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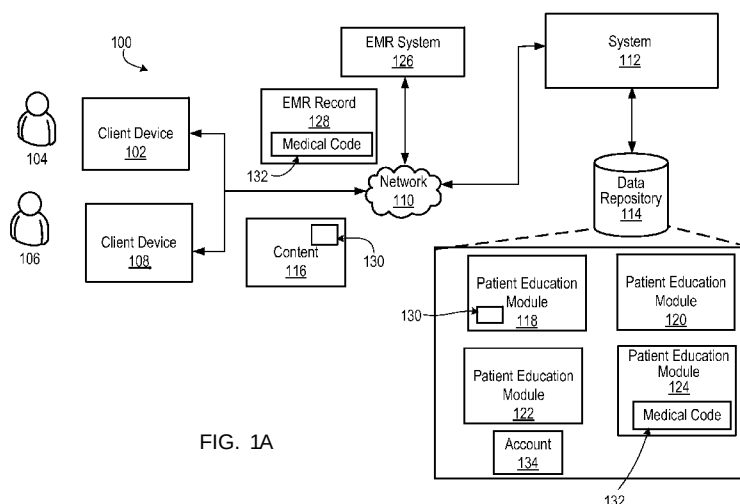


FIG. 1A

(57) Abstract: A computer-implemented method comprising: retrieving, by one or more computer systems, a patient education module for educating a patient about a medical procedure; wherein a structure of the patient education module comprises a first educational section and a second educational section; where the first educational section comprises information and one or more visualizations related to a first stage of the medical procedure; wherein the second educational section comprises information and one or more visualizations related to a second stage of the medical procedure; transmitting, to a device used by the patient, the patient education module for the patient to review the patient education module; receiving, from the device used by the patient, information specifying that the patient has reviewed and understood one or more of the first educational section and the second educational section.

Interactive Medical Education Modules

CLAIM OF PRIORITY

This application claims priority under 35 U.S.C. §119(e) to provisional U.S. Patent Application No. 61/583,069, filed on 1/4/2012, the entire contents of which are hereby
5 incorporated by reference.

BACKGROUND

An electronic medical record ("EMR") is a computerized medical record created in an organization that delivers care, such as a hospital and/or a doctor's office. EMRs may be a part of a local stand-alone health data system that allows storage, retrieval and
10 modification of records.

SUMMARY

In general, one innovative aspect of the subject matter described in this specification can be embodied in methods that include the actions of retrieving, by one or more computer systems, a patient education module for educating a patient about a
15 medical procedure; wherein a structure of the patient education module includes a first educational section and a second educational section; where the first educational section includes information and one or more visualizations related to a first stage of the medical procedure; wherein the second educational section includes information and one or more visualizations related to a second stage of the medical procedure; transmitting, to a device
20 used by the patient, the patient education module for the patient to review the patient education module; receiving, from the device used by the patient, information specifying that the patient has reviewed and understood one or more of the first educational section and the second educational section.

Other embodiments of this aspect include corresponding computer systems,
25 apparatus, and computer programs recorded on one or more computer storage devices, each configured to perform the actions of the methods. A system of one or more computers can be configured to perform particular operations or actions by virtue of having software, firmware, hardware, or a combination of them installed on the system that in operation causes or cause the system to perform the actions. One or more computer

programs can be configured to perform particular operations or actions by virtue of including instructions that, when executed by data processing apparatus, cause the apparatus to perform the actions.

5 The foregoing and other embodiments can each optionally include one or more of the following features, alone or in combination. In particular, one embodiment may include all the following features in combination. In some examples, the features include structuring the patient education module into a first educational section and a second educational section; generating, for the first educational section, the information and the one or more visualizations related to the first stage of the medical procedure; assigning, to 10 the first educational section, the generated information and the one or more visualizations related to the first stage of the medical procedure; generating, for the second educational section, the information and the one or more visualizations related to the second stage of the medical procedure; and assigning, to the second educational section, the generated information and the one or more visualizations related to the second stage of the medical procedure. 15

In other implementations, the features include retrieving an electronic medical record that is associated with the patient; identifying one or more medical codes in the electronic medical record; searching, in a database, for patient education modules with medical codes corresponding to the medical code included in the electronic medical record; and identifying, based on a searching, a patient education module with a medical code corresponding to the medical code included in the electronic medical record; wherein 20 retrieving the patient education module includes: retrieving the identified patient education module.

In still other implementations, patient education modules are associated with unique identifiers, and the method further includes: receiving, from a device used by a 25 medical service provider, a message including content for a patient education module, wherein the message includes a unique identifier for the content; searching, in a database storing the patient education modules, for a patient education module with a unique identifier corresponding to the unique identifier for the content; identifying, based on 30 searching, a patient education module with a unique identifier corresponding to the unique

identifier for the content; and assigning the content to the identified patient education module.

In still other implementations, the method includes receiving a request for a patient education module that is related to a medical procedure to be performed on a patient; and selecting, from a set of patient education modules, the patient education module that is related to the medical procedure, wherein selecting is based on a type of the medical procedure. In yet other implementations, the first educational section includes a graphical user interface for the patient to confirm review of the first educational section and to indicate consent to the procedure addressed by the first educational section, the method further includes: tracking an amount of time the patient spends reviewing the first educational section; receiving, from the device used by the user through the graphical user interface, information confirming the review and indicating the consent; comparing the tracked amount of time to a threshold amount of time; determining, based on comparing, that the tracked amount of time is less than the threshold amount of time; and in response to determining that the tracked amount of time is less than the threshold amount of time, performing one or more operations including: sending, to the device used by the patient, a message notifying the patient to re-review the first educational section; and sending, to a device associated with a medical service provider, a notification that that patient may have inadequately reviewed the first educational section.

In yet other implementations, the patient education module includes a first patient education module, wherein the medical procedure includes a first medical procedure, and the method further includes: retrieving, by the one or more computer systems, a second patient education module for educating the patient about a second medical procedure; wherein the first patient education module differs from the second patient education module; wherein the first medical procedure differs from the second medical procedure. In still other implementations, the features include structuring the first educational section to include a series of trays, wherein a tray includes a collection of information associated with a category specified by the tray.

All or part of the foregoing may be implemented as a computer program product including instructions that are stored on one or more non-transitory machine-readable storage media, and that are executable on one or more processing devices. All or part of

the foregoing may be implemented as an apparatus, method, or electronic system that may include one or more processing devices and memory to store executable instructions to implement the stated functions.

The details of one or more embodiments of the subject matter of this specification are set forth in the accompanying drawings and the description below. Other features, aspects, and advantages of the subject matter will become apparent from the description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1A is a conceptual diagram of a network environment for generating patient education modules.

FIG. 1B is a block diagram of components of the network environment for generating patient education modules.

FIGS. 2-8 are examples of graphical user interfaces included in patient education modules.

FIG. 9 is a flow chart of an example of a process for implementing a patient education module.

FIGS. 10-22 illustrate exemplary graphical user interfaces.

Like reference symbols in the various drawings indicate like elements.

DETAILED DESCRIPTION

Described herein is a system for providing a patient with various patient education modules. Generally, a patient education module includes a collection of information to promote an education of a patient regarding an area of medicine and/or a medical service, including, e.g., a particular medical topic, a particular medical procedure, a particular medical surgery, and so forth. Types of information included in a patient education module include consent forms, pamphlets describing the process of a medical procedure and possible outcomes, visualizations of areas of the anatomy where a medical procedure is being performed, information describing potential risks and side effects of a procedure, pre-operative information, information describing how to prepare for a surgery, post-

operative information, information describing medical conditions, visualizations of a patient's anatomy in a normal condition, pre-operative condition, in a post-operative condition, and so forth.

FIG. 1A is a conceptual diagram of network environment 100 for generating patient education modules 118, 120, 122, 124. System 100 includes network 110, client devices 102, 104, EMR system 126, system 112, and data repository 114. In the example of FIG. 1A, system 112 is configured to generate patient education modules, including, e.g., patient education modules 118, 120, 122, 124.

In an example, client device 102 is used by user 104. In this example, user 104 is a medical service provider. In this example, user 104 may want to generate a patient education module that user 104 can provide to patients to educate the patients about an upcoming medical procedure and to receive consent to perform the medical procedure. In this example, the medical procedure is a knee replacement surgery. In this example, user 104 uses client device 102 to transmit, to system 112, content 116 for a patient education module. In this example, content 116 is created by user 104 (and/or by an administrator associated with user 104) and is specific to a practice associated with user 104.

In this example, user 104 may send, to system 112, a request to generate a patient education module that includes content that is provided by user 104. In response to the request, system 112 generates a patient education module, including, e.g., patient education module 118. System 112 includes unique identifier 130 in patient education module 118. In this example, system 112 sends, to client device 102, information notifying user 102 that patient education module 118 has been generated and information specifying unique identifier 126. In this example, when client device 102 sends content 116 to system 112, client device 102 embeds unique identifier 130 in content 116.

Upon receipt of content 116, system 112 searches data repository 114 for patient education modules with a unique identifier that matches unique identifier 130 included in content 116. In this example, system 112 identifies that patient education module 118 is associated with unique identifier 130 that matches unique identifier 130 included in content 116. Based on the match, system 112 identifies that content 116 is for patient education module 118. Accordingly, system 112 adds content 116 to patient education module 118.

In another example, client device 108 is used by user 106. In this example, user 106 includes a patient, including, e.g., a patient that is being seen by user 104. System 112 is configured to identify which ones of patient education modules 118, 120, 122, 124 are pertinent to user 106. There are various ways in which system 112 may determine which ones of patient education modules 118, 120, 122, 124 are pertinent to user 106. In some examples, user 106 is provided an account to gain access to system 112. In this example, system 112 tracks upcoming appointments and/or procedures for user 106. System 112 may track the upcoming appointments, e.g., by retrieving data from an external appointment booking system. When system 112 identifies an appointment of user 106, system 112 may send a message to a medical service provider associated with the appointment for instructions as to which patient education modules to associate with user 106.

In another example, system 112 may use EMR record 128 for user 106 in identifying which ones of patient education modules 118, 120, 122, 124 to assign to user 106 (and/or an account of user 106 in system 112). In this example, EMR system 126 is configured to store EMR records for various users. Generally, an EMR record includes an electronic version of a patient's medical record. In this example, EMR record 128 includes various medical codes, including, e.g., medical code 132. Generally, a medical code includes information uniquely identifying a particular type of diagnosis, medical condition, medical procedure, and so forth. There are various types of medical codes, including, e.g., diagnosis codes, International Statistical Classification of Diseases and Related Health Problems ("ICD") codes (e.g., ICD-9 and ICD-10 codes), Current Procedural Terminology ("CPT") codes and other various diagnosis information and treatment information.

In the example of FIG. 1A, one or more of patient education modules 118, 120, 122, 124 are associated with medical codes. For example, patient education module 124 is associated with medical code 132. There are various ways in which system 112 identifies medical codes to be associated with patient education modules. In some examples, content 116 includes information specifying medical codes to be associated with the patient education module specified by unique identifier 130. In another example, system 112 may identify medical codes to be associated with patient education modules based on the contents of patient education modules. In this example, the medical codes may be

associated with descriptions or other information specifying types of information that are classified or otherwise associated with the medical codes. Using the descriptions of the medical codes and the contents of the patient education modules, system 112 identifies medical codes with descriptions that are related to the contents of the patient education modules, e.g., based on word matching and/or similarity between words in the descriptions of the medical codes and the contents of the patient education modules.

In the example of FIG. 1A, system 112 uses the medical codes included in EMR record 128 and the medical codes associated with one or more of patient education modules 118, 120, 122, 124 to identify which patient education modules are assigned to user 106, e.g., based on matches and/or similarities among medical codes in EMR record 128 and medical codes associated with patient education modules 118, 120, 122, 124. In this example, user 106 is associated with account 134 on system 112. In this example, account 134 is specific to user 106. When system 112 identifies a correspondence between medical code 132 in EMR record 128 and medical code 132 that is associated with patient education module 124, system 112 assigns the patient education module 124 to account 134. Generally, a correspondence includes a similarity and/or a match among items of data.

FIG. 1B is a block diagram of components of the network environment for generating patient education modules. In FIG. 1B, client devices 104, 106 can be any sort of computing devices capable of taking input from a user and communicating over network 110 with system 112 and/or with other client devices. For example, client devices 104, 106 can be mobile devices, desktop computers, laptops, cell phones, personal digital assistants ("PDAs"), servers, embedded computing systems, and so forth.

System 112 can be any of a variety of computing devices capable of receiving data, such as a server, a distributed computing system, a desktop computer, a laptop, a cell phone, a rack-mounted server, and so forth. System 112 may be a single server or a group of servers that are at a same location or at different locations.

The illustrated system 112 can receive data from client devices 104, 106 and from EMR system 126 via input/output ("I/O") interface 140. I/O interface 140 can be any type of interface capable of receiving data over a network, such as an Ethernet interface, a wireless networking interface, a fiber-optic networking interface, a modem, and so forth.

System 112 also includes a processing device 148 and memory 144. A bus system 146, including, for example, a data bus and a motherboard, can be used to establish and to control data communication between the components of system 112.

The illustrated processing device 148 may include one or more microprocessors. Generally, processing device 148 may include any appropriate processor and/or logic that is capable of receiving and storing data, and of communicating over a network (not shown). Memory 144 can include a hard drive and a random access memory storage device, such as a dynamic random access memory, or other types of non-transitory machine-readable storage devices. Memory 144 stores computer programs (not shown) that are executable by processing device 148 to perform the techniques described herein.

Referring to FIG. 2, system 112 generates graphical user interface 200 for user 106 to log into account 134. In some example, user 106 receives an email from a medical institution (e.g., a medical institution associated with user 104) that includes a link to graphical user interface 200. In the example of FIG. 2, graphical user interface 200 includes link 202. Through selection of link 202, user 106 may access and may view content of patient education module 124.

Referring to FIG. 3, graphical user interface 300 is displayed (e.g., on client device 108), e.g., following user 106 logging into account 134. In this example, graphical user interface 300 displays a dashboard view of the contents of patient education module 124. For example, graphical user interface 300 includes portion 302 for display of an agenda of user 106. In this example, portion 302 displays information specifying assignments that user 106 need to complete. Generally, an assignment includes information for a patient to review and/or questions for a patient to answer. Portion 302 also displays information specifying appointments and checklists. Generally, a checklist includes a visual indication of actions a patient needs to perform, e.g., prior to a procedure and/or appointment.

Graphical user interface 300 also includes visualizations 304, 306, 308. In this example, various portions of patient education module 124 include content that is related to various stages of a procedure, including, e.g., pre-operative content, content related to preparing for surgery and post-operative content. In this example, patient education module 124 provides user 106 with various assignments and/or checklists to be completed for each of the various stages. Visualizations 304, 306, 308 provide time-chronicled

indicators of progress of user 106 in completing content that is related to various stages of a procedure. For example, visualization 304 provides a visual indication of completion of the pre-operative content. Visualization 306 provides a visual indication of completion of content related to preparing for surgery. Visualization 308 provides a visual indication of completion of the post-operative content.

In an example, one or more of visualizations 304, 306, 308 are selectable, e.g., for display of assignments related to the type of content associated with visualizations 304, 306, 308. For example, selection of visualization 304 causes client device 106 to display content of patient education module 124 that is related to pre-operative content.

Referring to FIG. 4, graphical user interface 400 displays pre-operative content, e.g., that is included in patient education module 124. In this example, graphical user interface 400 also displays selectable portions for display of summary sheets. Generally, a summary sheet includes information specifying an overview (e.g., a summary) of content (e.g., the pre-operative content). In the example of FIG. 4, summary sheet 402 is shown. In this example, summary sheet 402 is printable and is displayed in PDF format. Summary sheet 402 includes visualizations 404, 406, 408 for display of images showing a normal portion of the anatomy on which the patient is having a procedure, an abnormal portion of the anatomy, and the anatomy following repair, respectively.

Referring to FIG. 5, graphical user interface 500 displays contents of a portion of patient education module 124 that include visualizations of an area of the anatomy. In this example, visualization 504 includes an image of an area of the anatomy, including, e.g., an area of the anatomy that a patient is scheduled for surgery. Using control 502, a user may rotate visualization 504, e.g., to view different areas of the anatomy represented by visualization 504. In this example, control 502 may be used to rotate visualization 502 three-hundred sixty degrees. Visualization includes a three-dimensional visualization. While FIG. 5 illustrates a visualization of an area of the anatomy in a particular condition (e.g., the normal condition), system 112 may be configured to display a rotatable visualization of the area of the anatomy in various, other conditions (e.g., an abnormal condition, a repaired condition, and so forth).

As previously described, portions of patient education module 124 may include content for the various stages of a procedure, including, e.g., pre-operative content,

content in preparation for the procedure, and post-operative content. In this example, the content in patient education module 124 is assigned to various educational sections, with an educational section including the content for a particular stage of a procedure. For example, system 112 may be configured to structure the contents of patient education module 124 into various sections. In this example, after a user has completed review of content for a particular educational section, system 112 prompts the user for verification and confirmation that the user has reviewed and accepts the content presented to the user.

Referring back to FIG. 1A, patient education modules 118, 120, 122, 124 may include information for the various stages of a medical procedure. For example, patient education module 118 may include content for the pre-operative stage. Patient education module 120 may include content for the stage of preparing for surgery. Patient education module 122 may include content for the post-operative stages. In this example and using the techniques disclosed herein, system 112 may select one or more of patient education modules 118, 120, 122, 124 to present user 106 with the educational materials associated with a particular medical procedure.

Graphical user interface 500 includes various trays 506, 508, 510, 512, 514, 516, 518. Generally, a tray may include a portion of a graphical user interface that when selected causes an update to a type of information displayed in a graphical user interface. In this example, tray 506 is for display of introductory information, including, e.g., information describing the various educational sections of the patient education module and contents of a particular educational section of the patient education module. Tray 508 is for display of information that describes a particular condition (e.g., normal condition) of an area of the anatomy (e.g., the hip). Tray 510 is for display of information that describes a particular disease of an area of the anatomy (e.g., the hip). Tray 512 is for display of information that describes treatment options. Tray 514 is for display of information that describes a procedure to be performed on the area of the anatomy. Tray 516 is for display of information that describes possible risks and complications to be reviewed by the patient to ensure the patient is aware of critical information. Tray 518 is for display of information that confirms that the patient has review the information included in the various trays for an educational section of the patient education module. In an example, one or more of the foregoing trays may be included in any of the graphical user interfaces generated by system 112.

System 112 structures an educational section of a patient education module to include a series of trays, wherein a tray includes a collection of information associated with a category specified by the tray. In this example, a tray is associated with a category indicative of a type of information. By structuring the contents of an education section into a series of trays, system 112 structures the contents by assigning the contents to various categories.

In an example, a patient can toggle through different views of a condition, e.g., using controls providing in a graphical user interface. Referring to FIG. 6, graphical user interface 600 includes controls 602, 604, 606, 608 for a patient to select to view various conditions that are associated with the patient. Graphical user interface 600 also includes visualization 610. In this example, selection of one of controls 602, 604, 606, 608 causes a portion of visualization 610 to be highlighted. In this example, the highlighted portion of visualization 610 corresponds to a portion of the anatomy that is affected by a condition selected through controls 602, 604, 606, 608. Graphical user interface 600 also includes control 610 for text to speech narration that allows the patient to both read and listen to the education material.

Referring to FIG. 7, graphical user interface 700 displays message 702 informing the user of completion of a particular educational section of patient education module 124. Graphical user interface 700 also includes control 704 for a patient to confirm that he has reviewed and understood the contents of the educational section. Upon selection of control 704, the patient sends to system 112 information specifying a confirmation that the patient has reviewed and understands the information. Upon selection of control 704, the patient sends to system 112 information specifying that the patient would like to review again the educational section.

In an example, system 112 is configured tracks an amount of time a user (e.g., user 106) spends on review of an educational section. In this example, system 112 stores, in data repository 114, information specifying a threshold, e.g., a threshold amount of time that the user needs to spend reviewing an educational section. In this example, when a user selects control 704, system 112 compares the tracked amount of time the user has spent reviewing the educational section to the threshold. If the tracked amount of time is

less than the threshold, system 112 may perform various actions, including, e.g., requesting that the user re-review the educational section, preventing the user from sending sending confirmation of completion of the educational section, sending a notification to a medical service provider (e.g., a physician performing the procedure), and so forth. That is, through control 704, patients are prompted to verify their understanding of the material and to provide an electronic consent for the procedures addressed in the section. Actions throughout the module are fully tracked, including time spent, and reported to a dashboard. Compliance and consent indicators are supplemented by special alerts for times that suggest insufficient review of the material in the institution's dashboard.

In addition to prompting the patient for consent to perform the medical procedure, system 112 may also prompt physicians to confirm assignments and review of material with patients. Referring to FIG. 8, graphical user interface 800 displays, for a physician, control 802, through which the physician can confirm assignments and review of material with patients.

FIG. 9 is a flow chart of an example of process 900 for implementing a patient education module. In operation, system 112 receives (902) content, including, e.g., content 116. Using the received content, system 112 generates (904) a patient education module, including, e.g., one of patient education modules 118, 120, 122, 124. In this example, system 112 may generate the patient education module by generating a shell for the patient education module. Generally, a shell includes a data structure to be populated with data. In this example, upon receipt of the content, system 112 populates the shell with the content.

System 112 also retrieves (906), from EMR system 126, an EMR record, including, e.g., EMR record 128. Using contents of the retrieved EMR record (e.g., medical codes included in the EMR record), system 112 assigns (908) a patient education module to a user associated with the retrieved EMR record. In an example, system 112 assigns the patient education module to a user by assigning the patient education module to an account associated with the user.

In the example of FIG. 9, system 112 tracks (910) an amount of time spent reviewing the various educational sections of a patient education module. System 112 also receives (912) an indication of completion of an educational section. In this example,

system 112 receives the indication from client device 108. Using the tracked amount of time and a threshold amount of time, system 112 determines (914) whether the tracked amount of time satisfies the threshold amount of time (e.g., whether the tracked amount of time exceeds the threshold amount of time). If system 112 determines that the tracked amount of time exceeds the threshold amount of time, then system 112 allows a user to indicate consent to the procedure and/or to submit confirmation that the user has reviewed the educational section. If system 112 determines that the tracked amount of time does not satisfy the threshold amount of time, then, in some examples, system 112 notifies the patient and/or prompts the patient to re-review the educational section.

In an example, system 112 is configured to perform various other types of techniques, including, patient trending, data mining, generating interactive electronic consents (eConents), virtual surgery modeling, eDictation, a referring doctors portal, and an operation notes module.

Referring to FIG. 10, graphical user interface 1000 shows a clinical summary sheet, including, e.g., a summary of medical information and/or clinical information for a particular patient. In this example, graphical user interface 1000 includes control 1002. Upon selection of control 1002, a patient may view his/her trends in clinical information. Generally, a trend includes a charting of information for different and/or various time periods. Referring to FIG. 11, graphical user interface 1100 shows various trend data. Generally, trend data includes values associated with a particular data type, with the values being visually displayed over a period of time. In this example, graphical user interface 1100 displays various types of trend data, including, e.g., types 1102, 1104, 1106, 1108, 1110, 1112, 1114, 1116, 1118, 1120. In this example, graphical user interface 1100 also displays timeline 1122. In this example, timeline 1122 displays various dates, e.g., dates on which the various types of trend data are collected.

In this example, timeline 1122 also displays indicators 1124, 1126, 1128, 1130, 1132 that specify if one of the dates included in timeline 1122 is a preoperative date, a post operative date, a follow-up date, and so forth. In this example, graphical user interface 1100 displays trend data 1134. For example, trend data type 1120 includes items 1136, 1138, 1140, 1142, 1144 of trend data 1134. Items 1136, 1138, 1140, 1142, 1144 of trend data 1134 include values that specific to trend data type 1120 and are of a type specified

by trend data type 1120. In this example, timeline 1122 includes time values 1146, 1148, 1150, 1152, 1154, with each time value specifying a particular point in time, e.g., a particular day. In this example, item 1136 is associated with time value 1146. Item 1138 is associated with time value 1148. Item 1140 is associated with time value 1150. Item 1142 is associated with time value 1152. Item 1144 is associated with time value 1154. That is, there are time values for each time value in timeline 1122. In this example, items 1136, 1138, 1140, 1142, 1144 represent items of trend data that are visually charted over a period of time (e.g., over timeline 1122) for a particular type of data, as specified by type 1120. In the example of FIG. 1, the time values in timeline 112 could include appointments that are held and or scheduled for a patient or other time intervals.

In an example, system 112 is configured to automatically collect the information items of trend data, e.g., based on information input by a physician into the system, based on information collected through questionnaires, etc. Based on the input data, system 112 is configured to automatically generate the trends.

Referring to FIG. 12, system 112 generates graphical user interface 1200. In this example, graphical user interface 1200 visually displays information that correlates the items of trend data over time, e.g., as a function of time. In this example, graphical user interface 1200 displays links 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220. Each of links 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220 is associated with a particular type of data. In this example, selection of one of links 1202, 1204, 1206, 1208, 1210, 1212, 1214, 1216, 1218, 1220 causes a chart for a trend for a particular type of data to be shown, as illustrated in FIG. 13. Referring to FIG. 13, the particular type of data shown is data that is associated with link 1202.

Referring to FIG. 12, graph 1222 is color coded in accordance with various time intervals, e.g., a pre-operation time period and a post operation time period. In an example, graph 122 includes portions 1224, 1226. In this example, portion 1224 is color coded to depict the patient's progress pre-operation and portion 1226 is color coded to depict the patient's progress post-operation. In still another example, graph 1222 displays a patient's progress in comparison to nation standards, e.g., the MCID (minimal clinical improvement standard). In still another example, the patient's progress (as shown in chart

1222) is shown next to the patient's profile and/or in combination with the patient's profile.

In an example, system 112 selects a first portion 1224 of chart 1222 to be associated with a first stage in a medical procedure (e.g., the preoperative stage), with first portion 1224 of chart 1222 being associated with a first subset of various time intervals 1228, 1230, 1232. In this example, system 112 causes first portion 1224 of chart 1222 to be color coded in association with first stage in the medical procedure to visually indicate to a viewer of chart 1222 that charted trend data included in first portion 1224 of chart 1222 is associated with the first stage. System 112 selects also selects second portion 1226 of chart 1222 to be associated with a second stage in a medical procedure (e.g., a post-operative stage), with second portion 1226 of chart 1222 being associated with a second subset of various time intervals 1232, 1234, 1236. In this example, system 112 causes second portion 1226 of chart 1222 to be color coded in association with the second stage in the medical procedure to visually indicate to a viewer of chart 1222 that charted trend data included in second portion 1226 of chart 1222 is associated with the second stage. In the example of FIG. 12, graphical user interface 1200 also includes controls 1238, 1240, 1242 for selection of viewing trend data that is associated with a particular stage of a medical procedure, including, e.g., a pre-operative stage, a surgery stage, a post-operative stage, and so forth.

In an example, system 112 is configured to perform real-time data mining, e.g., based on various criteria and of the trend data. Referring to FIG. 14, system 112 generates graphical user interface 1400. In this example, graphical user interface 1400 displays charts 1402, 1404, 1406. In an example, chart 1402 displays various types of data (e.g., trend data) over a particular time period, e.g., a pre-operative time period. In this example, data includes body pain data, general health data, mental health data, and so forth.

In an example, charts 1402, 1404, 1406 display trend data for patients with attributes matching various criteria, including, e.g., criteria 1408, 1410. In this example, charts 1402, 1404, 1406 only display trend data for patients who are smokers and who have diabetes. Graphical user interface 1400 also includes controls 1414, 1416, 1416 for selection of various other criteria. Charts 1402, 1404, 1406 display trend data for patients

with attributes matching criteria specified in controls 1414, 1416, 1416. In this example, portion 1418 of graphical user interface 1400 specifies that 251 patients are associated with attributes matching criteria 1408, 1410 and criteria specified in controls 1414, 1416, 1416. If one or more of criteria 1408, 1410 and criteria specified in controls 1414, 1416, 1416 are relaxed and/or removed, a number of patients for which trend data is shown increases.

In an example, system 112 accesses patient trend data, e.g., from a data repository. In this example, the accessed patient trend data includes data 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434. In this example, system 112 receives, from a client device, information specifying one or more of criteria 1408, 1410, and criteria specified by controls 1412, 1414, 1416 to be applied to the accessed patient trend data 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434.

System 112 also accesses information specifying attributes of patients associated with the accessed patient trend data. System 112 determines one or more patients with attributes that satisfy one or more of criteria 1408, 1410, and criteria specified by controls 1412, 1414, 1416. System 112 selects, from the patient trend data, a portion of the patient trend data associated with the determined one or more patients. In this example, the selected portion of data includes patient trend data 1418, 1420, 1422, 1424, 1426, 1428, 1430, 1432, 1434. System 112 assigns first items 1436, 1438, 1440, 1442, 1444, 1446, 1448, 1450, 1452 of data in the selected portion to first time interval 1454 corresponding to a stage in a medical procedure, e.g., a pre-operative stage. System 112 generates a visualization (e.g., chart 1402) of trends in the first items 1436, 1438, 1440, 1442, 1444, 1446, 1448, 1450, 1452 of data over the first time interval 1454.

System 112 assigns second 1456, 1458, 1460, 1462, 1464, 1466, 1468, 1470 of data in the selected portion to second time interval 1472 corresponding to a stage in a medical procedure, e.g., a surgical stage. System 112 generates a visualization (e.g., chart 1404) of the second items 1456, 1458, 1460, 1462, 1464, 1466, 1468, 1470 of data (e.g., and/or of trends in the second items) over the second time interval 1472.

In an example, system 112 generates eConsents, e.g., electronic information that is presented to a user for the user to indicate consent for a medical procedure and/or a portion of a medical procedure. In an example, system generates a set of eConsents for

various pre-defined events, including, e.g., a patient visit, a pre-operative procedure, an operative procedure, a post operative procedure, a research plan, an information disclosure, and so forth. By having the eConsents for the various events, system 112 implements a staged information release with check points to ensure a patient's comprehension of information that is presented to the patient to inform the patient's consent. For example, rather than having a patient provide consent for both a pre-operative procedure and an operative procedure at the same time, system 112 generates one eConsent to gain consent for the pre-operative procedure and another eConsent to gain consent for the post-operative procedure. Through the eConsents for the various predefined events, system 112 promotes an increase in an amount of informed consent being given for various procedures, e.g., relative to an amount of information consent when consent is given simultaneously for multiple procedures.

In an example, while reviewing an eConsent, a patient may send to system 112 information specifying that the patient does not understand a portion of the information presented in the eConsent. In this example, system 112 generates a notification and sends the notification to a device used by a medical provider. Through the notification, the medical service provider to information of the need to discuss particular information with a patient. In this example, the eConsent may also be associated with various trigger points, e.g., an event that causes additional information to be displayed to a patient and/or an event that causes a notification to be sent to a medical service provider. In an example, if a patient indicates that they don't understand an aspect of the eConsent, the patient can select a link to read more about the aspect of the disclosure and/or to engage in a real-time consultation with a physician about the aspect of the consent to better understand the aspect of the content

In an example, patient consent - e.g., that is provided through the eConsents, is tracked by system 112, e.g., for audit reporting and to track which procedures a patient has provided consent for. In another example, system 112 provides a medical service provider with authoring tools with preset templates for clients to develop their own eConsents. That is, if a medical service provider want to generate an eConsent, system 112 has a template that the medical service provider can use in generating the eConsent.

As described herein, eConsents include interactive consent forms, in which the consent form is displayed in parts, e.g., rather than the entire consent form being displayed in one view. That is, the consent form is broken into numerous different portions. As each portion of the consent form is displayed, the patient is prompted to indicate their consent for the portion of the consent form. Each portion of the consent form also displays numerous links/controls, selection of which displays information additional information about the consent and explains various aspects of the consent form to the consumer. There may also be an oncall physician or medical service provider. For example, there may be a link, selection of which enables the consumer to connect (via an IM chat, or a teleconference or a video conference) with a medical service provider to learn more about the various aspect of consent that is requested.

In an example, system 112 is configured to gain a patient's informed consent to a medical procedure, e.g., knee replacement surgery. In this example, system 112 accessed information indicative of a first portion of the medical procedure and information indicative of the second portion of the medical procedure. For example, the first portion may include possible complications of the medical procedure. The second portion may include resuscitation should the patient become unconscious during the procedure. For the first portion of the medical procedure, system 112 generates a first interactive consent form by generating a plurality of first graphical user interfaces that provide the user with information for promoting informed consent of the first portion. In this example, each of the first graphical user interfaces includes controls, selection of which specifies the user's consent to the information displayed in the first graphical user interfaces. System 112 receives information indicative of the user's selection of the controls in each of the first graphical user interfaces. System 112 determines, based on the received information, that the user has provided informed consent for the first portion of the medical procedure.

In this example, for the second portion of the medical procedure, system 112 generates a second interactive consent form by generating a plurality of second graphical user interfaces that provide the user with information for promoting informed consent of the second portion. In this example, each of the second graphical user interfaces includes controls, selection of which specifies the user's consent to the information displayed in the second graphical user interfaces. System 112 receives information indicative of the user's selection of the controls in each of the second graphical user interfaces; and determines,

based on the received information, that the user has provided informed consent for the second portion of the medical procedure. Responsive to determining that the user has provided informed consent for the second portion of the medical procedure and for the first portion of the medical procedure, system 112 determines that the user has provided informed consent for the medical procedure.

Referring to FIG. 15, system 115 generates graphical user interface 1500 for a medical service provider interactive virtual surgery module. Using the medical service provider interactive virtual surgery module, medical service providers may visual and/or review information associated with various stages of medical procedures, e.g., a normal condition vs. a patient's current condition, current condition vs. the recommended surgery, surgical and post-operative conditions, complications, and so forth.

In an example, system 112 determines a practice type associated with a medical service provider. Using the determined practice type, system 112 selects various visualizations for display to the medical service provider. In an example, a medical service provider is associated with a profile that specifies a practice area of the medical service provider. In this example, system 112 accesses the profile to determine the practice type associated with the medical service provider.

Referring to FIG. 15, graphical user interface 1500 displays controls 1502, 1504 for a medical service provider to select various types of hip procedures. In this example, system 112 selects graphical user interface 1500 to display to the medical service provider, e.g., based on a specialty specified in the medical service provider's profile. Referring to FIG. 16, system 112 generates graphical user interface 1600 to provide a medical service provider with information associated with various stages of a particular type of hip procedure, e.g., a total hip replacement procedure. In this example, graphical user interface 1600 includes controls 1602, 1604, 1606 for viewing information associated with the various stages of the total hip replacement procedure. These various stages include a pre-operative stage, a surgical stage and a post operative stage. Graphical user interface 1600 also includes visualizations 1608, 1610 for displaying views of a normal hip and an abnormal hip, respectively. These views assist a medical service provider in performing the surgery. Referring to FIG. 17, system 112 also generates graphical user interface 1700 to provide a medical service provider with information 1702 about how to perform a

particular medical procedure and materials to use during the medical procedure.
Graphical user interface 1700 also displays timeline 1704 for providing a medical service provider with a view indicating a stage that is associated with displayed information 1702.

In an example, system 112 accesses a profile of a medical service provider.

5 System 112 determines, based on contents of the accessed profile, a practice type that is associated with the medical service provider. System 112 selects, based on the determined practice type, a medical service provider interactive virtual surgery module for the medical service provider, with the medical service provider interactive virtual surgery module being for particular types of medical procedures and including graphical user interfaces
10 1500, 1600, 1700. System 112 also causes causing one or more graphical user interfaces 1500, 1600, 1700 included in the medical service provider interactive virtual surgery module to be displayed on a client device used by the medical service provider, with the one or more displayed graphical user interfaces promoting an education of the medical service provider about the particular types of medical procedures. Additionally,
15 information in the graphical user interfaces 1600, 1700 is displayed in accordance with stages of the medical procedures. For example, information 1702 is displayed in association with a surgical stage of a hip replacement procedure, as indicated by timeline 1704.

In an example, system 112 is also configured to automatically generate electronic
20 dictation (eDictation notes). In this example, system 112 provides a physician with templates for dictation notes and pre-populated fields for customization of the dictation notes. Referring to FIG. 18, system 112 generates graphical user interface 1800. In this example, graphical user interface 1800 displays a patient's medical chart and/or a summary of a patient's medical chart. Graphical user interface 1800 also includes control
25 1802 for selecting one or more templates for an eDictation. In this example, there are various types of templates, including, e.g., templates 1804, 1806, 1808, 1810, 1812, 1814, 1816. In this example, a user selects template 1806 from control 1802.

Referring to FIG. 19, system 112 generates graphical user interface 1900. In this example, graphical user interface 1900 displays portions of a patient's medical record.
30 Graphical user interface 1900 includes contents of dictation template 1902, which includes a template of a dictation that a physician can use to describe a hip consultation with a

patient. Generally, a dictation includes a statement of a medical service provider regarding a patient. In this example, dictation template 1902 includes various sections 1904, 1904, 1908, e.g., based on sections that a medical service provider may typically employ in a dictation. For each of sections 1904, 1904, 1908, dictation template 1902 includes default text 1910, 1912, 1914, respectively. Dictation template 1902 also includes fields 1916, 1912, 1918, 1920, 1922, 1924, 1926, 1928. In this example, fields 1916, 1912, 1918, 1920, 1922, 1924, 1926, 1928 are pre-populated with values. For example, field 1916 is pre-populated with a value of "right." In this example, dictation template 1902 includes multiple instances of field 1916.

In an example, a user may update the values included in field 1916. Referring to FIG. 20, an updated image of graphical use interface 1900 is shown. In this example, a user selects control 2000 to update the pre-populated values of fields 1916, 1912, 1918, 1920, 1922, 1924, 1926, 1928. In this example, portion 2010 displays the various fields for which values may be updated. In this example, a user selects portion 2012, e.g., to indicate that the user wants to update field 1916 that is pre-populated with a value of "right." In response to selection of portion 2012, graphical user interface 1900, displays control 2002. Through control 2002, the user can select field 1916 to be updated with values 2004, 2006, 2008.

In this example, based on selection of value 2006, the user chooses to make a global replacement of all instances of "right" - as specified by field 1916 with the word "left." In another example, field 1928 is pre-populated with an asterisk to mark a wild card. In this example, the user may select portion 2014 choose to make a global replacement of the wild card with a word.

In another example, a user may generate a customized template, e.g., by specifying sections for the template, default text for the sections and fields (with pre-populated values) to be included in the default text. The user may also specify other values that may be used in updating and in modifying the pre-populated values.

In an example, the values fields 1916, 1912, 1918, 1920, 1922, 1924, 1926, 1928 may be color coded. For example, when a field is pre-populated with a value, the pre-populated value may be one color. When the value of the field changes, the updated value may be a different value, e.g., to visually indicate that the value of the field is updated. In

still another example, dictation template 1902 is editable, e.g., such that a user may add text, delete text, and so forth.

In an example, dictation template 1902 is finalized, e.g., after a user has edited the text and/or updated the fields. In this example, system 112 may be configured to identify portions of the finalized dictation template that pertain to various sections of a patient electronic medical record. These identified portions may include keywords, e.g., that enable system 112 to identify them as pertaining to various sections that are also associated with the keywords. These various sections include a radiology section, an order sheet section, a general notes section, a physical examination section, and so forth. In this example, system 112 is configured to segment finalized dictation template, e.g., by assigning the identified portions of the finalized dictation template to the various sections of a patient electronic medical record. In still another example, in addition to using eDictation to generate a dictation (e.g., a treating physician note), a referring physician can also use these eDictation templates to generate a referring physician note.

In an example, system 112 receives a request to access an electronic dictation template (e.g., dictation template 1902) for a particular type of medical procedure. Responsive to the request, system 112 causes the requested electronic dictation template to be displayed (e.g., in graphical user interface 1900) for a user associated with the request, wherein the electronic dictation template includes multiple instances of a field (e.g., field 1916) that is pre-populated with default values. System 112 also receives a request to update the multiple instances of the field with a selected value, e.g., value 2006. For each instance of the field in the electronic dictation template, system 112 also updates updating the field with the selected value.

In an example, system 112 also generates and maintains a referring medical service provider portal for generation of correspondence by a referring medical service provider, e.g., a medical service provider to whom a patient has been referred. For purposes of convenience, a referring medical service provider includes a referring doctor and a referring physician.

In this example, the referring medical service provider portal provides a referring medical service provider with various options for requesting generation of correspondence. There are value type of correspondence that may be generated,

including, e.g., a thank you note with a patient's health identifier, a thank you note with a summary of the visit (e.g., a chief complaint, results of a physical exam, planned treatment, and so forth), a thank you note with detail data of every encounter during the visit. IN an example, each of these type of notes may include trend data and/or visit trends.

5 In an example, at the end of a patient visit, system 112 generates a dashboard that is presented to a treating physician. Through the dashboard, the treating physician may generate referrals to referring physicians. The treating physician can also customize the amount and level of information that is included in the referral for viewing by the referring physician. For example, the treating physician can select portions of a patient's medical
10 record to include in the referral. These referrals are then sent to the referring physician who may access the referrals through the referring medical service provider portal. In an example, these referrals may be sent in batch to the referring physicians.

In an example, the referring doctors portal also provides for continuity of medical care. The treating physician who made the referral can log into a treating physician portal
15 to view the notes of the referring physician that performed a procedure. The referring physician can then comment on the notes/operation notes and can confirm questions of the treating physician. The referring physician can also override certain notes of a physician performing a procedure, if the referring physician has approval. The portal also has audit functionality that shows a user who made edits to operative notes and when they were
20 made.

In an example, system 112 generates various portal to perform the above described techniques, including, e.g., a referring physician portal and a treating physician portal. Through the referring physician portal, a referring physician may receive referrals and may request auto-generation of correspondence acknowledging the referral, sending a
25 summary of a visit resulting from the referral and so forth. Through the treating physician portal, a treating physician may send referrals and/or various portions of a patient's electronic medical record to a referring physician portal of a referring physician. Generally, a treating physician includes a physician that is making a referral and treating a patient. Additionally, through the treating physician portal, a treating physician may make
30 questions and/or comments to a referring physician. In this example, the referring physician may receive the questions/comments through the referring physician portal.

In an example, system 112 generates the above-described referring physician portal and the treating physician portal. In this example, system 112 receives, in a referring physician portal, a referral for a referring physician. System 112 also receives, through the referring physician portal, information indicative of a type of correspondence to be automatically generated, in response to the referral. As previously described, the type of correspondence may include various types of automatically generated notes. System 112 sends, to the treating physician portal, the automatically generated correspondence. System 112 receives, from the treating physician portal, information indicative of a question for the referring physician. System 112 also causes the referring physician portal to display the information indicative of the question for the referring physician.

In an example, system 112 also implements an operation notes module, e.g., a series of executable instructions for generating an operation note (e.g., a note pertaining to an operation), e.g., based on user input. In this example, the operation notes module includes an automated BUT controlled feed to registries (e.g., electronic medical records) and billing. In an example, the operation notes module includes the eDictation techniques described above, e.g., to expedite and efficiently generate an operation note.

In an example, the operation notes module is configured to access a database that stores information of various device implants. In this example, the operation notes module generates an operation notes template, e.g., a template that is used in generating an operation note. In this example, the operation notes template render images of portions of human anatomy that an operation is being performed on. The operation notes template also renders images of medical devices that may be used in an operation. To render the images of the medical devices, the operation notes modules access the database and retrieves information of the various implants.

In this example, the operation notes module also tracks compliance with medical standards and/or with federal practices, e.g., for a particular operation. For example, the operation notes module detects based on information that a physician enters into the operation notes template that the physician is working on a section of anatomy that is not in compliance with how a procedure should be performed. Through entering of information into the template, the physician can also indicate the work that he has done to various portions of the patient's body and the system can determine whether the work

performed (and/or the areas of the body in which the work has been performed) are in compliance with national standards. When the operation notes module detects that the work of a physician is not in compliance with various standard, the operation nodes module generates an alert. In this example, the alert is rendered in a graphical user interface. The alert provides the physician with information indicating that the work is not in compliance with the various standards. The alert may also provide the physician with additional information on how to correct the procedure and/or perform additional operations such that a particular procedure is in compliance with the national standards.

Referring to FIG. 21, graphical user interface 2100 displays operation notes template 2102. In an example, there are various different types of operation notes templates, e.g., for various types of medical procedures and operations. For example, there is an operation notes template for hip replacement surgeries, thoracic surgeries, and so forth.

In the example of FIG. 21, template 2102 includes controls 2104, 2106, 2108, 2110 with various selectable portions for a physician to select certain attributes of the operation, e.g., preoperative diagnosis, postoperative diagnosis, antibiotic, approach, and so forth. Based on a physician's selection of portions of one or more of controls 2104, 2106, 2108, 2110, system 112 generate an operation note that includes information specified by the selected portion. For example, a user may select portion 2122 of control 2104, e.g., to indicate that the preoperative diagnosis is of AVN. In the example of FIG. 21, template 2102 also includes controls 2114, 2116, 2118, 2120, 2122, 2124, e.g., for selection of additional information to be input into the operative note.

Referring now to FIG. 22, another operative notes template 2202 is shown in graphical user interface 2200. In this example, system 112 causes template 2202 to be displayed upon selection of control 2126 (FIG. 21). In this example, template 2202 displays image 2204. In an example, system 112 retrieves from a data repository information for the rendering of image 2204. In this example, the information corresponds to various portions of the anatomy, e.g., a rotator cuff. In this example, system 112 uses the retrieved information to render image 2204 in template 2202. In the example of FIG. 22, a user may mark up image 2204, e.g., by inserting tags into image 2202. Generally, a tag includes identifying information. For example, a tag may be used

to identify where a patient has a tear and/or an abnormality in the part of the anatomy represented by image 2202. In another example, a tag may be used to identify a portion of the anatomy where a physician will be performing surgery.

In the example of FIG. 22, image 2204 is associated with controls 2220, 2222.

5 Through selection of one or more of controls 2220, 2222, a user may insert drawings and other markings into image 2204. For example, through selection of control 2220, a user may insert markings 2224, 2226 into image 2204, e.g., to indicate portions of the anatomy to be repaired through the surgery. Through selection of control 2222, a user may insert markings 2228 into image 2204, e.g., to indicate another attribute of the anatomy
10 represented in image 2204 - e.g., areas of a tear.

Template 2202 also includes controls 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244. Through selection of portions of one or more of controls 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244, a user (e.g., a physician) may specify and/or select other
15 information to be included in the operation note. For example, a user selects portion 2246 of control 2234. Portion 2246 indicates a quantity amount (three) of a medical device that was used in the operations. Based on selection of portion 2246 of control 2234, system 112 may generate text for insertion into the operative note. The generated text includes (i) information that was selected through portion 2246 of control 2234 (e.g., "three"), and (ii) information explaining a context for the selectable portion of the control (e.g., "the
20 quantity of medical devices used is"). In this example, the generated text includes the following text: the quantity of medical devices used is three.

In an example, image 2204 of the portion of the body on which work is being performed is customized based on the patient's medical record. For example, if a part of the patient's knee is degenerative, then image 2204 will show a degenerative portion of the
25 knee.

In an example, image 2204 includes a visual representation of the portion of the patient's body on which surgery is performed. In this example, image 2204 is pre tagged based on the patient's medical record. For example, portions of image 2204 may be marked (e.g., with one or more of tags 2206, 2208, 2210, 2212, 2214, 2216) to denote
30 where the patient is experiencing certain symptoms, e.g., pain, degeneration, prior work or procedures, and so forth. In this example, a user may move the tags, e.g., to a position that

is more accurate, e.g., relative to a position at which system 112 inserted the tag. In an example, the operative notes module also allow for trend checking in which patient trends are tracked over a period of time, as previously described. The operative notes modules also allows notifies the physician when the physician has failed to complete a section of the operative notes template, e.g., template 2102, 2202. System 112 also includes an automatic export functionality in which the operative notes can be automatically sent to a designated recipient.

In an example, using information selected and/or input into templates 2102 and 2202, system 112 generates an operative note that includes information input into templates 2012, 2202 and information explaining (e.g., providing context for) the information input into templates 2102, 2202.

In an example, system 112 receives a request to access a template for generating an operative note, with the request comprising information indicative of a type of requested template. For example, one or more of templates 2102 and 2202 could be requested. In this example, responsive to the request, system 112 retrieves the requested template. System 112 also transmits, to a device used by a user submitting the requested, information indicative of the selected template. In response, a user may select one or more portions of controls 2230, 2232, 2234, 2236, 2238, 2240, 2242, 2244 and/or may insert one or more markings and/or tags into image 2204. System 112 receives, from the device used by the user, information indicative of a selection of one or more portions of the template and/or information indicative of an insertion of information into the images. System 112 also generates, based on the selection of the one or more portions, an operative note, with the generated operative note include information specifying values associated with the selected one or more portions. System 112 also inserts into the generated operative note information that provides a context for the specified values.

Embodiments can be implemented in digital electronic circuitry, or in computer hardware, firmware, software, or in combinations thereof. An apparatus can be implemented in a computer program product tangibly embodied or stored in a machine-readable storage device for execution by a programmable processor; and method actions can be performed by a programmable processor executing a program of instructions to perform functions by operating on input data and generating output. The embodiments described herein, and other embodiments of the invention, can be implemented

advantageously in one or more computer programs that are executable on a programmable system including at least one programmable processor coupled to receive data and instructions from, and to transmit data and instructions to, a data storage system, at least one input device, and at least one output device. Each computer program can be
5 implemented in a high-level procedural or object oriented programming language, or in assembly or machine language if desired; and in any case, the language can be a compiled or interpreted language.

Processors suitable for the execution of a computer program include, by way of example, both general and special purpose microprocessors, and any one or more
10 processors of any kind of digital computer. Generally, a processor will receive instructions and data from a read-only memory or a random-access memory or both. The essential elements of a computer are a processor for executing instructions and one or more memory devices for storing instructions and data. Generally, a computer will also include, or be operatively coupled to receive data from or transfer data to, or both, one or
15 more mass storage devices for storing data, e.g., magnetic, magneto optical disks, or optical disks. Computer readable media for embodying computer program instructions and data include all forms of non-volatile memory, including by way of example semiconductor memory devices, e.g., EPROM, EEPROM, and flash memory devices; magnetic disks, e.g., internal hard disks or removable disks; magneto optical disks; and
20 CD ROM and DVD-ROM disks. The processor and the memory can be supplemented by, or incorporated in special purpose logic circuitry. Any of the foregoing can be supplemented by, or incorporated in, ASICs (application-specific integrated circuits).

To provide for interaction with a user, embodiments can be implemented on a computer having a display device, e.g., a LCD (liquid crystal display) monitor, for
25 displaying data to the user and a keyboard and a pointing device, e.g., a mouse or a trackball, by which the user can provide input to the computer. Other kinds of devices can be used to provide for interaction with a user as well; for example, feedback provided to the user can be any form of sensory feedback, e.g., visual feedback, auditory feedback, or tactile feedback; and input from the user can be received in any form, including acoustic,
30 speech, or tactile input.

Embodiments can be implemented in a computing system that includes a back end component, e.g., as a data server, or that includes a middleware component, e.g., an application server, or that includes a front end component, e.g., a client computer having a graphical user interface or a Web browser through which a user can interact with an implementation of embodiments, or any combination of such back end, middleware, or front end components. The components of the system can be interconnected by any form or medium of digital data communication, e.g., a communication network. Examples of communication networks include a local area network (LAN) and a wide area network (WAN), e.g., the Internet.

The system and method or parts thereof may use the "World Wide Web" (Web or WWW), which is that collection of servers on the Internet that utilize the Hypertext Transfer Protocol (HTTP). HTTP is a known application protocol that provides users access to resources, which may be data in different formats such as text, graphics, images, sound, video, Hypertext Markup Language (HTML), as well as programs. Upon specification of a link by the user, the client computer makes a TCP/IP request to a Web server and receives data, which may be another Web page that is formatted according to HTML. Users can also access other pages on the same or other servers by following instructions on the screen, entering certain data, or clicking on selected icons. It should also be noted that any type of selection device known to those skilled in the art, such as check boxes, drop-down boxes, and the like, may be used for embodiments using web pages to allow a user to select options for a given component. Servers run on a variety of platforms, including UNIX machines, although other platforms, such as Windows 2000/2003, Windows NT, Sun, Linux, and Macintosh may also be used. Computer users can view data available on servers or networks on the Web through the use of browsing software, such as Firefox, Netscape Navigator, Microsoft Internet Explorer, or Mosaic browsers. The computing system can include clients and servers. A client and server are generally remote from each other and typically interact through a communication network. The relationship of client and server arises by virtue of computer programs running on the respective computers and having a client-server relationship to each other.

Other embodiments are within the scope and spirit of the description claims. Additionally, due to the nature of software, functions described above can be implemented using software, hardware, firmware, hardwiring, or combinations of any of these.

Features implementing functions may also be physically located at various positions, including being distributed such that portions of functions are implemented at different physical locations. The use of the term "a" herein and throughout the application is not used in a limiting manner and therefore is not meant to exclude a multiple meaning or a
5 "one or more" meaning for the term "a." Additionally, to the extent priority is claimed to a provisional patent application, it should be understood that the provisional patent application is not limiting but includes examples of how the techniques described herein may be implemented.

A number of exemplary embodiments of the invention have been described.
10 Nevertheless, it will be understood by one of ordinary skill in the art that various modifications may be made without departing from the spirit and scope of the invention.

WHAT IS CLAIMED IS:

1. A computer-implemented method comprising:
retrieving, by one or more computer systems, a patient education module for
educating a patient about a medical procedure;
5 wherein a structure of the patient education module comprises a first educational
section and a second educational section;
where the first educational section comprises information and one or more
visualizations related to a first stage of the medical procedure;
wherein the second educational section comprises information and one or more
10 visualizations related to a second stage of the medical procedure;
transmitting, to a device used by the patient, the patient education module for the
patient to review the patient education module;
receiving, from the device used by the patient, information specifying that the
patient has reviewed and understood one or more of the first educational section and the
15 second educational section.
2. The computer-implemented method of claim 1, further comprising:
structuring the patient education module into a first educational section and a
second educational section;
20 generating, for the first educational section, the information and the one or more
visualizations related to the first stage of the medical procedure;
assigning, to the first educational section, the generated information and the one or
more visualizations related to the first stage of the medical procedure;
generating, for the second educational section, the information and the one or more
25 visualizations related to the second stage of the medical procedure; and
assigning, to the second educational section, the generated information and the one
or more visualizations related to the second stage of the medical procedure.
3. The computer-implemented method of claim 1, further comprising:
30 retrieving an electronic medical record that is associated with the patient;
identifying one or more medical codes in the electronic medical record;
searching, in a database, for patient education modules with medical codes
corresponding to the medical code included in the electronic medical record; and

identifying, based on a searching, a patient education module with a medical code corresponding to the medical code included in the electronic medical record;

wherein retrieving the patient education module comprises:

retrieving the identified patient education module.

5

4. The computer-implemented method of claim 1, wherein patient education modules are associated with unique identifiers, and wherein the method further comprises:

receiving, from a device used by a medical service provider, a message comprising content for a patient education module, wherein the message comprises a unique identifier for the content;

10

searching, in a database storing the patient education modules, for a patient education module with a unique identifier corresponding to the unique identifier for the content;

identifying, based on searching, a patient education module with a unique identifier corresponding to the unique identifier for the content; and

15

assigning the content to the identified patient education module.

5. The computer-implemented method of claim 1, further comprising: receiving a request for a patient education module that is related to a medical procedure to be performed on a patient; and

20

selecting, from a set of patient education modules, the patient education module that is related to the medical procedure, wherein selecting is based on a type of the medical procedure.

6. The computer-implemented method of claim 1, wherein the first educational section comprises a graphical user interface for the patient to confirm review of the first educational section and to indicate consent to the procedure addressed by the first educational section, wherein the method further comprises:

25

tracking an amount of time the patient spends reviewing the first educational section;

30

receiving, from the device used by the user through the graphical user interface, information confirming the review and indicating the consent;

comparing the tracked amount of time to a threshold amount of time;

determining, based on comparing, that the tracked amount of time is less than the threshold amount of time; and

in response to determining that the tracked amount of time is less than the threshold amount of time, performing one or more operations comprising:

5 sending, to the device used by the patient, a message notifying the patient to re-review the first educational section; and

 sending, to a device associated with a medical service provider, a notification that that patient may have inadequately reviewed the first educational section.

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7. The computer-implemented method of claim 1, wherein the patient education module comprises a first patient education module, wherein the medical procedure comprises a first medical procedure, and wherein the method further comprises:

15 retrieving, by the one or more computer systems, a second patient education module for educating the patient about a second medical procedure;

 wherein the first patient education module differs from the second patient education module;

 wherein the first medical procedure differs from the second medical procedure.

20

8. The computer-implemented method of claim 1, further comprising:

 structuring the first educational section to include a series of trays, wherein a tray includes a collection of information associated with a category specified by the tray.

25

9. One or more machine-readable media configured to store instructions that are executable by one or more processing devices to perform operations comprising:

 retrieving a patient education module for educating a patient about a medical procedure;

 wherein a structure of the patient education module comprises a first educational section and a second educational section;

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 where the first educational section comprises information and one or more visualizations related to a first stage of the medical procedure;

 wherein the second educational section comprises information and one or more visualizations related to a second stage of the medical procedure;

transmitting, to a device used by the patient, the patient education module for the patient to review the patient education module;

receiving, from the device used by the patient, information specifying that the patient has reviewed and understood one or more of the first educational section and the second educational section.

10. The one or more machine-readable media of claim 9, wherein the operations further comprise:

structuring the patient education module into a first educational section and a second educational section;

generating, for the first educational section, the information and the one or more visualizations related to the first stage of the medical procedure;

assigning, to the first educational section, the generated information and the one or more visualizations related to the first stage of the medical procedure;

generating, for the second educational section, the information and the one or more visualizations related to the second stage of the medical procedure; and

assigning, to the second educational section, the generated information and the one or more visualizations related to the second stage of the medical procedure.

11. The one or more machine-readable media of claim 9, wherein the operations further comprise:

retrieving an electronic medical record that is associated with the patient;

identifying one or more medical codes in the electronic medical record;

searching, in a database, for patient education modules with medical codes corresponding to the medical code included in the electronic medical record; and

identifying, based on a searching, a patient education module with a medical code corresponding to the medical code included in the electronic medical record;

wherein retrieving the patient education module comprises:

retrieving the identified patient education module.

12. The one or more machine-readable media of claim 9, wherein patient education modules are associated with unique identifiers, and wherein the operations further comprise:

receiving, from a device used by a medical service provider, a message comprising content for a patient education module, wherein the message comprises a unique identifier for the content;

searching, in a database storing the patient education modules, for a patient education module with a unique identifier corresponding to the unique identifier for the content;

identifying, based on searching, a patient education module with a unique identifier corresponding to the unique identifier for the content; and

assigning the content to the identified patient education module.

13. The one or more machine-readable media of claim 9, wherein the operations further comprise:

receiving a request for a patient education module that is related to a medical procedure to be performed on a patient; and

selecting, from a set of patient education modules, the patient education module that is related to the medical procedure, wherein selecting is based on a type of the medical procedure.

14. The one or more machine-readable media of claim 9, wherein the first educational section comprises a graphical user interface for the patient to confirm review of the first educational section and to indicate consent to the procedure addressed by the first educational section, wherein the operations further comprise:

tracking an amount of time the patient spends reviewing the first educational section;

receiving, from the device used by the user through the graphical user interface, information confirming the review and indicating the consent;

comparing the tracked amount of time to a threshold amount of time;

determining, based on comparing, that the tracked amount of time is less than the threshold amount of time; and

in response to determining that the tracked amount of time is less than the threshold amount of time, performing one or more operations comprising:

sending, to the device used by the patient, a message notifying the patient to re-review the first educational section; and

sending, to a device associated with a medical service provider, a notification that that patient may have inadequately reviewed the first educational section.

5 15. The one or more machine-readable media of claim 9, wherein the patient education module comprises a first patient education module, wherein the medical procedure comprises a first medical procedure, and wherein the operations further comprise:

retrieving, by the one or more computer systems, a second patient education
10 module for educating the patient about a second medical procedure;

wherein the first patient education module differs from the second patient education module;

wherein the first medical procedure differs from the second medical procedure.

15 16. The one or more machine-readable media of claim 9, wherein the operations further comprise:

structuring the first educational section to include a series of trays, wherein a tray includes a collection of information associated with a category specified by the tray.

20 17. An electronic system comprising:

one or more processing devices; and

one or more machine-readable media configured to store instructions that are executable by the one or more processing devices to perform operations comprising:

retrieving a patient education module for educating a patient about a
25 medical procedure;

wherein a structure of the patient education module comprises a first educational section and a second educational section;

where the first educational section comprises information and one or more visualizations related to a first stage of the medical procedure;

30 wherein the second educational section comprises information and one or more visualizations related to a second stage of the medical procedure;

transmitting, to a device used by the patient, the patient education module for the patient to review the patient education module;

receiving, from the device used by the patient, information specifying that the patient has reviewed and understood one or more of the first educational section and the second educational section.

5 18. The electronic system of claim 17, wherein the operations further comprise: structuring the patient education module into a first educational section and a second educational section;

generating, for the first educational section, the information and the one or more visualizations related to the first stage of the medical procedure;

10 assigning, to the first educational section, the generated information and the one or more visualizations related to the first stage of the medical procedure;

generating, for the second educational section, the information and the one or more visualizations related to the second stage of the medical procedure; and

15 assigning, to the second educational section, the generated information and the one or more visualizations related to the second stage of the medical procedure.

19. The electronic system of claim 17, wherein the operations further comprise: retrieving an electronic medical record that is associated with the patient;

identifying one or more medical codes in the electronic medical record;

20 searching, in a database, for patient education modules with medical codes corresponding to the medical code included in the electronic medical record; and

identifying, based on a searching, a patient education module with a medical code corresponding to the medical code included in the electronic medical record;

wherein retrieving the patient education module comprises:

25 retrieving the identified patient education module.

20. The electronic system of claim 17, wherein patient education modules are associated with unique identifiers, and wherein the operations further comprise:

30 receiving, from a device used by a medical service provider, a message comprising content for a patient education module, wherein the message comprises a unique identifier for the content;

searching, in a database storing the patient education modules, for a patient education module with a unique identifier corresponding to the unique identifier for the content;

identifying, based on searching, a patient education module with a unique identifier corresponding to the unique identifier for the content; and
5 assigning the content to the identified patient education module.

21. A computer implemented method comprising:

accessing by one or more computers one or more types of trend data for a patient,
10 with the accessed one or more types of trend data being associated with various time intervals;

generating by the one or more computers information indicative of a chart for displaying the one or more types of the trend data over the various time intervals;

wherein for a particular type of trend data, various portions of the trend data of the particular type are assigned to the various time intervals;
15

selecting a first portion of the chart to be associated with a first stage in a medical procedure, with the first portion of the chart being associated with a first subset of the various time intervals;

causing the first portion of the chart to be color coded in association with the first stage in the medical procedure to visually indicate to a viewer of the chart that charted trend data included in the first portion of the chart is associated with the first stage;
20

selecting a second portion of the chart to be associated with a second stage in a medical procedure, with the second portion of the chart being associated with a second subset of the various time intervals; and

causing the second portion of the chart to be color coded in association with the second stage in the medical procedure to visually indicate to a viewer of the chart that charted trend data included in the second portion of the chart is associated with the second stage.
25

22. A computer implemented method comprising:

accessing, by a computer, patient trend data;

receiving, from a client device, information specifying one or more criteria to be applied to the accessed patient trend data;
30

accessing information specifying attributes of patients associated with the accessed patient trend data;

determining one or more patients with attributes that satisfy the one or more criteria;

5 selecting, from the patient trend data, a portion of the patient trend data associated with the determined one or more patients;

assigning first items of data in the selected portion to a first time interval corresponding to a stage in a medical procedure;

10 generating a visualization of trends in the first items of data over the first time interval;

assigning second items of data in the selected portion to a second time interval corresponding to another stage in the medical procedure; and

generating a visualization of trends in the second items of data over the second time interval.

15 generating, from the selected portion of the patient trend data, one or more visual

23. A computer-implemented method comprising:

20 accessing by one or more computers information indicative of a first portion of a medical procedure and information indicative of a second portion of the medical procedure;

for the first portion of the medical procedure:

generating a first interactive consent form by

25 generating a plurality of first graphical user interfaces that provide a user with information for promoting informed consent of the first portion;

wherein each of the first graphical user interfaces includes controls, selection of which specifies the user's consent to the information displayed in the first graphical user interfaces;

30 receiving information indicative of the user's selection of the controls in each of the first graphical user interfaces; and

determining, based on the received information, that the user has provided informed consent for the first portion of the medical procedure.

24. The method of claim 23, further comprising:

for the second portion of the medical procedure:

generating a second interactive consent form by

generating a plurality of second graphical user interfaces that

provide the user with information for promoting informed consent of the
second portion;

wherein each of the second graphical user interfaces includes

controls, selection of which specifies the user's consent to the information
displayed in the second graphical user interfaces;

receiving information indicative of the user's selection of the controls in each of
the second graphical user interfaces; and

determining, based on the received information, that the user has provided
informed consent for the second portion of the medical procedure; and

responsive to determining that the user has provided informed consent for the
second portion of the medical procedure and for the first portion of the medical procedure,
determining that the user has provided informed consent for the medical procedure.

25. A computer-implemented method comprising:

accessing a profile of a medical service provider;

determining, based on contents of the accessed profile, a practice type that is
associated with the medical service provider;

selecting, based on the determined practice type, a medical service provider
interactive virtual surgery module for the medical service provider, with the medical
service provider interactive virtual surgery module being for particular types of medical
procedures; and

causing one or more graphical user interfaces included in the medical service
provider interactive virtual surgery module to be displayed on a client device used by the
medical service provider, with the one or more displayed graphical user interfaces
promoting an education of the medical service provider about the particular types of
medical procedures;

wherein information in the graphical user interfaces is displayed in accordance
with stages of the medical procedures.

26. A computer-implemented method comprising:
receiving a request to access an electronic dictation template for a particular type
of medical procedure;
causing by a computer contents of the requested electronic dictation template to be
5 displayed for a user associated with the request, wherein the electronic dictation template
includes multiple instances of a field that is pre-populated with default values;
receiving a request to update the multiple instances of the field with a selected
value; and
for each instance of the field in the electronic dictation template,
10 updating the field with the selected value.

27. A computer-implemented method comprising:
receiving, in a referring physician portal, a referral for a referring physician;
receiving, through the referring physician portal, information indicative of a type
15 of correspondence to be automatically generated, in response to the referral;
sending, to a treating physician portal, the automatically generated
correspondence;
receiving, from the treating physician portal, information indicative of a question
for the referring physician; and
20 causing the referring physician portal to display the information indicative of the
question for the referring physician.

28. A computer-implemented method comprising:
receiving a request to access a template for generating an operative note, with the
25 request comprising information indicative of a type of requested template;
responsive to the request, retrieving the requested template;
transmitting, to a device used by a user submitting the requested, information
indicative of the selected template;
receiving, from the device used by the user, information indicative of a selection of
30 one or more portions of the template;
generating, based on the selection of the one or more portions, an operative note,
with the generated operative note include information specifying values associated with
the selected one or more portions; and

inserting into the generated operative note information that provides a context for the specified values.

1/23

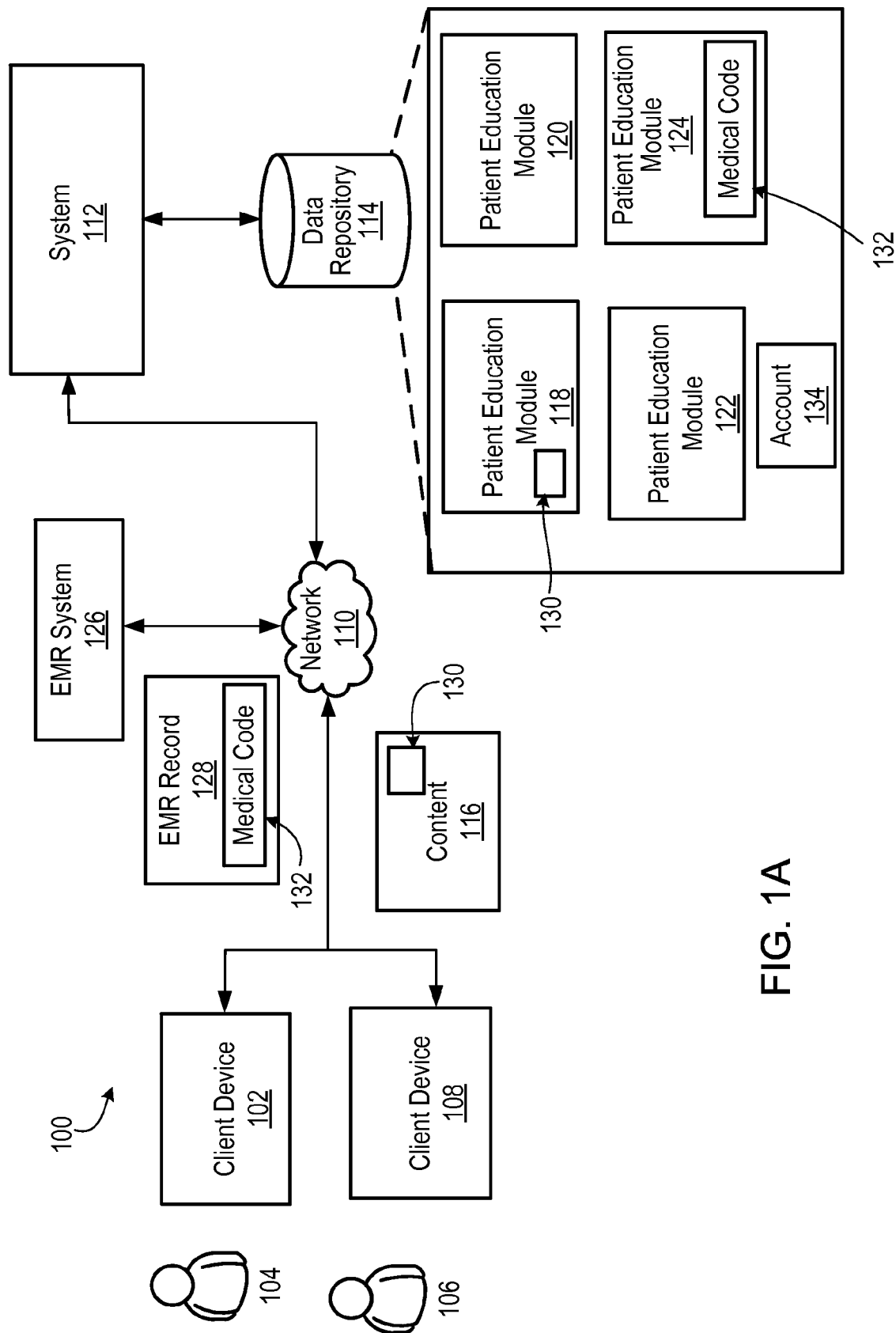


FIG. 1A

2/23

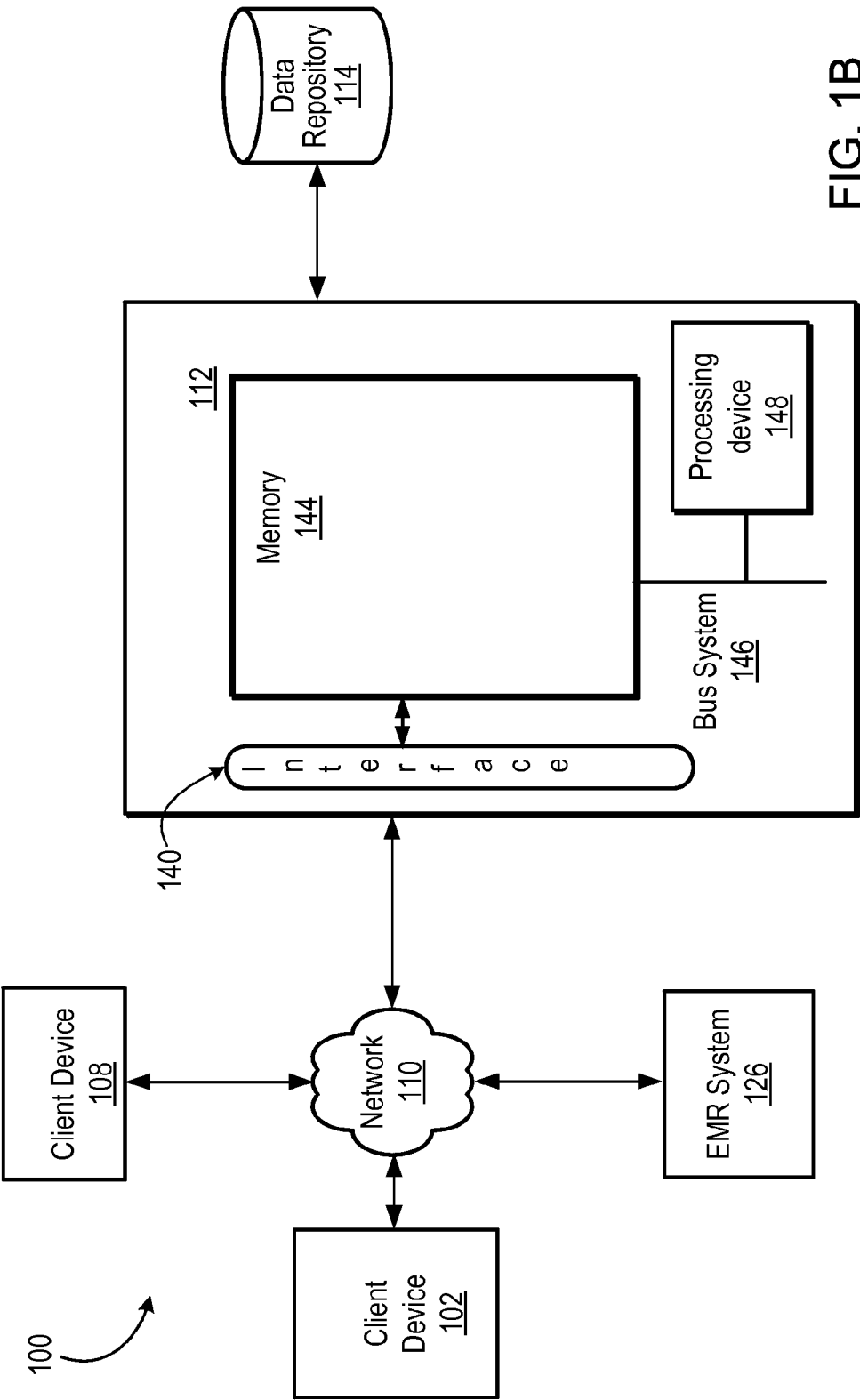


FIG. 1B

3/23

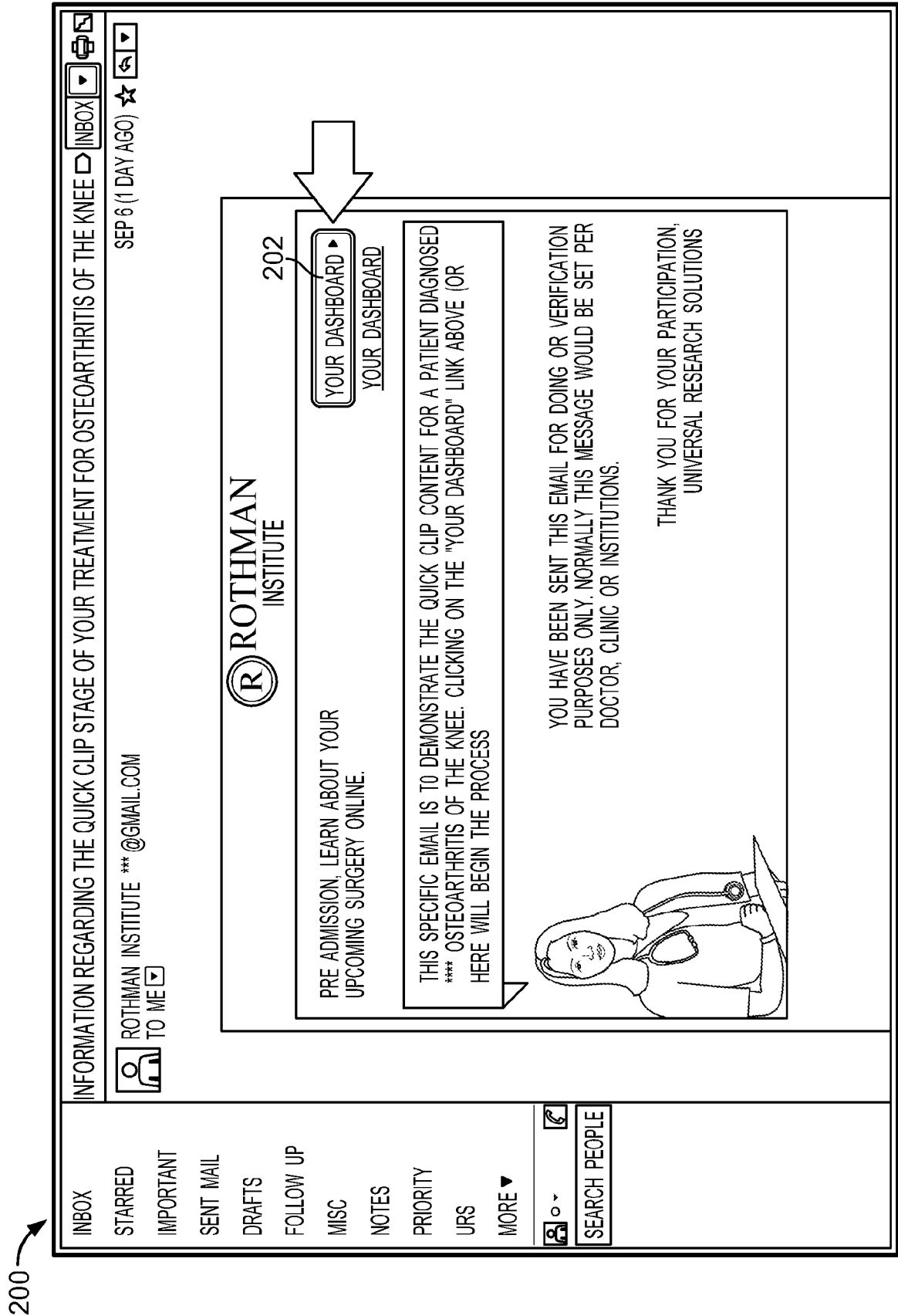


FIG. 2

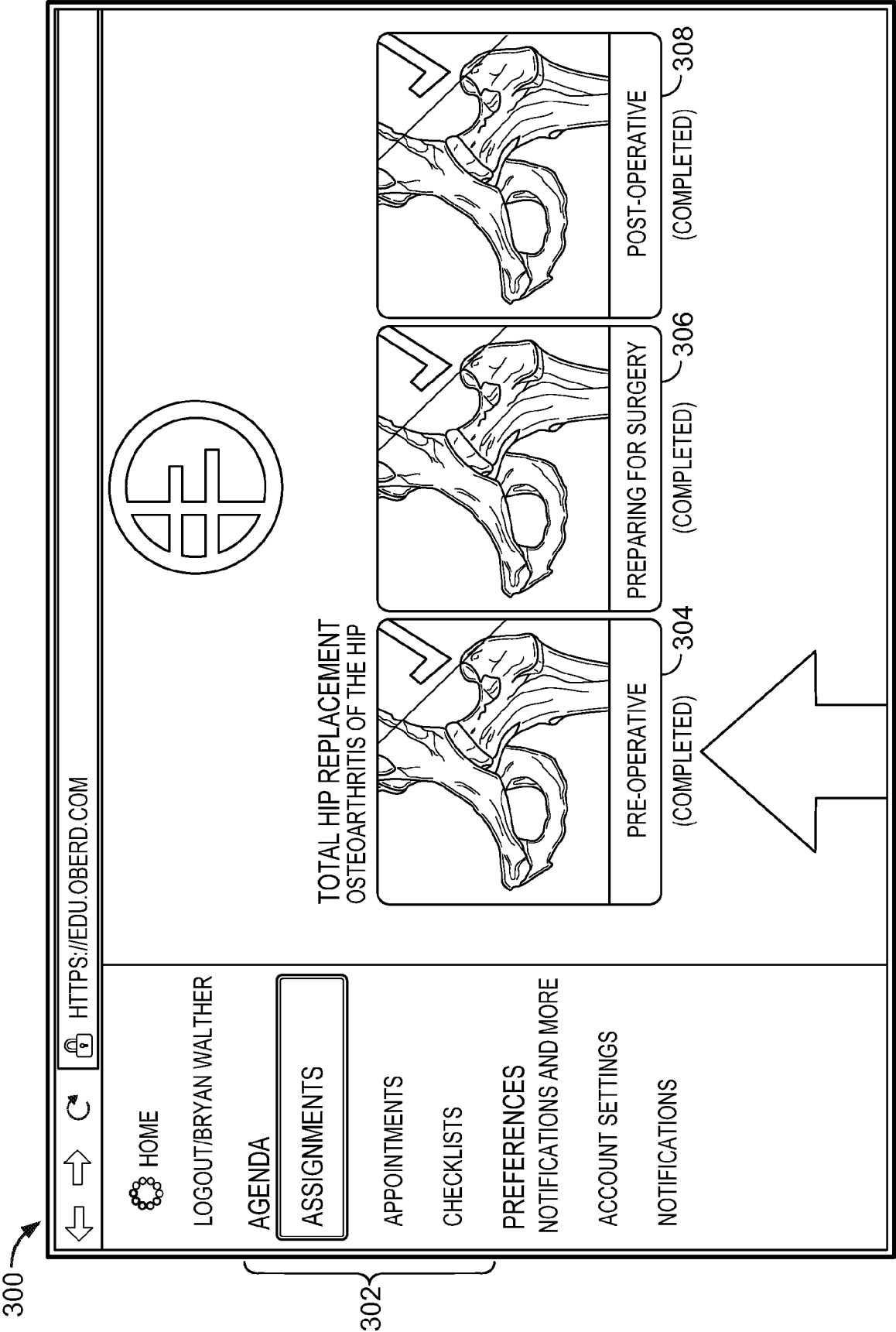


FIG. 3

5/23

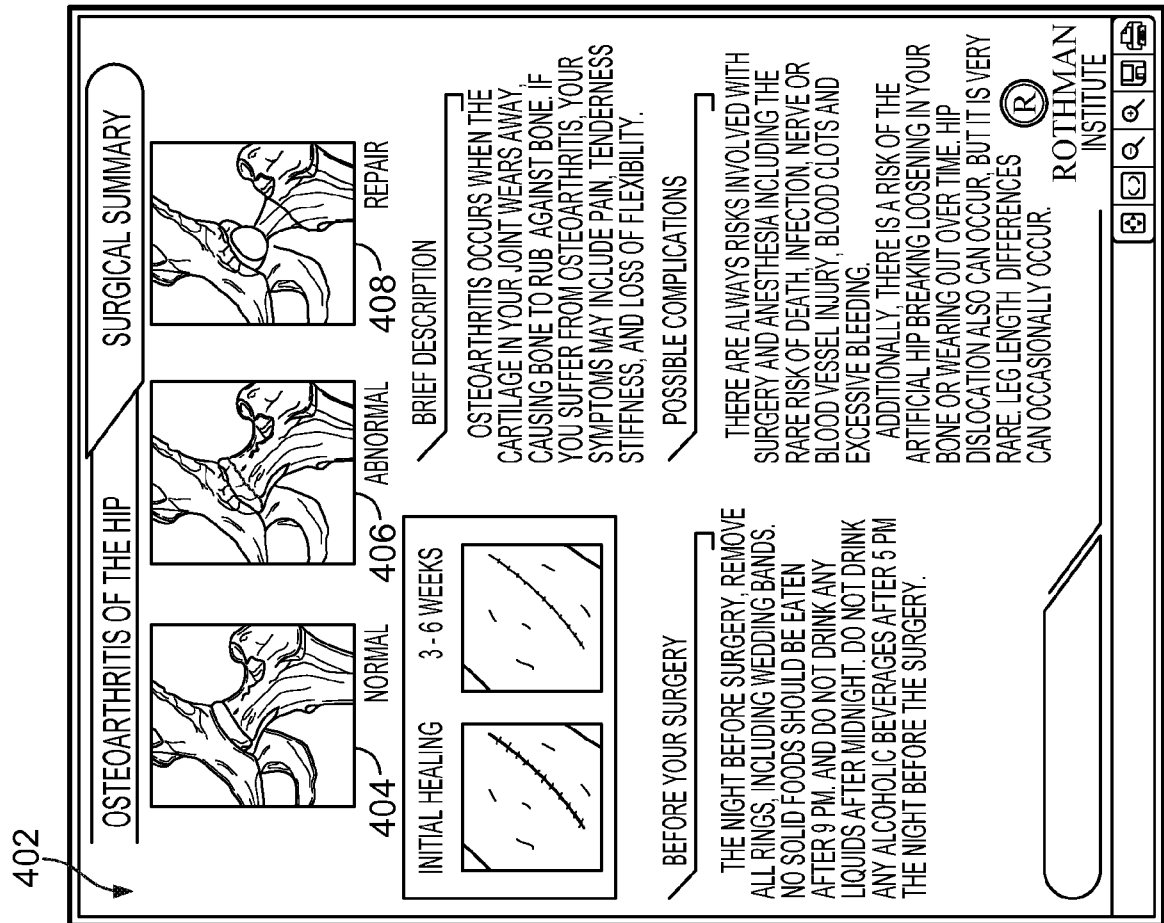


FIG. 4

6/23

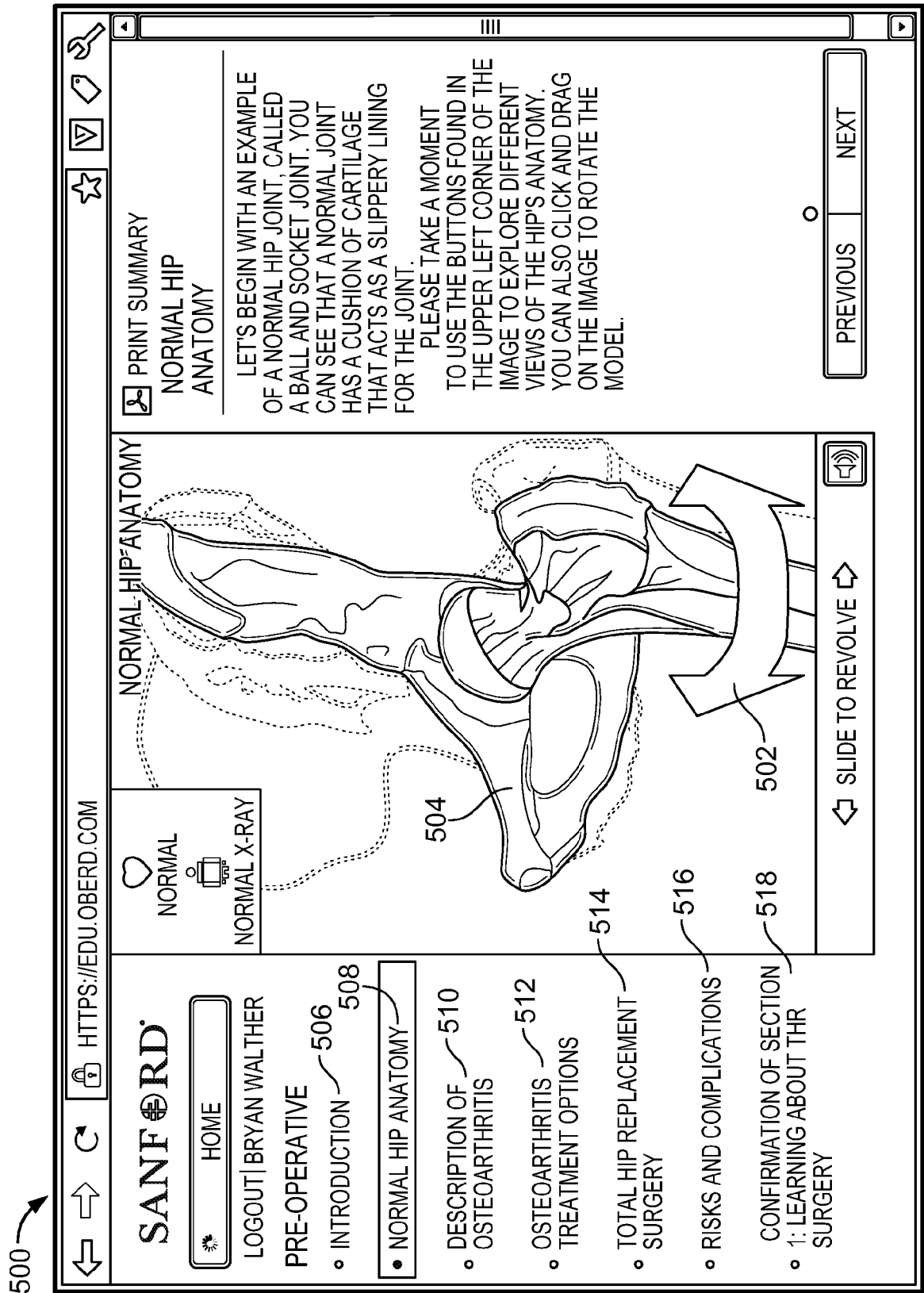


FIG. 5

7/23

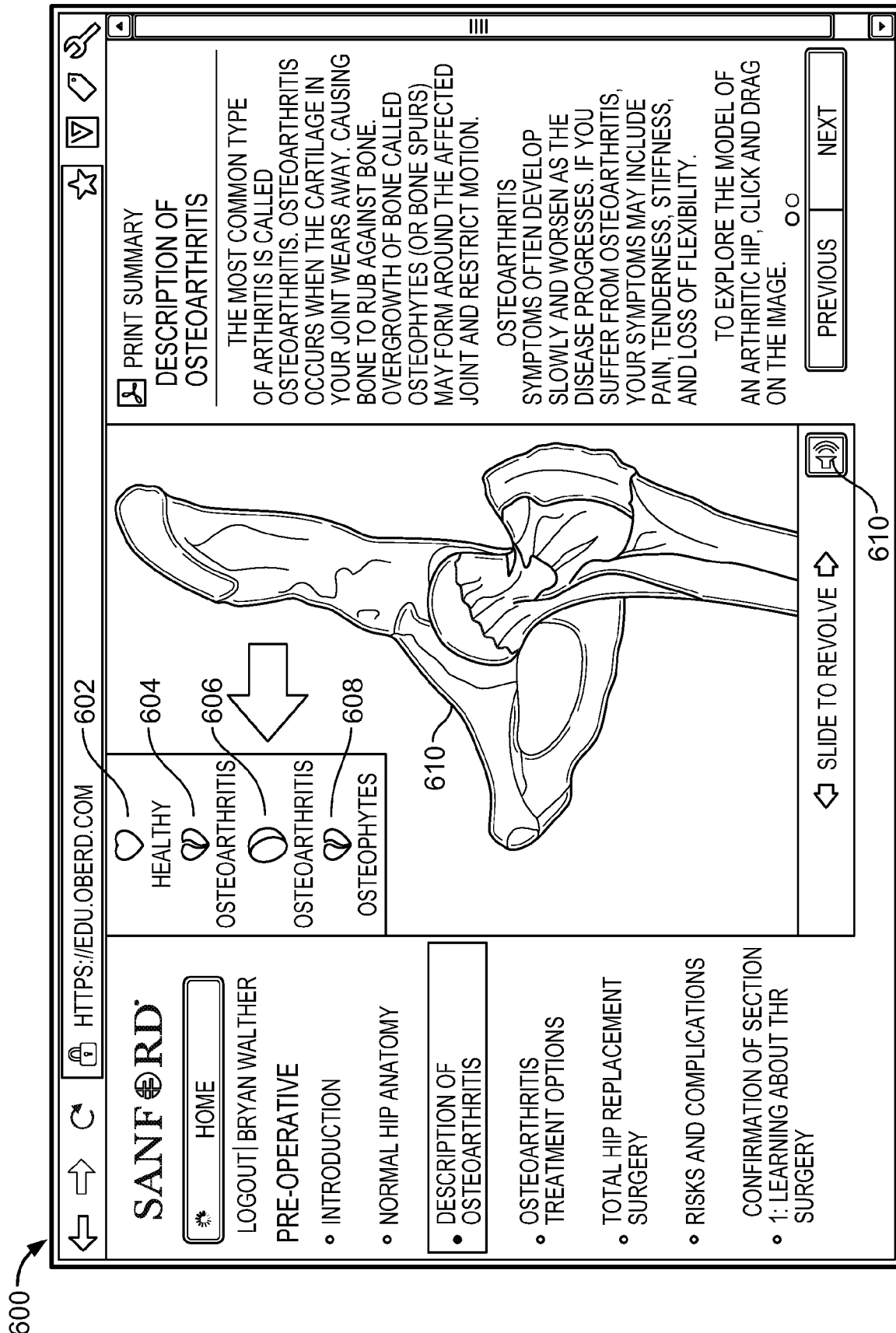


FIG. 6

8/23

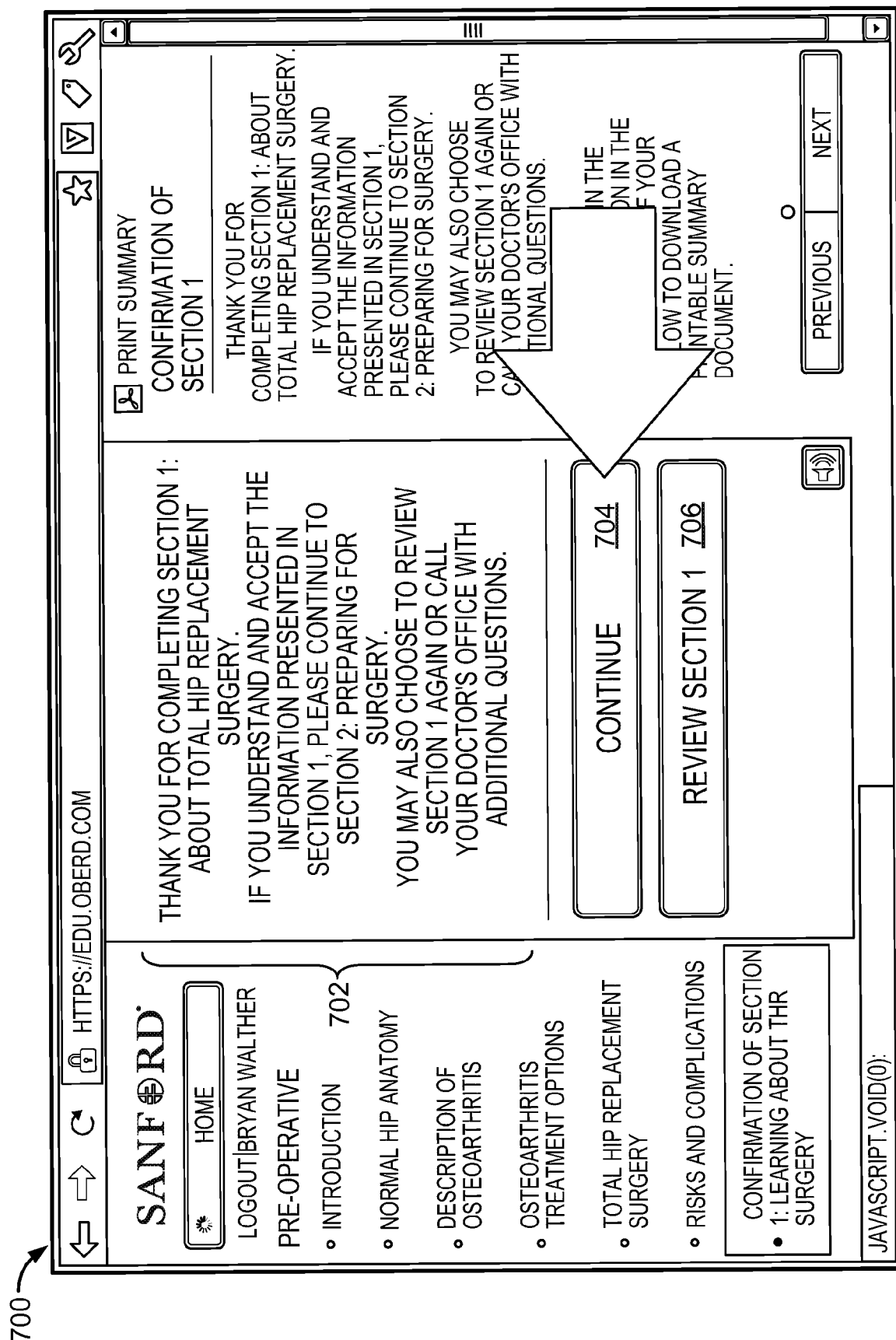


FIG. 7

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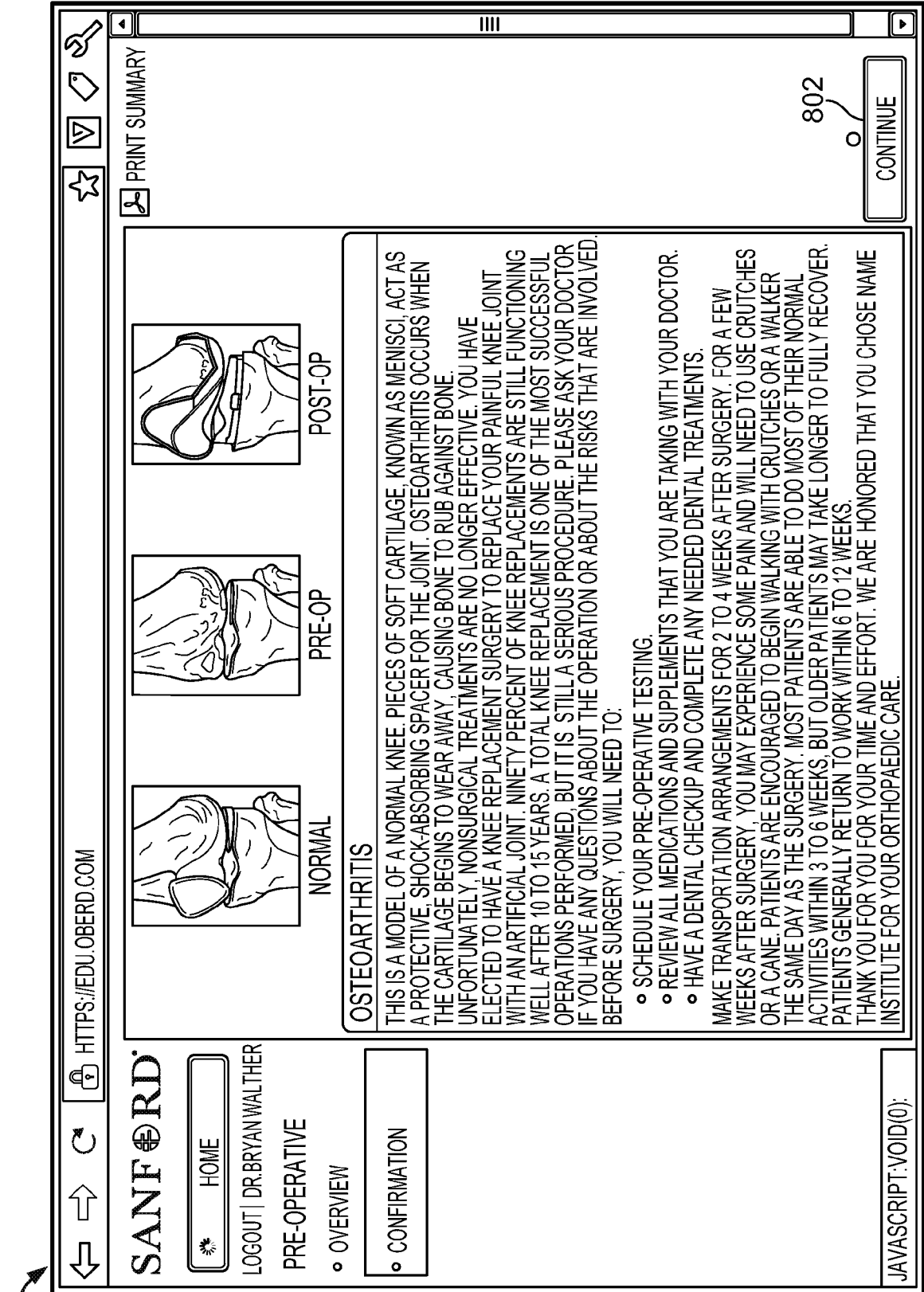


FIG. 8

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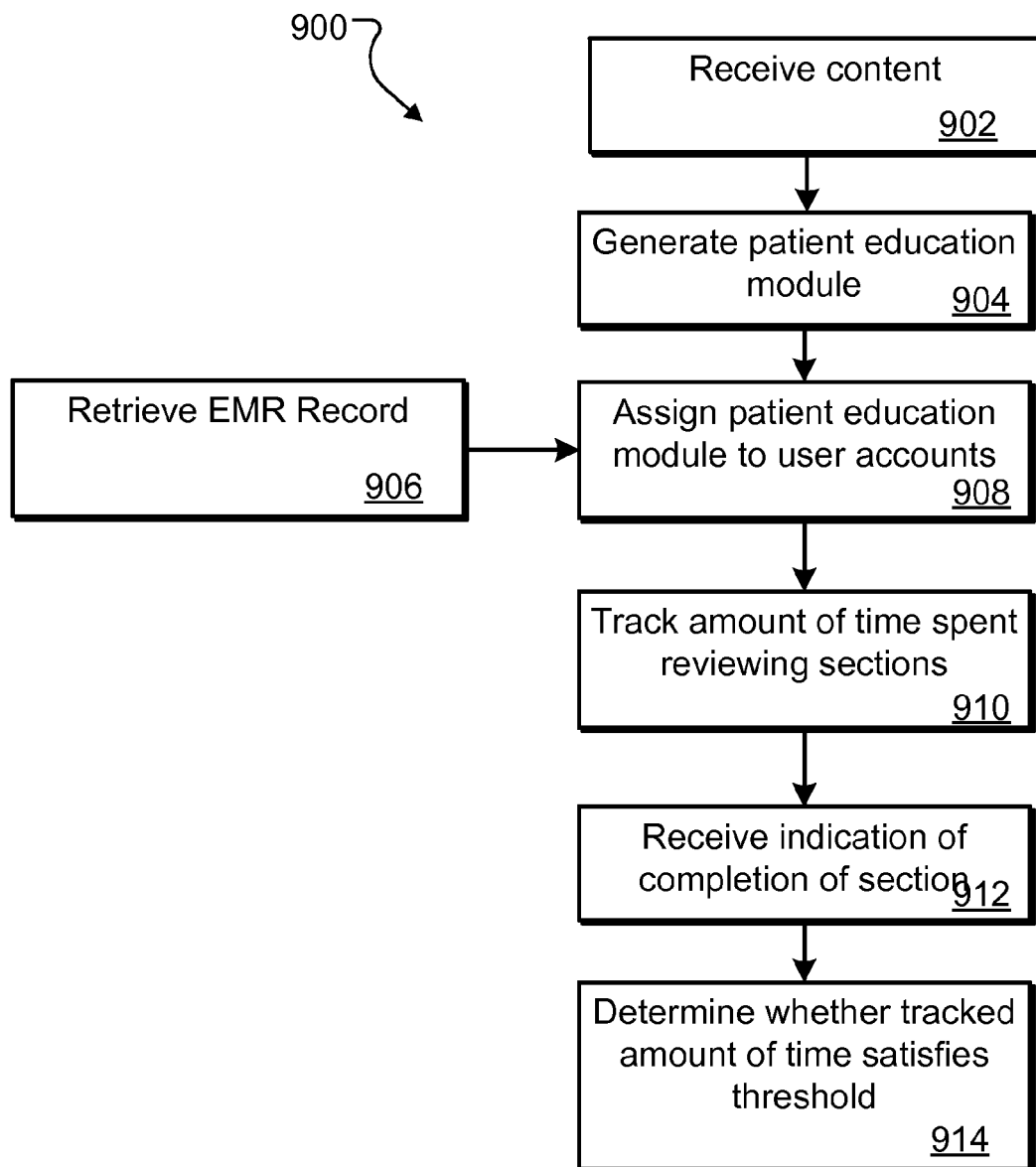


FIG. 9

1000

ANDREA TRENDS ON MAR 2ND, 2012 AT 8:00AM WITH DR. ALI DOCTOR

1002

PATIENT TRENDS

ALL APPTS.

GLOBAL DICTATION

NONE

REAL-TIME OUTCOME TRENDS
EMBEDDED IN CLINICAL
SUMMARY SHEET

PATIENT DETAILS

NONE

PATIENT NAME

ANDREA TRENDS

DATE OF BIRTH

01/01/2011 (0 YRS OLD)

HEIGHT

WEIGHT

ASSIGN QUESTIONNAIRES

REFERRING DOCTOR DETAILS

REFERRING DOCTOR

GENERAL NOTES

NONE

NO NOTES AVAILABLE.

LEGEND: ▢ OUTCOME

X-RAY

NONE

NO NOTES AVAILABLE.

DIAGNOSES AND TREATMENTS

NONE

ASSIGN CASE TYPES

DIAGNOSES

TREATMENTS

FIG. 10

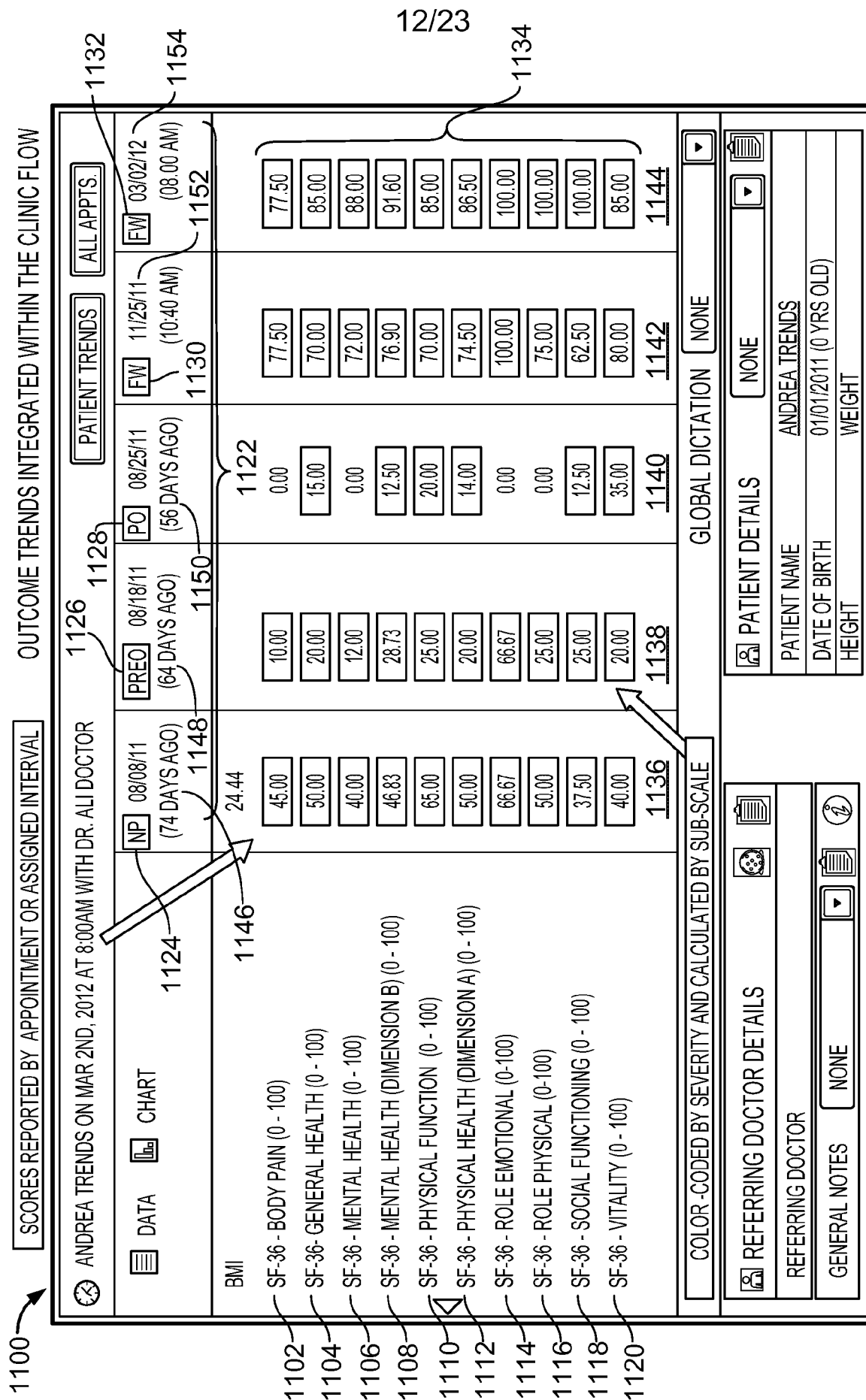


FIG. 11

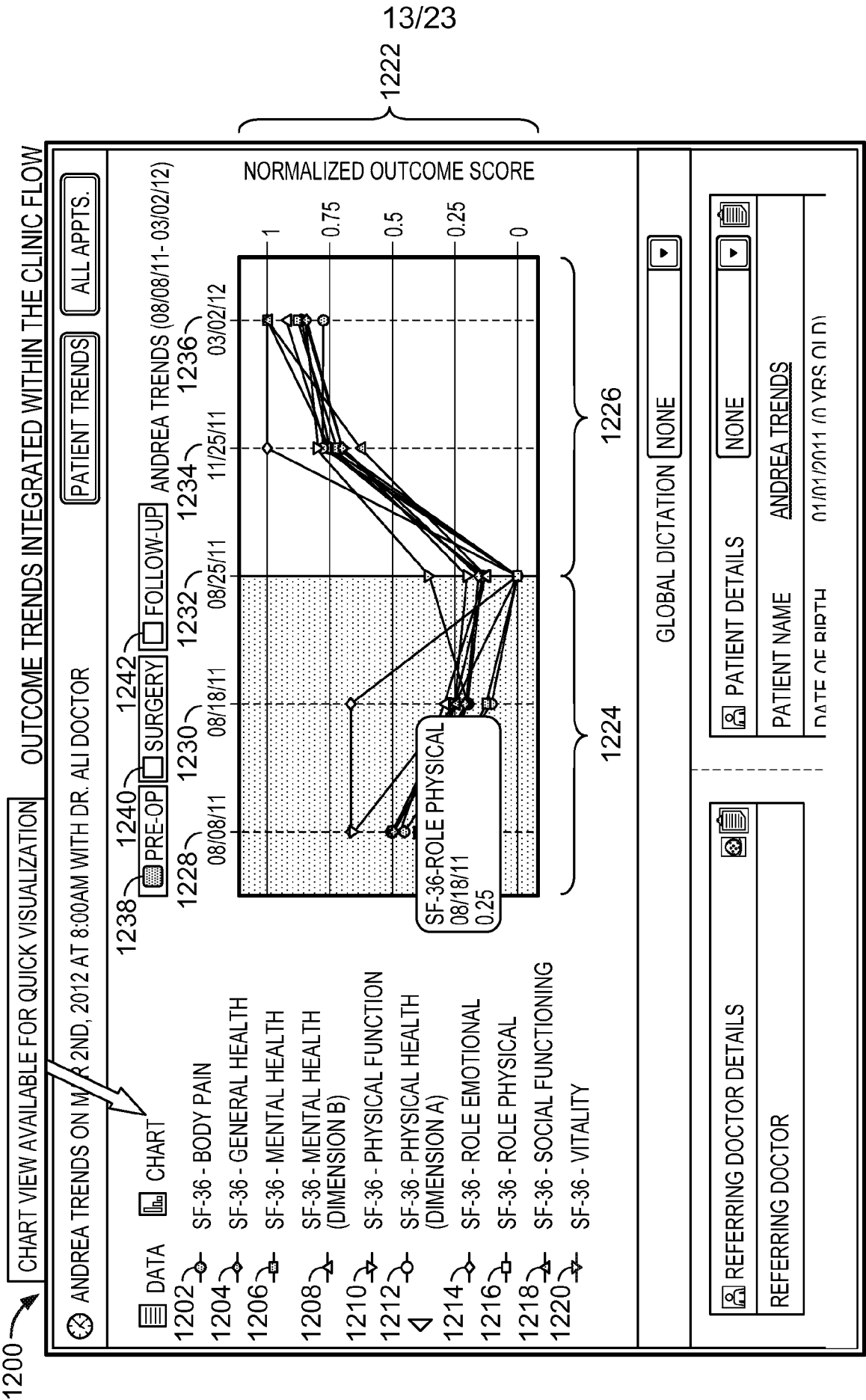


FIG. 12

14/23

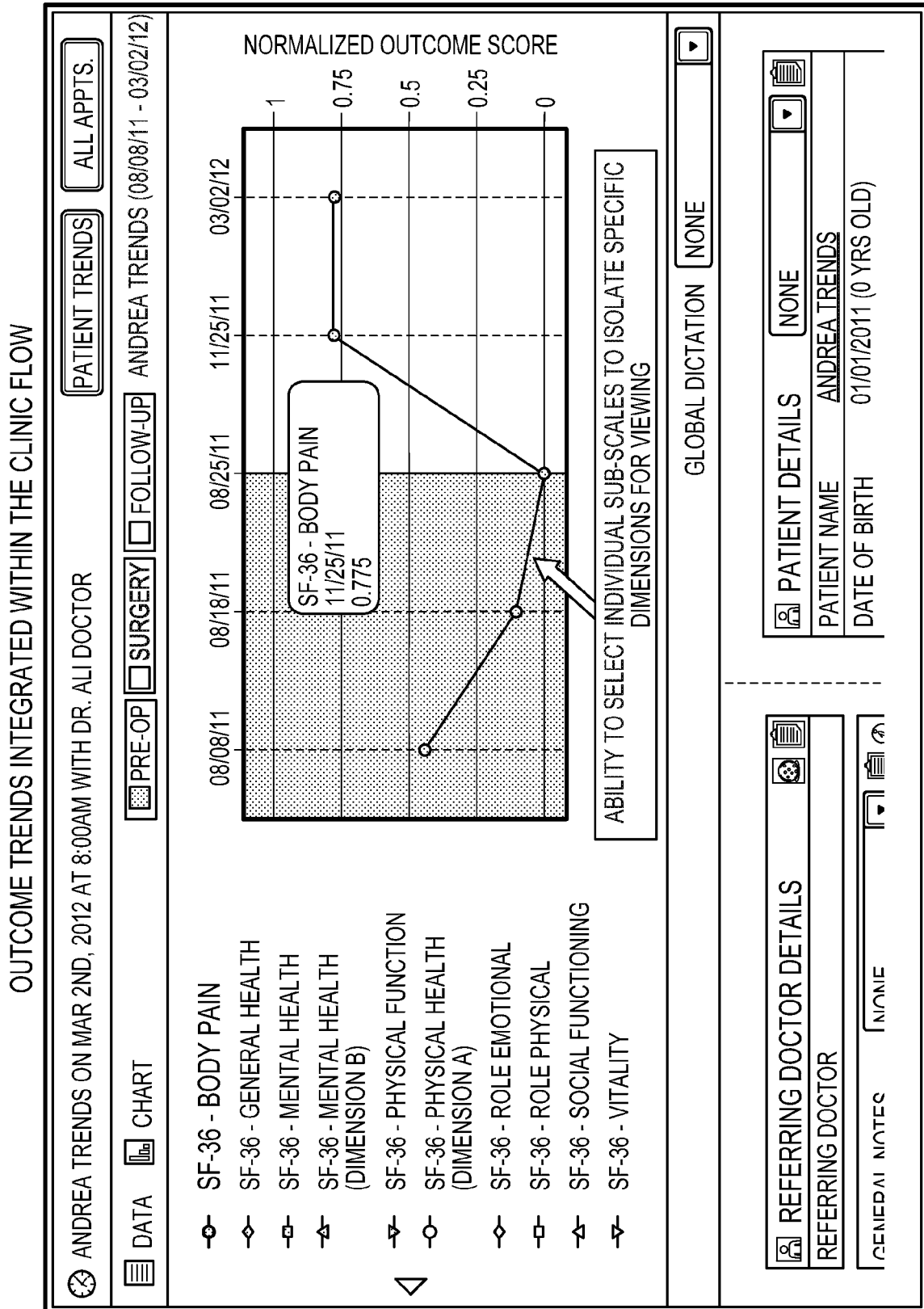
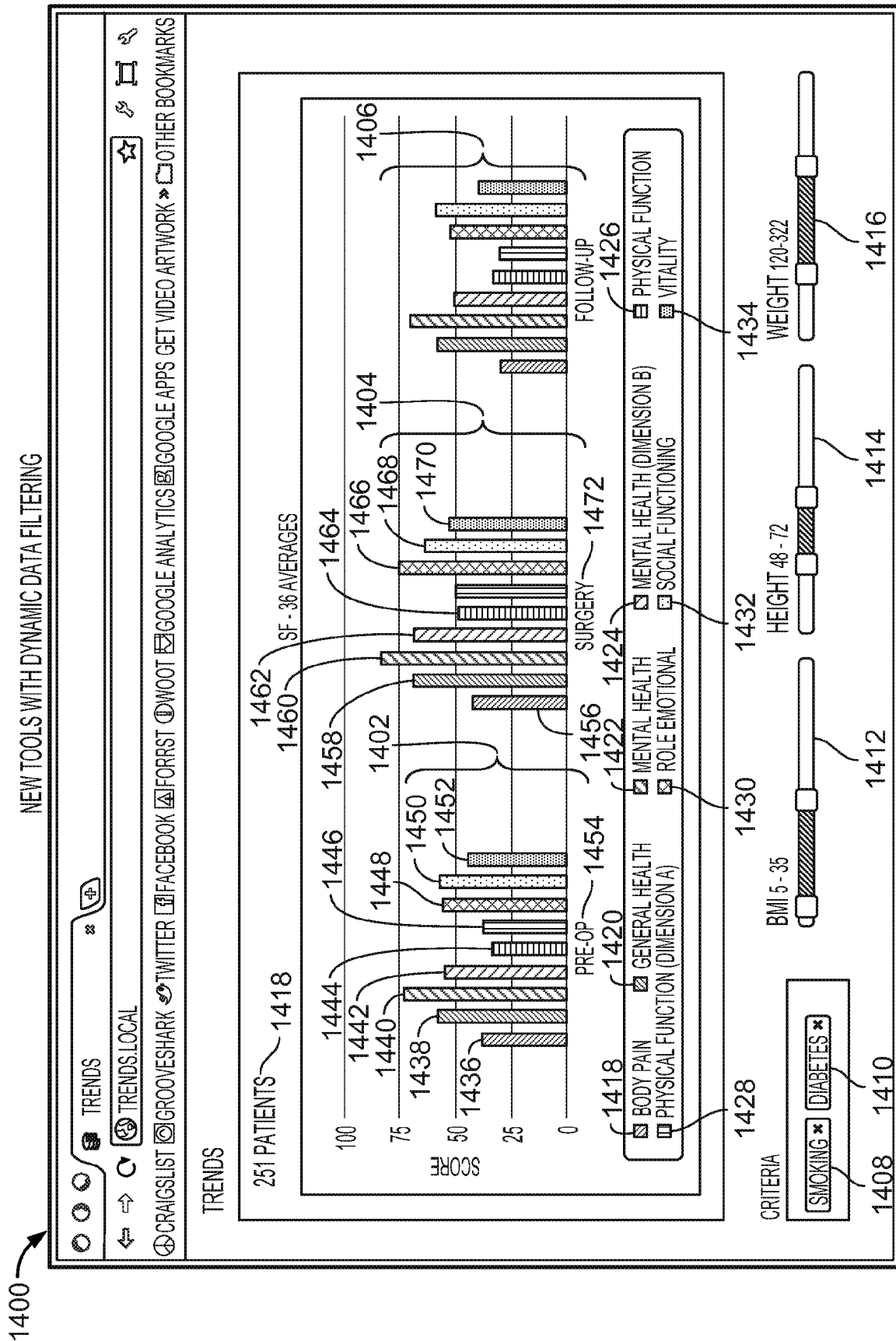


FIG. 13

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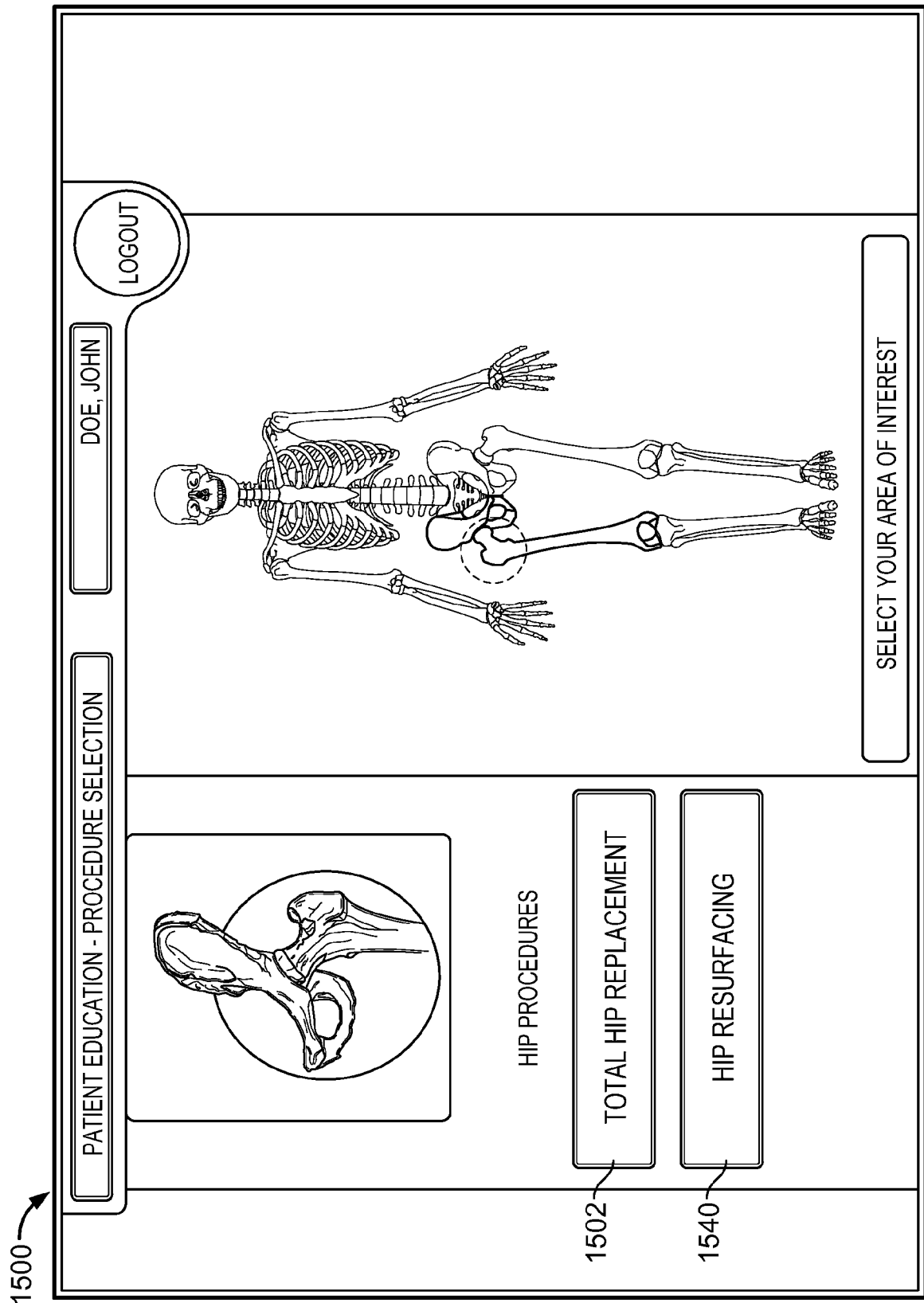


FIG. 15

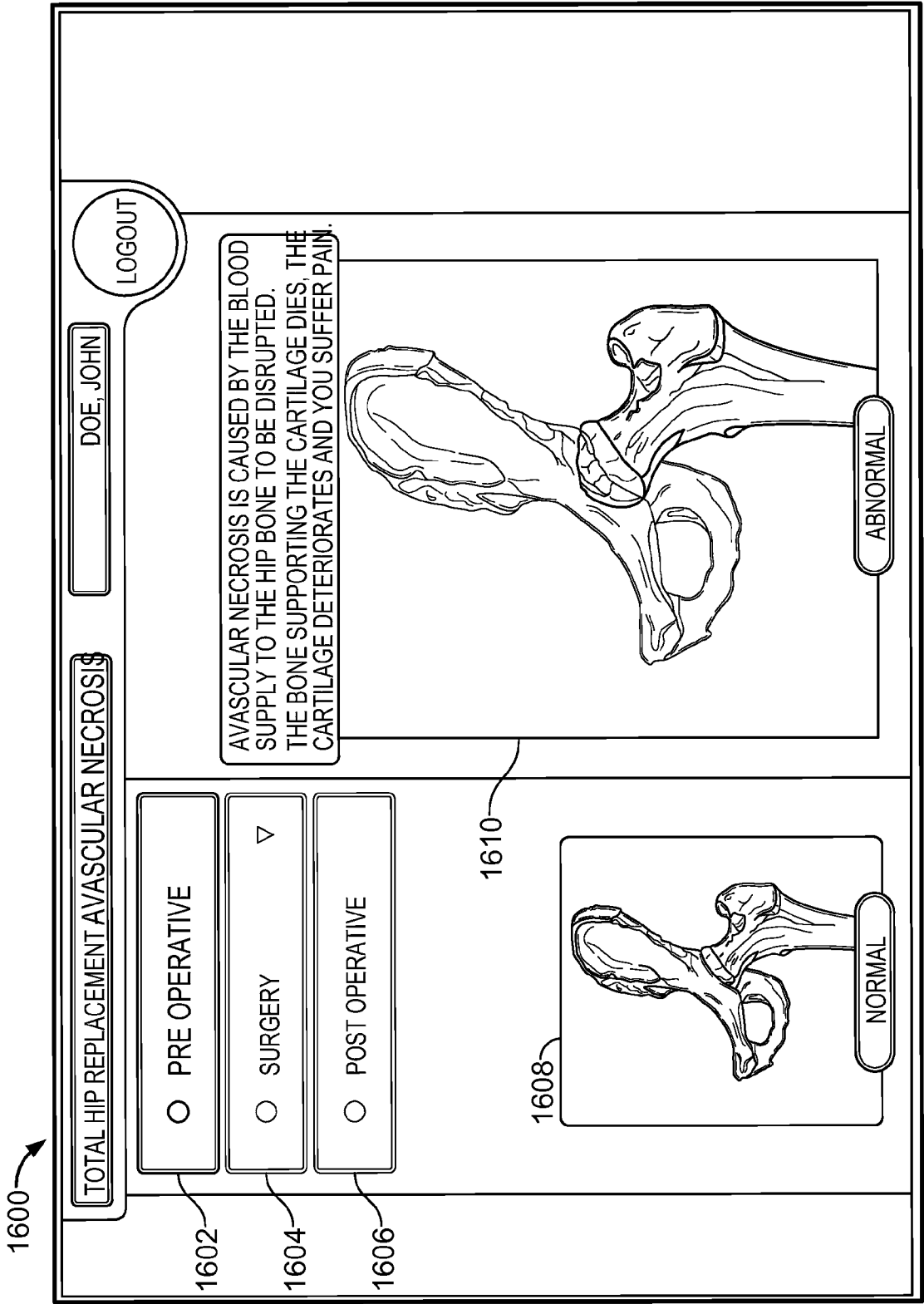


FIG. 16

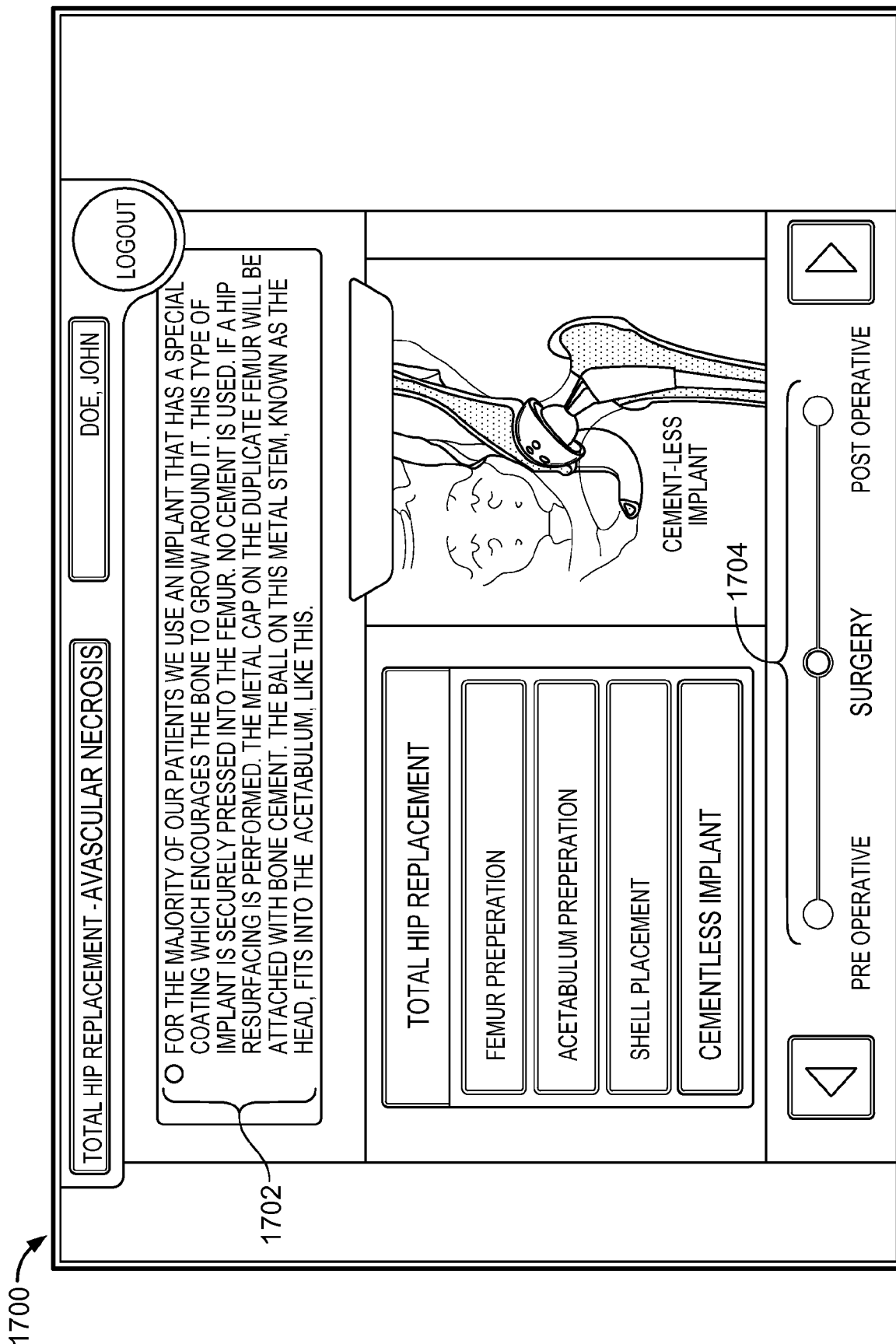


FIG. 17

EDICTATION

EDICTATION WITH PRESET COMPONENTS PER VISIT TYPE, PT. PROFILE AND THE SELECTED PROCEDURE

ANDREA TRENDS ON AUG 8TH, 2011 AT 1:00AM WITH DR. ALI DOCTOR

PATIENT TRENDS

ALL APPTS.

PRINT

GLOBAL DICTATION

1804

CORTISONE INJECTION TEMPLATE

HIP CONSULTATION 1808

HIP CONSULTATION - NONOP

HIP EXTENDED FOLLOW UP

KNEE CONSULTATION - NONOP

KNEE EXTENDED FOLLOW UP

NEW REVISION PLAN

PATIENT DETAILS

PATIENT NAME

DATE OF BIRTH

HEIGHT 5' 3" 1810

WEIGHT 138 LBS

BMI 24.4 1812

1816 1814

ASSIGN QUESTIONNAIRES

REFERRING DOCTOR DETAILS

REFERRING DOCTOR

ALIREF

GENERAL NOTES

IMPRESSION: THIS PATIENT IS FUNCTIONING WELL AFTER RIGHT TOTAL HIP ARTHROPLASTY. ULTIMATE FAILURE MAY OCCUR DUE TO MECHANICAL WEAR.

LEGEND:

SPECIALTY

HISTORY

OUTCOME

SHOW ALL

CHIEF COMPLAINT >>

REASON: RIGHT KNEE

PAIN LOCATION: --

NIGHT PAIN

PROBLEM DURATION: LESS THAN 1 MONTH

MEDICAL CONDITIONS >>

PREGNANT

OTHER: --

CURRENT MEDICATIONS >>

MEDS

CURRENT MEDICATIONS: LORATADINE, YAZ, TYLENOL

FIG. 18

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UNIVERSAL RESEARCH SOLUTIONS

MARK AS FINISHED

BACK TO DASHBOARD

ALL DOCTOR

IS LOGGED IN AND FILLING NOTES ON PATIENT

ANDREA PATIENT10

QUESTIONNAIRE

RI JOINTS OPNOTES

HOSPITAL

ATLANTIC CITY

SURGEON

DEIRMENGIAN, CARL

ASSISTANT 1

Q

TYPE TO SEARCH

ASSISTANT 2

JOHN PETERS

ANESTHESIOLOGIST

x

ANESTHESIA TYPE

F/M ACETABULAR SHELL

OPERATING ROOM #

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AVN

INFLAMMATORY DISEASE

POST-TRAUMA

OTHER

POSTOPERATIVE DIAGNOSIS

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INFLAMMATORY DISEASE

POST-TRAUMA

OTHER

ANTIBIOTIC

ANCEF

VANCO

CLINDA

OTHER

ANTIBIOTIC START TIME

10:05 PM

APPROACH

PARAPATELLAR

MIDVASTUS

SUBVASTUS

LATERAL

MIS PARAPATELLAR

MIS MIDVASTUS

MIS SUBVASTUS

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+ UNIVERSAL RESEARCH SOLUTIONS

ALL DOCTOR IS LOGGED IN AND FILLING NOTES ON PATIENT ANDREA PATIENT10

QUESTIONNAIRE RUSH - INTRAOPERATIVE RCR

ROTATOR CUFF

DEBRIDEMENT REPAIR 2230

DEVICE

ANCHOR TACK OTHER 2232

QUANTITY USED 2246

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REPAIR 2236

ANATOMIC MEDIAL REPAIR

MM MEDIAL 2242

REPAIR UNDER TENSION

NORMAL HIGH 2240

MARGINAL CONVERGENCE

YES NO 2238

TISSUE QUALITY

NORMAL THIN SEVERELY DEGENERATIVE 2244

PLEASE MARK REPAIR AND TEARING ON THE DIAGRAM BELOW

REPAIR TEAR CLEAR ALL

PREVIOUS NEXT