

AperTO - Archivio Istituzionale Open Access dell'Università di Torino

E-tools for hospital management: An overview of smartphone applications for health professionals

This is a pre print version of the following article:

Original Citation:

Availability:

This version is available <http://hdl.handle.net/2318/1730950> since 2020-02-25T15:42:13Z

Published version:

DOI:10.1016/j.ijmedinf.2019.01.010

Terms of use:

Open Access

Anyone can freely access the full text of works made available as "Open Access". Works made available under a Creative Commons license can be used according to the terms and conditions of said license. Use of all other works requires consent of the right holder (author or publisher) if not exempted from copyright protection by the applicable law.

(Article begins on next page)

Title:

E-tools for the hospital management: an overview of smartphones applications for health professionals

Authors:

Olivero E¹, Bert F¹, Thomas R¹, Scarmozzino A², Raciti IM², Gualano MR¹, Siliquini R¹

Affiliation:

¹ Department of Public Health Sciences, University of Turin

² A.O.U. City of Health and Science of Turin, Italy

Corresponding Author:

Dr. Robin Thomas

Department of Public Health Sciences, University of Turin

Via Santena 5 bis, 10126 Turin, Italy

Tel. +390116705875

Fax +390116705889

Email: robin.thomas@unito.it

Abstract

Background: Commonly, the management of the main hospital activities are organized by different software packages that run on desktop computers which may not always allow a fast and practical use by health operators. This problem could be alleviated through the use of mobile health. The aim of this study was to give an overview of smartphone and tablet applications used for hospital management and administration, in order to evaluate their features and analyse them according to their contents, number of downloads and field of application.

Methods: Researchers performed the survey on the two main application stores available on the Internet: iTunes for Apple devices and Google Play for Android devices. Using specific keywords, 47 apps were identified and met inclusion criteria.

Results: Most of the applications were designed for health operators and patients' management (76.6%), 12.8% were apps focused on the organization and setting of the hospital resources, while 10.6% included apps that could help hospital administrators to perform self-evaluations of their structures, processes and outcomes. The large majority of apps (80.7%) counted less than 1000 downloads. Most of them (87.5%) were in English and free to download (93.6%).

Discussion: The results of first attempt to provide an overview about this emerging topic showed how, despite the existence of several applications for hospital management purposes, these tools appear to be still poorly widespread. In our opinion, there is a strong need to assess furtherly the quality of these applications, thus it may be worth to continue monitoring this field in order to analyse eventual improvements in the design and diffusion of these apps.

Keywords:

Health management; smartphones; applications; e-health; hospital administration

1. Introduction

Italian hospitals are managed and organized by a Hospital Management Unit (HMU), which consists of a General Manager, an Administration Manager and a Chief Medical Officer. The main occupation of this unit is the achievement of different goals set by the hospital administration itself and ruled by Italian law, healthcare policies and programmes. In particular, HMUs must provide management, organization and arrangement of hygiene and prevention issues, forensic medicine, promotion of scientific acknowledgements and a qualitative improvement of the provided health services. Moreover, the hospital administration is jointly responsible of the clinical governance of the structure and aims to improve the efficacy and suitability of its healthcare services. In this context, the HMU plays a crucial role in the organization and setting of the hospital resources and services, such as the arrangement of wards spaces and activities, personnel shifts and timetables, beds and equipment management, patients' admissions and discharges. All the activities above mentioned are directly or indirectly regulated by this central administrative, management and supervisory body (1).

Commonly, the management of the main hospital activities is organized by different software packages that run **only** on desktop computers which may not always allow a fast and practical use by health operators. This problem could be overcome through the use of Mobile Health (2,3). Mobile health, defined as the use of mobile and wireless technologies to support the achievement of health objectives (4), is a rapidly expanding area within e-health. Since the number of medical apps has been increasing consistently during the last years, a growing number of clinicians and health professionals is getting used to smartphones and its applications, achieving successful results in different fields (5).

Recent literature reviews have evaluated the various uses of smartphones and tablet devices in many different contexts, such as health promotion interventions (smoking cessation, body weight loss, reducing alcohol consumption, sexually transmitted disease prevention) (6–10), diagnosis, treatment, monitoring and management of some of the most relevant conditions (such as diabetes,

asthma, mood disorders, hearing loss, migraine and pregnancy) (11–15) and as support for screening (16), medical education (17,18) and clinical practice (19).

However, to the best of our knowledge, there are no studies about applications used for hospital management and administration. Therefore, our research aims to describe the applications available for the professionals working in the hospital management unit, through the analysis of their features, the number of downloads and the potential fields of application.

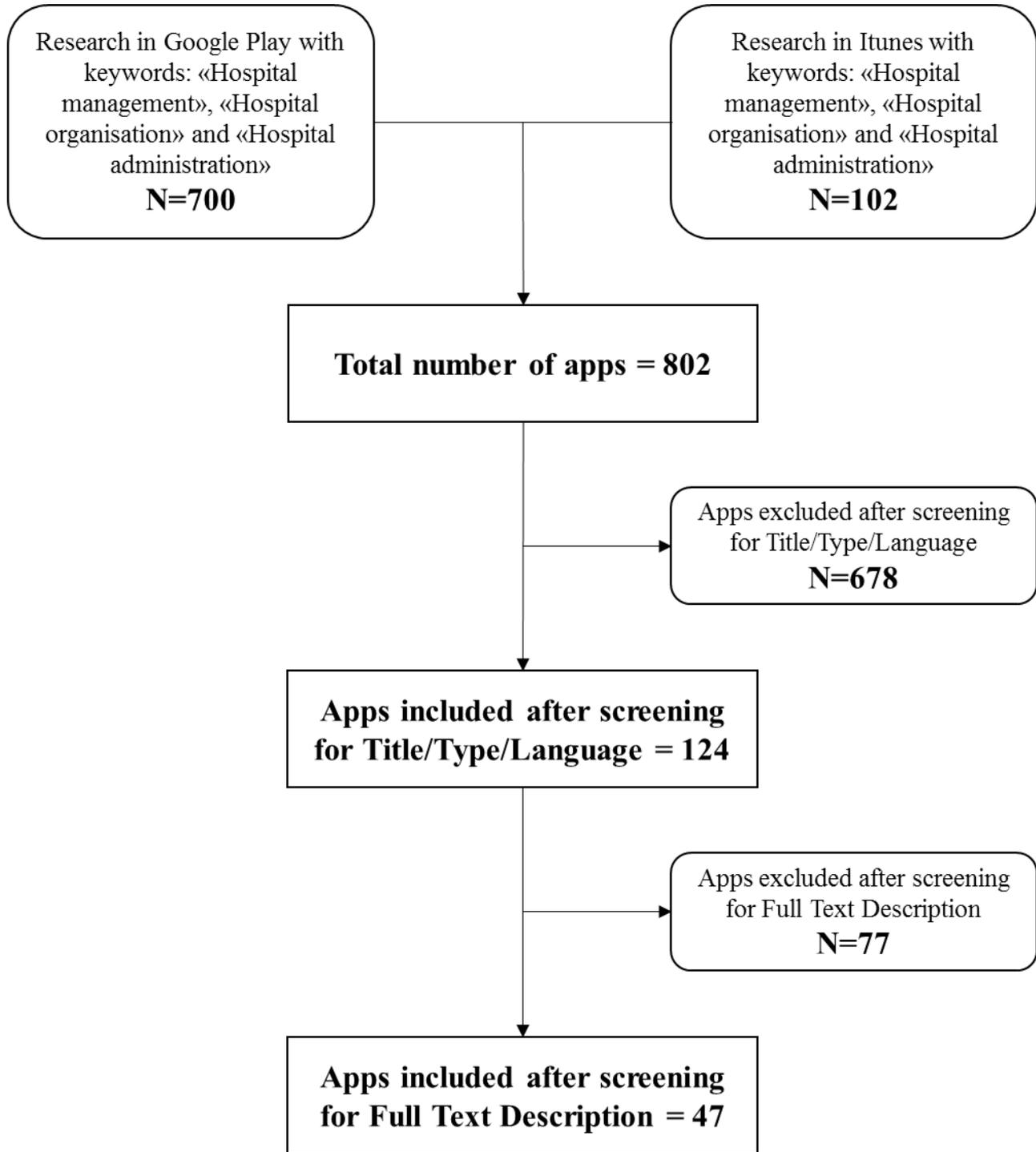
2. Methods

In the conduct of this study, researchers decided to use the definition of smartphone as stated by Ozdalga et al: “any cellular device that has additional functions including a camera, global positioning system (GPS), and Wi-Fi capabilities and is running one of the following operating systems: iPhone, Android, BlackBerry, or Windows Mobile” (18). The researchers performed their survey on the two main application stores available on the internet: iTunes for Apple devices and Google Play for Android devices (20). The selected keywords used for our research were “hospital management”, “hospital organization” and “hospital administration”. Research results were analyzed critically by two researchers (EO and RT) in order to collect all the appropriate apps for the aims of this study. Any disagreement was solved by asking a third opinion to another researcher (FB).

The inclusion criteria were: Applications designed in English, Italian or French; Applications included in the categories Medicine, Productivity, Health and Fitness, Business, Lifestyle, Utilities by the developers; and Relevance of the Apps’ main features with the main topics of Health Management Unit.

All the applications, designed in other languages or included in categories different from the above mentioned and all the applications with contents and features not relevant to the topic, were excluded. Figure 1 shows the flow diagram of the research conducted on the app stores.

Figure 1: Research flow diagram.



Finally, once all the apps were screened, the remaining ones were categorized in three different groups, according to the application's main features:

- 1 "Health operators and patients' management": applications designed for personnel shifts and timetables scheduling, beds management, patients' admissions and discharges, clinical records compiling;
- 2 "Resources, equipment and meals dispatch": applications designed for the organization and setting of the hospital resources and services, such as inventory of instruments and consumables;
- 3 "Quality assessment": applications designed for the evaluation of structures, processes and outcomes, and, at the same time, to assess the quality of services delivery and of patients' safety in hospitals.

Our findings were then collected and stored in a database, which included app names, names of developers, descriptions, languages and categories, the number of downloads and app prices.

3. Results

3.1 Description of the "sample"

The initial search using the above mentioned keywords on Google Play and iTunes returned globally 802 apps. After the removal of duplicates and the screening for title, type and language, the reviewers agreed that 124 apps deserving of a closer examination, as strictly related to the topic of interest.

Among these, 47 (16 iTunes apps and 31 Google Play apps) were identified as meeting the inclusion criteria and included in the study after the research and screening.

The description of the number of downloads for each app was conducted only for the Google Play applications, since these data are not displayed in the iTunes store. 32.2% of Google Play apps scored a number of downloads included in the range 1-50, while 9.7% were within the range 50–100, 32.3% were downloaded a number of times included between 100 and 500, 6.5 % within 500–1,000, 16.1%

count between 1,000 and 5,000 downloads and just 1 (3.2%) app was downloaded between 100,000

and 500,000 times. Since apps are also divided by the stores in different categories, the researchers analyzed which were the most represented ones. The large majority of the included apps (59.6%, n=28) were tagged as “Medical”, 21.3% as “Health & Fitness”, 10.6% were included in the “Productivity” category, 4.3% were tagged as “Business”, while the “Utilities” and “Lifestyle” categories both included 2.1% of apps (one each) (Figure 2). The majority of apps (87.5%) were in English, 8.3% had Italian contents, while just 4.2% were in French. Lastly, all the examined applications were free to download, and just three of them (6.4%) reported the presence of inside-app purchasing. All results are shown in Table 1. while in Figures 2 and 3 a bar chart visually describes the differences in percentages occurring among the applications for category of use and store categories.

Table 1 Descriptive analyses of included apps

Categories of Use	n	%
Health operators and patients management	36	76.6
Resources, equipment and meals dispatch	6	12.8
Quality assessment	5	10.6
Number of downloads (Google Play apps only)		
1 – 5	5	16.1
10 – 50	5	16.1
50 – 100	3	9.7
100 – 500	10	32.3
500 – 1,000	2	6.5
1,000 – 5,000	5	16.1
100,000 – 500,000	1	3.2
Store categories		
Medical	28	59.6
Health & Fitness	10	21.3
Productivity	5	10.6
Utilities	1	2.1
Lifestyle	1	2.1
Business	2	4.3

Language		
English	42	87.5
Italian	4	8.3
French	2	4.2
In-app purchase		
Yes	3	6.4
No	44	93.6

Figure 2 Distribution of the apps in the different store categories



3.2 Contents analysis

The applications retrieved were then divided into the three main categories of use briefly described above (Figure 3). All the applications cited in the following paragraphs are reported in the supplementary Table 2, together with information about stores, categories, descriptions, links, number of downloads, users' ratings and languages.

Figure 3 Distribution of the apps in the different categories based on their features

Apps categories based on their features

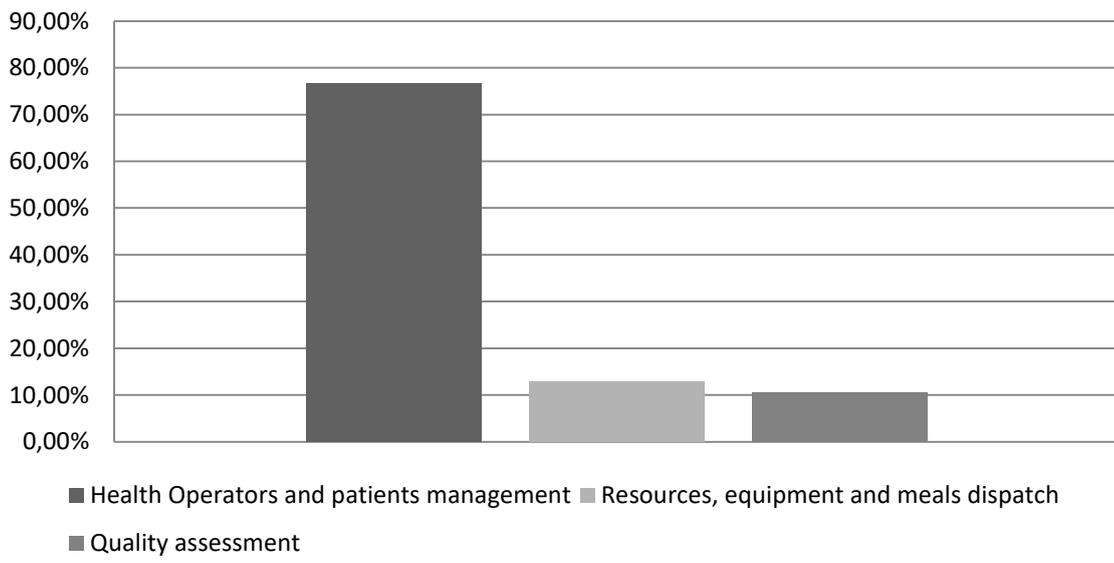


Table 2 List of information about included applications' features

APP name	Store	APP store Category	Description and link	Downloads	Rates	Category	Language
Hospital Inventory Manager	Play store	Medical	Hospital Inventory Manager (HIM) helps you easily manage your hospital or clinic's inventory of instruments and consumables. https://play.google.com/store/apps/details?id=com.navare.prashant.hospitalinventory	100-500	/	1	Eng
OPD MANAGEMENT	Play store	Medical	This project is mainly targeted for the doctors. This is a perfect application for hospital OPD. It stores information regarding complete cycle from Registration, Patient History, Patient Diagnosis, and Prescription etc. https://play.google.com/store/apps/details?id=com.opd_management_system	1.000-5.000	3.6	0	Eng
Practice & Hospital Mgmt.	Play store	Medical	Doctors Aid is OPD management tool for Doctors as well as small size hospitals having OPD. https://play.google.com/store/apps/details?id=com.VidyabhiSol.docaid	500-1.000	4.3	0	Eng
MocDoc HMS	Play store	Health & Fitness	MocDoc is an easy to use complete Digital Clinic and Hospital Management Solution with access to main features through Smart Phone App. It provides Patient Visit Record, Prescription, Billing, SMS Reminders, Service Provider, Accounts & Balancesheet, Reports, Task Management and more. https://play.google.com/store/apps/details?id=com.mocdocdrapps	1.000-5.000	4.4	0	Eng
Hospital Quality Manager	Play store	Health & Fitness	Hospital Quality Manager (HQM) was developed by BestRatedHospitals. HQM help Hospitals perform Self-Evaluation of their Structure, Processes and Outcomes and assess Quality Service Delivery and Patients Safety in Hospitals. https://play.google.com/store/apps/details?id=org.bestratedhospitals.hqm	10-50	/	2	Eng
Hospital Appointment Creator	Play store	Medical	HAC creates and manages Appointments for Clinics and Hospitals. HAC aim to improve Satisfaction for Patients and other Hospital Users. HAC also helps manage critical resources like Time, Healthcare Professionals and operational Processes in Hospitals. https://play.google.com/store/apps/details?id=com.phillipjoneloutlookcom.hhac	100-500	4.8	0	Eng
Hospital Bed Inventory Tracker	Play store	Productivity	This app enables optimal hospital bed inventory management for every hospital and clinic. https://play.google.com/store/apps/details?id=com.ginstr.hospitalBedsInventoryTracker	100-500	4	0	Eng

Dinewell Hospital	Play store	Business	This app manages meal bookings in hospitals as part of the Dinewell Hospital service. It allows staff to book meals as well as record meal delivery and meal consumption. The app also allows staff and patients to easily view nutritional and allergen information of each meal. https://play.google.com/store/apps/details?id=biz.dinewell.dinewellHospital	1-5	5	1	Eng
Vcare Hospital	Play store	Health & Fitness	app for hospitals, which can be used by all the departments to managing the information about the patients.this app mainly to view the daily reports. https://play.google.com/store/apps/details?id=rushdainfotech.in.vcarehospital	100-500	2.3	0	Eng
eMediCenter CMS - Demo	Play store	Medical	eMediCenter is an advanced health care information management system offering from Embien. Designed especially to meet the stringent security requirements for health care scenario, with aid of experts in various fields of medicine, it brings latest technology to the hands of the doctors. https://play.google.com/store/apps/details?id=com.embien.emedicenter	100-500	3.7	0	Eng
NalamRx	Play store	Medical	software for hospitals made hundreds of Doctors from 'Hand written' prescriptions to 'Just click' prescriptions. https://play.google.com/store/apps/details?id=com.technobess.nalamrx	50-100	4.9	0	Eng
RistoHospital	Play store	Productivity	Mediante l'utilizzo di questa app collegata alla piattaforma RistoCLOUD è possibile gestire in maniera integrata una serie di servizi al paziente nelle strutture Sanitarie e Socio Assistenziali. https://play.google.com/store/apps/details?id=com.RistoHospital	10-50	5	1	Ita
Hospital rounds management	Itunes	Medical	A productive tool to track hospital rounds of Physicians. Physicians can enter patient details, diagnosis and billing codes. Update codes per visit and submit for billing via sending email or interfacing with Ambulatory EHR applications. Manage Physicians, Referring Physicians, Hospitals. https://itunes.apple.com/it/app/hospital-rounds-management/id932413385?mt=8	/	/	0	Eng
Smart Hospital	Itunes	Utilities	This smart Clinic and Hospital outpatient management app is made by smart-Group to help organize patient Time, Pre-lab test Info., Medicine dosage, treatment Dietary, share Medical records of patient, estimate waiting time, Dr. information and contacts, as well as full guide inside hospital to next step in the process, floor plan guide and many more.	/	/	0	Eng

			https://itunes.apple.com/it/app/smart-hospital/id883091288?mt=8				
Nervecentre	Itunes	Medical	Nervecentre's iPhone app works with the Nervecentre server to provide electronic decision support for the capture of vital signs, plus full cascading escalation to doctors using Nervecentre's unique task management capability, and electronic handover support for clinical teams working in acute hospitals. https://itunes.apple.com/it/app/nervecentre/id580327847?mt=8	/	/	0	Ita, Fra, Eng
Hospital Quality Manager	Itunes	Medical	HQM is benchmarked against the International Society for Quality in Healthcare (ISQUA) ALPHA Standards. HQM produces Organizational Performance Scores evaluating Hospital Leadership Management, Strategic Planning Management, Care Process Management, Quality Management, Risk & Patient Safety Management, Human Resource Management and Resource Management. https://itunes.apple.com/it/app/hospital-quality-manager/id1128151746?mt=8	/	/	2	Eng
Smart Consultant	Itunes	Productivity	Smart Consultant is an app designed for doctors to maintain patient wise & hospital wise records of his Surgeries so that they can better track and reconcile the payments at the end of month. https://itunes.apple.com/it/app/smart-consultant/id737765036?mt=8	/	/	0	Ita, Eng
Connexall	Itunes	Medical	In healthcare environments where disparate silos are the norm, Connexall is the only hospital-wide software application that integrates any tasks, people, departments and systems. Connexall's vendor-neutral solutions reduce the cost of care by leveraging current technology infrastructure and resources while creating more efficient workflow and better patient outcomes. https://itunes.apple.com/it/app/connexall/id441829738?mt=8	/	/	0	Eng
SoftClinic® Pro	Itunes	Medical	SoftClinic Pro App is developed for the active users of SoftClinic Software. This app connects with SoftClinic Software's installed into your hospital/clinic and allows you to access your patient data anywhere – anytime through Internet. With SoftClinic Pro app user can easily manage appointments, patient records, patient visit notes, admission notes, round notes details, and discharge notes details. This app is useful for all physicians & healthcare professionals to help them manage patient records on a go. https://itunes.apple.com/it/app/softclinic-pro/id909882496?mt=8	/	/	0	Eng
StafficiencyApp	Itunes	Medical	Stafficiency™ is an iOS app for iPad and iPhone that provides an efficient and cost-effective way for hospitals to monitor and manage patient care unit staffing.	/	/	0	Eng

			https://itunes.apple.com/it/app/stafficiencyapp/id1200660721?mt=8				
HybridChart	Itunes	Medical	HybridChart is a comprehensive Hospital Rounding and Charge Capture Solution designed for medical practices of any specialty and any size. Manage your cloud-based census, assign diagnoses and submit charges directly to your practice management system. Includes Secure Messaging, Discharge Management and robust Data Collection. https://itunes.apple.com/it/app/hybridchart/id1170768559?mt=8	/	/	0	Eng
Embrace Health	Itunes	Medical	Embrace is a decision-support iOS app for case managers that delivers up-to-date, comprehensive community resource information to streamline hospital discharge processes and ultimately reduce readmissions. https://itunes.apple.com/it/app/embrace-health/id1114674276?mt=8	/	/	0	Eng
MocDoc HMS	Itunes	Health & Fitness	MocDoc is an easy to use complete Digital Clinic and Hospital Management Solution with access to main features through Smart Phone App. It provides Patient Visit Record Prescription Billing SMS Reminders Service Provider Accounts & Balancesheet Reports Task Management and more. And provides customization specific to Specialties like General Practice, Pediatrics, Ophthal (Eye), Dental, Homeo, Pet etc. https://itunes.apple.com/it/app/mocdoc-hms/id1071228117?mt=8	/	/	0	Eng
Chronorea - Gestionnaire d'interventions	Itunes	Medical	Chronorea permet aux ambulanciers, personnel des urgences (infirmiers anesthésistes, SMUR, SAMU, ASSU) et aux sapeurs-pompiers de gérer facilement leurs interventions. https://itunes.apple.com/it/app/chronorea-gestionnaire-dinterventions/id813086719?mt=8	/	/	2	Eng, Fra
Posey S.A.F.E. Audit	Itunes	Medical	The innovative app gives busy health-care personnel the ability to quickly and easily track compliance progress related to their falls prevention criteria – based on the facility's S.A.F.E. Approach implemented protocols – to help optimize patients' safety by reducing the risk of in-patient falls and fall-related injuries. https://itunes.apple.com/it/app/posey-s-a-f-e-audit/id1129410683?mt=8	/	/	2	Eng

ACES Medical	Itunes	Health & Fitness	<p>This product is designed for medical practices of any specialty or size. Manage your cloud-based census, assign diagnoses and submit charges directly to your practice management system. Includes Secure Messaging, Discharge Management and robust Data Collection.</p> <p>https://itunes.apple.com/it/app/aces-medical/id1226277008?mt=8</p>	/	/	0	Eng
MyDuty - Nurse Calendar	Play store	Lifestyle	<ol style="list-style-type: none"> 1. Puoi gestire il tuo calendario MyDuty 2. Condividi in maniera facile il tuo calendario MyDuty con Facebook, Twitter, internet etc. 3. Controlla facilmente i tuoi turni con l'esclusivo widget. 4. Gestisci le tue ferie 5. Crea un gruppo e invita amici o colleghi. Puoi controllare i turni dei componenti del gruppo quando sei in Landscape mode 6. é offerto un esclusivo servizio di messaggistica di gruppo 7. Puoi accedere a "MyDuty" tramite email o facebook 8. Puoi gestire il tuo calendario tramite MyDuty. <p>https://play.google.com/store/apps/details?id=kr.fourwheels.myduty</p>	100,000-500,000	4.6	0	Ita
Acutecrew	Play store	Medical	<p>Connects Doctors & Nurses with Hospitals & Medical Centres on a daily basis. Use in emergencies to rapidly find and communicate with available staff.</p> <p>Medical organizations looking for staff describe who they need, and the best matching staff are notified. Available staff can indicate their interest with a single click. Organizations can review the interest to quickly make informed staffing decisions.</p> <p>Its the most effective way to find new staff, and for staff to find work, but it's also an efficient way to connect with existing staff for last minute work. Organisations can prioritise notifications which go out to your preferred staff first.</p> <p>https://play.google.com/store/apps/details?id=com.acutecrew.acutecrew</p>	50-100	4	0	Eng
DonorFind	Play store	Medical	<p>DonorFind by Morph.org is an opt-in, location-aware app that revolutionizes the way hospitals, blood banks and patients efficiently find nearby blood, bone marrow, platelet & plasma matching donors. The "Uber" for blood and bone marrow donation is here!</p> <p>COUNTRY COVERAGE: App can be used globally to sign up as a donor and find a local match. Finding nearby collection hospitals and blood banks are just available for US & India currently.</p>	100 - 500	5	1	Eng

			https://play.google.com/store/apps/details?id=org.morph.donorfind				
Find Blood Donors	Play store	Health & Fitness	<p>The Socialblood Local Blood Donors App puts the power to save lives in the palm of your hand. Donating blood and platelets is easier than ever. Find nearby blood banks, create a blood request, find emergency blood donors around you.</p> <ul style="list-style-type: none"> • Convenient, easy blood donors search. • Receive blood requests from your neighborhood • View nearby blood banks to fix blood donation appointments. • Get geo-targeted blood shortage alerts let you know if your blood type is needed in your area. <p>https://play.google.com/store/apps/details?id=org.socialblood.app</p>	500-1000	4.6	1	Eng
Practice Unite ®	Play store	Medical	<p>Features:</p> <ul style="list-style-type: none"> •Reduce clinical communications delays •Send PHI securely to colleagues •Collaborate with care team members more easily •Find and communicate with colleagues by secure text or by phone •Receive clinical data where and when you need <p>Voice Calling: Call your colleagues directly through Practice Unite by cell, office number or VOIP if provided by your organization</p> <p>Consults: Deliver consults directly from the patient's EHR to physicians' mobile devices</p> <p>Clinical Alerts: Receive critical/abnormal lab results and other important clinical information directly from your EMR or other clinical systems</p> <p>Patient List: Securely create and share patient notes among physicians, nurses and other clinicians</p> <p>On-Call List: Identify and communicate with the "On-Call" physician, or team, quickly from any mobile device</p> <p>Procedures: Schedule procedures and have results delivered to ordering physician's mobile device</p> <p>Hospital System Directory: Access an up-to-date system-wide directory of phone numbers searchable by employee name or phone location.</p> <p>https://play.google.com/store/apps/details?id=com.bkl.practiceunite</p>	1000-5000	4.2	0	Eng
Patient Management	Play store	Medical	<p>Easy storage, Retrieval, edit, updation , E-Prescription , SMS Reminder, Print , View Appointments, Whatsapp Reminder, Photo Storage, Appointment of a particular Date, month , year Viewing , You can view the next Appointment Date , amount given , patient</p>	1000-5000	4.2	0	Eng

			name ,problems can call him/her in one click with this Patient Doctor Records or Patient Management . Data can be exported to PC and viewed with different softwares. https://play.google.com/store/apps/details?id=com.medical.free				
MedicalTimeStudy	Itunes	Productivity	Doctors and hospital administration need to record the time they have spent pre and post transplant on tasks like patient counselling, donor visits, nutrition counselling, data collection, social work, etc. The app provides list of various administrative tasks from which user can select the task and then record the time and day when the task was performed. It also provides a way to send the recorded time studies to an e-mail address specified provided by the user. Through this app a hospital can track the hours spent by the staff on administrative tasks. https://itunes.apple.com/th/app/medicaltimestudy/id1257511139?mt=8	/	/	0	Eng
Hospital Operations Process Efficiency Visualizer	Itunes	Medical	HospOp is an iPad application providing hospitals and healthcare organizations in Kerala (India) with effective access to their data and greater insight into their health service performance. The application currently provides process efficiency visualizations for Accident, Cancer and Treatment processes, based on the data received from the Health Department. https://itunes.apple.com/us/app/hospital-operations-process-efficiency-visualizer/id919152024?mt=8	/	/	2	Eng
Referral-H	Play store	Medical	Referralio-H, is a mobile application that is meant to enable the hospital administration and marketing team to respond to the referrals instantly. 1. Allows mapping of hospital users to partners. 2. Instantly informs hospital users on any new referrals as well as any messages on progress of a patient. 3. Allows hospital user to respond to the referring partner about patient progress, instantly. 4. Allows hospital user to liaise with the hospital doctors and specialists as well. https://play.google.com/store/apps/details?id=com.hospitalcheck.referralh	100-500	5	0	Eng

Avizia OnePass	Play store	Medical	Simplify clinical team collaboration, accelerate response times, and improve patient outcomes with Avizia OnePass. Instantly access your care team directory across all systems so you can send secure messages, images, and recorded video to a recipient or a group of recipients. The app includes medical-grade security features that meet HIPAA and HITECH compliance requirements, such as message expiration and remote wipe, 256-bit encryption, and a secure pin to protect against lost devices. - Send messages via SMS, page or email if the recipient is not currently able to receive secure messages. - Create and send secure message to a group of recipients. - Start a phone call without needing to know the recipient's phone number. - Manage your contact preferences to route phone calls and messages to different devices. https://play.google.com/store/apps/details?id=com.emergemd.onepass	1000-5000	4.2	0	Eng
healthCare pro	Play store	Health & Fitness	HealthCare is a software for agency administrator to manage personal user. It can check the real-time behavior of all the residents within the jurisdiction. It also can receive the warning information, the alarm information and emergency alarm of all the residents. function: view and screening of personal user in the region view the real-time events and historical events. https://play.google.com/store/apps/details?id=com.icwhich.healthCare	1-5	/	0	Eng
Healthcare Design Magazine	Play store	Health & Fitness	Healthcare Design serves an audience of architects, interior designers, hospital administrators, facility managers, engineers, and key members of the construction community as the premier source of insight, information, and inspiration for planning, designing, and constructing new or renovated healthcare facilities. Our goal is to help our audience navigate the current healthcare landscape and manage the evolving expectations surrounding design/architecture/construction in order to build environments that improve patient outcomes and satisfaction while also embodying high design standards. https://play.google.com/store/apps/details?id=com.branded.healthcare	100-500	5	1	eng

HMS365Cloud	Play store	Health & Fitness	<p>HMS365cloud is designed for small and mid-size hospitals and clinics, individual doctors, physicians as well as Multi-Specialty Hospitals, to cover a wide range of hospital administration and management processes. It is an integrated end-to-end Hospital Management System that provides relevant information across the hospital to support effective decision making for patient care, hospital administration and critical financial accounting, in a seamless flow, in the areas of clinical process analysis and activity-based costing. System provides the benefits of streamlined operations, enhanced administration and control, improved response to patient care, cost control, and improved profitability.</p> <p>https://play.google.com/store/apps/details?id=citta.app.ws7.hms365</p>	5-10	/	?	Eng
MediVoice	Play store	Medical	<p>MediVoice is your personal healthcare record all stored in a convenient portable place. It provides information for Doctors, Consultants, Nurses and any Healthcare Administrative team in an easy to read form. The passport is especially important for those who suffer from Allergies and long term illness e.g Motor Neurone Disease, ALS, Lou Gehrig's Disease, Parkinson's, MS, Strokes, Heart Disease, Dementia, Cancer and Speech difficulties.</p> <p>The Healthcare Passport stores measurements of vital signs and should be taken when the patient is:</p> <ul style="list-style-type: none"> • Admitted to hospital for any planned or unplanned assessment and treatment, • Attending out-patients appointments, • Visiting GP, • Travelling <p>Features:</p> <ul style="list-style-type: none"> • Communication tool using predictive text (basic user guide below), • Personal Details, • G.P/Medical Team Information, • Medical Diagnosis, • Vitals Information, • Allergies Information, • Medication Information, • About Me, • Personal Care/Support. <p>https://play.google.com/store/apps/details?id=uk.co.medivoice.jv</p>	10-50	5	0	Eng
MyPatient+	Play store	Medical	<p>MyPatient+ is an app that provides important, doctor-centric, real-time patient information to clinicians via mobile devices, anywhere, anytime. By linking to individual hospital's Patient Administration System, it allows the clinicians to obtain information such as patient location, patient data, and operating theatre schedules on their mobile devices while on the move. This reduces the time wasted by clinicians on hospital administrative tasks, and helps them focus their effort on patient care.</p> <p>MyPatient+ is designed and created for doctors working in Australian hospitals with the Patient Administration System.</p>	100-500	/	0	Eng

			https://play.google.com/store/apps/details?id=au.com.ramsayhealth.mypatientplus				
MyConsultation	Play store	Medical	<p>Doctors can add slots at any time and same will be reflected in the HIMS immediately, Payment details are visible to doctor as soon as hospital updates; no follow up is required by the hospital which results in less work for hospital administrative staff, Costs very minimal similar to your mobile bill payment, Works using the cloud and Mobile Technology, Consulting Doctors or Paramedics can view the number of appointments at any time live, Works with most of computers / laptops / tablet / Smartphone.</p> <p>https://play.google.com/store/apps/details?id=com.dib_myconsultation</p>	50-100	5	0	Eng
Altas Admin App	Play store	Medical	<p>●All the pending, cancelled, completed, lapsed appointments for various doctors are displayed under one screen with the doctor's name, ●Doctors list of the hospital are found under the Doctors list screen, ●Users of the client application can be viewed in the Patients list screen, ●Admin is able to view the appointment of a specific doctor also, ●Admin has an option of adding new doctor which is displayed in the booking application, ●Admin can remove a doctor and also be able to disable a doctor and enable them.</p> <p>Functionalities: ●The pending, lapsed, completed, cancelled appointments are displayed in the respective tabs with the patient name, doctor name, time and contact number, ●The list of doctor is found under doctor list screen where we can remove doctor and view the appointments booked for the specific doctor. We also have the option of adding new doctor, ●The patient details like name, OP/IP number, contact number, email can be found under patient list.</p> <p>https://play.google.com/store/apps/details?id=com.altas_bfx.admin_dashboard</p>	5-10	/	0	Eng
Doc2Doc	Play store	Productivity	<p>Web interface helps hospital administrator to schedule a call for surgery inviting needed specialty surgeons & doctors and track them for the call only on surgery day & time. It also helps manage operation theatre occupancy as well.</p> <p>Mobile interface helps doctors to manage & view all their visiting appointments in a single app with various advanced features taking care of doctors' privacy as well. It allows doctors to manage their working hours, holidays, non-working days such that they do not get unwanted schedules on their personal time.</p> <p>The App gives a clear visible indication for an emergency request.</p>	10-50	5	0	Eng

			<p>Surgery details can be viewed on a single click. Allows to report "DELAY" in arrival for the scheduled call. https://play.google.com/store/apps/details?id=com.thebeastapps.Doc2Doc</p>				
My Clinic Hospital-Patient Mgt	Play store	Business	<p>Clinic Management System is computer software and mobile application product that coordinate and integrate all the inherent activities involved in the management and running of a healthcare facility. This systems maintain the complete Patient Information coupled with the Electronic Medical Records (EMR), Follow-ups and meeting the stipulated security, technology & functional standards. The primary purpose is to digitize patient records so as to make data retrieval easy and efficient. Being in the digital form, patient data can be conveniently shared and accessed by multiple simultaneous users at different locations, resulting in smoother clinical operations and collaboration among clinicians. It also means that patient data can be easily backed up, and be protected for confidentiality and from tampering through access control. With this application you can Add Patient Record on patient visit, Set Follow-ups for next call revisit the clinic if needed, Get the details of each day records (Statistics), create Users Account (Add Users), Manage their access (Activate/Deactivate), Edit Personal and Edit Clinic Information if the admin/owner has logged in, Save resources. https://play.google.com/store/apps/details?id=com.honey.clinic</p>	100-500	5	0	Eng
Dieto Saifee Hospital	Play store	Health & Fitness	<p>Dieto is an android enterprise application to manage hospital patient record. Following are its features: Multiple Login for dieticians, Custom Diet Maker, Search Patient records, Calorie tracker, Food database, Report Generation, Feedback Module Integration with HMS for patient retrieval Admin Module(web panel): Add/Del/Update Dieticians, Create Feedback Logins, Unlimited Users, Add Customized Diets, Report Generation. https://play.google.com/store/apps/details?id=androapps.dieto</p>	50-100	5	0	Eng

OPCS Procedure Coder	Play store	Medical	<p>The app contains the latest OPCS 4.7 data.</p> <ul style="list-style-type: none"> - Browse by OPCS chapter - Browse by all 3 and 4 character codes - Save your most frequently used codes as favourites - Search all codes regardless of chapter <p>We think this is a great app, but if there are improvements to be made please contact us and tell us. Otherwise if you agree that this is a great app please rate and leave feedback on the Google play store.</p> <p>https://play.google.com/store/apps/details?id=uk.co.clinicalsoftware.solutions.opscoder</p>	50-100	4	0	Eng
---------------------------------	------------	---------	--	--------	---	---	-----

- Health operators and patients' management: 76.6% of apps retrieved (36 of 47 apps) were included in this category, which is widely the most represented amongst the considered apps, both in terms of availability and of total number of downloads. Through the analysis of the descriptions provided by the developer of each app, the researchers were able to highlight the main features of these applications. This category includes all the major issues related to the management of health operators' work and of patients' needs and data.

These apps, such as "*Practice & Hospital Mgmt.*", "*OPD MANAGEMENT*", "*Smart Hospital*", cover all aspects of patients' assistance, such as records of registration, patient history, diagnoses, prescriptions and discharges, lab-test data storage, clinical records storage, etc. Therefore, these apps provide health operators with a prompt and easy-sharing source of most of the essential patients' information. Moreover, in other apps ("*Hospital Bed Inventory Tracker*", "*SoftClinic® Pro*", "*Patient Management*"), we can find different items and functions, mostly focused and developed in order to streamline and organize admissions, bed inventory management, healthcare operators' shifts, discharges and visit dates. These other features, together with the previously described ones, may simplify clinical team collaboration, accelerate response intervals, reduce the time healthcare providers spend after administrative tasks, and improve patients' outcomes and satisfaction towards the received treatments.

- Resources, equipment and meals dispatch: 12.8% (6 of 47 apps) were applications designed for the organization and setting of the hospital resources and services, in order to improve the management of the inventory of instruments and consumables. Furthermore, these apps, such as "*Healthcare Design Magazine*", "*Hospital Inventory Manager*", "*Dinewell Hospital*", help to simplify the management of meal bookings in hospitals, by allowing staff to book meals, as well as record meal delivery and meal consumption. They also enable staff and patients to easily view nutritional and allergen information of each meal. Other apps ("*DonorFind*", "*Find Blood Donors*") in this category focus on blood and bone marrow banks organization by matching donors and patients and providing information on possible blood shortages.

Hospital administrators can use these apps as an important source of insight and information, useful

for the planning and designing of new or renovated facilities inside healthcare structures.

- Quality assessment: 10.6% (5/47 apps) included applications that could help HMU to perform self-evaluations of their structures, processes and outcomes and to assess the quality of service delivery and patients' safety inside their facilities. These apps (such as "*Posey S.A.F.E. Audit*", "*Hospital Quality Manager*", "*Hospital Operations Process Efficiency Visualizer*") produce organizational performance scores that evaluate the quality of hospital management, and, more specifically, strategic planning, clinical governance, risks and patients' safety assessment, personnel and resources management. This category also includes apps ("*Chronorea - Gestionnaire d'interventions*") that allow HMU to evaluate pre-hospital emergency care interventions providing their supervision and timing and to track personnel and patients' injuries, by inspecting falls and fall-related damages.

4. Discussion

Our overview aimed to identify and describe the applications for smartphones and tablets related to hospital management. Although some papers describe the peculiarities of health applications (3) and their use in hospital context (14), to our knowledge, this is the first research describing the features of new e-health tools (such as smartphones and tablets) specifically designed for this topic.

The results of our study showed how, despite the existence of several applications for hospital management purposes, these tools appear to be still poorly widespread (as we can see from the low number of downloads). The majority of the apps has been categorized as "Health operators and patients' management" and, within this category, we can also find the most used application (the only one with more than 100,000 reported downloads). This is in line with other studies, in which the mostly described use and function of health applications is that of patients' management (19,21). The other categories ("Resources, equipment and meals dispatch" and "Quality assessment") are less represented. Probably, this is due to the differences in organization (for example of the service providers) of the various hospitals and the resulting difficulty in creating an application fully serviceable for all hospitals and healthcare structures.

As expected, the majority of retrieved apps were in English language. The limited availability of

languages other than English may partially explain the narrow diffusion of these apps. Another important consideration is that all the applications were free to download, in consonance with the general tendency of the app stores market, where the majority of the applications are free (22). The free use of these applications could represent an advantage when compared to the currently most used hospital management software packages covered by license, since their spread could drastically cut costs. However, the software packages currently used often allow HMU to address modifications according to needs and structure's characteristics, whereas low-cost applications may not provide a similarly prompt service.

Another possible obstacle to the spread of these applications is represented by the complexity of the administration of each structure, which may compromise the full employment of some apps (e.g. structures may differ for kind of healthcare assistance provided and not all applications may include items or features specific for each hospital).

Furthermore, in some cases apps were originally designed following precise indications provided by a single structure's HMU, meaning that some applications freely available on the two considered stores may not be useful for other hospitals.

Given these premises, in our opinion, it would be worth implementing cross-sectoral applications, designed according to standard regulations nationally set, with the contribution of government agencies.

The present work represents the first attempt to provide an overview about this emerging topic. In our opinion, there is a strong need to assess furtherly the quality of these applications and their efficacy in the improvement of hospital management, in order to eventually guide hospital administrations to a good use of these instruments.

4.1 Limitations of the study

The researchers chose not to consider other application stores (for instance, BlackBerry and Windows Mobile). It has been acknowledged that, even if the spread of these two digital stores' is nowadays consistently reduced, further investigations in this sense may lead to alternative conclusions. Moreover, researchers did not screen for applications' developer. In fact, some apps may have been

projected and designed by coders who are not practical with topics of hospitals, patients and healthcare operators' management, thus resulting in the creation of software packages not tailored on the needs of the Hospital Management Unit.

4.2 Conclusions

In recent years, the spread of new possibilities given by the use of mobile devices by healthcare professionals has transformed many aspects of clinical practice (23,24). In addition, their utility is not restricted to healthcare providers, but is extended to patients and associated businesses (25). In literature, there are several examples of applications which are widely used and recognized as useful for different facets of health operators' work (6,7,11–13,18,19), nevertheless distribution is scarce, therefore, reduced use of applications serviceable to specific HMU's tasks and topics. Possibly, widespread use of other kinds of informative systems and software packages, specifically designed for hospitals management and administration, is eventually slowing down the diffusion of such applications. In our opinion, it may be worth to continue monitoring this field, in order to be able to notice and analyze eventual progresses in the development and diffusion of hospital management applications.

Summary Table	
What was already known on the topic	What this study added to our knowledge
Mobile health is becoming a relevant topic within e-Health.	Most of the applications were designed for health operators and patients' management.
Smartphone HMUs apps may allow a faster and more practical structure's features administration by health operators.	Some apps were originally designed following precise indications provided by a single structure's HMU.
There are no studies about applications used for hospital management and administration.	Despite the existence of several applications, there still is a scarce distribution and reduced use of these apps.

Statement on conflicts of interest

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- [1] Mastrilli F. Il governo tecnico dell'ospedale : manuale di sopravvivenza per la direzione ospedaliera [Internet]. Panorama della sanità; 2010 [cited 2018 Jan 25]. Available from: <https://www.libreriauniversitaria.it/governo-tecnico-ospedale-manuale-sopravvivenza/libro/9788896844076>
- [2] Burdette SD, Herchline TE, Oehler R. Surfing The Web: Practicing Medicine in a Technological Age: Using Smartphones in Clinical Practice. Clin Infect Dis [Internet]. 2008 Jul 1 [cited 2018 Jan 16];47(1):117–22. Available from: <https://academic.oup.com/cid/article-lookup/doi/10.1086/588788>
- [3] Ventola CL. Mobile devices and apps for health care professionals: uses and benefits. P T [Internet]. 2014 May [cited 2018 Jan 16];39(5):356–64. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24883008>
- [4] World Health Organization. Based on the findings of the second global survey on eHealth. Glob Obs eHealth Ser [Internet]. 2011;3. Available from: <http://www.who.int/about/>
- [5] Kailas A, Chong CC, Watanabe F. From mobile phones to personal wellness dashboards. IEEE Pulse. 2010;
- [6] Bert F, Giacometti M, Gualano MR, Siliquini R. Smartphones and Health Promotion: A Review of the Evidence. J Med Syst [Internet]. 2014;38(1):9995. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24346929>
- [7] Haskins BL, Lesperance D, Gibbons P, Boudreaux ED. A systematic review of smartphone applications for smoking cessation. Vol. 7, Translational Behavioral Medicine. 2017. p. 292–9.
- [8] Schoeppe S, Alley S, Lippevelde W Van, Bray NA, Williams SL, Duncan MJ, et al. Efficacy of interventions that use apps to improve diet, physical activity and sedentary behaviour: a systematic review. Int J Behav Nutr Phys Act [Internet]. 2016;13. Available from:

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5142356/pdf/12966%7B_%7D2016%7B_%7DArticle%7B_%7D454.pdf

- [9] Keoleian V, Polcin D, Galloway GP. Text Messaging for Addiction: A Review [Internet]. Vol. 47, *Journal of Psychoactive Drugs*. 2015. p. 158–76. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4537651/pdf/nihms657445.pdf>
- [10] Muessig KE, Nekkanti M, Bauermeister J, Bull S, Hightow-Weidman LB. A Systematic Review of Recent Smartphone, Internet and Web 2.0 Interventions to Address the HIV Continuum of Care [Internet]. Vol. 12, *Current HIV/AIDS Reports*. 2015. p. 173–90. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4370788/pdf/nihms662737.pdf>
- [11] Cui M, Wu X, Mao J, Wang X, Nie M. T2DM self-management via smartphone applications: A systematic review and meta-analysis. *PLoS One* [Internet]. 2016;11(11). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5115794/pdf/pone.0166718.pdf>
- [12] Van Ameringen M, Turna J, Khalesi Z, Pullia K, Patterson B. There is an app for that! The current state of mobile applications (apps) for DSM-5 obsessive-compulsive disorder, posttraumatic stress disorder, anxiety and mood disorders. *Depress Anxiety*. 2017;34(6):526–39.
- [13] Bright T, Pallawela D. Validated Smartphone-Based Apps for Ear and Hearing Assessments: A Review. *JMIR Rehabil Assist Technol* [Internet]. 2016;3(2). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5454564/pdf/rehab%7B_%7Dv3i2e13.pdf
- [14] Mosadeghi-Nik M, Askari MS, Fatehi F. Mobile health (mHealth) for headache disorders: A review of the evidence base. *J Telemed Telecare* [Internet]. 2016;22(8):472–7. Available from: <http://journals.sagepub.com/doi/10.1177/1357633X16673275>
- [15] Bert F, Passi S, Scaioli G, Gualano MR, Siliquini R. There comes a baby! What should I do? Smartphones' pregnancy-related applications: A web-based overview. *Health Informatics J* [Internet]. 2016 Sep [cited 2018 Jan 25];22(3):608–17. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25900813>

- [16] Bert F, Gualano MR, Clemente S, Villa G, Siliquini R. Technology and prevention in the era of mobile health: applications for cancer screening programs. *Ig Sanita Pubbl* [Internet]. [cited 2018 Jan 25];73(1):13–27. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/28428642>
- [17] Walsh K. Mobile Learning in Medical Education: Review. *Ethiop J Health Sci* [Internet]. 2015;25(4):363–6. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4762975/pdf/EJHS2504-0363.pdf>
- [18] Ozdalga E, Ozdalga A, Ahuja N. The smartphone in medicine: a review of current and potential use among physicians and students. *J Med Internet Res* [Internet]. 2012 Sep 27 [cited 2017 Aug 3];14(5):e128. Available from: <http://www.jmir.org/2012/5/e128/>
- [19] Thomairy N Al, Mummaneni M, Alsalamah S, Moussa N, Coustasse A. Use of Smartphones in Hospitals. *Health Care Manag (Frederick)* [Internet]. 2015;34(4):297–307. Available from: <https://insights.ovid.com/pubmed?pmid=26506291>
- [20] Statista. App stores: number of apps in leading app stores 2017 | Statista [Internet]. [cited 2017 Dec 6]. Available from: <https://www.statista.com/statistics/276623/number-of-apps-available-in-leading-app-stores/>
- [21] Free C, Phillips G, Watson L, Galli L, Felix L, Edwards P, et al. The Effectiveness of Mobile-Health Technologies to Improve Health Care Service Delivery Processes: A Systematic Review and Meta-Analysis. *PLoS Med* [Internet]. 2013 [cited 2017 Dec 21];10(1). Available from: <http://journals.plos.org/plosmedicine/article/file?id=10.1371/journal.pmed.1001363&type=printable>
- [22] Statista. Android & iOS free and paid apps share 2017 | Statistic [Internet]. [cited 2017 Dec 27]. Available from: <https://www.statista.com/statistics/263797/number-of-applications-for-mobile-phones/>
- [23] Wallace S, Clark M, White J. “It’s on my iPhone’: attitudes to the use of mobile computing devices in medical education, a mixed-methods study. *BMJ Open* [Internet]. 2012 [cited 2018

Jan 25];2(4). Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22923627>

[24] Aungst TD. Medical Applications for Pharmacists Using Mobile Devices. *Ann Pharmacother* [Internet]. 2013 Jul 2 [cited 2018 Jan 25];47(7–8):1088–95. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/23821609>

[25] Bajwa M. Emerging 21(st) Century Medical Technologies. *Pakistan J Med Sci* [Internet]. 2014 May [cited 2018 Jan 25];30(3):649–55. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/24948997>

Table S.1 List of information about included applications' features

APP name	Store	APP store Category	Description and link	Downloads	Rates	Category	Language
Hospital Inventory Manager	Play store	Medical	Hospital Inventory Manager (HIM) helps you easily manage your hospital or clinic's inventory of instruments and consumables. https://play.google.com/store/apps/details?id=com.navare.prashant.hospitalinventory	100-500	/	1	Eng
OPD MANAGEMENT	Play store	Medical	This project is mainly targeted for the doctors. This is a perfect application for hospital OPD. It stores information regarding complete cycle from Registration, Patient History, Patient Diagnosis, and Prescription etc. https://play.google.com/store/apps/details?id=com.opd_management_system	1.000-5.000	3.6	0	Eng
Practice & Hospital Mgmt.	Play store	Medical	Doctors Aid is OPD management tool for Doctors as well as small size hospitals having OPD. https://play.google.com/store/apps/details?id=com.VidyabhiSol.docaid	500-1.000	4.3	0	Eng
MocDoc HMS	Play store	Health & Fitness	MocDoc is an easy to use complete Digital Clinic and Hospital Management Solution with access to main features through Smart Phone App. It provides Patient Visit Record, Prescription, Billing, SMS Reminders, Service Provider, Accounts & Balancesheet, Reports, Task Management and more. https://play.google.com/store/apps/details?id=com.mocdocdrapps	1.000-5.000	4.4	0	Eng
Hospital Quality Manager	Play store	Health & Fitness	Hospital Quality Manager (HQM) was developed by BestRatedHospitals. HQM help Hospitals perform Self-Evaluation of their Structure, Processes and Outcomes and assess Quality Service Delivery and Patients Safety in Hospitals. https://play.google.com/store/apps/details?id=org.bestratedhospitals.hqm	10-50	/	2	Eng
Hospital Appointment Creator	Play store	Medical	HAC creates and manages Appointments for Clinics and Hospitals. HAC aim to improve Satisfaction for Patients and other Hospital Users. HAC also helps manage critical resources like Time, Healthcare Professionals and operational Processes in Hospitals. https://play.google.com/store/apps/details?id=com.phillipjoneoutlookcom.hhac	100-500	4.8	0	Eng
Hospital Bed Inventory Tracker	Play store	Productivity	This app enables optimal hospital bed inventory management for every hospital and clinic. https://play.google.com/store/apps/details?id=com.ginstr.hospitalBedsInventoryTracker	100-500	4	0	Eng

Dinewell Hospital	Play store	Business	This app manages meal bookings in hospitals as part of the Dinewell Hospital service. It allows staff to book meals as well as record meal delivery and meal consumption. The app also allows staff and patients to easily view nutritional and allergen information of each meal. https://play.google.com/store/apps/details?id=biz.dinewell.dinewellHospital	1-5	5	1	Eng
Vcare Hospital	Play store	Health & Fitness	app for hospitals, which can be used by all the departments to managing the information about the patients. this app mainly to view the daily reports. https://play.google.com/store/apps/details?id=rushdainfotech.in.vcarehospital	100-500	2.3	0	Eng
eMediCenter CMS - Demo	Play store	Medical	eMediCenter is an advanced health care information management system offering from Embien. Designed especially to meet the stringent security requirements for health care scenario, with aid of experts in various fields of medicine, it brings latest technology to the hands of the doctors. https://play.google.com/store/apps/details?id=com.embien.emedicenter	100-500	3.7	0	Eng
NalamRx	Play store	Medical	software for hospitals made hundreds of Doctors from 'Hand written' prescriptions to 'Just click' prescriptions. https://play.google.com/store/apps/details?id=com.technobess.nalamrx	50-100	4.9	0	Eng
RistoHospital	Play store	Productivity	Mediante l'utilizzo di questa app collegata alla piattaforma RistoCLOUD è possibile gestire in maniera integrata una serie di servizi al paziente nelle strutture Sanitarie e Socio Assistenziali. https://play.google.com/store/apps/details?id=com.RistoHospital	10-50	5	1	Ita
Hospital rounds management	Itunes	Medical	A productive tool to track hospital rounds of Physicians. Physicians can enter patient details, diagnosis and billing codes. Update codes per visit and submit for billing via sending email or interfacing with Ambulatory EHR applications. Manage Physicians, Referring Physicians, Hospitals. https://itunes.apple.com/it/app/hospital-rounds-management/id932413385?mt=8	/	/	0	Eng
Smart Hospital	Itunes	Utilities	This smart Clinic and Hospital outpatient management app is made by smart-Group to help organize patient Time, Pre-lab test Info., Medicine dosage, treatment Dietary, share Medical records of patient, estimate waiting time, Dr. information and contacts, as well as full guide inside hospital to next step in the process, floor plan guide and many more.	/	/	0	Eng

			https://itunes.apple.com/it/app/smart-hospital/id883091288?mt=8				
Nervecentre	Itunes	Medical	Nervecentre's iPhone app works with the Nervecentre server to provide electronic decision support for the capture of vital signs, plus full cascading escalation to doctors using Nervecentre's unique task management capability, and electronic handover support for clinical teams working in acute hospitals. https://itunes.apple.com/it/app/nervecentre/id580327847?mt=8	/	/	0	Ita, Fra, Eng
Hospital Quality Manager	Itunes	Medical	HQM is benchmarked against the International Society for Quality in Healthcare (ISQUA) ALPHA Standards. HQM produces Organizational Performance Scores evaluating Hospital Leadership Management, Strategic Planning Management, Care Process Management, Quality Management, Risk & Patient Safety Management, Human Resource Management and Resource Management. https://itunes.apple.com/it/app/hospital-quality-manager/id1128151746?mt=8	/	/	2	Eng
Smart Consultant	Itunes	Productivity	Smart Consultant is an app designed for doctors to maintain patient wise & hospital wise records of his Surgeries so that they can better track and reconcile the payments at the end of month. https://itunes.apple.com/it/app/smart-consultant/id737765036?mt=8	/	/	0	Ita, Eng
Connexall	Itunes	Medical	In healthcare environments where disparate silos are the norm, Connexall is the only hospital-wide software application that integrates any tasks, people, departments and systems. Connexall's vendor-neutral solutions reduce the cost of care by leveraging current technology infrastructure and resources while creating more efficient workflow and better patient outcomes. https://itunes.apple.com/it/app/connexall/id441829738?mt=8	/	/	0	Eng
SoftClinic® Pro	Itunes	Medical	SoftClinic Pro App is developed for the active users of SoftClinic Software. This app connects with SoftClinic Software's installed into your hospital/clinic and allows you to access your patient data anywhere – anytime through Internet. With SoftClinic Pro app user can easily manage appointments, patient records, patient visit notes, admission notes, round notes details, and discharge notes details. This app is useful for all physicians & healthcare professionals to help them manage patient records on a go. https://itunes.apple.com/it/app/softclinic-pro/id909882496?mt=8	/	/	0	Eng
StafficiencyApp	Itunes	Medical	Stafficiency™ is an iOS app for iPad and iPhone that provides an efficient and cost-effective way for hospitals to monitor and manage patient care unit staffing.	/	/	0	Eng

			https://itunes.apple.com/it/app/stafficiencyapp/id1200660721?mt=8				
HybridChart	Itunes	Medical	HybridChart is a comprehensive Hospital Rounding and Charge Capture Solution designed for medical practices of any specialty and any size. Manage your cloud-based census, assign diagnoses and submit charges directly to your practice management system. Includes Secure Messaging, Discharge Management and robust Data Collection. https://itunes.apple.com/it/app/hybridchart/id1170768559?mt=8	/	/	0	Eng
Embrace Health	Itunes	Medical	Embrace is a decision-support iOS app for case managers that delivers up-to-date, comprehensive community resource information to streamline hospital discharge processes and ultimately reduce readmissions. https://itunes.apple.com/it/app/embrace-health/id1114674276?mt=8	/	/	0	Eng
MocDoc HMS	Itunes	Health & Fitness	MocDoc is an easy to use complete Digital Clinic and Hospital Management Solution with access to main features through Smart Phone App. It provides Patient Visit Record Prescription Billing SMS Reminders Service Provider Accounts & Balancesheet Reports Task Management and more. And provides customization specific to Specialties like General Practice, Pediatrics, Ophthal (Eye), Dental, Homeo, Pet etc. https://itunes.apple.com/it/app/mocdoc-hms/id1071228117?mt=8	/	/	0	Eng
Chronorea - Gestionnaire d'interventions	Itunes	Medical	Chronorea permet aux ambulanciers, personnel des urgences (infirmiers anesthésistes, SMUR, SAMU, ASSU) et aux sapeurs-pompiers de gérer facilement leurs interventions. https://itunes.apple.com/it/app/chronorea-gestionnaire-dinterventions/id813086719?mt=8	/	/	2	Eng, Fra
Posey S.A.F.E. Audit	Itunes	Medical	The innovative app gives busy health-care personnel the ability to quickly and easily track compliance progress related to their falls prevention criteria – based on the facility’s S.A.F.E. Approach implemented protocols – to help optimize patients’ safety by reducing the risk of in-patient falls and fall-related injuries. https://itunes.apple.com/it/app/posey-s-a-f-e-audit/id1129410683?mt=8	/	/	2	Eng

ACES Medical	Itunes	Health & Fitness	<p>This product is designed for medical practices of any specialty or size. Manage your cloud-based census, assign diagnoses and submit charges directly to your practice management system. Includes Secure Messaging, Discharge Management and robust Data Collection.</p> <p>https://itunes.apple.com/it/app/aces-medical/id1226277008?mt=8</p>	/	/	0	Eng
MyDuty - Nurse Calendar	Play store	Lifestyle	<p>9. Puoi gestire il tuo calendario MyDuty</p> <p>10. Condividi in maniera facile il tuo calendario MyDuty con Facebook, Twitter, internet etc.</p> <p>11. Controlla facilmente i tuoi turni con l'esclusivo widget.</p> <p>12. Gestisci le tue ferie</p> <p>13. Crea un gruppo e invita amici colleghi. Puoi controllare i turni dei componenti del gruppo quando sei in Landscape mode</p> <p>14. é offerto un esclusivo servizio di messaggistica di gruppo</p> <p>15. Puoi accedere a "MyDuty" tramite email o facebook</p> <p>16. Puoi gestire il tuo calendario tramite MyDuty.</p> <p>https://play.google.com/store/apps/details?id=kr.fourwheels.myduty</p>	100,000-500,000	4.6	0	Ita
Acutecrew	Play store	Medical	<p>Connects Doctors & Nurses with Hospitals & Medical Centres on a daily basis. Use in emergencies to rapidly find and communicate with available staff.</p> <p>Medical organizations looking for staff describe who they need, and the best matching staff are notified. Available staff can indicate their interest with a single click. Organizations can review the interest to quickly make informed staffing decisions.</p> <p>Its the most effective way to find new staff, and for staff to find work, but it's also an efficient way to connect with existing staff for last minute work. Organisations can prioritise notifications which go out to your preferred staff first.</p> <p>https://play.google.com/store/apps/details?id=com.acutecrew.acutecrew</p>	50-100	4	0	Eng
DonorFind	Play store	Medical	<p>DonorFind by Morph.org is an opt-in, location-aware app that revolutionizes the way hospitals, blood banks and patients efficiently find nearby blood, bone marrow, platelet & plasma matching donors. The "Uber" for blood and bone marrow donation is here!</p> <p>COUNTRY COVERAGE: App can be used globally to sign up as a donor and find a local match. Finding nearby collection hospitals and blood banks are just available for US & India currently.</p>	100 - 500	5	1	Eng

			https://play.google.com/store/apps/details?id=org.morph.donorfind				
Find Blood Donors	Play store	Health & Fitness	<p>The Socialblood Local Blood Donors App puts the power to save lives in the palm of your hand. Donating blood and platelets is easier than ever. Find nearby blood banks, create a blood request, find emergency blood donors around you.</p> <ul style="list-style-type: none"> • Convenient, easy blood donors search. • Receive blood requests from your neighborhood • View nearby blood banks to fix blood donation appointments. • Get geo-targeted blood shortage alerts let you know if your blood type is needed in your area. <p>https://play.google.com/store/apps/details?id=org.socialblood.app</p>	500-1000	4.6	1	Eng
Practice Unite ®	Play store	Medical	<p>Features:</p> <ul style="list-style-type: none"> •Reduce clinical communications delays •Send PHI securely to colleagues •Collaborate with care team members more easily •Find and communicate with colleagues by secure text or by phone •Receive clinical data where and when you need <p>Voice Calling: Call your colleagues directly through Practice Unite by cell, office number or VOIP if provided by your organization</p> <p>Consults: Deliver consults directly from the patient's EHR to physicians' mobile devices</p> <p>Clinical Alerts: Receive critical/abnormal lab results and other important clinical information directly from your EMR or other clinical systems</p> <p>Patient List: Securely create and share patient notes among physicians, nurses and other clinicians</p> <p>On-Call List: Identify and communicate with the "On-Call" physician, or team, quickly from any mobile device</p> <p>Procedures: Schedule procedures and have results delivered to ordering physician's mobile device</p> <p>Hospital System Directory: Access an up-to-date system-wide directory of phone numbers searchable by employee name or phone location.</p> <p>https://play.google.com/store/apps/details?id=com.bkl.practiceunit</p>	1000-5000	4.2	0	Eng
Patient Management	Play store	Medical	<p>Easy storage, Retrieval, edit, updation , E- Prescription , SMS Reminder, Print, View Appointments, Whatsapp Reminder, Photo Storage, Appointment of a particular Date, month ,year Viewing , You can view the next Appointment Date , amount given ,patient</p>	1000-5000	4.2	0	Eng

			<p>name ,problems can call him/her in one click with this Patient Doctor Records or Patient Management .</p> <p>Data can be exported to PC and viewed with different softwares.</p> <p>https://play.google.com/store/apps/details?id=com.medical.free</p>				
MedicalTimeStudy	Itunes	Productivity	<p>Doctors and hospital administration need to record the time they have spent pre and post transplant on tasks like patient counselling, donor visits, nutrition counselling, data collection, social work, etc. The app provides list of various administrative tasks from which user can select the task and then record the time and day when the task was performed. It also provides a way to send the recorded time studies to an e-mail address specified provided by the user. Through this app a hospital can track the hours spent by the staff on administrative tasks.</p> <p>https://itunes.apple.com/th/app/medicaltimestudy/id1257511139?mt=8</p>	/	/	0	Eng
Hospital Operations Process Efficiency Visualizer	Itunes	Medical	<p>HospOp is an iPad application providing hospitals and healthcare organizations in Kerala (India) with effective access to their data and greater insight into their health service performance. The application currently provides process efficiency visualizations for Accident, Cancer and Treatment processes, based on the data received from the Health Department.</p> <p>https://itunes.apple.com/us/app/hospital-operations-process-efficiency-visualizer/id919152024?mt=8</p>	/	/	2	Eng
Referral-H	Play store	Medical	<p>Referralio-H, is a mobile application that is meant to enable the hospital administration and marketing team to respond to the referrals instantly. 1. Allows mapping of hospital users to partners. 2. Instantly informs hospital users on any new referrals as well as any messages on progress of a patient. 3. Allows hospital user to respond to the referring partner about patient progress, instantly. 4. Allows hospital user to liaise with the hospital doctors and specialists as well.</p> <p>https://play.google.com/store/apps/details?id=com.hospitalcheck.referralh</p>	100-500	5	0	Eng

Avizia OnePass	Play store	Medical	<p>Simplify clinical team collaboration, accelerate response times, and improve patient outcomes with Avizia OnePass. Instantly access your care team directory across all systems so you can send secure messages, images, and recorded video to a recipient or a group of recipients. The app includes medical-grade security features that meet HIPAA and HITECH compliance requirements, such as message expiration and remote wipe, 256-bit encryption, and a secure pin to protect against lost devices. - Send messages via SMS, page or email if the recipient is not currently able to receive secure messages. - Create and send secure message to a group of recipients. - Start a phone call without needing to know the recipient's phone number. - Manage your contact preferences to route phone calls and messages to different devices.</p> <p>https://play.google.com/store/apps/details?id=com.emergemd.onepass</p>	1000-5000	4.2	0	Eng
healthCare pro	Play store	Health & Fitness	<p>HealthCare is a software for agency administrator to manage personal user. It can check the real-time behavior of all the residents within the jurisdiction. It also can receive the warning information, the alarm information and emergency alarm of all the residents. function: view and screening of personal user in the region view the real-time events and historical events.</p> <p>https://play.google.com/store/apps/details?id=com.icwhich.healthCare</p>	1-5	/	0	Eng
Healthcare Design Magazine	Play store	Health & Fitness	<p>Healthcare Design serves an audience of architects, interior designers, hospital administrators, facility managers, engineers, and key members of the construction community as the premier source of insight, information, and inspiration for planning, designing, and constructing new or renovated healthcare facilities. Our goal is to help our audience navigate the current healthcare landscape and manage the evolving expectations surrounding design/architecture/construction in order to build environments that improve patient outcomes and satisfaction while also embodying high design standards.</p> <p>https://play.google.com/store/apps/details?id=com.branded.healthcare</p>	100-500	5	1	eng

HMS365Cloud	Play store	Health & Fitness	<p>HMS365cloud is designed for small and mid-size hospitals and clinics, individual doctors, physicians as well as Multi-Specialty Hospitals, to cover a wide range of hospital administration and management processes. It is an integrated end-to-end Hospital Management System that provides relevant information across the hospital to support effective decision making for patient care, hospital administration and critical financial accounting, in a seamless flow, in the areas of clinical process analysis and activity-based costing. System provides the benefits of streamlined operations, enhanced administration and control, improved response to patient care, cost control, and improved profitability.</p> <p>https://play.google.com/store/apps/details?id=citta.app.ws7.hms365</p>	5-10	/	?	Eng
MediVoice	Play store	Medical	<p>MediVoice is your personal healthcare record all stored in a convenient portable place. It provides information for Doctors, Consultants, Nurses and any Healthcare Administrative team in an easy to read form. The passport is especially important for those who suffer from Allergies and long term illness e.g Motor Neurone Disease, ALS, Lou Gehrig's Disease, Parkinson's, MS, Strokes, Heart Disease, Dementia, Cancer and Speech difficulties.</p> <p>The Healthcare Passport stores measurements of vital signs and should be taken when the patient is:</p> <ul style="list-style-type: none"> • Admitted to hospital for any planned or unplanned assessment and treatment, • Attending out-patients appointments, • Visiting GP, • Travelling <p>Features:</p> <ul style="list-style-type: none"> • Communication tool using predictive text (basic user guide below), • Personal Details, • G.P/Medical Team Information, • Medical Diagnosis, • Vitals Information, • Allergies Information, • Medication Information, • About Me, • Personal Care/Support. <p>https://play.google.com/store/apps/details?id=uk.co.medivoice.jv</p>	10-50	5	0	Eng
MyPatient+	Play store	Medical	<p>MyPatient+ is an app that provides important, doctor-centric, real-time patient information to clinicians via mobile devices, anywhere, anytime. By linking to individual hospital's Patient Administration System, it allows the clinicians to obtain information such as patient location, patient data, and operating theatre schedules on their mobile devices while on the move. This reduces the time wasted by clinicians on hospital administrative tasks, and helps them focus their effort on patient care.</p> <p>MyPatient+ is designed and created for doctors working in Australian hospitals with the Patient Administration System.</p>	100-500	/	0	Eng

			https://play.google.com/store/apps/details?id=au.com.ramsayhealth.mypatientplus				
MyConsultation	Play store	Medical	<p>Doctors can add slots at any time and same will be reflected in the HIMS immediately, Payment details are visible to doctor as soon as hospital updates; no follow up is required by the hospital which results in less work for hospital administrative staff, Costs very minimal similar to your mobile bill payment, Works using the cloud and Mobile Technology, Consulting Doctors or Paramedics can view the number of appointments at any time live, Works with most of computers / laptops / tablet / Smartphone.</p> <p>https://play.google.com/store/apps/details?id=com.dib_myconsultation</p>	50-100	5	0	Eng
Altas Admin App	Play store	Medical	<ul style="list-style-type: none"> ●All the pending, cancelled, completed, lapsed appointments for various doctors are displayed under one screen with the doctor's name, ●Doctors list of the hospital are found under the Doctors list screen, ●Users of the client application can be viewed in the Patients list screen, ●Admin is able to view the appointment of a specific doctor also, ●Admin has an option of adding new doctor which is displayed in the booking application, ●Admin can remove a doctor and also be able to disable a doctor and enable them. <p>Functionalities: ●The pending, lapsed, completed, cancelled appointments are displayed in the respective tabs with the patient name, doctor name, time and contact number, ●The list of doctor is found under doctor list screen where we can remove doctor and view the appointments booked for the specific doctor. We also have the option of adding new doctor, ●The patient details like name, OP/IP number, contact number, email can be found under patient list.</p> <p>https://play.google.com/store/apps/details?id=com.altas_bfx.admin_dashboard</p>	5-10	/	0	Eng
Doc2Doc	Play store	Productivity	<p>Web interface helps hospital administrator to schedule a call for surgery inviting needed specialty surgeons & doctors and track them for the call only on surgery day & time. It also helps manage operation theatre occupancy as well.</p> <p>Mobile interface helps doctors to manage & view all their visiting appointments in a single app with various advanced features taking care of doctors' privacy as well. It allows doctors to manage their working hours, holidays, non-working days such that they do not get unwanted schedules on their personal time.</p> <p>The App gives a clear visible indication for an emergency request.</p>	10-50	5	0	Eng

			<p>Surgery details can be viewed on a single click. Allows to report "DELAY" in arrival for the scheduled call. https://play.google.com/store/apps/details?id=com.thebeastapps.Doc2Doc</p>				
My Clinic Hospital-Patient Mgt	Play store	Business	<p>Clinic Management System is computer software and mobile application product that coordinate and integrate all the inherent activities involved in the management and running of a healthcare facility.</p> <p>This systems maintain the complete Patient Information coupled with the Electronic Medical Records (EMR), Follow-ups and meeting the stipulated security, technology & functional standards.</p> <p>The primary purpose is to digitize patient records so as to make data retrieval easy and efficient. Being in the digital form, patient data can be conveniently shared and accessed by multiple simultaneous users at different locations, resulting in smoother clinical operations and collaboration among clinicians. It also means that patient data can be easily backed up, and be protected for confidentiality and from tampering through access control.</p> <p>With this application you can Add Patient Record on patient visit, Set Follow-ups for next call revisit the clinic if needed, Get the details of each day records (Statistics), create Users Account (Add Users), Manage their access (Activate/Deactivate), Edit Personal and Edit Clinic Information if the admin/owner has logged in, Save resources. https://play.google.com/store/apps/details?id=com.honey.clinic</p>	100-500	5	0	Eng
Dieto Saifee Hospital	Play store	Health & Fitness	<p>Dieto is an android enterprise application to manage hospital patient record.</p> <p>Following are its features: Multiple Login for dieticians, Custom Diet Maker, Search Patient records, Calorie tracker, Food database, Report Generation, Feedback Module</p> <p>Integration with HMS for patient retrieval</p> <p>Admin Module(web panel): Add/Del/Update Dieticians, Create Feedback Logins, Unlimited Users, Add Customized Diets, Report Generation. https://play.google.com/store/apps/details?id=androapps.dieto</p>	50-100	5	0	Eng

<p>OPCS Procedure Coder</p>	<p>Play store</p>	<p>Medical</p>	<p>The app contains the latest OPCS 4.7 data.</p> <ul style="list-style-type: none"> - Browse by OPCS chapter - Browse by all 3 and 4 character codes - Save your most frequently used codes as favourites - Search all codes regardless of chapter <p>We think this is a great app, but if there are improvements to be made please contact us and tell us. Otherwise if you agree that this is a great app please rate and leave feedback on the Google play store.</p> <p>https://play.google.com/store/apps/details?id=uk.co.clinicalsoftware.solutions.opccoder</p>	<p>50-100</p>	<p>4</p>	<p>0</p>	<p>Eng</p>
--	-------------------	----------------	--	---------------	----------	----------	------------

Conflict of interest

All the Authors have seen and approved the submitted manuscript and no conflicts of interest are declared.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.