

Smartphones in remote medicine and daily neurosurgery: The Sabah update

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ABSTRACT

Introduction: Healthcare costs continue to rise every day as the demand outgrows the supply of surgeons. The application of telephone consultation for immediate management is needed as most neurosurgeons are technology orientated. This enables a specialist at a remote mobile site to receive the necessary information and reduce transmission time, from the second the patient is seen till the management is obtained.

Materials and Methods: We conducted a survey on smartphone ownership among doctors and gathered cases that needed neurosurgical input from 1st November 2012 till 30th April 2013 from all 24 district hospitals in Sabah, Malaysia.

Results: The percentage of smartphone ownership among doctors surveyed and usage of it for remote and daily medicine at various departments at Queen Elizabeth Hospital, Kota Kinabalu, which shows at least 90% smartphone ownership and proves 100% ownership of cross-platform instant messaging applications and its usage for remote and daily medicine. It also proves to be a more popular mode of referral compared to "teleconsultation" (TC).

Discussion: In Sabah, the TC service is used for remote medical consultation and only available at four hospitals. The sender needs direct access to a computer with the TC software, and it causes delay whereas doctors using smartphones will just need to discuss the case on the spot and obtain the appropriate management within minutes. Smartphone usage is also important in daily neurosurgery especially at the department level to promote efficient communication, organization, and interaction between all the staff. As for the department's administrative sector, it is useful to notify if anyone is on leave, attending courses or even meetings as the shortage can be avoided, and redistribution easily done. It also allows us to transfer simple intra-departmental data at any time, and any place whenever required.

Conclusion: With all the given fact, it is clear that a day without utilizing this service in our daily life will leave us handicapped and struggling with time and resources.

Key words: Neurosurgery in Sabah, remote medicine, smartphones, telemedicine, teleconsultation

Introduction

Healthcare costs continue to rise everyday as the demand outgrows the supply of surgeons. As most of our neurosurgeons are tech-savvy industry specialists who can provide medical

advice via smartphones, the application of telephone consultation for immediate management is needed. This enables a specialist even at a remote mobile site to receive the information sent and reduces transmission time, from the second the patient is seen till the management is obtained.

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Accurate application of these techniques requires close cooperation between surgeons and other medical specialists. A specialist even at a remote mobile site may receive the information sent via smartphone, and this reduces transmission time, from the second the patient is seen till the management is obtained from specialist or consultant.

At the department level, there is a significant need for structures promoting an efficient flow of work among the staff thus enhancing our daily neurosurgical life. An efficient way is needed to enable the entire department to be updated on current problems. Creation of a discussion group via smartphones is necessary for these purposes.

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The purpose of this retrospective study is to summarize the results of telemedicine service usage on neurosurgical emergency care in Sabah and comparing it with a much easier alternative by using smartphones instead of the classic teleconsultation (TC) services. It is also to use our Sabah data to enable us to discuss the likely development and future of smartphone usage being widely accepted in remote medicine and daily neurosurgery in Malaysia and highlighting its' benefits.

Materials and Methods

We conducted a survey on smartphone ownership among doctors at various departments of Queen Elizabeth Hospital, Kota Kinabalu and their usage of smartphones in daily and remote medicine. We also highlighted the usage of cross-platform mobile messaging application which allows a user to exchange messages or other medias for this purpose as it is our preferred choice at Department of Neurosurgery, Queen Elizabeth Hospital 2, Kota Kinabalu, Sabah.

We gathered statistics on cases that needed neurosurgical input from November 1, 2012 till April 30, 2013 from all 24 hospitals in Sabah including district hospitals without specialists. These data were gathered from four main hospitals in Sabah with computed tomography (CT) scan facility and TC services. Comparison is made with a number of emergency trauma cases received at these centers from other districts and their choice on the mode of referral whether via TC or smartphones. It is a randomized study inclusive of all emergency trauma cases needing neurosurgery input from four hospitals in Sabah and Labuan with CT scan facility.

Results

These statistics below are based on an approach by utilizing a mobile smartphone for transferring medical images and updates to a specialist at a remote site in emergency care at our Department of Neurosurgery of Queen Elizabeth Hospital in Sabah. Information obtained especially in an emergency setting is transmitted via the mobile data package using current cross-platform instant messaging applications available and also rarely MMS.

The Table 1 shows the percentage of smartphone ownership among doctors surveyed and usage of it for remote and daily medicine at various departments at Queen Elizabeth Hospital, Kota Kinabalu, which shows at least 90% smartphone ownership and proves 100% ownership of cross-platform instant messaging applications and its usage for remote and daily medicine.

The column Chart 1 below shows the difference in number of emergency trauma cases referred from five specialist hospitals in Sabah via both TC services and smartphones over a period of 6 months; which proves that usage of smartphones are more preferred.

Table 1: Percentage of smartphone ownership among doctors and the usage for remote and daily medicine at various departments

Department/unit	Smartphone ownership (%)	Smartphone usage in remote and daily medicine (%)	Cross-platform instant messaging application ownership (%)
Neurosurgery	100	100	100
Internal Medicine	96.3	100	100
Genral Surgery	92.8	100	100
Anesthesiology	100	100	100
Ear, Nose, Throat	100	100	100
Ophthalmology	100	100	100
Emergency and Trauma	90	100	100
Rehabilitation	100	100	100
Psychiatry	100	100	100
Pediatric	94.1	100	100
Radiology	100	100	100
Orthopaedic	94.4	100	100
Obstetric and Gynaecology	100	100	100

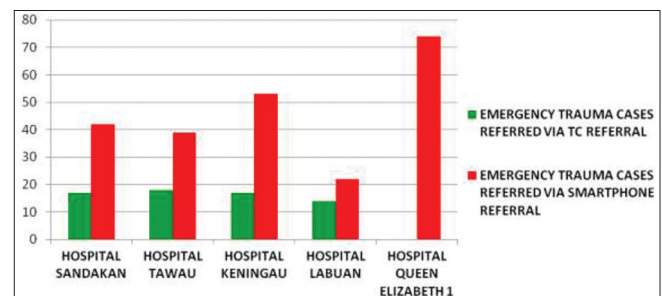


Chart 1: Difference in number of emergency trauma cases referred from five specialist hospitals in Sabah via both teleconsultation services and smartphones over a period of six months

Discussion

In Sabah, the TC service which is used for remote medical consultation is only available at 4 hospitals. Present teleradiology applications have organizational limitations.^[1] This requires the sender to have a direct access to the specified desktop computer with the TC software. A medical officer who receives a new case at the emergency department or having an ill patient in the ward will need to go to this desktop computer and discuss the case while patiently waiting for a reply. This of course causes delays compared to the smartphone usage.^[2] A doctor with a smartphone will just need to type out the case on the spot and send the necessary images to a specialist and obtain a reply on the appropriate management within minutes. The basic principle of using smartphones in remote medicine which is much faster and does not require a mediator is clearly shown in Figure 1.

The service is as effective as the classic hospital referrals and visits aimed at giving the initial or supportive management.

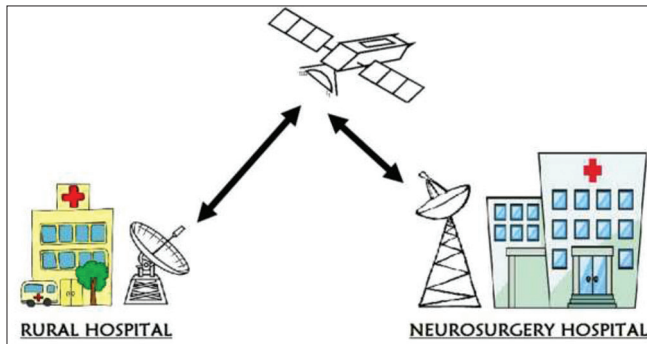


Figure 1: The basic principle of using smartphones in remote medicine which is much faster and does not require a mediator

This service is never a replacement for hospital and emergency care, but to provide remote medical services only where the initial consultant's advice is deemed important for the management plan of an ill patient allowing better patient triaging.^[2]

This helps to enhance healthcare simultaneously while saving patient's time and government's money at the same time with a telephone-based consultation method. As per our settings in Sabah, the immediate availability on transportation and the distance to Kota Kinabalu's main hospital is a major problem. The furthest district is almost 10 hours away and mostly requiring air service for transportation purposes and is a major factor to be considered as it involves a lot of funding. So if a patient is to be managed conservatively, the immediate plan can be given out to the remote districts thus avoiding unnecessary patient transfers. This saves cost, time and human resource.^[1,3]

Despite serving remote areas, the local hospital's on call team can discuss cases via smartphones especially in Kota Kinabalu's setting where there are three hospitals within the range of 18 km with the same on call team serving all three hospitals. So if we were to receive a case in one of these hospitals and the surgeon is in another, it is the best to discuss the cases via smartphones just as what we do with the remote district hospitals' referral.^[3]

We also emphasize on ensuring smooth administration of this system and to do so, we have given the contact details of all consultants and residents to all district and rural hospitals in Sabah along with the monthly on-call duty roster which is updated monthly. The current practice states that if a reply is not obtained within 10 min of referral, the referring doctor can call the consultant directly or if the person is not reachable, then the second consultant on-call can be contacted as there are two on-call duty consultants daily.

This service is also important for other aspects of daily neurosurgery to promote efficient communication, organization, and interaction between all the staff.^[4]

In view of surgery and operation theatre (OT), having a neurosurgery department group enables us to be updated on the whereabouts of a patient if the case has been already called to OT or if the patient is already on the operating table. Preparation of OT list too can be discussed via this group for the choice of patients whether it follows the actual elective OT data book or if there are any additional cases as the patients in our wards are dynamically changing. This enables the surgeon to track a patient's progress whenever it is necessary. Surgeons can also follow up on the progress of post op patients with the on-call team through this group.

As for the department's administrative function, this group will be useful to notify if anyone is on leave, attending courses or even meetings. Redistribution of staff can be easily done as the shortage can be identified early and solved. Any notices or announcements can also be made through this group, and everyone can be rest assured to have received the information. This facility allows us to transfer simple intra-departmental data and images at any time and any place whenever required.^[5]

Referrals via smartphones require written case discussions and provides as a legal documentation in black and white if at all there are any matters to arise as all discussions are properly documented and saved.^[6]

The major shortfall will be the issue of security and privacy of the patients' data shared via smartphones, but it is clear that as long as every doctor abides by the medical ethics; this issue will not arise.^[6] We do understand that the data transmitted is of a confidential nature and for now we have not implemented any formal written agreements with the referring doctors to ensure confidentiality by using these cross-platform instant messaging applications. We verbally notified the doctors to maintain the confidentiality of all discussions done via cross-platform instant messaging applications. We are currently still in the midst of working with the health department and ethical board to approve the usage of a confidentiality agreement form to be signed by all doctors concerning patients' data protection.

Conclusion

With all the given facts above, it shows that a day without utilizing this service in our daily life will leave us handicapped and struggling with time and resources especially while dealing with remote medicine in daily neurosurgery. As for the benefit of patients, it reduces the time to correct diagnosis and initiation of treatment of patients who need to be transferred and also avoid unnecessary patient transfers. While our daily struggle is to cut cost and be financially fit, developments in technology are needed to revolutionize neurosurgical emergency care in the country. Smartphones should be considered as the primary mode of remote medicine

referrals replacing our current TC services in the future as it is not readily available at all the hospitals.

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