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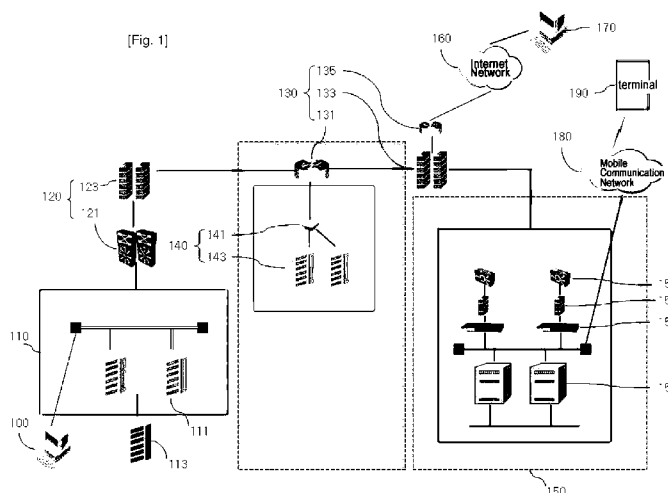
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(54) Title: SYSTEM FOR INTERCHANGING MEDICAL INFORMATION, METHOD FOR MAKING MEDICAL TREATMENT REFERRAL, AND METHOD FOR RETURNING MEDICAL TREATMENT REFERRAL



(57) Abstract: A system for interchanging medical information, a method for referring for medical treatment, and a method for returning medical referral are provided. The system for interchanging medical information includes a medical information management server which records and manages medical record of a patient of a hospital and electronic medical record (EMR), and a medical information relay server which performs authentication on a connected terminal of an affiliated hospital and contains at least one of medical record and a medical referral letter interchanged between the medical information management server and the terminal of the affiliated hospital.

Description

Title of Invention: SYSTEM FOR INTERCHANGING MEDICAL INFORMATION, METHOD FOR MAKING MEDICAL TREATMENT REFERRAL, AND METHOD FOR RETURNING MEDICAL TREATMENT REFERRAL

Technical Field

- [1] An embodiment relates to a system for interchanging medical information, a method for making medical treatment referral, and a method for returning medical treatment referral, and more particularly, to a system for interchanging medical information, a method for making medical treatment referral, and a method for returning medical treatment referral which can activate information exchange among collaborated clinics and hospitals such as, for example, primary and secondary hospitals to thereby meet demands of both patients and referring doctors.

Background Art

- [2] It is generally necessary to transfer medical record to transfer patients from the lower level medical facilities such as primary and secondary facilities including clinics or hospitals to upper level facilities including university hospitals or general hospitals. For example, a doctor at a clinic intending to transfer his patient to a collaborating general hospital needs to provide the general hospital with the patient's medical history. Generally, the patient himself carries his own medical record issued from the lower level medical facility on his first visit to the upper level facility.
- [3] Recently, attempts have been made to implement the internet technology to enable direct transfer a patient's medical record on-line between the lower and upper level medical facilities instead of inconveniencing a patient to carry his own medical record.
- [4] However, related healthcare law requires that the storage and retrieval of medical record be kept only within the medical facilities. For example, one will breach the law if he keeps medical record of specific hospital or clinic at a broker system which is a non-medical facility and attempts to retrieve specific data therefrom.
- [5] Accordingly, the current use of on-line system to provide medical record of a patient generally stays within an extent where university hospital or general hospital provides medical history on its website, or a hospital or clinic (i.e., doctor) transferring a patient or the patient himself accesses corresponding medical record.
- [6] However, these systems have shortcomings. That is, the systems are insecure to safety attacks, and these simply provide mere information inquiry and view function, rather than providing information transfer function. The efficiency of exchanging

medical information particularly deteriorates if the respective hospitals employ different models of equipments. Accordingly, this means that each hospital has to be equipped suitably to participate in information interchange.

Disclosure of Invention

Technical Problem

- [7] According to one embodiment, a technical objective is to provide a system for interchanging medical information, a method for making medical treatment referral and a method for returning medical treatment referral, which relay medical information interchange among hospitals without breaching current healthcare laws, and electronically transfer the patient's medical record to enable the patient to directly access the information through electronic medical record (EMR) of the referral hospital without having to carry the information by himself on his visit to the referral hospital.
- [8] Another technical objective is to provide a system for interchanging medical information, a method for making medical treatment referral and a method for returning medical treatment referral, which enable transfer of patient's medical information using computer and network technologies to maintain continuity of the patient's treatment, so that it is not required for a referring hospital to send the patient's medical information off-line, i.e., in the form of charts, or CDs.

Solution to Problem

- [9] In one embodiment, a system for interchanging medical information is provided, which may include a medical information management server which records and manages medical record of a patient of a hospital and electronic medical record (EMR), and a medical information relay server which performs authentication on a connected terminal of an affiliated hospital and contains at least one of medical record and a medical referral letter interchanged between the medical information management server and the terminal of the affiliated hospital.
- [10] In one embodiment, a method for referring for a medical treatment is provided, which may include connecting, by a terminal of an affiliated hospital, to a medical information relay server that allows sharing of medical information comprising at least one of medical record and a medical referral letter to process public authentication to refer a patient for medical treatment, and transmitting the medical information for the medical treatment referral under consent of the patient, determining if there is a right of access for making the medical referral, and if determining so, receiving the medical information from the medical information relay server and storing the received information in a first database, receiving the medical information provided in association with the first database and storing the received information in a second database, connecting, by a terminal of a medical team, to a medical information management

server which records and manages medical record of a patient and Electronic Medical Record (EMR) to inquire about the medical information stored in the second database, receiving the medical information as a response to the inquiry, and providing test-related information based on the medical information or a reply and storing the same in the second database, and connecting, by the terminal of the affiliated hospital, to the medical information relay server to receive the stored test-related information or the reply from the second database.

- [11] In one embodiment, a method for returning a medical referral is provided, which may include requesting a returning of medical referral, by transmitting from a terminal of a medical team to a medical information management server that comprises at least one of medical record of a patient who has completed treatment and returned to an affiliated hospital, and images obtained as a result of tests, selecting an affiliated hospital to receive the returned patient according to the request and generates a returning referral list, storing the returning referral information and the returning referral list in a second database, and connecting, by a terminal of an affiliated hospital, to a medical information relay server to request in association with a database the stored returned medical record and the returning referral list and receive the same.

Advantageous Effects of Invention

- [12] According to embodiments, on a referring doctor's part, since convenience of making a medical referral increases and level of awareness also increases due to the presence of hot line, treatment time is shortened, and range of information search increases. As a result, patient influx increases.
- [13] On a patient's part, advantages such as efficient and convenience transfer, reduced inconvenience of having to prepare materials to submit to a referred hospital, reduced possibility of double prescription, and reduced treatment time at tertiary medical facility are provided. As a result, medical cost decreases.
- [14] Furthermore, on a hospital's part, advantages such as referring doctors' increased level of satisfaction, increased number of medical treatment referrals, increased severity, minimized error in referral information, and reduced length of stay (LOS) are provided. As a result, increased profit is expected.

Brief Description of Drawings

- [15] The above and/or other aspects of the present inventive concept will be more apparent by describing certain exemplary embodiments of the present inventive concept with reference to the accompanying drawings, in which:
- [16] FIG. 1 is a view illustrating a system for interchanging medical information according to an embodiment of the invention;
- [17] FIG. 2 is a view illustrating main function of the medical information sub system and

the refer sub system of FIG. 1;

[18] FIG. 3 is a view illustrating in detail the structure of the medical information relay server of FIG. 1;

[19] FIGS. 4A to 4E are views illustrating widget guide screen of a devoted program displayed on a terminal of an affiliated hospital of FIG. 1;

[20] FIG. 5 is a view illustrating the main structure of software of the medical information relay server and the medical information relay DB server of FIG. 1;

[21] FIG. 6A is a view illustrating a process of interchanging medical information by the system of FIG. 1;

[22] FIG. 6B is a data flowchart of FIG. 6A;

[23] FIG. 7A is a flowchart provided to explain a process of making medical treatment referral;

[24] FIG. 7B is a flowchart provided to explain a process of returning medical treatment referral;

[25] FIG. 7C is a schematic view of FIGS. 7A and 7B;

[26] FIGS. 8 to 13 are views illustrating driving screen of a terminal at the affiliated hospital; and

[27] FIGS. 14 to 16 are views illustrating driving screen of a terminal of a medical team.

Best Mode for Carrying out the Invention

[28] Certain exemplary embodiments of the present inventive concept will now be described in greater detail with reference to the accompanying drawings.

[29] In the following description, same drawing reference numerals are used for the same elements even in different drawings. The matters defined in the description, such as detailed construction and elements, are provided to assist in a comprehensive understanding of the present inventive concept. Accordingly, it is apparent that the exemplary embodiments of the present inventive concept can be carried out without those specifically defined matters. Also, well-known functions or constructions are not described in detail since they would obscure the invention with unnecessary detail.

[30] FIG. 1 is a view illustrating a system for interchanging medical information according to an embodiment of the invention, FIG. 2 is a view illustrating main function of the medical information sub system and the refer serve system of FIG. 1, and FIG. 3 is a view illustrating in detail the structure of the medical information relay server of FIG. 1.

[31] Referring to FIGS. 1 to 3, the system for interchanging medical information according to one embodiment may include a medical information sub system 110, and refer sub system 140, 150, and additionally include part or entirety of a medical team terminal 100, a first access restricting unit 120, and a second access restricting unit

130. Herein, the medical information sub system 110 may include a medical information management server 111, and the refer sub system 140, 150 may include part or entirety of medical information relay server 157, medical information relay DB server 143 and third access restricting unit 151, 153, 155.

[32] The medical team terminal 100 may include desktop computer, laptop computer, net book, or tablet PC used by medical team of upper level hospital such as Samsung Medical Center. A smartphone may also apply as the medical team terminal 100 provided that the medical team confirms or manages patient's medical information therethrough. The medical information may include patient information, universal code, outpatient/inpatient/emergency record, information about referring doctor, content of referral, prescription data, test result, EMR, or the like.

[33] The medical information sub system 110 is provided for automation and sharing of medical information within upper level medical facility, and includes a medical information management server 111 which operates in association with an EMR authentication server 113 to store therein information about patient and EMR. Client within the hospital accesses the medical information sub system 110 as illustrated in FIG. 2 to inquire about and record the EMR therein, in which the EMR may include, for example, patient information, information about medical treatment, PACS images, or the like. The client may also perform various other functions including, for example, inquiry about electronic medical referral, mapping of electronic medical referral, viewing of electronic medical referral letter, output of electronic medical referral letter, inquiry of SRC booking data, registration of patents making inquiries, or the like. Of course, an external client is not allowed to access the medical information sub system 110 due to, for example, first firewall 123. The medical information management server 111 may include therein a database, or operate in association with a separate medical information management DB server (not illustrated), or operate in association with an EMR authentication server 113 other than the medical information sub system 110. Further, the medical information management server 111 may operate in association with a medical information relay server 143 and a medical information relay server 157 of the refer sub system 140, 150. The medical information management server 111 may additionally include a first switch 121, a first firewall 123 and a first relay means 131 to construct a backbone switch, to thus be able to access the medical information relay DB server 143. The medical information management server 111 may also include a second firewall 133, a second switch 151 such as L4 switch, a third firewall 153 such as web firewall, and a third switch 155 such as a L2 switch to thus be able to access the medical information relay server 157. As explained above, since the medical information management server 111 operates in association with the medical information relay DB server 143 of the refer sub system 140, 150, DB linkage

is enabled. Accordingly, the medical team can check the medical record provided by an affiliated hospital terminal 170 through the medical team terminal 100. In one embodiment, the EMR authentication server 113 may not be part of the medical information sub system 110. However, the EMR authentication server 113 may operate in association with the medical information management server 111 so that the medical information management server 111 is able to process authentication in response to an EMR inquiry. As a result, search is performed based on the inquiry and the recorded information may be re-stored.

- [34] The first access restricting unit 120 may be a backbone switch connected to the backbone network of the medical information sub system 110, and include the first switch 121 and the first firewall 123. Herein, the first switch 121 is connected to a plurality of medical information management servers 111 to allow access of the respective medical information management servers 111 to the refer sub system 140, 150, and the first firewall 123 blocks access of an external client from the medical information sub system 110.
- [35] The second access restricting unit 130 may include the first and second relay means 131, 135 and the second firewall 133 to restrict access to specific clients. The first and second relay means 131, 135 may be, for example, routers which guide paths to the medical information sub system 110 and the first refer sub system 140, and further operate to change protocol to connect to different communication networks such as the internet 160 and internal network of a specific hospital. The second firewall 133 restricts access so that only the affiliated hospital terminal 170 of the clients of the affiliated hospitals access the refer sub system 140, 150.
- [36] The refer sub system 140, 150 is a medical information sharing system through which it is possible to give and take medical record, a medical referral letter, or the like with external affiliated hospitals. The refer sub system 140, 150 may include a first refer sub system 140 including the medical information relay DB server 143 and a second refer sub system 150 including the medical information relay server 157. The first refer sub system 140 may operate in association with the second refer sub system 150 via the first relay means 131 and the second firewall 133 of the second access restricting unit 130. The first refer sub system 140 may additionally include a tap 141 to connect one DB server to a development server. Meanwhile, the second refer sub system 150 may include a third access restricting unit 151, 153, 155 between the second access restricting unit 130 and the medical information relay server 157, in which the third access restricting unit 151, 153, 155 may include a second switch 151 such as L4 switch, a third firewall 153 such as web firewall, and a third switch 155 such as L2 switch.
- [37] The refer sub system 140, 150 constructed as explained above may be located within

a specific hospital such as, for example, Samsung Medical Care (SMC) and implemented in a dualized system with the medical information sub system 110 through a cyber net. The refer sub system 140, 150 carries out functions including management of access to external affiliated hospitals, reception and management of medical records and referral letters, transmission of medical record of specific hospital, returning of referral, or the like. Further, the refer sub system 140, 150 may provide medical images stored at the medical information sub system 110 to external affiliated hospitals through EMR management program such as, for example, Web-PACS, and provide the EMR stored at the medical information sub system 110. Herein, the medical information relay DB server 143 of the first refer sub system 140 may be connected only to an authorized port, and linked with database of the medical information management server 111 of the medical information sub system 110. The medical information relay DB server 143 provides the information such as medical record received from the affiliated hospitals to the medical information sub system 110, receives the medical record, EMR or image data stored at the medical information sub system 110, and provides the received information to the external affiliated hospitals.

- [38] The medical information relay server 157 of the second refer sub system 1520 will be explained in greater detail below. Referring to FIG. 3, the medical information relay server 157 may include an authentication processing unit 300, a DB unit 310, a medical information inter-operating unit 320 and a message transmitting unit 330. The authentication processing unit 300 processes electronic authentication of the affiliated hospital terminal 170 which is connected through the internet 160, and the DB unit 310 may store treatment-related information shared among the lower and upper level medical facilities therein. The medical information inter-operating unit 320 operates in association with the medical information management DB server (not illustrated) and the medical information relay DB server 143 to transmit the medical information and EMR of a referred patient received from the affiliated hospital terminal 170 back to the affiliated hospital terminal 170, and upon completion of the electronic authentication on the affiliated hospital terminal 170 by the authentication processing unit 300, retrieve information about returning a referral from the medical information management server 111 and transmit the received information to the affiliated hospital terminal 170. If a medical treatment referral letter is received from the affiliated hospital terminal 170, the message transmitting unit 330 transmits a message indicating the reception of the medical referral letter in real-time basis to a terminal 190 of a referred patient who corresponds to the received medical referral letter, and if booking for referred patient is completed, transmits in real-time basis the booking message to the affiliated hospital terminal 170. Furthermore, if the medical team terminal 100 books visit of the referred patient, in sending out reply, the message transmitting unit

330 transmits in real-time basis a message to the affiliated hospital terminal 170 regarding information for the affiliated hospital to know such as notice, or the like.

[39] The client of the affiliated hospital, or to be more specific, the affiliated hospital terminal 170 may be connected to the refer sub system 140, 150 via the internet 160 in web communication manner of HTTP, TCP/IP, and access the refer sub system 140, 150 through a client program. Referring to FIG. 2, the client may send a medical referral letter along with medical information to the refer sub system 140, 150, and confirm the list based on a devoted program. The 'devoted program' herein may be implemented as a devoted program widget, or a sidebar menu, or an intermediate form between widget and sidebar menu with certain replacements and selections. The devoted program widget will be explained in greater detail below. The affiliated hospital terminal 170 may receive a list of patients who are returned by the specific hospital such as Samsung Medical Care and their medical information. Additionally, the client of the affiliated hospital may carry out through the affiliated hospital terminal 170 various functions such as drug information, viewing prescription order/test result, reply, viewing EMR, or the like. Further, the affiliated hospital terminal 170 may additionally be installed with a separate program for Web-PACS only to be able to view medical images such as digital imaging and communications in medicine (DICOM) with high resolution. The documents exchanged between the affiliated hospital terminal 170 and the medical information relay server 157 may be in XML format consisting of patient information, name of disease, medical prognosis, images, or the like.

[40] If the client of the affiliated hospital accesses the refer sub system 140, 150 operated by the upper level medical facility and inputs an electronic medical referral letter under consent of a patient, the medical information relay server 157 of the refer sub system 150 may notify the terminal 190 of the corresponding patient of the reception of the medical referral letter via a mobile communication network 180, additionally notify the terminal 190 of the patient, according to a request by the medical information management server 111, that a visit to a specific doctor at a specific hospital is booked, and also notify the affiliated hospital terminal 170 of a referring doctor, which is the client of the affiliated hospital, that the visit of the referred patient is booked. The mobile communication network 180 may include a variety of communication networks such as CDMA, WCDMA, or LTE. For example, in WCDMA network, if the medical information management server 111 requests a packet data exchange station (SGSN) for message transmission, SGSN transmits a message to the terminal 190 of the patient through base station controller (RNC) or base station transmission system such as Node B, and receives a response message through the same path to provide the result to the medical information relay server 157. The terminal 190 may include a mobile

phone such as a smartphone.

[41] FIGS. 4A to 4D are views illustrating a widget guide screen of a devoted program displayed on the affiliated hospital terminal of FIG. 1.

[42] FIG. 4A illustrates a log-in screen, on which an icon or a button to close the log-in screen is formed on a right-upper portion. ID, password, public authentication and log-in buttons are also formed. Once a storage portion of the ID item is ticked ($\checkmark$), the ID is stored so that it is not necessary for a user to input his ID when the log-in screen pops up. If the user logs in without going through public authentication on the public authentication item, he is able to access the test result, prescription order or images, but denied to access electronic medical referral letter or EMR medical record. The user inputs necessary information on respective items and logs in by clicking on the log-in button.

[43] FIG. 4B shows the widget screen, on which widget hiding (-), closing (x) buttons are formed on right upper portion. Through this, the user may hide the widget in a tray area or task bar, or close the widget. On a center area, icons representing main menu areas are formed, through which the user can directly go to the most-frequently used functions of the refer sub system. A lock-shaped icon is formed on a left lower portion, which enables the user to lock the program when he is not at the desk or not currently using the same. The program may be locked when the network has abnormality. A sidebar-conversion icon is formed on a right lower portion to carry out a function of directly converting the widget to a sidebar. A setting item to set up the widget environment, and a help item to provide guide for using the widget are formed on a lower-most portion. The help item may also appear in response to a pressing on F1 key.

[44] FIG. 4C shows a widget unlock screen. To unlock the widget, the user selects an S icon on the task tray area, clicks on a right mouse, and selects 'Widget Main'. As a result, a password input screen appears. As the user inputs password on the password input item on the password input screen and then hits confirm or enter key, the widget screen reappears.

[45] FIG. 4D shows a sidebar screen, on which a movement fixing button to fix a movement is formed on a left upper-most portion to prevent folding in left direction of the screen. A lock button is formed right to the movement fixing button, and on right side to the lock button, buttons to carry out hiding (-) and closing (x) functions are formed. On a lower side, a transparency adjusting unit to regulate transparency of the sidebar is formed, in which mark '+' indicates transparent or closer to transparent state, and mark '-' indicates opaque or closer to opaque state. The main menu areas include input of medical referral letter, referred patient and re-referred patient, and buttons to perform folding and unfolding are formed at a left center portion. Through the folding

and unfolding buttons, the user may fold the sidebar to the right side when it is not necessary, or unfold the folded sidebar. A conversion button to convert the sidebar to widget is formed on a lower-most portion, and above the same, an area to set up an environment of the widget and provide guide is formed. Above the environment and help area, additional service menu area such as drug information is formed.

- [46] FIG. 4E shows a widget environment setup screen, which may provide a first screen to set a basic screen to a widget or a sidebar, or a second screen to set a message notifying function to provide useful information such as notification of completed booking, reception of reply, or the like. For example, if an automated message hiding function is set on the second screen, the message may appear for the time (maximum 15 seconds) set by the message notifying function, and then disappear. A third screen may also appear, on which a monitor to display Web-PACS screen is set.
- [47] FIG. 5 is a view illustrating main structure of software of the medical information relay server and the medical information relay DB server of FIG. 1.
- [48] Referring to FIG. 5 and FIG. 1, the operating server and the UNIX item are implemented as the operating servers for the second refer sub system 150. That is, UNIX-based operating system is loaded on the medical information relay server 157. The web application server (WAS) is a type of middleware software server to process stable transactions, and 'Anyframe' refers to Samsung SDS software development framework. 'X-internet' refers to an internet structure with executability and extendability, having internet-based architecture and C/S-based user interface (UI). The 'Push server' refers to a real-time messaging server that sends out confirmation of medical referral letter and booking of patient's visit, and 'electronic authentication' refers to user authentication based on electronic signature. Further, the 'Global reporting tool, Flash charting component' refers to analyzed data reporting output tool. The application program is a JAVA-based application program, and DBMS refers to database management system, and DB security refers to database security program.
- [49] FIG. 6A shows process of interchanging medical record in the system of FIG. 1, and FIG. 6B is a data flowchart of FIG. 6A.
- [50] Referring to FIGS. 6A and 6B, at S601, a referring doctor using the affiliated hospital terminal 170 refers a patient to the medical information relay server 157 of the refer sub system 140, 150 upon completing consulting with the patient and obtaining consent of the patient. During this process, the referring doctor writes a medical referral letter and inputs the written medical referral letter, in which, under consent of the patient to disclose the patient's information, the doctor inputs information and medical record of the referred patient and transmits the same to the second refer sub system 150, possibly along with medical images or with attachment of medical image file.

- [51] For example, since the devoted program is installed on the affiliated hospital terminal 170, the affiliated hospital terminal 170 is able to access the refer sub system 140, 150 at a fixed IP address, and the devoted program may authenticate the doctor based on the public authentication certificate.
- [52] As the referral process is completed, at S603, the medical information relay server 157 determines if there is right to access, and requests to store the medical referral letter and the medical record on the medical information relay DB server 143. Through this process, the medical information relay DB server 143 of the first refer sub system 140 stores referral information of a specific patient provided by the referring doctor through the affiliated hospital terminal 170.
- [53] For example, if the referral process is completed, the medical information relay server 157 may send out a message to the terminal 190 of the patient such as a mobile phone that the referral request is accepted. Of course, the message is provided in association with the mobile communication network 180. At S605, the medical information relay server 157 also sends out a booking confirmation message based on the booking-related information provided by the medical information sub system 110. The booking confirmation message may be provided to the terminal 190 of the patient or the affiliated hospital terminal 170.
- [54] In connection with the above, an operator of the medical information sub system 110 may check the medical referral letter, contact the patient by phone, or the like, using the contact information included in the patient information, to book a visit or confirm that the patient agrees to the access to his medical history. Further, the operator may input content of booking, including, for example, patient booked, time for visit, and referred doctor. If the patient's visit is booked for the patient referred by the affiliated hospital, the medical information relay server 157 may transmit the booking confirmation message to both the patient and the doctor at the affiliated hospital.
- [55] The process of viewing test result or reply with respect to the requested medical record will be explained below.
- [56] At S607, the medical team at the upper level medical facility using the medical team terminal 100 may connect on-line to the medical information management server 111 and inquire about the electronic medical referral letter.
- [57] Next, at S609, the medical information management server 111 requests the referral information to the medical information relay DB server 143 or the medical information management DB server (not illustrated) linked to the medical information relay DB server 143 and receives the referral information so that the medical team checks the referral information, treats the patient, and stores various test results and EMR, or reply (if necessary) in the medical information management DB server (not illustrated), and the information is transmitted in association with the medical information relay DB

server 143.

- [58] At S611, the doctor at the affiliated hospital using the affiliated hospital terminal 170 connects to the medical information relay server 157 and requests information related to the treatment or reply, and at S613 and S615, receives treatment-related information or reply from the medical information relay DB server 143 in association with the medical information management DB server (not illustrated) and views the prescription order, integrated test result, EMR, or reply regarding the referred patient.
- [59] The process in which the upper level medical facility returns a patient to the lower level medical facility will be explained below.
- [60] At S617, if a doctor at the upper level medical facility completes treating a patient and requests a medical referral center such as, for example, the medical information management server 111, for a letter of returning medical treatment referral to return the patient to the affiliated hospital, the medical information management server 111 selects an affiliated hospital and returns a referral. At S619, the medical information management server 111 generates a list of referred affiliated hospitals, or stores referral return information such as a letter of returning a referral, information about returned patient, medical record or images in the medical information management DB server (not illustrated). The above-explained information is operated in association with the medical information DB server 143.
- [61] After that, at S621, if the affiliated hospital terminal 170 accesses the medical information relay server 157, at S623, the medical information relay server 157 determines if there is the right of access, requests a list of returned referrals to the medical information relay DB server 143 and receives the list.
- [62] At S625, the medical information relay server 157 may transmit the list of returned referrals to the affiliated hospital terminal 170, according to which the doctor of the affiliated hospital terminal 170 is able to check the medical information of the returned patients based on the list of returned referrals.
- [63] In the above process, the affiliated hospital terminal 170 may receive medical record of the returned patient, EMR, or test result images from the medical information relay server 157. The medical information relay server 157 may provide the affiliated hospital terminal 170 with the images obtained from medical imaging such as CT, MRI or ultrasound images by Web-PACS, thereby enabling the affiliated hospital terminal 170 to view the images obtained by medical imaging and stored at the medical information sub system 110 by Web-PACS.
- [64] FIG. 7A is a flowchart provided to explain a process of making a medical treatment referral, FIG. 7B is a flowchart provided to explain a process of returning a medical treatment referral, and FIG. 7C is a schematic conceptualized view of FIGS. 7A and 7B.

- [65] Referring to FIGS. 7A, 7C and 1, if a doctor at an affiliated hospital decides to refer a patient to an upper level medical facility upon completing treating the patient, the referring doctor writes an electronic medical referral letter through the affiliated hospital terminal 170 and transmits the medical referral letter to the medical information relay server 157 of the refer sub system 140, 150.
- [66] Accordingly, the refer sub system 140, 150 receives the medical referral letter from the affiliated hospital, and may provide the patient or the referring doctor that the referral is accepted.
- [67] The medical information sub system 110 retrieves the electronic referral information from the refer sub system 140, 150, and the operator may call the patient to book a visit. Upon completing the booking, the registration of the patient is completed, and outpatient treatment is provided.
- [68] Further, upon completing booking of a visit, the operator may additionally continue to ask if the patient agrees to the disclosure of his own medical information. Without the patient's consent, the access of the referred doctor is limited to the booking information only.
- [69] If the referred patient agrees to the disclosure of his own information, the patient is registered, and along with this, the medical information sub system 110 may request the refer sub system 140, 150, or the medical information relay server 157 to be specific, to send out a message to confirm that the patient registration is completed. Accordingly, the medical information relay server 157 sends out a message to the terminal 190 of the patient, and may also send out a message to the affiliated hospital terminal 170 of the referring doctor.
- [70] The doctor at the upper level medical facility may access booking information and medical record of the registered patient, provides outpatient treatment, and writes a reply.
- [71] The information related to the reply may be provided back to the refer sub system 140, 150, according to which the referring doctor is able to access the reply written by the referred doctor at the upper level medical facility.
- [72] Referring to FIGS. 7B, 7C and 1, the process of confirming returning of a referral includes treating of a referred patient by a doctor at the upper level medical facility and determining by the doctor at the upper level medical facility to whether to return a referral.
- [73] If the doctor does not decide to return a referral, the treatment continues in the upper level medical facility. However, if the doctor decides to return a referral, the doctor electronically inputs to, for example, the medical information sub system 110, or the medical information management server 111 to be specific, a request for returning a referral.

- [74] Accordingly, a request for returning a referral is received at the medical information relay server 157 of the refer sub system 140, 150. Then through consultation with the patient, the hospital to provide further care for the returned patient is decided. The patient who is not returned to the affiliated hospital continues receiving treatment at the upper level medical facility (e.g., Samsung Medical Care).
- [75] If the hospital is determined, the hospital is registered as the hospital to receive the returned patient, and through this, the doctor at the registered hospital is able to access all the requests for returning patients.
- [76] FIGS. 8 to 13 are views illustrating a driving screen of the affiliated hospital terminal.
- [77] Referring to FIGS. 8 to 13 and FIG. 1, FIG. 8 shows a background screen provided for log-in. The log-in screen includes ID and password items and authentication item for public authentication. The affiliated hospital terminal 170, having a widget-devoted program, displays the log-in background screen to enable efficient access to the system, while also requiring log-in by public authentication to increase security.
- [78] FIG. 9 illustrates a screen to input a medical referral letter. The affiliated hospital terminal 170 has an EMR management program in addition to the devoted program to be able to input patient's information to the devoted program and sends out a medical referral letter (or electronic medical referral letter). In inputting the medical referral letter, functions such as essential item minimization, sample texts, text input, image capture and input, or image file upload may be carried out.
- [79] FIG. 10 illustrates a message driving screen. If a medical referral letter is transmitted from the affiliated hospital terminal 170 to, for example, the refer sub system 140, 150 and the referral is accepted, the medical information sub system 110 checks the referral-related information and proceeds with a booking by telephone conversation with the patient, or the like, and upon completing the booking, a message to confirm completion of booking is transmitted to the affiliated hospital terminal 170 and booking information is transmitted to the terminal 190 (e.g., mobile phone) of the patient in the form of SMS message.
- [80] FIG. 11 illustrates a screen to inquire about a specific item. In one embodiment, Web-PACS-based DICOM image rather than JPEG image is used to cover the existing functions used by PACS of the hospital, while extending a range of inquiry functions and scopes with increased resolution.
- [81] FIG. 12 illustrates a screen to activate a reply to the referral letter. If a specific patient is selected from the list of patients with replies, as illustrated in FIG. 12, only the detailed reply regarding the specific patient appears. In one embodiment, the reply is provided fast, and viewing EMR is also enabled.
- [82] FIG. 13 illustrates a screen to activate a letter of returning a referral. If a specific

patient is selected from a list of patients with doctor's recommendation to return, the doctor's letter of returning referral is activated and appears. Accordingly, it is possible to access and view the letter of returning the specific patient.

[83] Referring to FIGS. 14 to 16 and 1, FIG. 14 illustrates a screen to select an outpatient of a designated part. The symbol 'ⓔ' in front of the outpatient indicates that the patient is electronically referred. Accordingly, if the electronically-referred patient is selected, a window is activated, thereby indicating that the reason for visit to the hospital is due to electronic referral. The electronic medical referral letter is activated and displayed when the medical team consults with the patient.

[84] FIG. 15 illustrates a screen to manage outpatients at an outpatient nurse department, in which a mark 'e-referral' in the remark section indicates that the patient is referred electronically.

[85] FIG. 16 illustrates a screen to manage details of referral at the cashier's desk, which indicates that the patient is referred by the system of electronic referral.

[86] The foregoing exemplary embodiments and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. Also, the description of the exemplary embodiments of the present inventive concept is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

Claims

- [Claim 1] A system for interchanging medical information, comprising:
a medical information management server which records and manages medical record of a patient of a hospital and electronic medical record (EMR); and
a medical information relay server which performs authentication on a connected terminal of an affiliated hospital and contains at least one of medical record and a medical referral letter interchanged between the medical information management server and the terminal of the affiliated hospital.
- [Claim 2] The system of claim 1, further comprising a medical team terminal installed within the hospital to manage the medical record of the patient and input and output of the EMR.
- [Claim 3] The system of claim 1, further comprising a medical information management DB server which operates in association with the medical information management server and stores the medical record and the EMR of a referred patient.
- [Claim 4] The system of claim 1, further comprising a medical information relay DB server which operates in association with the medical information relay server and operates in association with a medical information management DB server where the medical record is stored to retrieve the medical record and the EMR of a referred patient.
- [Claim 5] The system of claim 1, wherein the terminal of the affiliated hospital has a devoted program installed thereon, and is accessible to the medical information relay server via the internet.
- [Claim 6] The system of claim 5, wherein the devoted program of the terminal of the affiliated hospital is a devoted browser which is executed independently, and further comprises a widget to gather frequently-used functions to allow easy access and retrieval of information, and a sidebar function placed on a side of a screen.
- [Claim 7] The system of claim 5, wherein the terminal of the affiliated hospital has a program devoted for Picture Archiving and Communication System (Web-PACS), and the Web-PACS provides high-resolution medical image with respect to Digital Imaging and Communications in Medicine (DICOM).
- [Claim 8] The system of claim 1, wherein communication between the terminal of the affiliated hospital and the medical information relay server is

carried out in web communication manner of HTTP, TCP/IP.

[Claim 9] The system of claim 1, wherein documents transmitted between the terminal of the affiliated hospital and the medical information relay server is in XML format consisting of patient information, name of disease, medical prognosis, or images.

[Claim 10] A method for referring for a medical treatment, comprising:
connecting, by a terminal of an affiliated hospital, to a medical information relay server that allows sharing of medical information comprising at least one of medical record and a medical referral letter to process public authentication to refer a patient for medical treatment, and transmitting the medical information for the medical treatment referral under consent of the patient;
determining if there is a right of access for making the medical referral, and if determining so, receiving the medical information from the medical information relay server and storing the received information in a first database;
receiving the medical information provided in association with the first database and storing the received information in a second database;
connecting, by a terminal of a medical team, to a medical information management server which records and manages medical record of a patient and Electronic Medical Record (EMR) to inquire about the medical information stored in the second database;
receiving the medical information as a response to the inquiry, and providing test-related information based on the medical information or a reply and storing the same in the second database; and
connecting, by the terminal of the affiliated hospital, to the medical information relay server to receive the stored test-related information or the reply from the second database.

[Claim 11] The method of claim 10, if it is determined that there is the right of access after the medical information is received from the medical information relay server, further comprising sending out a message to the terminal of the affiliated hospital and the patient to notify that the referral is accepted.

[Claim 12] The method of claim 10, comprising:
checking the medical referral letter at the medical information management server and processing with the patient regarding booking of visit and if the patient agrees to disclosure of his medical record; and
if it is necessary to send out a message to the patient and the terminal of

the affiliated hospital according to booking information, requesting, by the medical information management server to the medical information relay server, to transmit the message.

[Claim 13]

A method for returning a medical referral, comprising:

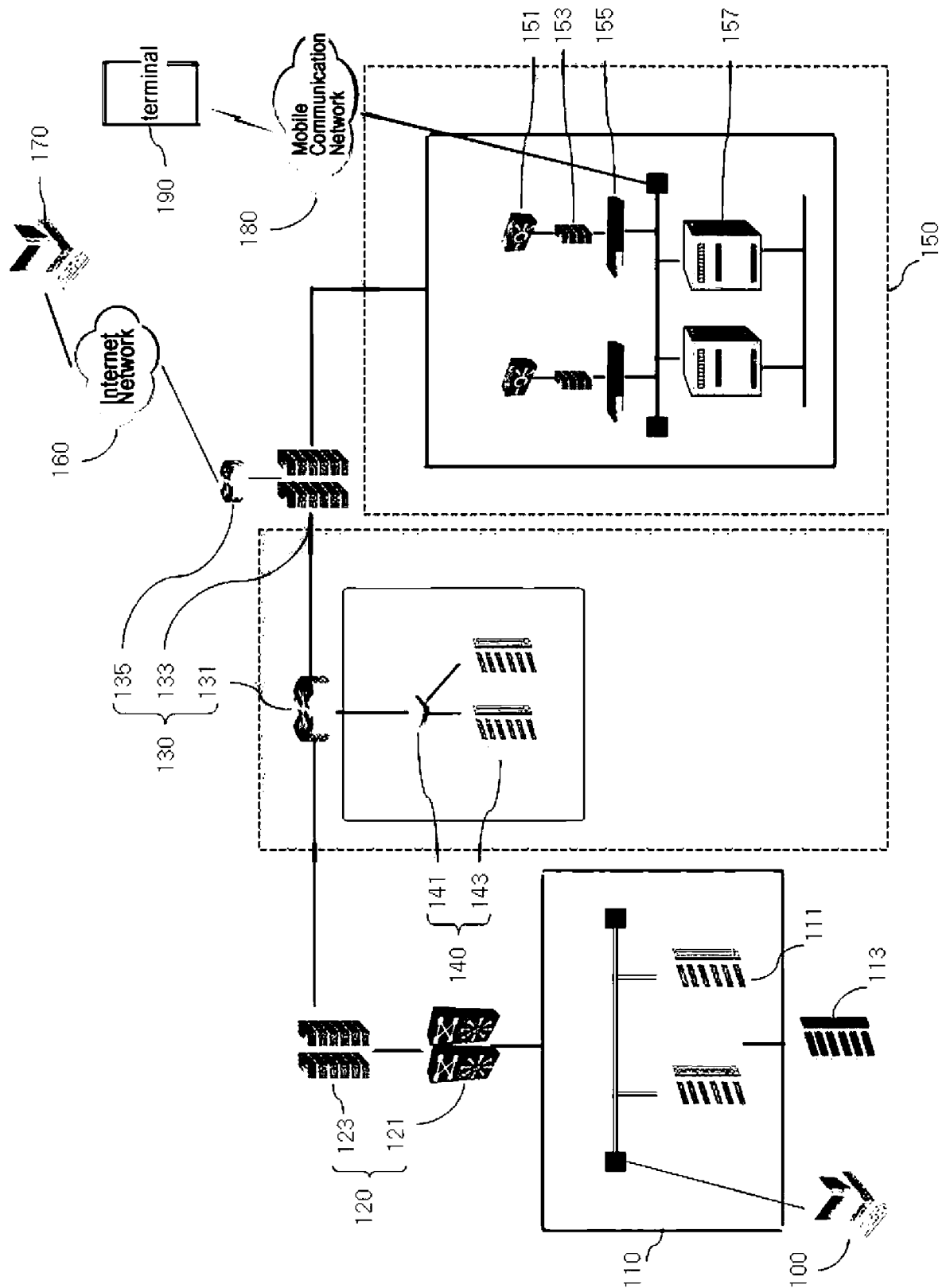
requesting a returning of medical referral, by transmitting from a terminal of a medical team to a medical information management server that comprises at least one of medical record of a patient who has completed treatment and returned to an affiliated hospital, and images obtained as a result of tests;

selecting an affiliated hospital to receive the returned patient according to the request and generates a returning referral list;

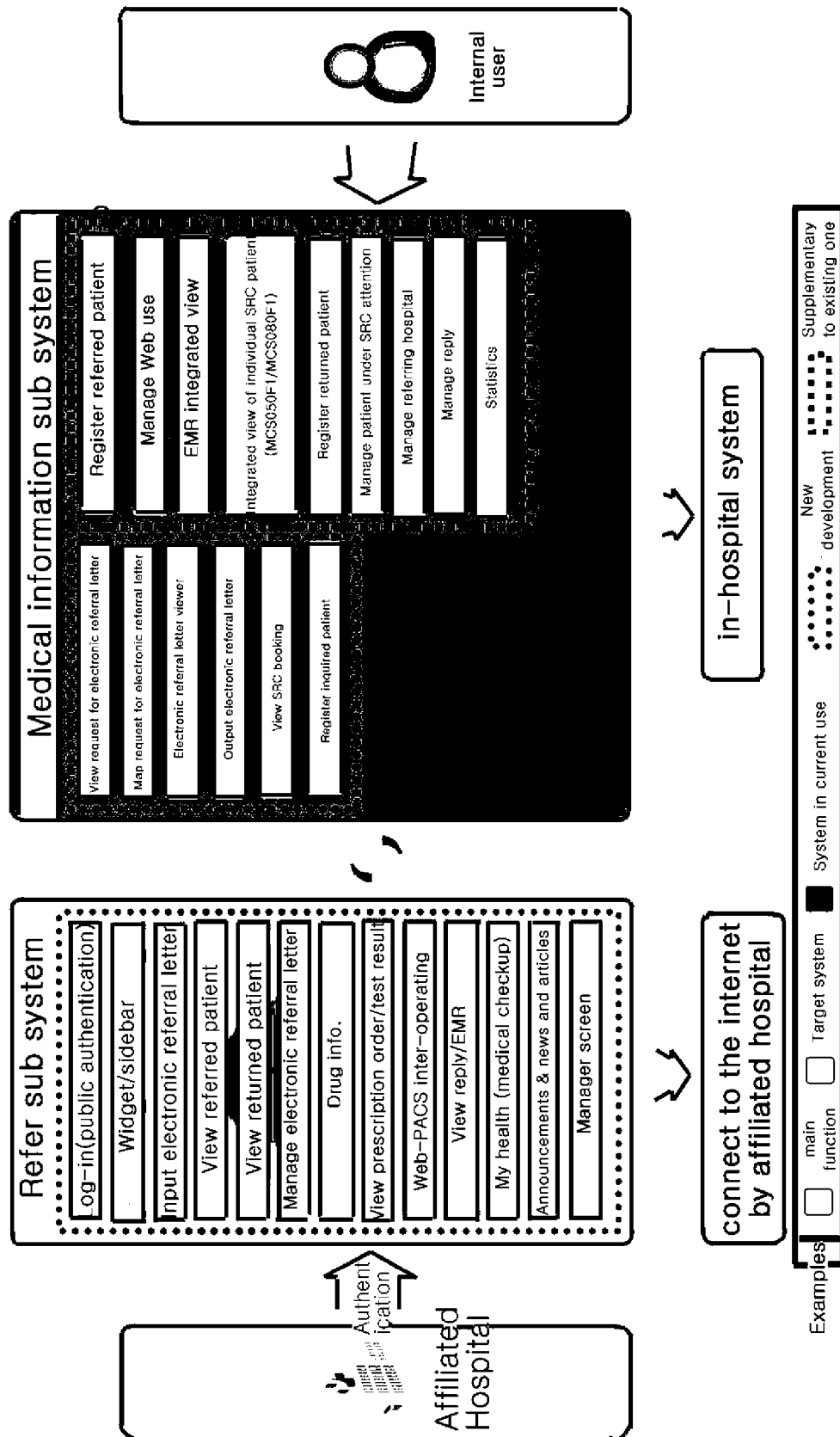
storing the returning referral information and the returning referral list in a second database; and

connecting, by a terminal of an affiliated hospital, to a medical information relay server to request in association with a database the stored returned medical record and the returning referral list and receive the same.

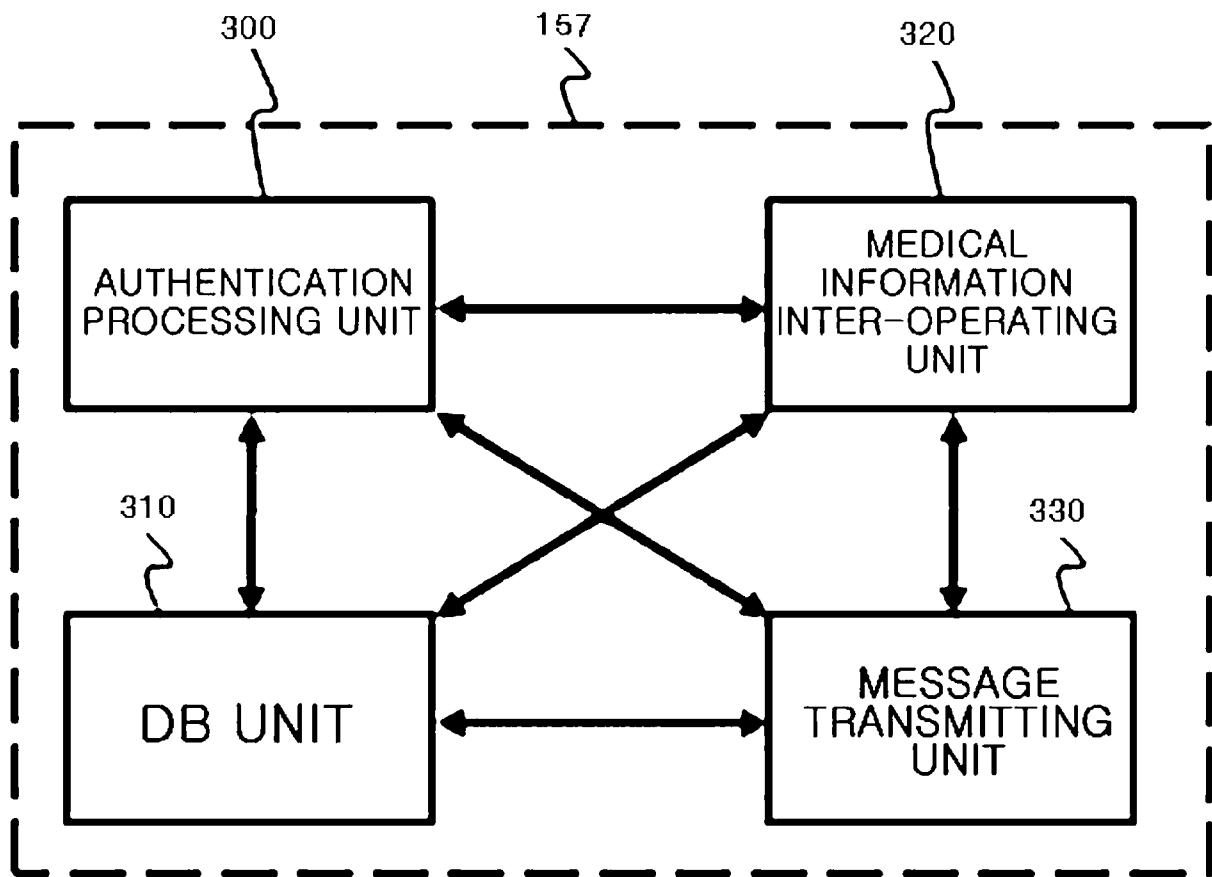
[Fig. 1]



[Fig. 2]



[Fig. 3]



[Fig. 4a]

Refer System

아이디 ☒ 저장

비밀번호

공인인증 인증

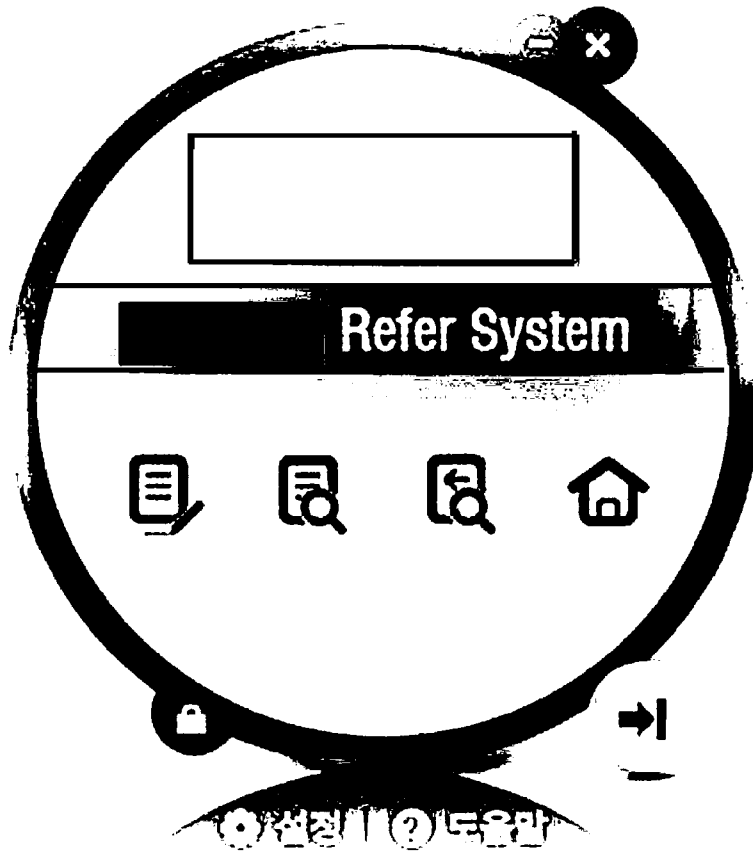
Login

[로그인](#)

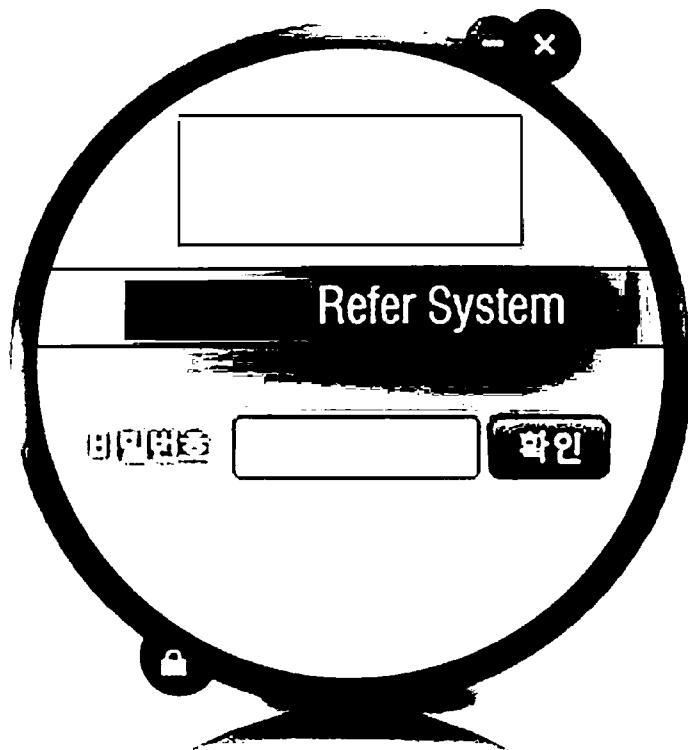
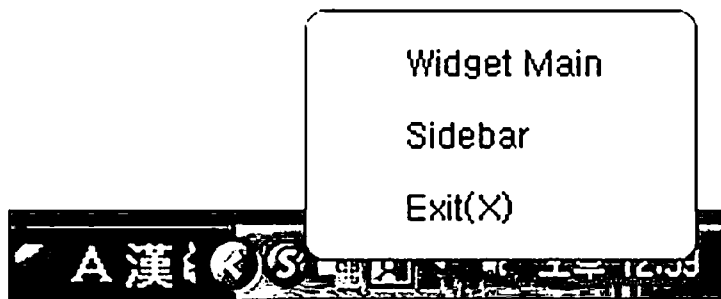
[아이디/비밀번호 찾기](#)

SRC ☎ : 02 · 3410 · 0800

[Fig. 4b]



[Fig. 4c]



[Fig. 4d]



[Fig. 4e]

위젯환경설정

기본

- 알림
- WEBPACS

기본

기본화면 설정

☒ Widget ☐ Side bar

위젯환경설정

알림

- 기본
- 알림**
- WEBPACS

☒ 알림 메시지 수신여부
정기적인 소식 또는 유용한 정보들을 받아 보실 수 있습니다.

☐ 메시지 자동숨김 여부

메시지 알림 시간설정 (초단위)

5 초

위젯환경설정

WEBPACS

- 기본
- 알림
- WEBPACS**

WEBPACS 조회를 위한 기본 모니터설정

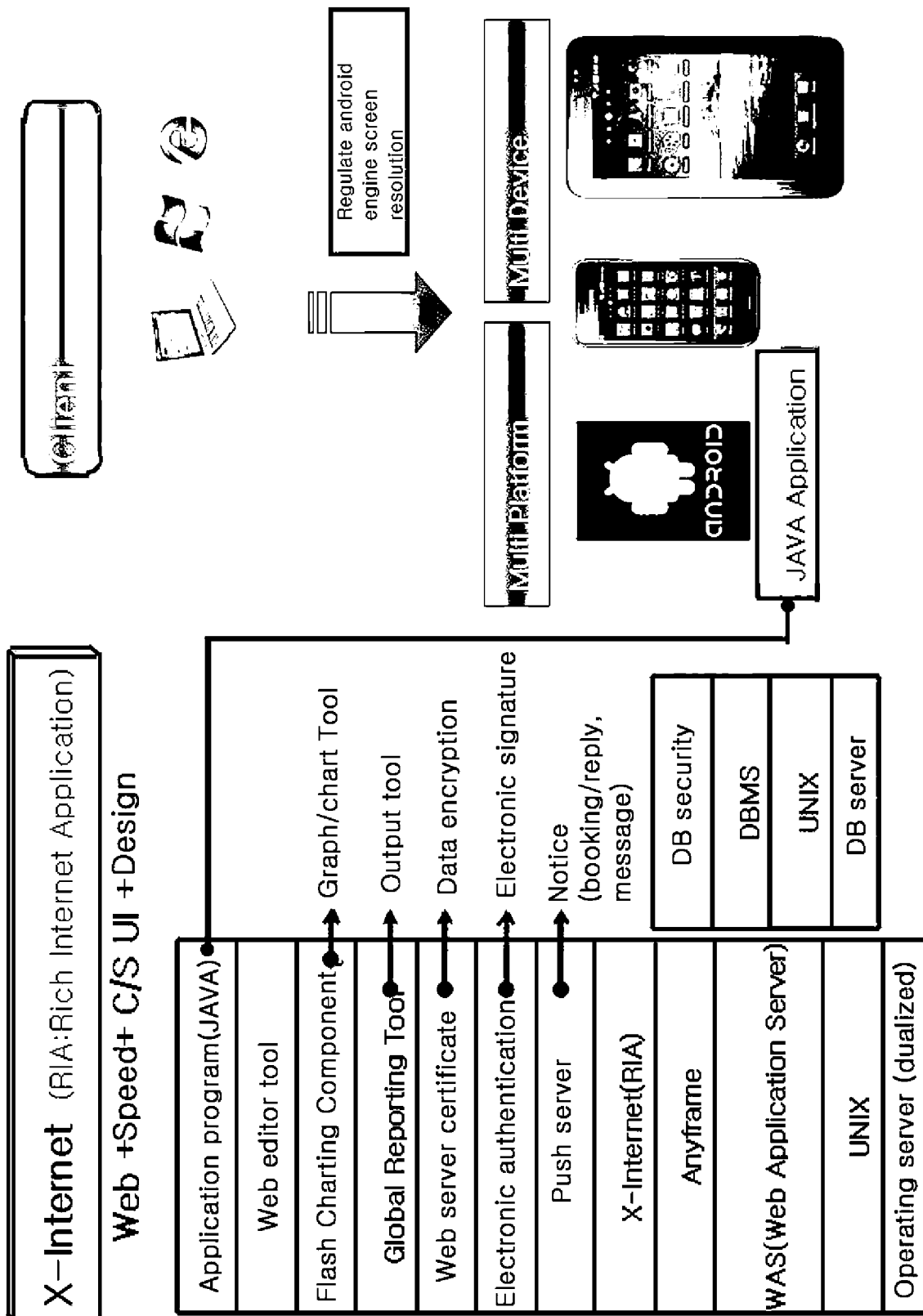
☐ One Monitor 사용

☒ Dual Monitor 사용

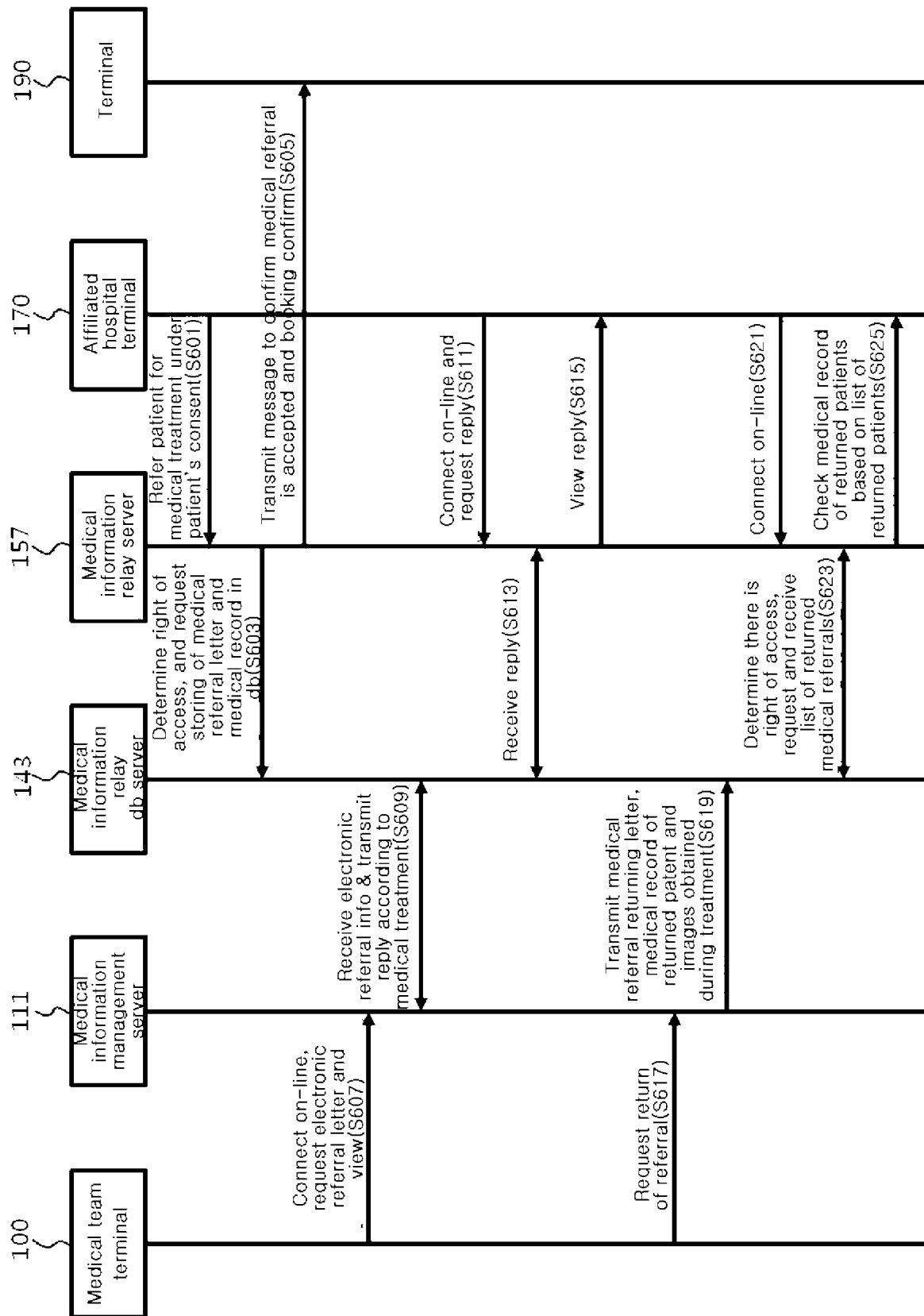
☒ 왼쪽 ☐ 오른쪽

확인 **취소**

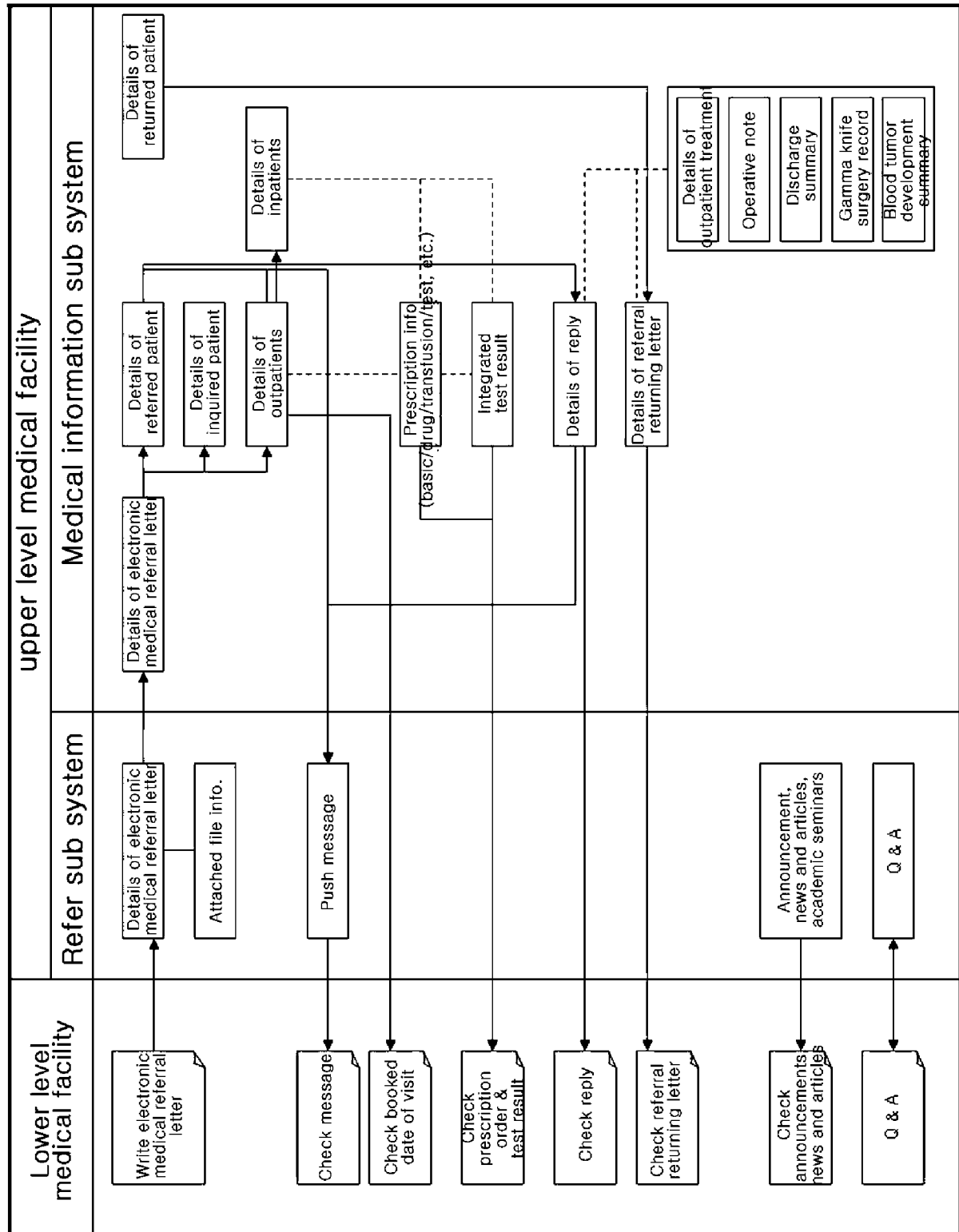
[Fig. 5]



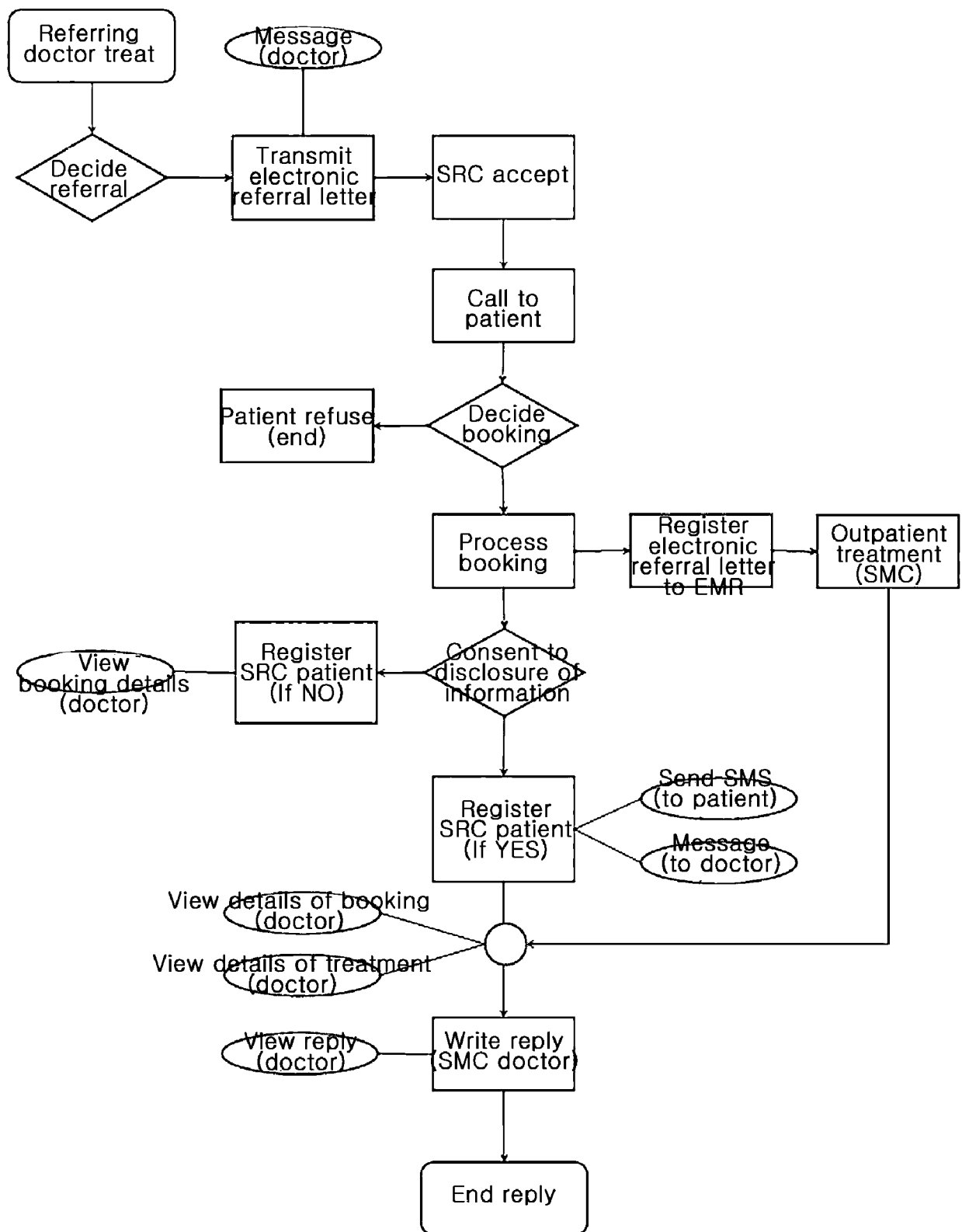
[Fig. 6a]



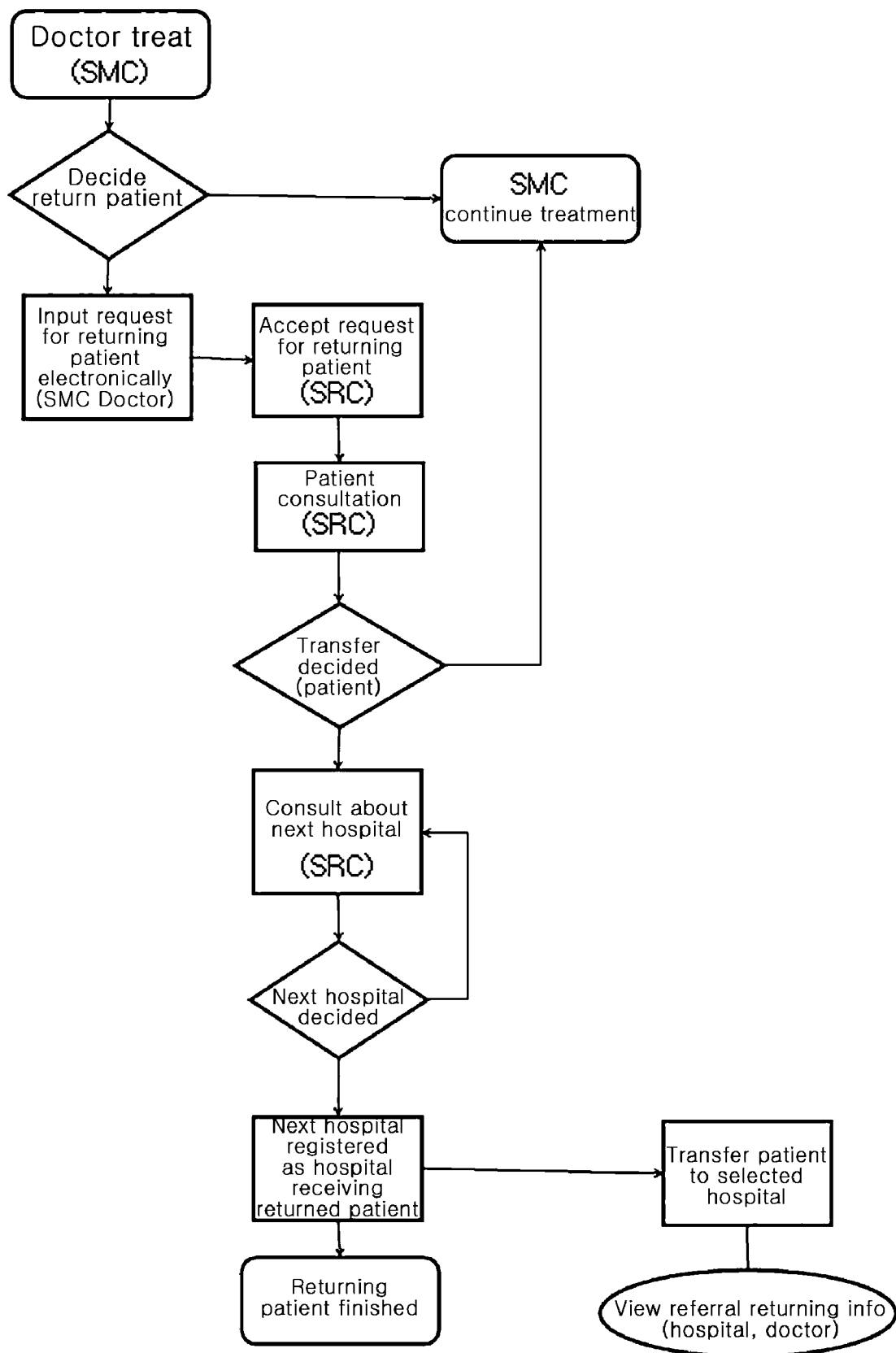
[Fig. 6b]



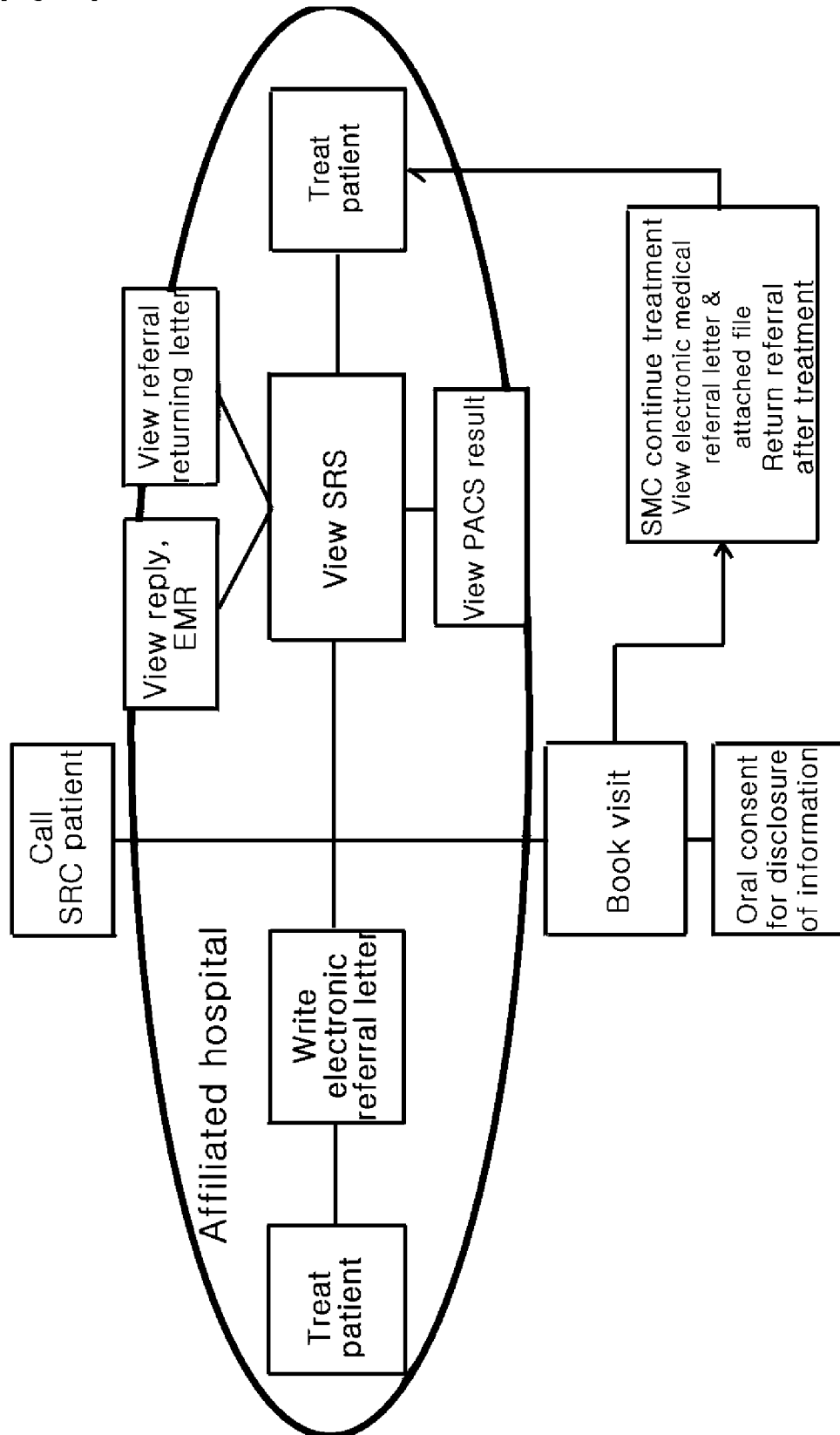
[Fig. 7a]



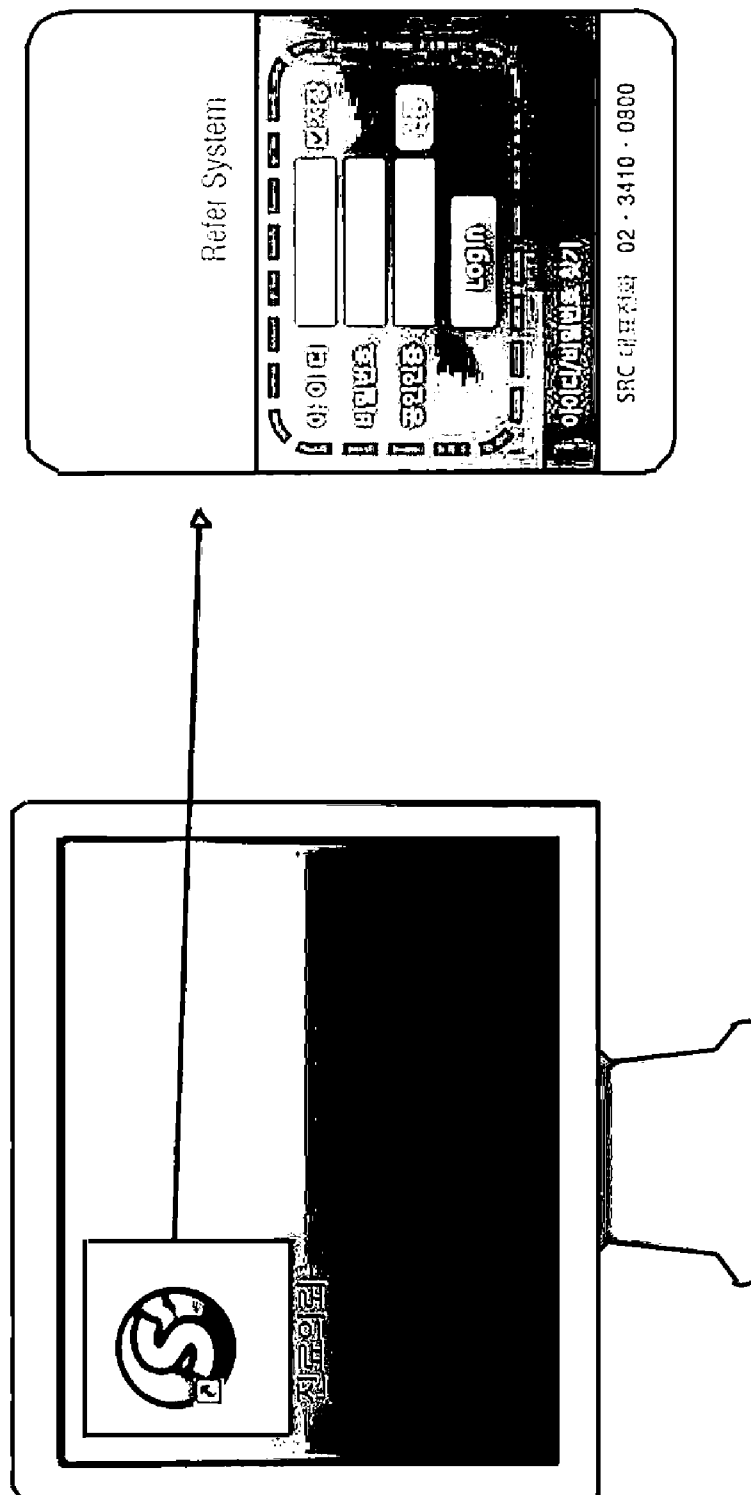
[Fig. 7b]



[Fig. 7c]



[Fig. 8]



[Fig. 9]

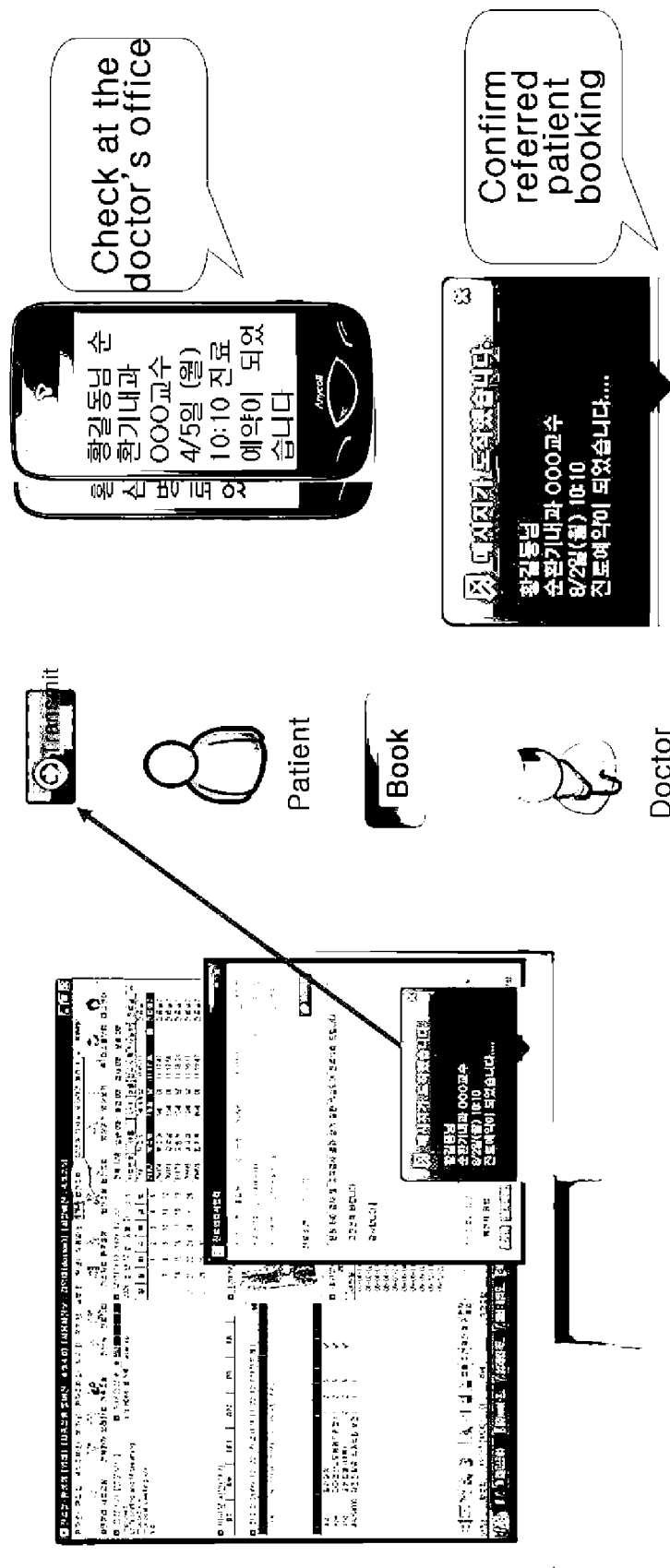
진료의뢰서입력 * 성 명 : 홍길동 주민번호 : 780505 - 111111 * 휴대전화 : 010-0000-0000 * 상병명 : i/o Stomach Ca	진료소견 그림 및 검사이미지 문원 600 검사 및 조직검사 결과 상기 질환 의심되어 진료의뢰 드립니다. 고전선처 바랍니다. 감사합니다!	환자정보/성명의 [회신서 발행 : 의사가 직접 작성한 회신서를 원하시는 경우에만 체크] 개 의뢰진단 환부대일
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의심 [발신자확인] [발신시간]

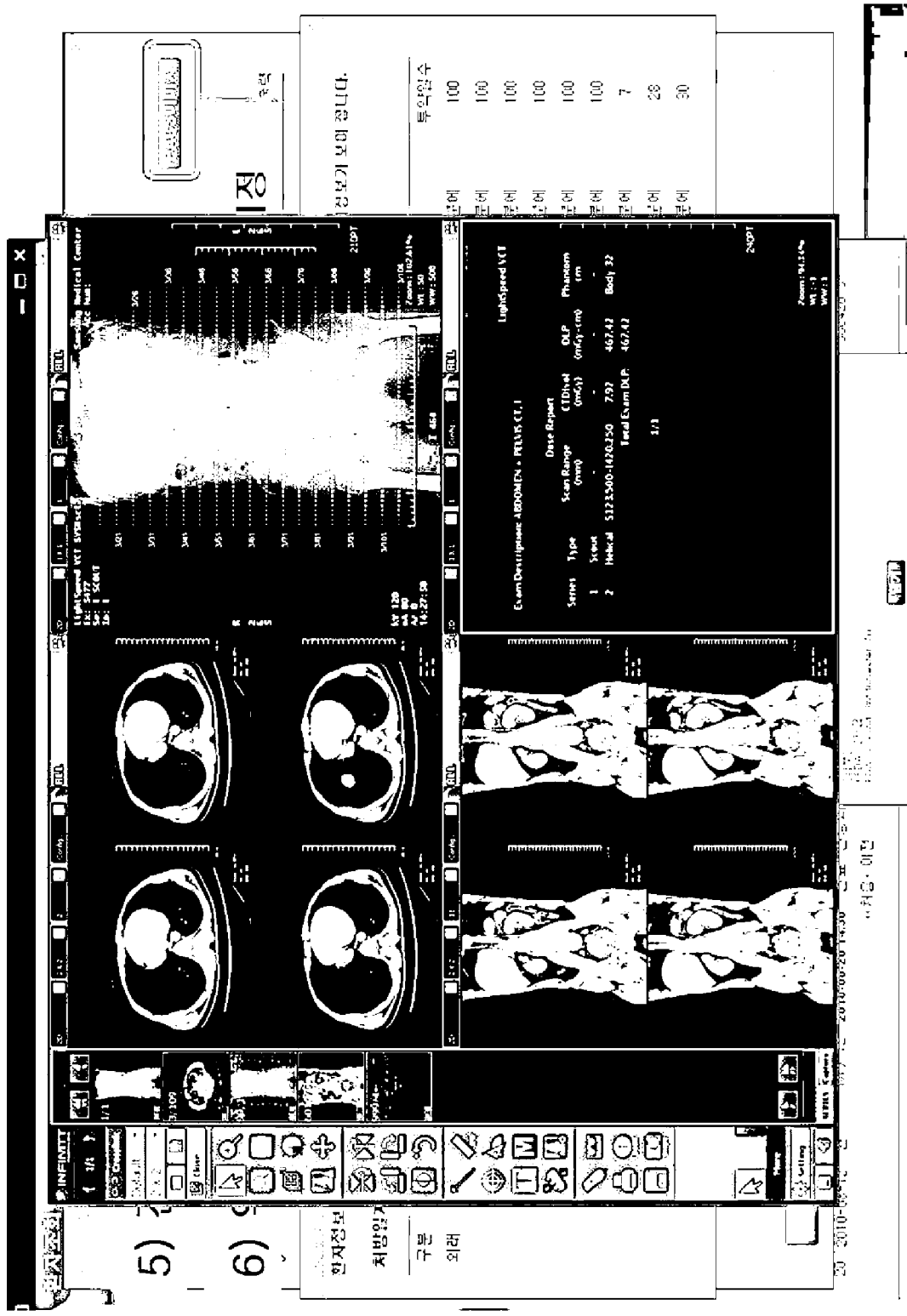
V. 전송후 확인필.

[illegible]

[Fig. 10]



[Fig. 11]



[Fig. 13]

[illegible]

[Fig. 14]

[MM001001] - 외래환자선택 [다외비]				
진료과	[IM1]	미진찰	☒ 진찰	☒ 오전
진료이	[102028]	유병철	기타	2차
조회				
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*11	188	AM 09:50	19767818	심태6781
*12	190	AM 09:50	24731381	이태3138
*13	201	AM 10:00	16562955	장태6295
*14	202	AM 10:00	14128357	심태2835
*15	213	AM 10:10	19377383	주태7733
*16	215	AM 10:10	16324649	구태2449
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18	240	AM 10:20	25715182	Ⓢ홍태1518
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*21	253	AM 10:30	25613206	서태13206
22	263	AM 10:40	13070383	김태7038
23	264	AM 10:40	25712646	차태1264

외래환자선택

0건의 자료가 조회되었습니다

[Fig. 15]

MNO060F1 - 외래예약환자															
진료일	[2010-09-14]	>	진료과	[IM1]	>	진료의	[102028]	>	유병철	전체	문물관	양세서	상병	미진할	조회
S8 MNO200F1 - 외래접수관리(다외비)															
환자번호		[11114023]		권타1402											
진료과	진료시간	진료의	예약번호	E&E대상	초/재진	접수여부	접수시간	위치명	센터명	특기사항					
IM1	12:30	유병철	456	Y	초진			본원 소화기센터	[e-아리]	임 선생님 의뢰 // 서울					
※ 접수와 동시에 안내지가 출력됩니다.															
점수(F8)	안내지 출력										증로				
488	12:50	12130600	장태3060	재진	N	Y	XXX-XXXX-XXXX	진료과	환정월	2010-03-23	12:14	본원			
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491	12:50	23699427	이태9942	재진	N	N	2010-07-20 XXX-XXXX-XXXX	진료과	유병철	2010-07-20	13:11	본원			
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환자명 앞 ◎ 표시 : 전직전문의원 환자입니다.															
[제견의 자료가 조회되었습니다]															
(X) □ : 공휴일 : 휴진일 : 휴진일 (오전/오후만) □ : Clinic															
예약환자 예약 종료															
환자선택 출력 재종료															

[Fig. 16]

[illegible]

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2011/008053**A. CLASSIFICATION OF SUBJECT MATTER****G06Q 50/00(2006.01)i**

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)

G06Q 50/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models

Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS(KIPO internal) & Keywords: hospital, medical information, interchange, share, refer, affiliate

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 10-0805642 B1 (KANG, E. S. et al.) 26 February 2008 See page 6, paragraph [0028]-page 14, paragraph [0133] and figures 1-36.	1-13
A	KR 10-2006-0088142 A (ISU UBCARE CO., LTD.) 4 August 2006 See page 3, line 36-page 8, line 20 and figures 1-9.	1-13
A	JP 2010-237833 A (KONICA MINOLTA MEDICAL & GRAPHIC INC.) 21 October 2010 See page 3, paragraph [0015]-page 7, paragraph [0058] and figures 1-9B.	1-13
A	JP 2010-092418 A (TOUKEI COMPUTER CO., LTD.) 22 April 2010 See page 2, paragraph [0007]-page 10, paragraph [0078] and figures 1-17.	1-13



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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

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"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

08 MAY 2012 (08.05.2012)

Date of mailing of the international search report

09 MAY 2012 (09.05.2012)

Name and mailing address of the ISA/KR

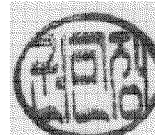
Korean Intellectual Property Office
Government Complex-Daejeon, 189 Cheongsu-ro,
Seo-gu, Daejeon 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

Kwon Min Jeong

Telephone No. 82-42-481-8678



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2011/008053

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
KR 10-0805642 B1	26.02.2008	None	
KR 10-2006-0088142 A	04.08.2006	None	
JP 2010-237833 A	21.10.2010	None	
JP 2010-092418 A	22.04.2010	None	