

AUSTRALIA

Patents Act 1990

COMPLETE SPECIFICATION

INNOVATION PATENT

PATIENT.LINK SYSTEM

Patient.Link – an app-based, cloud-driven, integrated healthcare facility communication and floor management system

Applicant: **Australian Medical Doctor Pty Ltd, Australia**

Inventor: **Dr. Yu-sheng (Tom) Huang, Brisbane, Australia**

Appl. No. : **Pending**

Filed: **September. 09 2019**

Background

[0001] Most health care facilities have a floor management system, a patient nurse-call system, and a nurse-to-nurse communication system that are independent and separate in operation. The floor management system consists of desktop computers -

situated at work areas - accessing patient details stored on an on-site server and database. Often this information is then printed and distributed for the purpose of clinical care. The patient information such as clinical status, risk factors, diet / fluid restrictions etc are only infrequently updated at the end of each shift on the computer.

[0002] The nurse-call system, on the hand, normally involves the patient placing caregiver calls by means of pressing a physical button or actuating a physical switch located in the patient's vicinity. After the call is placed, the nurses are notified by either a simple auditory alert system or two-way voice communication system. Both of these systems are normally situated at the nurse station or integrated with its in-facility phone system that enables certain degree of mobility. The entire system requires physical connections (ethernet cables) between devices and switches (PoE). Some facilities have a graphical display system to output simple patient's details (for example the patient's location) when a nurse call is placed. US Pat. No. 15/939,762 to Hill-Rom Services, Inc discloses a graphical audio station of a wired nurse call system that permits voice and textual communication.

[0003] The most common type of nurse-to-nurse communication system is of "Digital Enhanced Cordless Technology" (DECT) type. Only voice and simple text communication is possible with this system. Furthermore, the cordless devices communicate with base devices that requires physical telephone circuit wiring, power modules, interface module, and servers. US Pat. No. 2011/0103354A1 to Huawei Device Shenzhen Co Ltd discloses an example of DECT phone system that permits voice and textual communication.

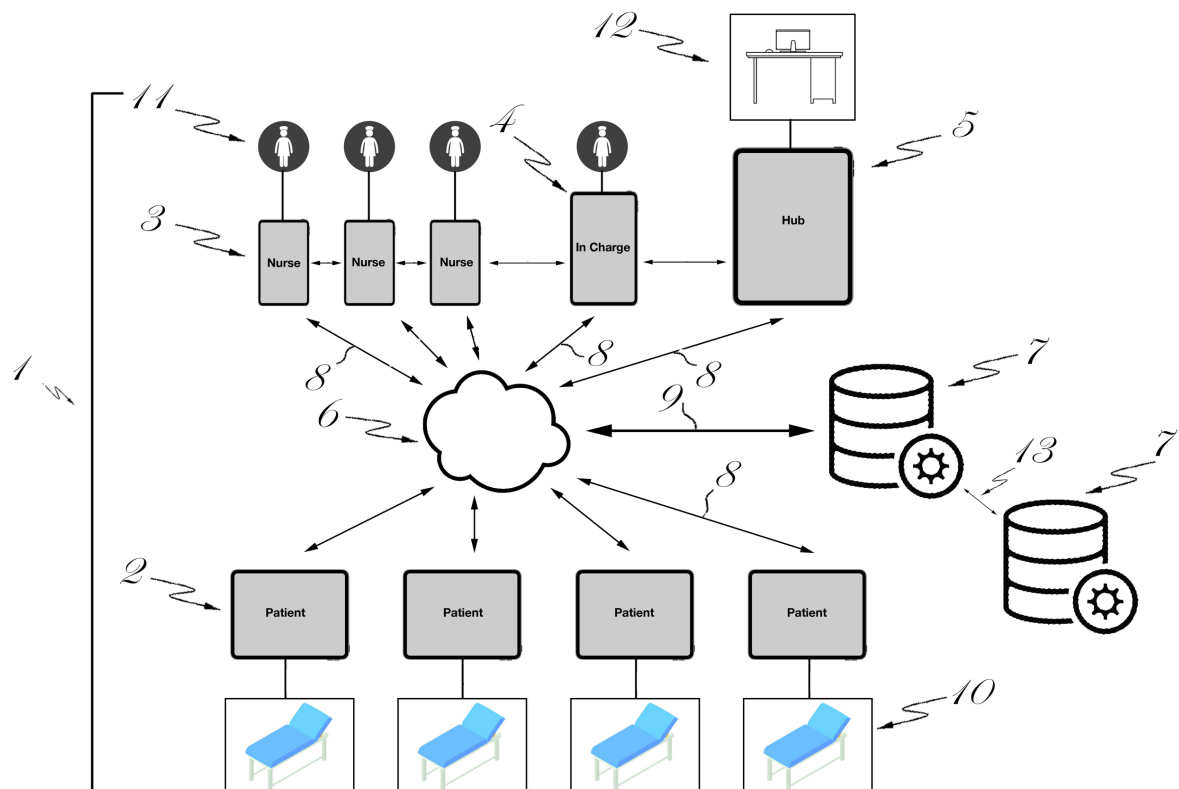


FIG. 1

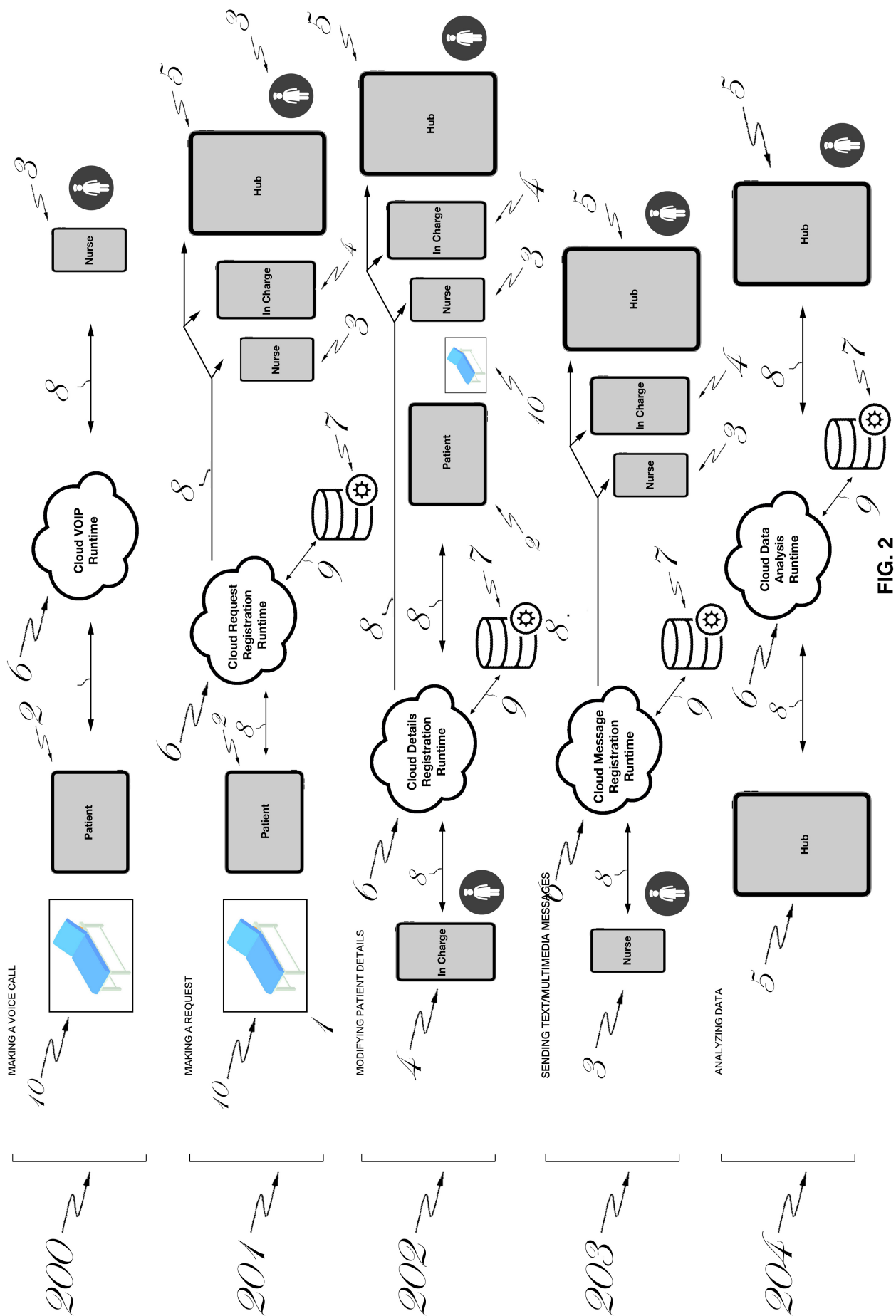


FIG. 2

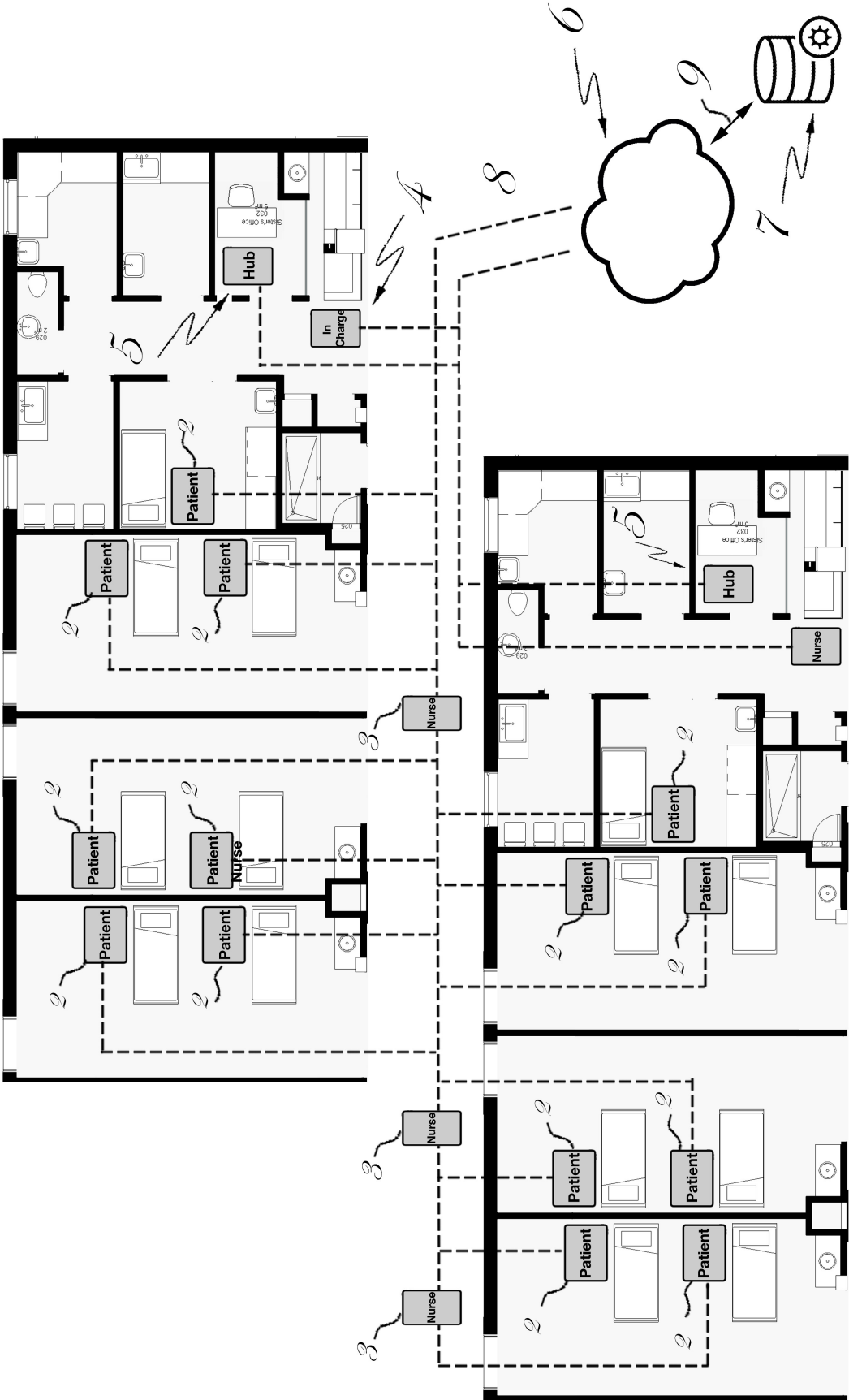


FIG. 3

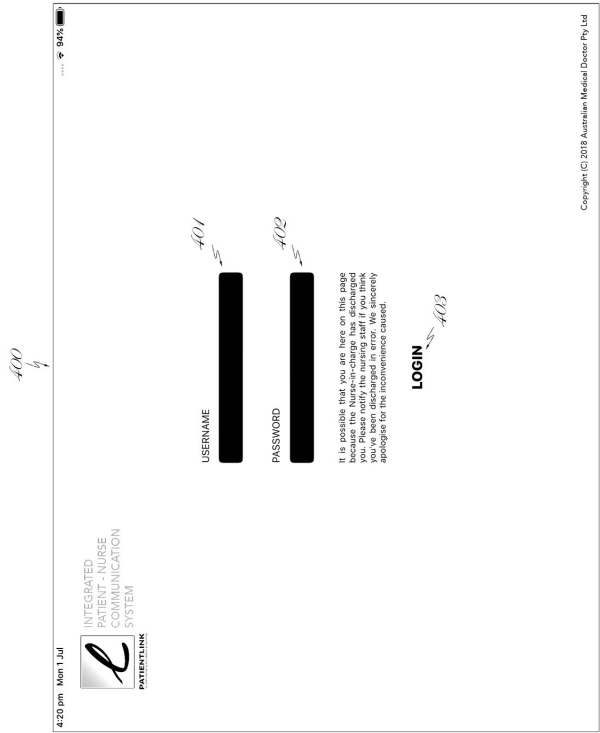


FIG. 4

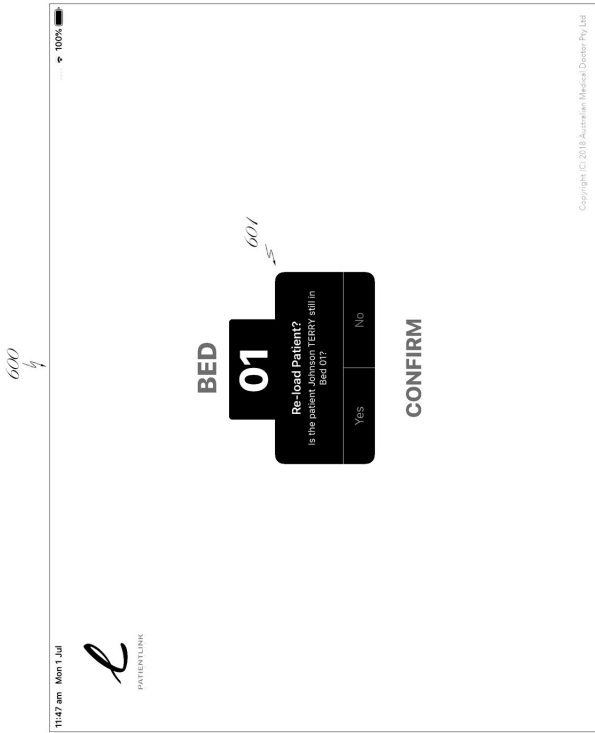


FIG. 06

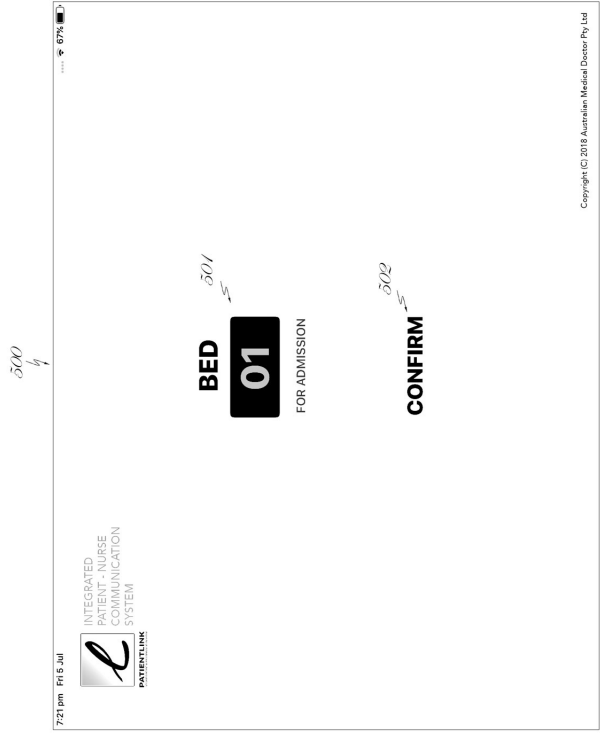


FIG. 05

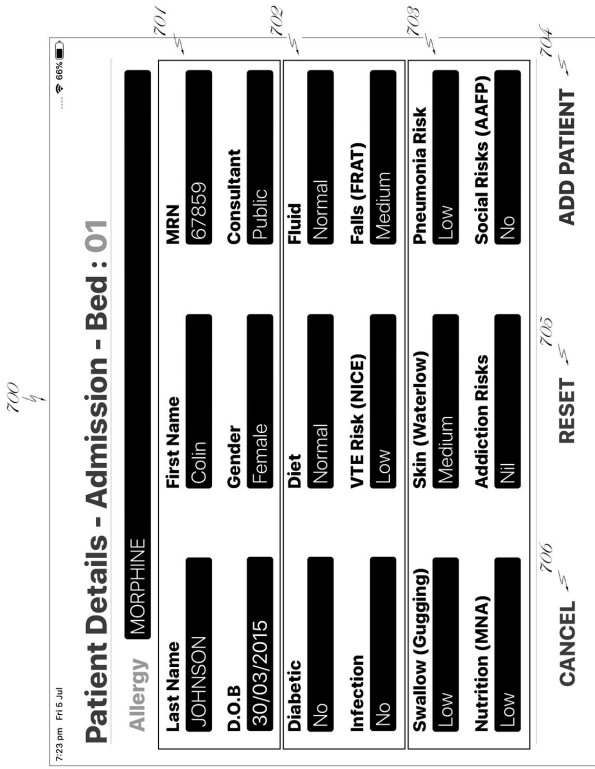


FIG. 07

 1000_4 

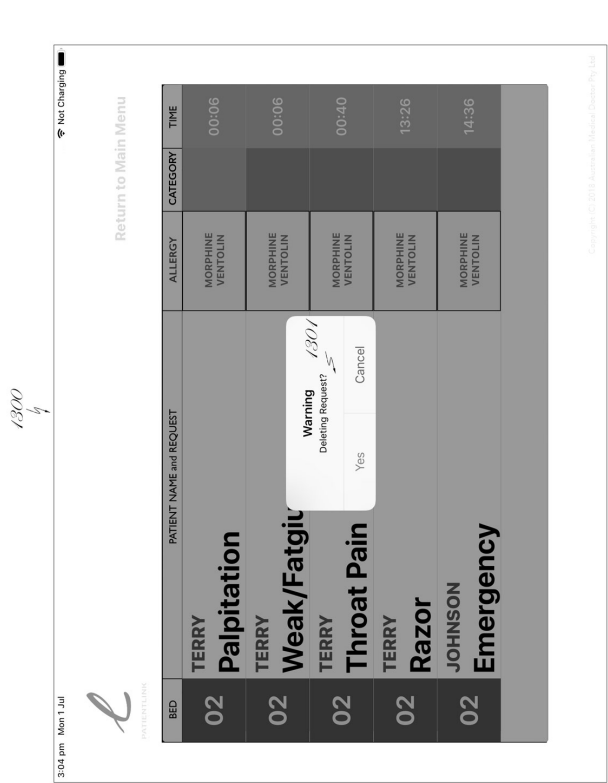


FIG. 13

1300

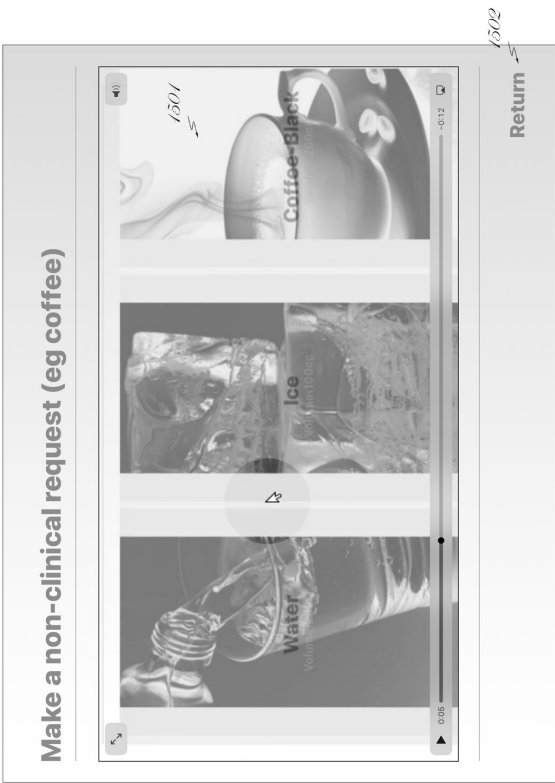


FIG. 15

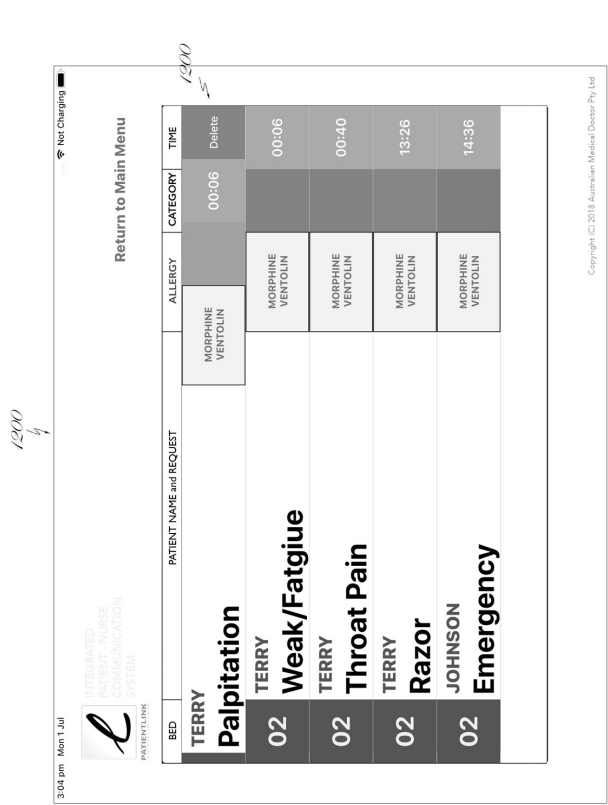


FIG. 12

1400

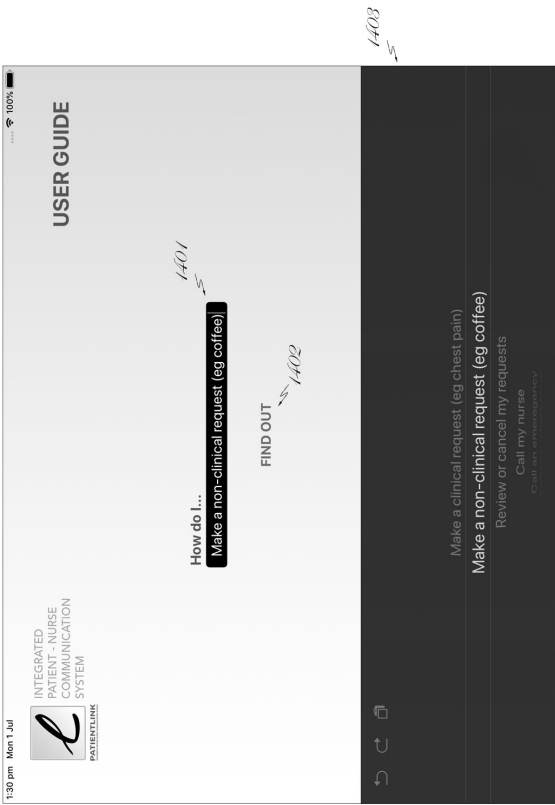


FIG. 14

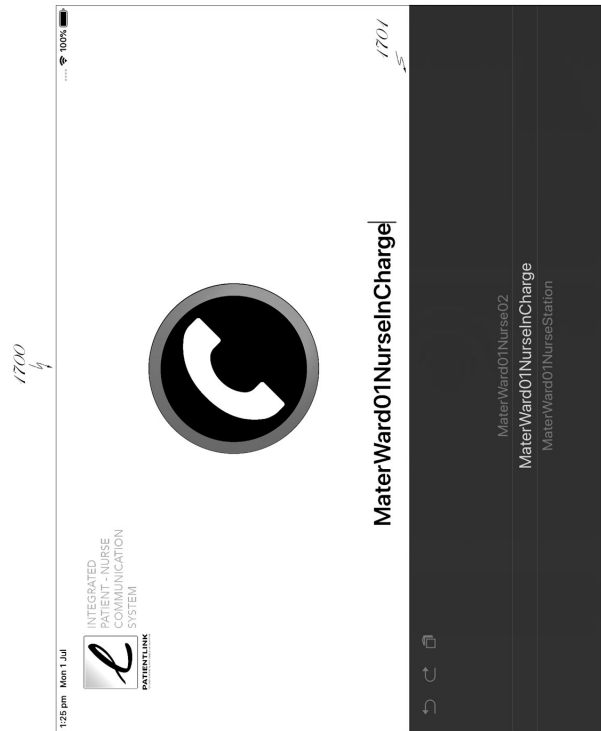


FIG. 17

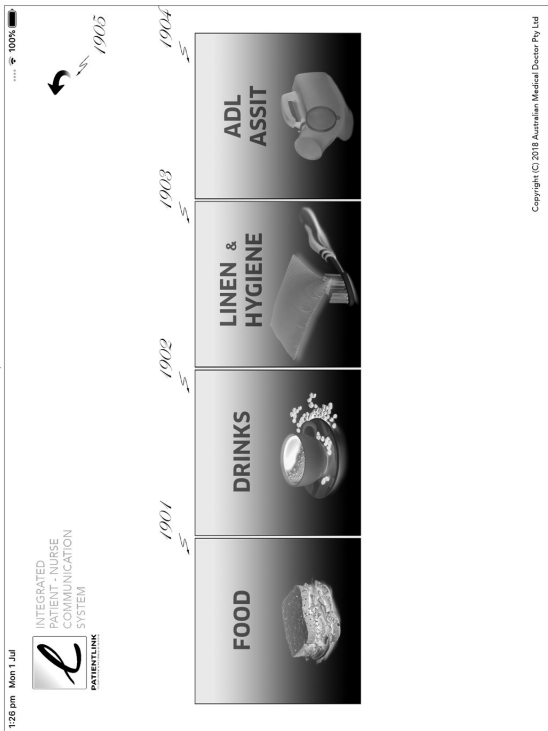


FIG. 19

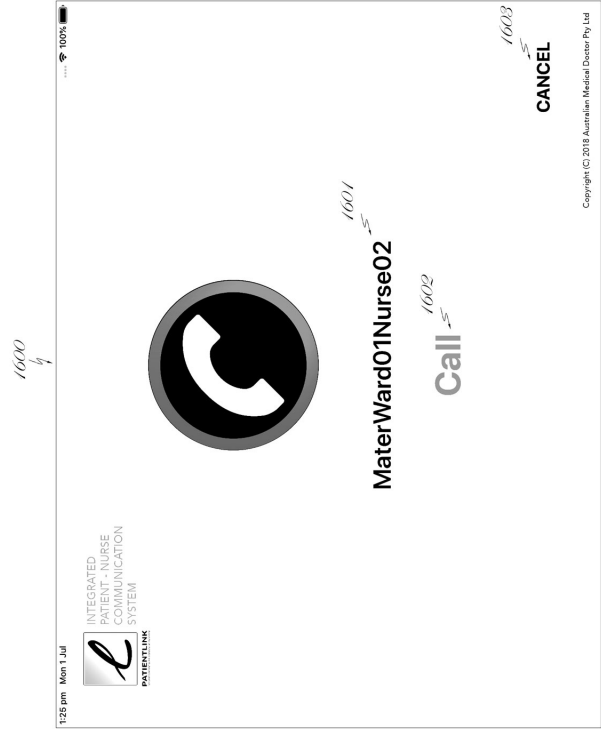


FIG. 16

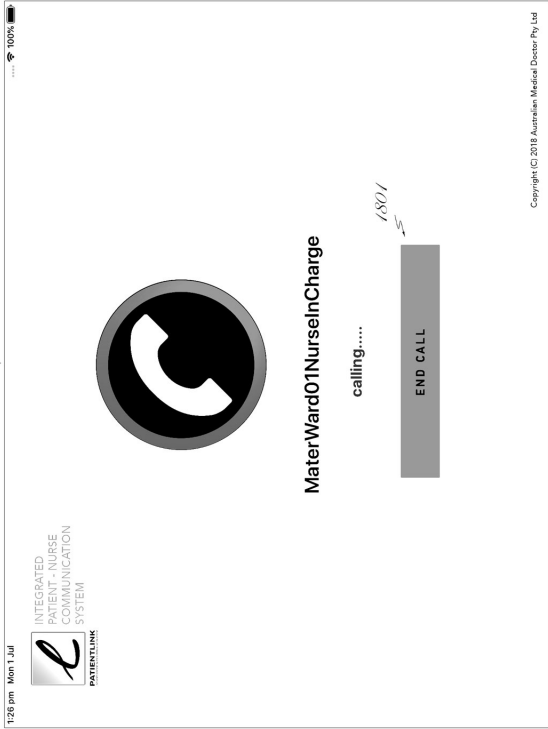


FIG. 18

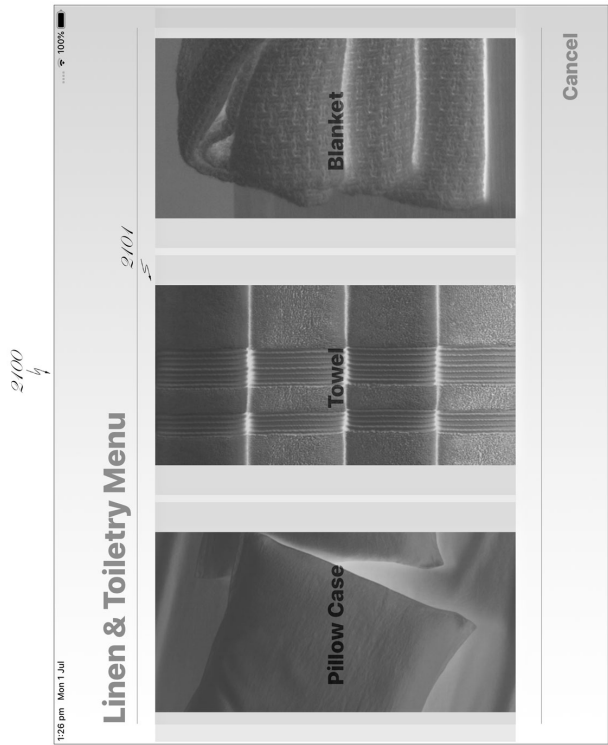


FIG. 21

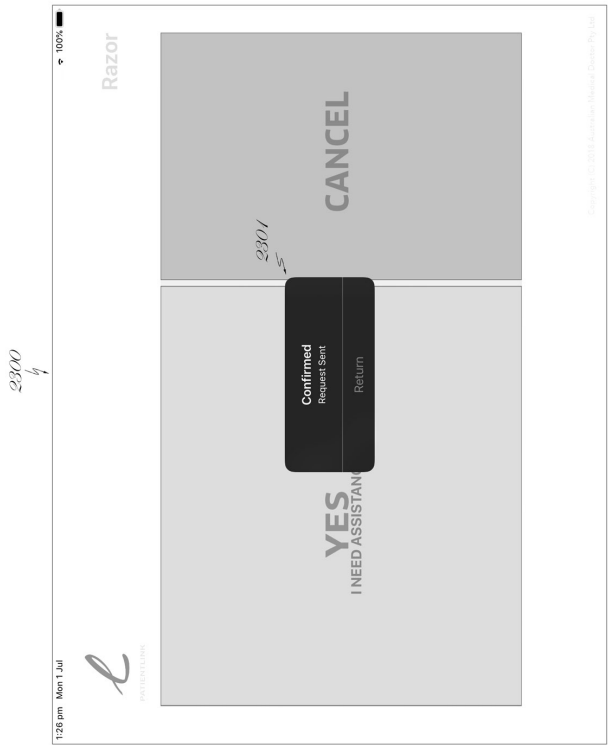


FIG. 23

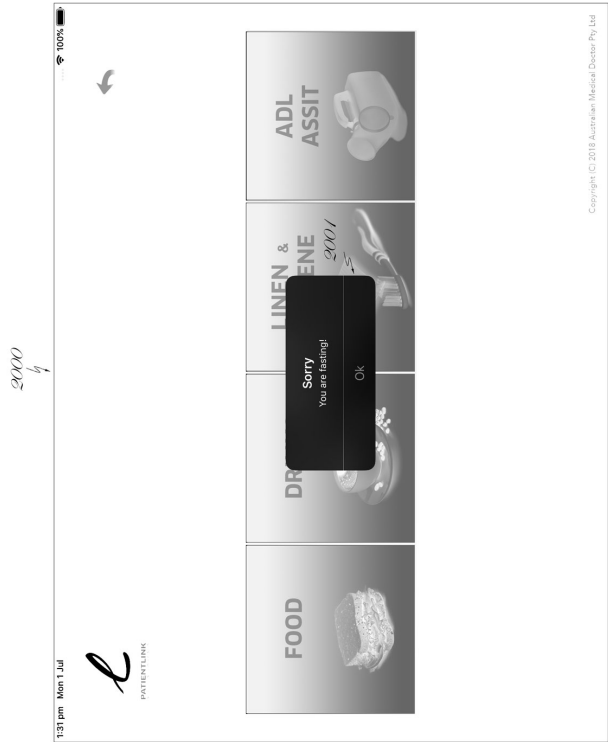


FIG. 20

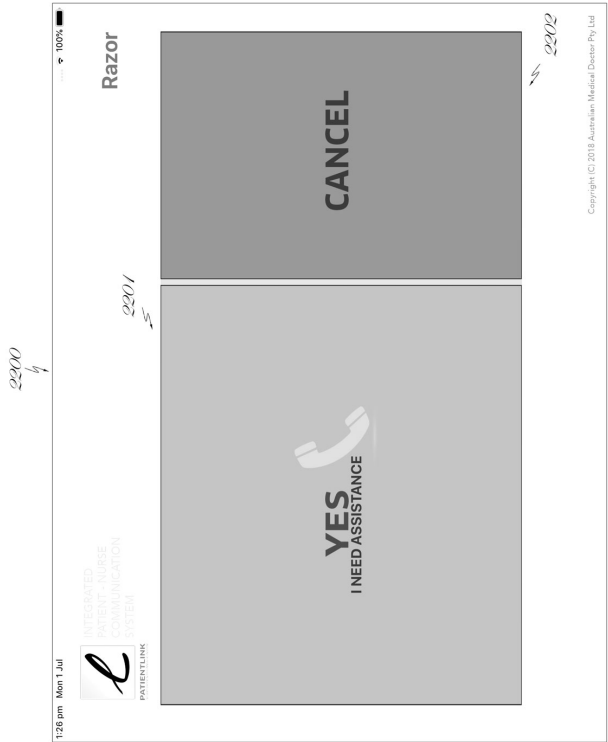


FIG. 22



FIG. 25

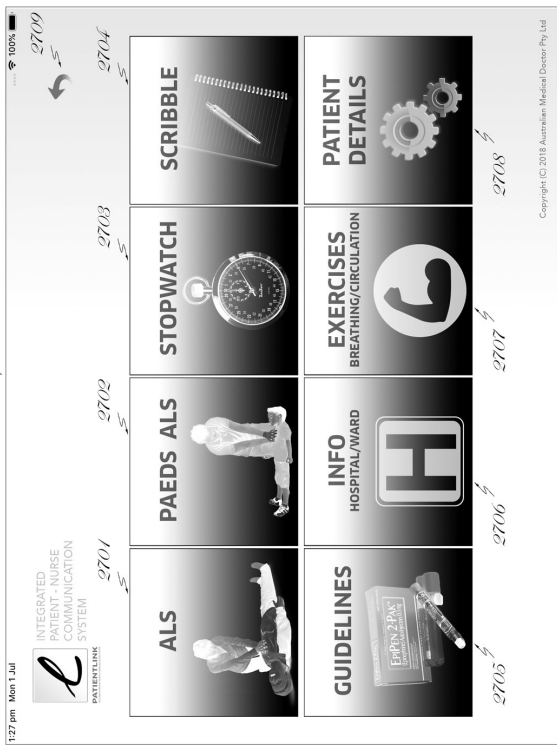


FIG. 27

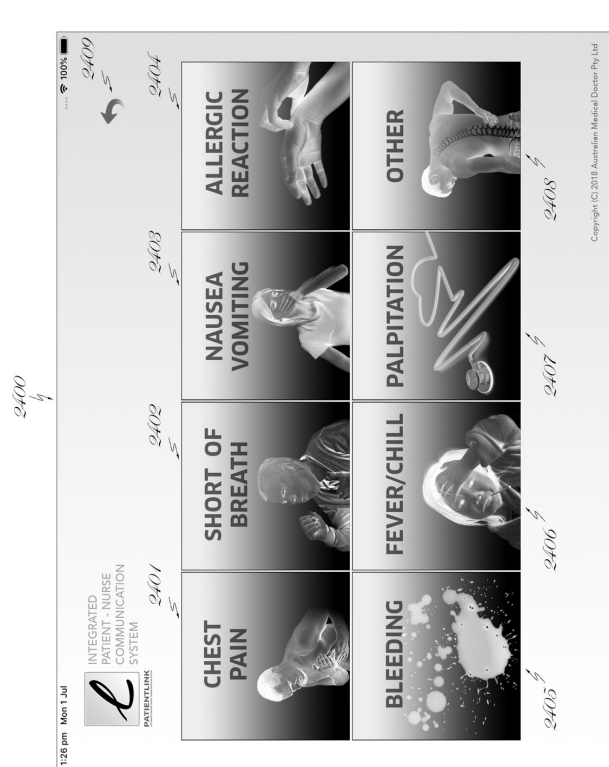


FIG. 24



FIG. 26

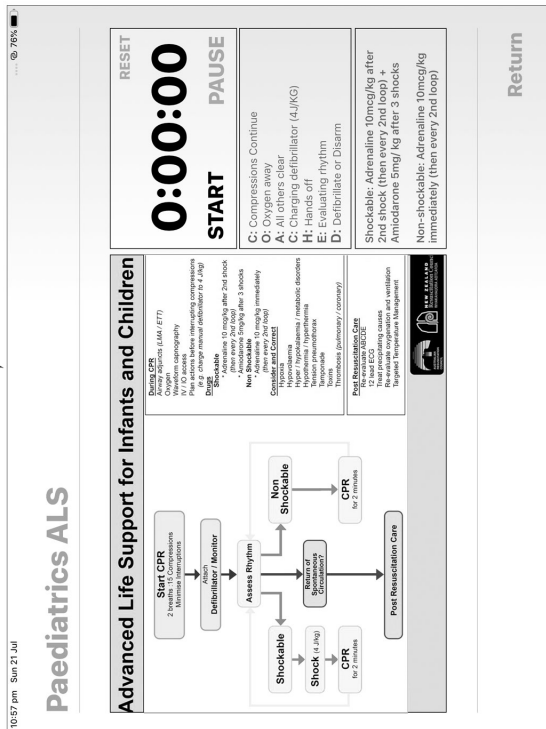


FIG. 29

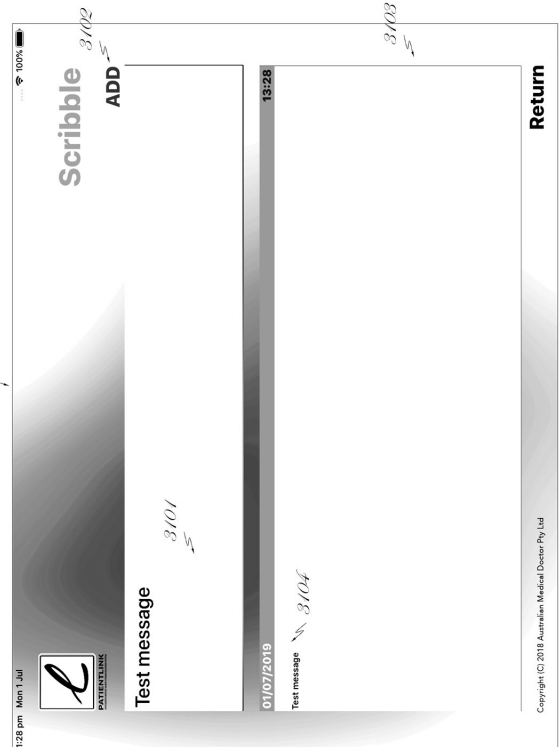


FIG. 31

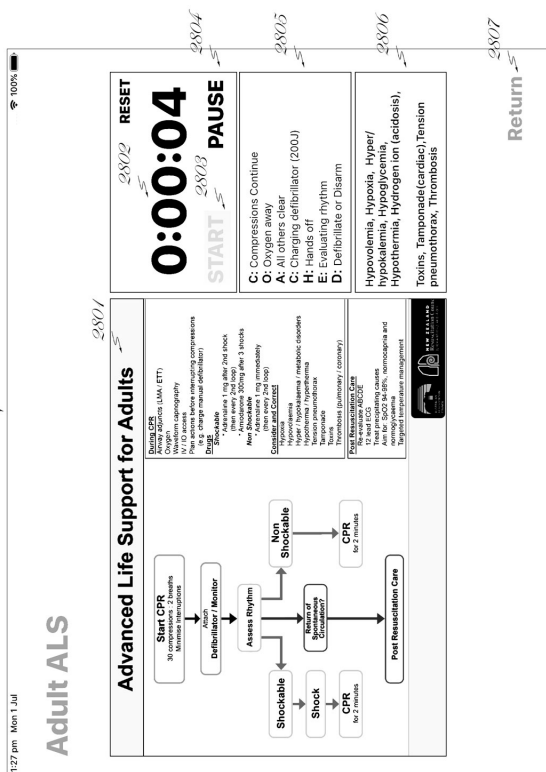


FIG. 28

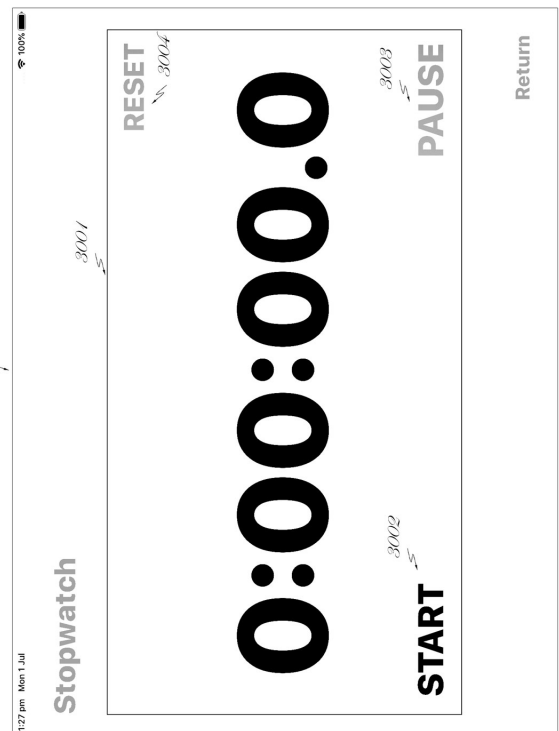


FIG. 30



FIG. 32



FIG. 34

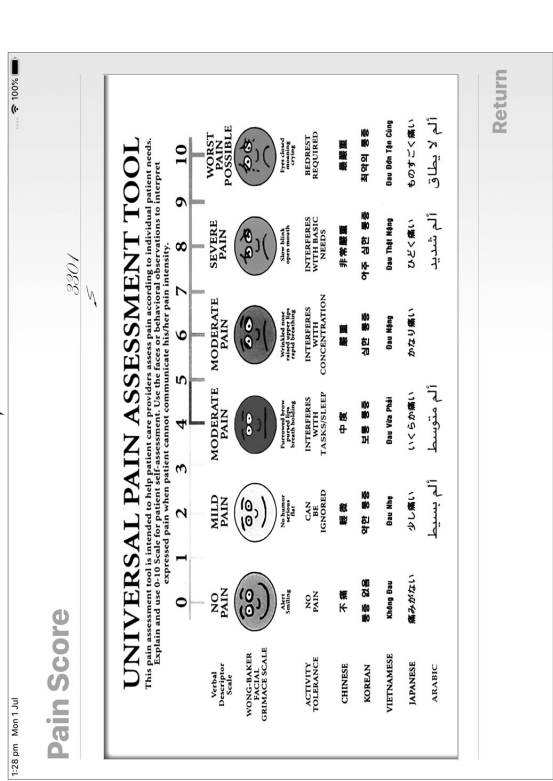


FIG. 33

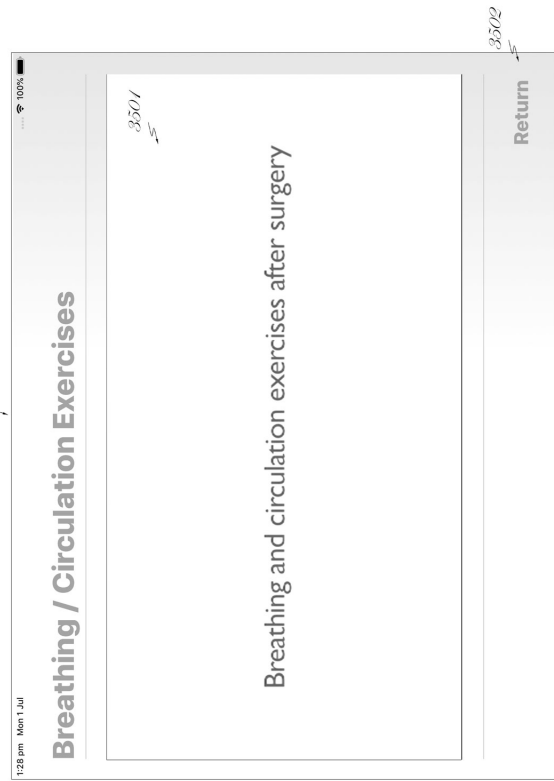


FIG. 35



FIG. 36

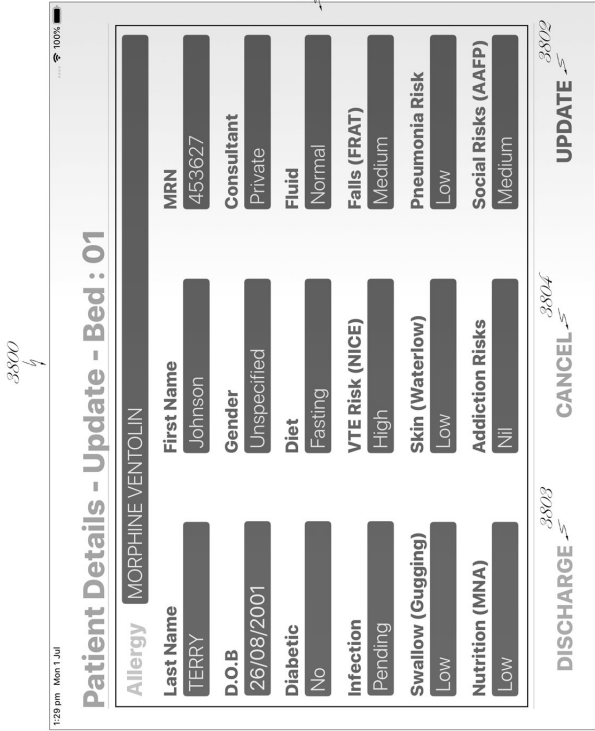


FIG. 38

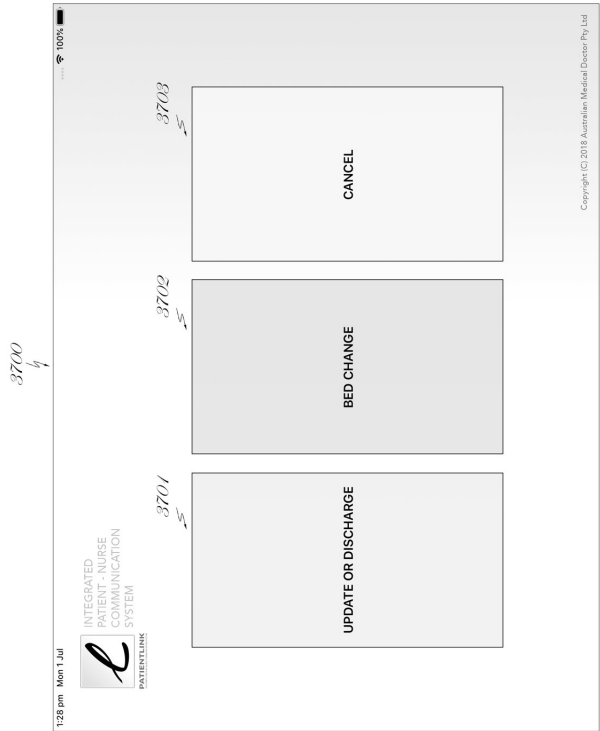


FIG. 37

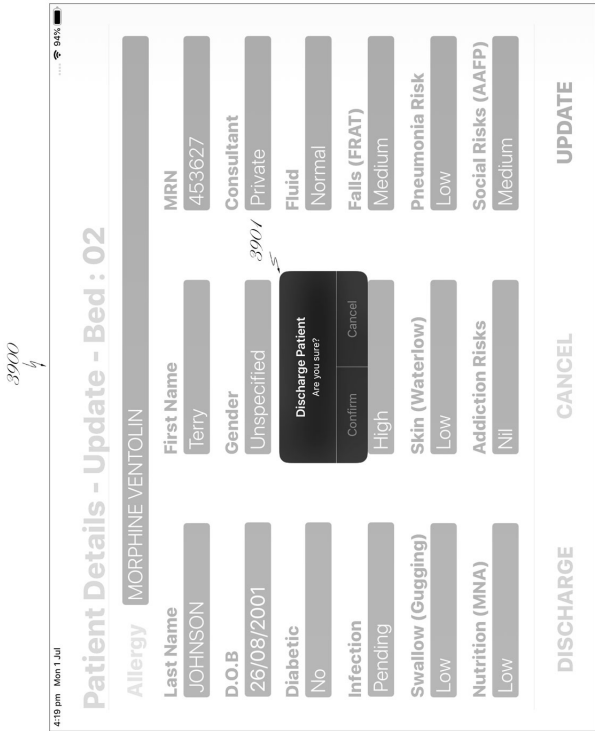


FIG. 39

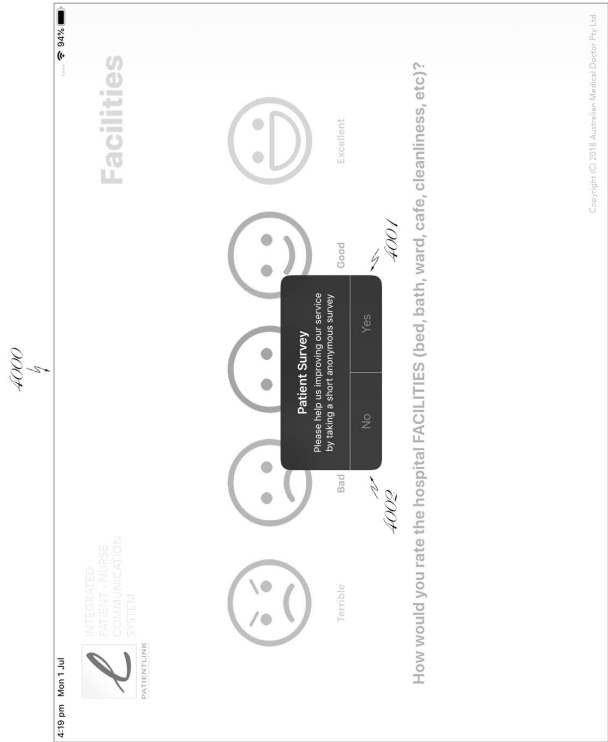


FIG. 40

4200

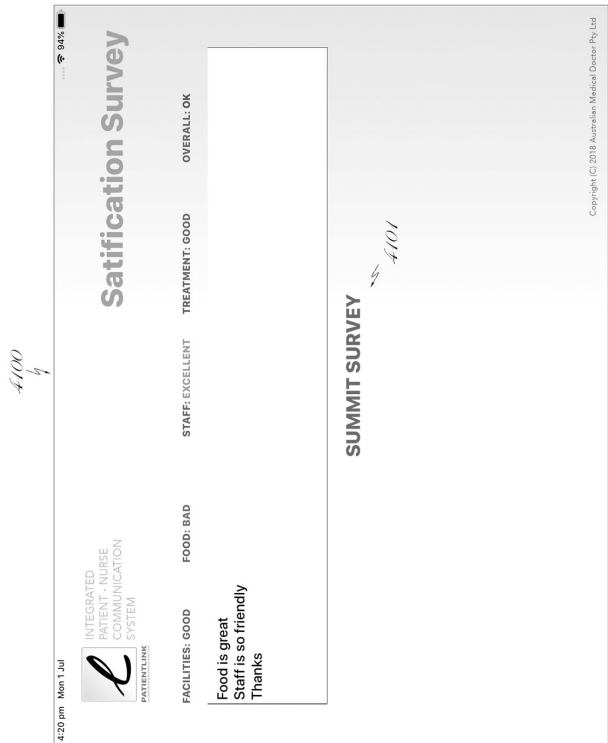


FIG. 41

4300

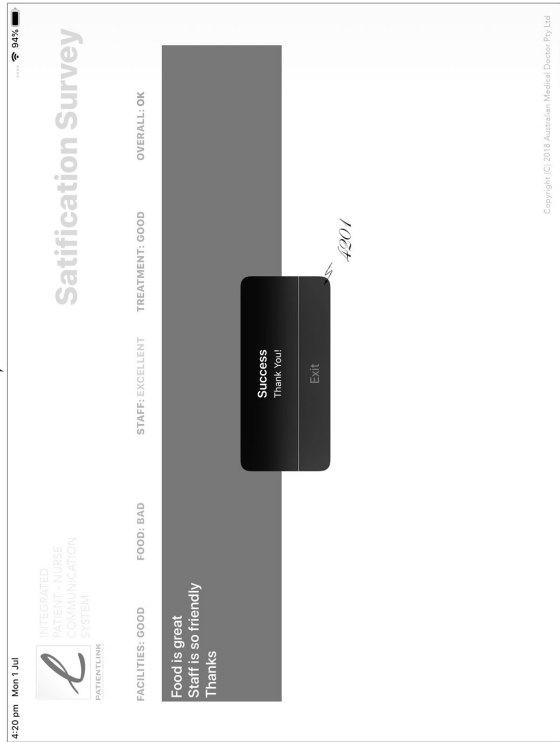


FIG. 42

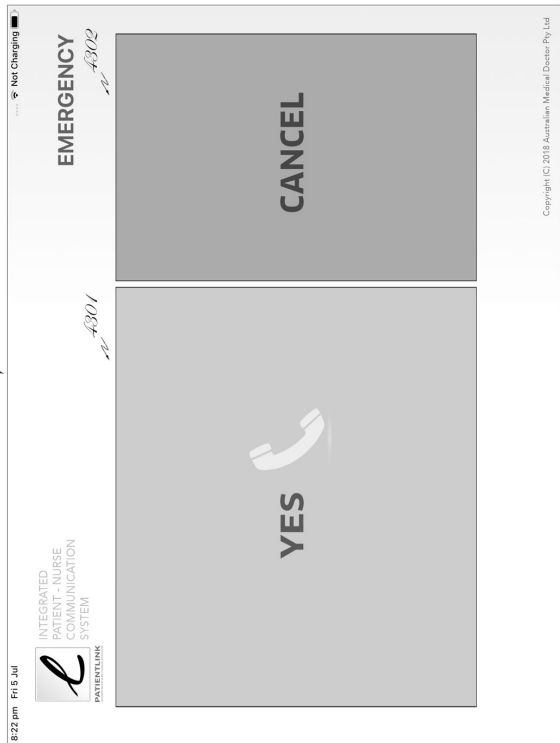


FIG. 43

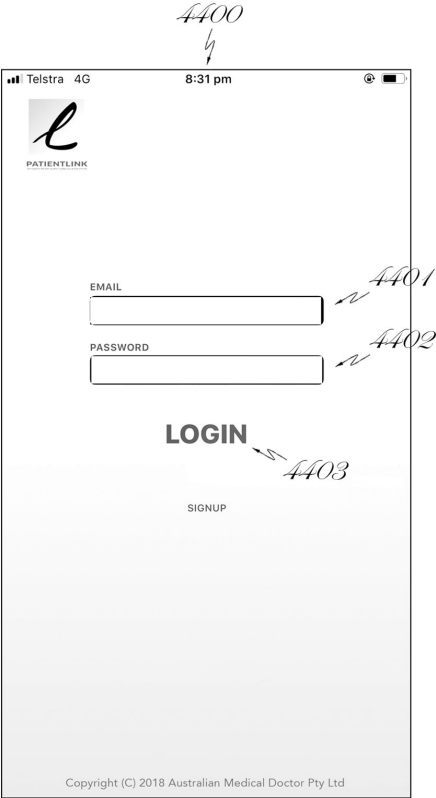


FIG. 44

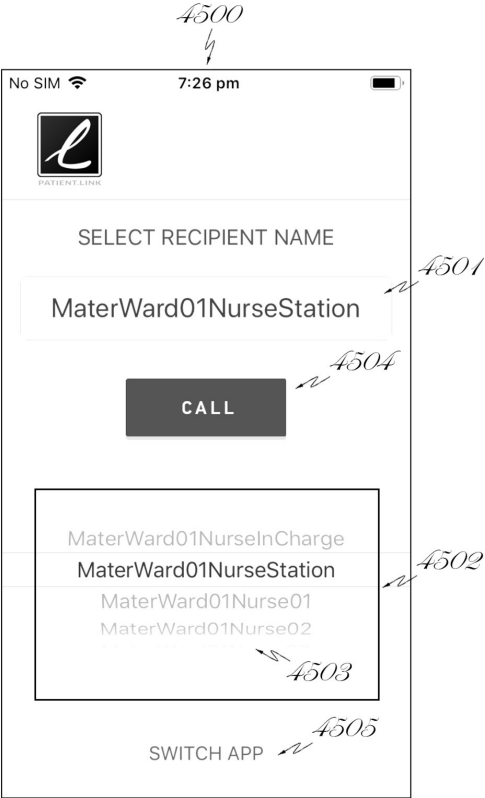


FIG. 45

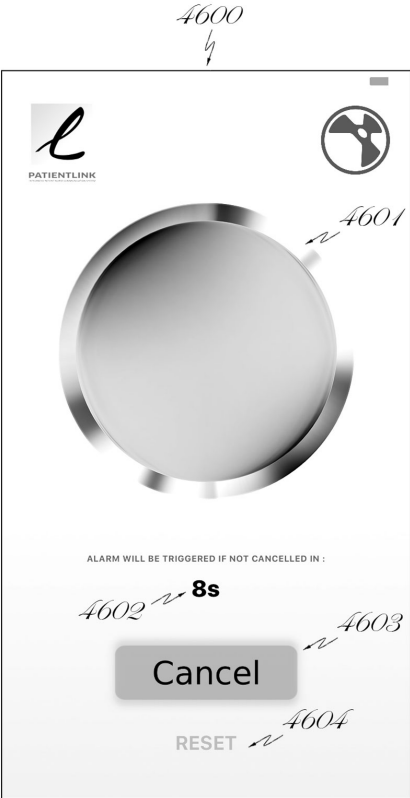


FIG. 46

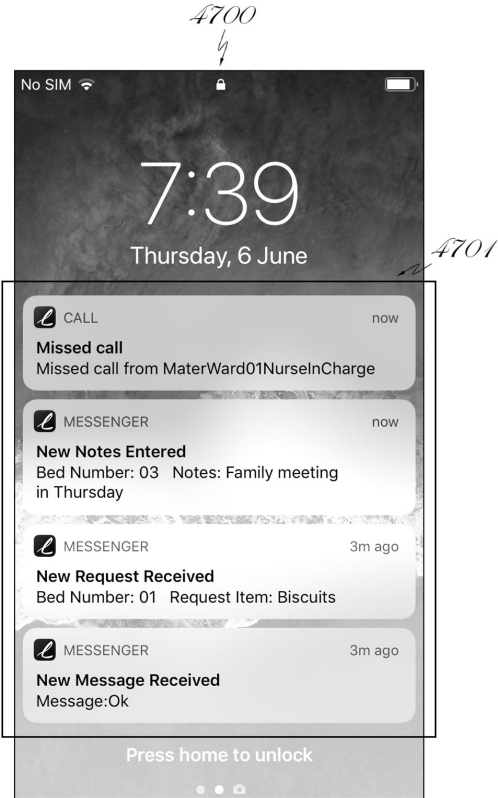
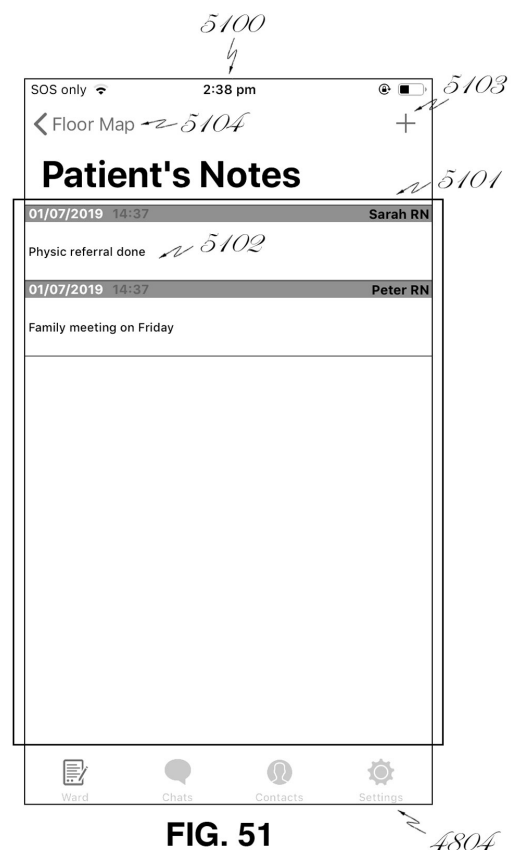
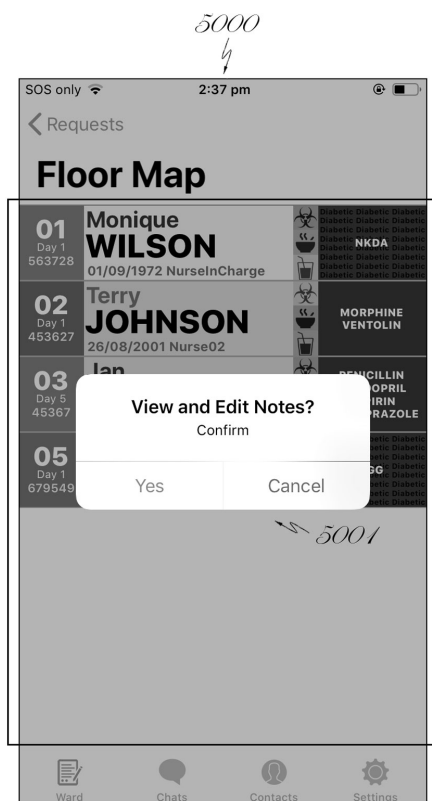
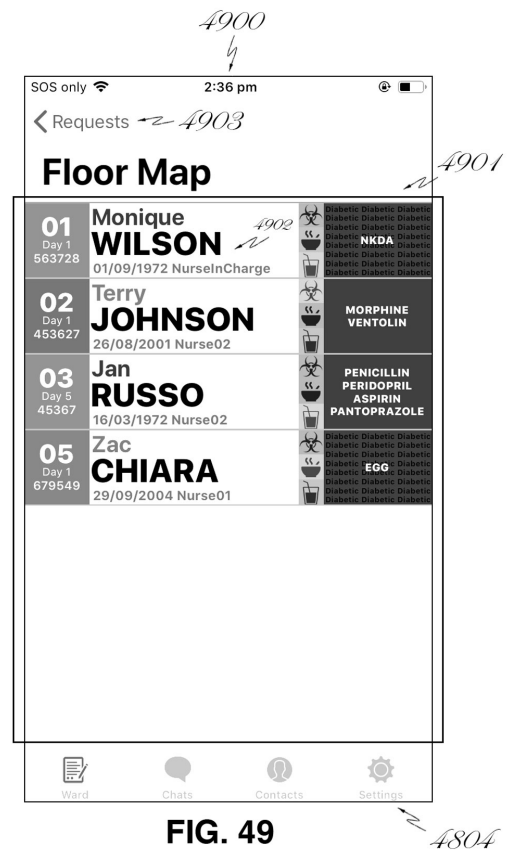
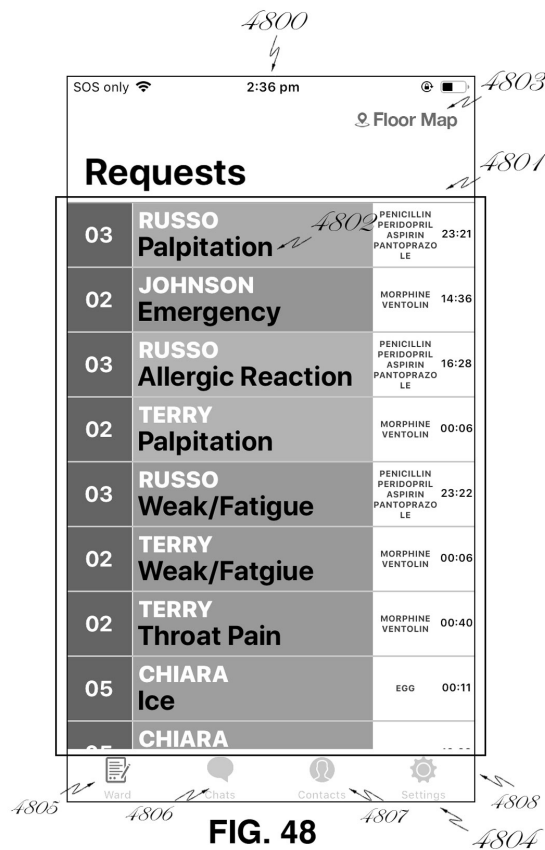
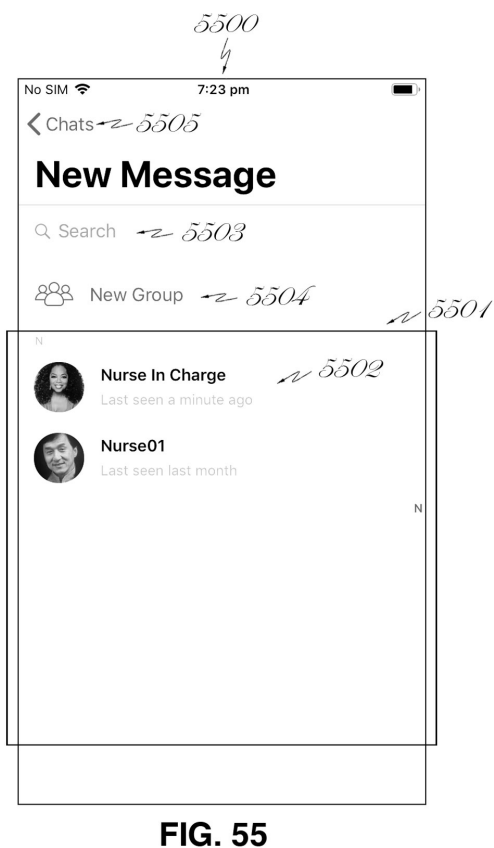
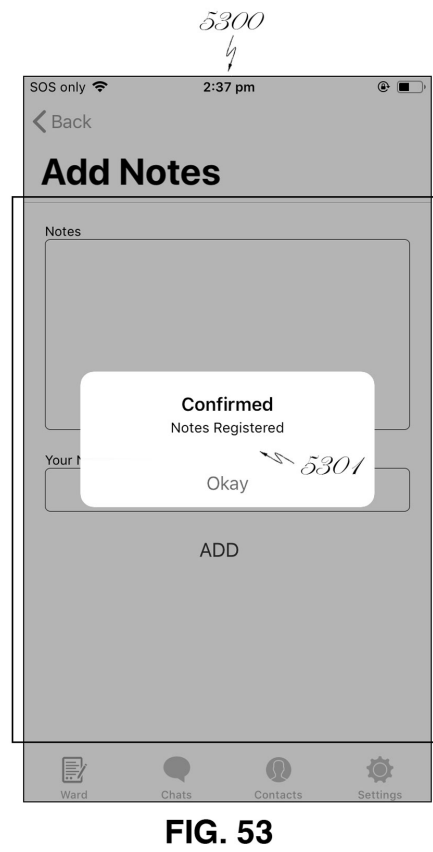
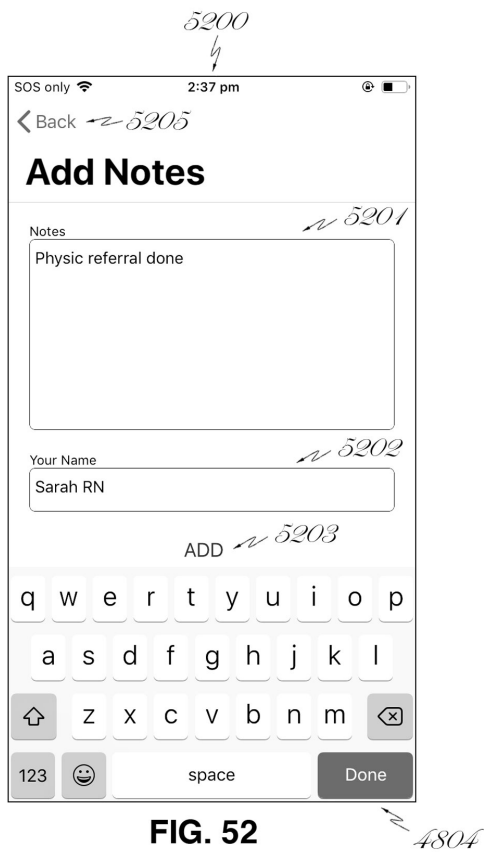


FIG. 47





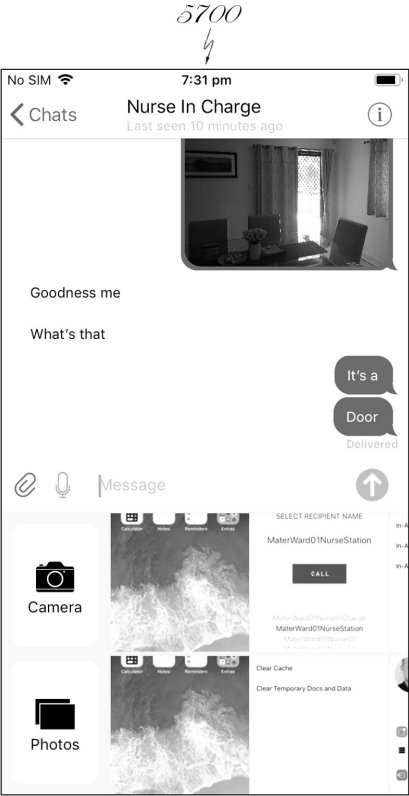


FIG. 57

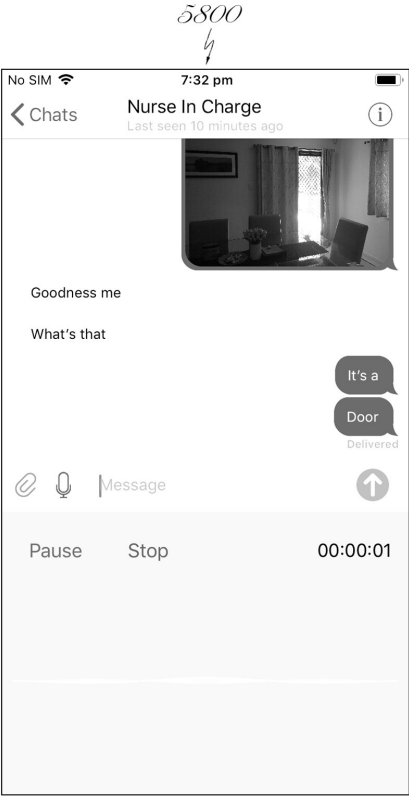


FIG. 58

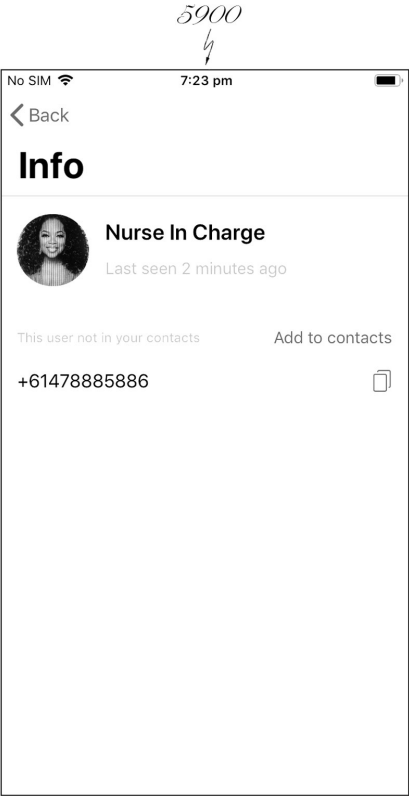


FIG. 59

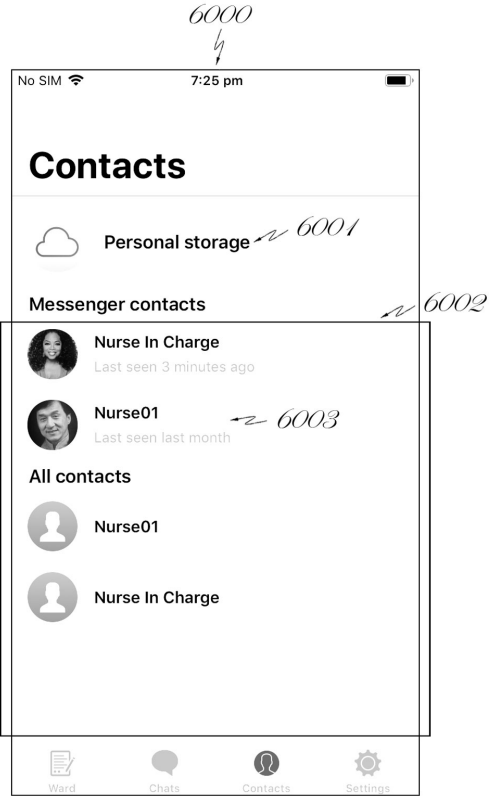
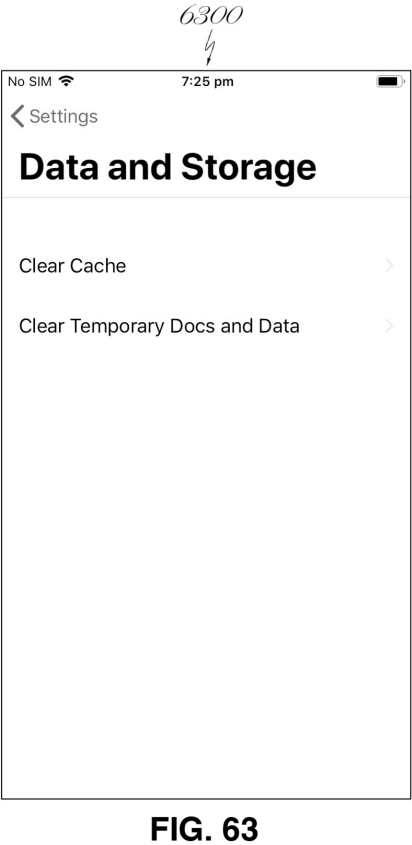
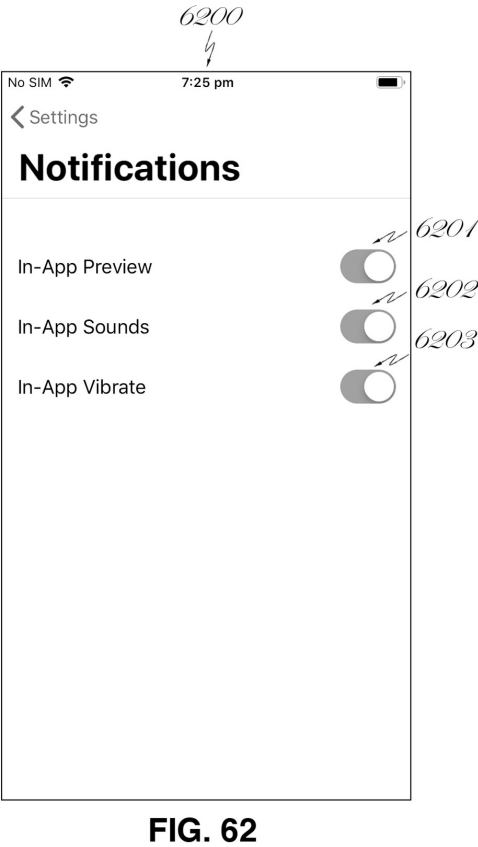
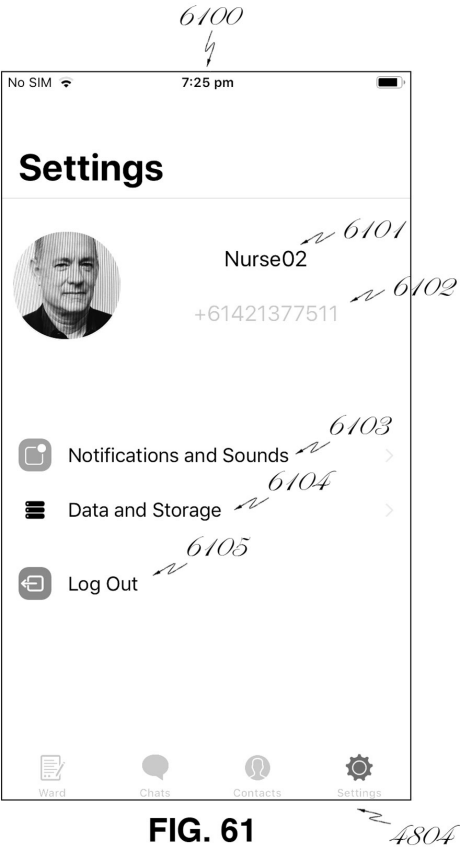


FIG. 60



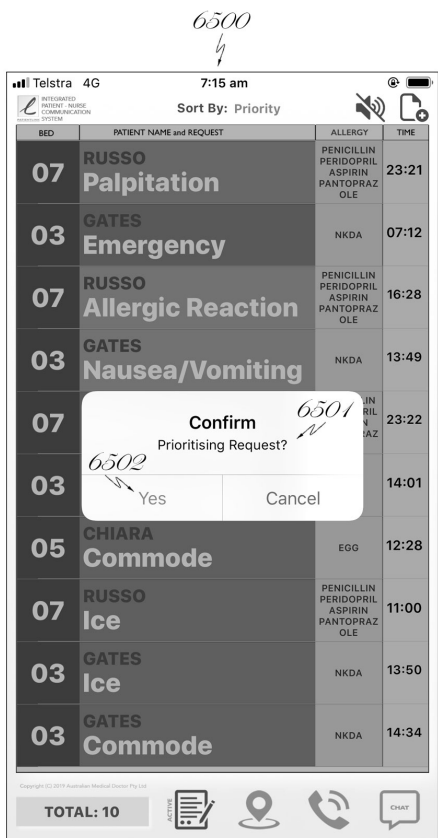


FIG. 65

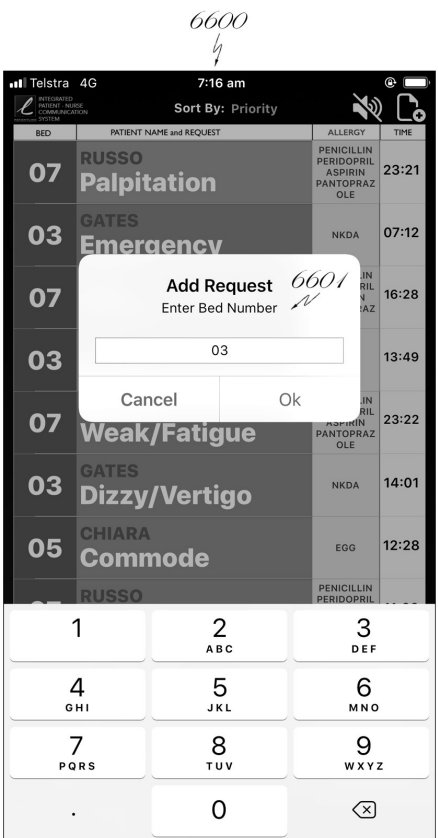


FIG. 66

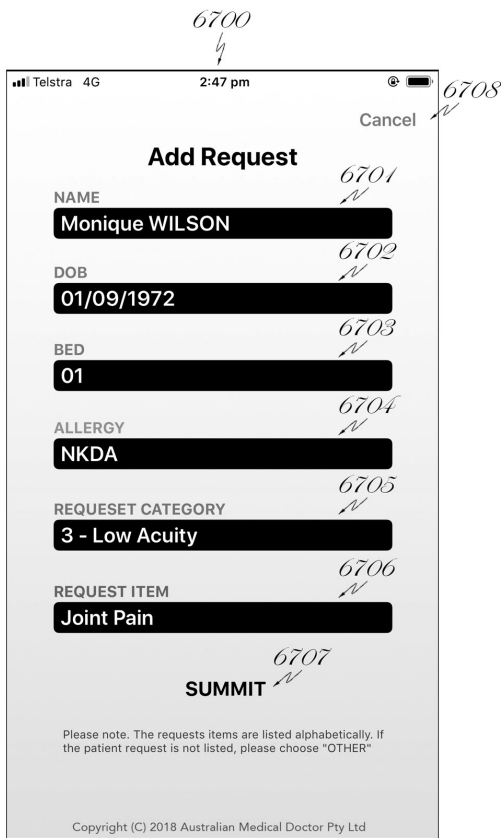


FIG. 67

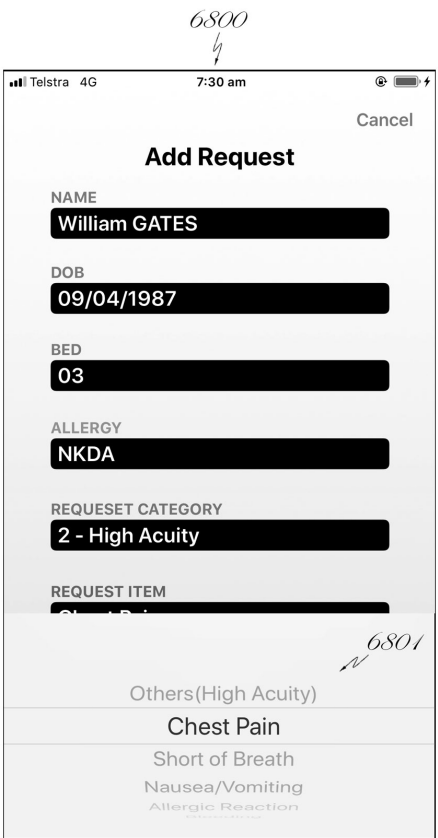


FIG. 68

6900

Cancel

Add Request

NAME
Monique WILSON

DOB
01/09/1972

BED
01

ALLERGY
NKDA

REQUEST ITEM
3 - Low Acuity

Confirmed
Request Sent

Return

SUMMIT

Please note. The requests items are listed alphabetically. If the patient request is not listed, please choose "OTHER"

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FIG. 69

7000

Sort By: Priority

BED	PATIENT NAME and REQUEST	ALLERGY	TIME
07	RUSSO Palpitation	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	23:21
03	GATES Emergency	NKDA	07:12
07	RUSSO Allergic Reaction	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	16:28
07	RUSSO Nausea/Vomiting	NKDA	13:49
07	RUSSO Weak/Fatigue	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	23:22
03	GATES Dizzy/Vertigo	NKDA	14:01
05	CHIARA Commode	EGG	12:28
07	RUSSO Ice	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	11:00
03	GATES Ice	NKDA	13:50
03	GATES Commode	NKDA	14:34

Delete

TOTAL: 10

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FIG. 70

7100

Sort By: Time

BED	PATIENT NAME and REQUEST	ALLERGY	TIME
07	RUSSO Palpitation	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	23:21
07	RUSSO Weak/Fatigue	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	23:22
05	CHIARA Commode	EGG	12:28
07	RUSSO Allergic Reaction	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	16:28
07	RUSSO Ice	PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	11:00
03	GATES Nausea/Vomiting	NKDA	13:49
03	GATES Ice	NKDA	13:50
03	GATES Commode	NKDA	14:01

Priority

Time

Patient

7101

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FIG. 71

7200

Sort By: Bed Number

BED	PATIENT DETAILS	RISKS
01	Colin JOHNSON 67859 Public Pending 30/03/2015 NurseInCharge MORPHINE	Infection: No Diet: Normal Fluid: Normal Addiction: Nil NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
03	William GATES 73512 Private Pending 09/04/1987 NurseInCharge NKDA	Infection: Pending Diet: Normal Fluid: Normal Addiction: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
05	Zac CHIARA 679549 Public Complex 29/09/2004 Nurse01 EGG	Infection: VRE Diet: Clear Fluid Fluid: Normal Addiction: Nil NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
07	Jan RUSSO 45367 Private Pending 16/03/1972 Nurse02 PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	Infection: VRE Diet: Fasting Fluid: 2.0L Addiction: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL

TOTAL: 4

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FIG. 72

7300

Telstra 4G 7:17 am

Sort By: Bed Number

BED	PATIENT DETAILS	RISKS
01 Day 5	Colin JOHNSON 67859 Public Pending 30/03/2015 NurseInCharge MORPHINE	Infection: No Diet: Normal Fluid: Normal Addiction: Nil NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL
ISSUES 1) D4 post-op 2) Monoclyc Asemia - pre-sumed iron deficiency RESULTS Hb 76 WCC 10.4 GRP 16 (01/05/19) MX 2 x PRBCs transfusion iron supplementation TO DO OT referral, Repeat FBE tomorrow, Am discharge on Monday		
03 Day 1	William GATES 73512 Private Pending 09/04/1987 NurseInCharge NKDA	Infection: Pending Diet: Normal Fluid: Normal Addiction: Nicotine NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL
05 Day 1	Zac CHIARA 679549 Public Complex 29/09/2004 Nurse01 EGG	Infection: VRE Diet: Clear Fluid Fluid: Normal Addiction: Nil NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL
07 Day 1	Jan RUSSO 45367 Private Pending 16/03/1972 Nurse02 PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	Infection: VRE Diet: Fasting Fluid: 2.0L Addiction: Nicotine NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL

TOTAL: 4

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FIG. 73

7400

Telstra 4G 7:20 am

Sort By: Bed Number

BED	PATIENT DETAILS	RISKS
01 Day 5	Colin JOHNSON 67859 Public Pending 30/03/2015 NurseInCharge MORPHINE	Infection: No Diet: Normal Fluid: Normal Addiction: Nil NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL
03 Day 1	William GATES 73512 Private Pending 09/04/1987 NurseInCharge NKDA	Infection: Pending Diet: Normal Fluid: Normal Addiction: Nicotine NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL
05 Day 1	Zac CHIARA 679549 Public Complex 29/09/2004 Nurse01 EGG	Infection: VRE Diet: Clear Fluid Fluid: Normal Addiction: Nil NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL
07 Day 1	Jan RUSSO 45367 Private Pending 16/03/1972 Nurse02 PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	Infection: VRE Diet: Fasting Fluid: 2.0L Addiction: Nicotine NUTRITION SKIN SWALLOW DVT PNEUMONIA FALL DIABETIC SOCIAL

Confirm
View/Write Notes
Yes Cancel

TOTAL: 4

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FIG. 74

7500

Telstra 4G 3:30 pm

View / Add Notes Return

7503

7504 7506 7505

7502

08/07/2019 22:08 Angela RN

From nurse

08/07/2019 20:50 Jen Doctor

Ok

08/07/2019 20:49 John Doctor

Discharge time

08/07/2019 20:38 James OT

Hello

08/07/2019 18:21 Yass Pharmacy

Hi

08/07/2019 16:00 Jen Doctor

Hello

SORT BY: All

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FIG. 75

7600

Telstra 4G 10:37 am

View / Add Notes Return

Family meeting this afternoon

James RN

SUMMIT

08/07/2019 22:08 Angela RN

From nurse

08/07/2019 20:50 Jen Doctor

Ok

08/07/2019 20:49 John Doctor

Discharge time

08/07/2019 20:38 James OT

afternoons

q w e r t y u i o p

a s d f g h j k l

z x c v b n m

123 space return

FIG. 76

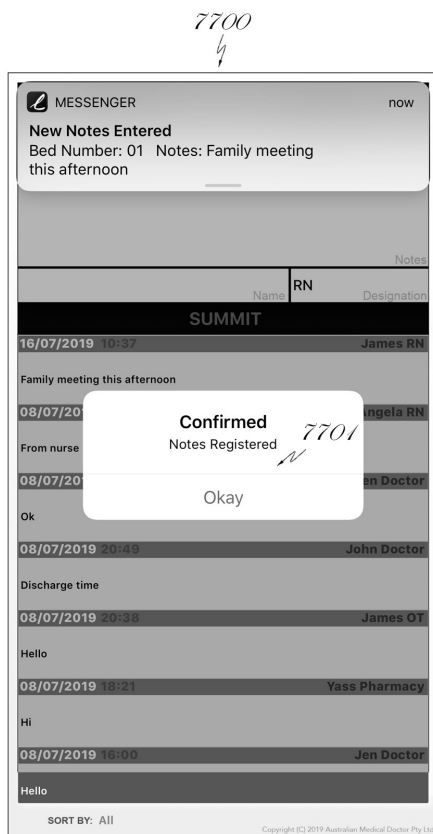


FIG. 77

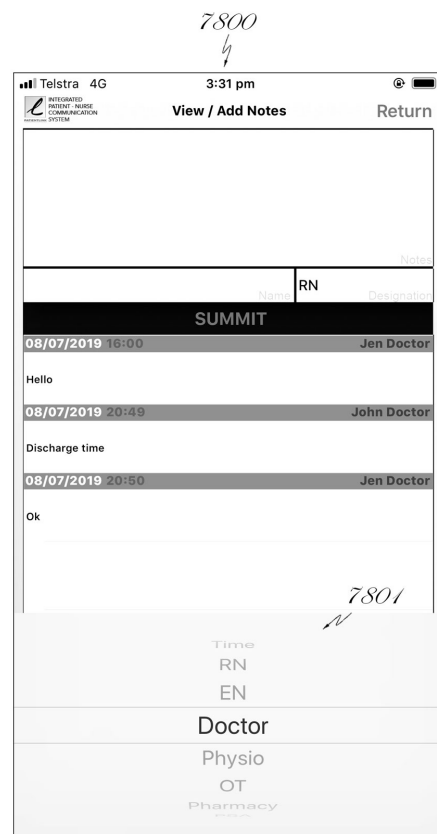


FIG. 78

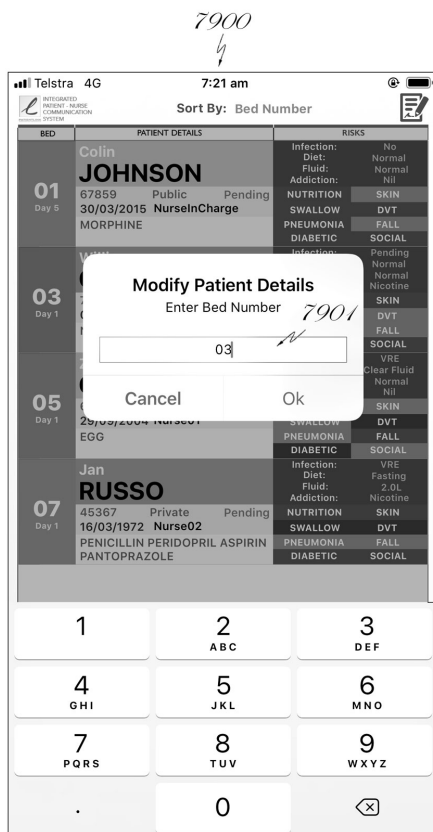


FIG. 79

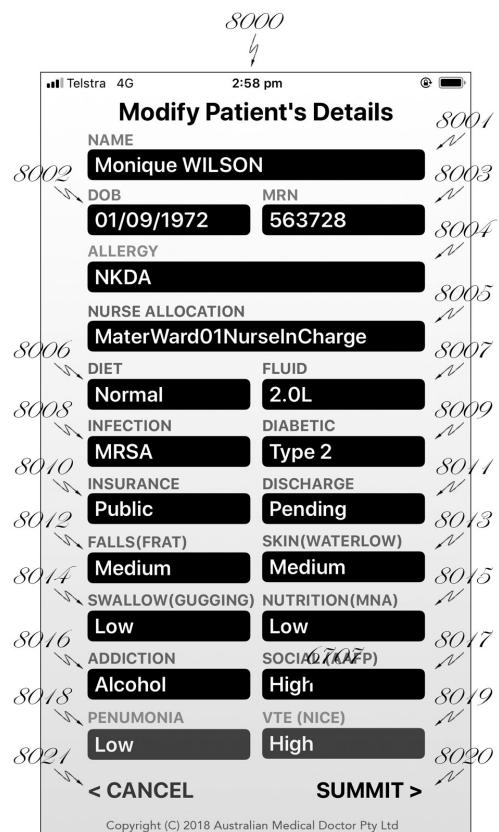


FIG. 80

8200

Telstra 4G 2:58 pm

Modify Patient's Details

NAME
Monique WILSON

DOB
01/09/1972

MRN
563728

ALLERGY
NKDA

NURSE ALLOCATION
MaterWard01Nurse02

DIET
No

FLUID
No

INFECTION
M

INSURANCE
Pu

Success
Patient Details Updated

Return

FALLS (FRAT)
Medium

SKIN (WATERLOW)
Medium

SWALLOW (GUGGING)
Low

NUTRITION (MNA)
Low

ADDICTION
Alcohol

SOCIAL (AAFP)
High

PNEUMONIA
Low

VTE (NICE)
High

< CANCEL SUMMIT >

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FIG. 82

8300

Telstra 4G 7:21 am

Sort By: Bed Number

BED	PATIENT DETAILS	RISKS
01 Day 5	Colin JOHNSON 67859 Public Pending 30/03/2015 NurseInCharge MORPHINE	Infection: No Diet: Normal Fluid: Normal Addition: Nil NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
03 Day 1	William GATES 73512 Private Pending 09/04/1987 NurseInCharge NKDA	Infection: Pending Diet: Normal Fluid: Normal Addition: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
05 Day 1	Zac CHIARA 679549 Public Complex 29/09/2004 Nurse01 EGG	Infection: VRE Diet: Clear Fluid Fluid: Normal Addition: Nil NUTRITION: SKIN SWALLOW: FALL PNEUMONIA: FALL DIABETIC: SOCIAL
07 Day 1	Jan RUSSO 45367 Private Pending 16/03/1972 Nurse02 PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	Infection: VRE Diet: Fasting Fluid: 2.0L Addition: Nicotine NUTRITION: SKIN SWALLOW: FALL PNEUMONIA: FALL DIABETIC: SOCIAL

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TOTAL: 4

ACTIVITY LOCATION PHONE CHAT

FIG. 83

8400

Telstra 4G 7:21 am

Sort By: Bed Number

BED	PATIENT DETAILS	RISKS
01 Day 5	Colin JOHNSON 67859 Public Pending 30/03/2015 NurseInCharge MORPHINE	Infection: No Diet: Normal Fluid: Normal Addition: Nil NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
03 Day 1	William GATES 73512 Private Pending 09/04/1987 NurseInCharge NKDA	Infection: Pending Diet: Normal Fluid: Normal Addition: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
05 Day 1	Zac CHIARA 679549 Public Complex 29/09/2004 Nurse01 EGG	Infection: VRE Diet: Clear Fluid Fluid: Normal Addition: Nil NUTRITION: SKIN SWALLOW: FALL PNEUMONIA: FALL DIABETIC: SOCIAL
07 Day 1	Jan RUSSO 45367 Private Pending 16/03/1972 Nurse02 PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	Infection: VRE Diet: Fasting Fluid: 2.0L Addition: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL

Warning
Discharging Patient

Yes Cancel

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TOTAL: 4

ACTIVITY LOCATION PHONE CHAT

FIG. 84

8500

Telstra 4G 7:22 am

Sort By: Diet

BED	PATIENT DETAILS	RISKS
05 Day 1	Zac CHIARA 679549 Public Complex 29/09/2004 Nurse01 EGG	Infection: VRE Diet: Clear Fluid Fluid: Normal Addition: Nil NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
07 Day 1	Jan RUSSO 45367 Private Pending 16/03/1972 Nurse02 PENICILLIN PERIDOPRIL ASPIRIN PANTOPRAZOLE	Infection: VRE Diet: Fasting Fluid: 2.0L Addition: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
01 Day 5	Colin JOHNSON 67859 Public Pending 30/03/2015 NurseInCharge MORPHINE	Infection: No Diet: Normal Fluid: Normal Addition: Nil NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL
03 Day 1	William GATES 73512 Private Pending 09/04/1987 NurseInCharge NKDA	Infection: Pending Diet: Normal Fluid: Normal Addition: Nicotine NUTRITION: SKIN SWALLOW: DVT PNEUMONIA: FALL DIABETIC: SOCIAL

Bed Number
LOS
Consultant
Diet

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FIG. 85

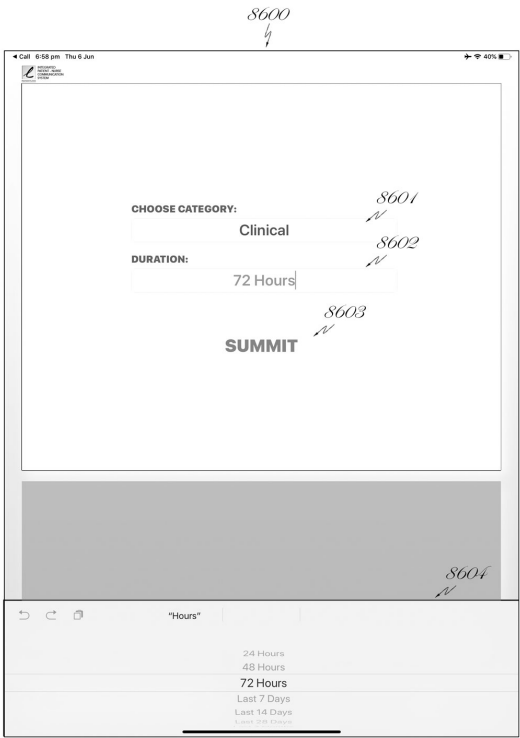


FIG. 86

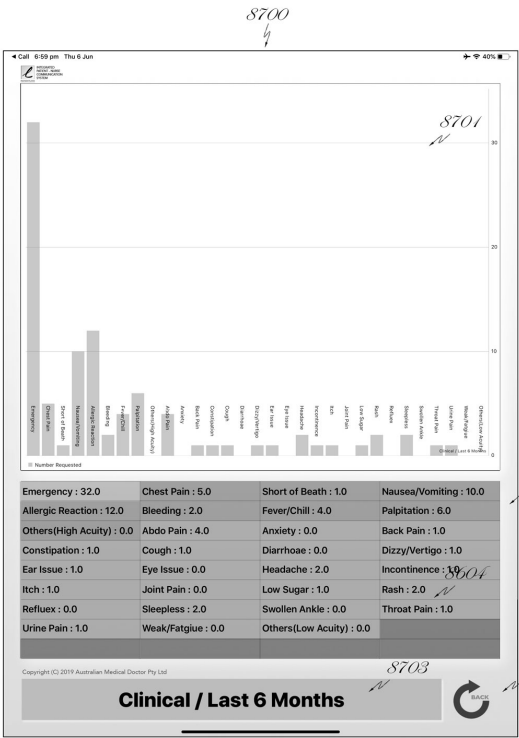


FIG. 87

BLANK

[0004] Currently, the major downsides of these on-premise systems are

- 1) Requirement of physical connections and network infrastructure namely, electrical supply lines and cables connecting plurality of devices including power over ethernet (PoE) switches, user input devices, I/O circuits, onsite enterprise servers, wireless receivers, and telephones, etc that limits and constrains flexibility, mobility, and scalability.
- 2) Absence of integration between communication system and the floor management system.
- 3) Patient to nurse calls consists of simple auditory tone only. No voice / textual communication is possible.
- 4) Lack of multi-media communication (complex text, photo, video, message bank) capability.
- 5) Updates on patient details and clinical status are infrequent and in *asynchronised* manner, leading to inefficient and delayed distribution of patient's information.
- 6) Requirement of extensive loss prevention technology and redundancy hardware to maintain data recovery capability in the event of local hardware failure.
- 7) Requirement of in-house security monitoring and safeguarding of its sensitive data as majority of data theft occurs internally.
- 8) Requirement of labour-intensive onsite upgrades, maintenance, and repair of the system are invariably costly and time-consuming.
- 9) No off-line capability. When there is a catastrophic error, the entire communication and floor management systems become unserviceable.
- 10) Inability to analyse any data collected (for e.g. patient's requests / emergencies / admissions)

Summary

[0005] The present invention provides a healthcare communication and ward management system and/or method, or a component thereof, that has any on or more of the features listed in the appended claims and/or any one or more of the following features, which alone or in any combination may comprise patentable subject matter:

[0006] One graphical device (Patient Device) with touch screen for typed input, a microphone, and a speaker will be provided to each physical hospital bed – either mounted to the bed itself or to the wall. A free-standing software application (App) on this device establishes a communication connection with the cloud components of the system (i.e. cloud database and runtime) via either hospital or cellular network. It permits the user to make and receive voice call to and from another device; to input / alter / store patient information such as DOB, hospital number, allergies, health insurance status, infectious status, diet/fluid restrictions, and clinical risk factors; to make, review, and send patient's requests; to use an stop watch; to input / delete / store electronic notepad messages; to read clinical guidelines; to access basic information of the health care facility; to watch multimedia video presentation of breathing / circulation exercises; to deploy logic runs in determining if regular

interval reminders of these exercises are required and if patient is allowed to order food / drinks based on their dietary restrictions; to switch to device's "Night" mode; to perform a patient satisfaction survey upon discharge.

[0007] One graphical device (Nurse Device) with touch screen for typed input, a microphone, and a speaker will be provided to individual "on-the-floor" nursing staff. This device is portable. A free-standing software application (app) on the device links the user to the cloud components of the system via hospital or cellular network (ie. database and runtime) and permits the user to make and receive voice call to and from another device; to view a list of ward patient's active requests (each "request row" will contain the following information: patient's last name, bed number, request item, request category, allergy, time of the request); to view the ward floor map (each "patient row" will contain the following information: patient's first and last name, gender, bend number, health insurance status, hospital number, allocated nurse, allergy, admission details including medical background, issues, investigation results, treatments, and future plans); to view/add/delete patient's notes; to send and receive textual / pictorial / audio messages to and from other device or plurality of devices; to log out and disconnect from the cloud components of the system; to change the carrier's name and photo; to trigger a duress alarm. Notifications will be sent from the cloud server in the event of incoming call, missed call, new message, new request, and new patient's note entered.

[0008] One graphical device (In Charge Device) with touch screen for typed input, a microphone, and a speaker will be provided to the nurse-in-charge. This device is portable. A free-standing software application (app) on the device links the user to the cloud component of the system, incorporating all the abovementioned Nurse Device's functionalities as well as the following: to add / delete / prioritise requests; to review / alter patient's clinical demographics, risks, admission information; to "discharge the patient" from the system.

[0009] One graphical device (Hub Device) with touch screen for typed input, a microphone, and a speaker will be located at the staff area. This device is mounted on the desk or the wall of the work area. A free-standing software application (app) on the device links the user to the cloud component of the system, incorporating all the abovementioned In Charge Device's functionalities as well as the following: to review all requests – active and completed - in the past 24 hours; to review and analyse logged alerts, nurse call data, and patient surveys and present these data in a graphical manner.

[0010] All signal communications are processed by the freestanding application (app) resides in the devices and sent using either local Wi-Fi or cellular network. These communications are further processed by the cloud runtime resides in cloud infrastructure. The cloud components of the system have the following functions: housing databases that store users' credential details, patients' information, and communications between devices including requests, notes, and messages; deploying logic runs to determine if a patient is associated with a particular device and to sort the requests according to their respective category and the patients according to

their bed number; connecting devices for two-way voice communications using Voice over Internet Protocol (VoIP). The cloud run times **6** has its functionalities and securities updated remotely. The cloud storage **7** are also automatically backed up remotely. Sensitive data are thereby safeguarded against local breach.

[0011] Another feature of the present invention is that all the devices are dynamically linked to each other via cloud server / database, allowing real-time data synchronisation among devices when the database is updated.

[0012] Additional features, which alone or in combination with any other feature(s), such as those listed above, may comprise patentable subject matter and will become apparent to those skilled in the art upon consideration of the following detailed description of various embodiments exemplifying the best mode of carrying out the embodiments as presently perceived.

Brief Description of The Drawings

[0013] The invention will be more fully understood and further advantages will become apparent when reference is had to the following detailed description of the preferred embodiments of the invention and the accompanying drawing, in which:

FIG. 1 is a schematic diagram showing various components of the integrated cloud ward communication and floor management system

FIG. 2 is a schematic diagram showing various processes that the devices and cloud servers use to communicate with each other.

FIG. 3 is a schematic diagram showing integrated cloud ward communication and floor management system of various devices coupled to each other and coupled to the cloud component of the system.

FIG. 4 is a screen shot of the Start Screen that appears on the graphical device (Patient Device).

FIG. 5 is a screen shot of Bed Selection screen that appears on the graphical device (Patient Device) when the device is not coupled with a patient.

FIG. 6 illustrates the example display screen (Patient Device) wherein the cloud runtime determines that the device is currently coupled with a patient and asked the user to confirm.

FIG. 7 is a screen shot of Patient Detail screen that appears on the graphical device (Patient Device) when the patient detail is retrieved from cloud database.

FIG. 8 is a screen shot of Set Notification screen that appears after the patient details has been entered / updated.

FIG. 9 is a screen shot of Main Navigation screen that appears on the graphical device (Patient Device) when the device is coupled with a patient.

FIG. 10 is a screen shot of "Night Mode" screen that appears on the graphical device (Patient Device) when the user activates night mode.

FIG. 11 is a screen shot of Requests List screen that appears on the graphical device (Patient Device) when details of the patient's active requests are retrieved from cloud database.

FIG. 12 is a screen shot of Requests List screen that appears on the graphical device (Patient Device) when the user activates the delete function.

FIG. 13 is a screen shot of Requests List screen that appears on the graphical device (Patient Device) when the device asks for delete confirmation.

FIG. 14 is a screen shot of User Guide Selection screen that appears on the graphical device (Patient Device) wherein the user may choose which part of the user guide to view.

FIG. 15 is a screen shot of User Guide screen that appears on the graphical device (Patient Device) after the device loads the user guide video.

FIG. 16 is a screen shot of Nurse Call screen that appears on the graphical device (Patient Device) when there is an incoming or outgoing voice call from or to another device.

FIG. 17 is a screen shot of Nurse Call screen that appears on the graphical device (Patient Device) when the user chooses a particular call recipient.

FIG. 18 is a screen shot of Nurse Call screen that appears on the graphical device (Patient Device) when the calling device connects to the recipient device via cloud VOIP.

FIG. 19 is a screen shot of Request Category Selection screen that appears on the graphical device (Patient Device) wherein the user may choose the category of their request belongs.

FIG. 20 is a screen shot of Request Category Selection screen that appears on the graphical device (Patient Device) when the patient's diet status is set to fasting.

FIG. 21 is an example screen shot of Request Selection screen that appears on the graphical device (Patient Device) wherein the user may select their request.

FIG. 22 is an example screen shot of Request Selection screen that appears on the graphical device (Patient Device) wherein the user may confirm or cancel their request.

FIG. 23 is an example screen shot of Request Selection screen that appears on the graphical device (Patient Device) when the request has been registered by the cloud run time.

FIG. 24 is an example screen shot of Clinical Selection screen that appears on the graphical device (Patient Device) wherein the user may select their clinical request.

FIG. 25 is an example screen shot of Request Selection screen that appears on the graphical device (Patient Device) wherein the user may select their request.

FIG. 26. Is an example screen shot of Patient Details screen that appears on the graphical device (Patient Device) with patient details as well as request history.

FIG. 27 is a screen shot of Tools Selection screen that appears on the graphical device (Patient Device) wherein the user may select their clinical tools.

FIG.28 is a screen shot of Adult ALS screen that appears on the graphical device (Patient Device) wherein the user may reference Adult ALS algorithm and uses the stopwatch function.

FIG.29 is a screen shot of Paediatric ALS screen that appears on the graphical device (Patient Device) wherein the user may reference Paediatric ALS algorithm and use the stopwatch function.

FIG. 30 is a screen shot of Stop Watch screen that appears on the graphical device (Patient Device) wherein the user may use the stop watch function.

FIG. 31 is a screen shot of Scribble screen that appears on the graphical device (Patient Device) wherein the user may enter / delete notes and these notes are displayed after retrieving from cloud database.

FIG. 32 is a screen shot of an example Clinical Guideline Selection screen that appears on the graphical device (Patient Device) wherein the user may select a particular clinical guideline.

FIG. 33 is a screen shot of an example Clinical Guideline screen that appears on the graphical device (Patient Device) wherein the user may read and examine a particular clinical guideline.

FIG. 34 is a screen shot of Hospital / Ward Information screen that appears on the graphical device (Patient Device) wherein the user may read information on the hospital and the ward.

FIG. 35 is a screen shot of Breathing / Circulation Exercise screen that appears on the graphical device (Patient Device) wherein the user may watch a short presentation of how to perform these exercises.

FIG. 36 is a screen shot of authentication process that takes place before user makes modification to patient details.

FIG. 37 is a screen shot of Patient Modification Menu screen wherein the user may choose the options.

FIG. 38 is a screen shot of Patient Detail Modification screen wherein the user can make changes to patient details as well as discharge patient.

FIG. 39 is a screen shot of Patient Detail Discharge Confirmation screen wherein the user is asked to confirm discharging the patient from the system and the device.

FIG. 40 is a screen shot of Patient Survey Confirmation screen wherein the user is asked to confirm his/her participation in a short survey.

FIG. 41 is a screen shot of Patient Survey screen wherein the user is asked to answer survey questions and input their opinions.

FIG. 42 is a screen shot of Patient Survey Submission Confirmation screen in which the user is prompted with a confirmation after the survey has been submitted.

FIG. 43 is an example screen shot of a Confirmation Screen.

FIG. 44 is a screen shot of a Log-In screen on the graphical device (Nurse / In Charge / Hub Device).

FIG. 45 is a screen shot of a Call screen on the graphical device (Nurse / In Charge / Hub Device).

FIG. 46 is a screen shot of a Duress screen on the graphical device (Nurse / In Charge / Hub Device).

FIG. 47 is a screen shot of a Notification Screen on the graphical device (Nurse / In Charge / Hub Device).

FIG. 48 is a screen shot of Requests List screen that appears on the graphical device (Nurse Device) when details of every patients' active requests are retrieved from cloud database.

FIG. 49 is a screen shot of Floor Map screen that appears on the graphical device (Nurse Device) when details of every patients' details are retrieved from cloud database.

FIG. 50 is a screen shot of View / Edit Notes Confirmation screen that appears on the graphical device (Nurse Device).

FIG. 51 is a screen shot of Patient's Note screen that appears on the graphical device (Nurse Device) when a patient's notes are retrieved from cloud database.

FIG. 52 is a screen shot of Notes Adding screen that appears on the graphical device (Nurse Device) wherein the user may add an entry to the patient's note.

FIG. 53 is a screen shot of Notes Added Confirmation screen that appears on the graphical device (Nurse Device).

FIG. 54 is a screen shot of Chat Contact screen that appears on the graphical device (Nurse Device) when details of other users (Nurse) are retrieved from cloud database.

FIG. 55 is a screen shot of New Message screen that appears on the graphical device (Nurse Device) wherein the user may start a new chat session with another contact.

FIG. 56 is an example screen shot of Message screen that appears on the graphical device (Nurse Device) when details of chat messages in a particular chat session are retrieved from cloud database.

FIG. 57 is an example screen shot of Photo Selection screen that appears on the graphical device (Nurse Device) wherein the user may select a photo to send.

FIG. 58 is an example screen shot of Audio Recording screen that appears on the graphical device (Nurse Device) wherein the user may select an audio recording to send.

FIG. 59 is a screen shot of Contact Information screen that appears on the graphical device (Nurse Device) when details of other users (Nurse) are retrieved from cloud database.

FIG. 60 is a screen shot of Contacts screen that appears on the graphical device (Nurse Device) when details of the current contacts are retrieved from cloud database.

FIG. 61 is a screen shot of Setting screen that appears on the graphical device (Nurse Device) when details of the current user (Nurse) are retrieved from cloud database.

FIG. 62 is a screen shot of Setting Notification screen that appears on the graphical device (Nurse Device).

FIG. 63 is a screen shot of Setting Data and Storage screen that appears on the graphical device (Nurse Device).

FIG. 64 is a screen shot of Requests List screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when details of every patients' active requests are retrieved from cloud database.

FIG. 65 is a screen shot of Prioritising Requests Confirmation screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when the device asks the user to confirm prioritising a particular request.

FIG. 66 is a screen shot of Add Requests Confirmation screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when the device asks the user to select a patient.

FIG. 67 is a screen shot of Add Requests screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) wherein the user may add a request on behalf of the patient.

FIG. 68 is a screen shot of Add Requests screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) that shows the list of request items to be selected from.

FIG. 69 is a screen shot of Add Requests screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) that shows confirmation.

FIG. 70 is a screen shot of Request Delete screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) that shows delete option.

FIG. 71 is a screen shot of Sort Request Criteria screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) that shows sorting option.

FIG. 72 is a screen shot of Floor Map screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when details of every patients are retrieved from cloud database.

FIG. 73 is a screen shot of Floor Map screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when extended clinical details of a single patient are retrieved from cloud database.

FIG. 74 is a screen shot of View/Edit Notes Confirmation screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) in response to a long touch on a single patient cell.

FIG. 75 is a screen shot of Notes Viewing / Adding screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) wherein the user may view, add entry to, and /or delete a patient's note(s).

FIG. 76 is a screen shot of Notes Viewing / Adding screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) with an on-display keyboard.

FIG. 77 is a screen shot of Notes Viewing / Adding screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) with a submission confirmation pop-up.

FIG. 78 is a screen shot of Notes Viewing / Adding screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) with a list of sorting criteria to be selected from.

FIG. 79 is a screen shot of Floor Map Modify Patient Confirmation screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when the user is prompted to select the patient to modify his/her details.

FIG. 80 is a screen shot of Modify Patient screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when the patient details are retrieved.

FIG. 81 is a screen shot of Modify Patient screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) that shows on-display list for the user to select.

FIG. 82 is a screen shot of Modify Patient Confirmation screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) when the patient details are successfully updated.

FIG. 83 is a screen shot of Discharge Patient screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) with the discharge option.

FIG. 84 is a screen shot of Discharge Patient Confirmation screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) with a discharge confirmation pop-up.

FIG. 85 is a screen shot of Floor Map Sort By screen that appears on the graphical device (Nurse In Charge and Nurse Hub Devices) with a list of sorting criteria to be selected from.

FIG. 86 is a screen shot of Chart Selection Criteria screen that appears on the graphical device (Nurse Hub Device) wherein the user may select the applicable criteria for data analysis.

FIG. 87 is a screen shot of Chart screen that appears on the graphical device (Nurse Hub Device) when analysed data, using selected criteria, is presented in a graphical manner.

Detailed Description

[0014] FIG. 1 is a diagrammatic depiction of a healthcare communication and floor management system **1** according to this disclosure. It includes a plurality of graphical touch screen devices **2,3,4** and a hub device **5** which are communicatively coupled using cloud-based runtime **6** and database **7** located offsite as shown in **FIG. 1**. No physical connections exist between any devices; instead, all communications **8** are conducted using Wi-Fi or cellular network through cloud runtime **6** as diagrammatically depicted by double arrows **8**. The patient device **2** is attached to a bed **10**. The nurse device **3** and nurse-in-charge device **4** are portable devices carried by on-the-floor nursing staff **11**. The hub device **5** is located at staff work area **12**. The functionality of devices **2,3,4,5** described herein is applicable to all stations regardless the locations. All the data from the devices are stored on and to the devices are retrieved from remote Cloud Database **7** via Cloud Runtime **6**. This communication is indicated diagrammatically by the double arrow **9**. The data are automatically duplicated on another database for loss prevention as depicted by the double arrow **13**.

[0015] FIG. 2 is a diagrammatic depiction of core functions of healthcare communication and floor management system **1** according to this disclosure. Screen **200** shows the communication processes that have taken place when a patient device **2** makes a call to a nurse device **3** using cloud VOIP runtime **6**. Screen **201** shows the communication processes that have taken place when a patient device **2** makes a request, the cloud storage and notification runtimes **6** will be triggered, resulting in database storage **9** and instant devices **3,4,5** notifications **8**. Screen **202** shows the communication processes that have taken place when a nurse-in-charge device **4** modifies patient details, the cloud retrieval, update, and store runtimes **6** will be triggered, resulting in database storage **9** and instant devices **2,3,4,5** updates **8**. Screen **203** shows the communication processes that have taken place when a nurse device **3** sends a text/multimedia message to another device, the cloud storage and notification runtimes **6** will be triggered, resulting in database storage **9** and instant devices **3,4,5** notifications. Screen **204** shows the communication processes that have taken place when a hub device **5** requests data analysis, the cloud retrieval and analysis runtimes **6** will be triggered and the result will be displayed graphically on hub device **5**.

[0016] FIG. 3 shows an example of how a system **1** might be set up on a ward **13** and the respective physical locations of devices **2, 3, 4, 5**. Since the system is driven by cloud-based runtimes and database **6, 7** no physical

connection between the devices is required as depicted by dotted lines **14**.

[0017] Referring to **FIG. 4** to **FIG. 38**, examples of user interfaces, which may appear on the graphical touch, display screens of a patient device **2**. The descriptions below will discuss the various screens as appearing on one of the Patient Devices **2**.

[0018] FIG. 4 is a screen shot of an example of a Start Screen **400**. In this embodiment, the screen may become backlit when a user touches screen. It includes a "Username" Text Field **401** for user to input a log-in ID, a "Password" Text Field **402** for user to input a password, and a "Log-In" Button **403** for user to initiate credential checking. The credentialing is done by cloud runtime **6** and **FIG. 5** Screen **500** will display if it is successful, otherwise an error message will show.

[0019] FIG. 5 is a screen shot of an example of a Bed Selection Screen **500**. includes a "Bed Number Selection" Text Field **501** and a "Confirm" button **502**. A background check will be performed by the Patient device **2** first to see if a patient has already been assigned to this particular Patient Device. If so, a Confirmation Pop-Up **601** of **FIG. 6** Screen **600** will prompt the user to confirm if the patient is still assigned to this particular device. Else, the user will be asked to select the bed number that this particular Patient Device will be associated with. When the "Confirm" Button **502** is pressed, the device will communicate with the cloud runtime **6**, which, in turn, checks if the bed number is already been assigned to another Patient Device. An error message will return if that is the case, prompting the user to select a different bed number. Once the bed is chosen or the user confirms the device's pre-existing association, the device **2** proceeds to **FIG. 7** Screen **700**.

[0020] FIG. 7 Screen **700** includes fields that contain patient's demographics **701**, clinical parameters **702**, and risk factors **703**. These will receive inputs from the user. All the fields will be pre-filled with the patient's details stored on cloud database **7** in the event of the device is already assigned to a bed number and a patient. When "Add Patient" Button **704** is pressed, the demographics information will be checked for error (for e.g empty fields) then send to cloud-based database **7** for storage. If "Reset" Button **705** is pressed, the Device will return all values of **701, 702, and 703** to default. If "Cancel" Button **706** is pressed, the Device will return the user to **FIG. 5** Screen **500**. The "Cancel" Button **706** will display "Discharge" if the device is already associated with a patient and allows the user to disassociate the Device from a particular patient.

[0021] FIG. 8 Screen **800** is an example of "Set Notifications" Screen. In response to user touching "Yes" Button **801**, the device will set automatically timed patient reminders for breathing and circulation exercises depending on the degree of risk.

[0022] FIG. 9 Screen **900** displays an example of the Main Navigation Screen. In response to a user touching "Night

Mode" switch **901**, the device **2** will enter Night Mode with display brightness set to lowest and audio function of the device disabled (**FIG. 10** Screen **1000**). In response to a user touching "My Requests" button **902**, the Request Summary Screen **FIG. 11** Screen **1100** will appear on the display **[0023]**. In response to a user touching "User Guide" button **903**, the User Guide Screen **FIG. 14** Screen **1400** will appear on the display **[0024]**. In response to a user touching "Call" Button **904**, the Call Screen **FIG. 16** Screen **1600** will appear on the display **[0025]**. In response to a user touching "Request" Button **905**, the Request Screen **FIG. 19** Screen **1900** will appear on the display **[0026]**. In response to a user touching "Clinical" Button **906**, the Clinical Request Screen **FIG. 11** Screen **1100** will appear on the display **[0027]**. In response to a user touching "Patient" button **907**, the Patient Detail Screen **FIG. 26** Screen **2600** will appear on the display **[0029]**. In response to a user touching "Tools" Button **908**, the Utility Screen **FIG. 27** Screen **2700** will appear on the display **[0030]**. In response to a user touching "Emergency" button **909**, the Emergency Call Screen **FIG. 43** Screen **4300** will appear on the display. The "Patient" button **907** receives real-time textual updates from Cloud-based runtime **6** whenever there is a change in patient's name and / or allergies. The colour of this button also changes according to the patient's fasting status. This button **907**, therefore, provides most crucial patient information in real-time. "My Request" button **902** receives real-time updates from Cloud-based runtime **6** whenever there is a change in the number of active requests and provides a graphical display of the number.

[0023] In response to "My Request" button **902** being touched, the Request Summary Screen **1100** of **FIG. 11** appears on the display screen of the Patient device **2**. On this screen **1100**, a scrollable "Request" Table **1101** will be populated with all the patient's Active Request Cells **1102**. The cell **1102** contains information such as Bed Number, Surname, Request Item, Allergies, Request Item Category, and Time Requested. User can swipe left of each individual cell to bring out "Delete" Button **1201** of **FIG. 12**. When the user touches "Yes" Button **1302** of the "Confirmation" Pop-up **1301** of **FIG. 13**, the request will be removed from the cloud database using the process depicted in Screen **201** of **FIG. 2**. The device **2** will return the display to Screen **900** if the user touches "Return to Main Menu" Button **1103**.

[0024] In response to "User Guide" Button **903** being touched, the "User Guide" Screen **1400** of **FIG. 14** appears on the display of the Patient device **2**. In response to the user touching "Guide Selection" Text Field **1403**, a scrollable list **1402** of selectable content appears at the bottom of the screen **1400**. When the user touches "Find Out" Button **1401**, Screen **1500** of **FIG. 15** will display with the guide video pre-loaded **1501**. The device **2** will return the display to Screen **900** if the user touches "Return" Button **1502**.

[0025] In response to "Call" Button **904** being touched, the "Call" Screen **1600** of **FIG. 16** appears on the display of the Patient device **2**. In response to the user touching "Recipient" Text Field **1601**, a Recipient Drop-Down Menu **1701** of **FIG. 17** Screen **1700** allows the user to choose the person to call. Once the recipient is selected, the user then touches the 'Call' Button **1602**. The device **2** will connect

cloud-based runtime **6**, which, in turn, connects the device with the designated recipient device using Voice-over-Internet Protocol (VOIP) using processes depicted in Screen **200** of **FIG. 2**. **FIG. 18** Screen **1800** shows an example of a call in progress. The device **2** will return the display to Screen **900** if the user touches 'Cancel' button **1603** or "End Call" Button **1801**.

[0026] In response to "Request" Button **905** being touched, the Request Screen **1900** of **FIG. 19** will display. On this screen **1900**, four buttons will be displayed **1901, 1902, 1903, 1904**. Each button has textual description of a particular request category. When these buttons are touched, the "Request Sub Menu" Screen will display (see **FIG. 21** Screen **2100** for an example). When a particular item **2101** was touched by the user, Confirmation Screen **2200** of **FIG. 22** will display (See **[0028]** for details). A graphical "Return" Button **1905** is located at top-right of the screen **1900** which, when touched, returns the user to Screen **900**. If the patient's diet status is set to fasting, the user will be prompted with a Warning Pop-Up **2001** of **FIG. 20** and thus prevented from selecting a food / drink request.

[0027] In response to "Clinical" Button **803** being touched, the Clinical Request Screen **2400** of **FIG. 24**. Will display. On this screen **2400**, eight buttons will be displayed **2401, 2402, 2403, 2404, 2405, 2406, 2407, 2408**. Each button except "Other" Button **2408** has textual description of a particular symptom. In response to "Other" Button **2408** being touched, the "Clinical Sub-Menu" Screen will display (see **FIG. 25** Screen **2500**). When a particular item **2501** was touched by the user, Confirmation Screen **2200** of **FIG. 22** will display (See **[0028]** for details). A graphical "Return" Button **2409** is located at top-right of the screen which, when touched, returns the user to Screen **900**.

[0028] Screen **2200** of **FIG. 22** shows an example of "Confirmation" Screen in response to a particular request button being touched on the Patient device **2**. On this screen **2200**, the user can either touch "Yes" Button **2201** to confirm or "Cancel" Button **2202** to cancel the request. "Item" Text Field **2203** will display the item being requested. Upon "Yes" Button **2201** being touched, the Patient device **2** will connect to Cloud Runtime **6** using the process depicted in Screen **201** of **FIG. 2** and if the request was successfully sent, a "Confirmation" Pop-Up **2301** of **FIG. 23** will display. The user will be returned to Screen **900** of **FIG. 9** when "Cancel" Button is touched **2202**.

[0029] In response to "Patient" Button **907** being touched, the "Patient Detail" Screen **2600** of **FIG. 26** appears on the display screen of the Patient device **2**. On this screen **2600**, patient's demographics are displayed in different sections **2601, 2602, 2603, 2604, 2605, 2606**. Section **2601** displays patient's full name. Section **2602** displays patient's Hospital UR number, date of birth, and length of stay. Section **2603** displays patient's allergies. Section **2604** displays patient's clinical parameters. Section **2605** displays patient's risk factors. Section **2606** displays the list of past requests **2607** made by the patient in a scrollable table format. All the patient's details are updated in real time by Cloud Runtime **6** if there are any changes on Cloud Database **7** using the process depicted in

Screen **202** of **FIG. 2**. When “Return” Button **2608** is pressed, the display returns to Screen **900**.

[0030] In response to “Tool” Button **908** being touched, the “Utility” Screen **2700** of **FIG. 27** appears on the display screen of the Patient device **2**. On this screen **2700**, eight buttons will be displayed **2701, 2702, 2703, 2704, 2705, 2706, 2707, and 2708**. Each button has textual description corresponding to the tool associated with the button. See [0031] - [0037] for details of each individual tool. A graphical “Return” Button **1309** is located at top-right of the screen which, when touched, returns the user to Screen **900**.

[0031] **FIG. 28** Screen **2800** displays an example of the tool “Adult ALS” Screen after Button **2701** is touched. Picture Box **2801** displays a zoomable and scrollable diagram of Adult ALS algorithm. The Stop Watch Box **2802** displays a stop clock in hour:minute:seconds format. In response to the user touches “Start” Button **2803**, the stop clock commences and stops when the user touches “Pause” Button **2804**. The “COACHED” Text Field **2805** and “Aetiology” Text Field **2806** display important mnemonics of the defibrillation sequence and common causes of an arrest in adults, respectively. In response to the user touches “Return” Button **2807**, the “Utility” Screen **2700** of **FIG. 27** will display.

[0032] **FIG. 29** Screen **2900** displays an example of the “Paediatrics ALS” screen after Button **2702** is touched. This tool offers identical functions as the tool “Adult ALS” with the only exception that the algorithm applies to a paediatric resuscitation scenario.

[0033] **FIG. 30** Screen **3000** displays an example of the “Stop Watch” screen after Button **2703** is touched. The Stop Watch Box **3001** displays a stop clock in hour:minute:seconds format. In response to the user touches “Start” Button **3002**, the stop clock commences. In response to the user touches “Pause” Button **3003**, the stop clock stops. In response to the user touches “Reset” Button **3004**, the stop clock reset to 00:00:00. In response to the user touches “Return” Button **3005**, the “Utility” Screen **2700** of **FIG. 27** will display.

[0034] **FIG. 31** Screen **3100** displays an example of the “Scribble” screen. In response to the user touches the “Type Here” Text Field **3101**, a keyboard will be display at the bottom of the screen, allowing the user to type the note. In response to the user touches the “Add” Button **3102**, the message in Text Field **3101** will be sent to the cloud database **7** for storage, which in turn dynamically updates the content of the scrollable “Notes” Table **3103**. The “Notes” Table contains individual “Notes” Cell **3104** that displays the message written by the user as well as the date of the message entry and is sorted by time/date in reverse order. In response to the user touches “Return” button **3105**, the “Utility” Screen **2700** of **FIG. 27** will display.

[0035] **FIG. 32** Screen **3200** displays an example of the “Guideline List” screen. The scrollable “Guideline List” Table **3201** displays individual “Guideline” Cells **3202**. In response to the user touches individual “Guideline” cell, the corresponding guideline screen (**FIG 33** Screen **3300** shows an example) will display. In response to the user

touches “Return” button **3203**, the “Utility” Screen **2700** of **FIG. 27** will display.

[0036] **FIG. 34** Screen **3400** displays an example of the “Hospital / Ward Info” screen. The “Information” Text Field **3401** displays information regarding the ward and the hospital. In response to the user touches “Return” button **3402**, the “Utility” Screen **2700** of **FIG. 27** will display.

[0037] **FIG. 35** Screen **3500** displays an example of the “Breathing / Circulation Exercise” screen. The “Breathing / Circulation Exercise Video” Box **3501** will automatically play an instructional video, demonstrating how the breathing and circulations exercises are done. In response to the user touches “Return” button **3502**, the “Utility” Screen **2700** of **FIG. 27** will display.

[0038] After authentication (**FIG. 36** Screen **3600**), the Patient device **2** displays **FIG. 37** Screen **3700** the “Patient Details – Update / Discharge / Bed Change” Menu Screen, in which the user can select “Update Or Discharge” Button **3701** to update patient’s details, or to select “Bed Change” Button **3702** to change patient’s bed number, or to select “Cancel” Button **3703** return to “Utility” Screen **2700** of **FIG. 27**

[0039] **FIG. 38** Screen **3800** displays an example of “Update / Discharge Patient” screen. Multiple Text Fields **3801** allows the user to modify patient details. In response to the user touching “Update” Button **3802**, the device **2** will communicate with cloud runtime **6**, which, in turn, updates the cloud database using the process depicted in Screen **202** of **FIG. 2**. In response to the user touching “Discharge” Button **3803**, a “Confirmation” Pop-Up **3901** of **FIG. 39** will display, asking the user to confirm discharging the patient from the device **2**. In response to the user touches “Confirm” Button **3901**, the “Patient Survey” Screen **4000** of **FIG. 40** will display. The user can select “Cancel” Button **3804** to return to “Utility” Screen **2700** of **FIG. 27**

[0040] **FIG. 40** Screen **4000** displays an example of “Patient Survey” screen, in which a Confirmation Pop-Up **4001** asking for the user to confirm participation in the survey. In response to the user touches “Yes” Button **4002**, the user will be taken through a series of survey questions (**FIG. 41** Screen **4100**), culminating in a “Success” Message **4201** (**FIG. 42** Screen **4200**) upon survey submission by touching “Summit Survey” Button **4202**. The device **2** then logs out and Screen **400** of **FIG. 4** will display. The cloud database **7** will be updated.

[0041] Referring to **FIG. 44** to **FIG. 47**, examples of user interfaces which may appear on the graphical touch display screens of all Nurse Device **3**, In-Charge Device **4**, and Hub Device **5**. The descriptions below will discuss the various screens as appearing on one of the devices **3,4,5**.

[0042] **FIG. 44** is a screen shot of an example of a Start Screen **4400** which applies to devices **3,4,5**. In this embodiment, the screen may become backlit when a user

touches screen. Screen **4400** includes Text Fields **4401** for log-in email id and password entries **4402**. In response to “Login” Button **4403** being touched, the log-in information will be sent to cloud-based run time **6** for user authentication. In the event of a successful log in, Screen **4800** of **FIG. 48** will display on Nurse device **3**, or Screen **6400** of **FIG. 64** on In Charge **4** and Hub devices **5**. Otherwise an error message will be displayed, prompting the user to re-enter log-in details.

[0043] FIG. 45 Screen **4500** displays an example of “Call” screen, which applies to devices **3,4,5**. In response to user touching “Recipient” Text Field **4501**, a scrollable list **4502** will appear on the screen, allowing the user to select the name of the recipient **4503**. In response to user touching the “Call” Button **4504**, the device **3,4,5** will be connected by the Cloud Server **6** to the selected recipient’s device using VOIP, enabling voice communication to occur using the process depicted in Screen **200** of **FIG. 2**. In response to user touching the “Switch App” Button **4505**, Screen **4800** of **FIG. 48** will display on Nurse device **3**, or Screen **6400** of **FIG. 64** on In Charge **4** and Hub devices **5**.

[0044] FIG. 46 Screen **4600** displays an example of “Duress” screen which appears when the user activates the duress function on devices **3,4,5**. In response to user touching “Warning” Button **4601**, the device will connect to the cloud server **6** and send a duress message to all other devices **3,4,5** in the network. The “Countdown” Text Field **4602** displays the number of seconds remaining before the device connects the cloud server **6** and send duress notification to all the Nurse Devices **3,4,5** automatically using the process depicted in Screen **201** of **FIG. 2**. In response to the user touches the “Cancel” Button **4603**, the “Countdown” **4602** will stop. In response to the user touches the “Reset” Button **4604**, the Countdown” **4602** will stop and reset to 10s.

[0045] FIG. 47 Screen **4700** displays an example of “Notification” Screen which appears when the cloud server sends notifications **4701** to the devices **3,4,5**. In response to the user touches the notification **4701**, the devices **3,4,5** will open relevant application.

[0046] Referring to **FIG. 48** to **FIG. 63**, examples of user interfaces which may appear on the graphical touch display screens of Nurse Device **3**. The descriptions below will discuss the various screens as appearing on one of the devices **3**.

[0047] FIG. 48 Screen **4800** displays an example of the “Requests” screen. The scrollable table **4801** will be populated with a list of all patients’ active requests. The Request Cells **4802** are sorted and colour-coded according to the priority category of the requests. The cell also contains the following information: bed number, patient’s last name, request item, patient’s allergy, and time of the request. In response to user touching “Floor Map” Button **4803**, the screen will display Floor Map Screen **4900** of **FIG. 49**. The Main Navigation Panel **4804** of the application is located at the bottom of screen and contains 4 touchable graphical buttons **4805, 4806, 4807, 4808**. In response to user touches the graphical “Ward” Button **4805**, the Requests Screen **4800** of **FIG. 48** will display. In

response to user touches the graphical “Chats” Button **4806**, the Chats Screen **5400** of **FIG. 54** will display. In response to user touches the graphical “Contacts” Button **4807**, the Contacts Screen **6000** of **FIG. 60** will display. In response to user touches the graphical “Settings” button **4808**, the Settings Screen **6100** of **FIG. 61** will display.

[0048] FIG. 49 Screen **4900** displays an example of the “Floor Map” screen. The scrollable Table **4901** will be populated in real time with a list of all the patients on the ward. The Patient Cells **4902** are sorted according to the bed number and it’s colour-coded according to the gender of the patient. The cell **4902** also contains the following information: patient’s first, last name, patient ID, insurance status, and allergy. In response to user touching a particular patient cell **4902**, the “View and Edit Notes Confirmation” Dialogue Box (**5001** of **FIG. 50** Screen **5000**) will appear on the screen. If the user touches “Yes” Button **5002**, the “Patient’s Notes” Screen **5100** of **FIG. 51** will display. The dialogue disappears if the user touches “Cancel” Button **5003** instead. In response to the user touching “Requests” **4903**, the display returns to Screen **4800** of **FIG. 48**. Refer to Section **[0047]** for details of the functionalities of the Main Navigation Pane at the bottom of the screen **4900**.

[0049] FIG. 51 Screen **5100** displays an example of the “Patient’s Notes” screen. The scrollable table **5101** will be populated with a list of all the notes written about the patient and is updated in real time by Cloud Runtime **6**. The Notes Cells **5102** are sorted according to the reverse time stamp of the notes entered. In response to a user touching “+” Button **5103** on the top right of the screen, the “Add Notes” Screen **5200** of **FIG. 52** will display. In response to the user touching “Floor Map” Button **5104**, the device **3** will return to “Floor Map” Screen **4900** of **FIG. 49**. Refer to Section **[0047]** for details of the functionalities of the Main Navigation Pane at the bottom of the screen **5100**.

[0050] FIG. 52 Screen **5200** displays an example of the “Add Notes” screen. In response to the user touches the editable “Notes” Text Field **5201**, an onscreen Keyboard **5204** will pop up, allowing the user to input the note. The same onscreen keyboard **5204** allows the user to edit “Your Name” Text Filed **5202**. In response to the user touches “Add” Button **5203**, the device **3** will check for any error before sending the note to the Cloud Database **7** for storage using a similar process as depicted in Screen **203** of **FIG. 2**. All the connected nurse devices **3,4,5** will be notified of a new note entry. A “Confirmation” Pop-Up (**5301** of **FIG. 53** Screen **5301**) will appear on the screen when the process is completed. “Notes” Screen **5100** of **FIG. 51** will display when the user touches “Back” Button **5205**.

[0051] FIG. 54 Screen **5400** displays an example of “Chats” screen that is applicable to Device **3** and **4**. The scrollable table **5401** will be populated with a list of all Conversations Cells **5402** and are sorted by the date and time of the conversation in reverse order. In response to user touches “Search” field **5403**, an onscreen keyboard will appear on the screen, allowing the user to type the name of the contact for the device to search amongst the conversation **5402**. In response to user touches “Edit” Button **5403**, graphical “Delete” Buttons will be displayed

next to each contact, allowing the user to delete conversations **5402**. In response to user touches the graphical “Add Conversation” Button **5404**, the “New Message” Screen **5500** of **FIG. 55** will display. Touching “Edit” Button **5405** will bring out the delete option to remove conversations. Refer to Section **[0047]** for details of the functionalities of the Main Navigation Pane at the bottom of the screen **5400**.

[0052] FIG. 55 Screen **5500** displays an example of “New Message” screen. The scrollable table **5501** will be populated with a list of all the contacts **5502** and are sorted alphabetically. In response to user touches “Search” field **5503**, an onscreen keyboard will appear on the screen, allowing the user to type the name of the contact for the device to search amongst the contacts **5502**. In response to the user touches “New Group” Button **5504**, the user is given the opportunity to start a group conversation. When the user touches a contact **5502**, the “Conversation” Screen **5600** of **FIG. 56** will display. The device returns to Screen **5400** of **FIG. 54** when the user touches “Chats” Button **5505**.

[0053] FIG. 56 Screen **5600** displays an example of “Conversation” screen. The scrollable table **5601** will be populated with Messages **5602** and are sorted by the date and time of the messages in reverse order. The messages are also further colour-differentiated based on the source of the message. In response to user touches “Message” Text Field **5603**, a keyboard **5604** will appear on the screen, allowing the user to type the message. In response to user touching the graphical “Add Photo” Button **5605**, the “Gallery” Screen **5700** of **FIG. 57** will display, allowing the user to browse and select photos to send. In response to user touching the graphical “Add Voice Message” Button **5606**, the “Recording” Screen **5800** of **FIG. 58** will display, allowing the user to record a voice message. In response to the user touches the graphical “Send” Button **5607**, the message, photos, and / or recorded voice in the field **5603** will be sent to cloud server **7** for storage and then forwarded to the other user in the conversation using a similar process as depicted in Screen **203** of **FIG. 2**. In response to user touching the graphical “Information” Button **5608**, the “Information” Screen **5900** of **FIG. 59** will display, showing information such as number of messages and the last message sent. In response to the user touches “Back” Button **5609**, the “Chats” Screen **5400** of **FIG. 54** will display.

[0054] FIG. 60 Screen **6000** displays an example of “Contacts” screen. In response to user touching “Personal Storage” Button **6001**, the “Storage Setting” Screen **6300** of **FIG. 63** will display, showing information on the storage capacity (used and remaining). The scrollable table **6002** will be populated with “Names of Contacts” Cells **6003** and are sorted by the name of the contacts in alphabetical order. In response to user touching the “Name of Contacts” cell, the “Conversation” Screen **5600** of **FIG. 56** will display, showing the messages between the user and the selected user. Refer to Section **[0047]** for details of the functionalities of the Main Navigation Pane at the bottom of the screen **6000**.

[0055] FIG. 61 Screen **6100** displays an example of “Settings” screen. In response to the user touches “Name” Text Field **6101**, a keyboard will appear on the screen,

allowing the user to change the name of the user. The “Mobile Number” Text Field **6102** displays the mobile number currently associated with the device. In response to user touching the “Notifications and Sounds” Button **6103**, the “Notifications and Sounds Setting” Screen **6200** of **FIG. 62** will display, allowing the user to change the settings on notification and sound. In response to user touching the “Data and Storage” Button **6104**, the “Storage Setting” Screen **6300** of **FIG. 63** will display, allowing the user to change the settings on personal storage. In response to user touching the “Log Out” Button **6105**, the device will log out. Refer to Section **[0047]** for details of the functionalities of the Main Navigation Pane at the bottom of the screen **6300**.

[0056] Referring to **FIG. 64** to **FIG. 86**, examples of user interfaces which may appear on the graphical touch display screens of a Nurse Device **4,5**. The descriptions below will discuss the various screens as appearing on one of the devices **4,5**.

[0057] After successful log in, (**FIG. 44** Screen **4400**) **FIG. 64** Screen **6400** displays an example of the “Requests” screen that applies to both Devices **4, 5**. The scrollable table **6401** will be populated with a list of all the patients’ active requests. The request cells **6402** are sorted according to the priority category of the requests and it’s colour-coded. The cell **6402** also contains the following information: bed number, patient’s last name, request item, patient’s allergy, and time of the request. In response to user touches an individual request cell **6402**, a “Confirmation” Pop-Up **6501** of **FIG. 65** Screen **6500** will display asking the user to confirm prioritising the request. If the user touches “Yes” Button **6502**, the request will be prioritised and the cloud database **7** will be updated using the process depicted in Screen **201** of **FIG. 2**. When the user swipes a request cell to left, the user is then given the option to delete the request (**7001** of **FIG. 70** Screen **7000**). When the user touches “Sort By” Button **6403**, request cells **6402** will rearrange according to the sorting criteria (**7101** of **FIG. 71** Screen **7100**). In response to user touches the graphical “Silent” Button **6404**, any warning siren – triggered in the event of an “Emergency” being activated – will be silenced. In response to user touches the graphical “Add Request” Button **6405**, the user will be prompted to enter the “Bed Number” in a Pop-Up **6601** of **FIG. 66** Screen **6600**. Once the patient is selected, the “Add Request” Screen **6700** of **FIG. 67** will display **[0055]**. The main navigation panel **6406** of the application is located at the bottom and consists of 4 touchable buttons, **6407, 6408, 6409, 6410**. In response to user touches the graphical “Request” Button **6407**, the “Requests” Screen **6400** of **FIG. 64** will display. In response to user touches the graphical “Floor Map” button **6408**, the Floor Map Screen **7200** of **FIG. 72** will display. In response to user touches the graphical “Call” Button **6409** the Call Screen **4500** of **FIG. 45** will display. In response to user touches the graphical “Chat” button **6410**, the “Chats” Screen **5400** of **FIG. 54** will display. Situated to the left of the main navigation panel is “Total Request” Text Field **6411**, which displays the total number of active requests on the ward.

[0058] FIG. 67 Screen 6700 displays an example of the “Add Request” Screen that applies to both Devices 4, 5. Basic demographics of the patient will be retrieved from the cloud database 7 and the corresponding Text Fields 6701 (Name), 6702(D.O.B.), 6703(Bed Number), 6704 (Allergy) will then be populated. In response to the user touches the “Request Category” Text Field 6705, a list of request categories will be displayed at the bottom of the screen for the user to select. In response to the user touches the “Request Item” Text Field 6706, a list of request items will be displayed at the bottom of the screen for the user to select (6801 of FIG. 68 Screen 6800). In response to the user touches “Summit” Button 6707, the device will first check if there are any empty fields, if not, the new request will be sent to the cloud server 7 and stored using the process depicted in Screen 201 of FIG. 2 and confirmation will be displayed (6901 of FIG. 69 Screen 6900) The cloud runtime 6 will then send a notification of new request to all Nurse Devices 3,4,5. Any Nurse Devices with Request Screen 6400 of FIG. 64 opened will have the table 6401 updated instantly. If the item added is “Emergency,” warning sirens will also sound on all Nurse Devices 3,4,5. In response to user touches “Cancel” Button 6708, the Request Screen 6400 of FIG. 64 will display.

[0059] FIG. 72 Screen 7200 displays an example of the “Floor Map” screen that applies to both Devices 4, 5. The scrollable table 7201 will be populated with a list of all the patients on the ward. The patient cells 7202 are sorted according to the bed number initially and colour-coded according to the gender of the patient. The cell also contains the following information: patient’s first, last name, D.O.B, hospital ID, insurance status, nurse assigned, allergy, clinical parameters, and risk factors. . In response to user touching a particular cell 7202, extra patient information will drop down (7301 of FIG. 73 Screen 7300). Another touch will retract 7301. In response to the user touching a patient cell 7202 for more than 2 seconds, the “View and Edit Notes Confirmation” Pop-Up 7401 FIG. 74 Screen 7401 will display. If the user touches “Yes” Button 7402, the Patient’s Notes Screen 75 of FIG. 7500 will display. The Pop-Up 7401 disappears if the user touches “Cancel” Button 7403 instead. When the user swipes a patient cell to left, the user is then given the option to discharge the patient (8301 of FIG. 83 Screen 8300). In response to the user touches the graphical “Modify Patient Details” Button 7203, the “Modify Patient Details Confirmation” Pop-Up 7901 of FIG. 79 Screen 7900 will display, prompting user to enter the bed number of the patient in the text field 7902 of FIG. 79 Screen 7900. In response to the user touches “Ok” Button 7903 of FIG. 79 Screen 7900 of the dialogue box, the cloud function will check if there is any patient associated with the bed number entered, the “Modify Patient Details” Screen 8000 of FIG. 80 will display if there is, otherwise an error message will be displayed instead. When the user touches “Sort By” Button 7204, patient cells 7202 will rearrange according to the sorting criteria (8401 of FIG.84 Screen 8400). Refer to Section [0057] for details of the functionalities of the navigation pane 6406 at the bottom of the screen 7200. Situated to the left of the main navigation panel is “Total Patient” Text Field 7205, which displays the total number of patients on the ward.

[0060] FIG. 75 Screen 7500 displays an example of the “Patient’s Notes” screen. The scrollable table 7501 will be populated with a list of all the notes written about the patient. The Note Cells 7502 are sorted initially according to the reverse time stamp of the notes entered. In response to the user touches the editable “Notes” Text Field 7503, an onscreen Keyboard 7601 of FIG. 76 Screen 7600 will pop up, allowing the user to input the note. The same onscreen keyboard 7601 allows the user to edit “Your Name” Text Filed 7504 and the “Designation” Text Field 7505. In response to the user touches “Summit” Button 7506, the device will check for any error before sending the note to the cloud database 7 for storage using a process similar to the one depicted in Screen 201 of FIG. 2. All the connected Nurse Devices 3,4,5 will be notified of a new note entry. A “Confirmation” Pop-Up (7701 of FIG. 77 Screen 7700) will appear on the screen when the process is completed. When the user touches “Sort By” Button 7507, notes cells 7502 will filter the messages according to the designation criteria (7801 of FIG. 78 Screen 7800). Screen 7200 of FIG. 72 will display when the user touches “Return” Button 7508.

[0061] FIG. 80 Screen 8000 displays an example of the “Modify Patient Details” screen that applies to both Devices 4,5. Basic demographics of the patient will be retrieved from the cloud database 7 and the corresponding fields 8001 (Name), 8002 (D.O.B.), 8003 (Hospital Number), 8004 (Allergy), 8005 (Nurse Allocation), 8006 (Diet), 8007 (Fluid), 8008 (Infection), 8009 (Diabetic), 8010 (Insurance), 8011 (Discharge Destination), 8012 (Falls), 8013 (Skin), 8014 (Swallow), 8015 (Nutrition), 8016 (Addiction), 8017 (Social), 8018 (Pneumonias), 8019 (VTE), will then be populated. In response to the user touches a particular field 8001 - 8019, a list or a keyboard will display at the bottom of the screen for the user to select or type in (8101 of FIG. 81 Screen 8100). In response to the user touches “Summit” Button 8020, the device will first check if there are any empty fields, if not, the updated patient details will be sent to the cloud server 7 and stored. The cloud runtime 6 will also update the corresponding patient’s details on all devices 2,3,4,5. The process is depicted in Screen 202 of FIG.2 A “Confirmation” Pop-Up (8201 of FIG. 82 Screen 8200) will appear on the screen when this process is completed. In response to user touches “Cancel” Button 8021, the Floor Map Screen 7200 of FIG. 72 will display.

[0062] Referring to FIG. 86 to FIG. 90, examples of user interfaces which may appear on the graphical touch display screens of a Hub Device 5. The descriptions below will discuss the various screens as appearing on one of the devices 5.

[0063] FIG. 86 Screen 8600 displays an example of the “Clinical Data Analysis” screen that applies to only Devices 5. In response to the user touches “Choose Category” Text Field 8601, a scrollable list 8604 will appear at the bottom of the screen, allowing the user to select a particular clinical parameter. In response to the user touches “Duration” Text Field 8602, another scrollable list 8604 will appear at the bottom of the device 5, allowing the user to select a particular time frame. After the

selections are completed, the user then touches "Summit" Button **8603** to command Cloud Runtime **6** to analyse the data stored on Cloud Database **7** and then presented in graphical manners shown on **Fig. 87** using the process depicted in Screen **204** of **FIG. 2**.

[0064] **FIG. 87** Screen **8700** displays an example of the "Clinical Graph" screen that applies to only Devices **5**. The "Graph" Diagram Box **8701** displays a bar graph with X-axis being the item and Y-axis being the number. The "Data" Text Box **8702** displays the items and corresponding number. The "Category/Duration" Text Box **8703** displays the category and duration of the data set. The "Back" Button **8704** returns the user to Screen **8600** of **FIG. 86** when touched.

Abstract

[0065] The presently disclosed embodiments relate to health care facility communication and floor management, in particular to a wireless system, app-based method, and cloud servers comprising runtime modules and database storage. Terminal apps loaded on multiple graphical devices are operable to permit a user to perform one or more of the following functions: establish a two-way voice / text / multimedia communication with another graphical device in the same network; add and/or view and/or cancel nurse calls / requests originating in a plurality of patient graphical devices; retrieving / modifying patient details; initiating a duress alarm; accessing clinical guidelines / medical utilities form the bed side; performing patient satisfaction survey; writing patient's notes; analysing past ward performance indicators. This embodiment brings ward communication and real-time patient data without the need for physical connections and servers.

Claims

[0066] As mentioned previously, a system 1 according to this disclosure is marketed by Australian Medical Doctors Pty Ltd. as the Patient.Link system. Although certain illustrative embodiments have been described in detail above, variations and modifications exist within the scope and spirit of this disclosure as described and as defined in the following claims. The invention claimed is:

1. An app-based, cloud-driven, integrated healthcare communication and ward floor management system for use in a health care facility having a plurality of patient rooms and staff. The system comprising: a plurality of graphical audio stations at each patient's bed (Patient Device), portable graphical audio devices carried by nurses and doctors, and fixed graphical audio stations at staff area. Each of the plurality of graphical audio stations and devices having a graphical touch screen, having user inputs that are usable by a user, and having apps loaded.
2. All devices listed in claim 1 are communicatively coupled to each other using cloud runtime and cloud database hosted on remote servers using apps preloaded on the devices. Hence there are no physical connections existed between any of the devices and between the devices and the cloud servers. The entire system is therefore scalable without the need of adding or removing

physical connections. The cloud functions and database can also be updated and expanded to include more functions and storage. The required hardware is located and maintained remotely.

3. In the event of network issues, the healthcare communication system of claim 1 is offline-capable. The devices will store changes locally on the device and later update the cloud runtime and storage when network functionality is restored.

4. The healthcare communication system of claim 1, wherein at least one of the user inputs of each of the plurality of graphical audio stations are usable to establish a two-way communication link with another device using cloud-based protocol (VoIP in the case of voice communication and cloud notifications in the case of textual or pictorial communication).

5. The healthcare communication system of claim 1, wherein the nurse call / request signals / patient surveys are generated in response to a patient manipulating a graphical audio station located on the associated hospital bed.

6. The healthcare communication system of claim 1, wherein each of the graphical audio devices (portable or fixed nurse) is configured to receive an alert / duress signal from all other devices.

7. The healthcare communication system of claim 1, wherein the user inputs of the plurality of graphical audio devices and stations are usable to view multimedia content.

8. The healthcare communication system of claim 1, wherein the user inputs of the plurality of graphical audio devices (portable nurse or fixed hub) are usable to perform at least of the following functions: view requests or nurse calls, prioritise requests or nurse calls, acknowledge request or nurse calls, answer requests or nurse calls, add or cancel alerts or nurse calls, edit / view nurse notes, modify / view patient details.

9. The healthcare communication system of claim 1, wherein the user inputs of the plurality of fixed Hub devices are usable to view analysis of data stored on cloud database in graphical form.

- END -