

Editorial

Otolaryngologic Limited Experience with Teleconsultation Using Multimedia Message Service through Mobiles for the Transmission of Clinical and Radiological Images

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A mobile or cellular telephone by definition is a long-range portable electronic device for personal telecommunication. In lay terms, it is a cordless phone, which can be carried around in the pocket. The first prototype of mobile phones, the so called G1 generation, were first introduced in the early 1980s, just around the same time the internet went public (1981); both of which have an impact on peoples' daily life approaching if not exceeding the importance of the invention of first steam engine. What makes mobile phones a very useful technology is its availability with an affordable fee, the ease of its use and super-added services such as SMS for text messages, e-mail, packet switching (communication paradigm) and lately the internet access, MMS for sending and receiving photos and videos¹.

With the clock ticking, the evolution of communication technology and methods of connecting are growing enormously. A significant change has been noticed since telex service was introduced to the era of wireless networking devices. It is becoming a necessity in almost every aspect of daily living. The unlimited possibilities to utilize these facilities should be studied and utilized to serve all aspects of medical field.

MMS and Healthcare

One of the truly growing service is the Multi-Media Message Service (MMS). It is a standard for telephone message systems to allow sending multimedia objects (images, audio, video, rich text) and not just text as in Short Message Service (SMS). It is mainly deployed in cellular networks along with other message systems like SMS, Mobile Instant Message and Mobile E-mail.

Various message technologies were utilized in the medical field on numerous occasions. These technologies support both the patient and the physician for optimizing the treatment and the management of different medical predicaments. The need for communication and support is not limited to a specific medical specialty; it is usually an integrated tool that can be utilized by all the health systems. All this is to ensure the maximization of care and well-being of those in need.

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Where Are We Now?

Examples of what was achieved so far in the communication technology and healthcare are enormous, but utilizing mobile message services are still limited. These limitations may be highly influenced by concerns about electromagnetic interference (EMI)¹. It was significantly demonstrated that mobile phones EMI risks are small and manageable; on the contrary, their use in a hospital setting can be enormous. They allow better, quicker and more easily accessible communication when compared to their traditional counterparts like pagers; they enable powerful new applications with the potential to improve greatly the safety and efficiency of patient care. There is a global trend towards replacing the on-call pagers by mobile phones, as the case in BDF hospital. The finding that physicians who used pagers, as their primary means of communication, reported a higher incidence of communication delay-related medical error or injury than those who could be contacted by mobile phones¹.

Mobile phones are widely used in Bahrain according to the statistics provided by The Telecommunication Regulatory Authority (TRA). The mobile phones subscribers' penetration rate (which takes into account the dual ownership) approached 110% for the year 2006. Ignoring the pricing issue, the services provided by the two telecommunication companies, namely Batelco and Zain-Bahrain, are quite advanced and up-to-date².

The MMS service was first introduced in Bahrain in the year 2003. Since then, there was no published paper on the utility of MMS in medicine in Bahrain; even review of what was published internationally revealed only few sporadic articles in other specialties, examples of these include:

1. Wearable Device warns Hospital of Heart Attack

A prototype Bluetooth heart monitor periodically records the electrocardiogram (ECG) of the high risk patient and transmits the information via radio frequency signals to his or her modified mobile phone. If signs of imminent heart attack are detected, the phone analyzes the ECG signal and sends a message via the SMS text service to the nearest medical center. This device was designed to give patients who have already had one heart attack a greater chance of receiving life-saving treatment within the so-called "golden hour" -- the period during which it is most crucial to receive medical care³.

2. MMS in the Operation Theater

A case was reported of using the mobile phone to capture dysrhythmia occurring intra-operatively in a patient via multimedia message service (MMS), and sending it to the consultant in charge as well as to a cardiologist to take immediate remedial action. This way, eliminates the time needed for such experts to come to theater, not to ignore the extra potential time that can be lost as they put on the gowns⁴.

The utility of MMS was addressed in other different aspects as follows:

1. Teleconsultation for emergency orthopedic patients using multimedia message service; it demonstrated good reliability but poor diagnostic accuracy which could have major consequences in emergency patients⁵.
2. Multimedia message service in the provision of emergency neurosurgery services showed that MMS technology is a useful media for the transmission of high-

quality images to assist in the diagnostic process and implementation of emergency clinical therapy^y.

- ϣ. One month evaluation of the use of multi-media message in the referral of musculoskeletal limb injuries to a tertiary trauma centre concluded that a multimedia message has the potential to facilitate the rapid, cost-effective management of musculoskeletal limb injuries thereby enhancing clinical care[^].
- ξ. Image-transfer in an emergency setting was first reported in integration of picture archiving and communication systems (PACS) with general packet radio services (GPRS)[^].
- ο. Instant wireless transmission of radiological images using a personal digital assisted phone for emergency teleconsultation suggested its usefulness at a minimum size of 640x480 for CT, MRI and digital angiography[^].
- ϛ. Teleconsultation with the mobile camera-phone in digital soft-tissue injury: a feasibility study[^].

MMS and ENT

The on call service in the ENT department at the BDF-Royal medical services in Bahrain is provided by the first on call (resident) and the second on call (consultant). In certain situations, valuable advice can be provided merely if clinical photos or X-rays are reviewed by the consultant on call without the need for him to attend; or the consultant may give important instructions like theater arrangements as the case with removal of foreign bodies for upper aero-digestive tract.

ϝ. Pre-auricular Abscess

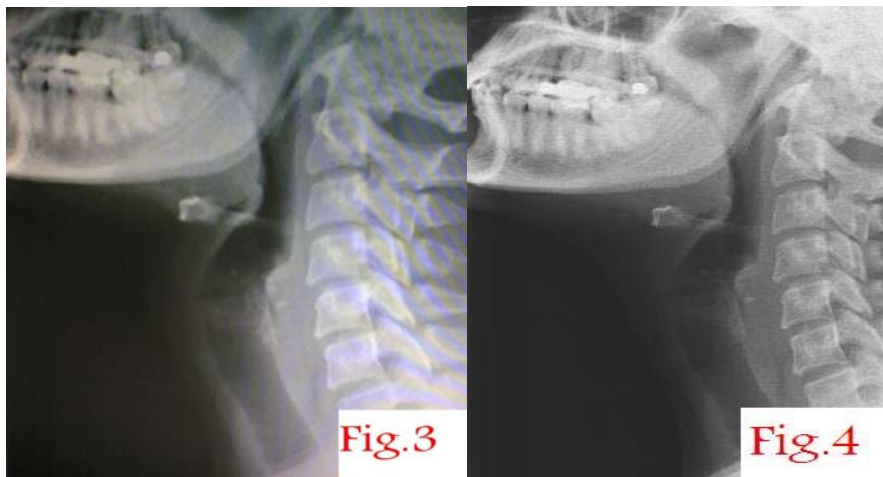
The ENT resident was called on his first day on-call to review a twenty-five years old gentleman, not known to have any medical illnesses, presenting to the accident and emergency with three days history of right otalgia and swelling in the pre-auricular region. He gave history of discharge which started on the same day of presentation. On evaluation, the patient was found to be afebrile with 2X1.5 cm fluctuant right pre-auricular swelling. The consultant on call was contacted by phone. He had doubts about the diagnosis, bearing in mind the limited experience of the on-call resident, whether the abscess was an easily managed superficial soft tissue one or a deep parotid abscess that might need admission with incision and drainage under general anesthesia. The consultant on call advised the resident to send an MMS carrying the clinical photo of the lesion taken by 1.3 mega pixels phone camera (figure 1), which was diagnostic of a superficial soft tissue abscess. To make it more useful and interesting, the new technology of MMS allowed the consultant to re-send the photo back to the resident with illustration of the direction and size of the incision to be made (figure 2).



٧. Ingestion of Foreign Body

A sixty-one years old lady, a known case of hypothyroidism, presented through accident and emergency with history of dysphagia and throat discomfort which she experienced suddenly while having dinner. On initial evaluation by the resident on-call, she was found to have a normal otolaryngologic system with normal lateral soft tissue neck X-ray and no evidence of foreign body impaction.

MMS of the X-ray was sent to the consultant on call (figure 3) which clearly showed no abnormality. The consultant came to review the patient and the X-ray to compare the consistency of the MMS with actual X-ray (figure 4). The patient was re-assured that no abnormality was found. The consultant found that the quality of the MMS sent to him was very well in keeping with the actual X-ray, especially when the feature of magnifying the suspicious areas on the MMS photo was utilized.



٨. Sending Pre-operative Audiogram

The patient was planned for tympanoplasty next day, and had an audiogram done a day prior to surgery. An image of the audiogram was sent to the consultant via MMS. Though it might be thought by some as unnecessary, we found it convenient and helpful for the consultant to have piece of mind, to plan for the surgery the next day; whether the surgery is tympanoplasty or ossicular reconstruction (figure 5).

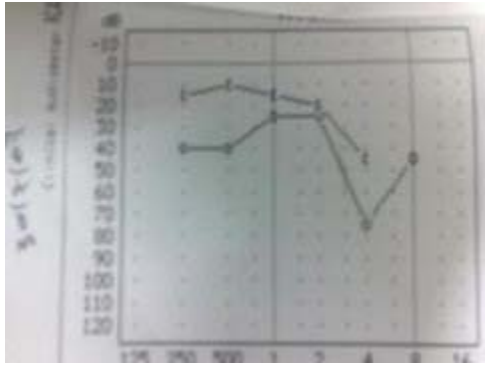


Figure: 5

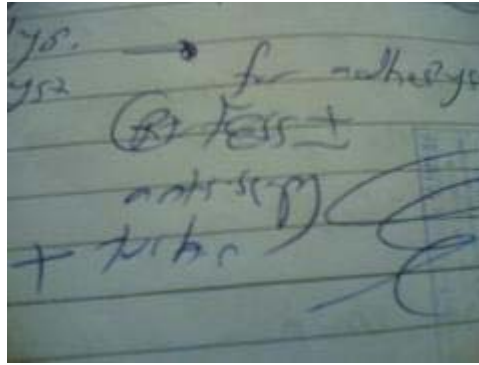


Figure: 6

ξ. Doctors' Handwriting

The resident on-call over the weekend was preparing the operative routine list for the next day, as he was clerking one of the patients, he could not make out the handwriting of the consultant in-charge, which I guess it happens frequently when we read our colleagues' handwritings. Therefore, the on call doctor photographed via his mobile phone the handwriting of the consultant and sent it back to him, where he was able to decode his mystical handwriting (figure 6).

These examples show the potential utilization of imaging and the ability to transmit it in seconds anywhere it is needed. This also shows the benefit of immediate communication and it speeds up the initiation of management which is satisfying to the care provider and recipient. Another important aspect is the quality of phone imaging that is almost similar to reality.

The Future

Today's mobile phones, smart devices and other wireless technologies enable powerful new applications, many of which have been developed through collaboration between telecommunications companies and physicians; they have the potential to reshape patient's care, for example, such an application might allow a physician to access current patient information from almost anywhere, instantly. There are also endless exciting possibilities.

In the last few months, Bahrain Defence Force-royal medical services had joined the era of telemedicine, and had integrated a state of art and up-to-date digital radiological technology, which can transmit the radiological image directly to the mobile phone of the intended consultant. Above all, not to forget the possibility of having real life video broad casting from the video camera to the Laptop of the consultant utilizing visual and audiological two-way communication, which can be established in certain serious cases.

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