SUMMARY

[008a] According to a first aspect of the present invention, there is provided a system for enabling the remote monitoring of at least one medical device, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by at least one medical device, wherein each said data packet includes identifying medical device data and at least a medical device identifier or a patient identifier;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database, and

a web server configured for providing web pages for receiving at least the medical data and, transmitting the medical device data to a first remote monitoring device via a secure internet connection for displaying the medical device data at the first remote monitoring device and transmitting at least a portion of the medical device data to a second remote monitoring device for displaying the portion of the medical device data at the second remote monitoring device, wherein the portion of the medical device data displayed by the second remote monitoring device differs from the data displayed by the first remote monitoring device.

[008b] According to a second aspect of the present invention, there is provided a system for enabling the remote monitoring of at least one medical device, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by at least one medical device, wherein each said data packet includes data identifying medical device data and at least one of a medical device identifier and a patient identifier;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database,

a web server configured for providing web pages for receiving at least the medical device data and, subject to verification of the patient identifier and medical device identifier, transmitting the medical device data to first monitoring device and second remote monitoring device via a secure internet connection for displaying the medical device data at the first and second monitoring devices, wherein the second monitoring device is configured to display portions of the medical device data that differ from the data displayed by the first monitoring device; and

a network status server configured for transmitting to at least one of the first or second remote monitoring devices, status information concerning a wireless relay network associated with the wireless relay device.

[008c] According to a third aspect of the present invention, there is provided method for displaying medical device data by a medical device monitoring system, the method comprising:

receiving credentials from a user of a first monitoring device and a request from said user for medical device information for a patient to be monitored;

verifying said user is authorized to receive the medical device information; and

if verification is achieved, then

identifying, based on at least said credentials and said request, an address for a secure patient database having information regarding said patient;

retrieving patient data and associated medical device identification data by a web server from said patient database over a secure communications link;

retrieving medical device data from a device control database for at least one medical device according to said retrieved medical device identification data;

transmitting said retrieved medical device data by said web server for display on said first monitoring device;

transmitting at least a portion of the medical device data to a second remote monitoring device for displaying at the second remote monitoring device; and

displaying, on the second remote monitoring device, portions of the medical data that differ from the data displayed by the first monitoring device.

[008d] According to a fourth aspect of the present invention, there is provided a system for enabling the remote monitoring of at least one medical device, the system comprising:

at least one wireless relay device configured to communicate with the at least one medical device;

an access point in communication with the at least one wireless relay device, said access point including a device integrator server coupled to a database having stored therein medical device data and a secure device server coupled to said device integrator server;

a patient care database node separate from said access point, said patient care database node including a secure patient server coupled to a patient database having patient data stored therein;

a first monitoring device configured to receive and display data provided by the at least one medical device;

a second monitoring device configured to receive and display at least a portion of the data provided by the at least one medical device that differs from the data displayed by the first monitoring device; and

a secure link coupled between said secure patient server and said secure device server of said access node.

[009] ~~The~~ Embodiments of the present invention ~~is~~ are directed to a remote monitoring system and method for monitoring the status of a plurality of medical devices located remotely from the monitoring system at a patient care or home care facility. In accordance with one embodiment of the invention, one or more medical devices (including but not limited to respirators, enteral feeding devices, pulse oximeters, blood pressure monitors, pulse monitors, weight scales and glucose meters) are provided at a patient care or home care facility. An interface circuit is coupled to each medical device, and is configured for communicating with one of a plurality of the wireless relay modules via a wireless relay network. The wireless relay modules are further configured to communicate with the remote monitoring device over an internet-accessible wireless communication network, and preferably, a wireless wide-area network (WWAN) such as a mobile telephone data network including (for example, based on a Global System for

Mobile Communications (GSM) or Code Division Multiple Access (CDMA) cellular network or associated wireless data channels). Also, for compliance for example with HIPAA regulations, communications over each of the wireless networks are preferably conducted securely.

[010] The remote monitoring system and method includes a device integration server in communication with the wireless relay modules for receiving data packets from the wireless relay modules including information provided by the medical devices. This information includes identification of an associated medical device and may include data of the medical device, and is preferably encrypted or otherwise securely transmitted, for example, in compliance with HIPAA patient data privacy provisions. In addition, the information may include encrypted or otherwise securely transmitted patient identification information, which in addition may preferably be coded in its unencrypted state to avoid any reference to the patient's identity.

[011] The remote monitoring system also includes a data management system including a secure device web server and a device control database, and an outbound web server. The data management system is configured to log information provided to the device integration server concerning the medical devices. The outbound web server (alternatively referred to as "web server" herein) is configured to provide webpages including the data of the medical devices for display on a first and second remote

We claim:

1. A system for enabling the remote monitoring of at least one medical device, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by at least one medical device, wherein each said data packet includes identifying medical device data and at least a medical device identifier or a patient identifier;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database, and

a web server configured for providing web pages for receiving at least the medical data and, transmitting the medical device data to a first remote monitoring device via a secure internet connection for displaying the medical device data at the first remote monitoring device; and transmitting at least a portion of the medical device data to a second remote monitoring device for displaying the portion of the medical device data at the second remote monitoring device.

2. The system of claim 1 wherein said web server is configured for verifying the patient identifier and medical device identifier before transmitting the medical device data to the first remote monitoring device.

3. The system of claim 1 wherein said web server is configured to transmit the portion of the medical device data to the second remote monitoring device by at least a wireless data link.

4. The system of claim 3 wherein said wireless data link is over a wireless mobile data network.

5. The system of claim 1 wherein the second remote monitoring device is a portable communications device of least one of a mobile phone , tablet computer and portable computer.

6. The system of claim 1 wherein said web server is configured to transmit to at least one of the first and the second remote monitoring devices, status information concerning a wireless relay network associated with the wireless relay device.

7. A system for enabling the remote monitoring of at least one medical device, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by at least one medical device, wherein each said data packet includes data identifying medical device data and at least one of a medical device identifier and a patient identifier ;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database,

a web server configured for providing web pages for receiving at least the medical device data and, subject to verification of the patient identifier and medical device identifier, transmitting the medical device data to first and second remote monitoring devices via a secure internet connection for displaying the medical device data at the first and remote monitoring devices; and

a network status server configured for transmitting to at least one of the first or second remote monitoring devices, status information concerning a wireless relay network associated with the wireless relay device.

8. The system of claim 7 wherein said network status server is located at a different geographic location than the web server.

9. A method for displaying medical device data by a medical device monitoring system, the method comprising:

receiving credentials from a user of a first monitoring device and a request from said user for medical device information for a patient to be monitored;

verifying said user is authorized to receive the medical device information; and

if verification is achieved, then

(a) identifying, based on at least said credentials and said request, an address for a secure patient database having information regarding said patient;

(b) retrieving patient data and associated medical device identification data by a web server from said patient database over a secure communications link;

(c) retrieving medical device data from a device control database for at least one medical device according to said retrieved medical device identification data;

(d) transmitting said retrieved medical device data by said web server for display on said first monitoring device; and

(e) transmitting at least a portion of the medical device data to a second remote monitoring device for displaying at the second remote monitoring device.

10. The method of claim 9, wherein transmitting at least a portion of the medical device data to a second remote monitoring device comprises transmitting at least status information concerning a wireless relay network associated with a wireless relay device to the second remote monitoring device.

11. The method of claim 9, further comprising receiving, from said wireless relay module, status information concerning a wireless relay network associated with the wireless relay device.

12. The method of claim 9, wherein the status information concerning a wireless relay network concerns at least one of signal strength, data rates, particular transmission time stamp, number of active relay modules in the wireless relay network, and a unique identifier number for a particular relay module.

13. The method of claim 9 wherein transmitting the portion of the medical device data to the second remote monitoring device comprises encrypting said portion on the portion of the medical device data.

14. The method of claim 9 wherein the step of transmitting the retrieved medical device data for display on the first monitoring device further comprises encrypting said medical device data with a first encryption technique, and wherein said step of

transmitting the portion of the medical device data to the second remote monitoring device comprises encrypting the portion of the medical device data using a second encryption technique, wherein the first encryption technique differs from the second encryption technique.

15. A system for enabling the remote monitoring of at least one medical device, the system comprising:

at least one wireless relay device configured to communicate with the at least one medical device;

an access point in communication with the at least one wireless relay device, said access point including a device integrator server coupled to a database having stored therein medical device data and a secure device server coupled to said device integrator server;

a patient care database node separate from said access point, said patient care database node including a secure patient server coupled to a patient database having patient data stored therein; and

a secure link coupled between said secure patient server and said secure device server of said access node.

~~AMENDED~~ CLAIMS

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1. A system for enabling the remote monitoring of at least one medical device, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by at least one medical device, wherein each said data packet includes identifying medical device data and at least a medical device identifier or a patient identifier;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database, and

a web server configured for providing web pages for receiving at least the medical data and, transmitting the medical device data to a first remote monitoring device via a secure internet connection for displaying the medical device data at the first remote monitoring device and transmitting at least a portion of the medical device data to a second remote monitoring device for displaying the portion of the medical device data at the second remote monitoring device, wherein the portion of the medical device data displayed by the second remote monitoring device differs from the data displayed by the first remote monitoring device.

2. The system of claim 1 wherein said web server is configured for verifying the patient identifier and medical device identifier before transmitting the medical device data to the first remote monitoring device.

3. The system of claim 1 wherein said web server is configured to transmit the portion of the medical device data to the second remote monitoring device by at least a wireless data link.

4. The system of claim 3 wherein said wireless data link is over a wireless mobile data network.

5. The system of claim 1 wherein the second remote monitoring device is a portable communications device of least one of a mobile phone, tablet computer and portable computer.

6. The system of claim 1 wherein said web server is configured to transmit to at least one of the first and the second remote monitoring devices, status information concerning a wireless relay network associated with the wireless relay device.

7. A system for enabling the remote monitoring of at least one medical device, the system comprising:

a device integrator server in communication with at least one wireless relay device, wherein said wireless relay device is configured to transmit data packets containing information provided by at least one medical device, wherein each said data packet includes data identifying medical device data and at least one of a medical device identifier and a patient identifier;

a data manager system coupled to said device integrator server, said data manager system comprising at least a device control database,

a web server configured for providing web pages for receiving at least the medical device data and, subject to verification of the patient identifier and medical device identifier, transmitting the medical device data to first monitoring device and second remote monitoring device via a secure internet connection for displaying the medical device data at the first and second monitoring devices, wherein the second monitoring device is configured to display portions of the medical device data that differ from the data displayed by the first monitoring device; and

a network status server configured for transmitting to at least one of the first or second remote monitoring devices, status information concerning a wireless relay network associated with the wireless relay device.

8. The system of claim 7 wherein said network status server is located at a different geographic location than the web server.

9. A method for displaying medical device data by a medical device monitoring system, the method comprising:

receiving credentials from a user of a first monitoring device and a request from said user for medical device information for a patient to be monitored;

verifying said user is authorized to receive the medical device information; and

if verification is achieved, then

identifying, based on at least said credentials and said request, an address for a secure patient database having information regarding said patient;

retrieving patient data and associated medical device identification data by a web server from said patient database over a secure communications link;

retrieving medical device data from a device control database for at least one medical device according to said retrieved medical device identification data;

transmitting said retrieved medical device data by said web server for display on said first monitoring device;

transmitting at least a portion of the medical device data to a second remote monitoring device for displaying at the second remote monitoring device; and

displaying, on the second remote monitoring device, portions of the medical data that differ from the data displayed by the first monitoring device.

10. The method of claim 9, wherein transmitting at least a portion of the medical device data to a second remote monitoring device comprises transmitting at least status information concerning a wireless relay network associated with a wireless relay device to the second remote monitoring device.

11. The method of claim 9, further comprising receiving, from said wireless relay module, status information concerning a wireless relay network associated with the wireless relay device.

12. The method of claim 9, wherein the status information concerning a wireless relay network concerns at least one of signal strength, data rates, particular transmission time stamp, number of active relay modules in the wireless relay network, and a unique identifier number for a particular relay module.

13. The method of claim 9 wherein transmitting the portion of the medical device data to the second remote monitoring device comprises encrypting said portion on the portion of the medical device data.

14. The method of claim 9 wherein the step of transmitting the retrieved medical device data for display on the first monitoring device further comprises encrypting said medical device data with a first encryption technique, and wherein said step of transmitting the portion of the medical device data to the second remote monitoring device comprises encrypting the portion of the medical device data using a second encryption technique, wherein the first encryption technique differs from the second encryption technique.

15. A system for enabling the remote monitoring of at least one medical device, the system comprising:

at least one wireless relay device configured to communicate with the at least one medical device;

an access point in communication with the at least one wireless relay device, said access point including a device integrator server coupled to a database having stored therein medical device data and a secure device server coupled to said device integrator server;

a patient care database node separate from said access point, said patient care database node including a secure patient server coupled to a patient database having patient data stored therein;

a first monitoring device configured to receive and display data provided by the at least one medical device;

a second monitoring device configured to receive and display at least a portion of the data provided by the at least one medical device that differs from the data displayed by the first monitoring device; and

a secure link coupled between said secure patient server and said secure device server of said access node.

16. The system of claim 1 wherein the data displayed by the second monitoring device is less detailed than the data displayed by the first monitoring device.

17. The system of claim 16 wherein the second remote monitoring device is located in a homecare environment and the data displayed by the second monitoring device is designed to be viewed in a homecare environment.

18. The system of claim 17 wherein the device integrator server is further configured to transmit device control commands to the at least on medical device.