



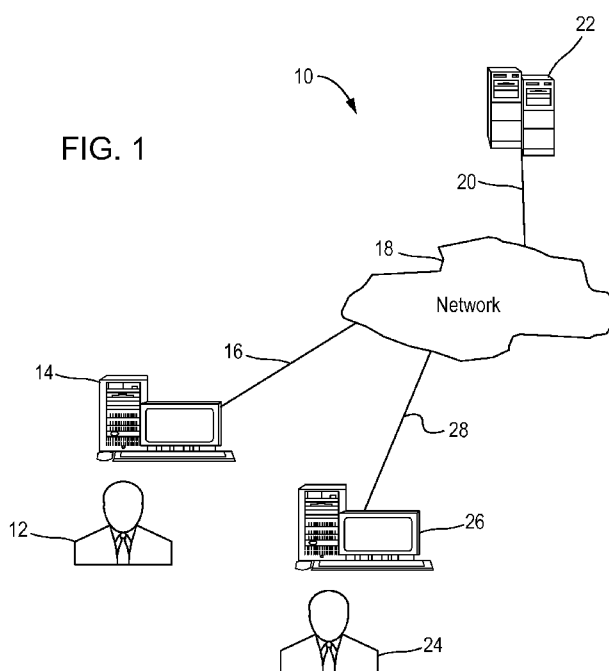
- (51) International Patent Classification:
G06Q 50/00 (2012.01)
- (21) International Application Number:
PCT/US2015/028504
- (22) International Filing Date:
30 April 2015 (30.04.2015)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:
61/986,715 30 April 2014 (30.04.2014) US
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- (81) Designated States (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.
- (84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: METHODS AND SYSTEMS FOR INTEGRATING ELECTRONIC MEDICAL RECORD AND PROVIDING A CUSTOMIZED MEDICAL DIAGNOSIS AND RECOMMENDATION WORKFLOW



(57) Abstract: The present methods and apparatuses relate to generating a medical diagnosis and recommendation workflow, comprising accessing a medical diagnostic and recommendation engine; creating a plurality of diagnosis and recommendation protocols for the medical diagnosis and recommendation workflow; establishing one or more logic definitions corresponding to each of the plurality of diagnosis and recommendation protocols; and determining a flow logic among the plurality of diagnosis and recommendation protocols based on the one or more logic definitions. Further, the present methods and apparatus relate to integrating an electronic medical record (EMR), comprising initiating, via an EMR framework, an integration procedure to normalize a plurality of data points from the EMR, wherein the plurality of data points correspond to information in one or more patient records; accessing the plurality of data points; analyzing the plurality of data points to determine a plurality of common data points.

METHODS AND SYSTEMS FOR INTEGRATING ELECTRONIC MEDICAL RECORD AND PROVIDING A CUSTOMIZED MEDICAL DIAGNOSIS AND RECOMMENDATION WORKFLOW

CLAIM OF PRIORITY UNDER 35 U.S.C §119

[0001] The present Application for Patent claims priority to U.S. Provisional Application No. 61/986,715 entitled "METHODS AND SYSTEMS FOR INTEGRATING AN ELECTRONIC MEDICAL RECORD AND PROVIDING A CUSTOMIZED MEDICAL DIAGNOSIS WORKFLOW" filed April 30, 2014, assigned to the assignee hereof and hereby expressly incorporated herein by reference.

FIELD OF THE INVENTION

[0002] Aspects of the present disclosure relate to systems and methods for enabling a user to automatically integrate an electronic medical record (EMR) or PHR (Personal Health Record) of a doctor or a patient and providing a customized and highly personalized medical diagnosis and recommendation workflow.

SUMMARY

[0003] The following presents a simplified summary of one or more aspects in order to provide a basic understanding of such aspects. This summary is not an extensive overview of all contemplated aspects, and is intended to neither identify key or critical elements of all aspects nor delineate the scope of any or all aspects. Its sole purpose is to present some concepts of one or more aspects in a simplified form as a prelude to the more detailed description that is presented later.

[0004] Aspects of the present invention provide systems and methods for 1) enabling a first level system user (e.g., physician or other customizing entity) to selectively program a health condition diagnostic system and user interface using personal health data; 2) enabling a second level system user to access and use the programmed user interface for health condition diagnostic, triaging and other purposes; and 3) enabling a third level system user (e.g., physician, other customizing entity, and/or other authorized user) to access and use the results of the second level system user input for follow up purposes, such as to provide information, prescribe medications, and/or schedule an doctor's appointment or other follow up.

[0005] Aspects of the present invention provide methods and systems for mimicking, replicating, and/or complementing a physician's process for making a diagnosis or recommendation, using a programmable automated interface that is customizable by a physician or other customizing entity.

[0006] In one example implementation, a system and method include a logic engine user interface for a physician or other customizing entity to use when inputting and interrelating a series of queries and response options, which may be used, for example, to successively narrow and/or identify a particular medical condition and/or its severity, prevention, treatment, or recommended monitoring.

[0007] In an example implementation, an EMR framework may be deployed to initiate an integration procedure between the existing EMR of the client (e.g., doctor) and the diagnostic or other parts of the system. The integration procedure normalizes a plurality of data points stored at the existing EMR that have been identified as common data points. The plurality of data points may correspond to one or more patient records. For example, a patient may have a patient record

stored on the existing EMR from previous visits with the doctor. These patient records may comprise a plurality of data points (e.g., age, allergies, blood pressure, body mass index, date of birth, ethnicity, gender, heart rate, height, medications, name, patient states, temperature, and weight). As a result of the integration procedure, the common data points may be stored in a database (e.g., database associated with the system of the present invention).

[0008] Once the integration procedure has completed, the physician or other customizing entity may access the plurality of common data points, including personal health record data and data collected from sensors in the diagnostic engine user interface, such as when generating a medical diagnosis and recommendation workflow output requiring such data. In one example, the physician or other customizing entity may generate a medical diagnosis and recommendation workflow via a medical diagnostic engine using a user interface. The medical diagnosis and recommendation workflow may be stored, and when accessed by a physician, patient, or other customizing entity, may automatically utilize the plurality of data points (e.g., previously stored patient information) stored at the database in completing a workflow (e.g., using the data in formulating a diagnosis for a patient), thus providing a highly personalized assessment of patient's condition.

[0009] Moreover, a patient may access the medical diagnosis and recommendation workflow in order to diagnose symptoms being experienced. In some instances, the patient may access the medical diagnosis and recommendation workflow through a user interface (e.g., a website) and receive a customized medical diagnosis and recommendation workflow based on the patient's previously stored medical history and symptoms the patient is currently experiencing (and/or other input by the patient consistent with the workflow).

[00010] The results of the patient or other user's inputs may then be assessed or otherwise used, such as by the physician, customizing entity, or other authorized reviewing user, in order to determine next steps, such as follow up with the patient or other user for condition determination, severity assessment, information exchange, prescription of treatment or intervention, and/or scheduling of a doctor's appointment or other follow up.

[00011] In one example, another aspect of the user interface of the logic engine may include providing user interface features to gather basic information about the patient or other user and/or to enable other input, such as setting up an account, providing medical history information, providing insurance, other payment or financial related information, providing information for patient or other user (e.g., for identity verification), interfacing with insurers or and/or other third parties, accessing the patient or other user's previous input and/or medical records, enabling appointment scheduling, scheduling a visit, and/or contacting a local emergency medical provider (e.g., emergency room), and otherwise communicating with other users of the system.

[00012] Methods and systems in accordance with aspects of the present invention may be used, for example, for assisting physicians and patients with identifying medical conditions, assessing the severity of the conditions, providing information on treatment options, making recommendations to a physician and/or patient (such as to seek urgent medical attention, medications, pre-screening for a doctor's visit or other follow up, and enabling or assisting with scheduling the doctor's visit or other follow up, among other uses) or monitoring already diagnosed condition.

[00013] Additional advantages and novel features in accordance with aspects of the present invention will be set forth in part in the description that follows, and in part will become more apparent to those skilled in the art upon examination of the following or upon learning by practice thereof.

BRIEF DESCRIPTION OF THE FIGURES

[00014] The features, nature, and advantages of the present disclosure will become more apparent from the detailed description set forth below when taken in conjunction with the drawings in which like reference characters identify correspondingly throughout and wherein:

[00015] Fig. 1 is an example schematic diagram of a communication system including an aspect of a medical diagnosis and recommendation workflow management system, in accordance with aspects of the present invention;

[00016] Fig. 2 is a flowchart of an aspect of an example method of integrating an electronic medical record (EMR), for use in accordance with aspects of the present invention;

[00017] Fig. 3 is a flowchart of an aspect of an example method of generating or otherwise creating a medical diagnosis and recommendation workflow, in accordance with aspects of the present invention;

[00018] Fig. 4 is an aspect of diagnosing a patient, in accordance with aspects of the present invention;

[00019] Figs 5-13 are conceptual diagrams illustrating aspects of the medical diagnosis and recommendation workflow management system; and

[00020] Fig. 14 is an example conceptual diagram illustrating an example computer system including aspects of the medical diagnosis and

recommendation workflow management system, e.g., according to Fig. 1, in accordance with aspects of the present invention.

DETAILED DESCRIPTION

[00021] The detailed description set forth below in connection with the appended drawings is intended as a description of various configurations and is not intended to represent the only configurations in which the concepts described herein may be practiced. The detailed description includes specific details for the purpose of providing a thorough understanding of various concepts. However, it will be apparent to those skilled in the art that these concepts may be practiced without these specific details. In some instances, well known structures and components are shown in block diagram form in order to avoid obscuring such concepts.

[00022] The present aspects generally relate to systems and methods of generating a medical diagnosis and recommendation workflow for diagnosing a patient. Specifically, a user (e.g., authorized medical personnel) may access (e.g., log on to) a medical diagnosis and recommendation workflow management system for generating or otherwise creating one or more medical diagnosis and recommendation workflows. For example, in conjunction with a typical visit to a doctor or hospital, a patient may be provided with a number of pre-determined inquiries by medical personnel (e.g., physician, nurse, physician's assistant) at these locations. In such instances, a patient may be requested to provide responses to doctor specified inquiries only after the patient provides initial illness symptoms (e.g., potential diagnosis). However, for diagnosable illnesses (e.g., for prevention purposes), the medical personnel may provide or otherwise make accessible the pre-determined inquiries to a patient at any time. Accordingly, in some aspects, the

present systems and methods may provide an efficient solution, as compared to current solutions, to generate a medical diagnosis and recommendation workflow for diagnosing a patient.

[00023] Aspects of the present invention may include systems and methods for 1) enabling a first level system user (e.g., physician or other customizing entity) to selectively program a health condition diagnostic system and user interface; 2) enabling a second level system user to access and use the programmed user interface for health condition diagnostic and other purposes; and 3) enabling a third level system user (e.g., physician, other customizing entity, and/or other authorized user) to access and use the results of the second level system user input for follow-up purposes, such as to provide information, prescribe medications, and/or schedule a doctor's appointment or other follow up.

[00024] Referring to Fig. 1, in an aspect, a communication system 10 includes a medical diagnosis and recommendation workflow management system 22 for at least managing and providing access to medical diagnosis and recommendation workflows. In some non-limiting cases, medical diagnosis and recommendation workflow management system 22 may be a remote computing system capable of communicating with one or more computing devices via a network connection (e.g., network 18). In such cases, medical diagnosis and recommendation workflow management 22 may communicate with network 18 via wired and/or wireless communication channel 20.

[00025] For example, communication system 10 may include a first computing device 14, which may be configured to access the medical diagnosis and recommendation workflow management system 22, by way of a wired and/or wireless communication channel 16, to thereby facilitate the generation of a medical

diagnosis and recommendation workflow. For example, a first user 12 (e.g., physician, nurse, physician's assistant) may access the medical diagnosis and recommendation workflow management system 22 using first computing device 14 located at, for instance, a first location (e.g., hospital or physician's office). It should be understood that first computing device 14 may also be referred to by those skilled in the art as a mobile device, a desktop computer, a laptop, a wireless device, or some other suitable terminology. In some aspects, first user 12 may provide authentication credentials (e.g., username and password) to access or otherwise log on to the medical diagnosis and recommendation workflow management system 22 using a user interface of first computing device 14.

[00026] In an aspect, an EMR framework may initiate an integration procedure to normalize a plurality of data points obtained and/or stored for use by various features in accordance with aspects of the present invention (e.g., workflow management system 22), wherein the plurality of data points may corresponds to one or more data elements in patient records. In some instances, the EMR framework may be deployed automatically without additional inputs from a user (e.g., first user 12). For example, the integration procedure performed by the EMR framework may comprise accessing a plurality of data points from the EMR; analyzing the plurality of data points to determine a plurality of common data points; and storing or otherwise the plurality of common data point information so as to provide the normalize data in a database (e.g., within the workflow management system 22 or some other database in network 18). The plurality of data points may correspond to one or more patient records comprising one or more items of data content, corresponding to one or more specific patient history data fields. For example, a patient may have a patient record stored on the existing EMR from

previous visits with a doctor. These patient records may comprise a plurality of data points (e.g., age, allergies, blood pressure, body mass index, date of birth, ethnicity, gender, heart rate, height, medications, name, patient states, temperature, and weight).

[00027] In further aspects, upon accessing the medical diagnosis and recommendation workflow management system 22, first user 12 may create a plurality of diagnosis protocols for the generating a medical diagnosis and recommendation workflow using first computing device 14. For example, in some aspects, first user 12 may access the medical diagnosis work management system 22 using a graphical user interface (GUI). Additionally, first user 12 may establish one or more logic definitions corresponding to each of the plurality of diagnosis protocols. For instance, first user 12 may provide or otherwise choose one or more data points for each of the one or more logic definitions. The one or more data points may correspond to one or more patient records comprising one or more data content corresponding to one or more specific patient history data fields. For example, a patient may have a patient record stored on the existing EMR from previous visits with the doctor. These patient records may comprise a plurality of data points (e.g., age, allergies, blood pressure, body mass index, date of birth, ethnicity, gender, heart rate, height, medications, name, patient states, temperature, and weight). As such, first user 12 may establish one or more logic relationships among the one or more data points, and establish an operator function and a corresponding value for each of the one or more data points.

[00028] Moreover, first user 12 may determine a flow logic among each of the plurality of diagnosis protocols based on the one or more logic definitions. In some instances, the flow logic links the plurality of diagnosis protocols on the basis

of a determination of whether the one or more data points may be satisfied. As such, once first user 12 is finished generating the medical diagnosis and recommendation workflow, it may be transmitted to a database and stored therein. Additionally, first user 12 may, for example, export the medical diagnosis and recommendation workflow to one or more medical entities for peer review. At any time after generating the medical diagnosis and recommendation workflow, first user 12 may access the newly generated medical diagnosis and recommendation workflow in order to modify it, such as, with new or different diagnosis protocols, logic definitions, and/or flow logic.

[00029] In another aspect, first user 12 may access the newly generated medical diagnosis and recommendation workflow stored at in a database of the present invention (e.g., for use by the medical diagnosis and recommendation workflow management system 22) to diagnose the symptoms of a patient. As a result, the diagnosis workflow management system 22 may be configured to match previously stored patient information of the patient with the one or more logic definitions of the medical diagnosis and recommendation workflow to create a customized medical diagnosis and recommendation workflow. Further, the customized medical diagnosis and recommendation workflow may be provided to first user 12. In response, first user 12 may provide a plurality of diagnosis responses from the patient with the diagnosis protocols of the customized medical diagnosis and recommendation workflow. As such, the diagnosis workflow management system 22 may be configured to determine a medical diagnosis result based on the plurality of diagnosis responses and communicate the medical diagnosis to the first user 12. In certain instances, the diagnosis workflow management system 22 may be configured to automatically create a patient

encounter for the patient and save the medical diagnosis result for the patient encounter.

[00030] In additional aspects, first user 12 may, by way of the first computing device 14 in communication with the medical diagnosis and recommendation workflow management system 22, organize the one or more diagnosis protocols. For example, the first computing device may be configured to permit the first user 12 to arrange and/or rearrange the diagnosis protocols in a hierarchical, a sequential, and/or an interconnected manner, to thus form a medical diagnosis and recommendation workflow. In some aspects, such arranging, rearranging, and/or linking of diagnosis protocols may be performed at the first computing device 14 using the graphical user interface. Further, it should be understood that workflow manipulation is not limited to designated diagnosis protocols and may take any suitable form of identifying an information element/object that permits the arranging, rearranging and/or linking of multiple inquiries for identification of a particular diagnosis.

[00031] Furthermore, communication system 10 may include second computing device 26, which may be configured to access a medical diagnosis and recommendation workflow stored or otherwise accessed by the medical diagnosis and recommendation workflow management system 22. For example, second user 24 (e.g., patient) may access (e.g., log on to) a medical diagnosis and recommendation workflow using a webpage or mobile application located on second computing device 26, which may be the same as or similar to the first computing device 14. Upon accessing the medical diagnosis and recommendation workflow management system 22, the second user 24 may, by way of the second computing device 26, execute any one or more medical diagnosis and recommendation

workflows. In some aspects, second computing device 26 may communicate, using a wired and/or wireless communication channel 28, with medical diagnosis and recommendation workflow management system 22 via network 18. Further, second computing device 26 may obtain vital information from second user 24 (e.g., patient). For example, second computing device 26 may be configured to obtain or otherwise determine the second user's height, weight, blood pressure, heart rate and temperature. It should be understood that the foregoing are mere examples and should not be held to limit the capabilities of the second computing device 14 to obtain second user vital information.

[00032] Referring to Figs. 2-4, in an operational aspect, a first computing device 14, a second computing device 26, and/or medical diagnosis and recommendation workflow management system 22 may integrate an EMR of a client, provide a customized medical diagnosis and recommendation workflow, and diagnose a patient based on the customized medical diagnosis and recommendation workflow. While, for purposes of simplicity of explanation, the methods are shown and described as a series of acts, it is to be understood and appreciated that the methods (and further methods related thereto) is/are not limited by the order of acts, as some acts may, in accordance with one or more aspects, occur in different orders and/or concurrently with other acts from that shown and described herein. For example, it is to be appreciated that a method could alternatively be represented as a series of interrelated states or events, such as in a state diagram. Moreover, not all illustrated acts may be required to implement a method in accordance with one or more features described herein.

[00033] Specifically, referring to the example of Fig. 2, an aspect of a method 40 of integrating an EMR includes, at block 42, initiating an integration

procedure to normalize a plurality of data points from the EMR. Further, method 40 includes, at block 44, accessing the plurality of data points. At block 46, method 40 includes analyzing the plurality of data points to determine a plurality of common data points. Further, at block 48, method 40 includes storing the plurality of common data points in a database.

[00034] It should be understood that any one or more components of first computing device 14 and/or medical diagnosis and recommendation workflow management system 22 may be configured to execute one or more subcomponents thereof to perform at least one of the blocks of method 40.

[00035] Referring to Fig. 3, an aspect of a method 60 of generating a medical diagnosis and recommendation workflow includes, at block 62, accessing a medical diagnostic engine. Further, at block 64, method 60 includes creating a plurality of diagnosis protocols for the medical diagnosis and recommendation workflow. At block 66, the method 60 includes establishing one or more logic definitions corresponding to each of the plurality of diagnosis protocols. At block 68, method 60 includes determining a flow logic among the plurality of diagnosis protocols based on the one or more logic definitions. Further, at block 70, method 60 includes providing diagnostic output results based on the flow logic. At block 72, method 60 includes transmitting the medical diagnosis and recommendation workflow to a database for or otherwise accessible by the present system. Additionally, at block 72, method 60 includes storing the medical diagnosis and recommendation workflow.

[00036] Referring to Fig. 4, an aspect of a method 80 of diagnosing a patient includes, at block 82, accessing the medical diagnosis and recommendation workflow in response to an inquiry from a first user for a second user. Further, at

block 84, method 80 includes matching previously stored patient information with the one or more logic definitions of the medical diagnosis and recommendation workflow to create a customized medical diagnosis and recommendation workflow. At block 86, method 80 includes receiving a plurality of diagnosis responses in response to the diagnosis protocols of the customized medical diagnosis and recommendation workflow. Moreover, at block 88, method 80 includes determining a medical diagnosis result based on the plurality of diagnosis responses. Additionally, at block 90, method 80 includes communicating the medical diagnosis result (e.g., to the patient).

[00037] Referring to Figs. 5-12, aspects of the medical diagnosis and recommendation workflow management system are illustrated. Fig. 5 illustrates in an aspect, an example screenshot of a patient or other user portal implementation for a medical diagnosis and recommendation workflow management system. For example, the user logs into the healthcare provider's website. The processing engine communicates with the EMR system, and pulls the patient's personal information. In an aspect, the patient's personal information may include the patient's name, gender, ethnicity, and date of birth. Further, Fig. 6 illustrates an example screenshot showing that the patient's personal information may include, for example, weight, height, heart rate, blood pressure (both top number (systolic) and bottom number (diastolic)), temperature, allergies, and medications. The user may confirm the patient's personal information by selecting "Save & Continue".

[00038] Fig. 7 illustrates an example screenshot of the patient portal in which the user may confirm the patient data entered is correct and current, and subsequently select relevant symptoms. Fig. 8 illustrates an example screenshot of the patient portal where the illnesses related to the entered symptoms are

generated. Once selected, Fig. 9, illustrates an example screenshot of the patient portal where the user is taken through an interview process in order to determine the illness of the patient. Fig. 10 illustrates an example screenshot for one example implementation of a diagnosis workflow. In an aspect, the interview responses that the user will be providing are designed by their doctor. The doctor specifies questions that they want to ask of their patients and determines the logic that dictates each question to ask and when to ask it.

[00039] Figs. 11 and 12 illustrate example screenshots of the diagnosis workflow depicting the “next question logic” engine. In an aspect, a doctor may create, for example, a highly personalized assessment and target some very specific demographics. For example, a black man who is over 40 years old and is taking anti-depressant medication is likely to react to hypertension medication in a very different matter than a white peer who is taking blood thinner medication. As such, a doctor may have an assessment with a plurality of questions. However, in some variations, a patient may only be asked questions that are specific to their ethnicity, medication, allergies, age, etc. Therefore, the diagnosis workflow enables a user (e.g., doctor) to construct their own medical protocols using a drag-and-drop interface in which no technical knowledge is required on the part of the user. In an aspect, the EMR framework may be integrated with any EMR system and access the patient information for the user to use. Moreover, the user (e.g., doctor) may export and exchange the diagnosis workflow protocols that they created for peer review. Additionally, users (e.g., doctors) may triage their patients to the correct facilities using the drag-and-drop fields.

[00040] Fig. 13 illustrates an example screenshot of the diagnosis workflow depicting triaging patients to the correct medical facility based on the day of

the week and the time of the day. For example, in an aspect, a child may have a fever on a Sunday night. After going through the fever assessment and during the interview process it may be determined that the child may not be treated virtually, so that a face-to-face visit is necessary. As such, the engine may automatically determine that it is currently Sunday at 6 PM, so the doctor is not available. However, the engine may automatically determine that the triage nurse is on call during these hours, so it may send the necessary information regarding what phone number to call. Moreover, if this situation occurs on Monday at 2 PM, then the engine may determine that it is business hours and will connect the patient to the primary care doctor.

[00041] Aspects of the present invention may be implemented using hardware, software, or a combination thereof and may be implemented in one or more computer systems or other processing systems. In an aspect of the present invention, features are directed toward one or more computer systems capable of carrying out the functionality described herein. An example of such a computer system 100 is shown in Fig. 14. It should be understood that one or more components and or subcomponents of the computer system 100 may be included in, the same as, or similar to first computing device 14 (Fig. 1) and/or second computing device 26 (Fig. 1).

[00042] Computer system 100 includes one or more processors, such as processor 104. The processor 104 is coupled to a communication infrastructure 106 (e.g., a communications bus, cross-over bar, or network). For example, the communication infrastructure may be located or installed locally or located at a cloud computing network/device. Various software aspects are described in terms of this example computer system. After reading this description, it will become apparent to

a person skilled in the relevant art(s) how to implement aspects hereof using other computer systems and/or architectures.

[00043] Computer system 100 may include a display interface 102 that forwards graphics, text, and other data from the communication infrastructure 106 (or from a frame buffer not shown) for display on a display unit 130. Computer system 100 may include a main memory 108, preferably random access memory (RAM), and may also include a secondary memory 110. The secondary memory 110 may include, for example, a hard disk drive 112 and/or a removable storage drive 114, representing a floppy disk drive, a magnetic tape drive, an optical disk drive, etc. The removable storage drive 114 may read from and/or write to a removable storage unit 118 in a well-known manner. Removable storage unit 118, represents a floppy disk, magnetic tape, optical disk, etc., which may be read by and written to removable storage drive 114. As will be appreciated, the removable storage unit 118 may include a computer usable storage medium having stored therein computer software and/or data.

[00044] Alternative aspects of the present invention may include secondary memory 110 and may include other similar devices for allowing computer programs or other instructions to be loaded into computer system 100. Such devices may include, for example, a removable storage unit 122 and an interface 120. Examples of such may include a program cartridge and cartridge interface (such as that found in video game devices), a removable memory chip (such as an erasable programmable read only memory (EPROM), or programmable read only memory (PROM)) and associated socket, and other removable storage units 122 and interfaces 120, which allow software and data to be transferred from the removable storage unit 122 to computer system 100.

[00045] Computer system 100 may also include a communications interface 124. Communications interface 124 may allow software and data to be transferred among computer system 100 and external devices. Examples of communications interface 124 may include a modem, a network interface (such as an Ethernet card), a communications port, a Personal Computer Memory Card International Association (PCMCIA) slot and card, etc. Software and data transferred via communications interface 124 may be in the form of signals 128, which may be electronic, electromagnetic, optical or other signals capable of being received by communications interface 124. These signals 128 may be provided to communications interface 124 via a communications path (e.g., channel) 126. This path 126 may carry signals 128 and may be implemented using wire or cable, fiber optics, a telephone line, a cellular link, a radio frequency (RF) link and/or other communications channels. As used herein, the terms “computer program medium” and “computer usable medium” refer generally to media such as a removable storage drive 114, 118 and/or 122, a hard disk installed in hard disk drive 112, and/or signals 128. These computer program products may provide software to the computer system 100. Aspects of the present invention are directed to such computer program products.

[00046] Computer programs (also referred to as computer control logic) may be stored in main memory 108 and/or secondary memory 110. Computer programs may also be received via communications interface 124. Such computer programs, when executed, may enable the computer system 100 to perform the features in accordance with aspects of the present invention, as discussed herein. In particular, the computer programs, when executed, may enable the processor 110 to perform the features in accordance with aspects of the present invention.

Accordingly, such computer programs may represent controllers of the computer system 100.

[00047] Where aspects of the present invention may be implemented using software, the software may be stored in a computer program product and loaded into computer system 100 using removable storage drive 114, hard drive 112, or communications interface 120. The control logic (software), when executed by the processor 104, may cause the processor 104 to perform the functions described herein. In another aspect of the present invention, the system may be implemented primarily in hardware using, for example, hardware components, such as application specific integrated circuits (ASICs). Implementation of the hardware state machine so as to perform the functions described herein will be apparent to persons skilled in the relevant art(s).

[00048] Although exemplary aspects of the present invention have now been discussed in accordance with the above advantages, it will be appreciated by one of ordinary skill in the art that these examples are merely illustrative and that numerous variations and/or modifications may be made without departing from the spirit or scope hereof.

CLAIMS

What is claimed is:

1. A method of generating a medical diagnosis and recommendation workflow, comprising:

accessing a medical diagnostic engine;

creating a plurality of diagnosis protocols for the medical diagnosis and recommendation workflow;

establishing one or more logic definitions corresponding to each of the plurality of diagnosis and recommendation protocols;

determining a flow logic among the plurality of diagnosis and recommendation protocols based on the one or more logic definitions; and

providing diagnostic and recommendation output results based on the flow logic.

2. The method of claim 1, further comprising:

transmitting the medical diagnosis and recommendation workflow to a database; and

storing the medical diagnosis and recommendation workflow.

3. The method of claim 2, wherein providing diagnostic and recommendation output results based on the flow logic comprises:

accessing the medical diagnosis and recommendation workflow in response to an inquiry from a user for a user;

matching previously stored patient information with the one or more logic definitions of the medical diagnosis and recommendation workflow to create a customized medical diagnosis and recommendation workflow;

receiving a plurality of diagnosis responses from the user in response to the diagnosis and recommendation protocols of the customized medical diagnosis and recommendation workflow;

determining a medical diagnosis and recommendation result based on the plurality of diagnosis responses; and

communicating the medical diagnosis and recommendation result.

4. The method of claim 3, further comprising:

automatically creating a patient encounter for the patient; and

saving the medical diagnosis and recommendation result for the patient encounter.

5. The method of claim 1, wherein establishing one or more logic definitions corresponding to each of the plurality of diagnosis and recommendation protocols comprises:

selecting one or more data points for each of the one or more logic definitions;

establishing one or more logic relationships among the one or more data points; and

establishing an operator function and a corresponding value for each of the one or more data points.

6. The method of claim 5, wherein the data points comprise one or more of age, allergies, blood pressure, body mass index, date of birth, ethnicity, gender, heart rate, height, medications, name, patient states encoded by SNOMED terms, temperature, and weight.

7. The method of claim 1, wherein the flow logic links the plurality of diagnosis and recommendation protocols based on a determination whether the one or more data points are satisfied.

8. The method of claim 1, wherein accessing the medical diagnosis engine comprises:

accessing the medical diagnosis and recommendation engine using a graphic user interface (GUI).

9. The method of claim 1, further comprising:

exporting the medical diagnosis and recommendation workflow to one or more medical entities for peer review.

10. The method of claim 1, wherein providing the diagnostic and recommendation output results based on the flow logic comprises:

providing the diagnostic and recommendation output results via a wireless network to a wireless device.

11. The method of claim 1, further comprising:

triaging the patient to a correct medical facility based on a day of a week and a time of the day.

12. A method of integrating an electronic medical record (EMR), comprising:

initiating, via an EMR framework, an integration procedure to normalize a plurality of data points from the EMR, wherein the plurality of data points correspond to information in one or more patient records;

accessing the plurality of data points;

analyzing the plurality of data points to determine a plurality of common data points; and

storing the plurality of common data points in a database, wherein the plurality of common data points are stored as one or more normalized patient records.

13. The method of claim 12, further comprising:

accessing the plurality of common data points at the database in response to initializing a medical diagnosis and recommendation workflow;

matching the plurality of common data points with one or more logic definitions of the medical diagnosis and recommendation workflow to create a customized medical diagnosis and recommendation workflow; and

providing the customized medical diagnosis and recommendation workflow.

14. The method of claim 12, wherein the plurality of common data points comprise one or more data content corresponding to one or more specific patient history data fields.

15. The method of claim 12, wherein the plurality of common data points comprise one or more of age, allergies, blood pressure, body mass index, date of birth, ethnicity, gender, heart rate, height, medications, name, patient states, temperature, and weight.

16. A system for generating a medical diagnosis and recommendation workflow, comprising:

a memory storing executable instructions; and

a processor in communication with the memory, wherein the processor is configured to execute the instructions to:

access a medical diagnostic and recommendation engine;

create a plurality of diagnosis and recommendation protocols for the medical diagnosis and recommendation workflow;

establish one or more logic definitions corresponding to each of the plurality of diagnosis and recommendation protocols; and

determine a flow logic among the plurality of diagnosis and recommendation protocols based on the one or more logic definitions; and

providing diagnostic and recommendation output results based on the flow logic.

17. A system for integrating an electronic medical record (EMR), comprising:

a memory storing executable instructions; and

a processor in communication with the memory, wherein the processor is configured to execute the instructions to:

initiate, via an EMR framework, an integration procedure to normalize a plurality of data points from the EMR, wherein the plurality of data points correspond to information in one or more patient records;

access the plurality of data points;

analyze the plurality of data points to determine a plurality of common data points; and

store the plurality of common data points in a database, wherein the plurality of common data points are stored as one or more normalized patient records.

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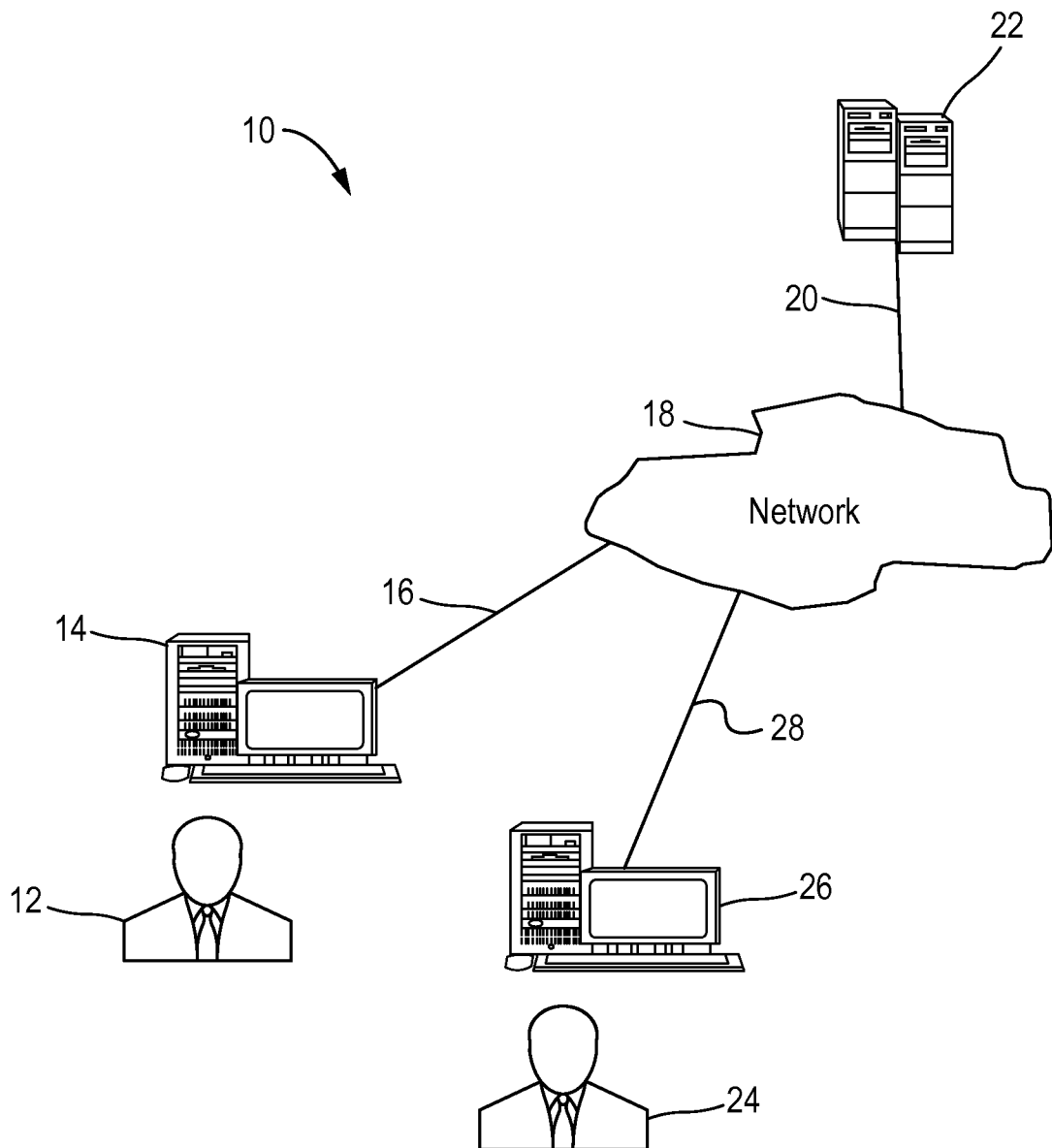


FIG. 1

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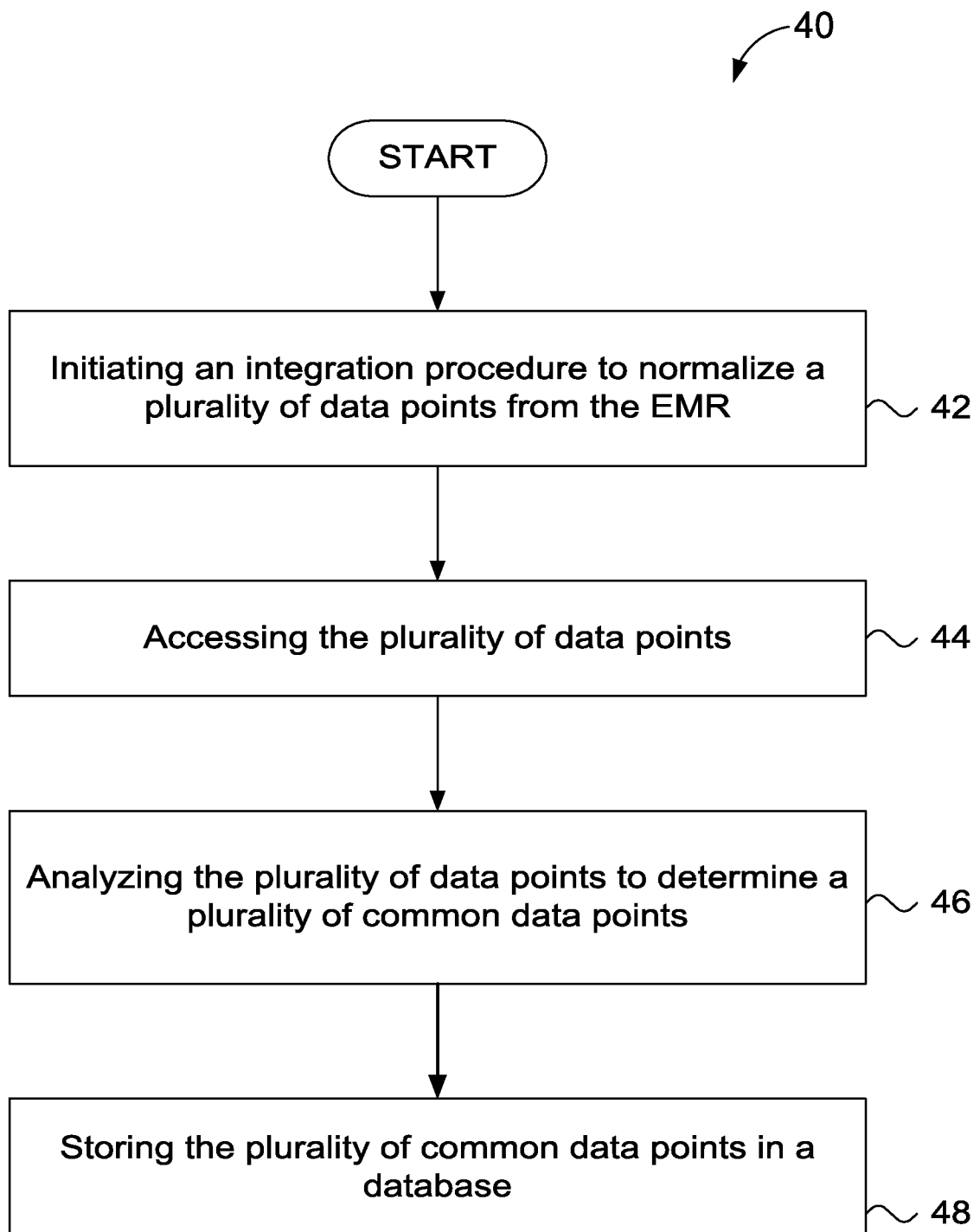


FIG. 2

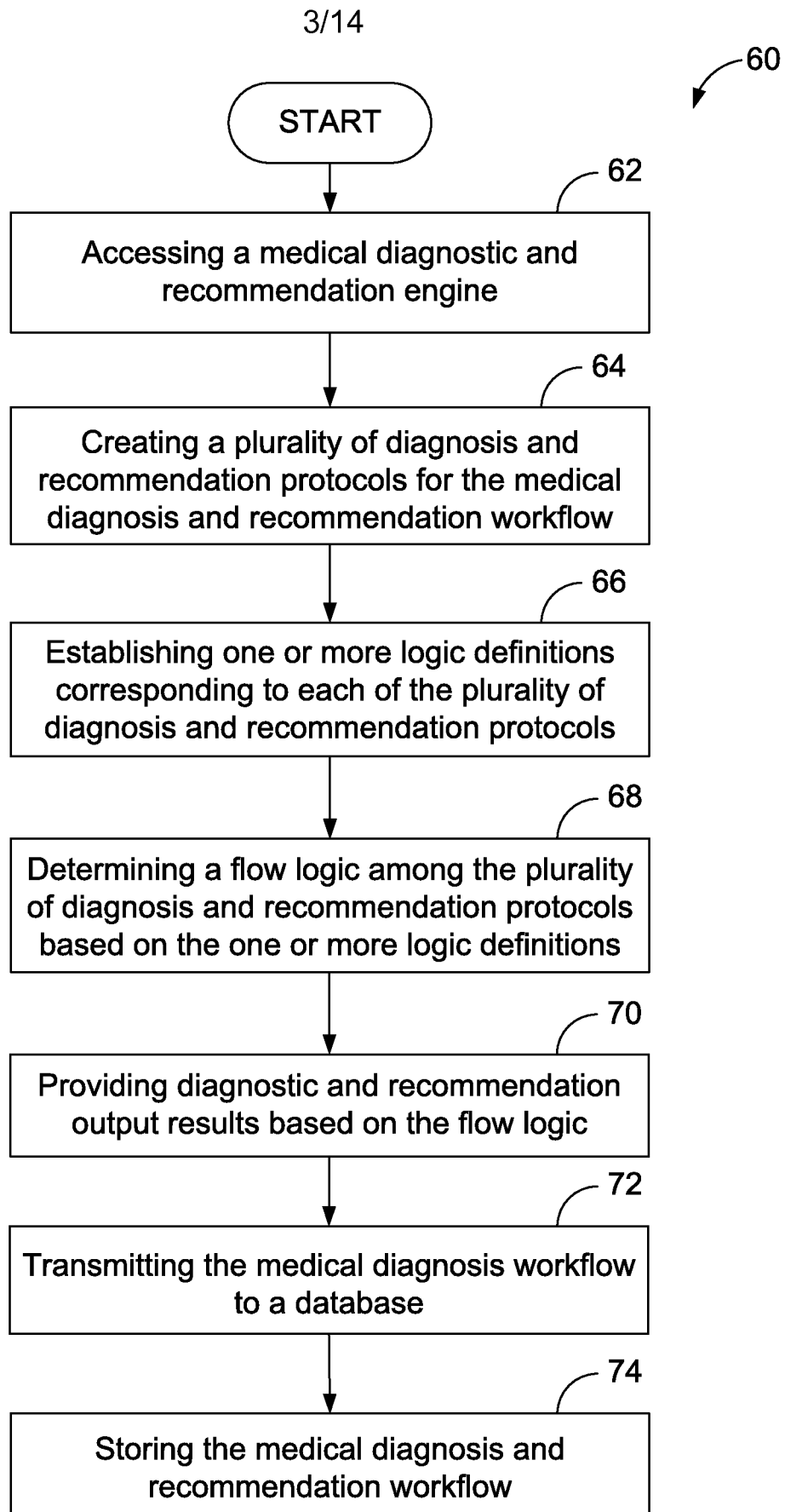


FIG. 3

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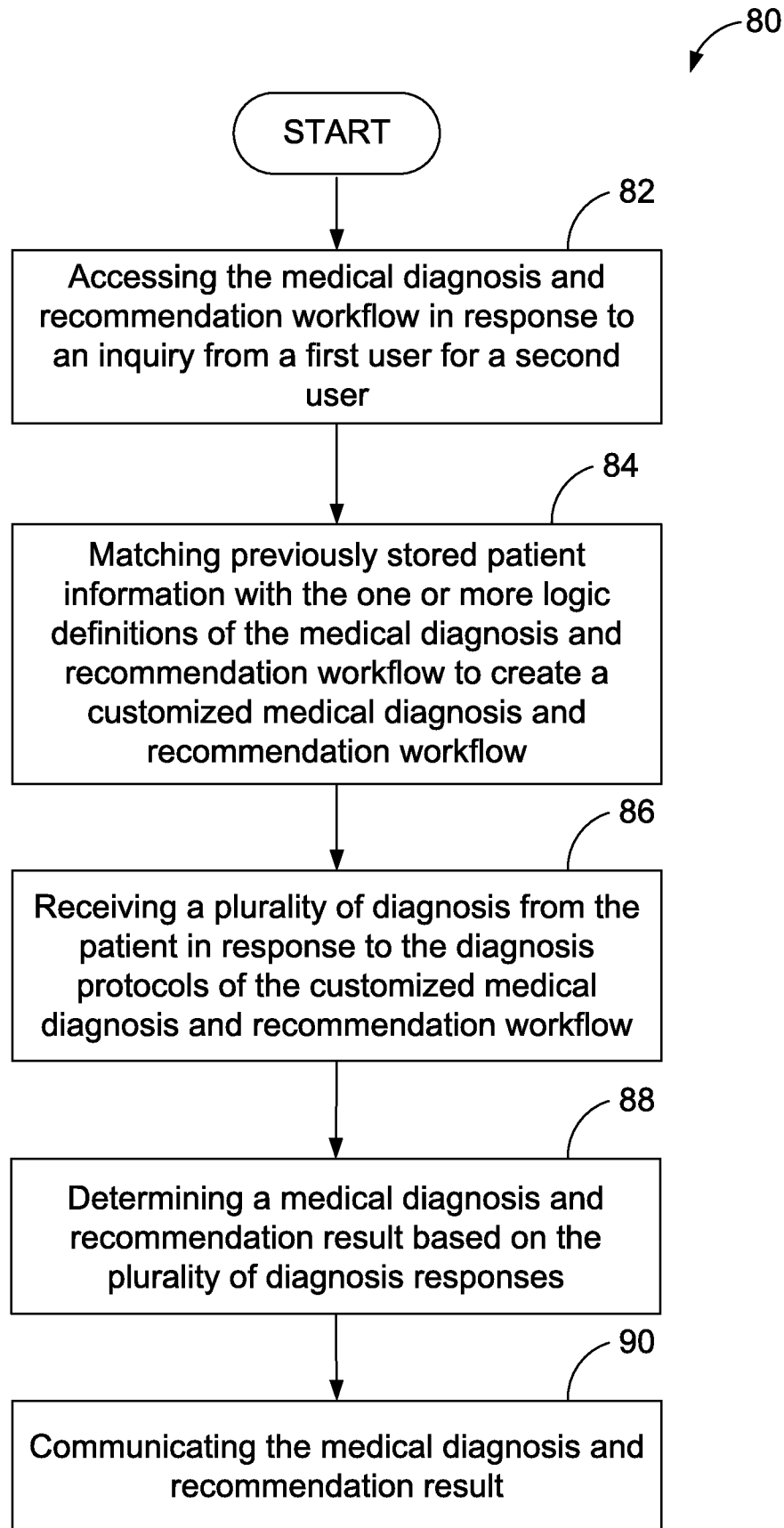
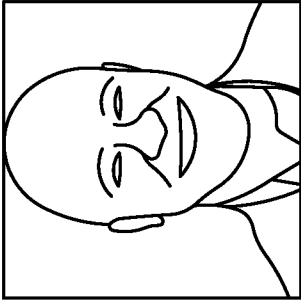


FIG. 4




Welcome to GoGoHealth's online assessment! I will do my best to guide you through this process.

I've pulled your medical history from our EMR system.

Please review each item and make any necessary corrections.

Or you can **skip** this step and go directly to selecting **symptoms**

 Personal Information

Name

Suzanne Smith

Gender

Female

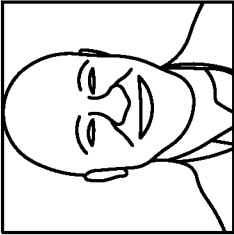
Ethnicity

Date of Birth

07-Jan-2004

→ Save & Continue

FIG. 5



Please make sure this information is correct and complete

The more information that you provide the better I can assess your condition.

Medical Information

Weight

16

LB

Height

40

IN

Heart Rate

110

BMI

Blood Pressure Top Number (Systolic)

92

Blood Pressure Bottom Number (Diastolic)

60

Temperature

98.5

F

Allergies

Add

Select an Allergy

Fruit

Remove

Garlic

Remove

Oats

Remove

Medications

Add

Select a Medication

Abacavir

Remove

Abatacept Injection

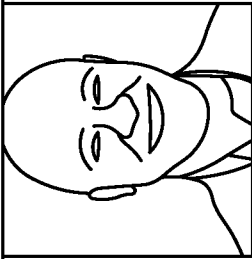
Remove

→ Save & Continue

FIG. 6


SUBSTITUTE SHEET (RULE 26)

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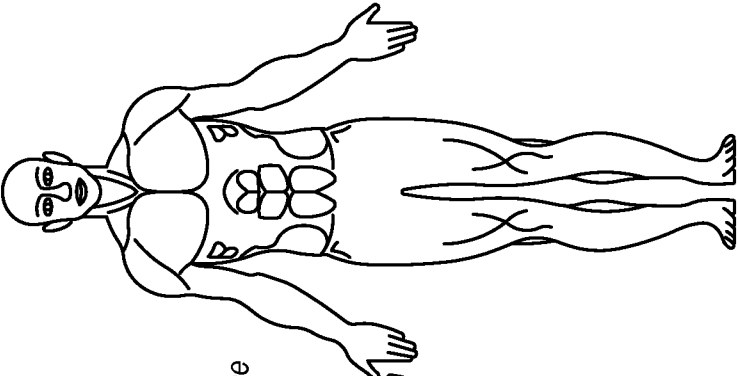



Show me the parts of your body associated with your symptoms, then list all of the symptoms you are experiencing.

The more information that you provide the better I can assess your condition.

 **Body**

Problem Areas:

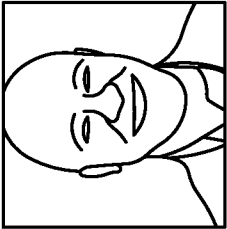


 **My Symptoms**

My symptoms are not in the list

FIG. 7

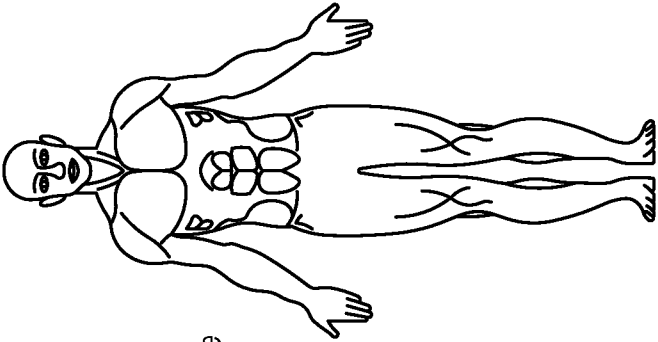
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Show me the parts of your body associated with your symptoms, then list all of the symptoms you are experiencing.

The more information that you provide the better I can assess your condition.

☐ Body Problem Areas:



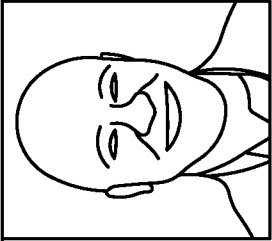
☐ My Symptoms

A drug allergy

☐ Illnesses

Confidence Illness 16.7% Allergy Diagnosis

FIG. 8



 Questions

For how long have you experienced your current symptoms?

Select

→ Continue

I need more specific information. Please answer these questions as accurately as you can.

*You may also **upload files** for me to review.*

FIG. 9

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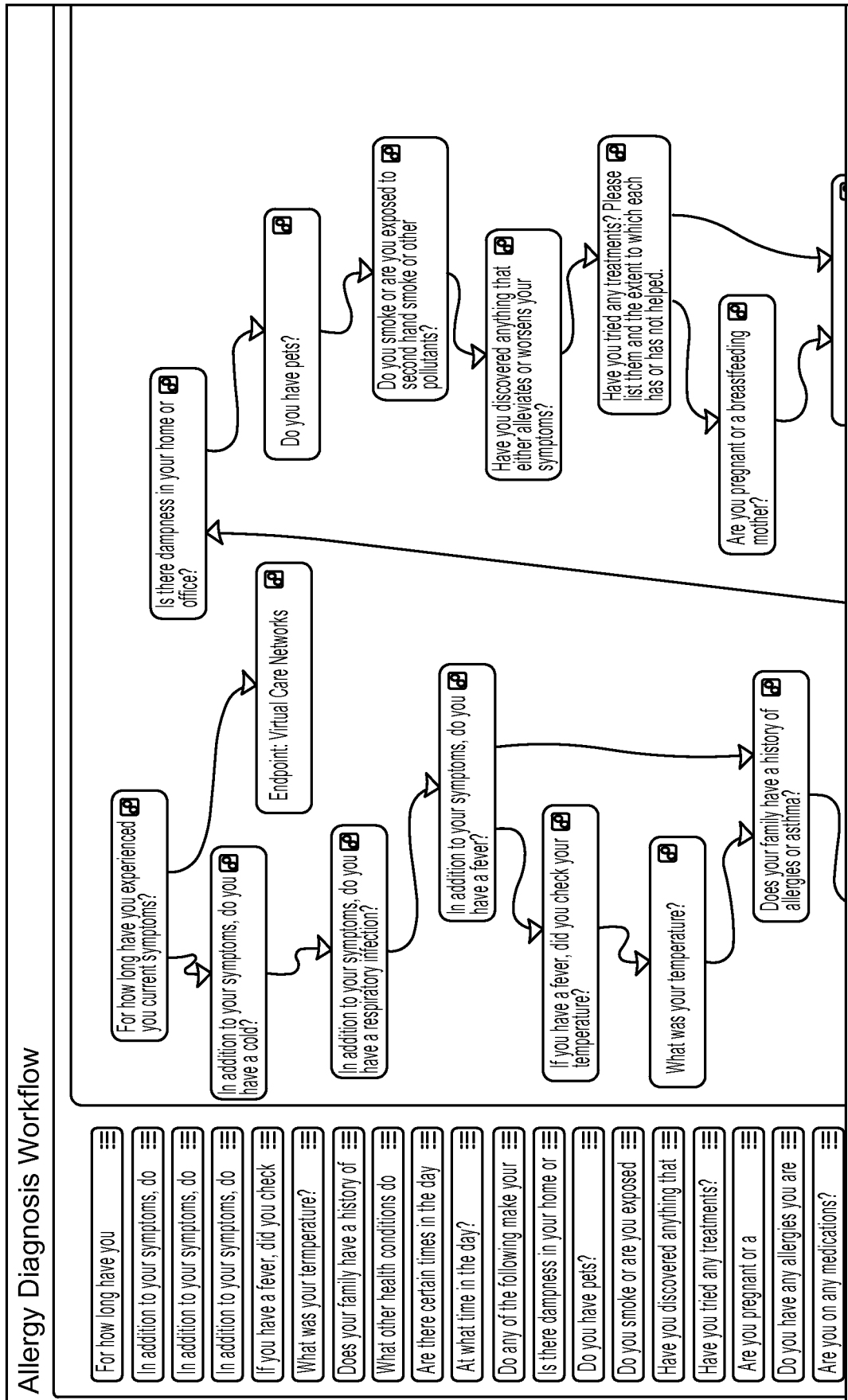


FIG. 10

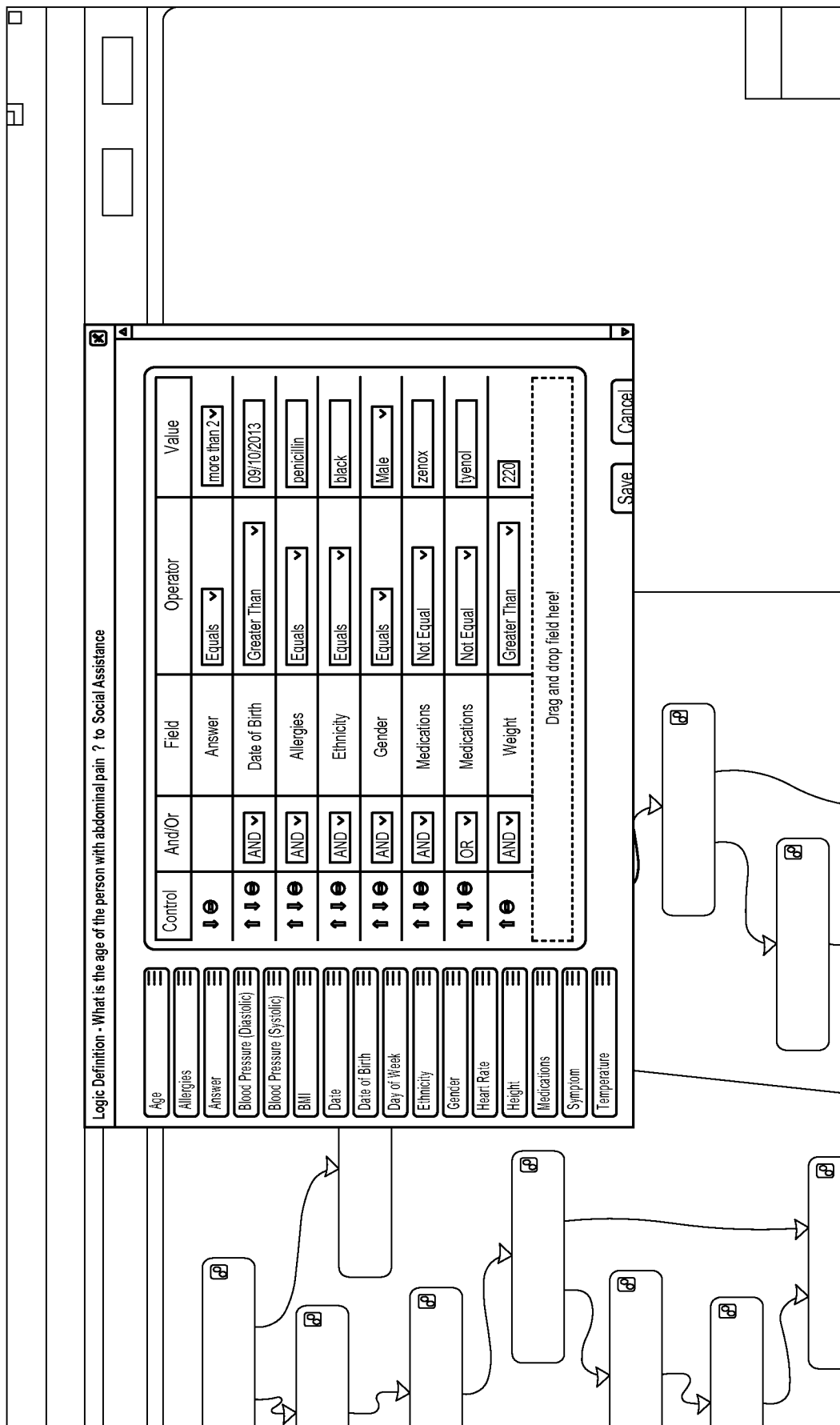


FIG. 11

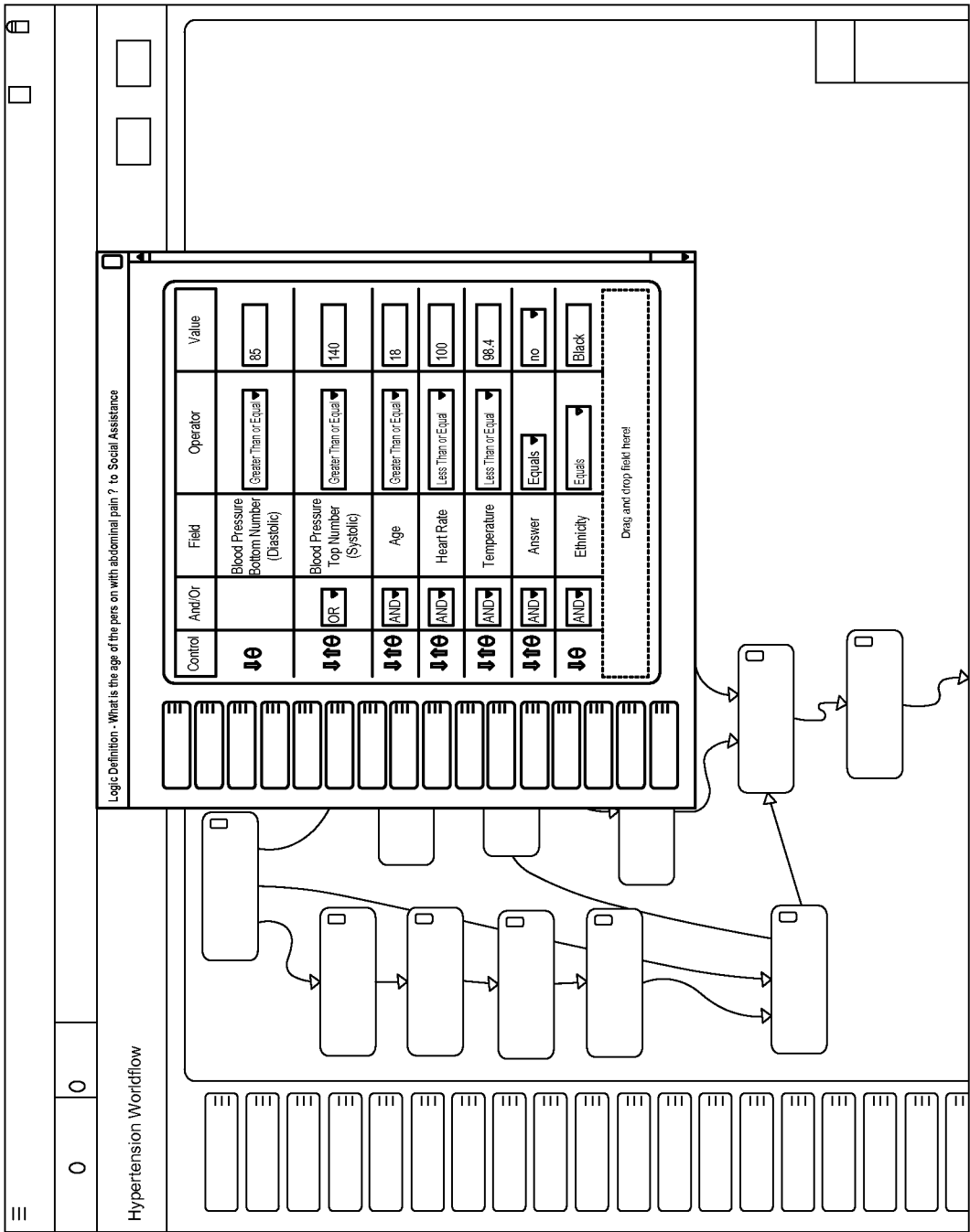


FIG. 12

Logic Definition - What is the age of the person with abdominal pain ? to Social Assistance				
Control	And/Or	Field / Question	Operator	Value
<input type="checkbox"/> ↓ ⊖		Age	[Equals]	17
<input checked="" type="checkbox"/> ↑ ↓ ⊖	OR	What is the age of the person	[Equals]	17
<input checked="" type="checkbox"/> ↑ ↓ ⊖	AND	Date	[After]	04/01/2015
<input checked="" type="checkbox"/> ↑ ⊖	AND	Time of Day	[Less Than or Equal]	5:00pm
Drag and drop field here!				

Age
Allergies
Answer
Blood Pressure (Diastolic)
Blood Pressure (Systolic)
BMI
Date
Date of Birth
Day of Week
Ethnicity
Gender
Heart Rate
Height
Medications
Symptom
Temperature
Time of Day
Weight

FIG. 13

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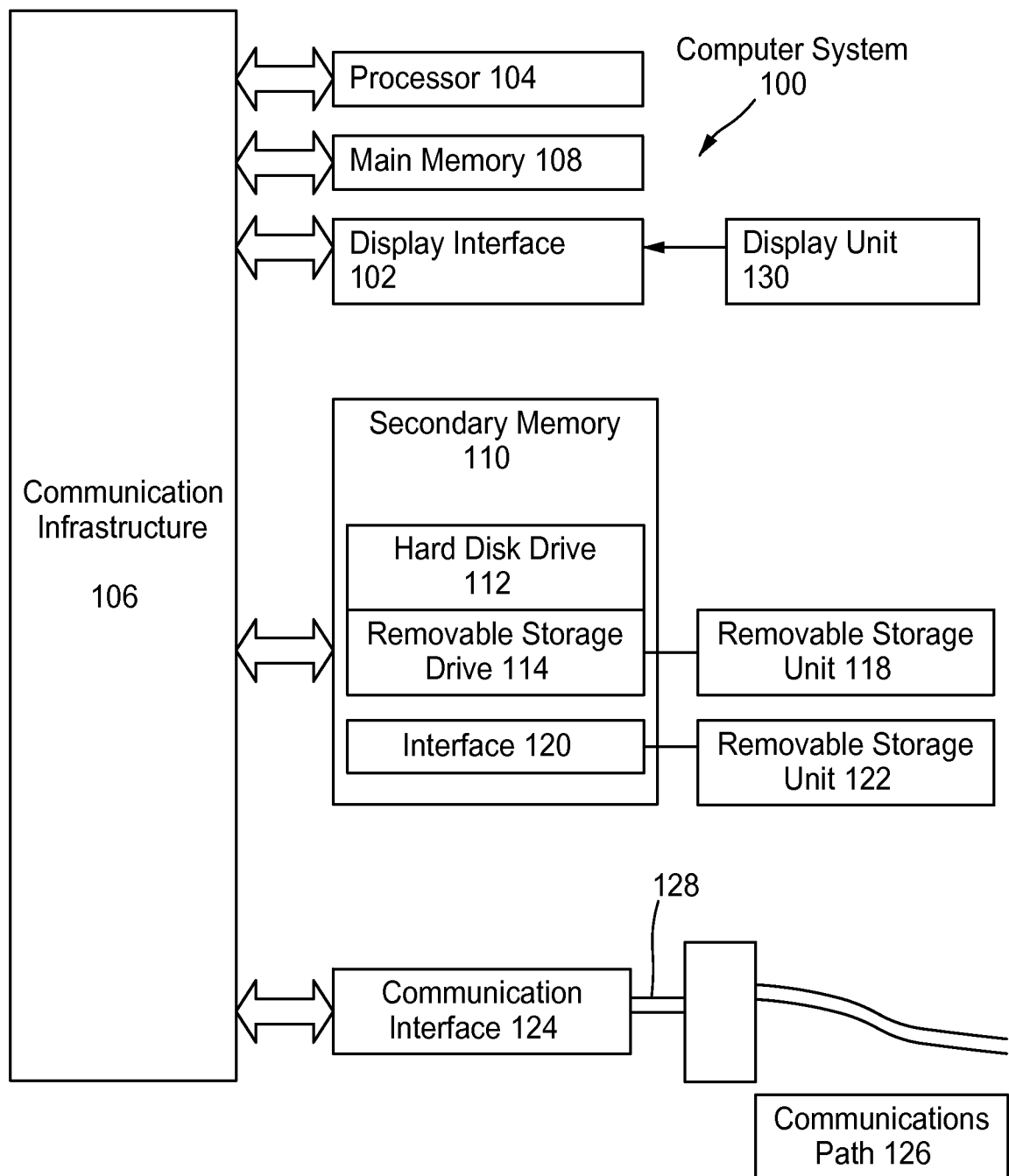


FIG. 14

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 15/28504

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G06Q 50/00 (2015.01)

CPC - G06Q 50/24

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC(8): G06Q 50/00 (2015.01), USPC: 705/3, CPC: G06Q 50/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
USPC: 705/3, 705/2, 705/7.27, 706/50, 707/999.102, 707/999.001, 707/999.2, 707/999.104; IPC(8): G06Q 50/00 (2015.01); CPC: G06Q 50/24, G06Q 50/22, G06F 19/322, G06Q 40/08, G06Q 10/10 (keyword limited; terms below)

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
PatBase, Google Scholar (no patents), Google Patents, electronic medical record, personal health record, EMR, PHR, medical diagnosis, recommendation, suggestion, workflow, protocols, logic definition, flow logic, output, results, Personal Health Information Technology (PHIT) systems, Electronic Health Record (EHR) systems, etc.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2009/0259495 A1 (ROSENFELD) 15 October 2009 (15.10.2009), entire document, especially para [0008], [0023], [0041], [0042], [0046], [0054], [0065], [0067], [0068] - [0072], [0074], [0068], [0087], [0089], Fig. 2.	1-17
A	US 2004/0260577 A1 (DAHLIN et al.) 24 December 2004 (24.12.2004), entire document.	1-17
A	US 2006/0112050 A1 (MIIKKULAINEN et al.) 25 May 2006 (25.05.2006), entire document.	1-17

☐ Further documents are listed in the continuation of Box C.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

15 July 2015 (15.07.2015)

Date of mailing of the international search report

07 AUG 2015

Name and mailing address of the ISA/US

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