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Review of mobile apps assists in pharmacy profession

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ABSTRACT

The lifestyle of people has been changed in the recent years due to growing advances made in technology, especially the mobile phones. So many software applications have been introduced for various benefits. The medical field makes use of the opportunity and provide medical guidelines by assisting the health care professionals, medical students, patients and other people. The reviewing of mobile apps in pharmacy profession brings about the importance of using them anywhere and at anytime. It covers the topic of how the apps help in assisting the health care professionals in preparing prescriptions, making use of the medical calculators and observation of lab reports. It also shows how it helps in providing information about drug-drug interaction, adverse drug reactions, detecting substandard and counterfeit medicines and how useful for visually impaired people.

Keywords: Mobile apps, drug information, medical health apps, health care professionals, medication errors

INTRODUCTION

The rate of population overgrowth and evolving new diseases leads to increased use of medicines worldwide. Due to the high demand in the international market, many new drugs are developed and formulated.The use of technology has increased day by day. People rely on technology to make their life easier[12].The most frequentlyused technology is mobile phones [26]. They play a crucial role in transforming many aspects of clinical and medical practice[26].It is helpful in the current scenario of managing disease conditions [2].They function with custom software programs called apps [15].Mobile apps are valuable and economical tool to save lives at low cost. Some apps contain standard databases of authorized medicines and are used to compare with the sample product [2]. Advanced software apps are being incorporated with advances in mobile technology [4]. Mobile camera is used to evaluate the visual features of drugs like its shape, colour etc [2].

There are many mobile health (mHealth) apps which gives information about usage of drugs, adverse effects, contraindications, warnings, adult dosing, paediatric dosing, brand and cost information, potential drug-drug interactions (PDDIs), dose adjustments, indications, clinical calculators, adverse drug reactionsetc.Secondary features such as medication reminder, refill reminder, medication history tracking, and pill identification could enhance the effectiveness of PDDI apps.Drug information plays a very important role in achieving health goals.Hence frequent updates on daily basis can be done through mobile apps. It gives confidence in the recovery of patients [2].

"The World Health Organization (WHO) has recently defined mHealth as "medical and public health practice supported by mobile devices, such as mobile phones, patient monitoring devices, personal digital assistants (PDAs), and other wireless devices." [17].

DRUG-DRUG INTERACTION (DDIs) APPS

When one drug interferes with other drug, it causes adverse drug reactions. The prevention of PDDIs is a challenging process in many countries especially China. It is found to be very difficult for the physicians and pharmacists to identify and remember all drug-drug interactions (DDIs). So medication related clinical decision support systems are developed and implemented in some countries for patient safety. But studies says that, Chinese app stores do not contain DDI-related mobile health apps for drug information. So they are unaware about it. With 20,000 drugs being

approved every year, information on more than 100,000 potential DDIs are available in the major medication knowledge bases, such as Micromedex and Lexi-Interact [25].

ADVERSE DRUG REACTION (ADR) APPS

The ADR PvPi app was launched in India in September 2017. It is a free app created by the National Coordination Centre-Pharmacovigilance Programme of India. The adverse drug reactions can be quickly reported by the healthcare professionals through this app and delivers safety information of drugs. It improves the quality and coordination of healthcare structures [21].

PRESCRIPTIONS

The prescriptions written by the doctors in hospitals may sometimes contain small errors. So the medical smart phone apps help the inexperienced doctors to make use of the resources in developing prescriptions. It gives confidence and support to the new doctors for a good start in their profession. It helps in providing successful medical therapy and concerned with patient safety.Recent studies have shown that the rate of prescribing errors by doctors in their first 2 years of practice varies between 7 and 10%.The safe prescriptions should reach the patients through effective drug information apps [6].

Due to workload and time pressure, doctors find it difficult to provide personalized knowledge about drug information to patients[24]. Inadequate training is also a factor for the newly qualified physicians to prescribe safe and effective medications. The errors are more common in UK hospitals, which lead to fatal consequences. The delivery of targeted education can improve prescribing performance. "An Audit Commission report has suggested that adverse medication events were responsible for the death of 1100 hospital patients in 2001 in the UK, a fivefold increase over the previous 10." [8]. The mobile health apps assist those problems and reduce the complex nature of prescribing errors [24].

EDUCATION

The students in medical field are dependent on mobile apps for getting quick information and notes. It helps in finding new or unknown medical terms, and they also attend online lectures. They develop their knowledge by attending various test and quiz offered by the apps. So it plays an important role in increasing student knowledge scores and is called as "pocket brain".Mobile devices have become ubiquitous in educational settings,because they are "learn anywhere" resource for accessing information or double-checking knowledge.Some drug information apps require payment, but users usually prefer to download a free app. The medical apps can be costlier at initial stages, but it becomes cost effective after certain updates are included[26].

Popular information management apps such as Evernote and Notability, enable users to write or dictate notes, record audio, store photographs and organize material into categories within a searchable electronic database [26]. Dropbox is an app used to store articles and journals for future references. The users can use the documents or photos whenever required, which is available in both online and offline [19].

The Sanford Guide was a paperback manual which is developed from web edition and converted into an antimicrobial reference app. It gives detailed information about immunization, HIV guidance and infections, which is updated every year. Micromedex drug information app is useful for adjusting dosages, and learning about adverse side effects of drugs. Epidemiology and outbreak news are known through certain apps like H1N1 Update, Outbreaks Near Me and Swine Flu Tracker Map. HIV iChart app is used to find HIV drug interactions [27].

HEALTH CARE PROFESSIONALS PREFER APPS

The mobile medical apps are more beneficial in pharmacy practice as they are provided with variety of features [1]. The availability of medical software applications has increased rapidly and used in clinical practice for intending specific purposes. Nowadays, Health care professionals (HCPs) choose such methods for giving medical guidelines through drug information applications [26]. The characteristics of the apps are taken into consideration by clinicians to choose suitable apps for daily practice [1]."Faster processors, improved memory, smaller batteries, and highly efficient open-source operating systems that perform complex functions have paved the way for the development of a flood of medical mobile device apps for both professional and personal use"[26]. They focus on individuals and give personalized care to the patients. The health care professionals access different types of resources in clinical setting. It includes communication capabilities, hospital information systems, informational resources and clinical software applications. Numerous apps are now available to assist HCPs with many important tasks, such as: information and time management; health record maintenance and access; communications and consulting; reference and information gathering; patient management and monitoring; clinical decision-making; and medical education and training [26].

"Personal management of chronic physical conditions involves five core skills: problem solving, decision making, resource utilization, forming patient-health professional relationships, and taking action". The apps act as supportive tools in managing those core skills. They are provided with abundant information and knowledge in an easily accessible and interactive way [15]. The Hospitals encourage health care professionals financially to use health apps with regular update. The apps are also used for medical training, which provides medical guidelines like current disease updates, ICU patient monitoring etc [17].

The apps help in tracking the patient's general health to check any diseased condition and blood parameters. It also helps to balance the irregular menstrual cycles by encouraging patients to change their routine to a healthy condition. The health care providers suggest health goals by altering physical activity levels and eating habits through the apps [9].

Dermatology themed apps are introduced by the app developers for easy accessible medical care. It is used to detect early symptoms of skin cancer. The electronic images of skin lesions are diagnosed through the apps in which the accuracy is not affected[7].

Many health apps are available to solve psychosocial problems. Phobia free is a psychology related app used for the treatment of phobias by exposure therapy of games. The apps are also used to solve many other mental conditions like

depression, anxiety, smoking cessation, psychosis and alcohol use disorders. The apps are investigated by the researchers and found that it is helpful for self monitoring the patients [16].

The activity level of patients and their heart rates are also monitored and examined through smartphones. Diabeo is a health app which provides benefits for the patients who suffer from type 1 diabetes. It gives insulin dosing recommendations by collecting details such as carbohydrate count, plasma glucose measurement and physical activity of a patient. It is reported that the patients who use this app with regular communication with the health care professionals have low glycated haemoglobin levels. The results are more effective for the patients than who visit clinics [20].

Recent survey indicates that the most commonly used apps by the consumers are blood pressure apps, exercise, nutrition and weight management apps. These apps are getting popular among the people. So they expect improved health suggestions and information capacity from the apps. As their expectation has increased, the app developers should increase the values and worth of apps to fulfil the satisfaction of consumers [13].

SUBSTANDARD AND COUNTERFEIT MEDICINES

Substandard and counterfeit medicines (SCM) are sometimes found in illegal markets through unregulated websites. It is a worldwide problem. It causes serious health consequences, adverse drug reactions and even death. It fails to treat the diseases for which it is intended. The most commonly reported substandard medical products are anti- malarial drugs and antibiotics. The expensive generic drugs can also be falsified for profit.An estimated 1 in 10 medical products in low and middle-income countries is substandard or falsified. So certain measures are taken to compare the relevant available mobile applications and a systemic review is taken to reduce the negative effects of clinical and public health outcome. The accuracy of the mobile apps are evaluated to detect the substandard medical products through Mobile App Rating Scale (MARS). Thus the MARS score is helpful for the identification of falsified drugs.The doubtful medical products can also be reported to National Medicines Regulatory Authority [10].

"The MARS mean score for the apps was 3.17 (acceptable), with a maximum of 4.9 and a minimum of 1.1. The 'functionality' dimension resulted in the highest mean score (3.4), while the 'engagement' and 'information' dimensions showed the lowest one (3.0). The validated Mobile App Rating Scale (MARS) to assess the quality of apps, (1 worst score, 3 acceptable score, and 5 best score)" [2].

Technology is a supportive tool for regulating the problems of substandard drugs, other than that the medical organization should take part in modulating the capacity of substandard drugs. The detection of poor and substandard quality drugs through software is difficult to analyse. It does not give accurate results and so additional confirmatory tests are required for conformation. But it helps to find out the basic information of medical products [10].

TIME MANAGEMENT

The use of mobile devices has grown rapidly in the world. So certain health apps are already installed in buying of new mobile devices. Health care professionals prefer online method and uses software apps for tracking appointments, meetings and call schedules for time management. It is very easier to make availabilities and becomes better option than direct interaction with patients.Mobile apps such as ZocDoc, which allow patients to view information to make appointments with participating doctors, are also available for the iPhone, Android, and Blackberry devices.The patients can get quick responses of consultation from health care professionals through messages, mails or direct telephone conversations. It is useful for the people who do not have easy access to reach hospitals and who live in long distance. Texting is found to be more efficient means of communication. They can enquire about their problems and ask questions through mobile health apps. It acts as a life saving measure especially in emergency cases. [26] It is a quickest method of accessing information[18].In previous days, printed materials of medical references are used for checking infectious diseases, diagnosis and treatment. Now they are available in mobile device apps like Johns Hopkins Antibiotic Guide (JHABx), Dynamed, Sanford Guide to Antimicrobial Therapy (SG), UpToDateetc [26].

The most frequently used mobile drug reference apps include: Epocrates, SkyscapeRxDrugs/Omnio, Micromedex, FDA Drugs, and DrugDoses.net. Epocrates, SkyscapeRxDrugs/Omnioand FDA [26].

Some people find difficult to visit doctors for each and every symptom they get. In such cases, the drug information apps help the patients to identify the symptoms and determine whether it is due to an adverse drug reaction or any other complication. It gives an initial clarification before visiting a doctor. Some people may forget the indications instructed by the doctors. So these health apps help in reminding the instructions of taking a dose. It gives information about the drugs and medical treatment [3].

These apps contain many additional useful features which help the patients in the management of diseases. It reminds the patients to take medicines at appropriate time, without forgetting the dose to be taken. The notification of the alarm sound indicates the patients to take their medication for effective treatment. It helps in avoiding skipping of doses. It also reminds of doctors' appointments. These apps help in providing lifestyle changes and promoting healthy habits. Electronic Pillbox is an app used to promote medication adherence and also increases treatment adherence. It provides extra general information and education about the illness [22].

USEFUL FOR VISUALLY IMPAIRED PEOPLE

People who suffer from visual impairment find difficulty in accessing appropriate information of taking medicines. In such cases, they need proper guidance. Health care professionals have the responsibility of guiding and counselling about using medicines, but the medical health apps can even be more useful. It is a supporting hand for the visually impaired people and the apps can be used at any time. A mobile app of drug information called FarmaceuticApp helps to give complete and appropriate information about the use and dose of drugs for such people [14].

The Tumedicina app gives information about the interactions and expiry dates of medicines through scanning the bar codes on the medication containers. It conveys the accurate therapeutic use by verbal instructions and it can also be stored as audio recordings. So it is beneficial for visually impaired people [22].

The resources available in the medical apps help in supporting clinical decision making. It also contains standard references or textbooks for dose calculation. It gives positive and reliable results.More than 85% of clinicians are now owners of smart phones, with approximately 50% using smart phone applications, or 'apps', in their clinical practice [6].

MEDICAL CALCULATORS AND LAB REPORTS

Medical calculators are used to make calculations of accurate drug doses and body mass index (BMI) by using standard formulas.[26] The app called 'Calculate by QxMD' (QxMD Medical Software Inc 2015) app provides a number of unique calculators specific to various medical specialities and decision support tools including risk analysis [5].

Paediatric Intensive Care Unit (PICU) calculator is used to calculate drug doses, concentrations and infusion rates. It helps in reducing paediatric medication errors. In recent years many of these apps are freely available in online. Paediatric emergency drug calculator is also available so that the practitioner can get quick access of emergency drug prescriptions [4].

Lab test apps are also available which reduces the cost of direct observation. It provides information such as reference values and causes for abnormal values. The health care professionals use those apps for appropriate tests. The apps like Pocket Lab Values, Lab Pro Values, Normal Lab Values,Labs 360,Lab Unit Converter, Davis's Laboratory and Diagnostic Tests are in use [26].The medical reports can be sent to the health care professionals through secured apps and can get professional consultation and drug dosage information through the apps. It increases efficiency of treating patients in earlier stage and also it helps in following the instructions in a daily routine basis for effective treatment [5].

ACCURACY OF CHOOSING QUALITY APP

Even though the mobile health apps give more benefits about drug information, the use of accurate and proper apps is very important for the safety of patients. People mostly check for directions of use of drugs and drug-drug interactions before taking a medicine. When they don't have complete information of the safe and effective use of drugs, they should be cautious in choosing an accurate information app. The potentially harmful apps should be eliminated to avoid fatal consequences [12].The health care professionals should assist the patients in choosing quality app. Better quality and standards should always be updated for the effective usage of drug information apps. The language used in the apps should be simple and easily understandable by all people. As they don't have the medical knowledge, the usage of complicated medical terms should be avoided [26].

As thousands of medical apps are increasing day to day, safety concerns are also raised regarding quality of content and information. The apps aim to bring the utmost potential medical resources for health benefits but some apps contain low level of professional medical involvement. It becomes difficult for the users to detect and it may cause problems due to misleading information [7]. If the health care apps contain any outdated information, the software companies are responsible for the medico-legal consequences. The most common errors are found in drug references and disease diagnosis [17].The mobile medical apps (MMA) are utilised by the hospital pharmacists for drug information and clinical decision making purposes. When a standard and quality app is chosen, it provides accurate and trustworthy information [11].

CONCLUSION

The ultimate goal of the health and drug information apps is to bring out better health outcomes of people. It aims and serves to prevent and manage chronic diseases. The importance of patient care management through apps should be addressed to patients. Physicians have reported that the use of a mobile device for retrieving information from a drug database led to more efficient decision-making and patient care[26].Many Pharmacists have reported that using of such medical health apps increases their confidence in answering drug information questions. It is used to solve many drug therapy problems. So, it creates a positive impact on Pharmacists [23].

The smartphone promises to be a portable medical toolkit or clinical gathering device for both clinicians and patients [5].Though the medical apps have many advantages, it also contains risk factors. So the medical apps require a detailed evaluation and validation for the best quality and safety of patients[26].

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