Internet. It is due to computer networking technology that network communication has become easy. Medical practitioners can discuss medical issues in medical forums, they can blog, write articles, contribute to medical journals available online. Updates in the medical field, advancements in medicine, information about new methods of treatment, etc. can reach the common man within minutes, thanks to the Internet and easy access to computers. Doctors can exchange images and messages in seconds and derive conclusions speedily. They can seek advice and share knowledge in a convenient manner over the Internet [1].

Computer-assisted Surgery (CAS) is a fast-advancing field in medicine, which combines medical expertise with computer intelligence to give faster and more accurate results in surgical procedures. In CAS, a model of the patient is created, then analyzed prior to surgery. The surgical procedure is simulated on the virtual image of the patient. The surgery can then be performed by a surgical robot, as programmed by a medical professional or the robot may only assist doctors while they do the actual surgery. In both cases, computer intelligence is at work, thus underlining the uses of computers in medicine.

Medical imaging deals with techniques to create images of the human body for medical purposes. Many of the modern methods of scanning and imaging are largely based on computer technology. We have been able to implement many of the advanced medical imaging techniques, thanks to developments in computer science. Magnetic resonance imaging employs computer software. Computed tomography makes use of digital geometry processing techniques to obtain 3-D images. Sophisticated computers and infrared cameras are used for obtaining high-resolution images. Computers are widely used for the generation of 3-D images. Many of the modern-day medical equipment have small, programmed computers. Many of the medical appliances of today work on pre-programmed instructions. The circuitry and logic in most of the medical equipment is basically a computer. The functioning of hospital-bed beeping systems, emergency alarm systems, X-ray machines and several such medical appliances is based on computer logic [1].

Innovative mHealth applications have the potential to transform healthcare in both the developing and the developed world. They can contribute to bringing healthcare to unserved or underserved populations; increasing the effectiveness and reducing the costs of healthcare delivery; improving the effectiveness of public health programmes and research; preventing illness (including through behaviour change); managing and treating chronic diseases; and keeping people out of hospital.

2 Main Definitions

eHealth: Electronic Health is defined as the application of Internet and other related technologies in the healthcare industry to improve the access, efficiency, effectiveness, and quality of clinical and business processes utilized by healthcare organizations, practitioners, patients, and consumers in an effort to improve the health status of patients [30]. eHealth includes many dimensions:

- delivery of key information to healthcare partners,
- provision of health information delivery services,
- facilitation of interaction between providers and patients,
- facilitation of the integration of healthcare industry-related business processes,
- both local and remote access to healthcare information,
- support for employers and employees, payers and providers.

mHealth: Mobile health refers to ambulatory care provision enabled by third-generation devices that allow for the collection, management, and processing of the patient's vital data. Mobile health services range from the recording of the patient's medical signs and the synchronous or asynchronous communication with health professionals via mobile communication means, to the automatic diagnosis of the data recorded to personal sensors and alarm notices in case of an emergency. Mobile health or mHealth is a step beyond electronic healthcare as it enhances ubiquitous health provision regardless of the patient's or physician's geographic location [25].

3 Main Applications in the Health Sector

3.1 Current eHealth Applications

Electronic Health (eHealth) describes the application of information and communications technologies across the whole range of functions that affect the health sector.

eHealth tools or solutions include products, systems and services that go beyond simply Internet-based applications. They include tools for both health authorities and professionals as well as personalised health systems for patients and citizens. Examples include health information networks, electronic health records, telemedicine services, personal wearable and portable communicable systems, health portals, and many other information and communication technology-based tools assisting prevention, diagnosis, treatment, health monitoring, and lifestyle management.

Examples include efforts for data exchange and interoperability in terms of terminology, ontology and standard development, protocols for information sharing and semantic interoperability, as well as legal and ethical issues for correct authentication, confidentiality and maintained trust. eCards, eSignature, unique identifiers for patients and providers, and protocols for electronic exchange of health Information are examples pointing to the technical and social eHealth infrastructure.

eHealth repositories would be Electronic Health Records and Patient portals, and there is a plethora of labels reported including DMP, EPR, EHR, longitudinal medical record, eArchive or eView. Patients and healthcare professionals should be able to securely access resources in an eHealth repository for purposes of coordination, continuity, and self-management. A study from Germany and Austria indicates high interest of patients respectively citizens on these technologies [23]. The DMP (dossier médical personnel) initiative in France illustrates interdependent efforts for inter-operability, security of systems, organization of services and involvement of all stakeholders to develop a coherent e-health "ecosystem". The variety of different requirements to eHealth repositories respectively Electronic Health Records across Europe is covered in a systematic review by Hoerbst and Ammenwerth [24].

eHealth applications are specific services for workflow support and interaction between providers and patients across time and space given available eHealth infrastructures and repositories. Services like eReferral, Patient Summary and eDischarge, ePrescription and eMedication, eRadiology, eLaboratory, eCare Coordination and eSurveillance as well as Telemedicine and eServices for citizens are identified as building blocks.

3.2 Mobile Communications for Medical Care

A combination of improved network connectivity, handsets and changing demographics is enabling people to take control of their healthcare needs through the use of mobile health, while the cost of providing the service is reduced.

Although many healthcare organisations have realised some success from mobile health, most have not captured their full potential. Those organisations yet to set out a robust mobile business strategy are missing a significant opportunity to improve patient health while reducing cost [7].

Enabled by technology found on even the simplest device, healthcare providers have the opportunity to create significant cost reductions. An immediate and measurable return on investment can be created by:

- providing immediate access to real-time critical patient data
- quickly and accurately documenting patient encounters
- reducing the cost of the most basic call-centre interactions
- facilitating the management and tracking of in-field assets
- more effectively shifting customer interaction from the care centre.

Mobile business services present the perfect opportunity to extend healthcare systems, creating services such as:

- connected devices for monitoring weight, blood pressure, blood glucose, cholesterol, drug adherence and activity levels
- GPS-based devices that locate dementia patients and raise alarms for those recuperating at home
- text-message-based notifications that help to ensure patients carry out their treatment properly as well as simple appointment reminders and use of cameras to assist in remote diagnosis.

Mobile Health (mHealth) applications are numerous and diverse. They range across remote diagnostics and monitoring, self-diagnostics, management of long-term conditions, clinical information systems, targeted public health messaging, data gathering for public health, hospital administration, and supply chain management. They are emerging in response to opportunities and needs that are similarly diverse, including the threat of pandemics; globalisation and population mobility; an ageing and increasing population; rising income (leading to lifestyle changes); increased expectations of health provision; demands for the personalisation of health-care; and a growing focus on behaviour change, disease prevention, and keeping people out of hospitals. There are various mHealth applications. The following main types of these applications are described here as example (Figure 1): mobile-enhanced appointment booking systems, drug authentication and tracking, mobile telemonitoring, well-being applications, and remote diagnosis.

3.2.1 Mobile-Enhanced Appointment Booking Systems

Systems to allow patients to make appointments to see doctors in primary care or hospital settings extend naturally to mobile networks. Patients can use a mobile phone or mobile-connected device to access existing systems without significant modification, using voice calls or text messages, or mobile access to websites. This type of application enhances whole-system efficiency, particularly in primary care.

Some systems encompass digital interactive TV as well as fixed and mobile telephony, email and web interfaces. Using the convenience of mobile voice and SMS to help make appointments with doctors and specialists. Such systems are widely applicable, and indeed have been widely deployed; they deliver utility and reduced costs for the healthcare provider, and ease-of-use benefits for the user [26].

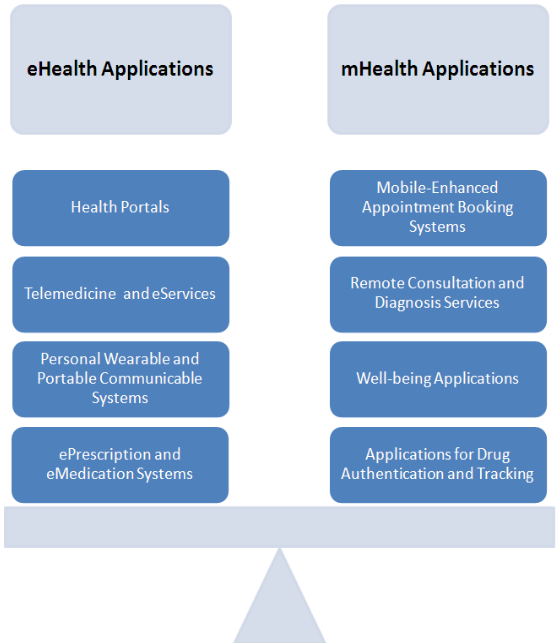

Figure 1: eHealth vs. mHealth Applications and Services

3.2.2 Applications for Drug Authentication and Tracking

Addressing counterfeiting and piracy by tracking drugs from the point of manufacture to the point of consumption, and authenticating provenance before use. Mobile networks allow tracking to be extended into remote regions, both to the point of sale and the point of use, and bring savings and brand benefits to manufacturers [26].

3.2.3 Remote Consultation and Diagnosis Services

mHealth applications can help a patient get a diagnosis without having to travel to a centre, using downloaded decision-support applications, remote access to decision-support databases and systems, or communication with a specialist, via voice, messaging or video. They may connect a healthcare worker with a specialist, or connect the patient directly with a healthcare worker [26].

3.2.4 Mobile Telemonitoring

Furthering the new approaches in the provision of healthcare services in the frame of eHealth, wireless developments create new opportunities for healthcare professionals, individuals and organizations, patients, and health authorities. The scope of mobile health addresses clinical, administrative, and consumer health-information applications and, as it could contribute to the improvement of health outcomes, m-health may be utilized to measure health status and population welfare [25].

The current state-of-the-art technology in medical sensors allows for the easy and unobtrusive electronic measurement of several health conditions. The sensors are often stand-alone devices and sometimes comprised of two or more elements connected by a cable or wireless technology. Medical sensors have the capability to measure vital signs such as blood pressure, pulse rate, respiration frequency, and so forth (Figure 2). Based on these medical parameters, the medical professionals can monitor the patient’s health condition and act in case of an anomaly.

Figure 2: Mobile Telemonitoring Services (http://www.vidavo.gr)

The application areas of the medical-device wireless telemonitoring capabilities include the following [25]:

- Assistance in case of accidents and emergencies
- Increased capacity and lower costs for hospitals
- Assistance and monitoring in a home-care
- setting
- Monitoring of chronically ill patients
- Patient involvement in setting a diagnosis
- Medicine dosage adjustment
- Physical-state monitoring in sports
- Monitoring of sporadically occurring symptoms
- Emergency alarms
- Improved health management.

3.2.5 Docphin – The Personalized Health Information Network

Docphin is a free platform that personalizes medical news and research instantly (Figure 3). In an environment that includes over a thousand medical journals with content that is increasingly complex and fragmented, physicians have grown tired of searching for relevant medical news. Docphin's technology combines comprehensive information from journals, news, and twitter while filtering out meaningless articles to bring physicians only the information they want. Docphin's goal is keep physicians current and to save them time.

Docphin helps physicians organize, bookmark, read and track medical news and research from a variety of sources, all within a single dashboard interface. The resulting product has a very consumer-like feel, especially with features like a Twitter widget for tracking medical societies' tweets, bookmarking, commenting and social sharing. But the content is all medical-focused. Users may then look for articles or read papers of interest. Choosing an article will then bring it up from the library that the user is associated with. This can then be read or downloaded as a PDF. Articles can also then be favourite and stored on the user's profile. In order to help manage their collection, users can create and tag articles for their own searches in the future.

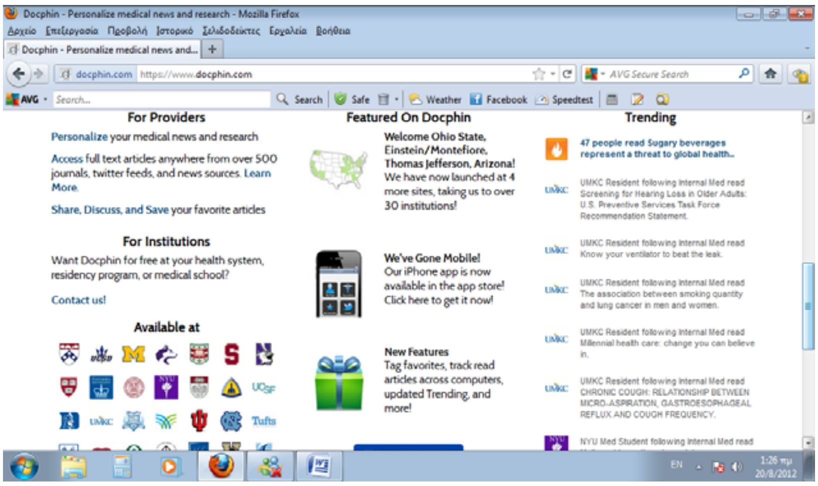

Figure 3: Docphin's Web Site (http://www.docphin.com)

Figure 4: Docphin Screenshots for iPhone

3.2.6 Medscape

Medscape (Figure 5) from WebMD (medscape.com) is the leading medical resource most used by physicians, medical students, nurses and other healthcare professionals for clinical information. Medscape is the top free iPad medical app. The Medscape app has been downloaded more than 500,000 times in the App Store, and with good reason. This neat app pulls news from WebMD (the Medscape website) and keeps doctors aware and up to date about the latest news in their profession. It has a drug database, news, blogs, drug interaction checker, directory pharmacies and physicians, and much more. These mobile phone applications are one of the best ways to be up to date with the global scene of medicine.

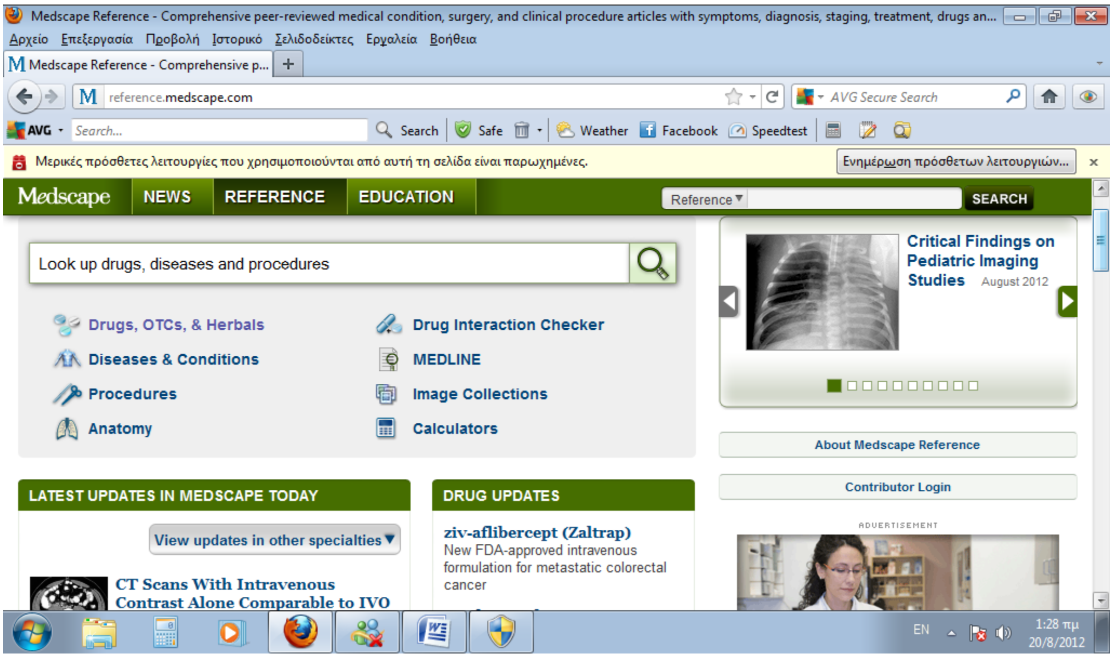

Figure 5: Medscape's Functions (http://www.medscape.com)

Figure 6: Medscape Screenshot for Mobile

3.2.7 Epocrates

Epocrates is the best mobile drug reference among U.S. physicians (Figure 7). Trusted for accurate content and innovative offerings, 50% of U.S. physicians rely on Epocrates to help improve patient safety and increase practice efficiency. Epocrates offers the following:

- Clinical information on thousands of prescription, generic, and OTC drugs
- In-depth formulary information
- Pill ID: identify pills by imprint code and physical characteristics
- InteractionCheck: check for adverse reactions between up to 30 drugs at a time
- Dozens of calculations, such as BMI and GFR
- Current medical news, research, and information
- Evidence-based treatment info for hundreds of diseases and conditions
- Specific/empiric treatment guidelines for hundreds of infectious diseases
- Lab prep, interpretation, and follow-up for hundreds of tests & panels
- Medical dictionary (over 100,000 medical terms)
- Over 20,000 ICD-9 and CPT® codes.

Epocrates Online provides the best possible patient care. It is a free, fast, and effective way to find clinical information at the point of care. Unlike other online medical references, Epocrates Online organizes practical, peer-reviewed content with a unique patient-centered approach, providing you with answers, not more questions.

- Continually updated, integrated drug and disease information
- The most relevant information, by clinicians, for clinicians
- Easy-to-use expandable menus that let you go from concise to comprehensive
- Look up a monograph directly, or find specific information through an open-text search.

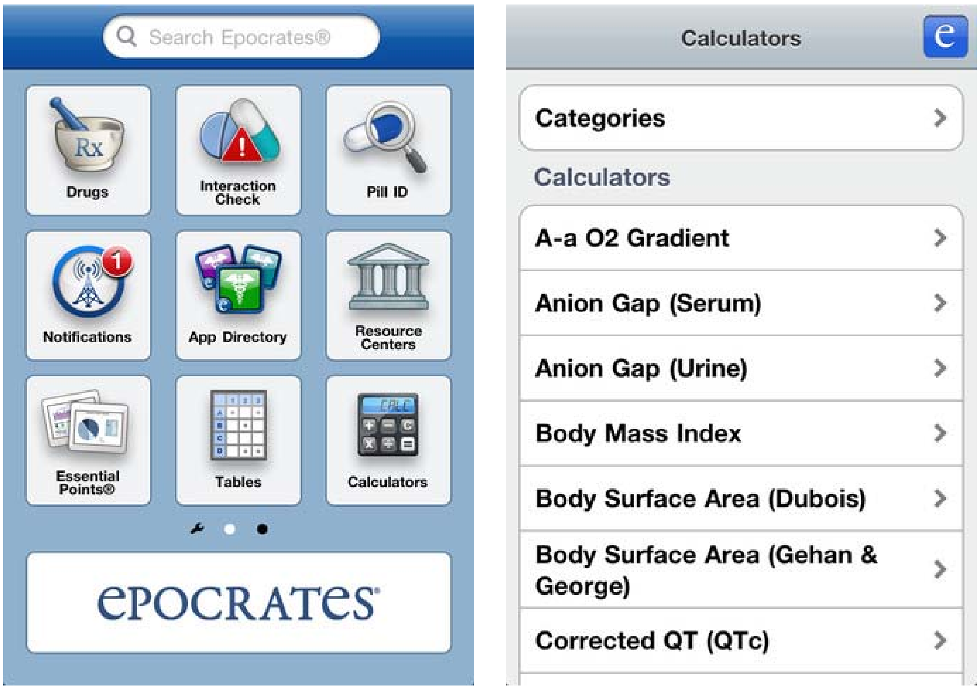

Figure 7: Epocrates Screenshots (http://www.epocrates.com)

3.2.8 iChart – The Digital Medical Assistant

iChart (Figure 8) offers care providers a "digital medical assistant" that fits in their pocket. iChart automates medical tasks and allows quick access to medical information, anytime, anywhere. The iChart intuitive medical record suite is comprised of several integrated modules, including:

- iPrescribing to administer patient medications
- iBilling to organize and submit billing records
- iLab Reports to manage laboratory data
- iNotes to write, store and transfer electronic notes.

iChart's iPrescribing is a trusted and secure application that enables healthcare providers to produce electronic prescriptions quickly and easily eliminating data omissions and errors related to prescriptions, so there's less need for follow-up with patients, pharmacies or providers.

iChart's iBilling is a code reference and capture tool for organizing diagnoses and procedure codes. Diagnoses are collected as part of a patient problem form and are stored and displayed within iNotes and online billing reports via iChart Sync. Billing reports can be uploaded for printing and further processing.

iChart's iLab is a lab and study organizer that tracks pending and reviewed labs and diagnostic studies for your iChart patients. Out of the box the system has hundreds of lab menu items that allow the user to quickly select a lab and enter the pertinent results. Results are automatically placed into the patient chart and an inbox entry is made to keep the user informed of all incoming reports to be reviewed. Labs can be reviewed and 'signed' in a few finger taps in the iPhone or iPod Touch.

iChart's iNotes is a powerful and easy-to-use 'tap and touch' system to create and review clinical notes. Users can download custom and library note types from the iChart Sync online application. iNotes is a data-aware system and inherits relevant clinical information to assist in the generation of daily notes. Histories, medications, vitals and problem/plans are all recalled and inserted automatically.

Figure 8: iChart (http://www.caretools.com)

3.2.9 Mobile Phone for Diabetes Self-Management

Diabetes Mellitus (DM) is a common chronic disease caused by insufficient secretion or action of hormone insulin. Many research efforts has been undertaken in order to improve the T1DM self-management using m-Health technologies. The majority of those systems are limited to data transfer and they are not able to provide personalized advices using lifestyle related information. In the last years many research efforts and projects focused on the design and development of mobile applications for diabetes self-management have been presented. The applications, either prototype or commercially available, are running on mobile phones or smart phones. In a typical scenario, as presented in Figure 9, the applications provide the patients with T1DM with a series of graphical interfaces which allow them to enter, either manually or automatically, and store blood glucose levels, information about insulin intake, physical activity, nutrition habits and other data vital for diabetes management. Those data are sent via wireless communication links to a server where physicians have access. The physician can monitor the state of the patient with T1DM, assess the followed treatment and send feedback with advices on needed treatment modifications [28].

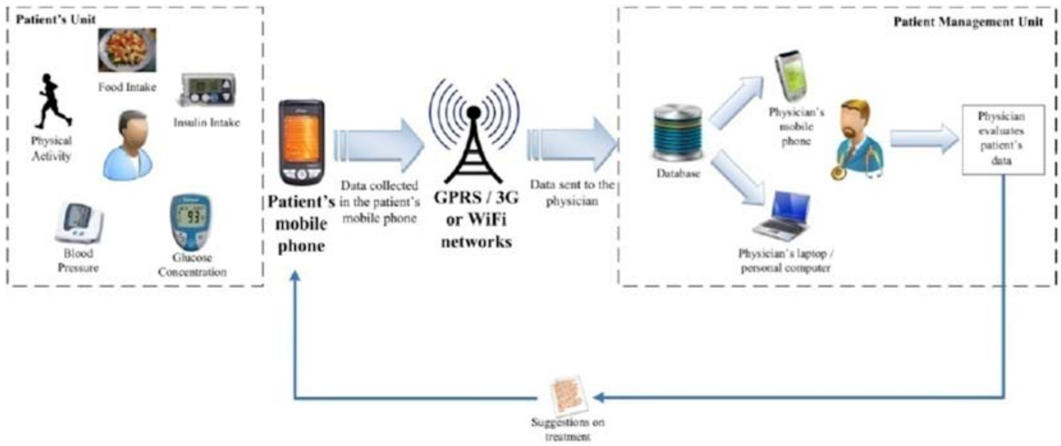

Figure 9: General Architecture of a System Based on Mobile Technologies for the Enhancement of Self-Management of Individuals with T1DM [28]

The developed MPA [28] based on the requirements defined by both individuals with T1DM and physicians. The process that was followed was an interactive approach with the involved users and developers, in order to dynamically specify all the required points that should be taken into consideration. The developed system is a Windows Mobile™ 6.1 based application running on 3G mobile phones. The used mobile phone is the HTC Touch Diamond, which has a 2.8” screen size, supports wireless connectivity via WiFi, and includes GPS. Additionally, the transmission network protocols supported by the device are 3G and GSM / GPRS. However, the application can be run on a broad range of commercially available mobile phones (windows based) used by many mobile user subscribers. The guidelines that have been followed are:

- User interfaces attractive for children and teenagers.
- Large on-screen buttons.
- Tools for entry, storage and analysis of information related to insulin intake (both via injections and pump), glucose measurements, blood pressure levels, nutrition (food/drinks) intake, and daily physical exercise, including intensity and duration.
- Calendar.
- Geo-locating information (Global Positioning System - GPS) that can be used in emergency cases.

The user after entering appropriate login and password can start the navigation to the MPA through the main menu (Figure 10). The application via the sub-menus provides a series of tools which allow the user to enter, select and store information related to diabetes self-management. Specifically, the user can enter

- glucose concentration (Figure 11),
- insulin intake either via injections or pumps (Figure 11),
- nutrition habits in terms of food type, g of CHO, starting time and
- duration (Figure 11),

- physical activity selecting among predefined categories and adding starting time and duration (Figure 12),
- blood pressure levels (Figure 12).

(a) (b) (c)

Figure 10: User interfaces for login, navigation to main menu, and submenus

(d) (e) (f)

Figure 11: User interfaces for management of glucose, insulin and nutrition.

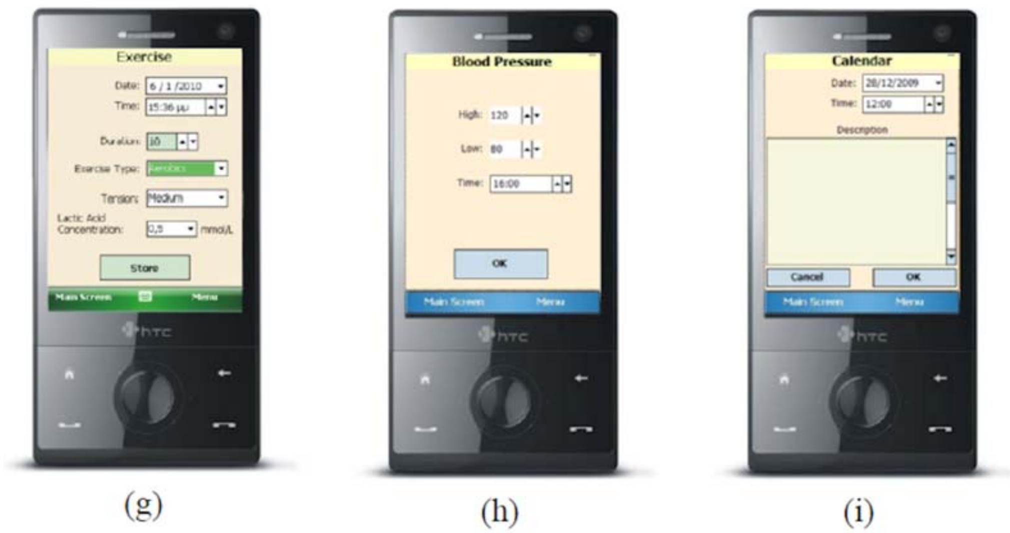

Figure 12: User interfaces for physical activity, blood pressure, and calendar

3.3 Cloud Computing in Health Sector

There’s no question that the healthcare sector is rapidly embracing cloud computing. Recent studies show that one-third of healthcare organizations are already implementing or maintaining cloud-based systems – ranking third among sectors polled, just behind large enterprises and higher education.

Healthcare IT organizations estimate spending 20% of their budgets on cloud computing over the next two years, with videoconferencing, e-mail storage and online learning solutions leading the charge. Virtualization and IT-as-a-service are two other popular routes to the cloud for healthcare firms.

Several factors are driving this industry-wide IT transformation:

- Pressures to reduce total cost of IT ownership and accelerate time-to-value on IT investments
- A growing demand for secure, anytime/anywhere access to critical clinical applications (e.g., patient health information) for improvement of patient care
- The need to streamline compliance in the face of mounting regulatory complexity.

By leveraging the cloud, healthcare organizations – especially small hospitals, clinics and physician practices -can focus less on managing IT and more on delivery of high-quality patient care. Reduced demands on internal IT staff coupled with cost-efficient, pay-as-you-go fee structures are especially enticing for these smaller care providers.

But as healthcare organizations move key services like e-mail, data storage and clinical records to the cloud, these mission-critical applications become remote applications. Every user becomes a remote user and every office and site becomes a remote site. Network health becomes paramount because every cloud-based transaction is “remote” and thus entirely dependent on network performance.

The transition to cloud-based services makes network performance management one of IT’s most vital functions. Any healthcare provider’s ability to derive business value from cloud computing, and mitigate associated business risk, depends entirely on its ability to guarantee service levels from the user’s perspective.

To manage network performance in the cloud, the users need to:

- continuously monitor network performance end-to-end from the cloud environment (whether it’s private, public or hybrid) to other users and back.
- quickly identify where and why performance is degrading – even within the virtualized cloud infrastructure itself.
- verify that cloud providers are meeting service level commitments.

3.4 Innovative Applications of Computed Radiology (CR) Systems

Digital imaging is an integral concept to current radiology practices wherein images are acquired, processed, post - processed and displayed in black and white, grey scale or colour using binary numbers. Computed Radiography (CR) systems use photo stimulable phosphor plate enclosed in a light tight cassette. CR utilises a two-stage process with the image capture and read-out done separately. X-ray information is stored in PSP imaging plates in the form of electrons. Some of the drawbacks of CR systems namely cassettes handling, long readout time of PSP plates, low DQE (Detector Quantum Efficiency) and poor resolution have been addressed by newer innovations like [3]:

a. Automated CR systems with fast readout: Automated CR systems achieve this by line-scan lasers and photodiode detectors that reduce read-out time to less than 10 seconds.

b. Newer phosphors for PSP plates: A needle shaped phosphor caesium bromide has been newly introduced which is considered more efficient due to its structured configuration of crystals.

c. Mobile CR systems: Bedside radiography of critically ill patients with conventional CR system involves physical transport of the cassette to the CR reader. To save labour and time, portable compact CR systems have been introduced which have a mobile X-ray unit with an integrated CR reader.

3.5 Innovative Applications of Digital Radiography (DR) Systems

Conventional radiography is evidently the last of the modalities to embrace and incorporate digital technology. Whilst CR is a simple and cost effective technology that permits use of existing radiographic equipment, the direct DR system scores highly due to significant improvement in the workflow and speed.

Direct Digital Radiography (DR) systems use detectors that have a combined image capture and image readout process. Digital radiography is witnessing rapid innovations in the hardware and software applications, few of which are mentioned below [3]:

a. Tomosynthesis: Multiple X-ray exposures are given from various angles while the X-ay tube moves in an arc while the detector remains stationary. Multiple images are possible to be created with different focal zones and these can be viewed individually or in cine loop.

b. Dual Energy Imaging: By using high and low voltage technique two sets of data are created. This is useful in chest radiography, particularly for the evaluation of calcified nodules and pleural plaques.

c. Computer Aided Diagnosis Software Programmes: These are important in early detection of lung and breast cancers.

d. Automatic Image Stitching: This is a feature useful in determining precise measurements in lengthy anatomical regions. Multiple sequential exposures are acquired at different patient positions and automatic stitching is then performed to reconstruct a larger composite image.

e. Mobile DR: This is a 17x14 -inches flat panel detector connected with a cable to a mobile X-ray system having a monitor.

f. Wireless FPD: The FPD without the help of transmits data to the DR system. It has no cables and does not interfere with surrounding machines.

3.6 Virtual Communities and Social Media in Healthcare

Social media may be used for a number of ways within the medical industry. Social media sites, including social networking websites, have grown tremendously and have become a popular way of communicating, networking, and growing a business. New uses for social media are being developed every day, particularly in the medical industry [5].

Current trends to watch in social media in health care include:

- Managing a conversation;
- Engaging e-patients;
- Convergence with personal health records; and
- Social media for providers.

An important distinction in this two-way conversation is between medical advice and medical information. Hospitals and providers need to walk a fine line between giving specific medical advice in the relatively public forums of social media and providing more generalized medical information.

At the same time, there are ways to create a conversation with health care consumers. Sites like Medhelp.org have provided this kind of information using medical experts to answer patient-submitted questions in general terms. Medical information relevant to many is provided without specific medical advice for a patient's medical condition.

The rise of e-Patients creates many opportunities for engagement. E-Patients are defined as those "who are equipped, enabled, empowered and engaged in their health and health care decisions." E-patients can provide feedback not only on improving hospital Web sites but also as participants in quality improvement within the health system.

Social media is here to stay in health care, but it will evolve quickly. Patient engagement will continue to characterize this change. Organizations will use social media tactically within their overall marketing and communications efforts -- videos and mobile technology will likely dominate these approaches.

Online patient communities will expand and will become a rich source of information for others. Physicians and other health care providers will discover social media, which will have the potential of progressing medical research.

There may be regular news reports of privacy violations, dangerous misinformation and fraud promoted via social media, but these reports are not likely to stop a wave of innovation and conversation [4].

People use healthcare related virtual communities in accordance with their personal interests to share their experiences, to ask questions, to obtain or provide emotional support and to obtain useful information that will help those. As more and more people are comfortable sharing the intimate details of their lives online via blogs and social networks, the future of health-related virtual communities is looking brighter than ever - with thousands of people logging on to share side effects, treatment options, test results, and coping strategies. Data-rich virtual communities, such as PatientsLikeMe, HealthCentral, and CureTogether, have been drawing a crowd in the past few years, offering a platform for patients with chronic illnesses such as fibromyalgia, depression, and multiple sclerosis to share information and connect.

Figure 13: PatientsLikeMe (http://www.patientslikeme.com)

PatientsLikeMe cofounders Ben and Jamie Heywood launched their site in 2008 after their brother Stephen was diagnosed with amyotrophic lateral sclerosis (ALS, also known as Lou Gehrig's disease). Earlier this year, the company tested a new design with the 158,000 members of its community, and is now ready to launch the revised product to new members (Figure 13). HealthCentral, a large-scale health content site offering virtual communities, draws 17 million users to its network of health-related sites per month (Figure 14). CureTogether, which rates treatment options for more than 500 illnesses, boosts more than 30,000 members (Figure 15).

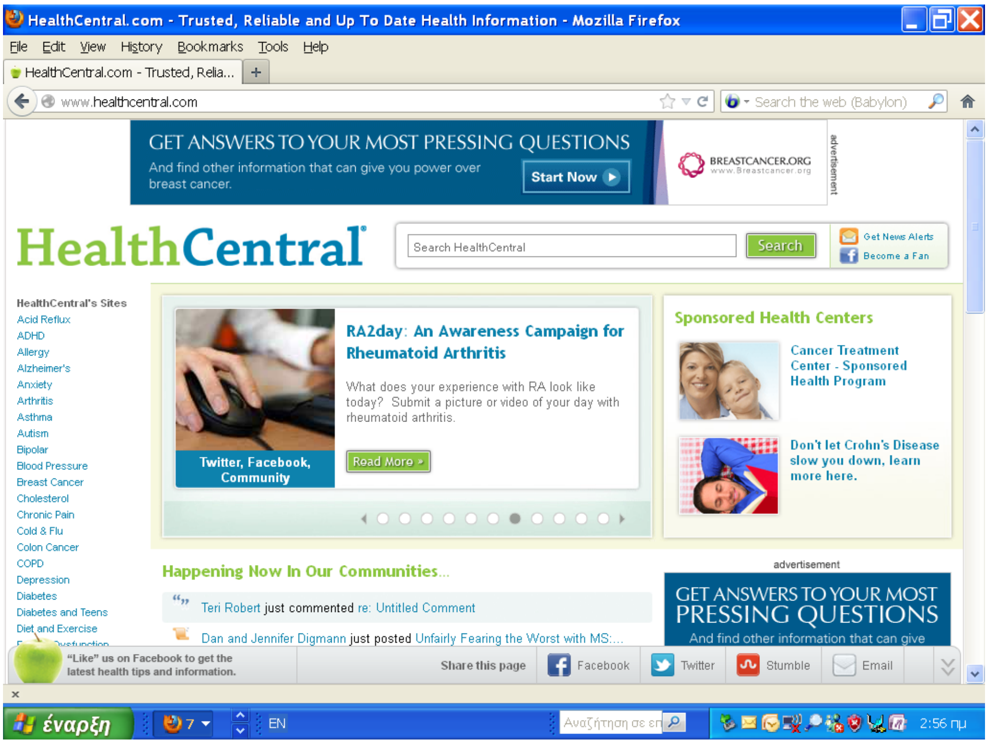

Figure 14: HealthCentral (http://www.healthcentral.com)

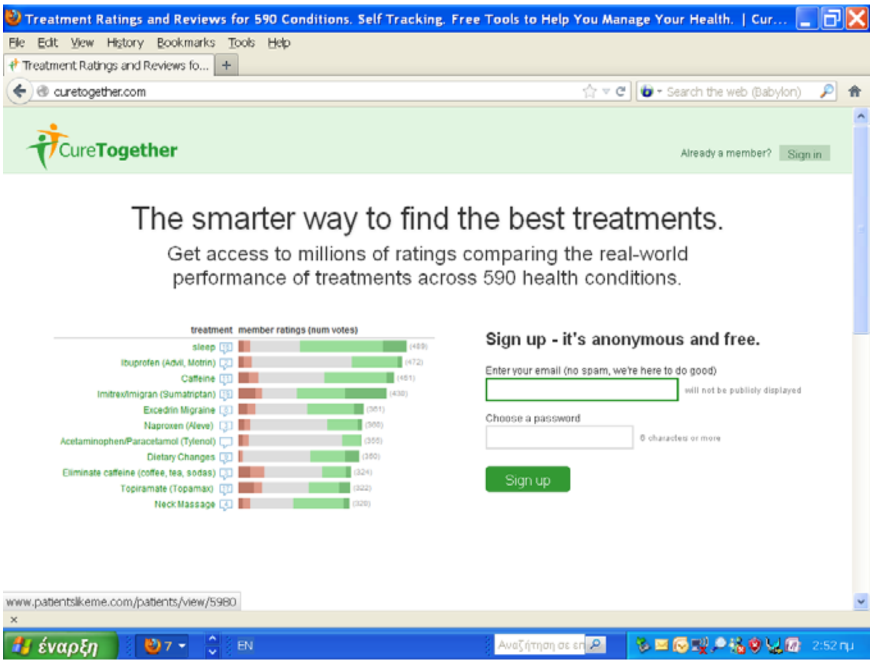

Figure 15: CureTogether (http://www.curetogether.com)

A few other virtual communities for those dealing with serious illness include Upopolis, which helps young patients, especially those in a hospital, stay wired with school friends and family in a format similar to Facebook but packed with "kid-friendly" tools. Also MDJunction offers online support groups to discuss feelings, ask questions, and share hopes about recovering from an illness with like-minded people (Figure 16).

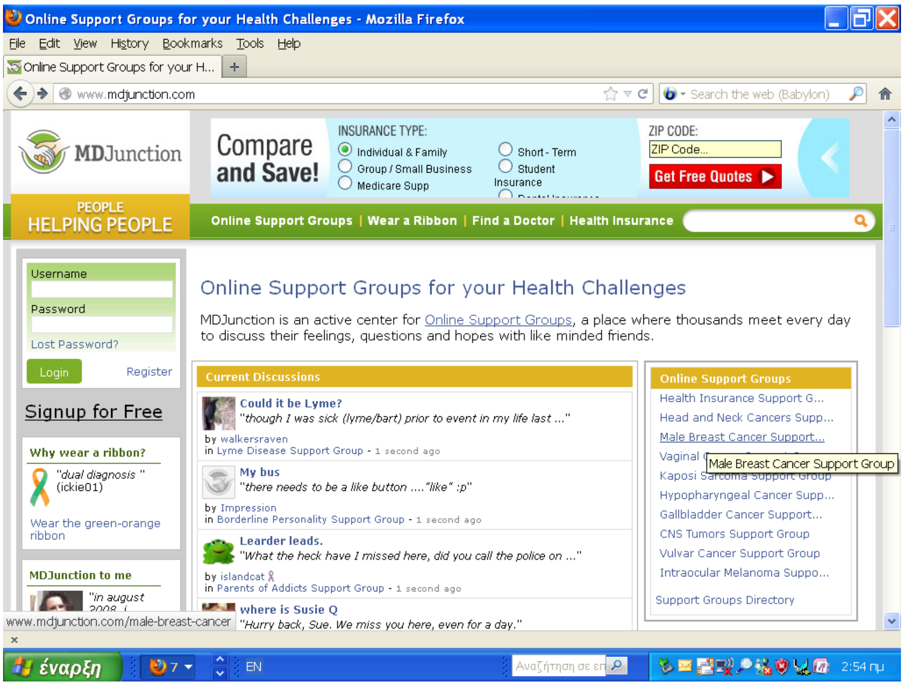

Figure 16: MDJunction (http://www.mdjunction.com)

4 Advantages and Disadvantages

Information technology don’t have a specific type, almost all types of latest computer networking technology are falls into the category of the types of information technology. Information technology is used in creating lot of technologies that really plays an important role in maintaining the life in the present as well as in the future. So, all the types that we generated in the field of computer networking or in this technological World are called as the types of the information technology. But some common types of information technologies are different types of mobile technologies; different types of technologies used in solving the computational tasks, some types are also used in creating different types of industrial detection system and processors etc. Due to the easy and the convenient approach to the development of the new technologies for the sake for the good future, information technology has any advantages that are really important for human life. Some important advantages are as follows:

- **Communication:** Information technology is used in developing different types of communicational devices and also helpful in better communication services between the two different places for the sake of good business and for many other purposes. It makes the communication services cheaper and convenient and also fast then other technologies.
- **Globalization:** Another important advantage of the information technology is the globalization. With the help of this advantage of the information technology the modern World becomes closer in the ways of communication and provides the easy way for faster communication, which also enhances the economy and the profit of different types of businesses.
- **Creation of new Jobs:** A major advantage of the information technology is that it provides the many ways for the jobs and increases the vacancies in the field. Because of the development of the new technologies in the field of information technology it provide the opportunity for the new generation to come in the technical field and generate the technology for the future.

Especially in health sector there has been a rapid expansion of computer use in all countries. The reasons are availability of high speed and wireless connections, decreasing cost, demands for increased quality of care and documentation, and improving medical education. On the other hand, there are disadvantages which are extra time and effort needed, vulnerability to viruses, breaches of patient confidentiality, and high cost at start-up.

In order to find the main advantages and disadvantages of using the computers in medicine, the following questions should be useful to be answered [2]:

- ***Question 1: How can computers improve quality of care and document that quality?***

  They can avoid illegible handwriting, can be programmed to find errors in dosage, medication name, medication interactions, and indentifying allergic patient or the wrong patient, computerized records can be backed up and are less likely to be lost or unavailable, computerized records can more easily be transferred even long distances, more easily collect data such as mortality or number of patients seen or types of diagnosis seen.

- ***Question 2: How can computers improve Medical Education?***

  They can decrease the amount of class time where there is information transfer without interaction, increase the amount of time available to answer questions and concentrate on confusing or difficult topics, teach medical/nursing students and residents how to efficiently get the most accurate, useful, and up to date information through computer programs. They can use this technique for the rest of their career. Computers can also decrease the amount of information needed to be memorized and reduce the chance of error due to faculty memory. They can decrease the amount of time needed to read journals and books while still maintain high quality knowledge.

- ***Question 3: What are the disadvantages of computer use in Medicine?***

  They can be less useful for those physicians/nurses who cannot type quickly, take extra time and effort to get used to, create psychological discomfort with a new way of practising medicine, be vulnerable to viruses and technical problems that risk lost of data unless backed up, be vulnerable to breaches of patient confidentiality, sometimes increase the amount of time needed to get work done, create fear that computerized data can be used by the legal system against doctors and hospitals, create the fear of making the interaction between the patient and doctor seem less personal and, have high cost at start-up.

The development and use of mobile and portable computing devices (PDAs) should be a priority for health service providers as they provide easy access to health services, achieve cost savings and reduced the incidence of mortality due to delayed care provision. The benefits from the use of mobile services and new mobile computing devices are:

- serving more people because saving time,
- possibility of measuring the area of citizenship, thus added value to the medical service, and achieved contact with citizens without geographic restrictions,
- extraction and utilization of measurable data for statistical and research purposes,
- improved quality of life due to better management of the disease,
- direct communication with the physician regardless of geographical distance,
- possibility of preventive medicine,
- increased sense of patient safety,
- monitoring the health status of patients by the physician,
- confidence and wellbeing of patients at high levels.

5 Conclusion

eHealth can be used as a catalyst for healthcare transformation. In light of the future demographic challenges, the transformation of healthcare service provision and commissioning is vital. Healthcare technology is a firm candidate to accelerate this transformation. Whilst care delivery is moving to a patient-centric model, it should also be a firm policy to appoint clinicians to drive implementation.

Important and substantial benefits can be achieved through the use of eHealth. As the call on national healthcare increases, eHealth is a viable option to improve the facility to serve increased patient and clinician demand, to support improvements in quality and to enable a transformation to a patient-centric service.

Mobile phone technology advances rapidly during the last decades. New devices are equipped with large memory storage, more powerful processors, faster connections, advanced user-friendly interfaces and lots of advanced subsystems, such as GPS receivers, accelerometers, wireless network connectivity (WiFi, Bluetooth) etc. These devices provide the background to develop supportive systems that will be used by more and more patients in their everyday life and will allow them to ameliorate the quality of life [28-29].

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