

so it has been impossible to make a prompt response.

[0007]

In view of the above-described problems, it is an object of the present invention to provide a patient status notification device and the like capable of appropriately and promptly notifying the proper staff member by changing a notice destination based on the status of a patient.

[Means for Solving the Problem]

[0008]

In order to solve the above-mentioned problems, the patient status notification device of the present invention is a patient status notification device connectable to a plurality of terminal devices, comprising:

a storing means for storing ranges of a caution level and a warning level as to a biological information value for each of biological information;

a biological information acquiring means for acquiring biological information on a patient; and,

a notifying means for giving a notice of a status of the patient, to a first notice destination terminal device when a biological information value of the biological information acquired by the biological information acquiring means falls within in the range of the caution level, and to a second notice destination terminal device when the biological information value falls within in the range of

invention will be described with reference to the drawings.
The following embodiment is an example in which the patient
status notification device of the present invention is applied,
and it goes without saying that the content of the invention
is not limited to the present embodiment.

[0014] [1. Entire System]

To begin with, the entire system in this embodiment will
be described. FIG. 1 is a diagram for explaining the entirety
of a patient status notification system 1 incorporating a
patient status notification device. First, a patient P lies
on a mattress 5 placed on a bed 3. A state detection device
20 is provided in the bed.

[0015]

The state detection device 20 is a device capable of
continuously acquiring biological information of a patient,
and acquires values such as a patient's body weight, body
movement, blood pressure, and blood glucose level, for example.
As an example, the state detection device 20 may be provided,
as shown in FIG. 1, between the bed 3 and the mattress 5,
or a sensor may be attached to the patient to detect a state
thereof. Alternatively, the device may be set directly on
the bed device (e.g., a load acting on an actuator is used).
Then, the state detection device 20 is connected to the patient
status display device 10.

[0016]

The patient status display device 10 has a function of a patient status notification device and is connected to the state detection device 20, connected to a measuring device 60, and/or connected to another server device or the like via a network. Further, by placing an authentication card 65 over the patient status display device 10, authentication processing (login processing) can be performed.

[0017]

The login process is a process that is performed by an authorized person such as a staff member (nurse, doctor, assistant staff), or the like. By logging in, the person can check the biological information values and the content of the alarm and register them into the electronic medical record. It is possible to set the authority level for each log-in person so as to differentiate the operable range.

[0018]

Connected to the network are, for example a server 30, an electronic medical record server 40, a terminal device 50 and a portable terminal device 55.

[0019]

The server 30 is a server that provides various services, and may be connected to a LAN in the hospital or facility, or may be provided externally via the internet.

[0020]

The electronic medical record server 40 is a server that stores information of electronic medical records on patients. Usually, this server is connected to the network in the hospital or facility, but for example, an external cloud server may be used.

[0021]

The terminal device 50 is a terminal device allowing connection in a nurse station or a management room and enables a grasp of the state of the patient status display device 10 from a remote place. Further, the portable terminal device 55 can be wirelessly connected to a LAN, for example, so that a nurse, assistant staff and the like can easily check information of the patient status display device 10.

[0022]

As will be described later, the terminal device 50 and the portable terminal device 55 are notified depending on the patient's condition. The notification may be given directly from the patient status display device 10 or may be given via the server 30.

[0023]

The patient condition display device 10 will be described in detail with reference to FIG. 2. The patient status display device 10 includes a display terminal 1000 and a connection device 2000. The display terminal 1000 is, for example, a tablet type display terminal and displays various types of

information and receives inputs of various operations. The display terminal 1000 may be a dedicated terminal as a part of the patient status display device 10, or may be implemented by installing an application (program) in a general-purpose tablet terminal.

[0024]

The connection device 2000 is a device for connecting the display terminal 1000 to various devices. That is, this device functions like a hub for various devices. For example, as shown in FIG. 1, connection of this device to the state detection device 20 makes it possible to continuously acquire the biological information of the patient, receive biological information from the measuring device 60 (e.g., a thermometer) and also receive biological information from a device attached to the patient's body (e.g., a wristwatch type wearable measuring device). Further, when the authentication card 65 is made to access a communicator 220, for example, it is also possible to perform an authentication process (e.g., patient authentication and staff authentication). As an authentication method, NFC is used as an example of short-range wireless communication in the present embodiment, but it is also possible to use other methods such as barcode, infrared, IC tag.

[0025]

Further, a notifying unit 260 is provided so as to be

able to give notice when, for example, an error occurs. Furthermore, the notifying unit is connectable to a server device and the like via a LAN (LAN may be either a wired LAN or a wireless LAN). The notifying unit 260 may be configured to be invisible in the normal condition and lit (displayed) only when giving notice. Further, the notifying unit may be configured to give notice by sound such as an alarm sound, warning sound and voice, or by light, instead of display. [0026]

In this embodiment, the display terminal 1000 is described as being used by being mounted on the connection device 2000, but the display terminal 1000 and the connection device 2000 may be used separately. For example, the display terminal 1000 may be taken out and used in another place, or the connection device 2000 may be built into the bed device while the display terminal 1000 may be used separately.

[0027] [2. Functional Configuration]

Next, the functional configuration in the present embodiment will be described with reference to the drawings. FIG. 3 is the diagram for explaining the functional configurations of the display terminal 1000 and the connection device 2000 in the patient status display device 10.

[0028] [2.1 Display Terminal]

First, the functional configuration of the display terminal 1000 will be described. The display terminal 1000

includes a control unit 100, a storage unit 110, a device communicator 150, an operation unit 160, a display unit 170 and a LAN communicator 180.

[0029]

5 The control unit 100 is a functional unit for controlling the entire display terminal 1000. The control unit 100 realizes various functions by reading and executing various programs stored in the storage unit 110 and is configured by, for example, a CPU (Central Processing Unit) or the like.

10 [0030]

 The storage unit 110 is a functional unit in which various programs necessary for the operation of the display terminal 1000 and various data are stored. The storage unit 110 is composed of, for example, a semiconductor memory, an HDD (Hard

15 Disk Drive) or the like.

[0031]

 Here, the configuration of the storage unit 110 will be described with reference to FIG. 4. The storage unit 110 stores biological information 112, personal electronic

20 medical record data 120, an alarm threshold table 122, patient status distinctive information 124 and a notice level table 126, and also stores as programs, a main program 132, an alarm program 134, a patient status display program 136, an

 electronic medical record registering program 138 and a

25 notification program 140.

and the last login time.

[0048]

Here, in the present embodiment, the patient status distinctive information changes if one of the biological information values falls within the associated range.

However, the patient status distinctive information may be updated when a plurality of biological information values fall in the caution range or warning range. Further, the patient status distinctive information is not limited to a single one, the patient status distinctive information may be stored as individual biological information or an individual predetermined group of biological information. For example, the continuous biological information and the measured biological information are classified into different predetermined groups, so that the patient status distinctive information may be determined based on the individual patient condition and stored separately.

[0049]

The notice level table 126 is a table for storing how notice should be given for each patient in association with the condition of the patient and each type of biological information. For example, as shown in FIG. 8, in association with a patient number, a type (e.g., "breathing") and a notice setting (e.g., "caution") indicating whether it is necessary to notify based on the associated biological information,

a liquid crystal display etc. Further, the operation unit 160 and the display unit 170 may be integrally formed of a touch panel.

[0062]

5 The LAN communicator 180 is an interface unit connectable to the LAN, and formed by a NIC for connecting to Ethernet (registered trademark) or the like. The LAN communicator 180 may be provided in the connection device 2000. In this case, the data to be transmitted is once sent to the connection
10 device 2000 via the device communicator 150 (250), and then transmitted to the network. Note that connection to the LAN may be implemented in either a wired or wireless manner.

[0063] [2. 2. Connection Device]

 Subsequently, the functional configuration of the
15 connection device 2000 will be described. The connection device 2000 includes a control unit 200, a storage unit 210, the communicator 220, an interface unit 230, the device communicator 250 and the notifying unit 260.

[0064]

20 The control unit 200 is a functional unit for controlling the connection device 2000 as a whole. The control unit 200 realizes various functions by reading out and executing various programs stored in the storage unit 210 and is configured of, for example, a CPU (Central Processing Unit)
25 and the like.

[0071] [2.3 Electronic Medical Record Server]

Next, the functional configuration of the electronic medical record server 40 will be described with reference to FIG. 11. The electronic medical record server 40 includes
5 a control unit 400, a communicator 410 and a storage unit 450.

[0072]

The control unit 400 is a functional unit for controlling the electronic medical record server 40 as a whole. The
10 control unit 400 realizes various functions by reading out and executing various programs stored in the storage unit 450, and is configured of, for example, a CPU (Central Processing Unit) and the like.

[0073]

15 The communicator 410 is an interface unit for connection to a network. This unit is composed of, for example, an NIC that can be connected to Ethernet. The communicator 410 enables communication with other devices through itself.

[0074]

20 The storage unit 450 is a functional unit in which various programs necessary for the operation of the electronic medical record server 40 and various data are stored. The storage unit 450 is configured of, for example, a semiconductor memory, an HDD (Hard Disk Drive) or the like.

25 [0075]

process by checking the system at intervals of a predetermined period.

[0099]

In this way, if there is biological information that produces the alarm state, it is possible to raise the alarm by performing the notification process. In addition, if there occurs the device connection error, the device error may be output as part of the alarm processing. It should be noted that the device connection error may be output by another method, or may be made so as not to be output.

[0100] [4.3 Patient Status Display Process]

[4.3.1 Processing Flow]

Patient status display processing will be described with reference to FIG. 16. The patient status display processing is a process corresponding to P102 in FIG. 13 (Step S106 in FIG. 14), and is implemented by the control unit 100 which reads out and runs the patient status display program 136 stored in the storage unit 110.

[0101]

First, the personal electronic medical record data is read out (Step S302). Here, it is possible to provide a configuration such that authentication of the patient is performed before reading out the data of the electronic medical record, then the data on the authenticated patient is read out.

distinctive display is updated (Step S372). Thus, the staff can easily confirm the current patient status and the worst state from the last logout time to the present.

[0116]

5 Thereafter, until the login process is performed again, the process from Step S356 is repeated (Step S374; No -> Step S356).

[0117]

10 Now, the scheme of the operation of patient status distinctive display will be described with reference to FIG. 18. FIG. 18(a) shows an example of distinctive display of the patient status displayed on the screen. The distinctive display based on the interval patient status is given by M 102 while the distinctive display based on the current patient status is given by M 104. In the present embodiment, considering visibility, the distinctive display M104 is displayed larger, but the two displays may have the same size, or may be formed differently in shape and position.

[0118]

20 FIG. 18(b) shows an example of distinctive display of each patient status. For example, M110 shows normal, M112 shows caution, and M114 shows warning. Here, the display may be differentiated according to color, movement or shape. For example, in the case of color, normal may be indicated by "white", caution by "yellow" and warning by "red".

25

CLAIMS

1. A system for monitoring patient status, comprising:
at least one sensor that automatically and continuously
5 acquires biological data from a patient;
a plurality of destination terminal devices; and
a controller configured to:

continuously receive biological data from the at
least one sensor;

10 compare currently received biological data with
one or more threshold values;

trigger a first alarm message at a first destination
terminal device if the currently received biological data
is determined to be outside of a first range based on the
15 comparison with the one or more threshold values;

trigger a second alarm message at a second
destination terminal device if the currently received
biological data is determined to be outside of a second range
based on the comparison with the one or more threshold values;

20 wherein the second range includes the first range, and
the first destination terminal device is different from the
second destination terminal device,

wherein the one or more threshold values compared with
the received biological data are selected based on an
25 associated patient identifier, a type of the currently
received biological data and a notice setting in an alarm
notice level table.

2. The system of claim 1, further comprising

a memory having stored therein the alarm notice level table identifying how notice of an alarm message should be given for a particular patient.

5 3. The system of claim 1, wherein each of the plurality of destination terminal devices are associated with a specific medical professional or a team of medical professionals assigned to care for the patient.

10 4. The system of claim 1, wherein the plurality of destination terminal devices includes one or more portable devices, each associated with a specific physician or nurse assigned to care for the patient.

15 5. The system of claim 1, wherein the controller is further configured to allow an authorized medical professional to update or adjust the one or more threshold values.

20 6. The system of claim 1, wherein the first and second alarm messages each include a patient identifier, and the biological data that triggered the alarm message.

25 7. The system of claim 6, wherein the first and second alarm messages each further include a response status indicating the medical professional who will handle each alarm message.

8. The system of claim 1, wherein the controller is further configured to

30 trigger a second notification of the first alarm message, if the controller determines that a predefined period of time has elapsed from triggering the first alarm message.

9. A patient status monitoring device, comprising:
a memory; and
a controller configured to

5 communicate with a plurality of destination
terminal devices;

 continuously receive biological data from at least
one sensor;

 compare currently received biological data with
10 one or more threshold values;

 trigger a first alarm message at a first destination
terminal device if the currently received biological data
is determined to be outside of a first range based on the
comparison with the one or more threshold values; and

15 trigger a second alarm message at a second
destination terminal device if the currently received
biological data is determined to be outside of a second range
based on the comparison with the one or more threshold values;

 wherein the second range includes the first range, and
20 the first destination terminal device is different from the
second destination terminal device,

 wherein the one or more threshold values compared with
the received biological data are selected based on an
associated patient identifier, a type of the currently
25 received biological data and a notice setting in an alarm
notice level table.

10. The device of claim 9, wherein

 the memory has stored therein an alarm notice level table
30 identifying how notice of an alarm message should be given
for a particular patient.

11. The device of claim 9, wherein each of the plurality
of destination terminal devices are associated with a specific
medical professional or a team of medical professionals
5 assigned to care for the patient.

12. The device of claim 9, wherein the plurality of
destination terminals includes one or more portable devices,
each associated to a specific physician or nurse assigned
10 to care for the patient.

13. The device of claim 9, wherein the controller is further
configured to allow an authorized medical professional to
update or adjust the plurality of stored threshold values
15 associated with each type of biological data.

14. The device of claim 9, wherein the first and second alarm
messages each include a patient identifier, and the biological
data that triggered the alarm message.

15. The device of claim 14, wherein the first and second
alarm messages each further include a response status
indicating the medical professional who will handle each alarm
message.

16. The device of claim 9, wherein the controller is further
configured to

trigger a second notification of the first alarm message,
if the controller determines that a predefined period of time
30 has elapsed from triggering the first alarm message.

17. A non-transitory computer readable medium having stored thereon instructions that when executed by a processor, cause the processor to perform the steps of

communicating with a plurality of destination terminal devices;

continuously receiving biological data from at least one sensor;

comparing currently received biological data with one or more threshold values;

triggering a first alarm message at a first destination terminal device if the currently received biological data is determined to be outside of a first range based on the comparison with the one or more threshold values; and

triggering a second alarm message at a second destination terminal device if the currently received biological data is determined to be outside of a second range based on the comparison with the one or more threshold values;

wherein the second range includes the first range, and the first destination terminal device is different from the second destination terminal device,

wherein the one or more threshold values compared with the received biological data are selected based on an associated patient identifier, a type of the currently received biological data and a notice setting in an alarm notice level table.