

Short Communication

## SMARTPHONE APPLICATIONS FOR MEDICAL STUDENTS AND PROFESSIONALS

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### Abstract :

Mobile phones have been widely used for several decades, but the smartphones are a more recent advance. The latest generation of smartphones are increasingly viewed as handheld computers rather than as just phones, due to their powerful on-board computing capability and open operating systems that encourage application download and development. In a relatively short period of time, smartphone technology has penetrated significantly into society from school children to senior citizens. The level of smartphone usage by medical students and professionals is increasing day by day with the extensive availability of downloadable medical applications related to medical education and health. This article mentions about the useful and popular smartphone applications for medical students and practitioners which helps to integrate technology into clinical practice.

Keywords: Smart phone application, Mobile technology.

### Introduction :

A smartphone is a mobile phone built on a mobile operating system, with more advanced computing capability and communication capability than any other phone. Smart phones are becoming an increasingly important platform for the delivery of health education and medical interventions. Most of the newer generation smartphones have features such as The latest generation of smartphones are increasingly viewed as handheld computers rather than as phones, due to their powerful on-board computing capability, capacious memories, large screens, on-board personal management tools, high quality cameras and open operating systems that encourage application (apps) development. Although the mobile phone has been widely used for several decades, smartphones are a more recent advance. In a relatively

short period of time, smartphone has penetrated significantly into society, capturing an entire age spectrum of subscribers. Smartphone technology is changing the way that the

medicine is learnt and practised, with users becoming increasingly more likely to access convenient, regularly updated, web-based literature than refer to hard copies of books or journals<sup>1</sup>.

The most common mobile operating systems (OS) used by modern smartphones include Google's Android, Apple's iOS, Nokia's Symbian, Samsung's Bada, Microsoft's Windows Phone, Hewlett-Packard's web OS, and embedded Linux distributions such as Maemo and MeeGo. Among these, smartphones with Google's Android and Apple's iOS are very commonly used. Android platform is very popular and has market share of 43% compared with Apple iOS having 28% of market share<sup>2</sup>. The mobile phone provides an essential "anytime, anywhere" connectivity into the entire world wide web of knowledge. Such continuous connectivity has important implications for use in education, healthcare and medicine. Mobile health (m-health) apps are on the rise, with many medical students, clinicians and allied health workers adopting smartphone mobile health apps successfully in their practices. The Smartphone apps are self-contained software applications that can be downloaded by and run from these smartphones<sup>3</sup>.

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Several studies have evaluated the use of smartphones to support healthcare and public health interventions, notably in the collection and collation of data for healthcare research<sup>4</sup>, healthcare, education and clinical practice in the community<sup>5</sup>. These phones can also be used for support telemedicine and remote healthcare in developing nations<sup>6</sup>. Many extensive reviews of the use of Smartphones and handheld computing devices in health and clinical practice are studied<sup>7,8</sup>. Smartphones can assist with physical examinations using apps to check hearing, eyesight, and color recognition; evaluate mental status; or photograph or video document physical findings<sup>9</sup>. Patients too are accessing health information, maintaining contact with their healthcare providers and actively participating in their own care (participatory healthcare) through smartphones<sup>8,10</sup>. In some of the medical schools such as Georgetown Medical School in the USA, is now requiring every medical student to have an iPhone<sup>11</sup>. Smartphones are therefore useful to the medical and health related professions because they are agile, handheld, easy to use and can be used on the move<sup>12</sup>. The use of smartphones by people who are old and with chronic disease will come in near future, as the cost comes down, easily usable applications become available and more aware of the new technology among the people<sup>13</sup>. The level of smartphone usage by medical professionals seems to be increasing exponentially. Now apps are available for all manner of medical situations, from resuscitation to pedometers. Though, there are many advantages of using a smartphone, there are barriers to its adoption in healthcare, since some of the smartphone apps are costly, network connectivity and battery power efficiency, usability, privacy issues, etc,

Smartphone application for medical practitioners and students.

Some of the very popular and useful smartphone apps are listed below

From Android Market:

1. Speed muscles MD, Speed bones MD, Speed Angiology MD, Speed Anatomy quiz, Speed Anatomy quiz: These apps are useful for students who are studying Anatomy.

They are apps which test the speed and memory of identifying the muscles, bones, arteries, veins in the body. Speed Anatomy quiz tests the speed and challenges your knowledge of human anatomy.

2. Medical encyclopedia - is a comprehensive medical reference from the University of Maryland Medical Center. It contains more than 50,000 pages of medical information in detail.

3. PubMed mobile pro - This provides a simplified, mobile-friendly Web interface to access PubMed. PubMed contains millions of article citations from thousands of biomedical journals. Many citations include abstracts.

4. Medscape- Medscape is the leading medical resource most commonly used by physicians, medical students and other healthcare professionals for clinical information.

5. Medscape from WebMD - It offers a huge drug reference library, a disease library (with info summaries, differentials, diagnostic workups, treatments, meds, and follow up), procedures and protocols, and a drug interaction checker. These are organized with their own menus, and subdivided by body system. Searchable directories of doctors, hospitals, and pharmacies; medical news articles. Finally, all of the articles can be saved for future reference, so can collect and keep the pieces of information that matter the most.

6. MedPage today mobile - This app is for physicians and other healthcare professionals. It puts breaking medical news and Continuing Medical Education (CME) credits at your fingertips, with daily coverage of over 30 specialties and annual coverage of over 60 meetings and symposia. The only service for physicians that provides a clinical perspective on the breaking medical news that their patients are reading. Physicians and other healthcare professionals may also receive CME credits at no cost by completing electronic educational programs co-developed by MedPage Today and the University of Pennsylvania School of Medicine, Office of CME.

7. MedCalc – It is a free medical calculator that gives easy

access to a wide array of medical formulas and scores. It includes detailed information and bibliographic references for each formula.

8. Drug infusion - An intravenous medication drip rate calculator designed for the doctors who work in the intensive care unit. This ensures accurate calculations of dose, concentration or rate of infusion, and offers both weight-based and non-weight-based calculations with unit conversion flexibility.

9. Quick LabRef- It provides quick look at the up-to-date information on the most commonly used clinical laboratory values and other useful relevant information such as lab data in Microbiology, Physiology / Pathophysiology, Toxicology and etc. Normal values reference are provided in both Conventional Units (CU) and in units of the "Système International" (SI).

10. Eponyms - It allows for quick look up, the meaning of more than 1 700 medical eponyms using full text search or by selecting from one of 28 categories. Users can create a starred list of eponyms to track those they tend to forget. Which will be very useful for medical students.

11. Taber's medical dictionary - Taber's is the leading medical dictionary used by healthcare professionals . This app contains more than 60,000 terms, 1,000 photos. It also has medical abbreviations, symbols and units of measurement, immunization schedules, nursing diagnoses, and more.

12. Sanford guide- It is the essential resource for healthcare professionals who care for patients with infectious diseases. The Sanford Guide to Antimicrobial Therapy application provides fast, convenient access to critical information on treatment of infectious diseases, for timely, effective decisions at the point of care.

13. Epocrates- It offers a free drug reference application—Epocrates Rx—featuring thousands of drug monographs, drug-drug interaction checker, pill identifier, and health plan formularies. Premium applications—Epocrates Essentials Deluxe, Epocrates

Essentials, and Epocrates Rx Pro—include additional features such as disease information, billing codes and more.

14. My pregnancy today- This app is brought out by BabyCenter, the most trusted parenting resource, supporting 25 million women worldwide. It is useful for pregnant women. By entering the baby's due date, the smartphone will be converted into an expert guide for your exact day of pregnancy. It can also used and get the answers you need, whenever you need them.

15. I'm Expecting - Pregnancy App- The comprehensive pregnancy app from the world's largest online health community. It helps to keep track of everything that's happening to the mother and the baby. Weekly updates of the baby's growth, track the symptoms and compare them to other pregnant women to see how common they are, get answers to your questions.

16.. WomanLog Calendar- WomanLog is a menstrual and fertility calendar for women. It may help the infertile couple for knowing the fertile period.

From Apple's iOS:

1. Peds anesthesia - On launching this app, the user is prompted to enter the patient's age, weight and fasting time. Once done, five icons are given:

- a. Endotracheal tube sizing tool – based on patients finger size.
- b. IntraOp crystalloid calculator – giving a maintenance rate, based on the 4-2-1 rule, and allowing the user to input insensible and blood losses to generate an hourly total.
- c. PreOp sedation – doses of oral ketamine, midazolam, and nasal dexmedetomidine.
- d. Age appropriate vitals – heart and respiratory rate and blood pressure.
- e. IntraOp Medications – giving calculated doses, with references, of common anesthetic drugs, divided into induction; muscle relaxant; pain medications; and STAT drugs and Misc.

2. Drug calc: Drug calc app is very simple to use and easy to navigate, which allows weight to be calculated if unknown. One excellent feature is the 'Press in an emergency' button, which puts essential resuscitation information only two button presses away. This takes the user, via an age selection button to basic resuscitation information (epinephrine and atropine doses, endotracheal tube size, fluid bolus, and DC shock). The main part of the app is accessed via three icons at the bottom of the screen:

- a. Normal Values – heart and respiratory rate, blood pressure, hemoglobin, and blood volume.
- b. Equipment – sizes of endotracheal tube and laryngeal mask airway, fluid maintenance and DC shock power.
- c. Drugs – alphabetical list, with 'quick links' to each letter and the ability to select 'favorites' from the list. The initial alphabetical list shows the calculated dose to be given, with more information available when the individual drug is selected.

3. Draw MD series: It is a patient education app. This app enables doctors to communicate better with their patients and helps improve the doctor patient relationship. The app enables doctors to draw out surgical procedures to their patients in a palatable manner. The series contains nine apps, with seven specialties covered: Cardiology,

General Surgery, Orthopedic Surgery, obstetrics and gynaecology Urology, ENT, and anaesthesia.

4. Radiology 2.0- The app contains 65 Radiology cases that pertain to Emergency Medicine, but knowledge that can be used for almost every other specialty.

4. ECG Guide- This is a teaching guide to ECG interpretation with examples.

5. Paeds ED- This app helps to calculate Age / weight / situation-specific paediatric drug and dosage which will be helpful for paediatricians and students for dosage calculation.

#### Conclusion:

The rapid adoption of new technology has transformed many aspects of our communication, and has the potential to change the way we teach, learn and practice medicine. Smartphones and their increasing integration with information technology in hospitals could change the way health care is delivered in the future. One of the biggest limitations is to find a reliable and good application among extensive collection of the apps. Finally, apps are ideal for presenting the contents of magazines and journals. This would appear to be the future of medical publishing.

#### References:

1. Burdette SD, Herchline TE, Oehler R. Surfing the web: practicing medicine in a technological age: using smartphones in clinical practice. *Clinical Infectious Diseases* 2008; 47: 117–22.
2. The Nielsen Company. Available at [https://blog.nielsen.com/nielsenwire/online\\_mobile/generation-app-62-of-mobile-users-25-34-own-smartphones/](https://blog.nielsen.com/nielsenwire/online_mobile/generation-app-62-of-mobile-users-25-34-own-smartphones/). Accessed December 2011.
3. Krishna S, Boren SA, Balas EA. Health care via cell phones: A systematic review. *Telemedicine Journal and E-Health* 2009; 15: 231-40.
4. Blaya JA, Fraser HS, Holt B. E-health technologies show promise in developing countries. *Health Affairs* 2010; 29: 244-251.
5. Lindquist AM, Johansson PE, Petersson GI, Saveman BI, Nilsson GC. The use of the Personal Digital Assistant (PDA) among personnel and students in health care: a review. *Journal of Medical Internet Research* 2008; 10(4): e31.
6. Kaplan WA. Can the ubiquitous power of mobile phones be used to improve health outcomes in developing countries? *Global Health* 2006; 2: 9.
7. Free C, Phillips G, Felix L, Galli L, Patel V, Edwards P. The effectiveness of M-health technologies for improving health and health services: a systematic review protocol. *BMC Research Notes* 2010; 3: 250.
8. Terry M. Medical Apps for Smartphones. *Telemedicine journal and E-Health* 2010; 16(1): 17-22.
9. Boulos MN, Wheeler S, Tavares C, Jones R. How smartphones are changing the face of mobile and participatory healthcare: An overview, with example from eCAALYX. *Biomedical Engineering Online* 2011; 10: 24.
10. Kailas A, Chong CC, Watanabe F. From mobile phones to personal wellness dashboards. *IEEE Pulse* 2010, 7/8: 57-63.
11. Georgetown University School of Medicine (SOM): iPod Touch/iPhone Requirement FAQ. [<http://som.georgetown.edu/76736.html>].
12. Sarasohn-Kahn J. How smartphones are changing health care for consumers and providers Oakland, CA: California HealthCare Foundation; 2010 [<http://www.chcf.org/publications/2010/04/how-smartphones-are-changing-health-carefor-consumers-and-providers>].
13. Mori K, Harada ET. Is learning a family matter? Experimental study of the influence of social environment on learning by older adults in the use of mobile phones. *Japanese Psychological Research* 2010; 52(3): 244-255.