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(54) Title: MEDICAL PRACTICE MANAGEMENT SYSTEM

(57) Abstract

A medical management system is provided which comprises a database of diagnosis profiles (figure 16A); logic of entering patient information (figure 6) into the medical management system; logic for comparing the patient information relative to the diagnosis profiles (figure 16C); and logic for selecting one or more possible diagnoses which have a diagnosis profile sufficiently similar to patient information entered into the system (figure 16C).

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MEDICAL PRACTICE MANAGEMENT SYSTEM

FIELD OF THE INVENTION

The present invention relates to methods and systems for facilitating the entry of patient data and the management of a medical practice.

BACKGROUND OF THE INVENTION

Over the last several years, insurance companies have applied increasing pressure upon healthcare providers to provide optimal medical care in the most cost-effective manner. In order to apply this pressure, increasingly complex documentation requirements have been created in order for healthcare providers to receive reimbursement. Healthcare providers can expect to collect only 50-60% of the billed services. Meanwhile, the increasingly complex documentation requirements have caused healthcare providers to spend a significant amount of their time on documentation and pay up to 15-20% of their revenue to third parties to provide support services.

There is also an increasing demand by insurers for the standardization of medical treatment in order to provide consistently excellent, cost-effective medical care. Insurers are demanding proof of positive outcomes as justification for reimbursement.

The amount of paperwork being required of healthcare providers contributes significantly to the cost of running a medical practice. Physicians generate less revenue because of the time spent doing the documentation. Meanwhile, failure to provide proper documentation results in reimbursement being denied or reduced.

Physicians are burdened by increasing rules and requirements that interfere with their ability to care for patients and generate revenue. These requirements add non-billable hours for which no money is generated. There are four key areas that make up a significant portion of these demands.

A. Documentation Requirements

Reimbursement is directly related to documentation. Medicare serves as the benchmark for all insurers and has defined specific documentation requirements. For example, the level of service for an initial consult, and the reimbursement, is directly linked to the detail included in

the documentation. Also, each patient encounter may require several forms of documentation to be completed (e.g. initial consult, letter of medical necessity to the insurer, and letter to the referring physician). A 30-minute initial visit commonly results in a minimum of 10-15 minutes worth of documentation/paperwork.

B. Billing

Obtaining reimbursement for medical services, especially pain management, is time-consuming and expensive. Reimbursement is based on the submitted bill that includes the diagnosis, the patient encounter code and the charge. The rules regarding coding change frequently, without warning, and vary by insurer. Keeping current is time-consuming. However, proper reimbursement requests are essential since even the slightest error results in either the reimbursement being denied or being granted at a lower amount. In addition, documentation may be required to substantiate the charges. Billing services process and submit bills but cannot make coding decisions. Coding is based on diagnoses and type of visit that are determined by medical documentation.

The penalties for not maintaining proper records can be severe. If a provider is audited by an insurer and found to not have adequate documentation to support the bill, the penalties include repayment with interest, a fine and potentially prison.

C. Clinical Pathways

Insurers are placing increasing pressure on physicians to standardize care. Clinical pathways are vehicles for explicitly designing, managing and improving clinical processes and the ancillary systems that support clinical care. Built into a clinical pathway is data gathering concerning outcomes, utilization, process compliance, functional goal achievement, and identification of outlyers. Clinical pathways serve to create predictable costs and utilization, promote consistency, and create proven treatment strategies for optimal patient care. Standardization of care and the ability to demonstrate improved outcomes and reduced utilization improves profitability. Because pain management is a new evolving specialty made up of multiple disciplines with few providers having formal training, few clinical pathways are available.

D. Outcome Measures

Insurers want providers to demonstrate cost-effective, quality medical care. Documentation of improvement in tangible measures of patient outcomes and utilization of healthcare dollars results in improved reimbursement via easier approval for encounters, better contract rates, and exclusive provider relationships. However, few physicians are able to provide this data because of the time and cost involved. From the physician's perspective, collecting, entering and analyzing outcome data does little but add to the unbearable mound of paperwork.

SUMMARY OF THE INVENTION

The present invention relates to a medical management system. In one embodiment, the medical management system comprises a database of diagnosis profiles; logic of entering patient information into the medical management system; logic for comparing the patient information relative to the diagnosis profiles; and logic for selecting one or more possible diagnoses which have a diagnosis profile sufficiently similar to patient information entered into the system.

The medical management system may further include a database of clinical pathways where different clinical pathways are associated with different diagnoses, and logic for displaying those clinical pathways associated with the selected one or more possible diagnoses.

The medical management system may also further include outcome reports associated with the plurality of clinical pathways, and logic for displaying outcome reports associated with those clinical pathways associated with the selected one or more possible diagnoses.

The medical management system may also further include information regarding the one or more possible diagnoses, and logic for displaying the information regarding the one or more possible diagnoses.

The logic of entering patient information may be adapted to receive patient information selected from the group consisting of background patient information, insurer information, present illness history, past medical history, social history, family history, medications, allergies, physical examination, and diagnostic studies.

The logic of entering patient information may be adapted to receive information entered into the system by a method selected from the group consisting of manual data entry, voice-recognition data entry, and scanning of a form.

The medical management system may also further include logic for suggesting to a user when additional patient information is needed.

The medical management system may also further include logic for suggesting additional patient information to obtain from the patient by a physical examination or a diagnostic study.

The medical management system may also further include logic for suggesting additional patient information to obtain from the patient in order to obtain a higher level of insurer reimbursement.

The medical management system may be adapted to be simultaneously used by a plurality of healthcare providers remote from each other. The system may also be adapted to have a patient enter a portion of the patient information by an Internet connection to the system. The system may also be adapted to be accessed by the plurality of different users through the Internet or phone lines.

In another embodiment, a medical management system is provided comprising: a database of insurer requirements for a plurality of different insurance coverages; logic of entering information about a patient encounter into the medical management system; logic of entering information identifying a patient's insurance coverage into the medical management system; and logic for producing documentation regarding the patient encounter customized to the insurer requirements of the patient's insurance coverage.

The database of insurer requirements may include information selected from the group consisting of information regarding pre-certification, patient co-payments, payment schedules, and codes for coding diagnoses and procedures.

The medical management system may further include logic for providing billing suggestions based on the patient's insurance coverage and the insurer information stored in the system.

The medical management system may further include logic for providing documentation suggestions based on the patient's insurance coverage and the insurer information stored in the system.

The medical management system may further include information regarding the one or more possible diagnoses, and logic for displaying the information regarding the one or more possible diagnoses.

The logic of entering patient information may be adapted to receive patient information selected from the group consisting of background patient information, insurer information,

present illness history, past medical history, social history, family history, medications, allergies, physical examination, and diagnostic studies.

The logic for entering patient information may be adapted to receive physical examination information and information from one or more diagnostic studies.

The medical management system may further include logic for suggesting additional patient information to obtain from the patient by a physical examination or a diagnostic study.

The medical management system may further include logic for suggesting additional patient information to obtain from the patient in order to obtain a higher level of insurer reimbursement.

The medical management system may further include logic for transmitting at least a portion of the documentation produced electronically to the insurer.

The system may be adapted to be simultaneously used by a plurality of healthcare providers remote from each other. The system may also be adapted to have a patient enter a portion of the patient information by an Internet connection to the system or be accessed by the plurality of different users through the Internet.

The present invention also relates to an automated method for suggesting patient diagnoses. In one embodiment, the method comprises:

entering patient information into a medical management system;

having the medical management system compare the patient information relative to a plurality of diagnosis profiles stored in the medical management system; and

having the medical management system select one or more possible diagnoses which have a diagnosis profile sufficiently similar to the patient information entered into the system.

According to the method, the medical management system may also include a plurality of clinical pathways, the method further including displaying one or more clinical pathways associated with the one or more diagnoses selected by the medical management system.

Also according to the method, the medical management system may also include outcome reports associated with the plurality of clinical pathways, the method further including displaying at least one of the outcome reports.

Also according to the method, the medical management system may also include information regarding the one or more possible diagnoses, the method further including displaying the information regarding the one or more possible diagnoses.

Also according to the method, the patient information may comprise information selected from the group consisting of background patient information, insurer information, present illness history, past medical history, social history, family history, medications, allergies, physical examination, and diagnostic studies.

Also according to the method, the patient information may be entered into the system by a method selected from the group consisting of manual data entry, voice-recognition data entry, and scanning of a form.

Also according to the method, entering patient information into the medical management system may include having the system suggest to a user when patient information is needed.

Also according to the method, entering patient information into the medical management system may also include having the system suggest additional patient information to obtain from the patient by a physical examination or a diagnostic study.

Also according to the method, entering patient information into the medical management system may include having the system suggest additional patient information to obtain from the patient in order to obtain a higher level of insurer reimbursement.

Also according to the method, entering patient information into the medical management system may be performed by a plurality of healthcare providers.

Also according to the method, entering patient information into the medical management system may include having a patient enter a portion of the patient information by an Internet connection to the system.

Also according to the method, the medical management system may be maintained in a central location and accessed remotely by a plurality of different users.

Also according to the method, access to the medical management system may be achieved by the plurality of different users through the Internet.

In another embodiment, an automated medical documentation method comprising:

entering information identifying a patient's insurance coverage into a medical management system, the medical management system including insurer requirements for a plurality of different insurance coverages;

entering information about a patient encounter into the medical management system; and

having the medical management system produce documentation regarding the patient encounter customized to the insurer requirements of the patient's insurance coverage.

According to the method, the insurer requirements may include information selected from the group consisting of information regarding precertification, patient co-payments, payment schedules, and codes for coding diagnoses and procedures.

Also according to the method, entering information about the patient encounter may include entering physical examination information or information from one or more diagnostic studies.

Also according to the method, the method may further comprise having the system provide billing suggestions based on the patient's insurance coverage and the insurer information stored in the system.

Also according to the method, the method may further comprise having the system provide documentation suggestions based on the patient's insurance coverage and the insurer information stored in the system.

Also according to the method, entering information about the patient encounter into the medical management system may include having the system suggest to a user when patient information is needed.

Also according to the method, entering information about the patient encounter into the medical management system may include having the system suggest additional patient information to obtain from the patient by a physical examination or a diagnostic study.

Also according to the method, entering patient information into the medical management system may include having the system suggest additional patient information to obtain from the patient in order to obtain a higher level of insurance reimbursement based on the insurer requirements of the patient's insurance coverage.

Also according to the method, the method may further include transmitting at least a portion of the documentation produced electronically to the insurer.

Also according to the method, the medical management system may be maintained in a central location and accessed remotely by a plurality of different users.

Also according to the method, the medical management system may be accessed by the plurality of different users through the Internet.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 illustrates an overview of information flow within the medical practice management system.

Figure 2 illustrates an example of a multidisciplinary medical practice.

Figure 3 illustrates an example of the process for searching and reporting potential drug interactions.

Figure 4A illustrates an example of raw data being converted into medical documents.

Figure 4B illustrates an example of the process flow for producing documents.

Figure 4C illustrates an example of a sentence from the initial consult template.

Figure 5A illustrates an example of the interaction between the Scheduling and Billing modules.

Figure 5B illustrates an example of the process used to identify insurer requirements.

Figure 5C illustrates an example of key elements used to determine the level of service provided in a patient encounter.

Figure 5D illustrates an example of the process flow for determining the diagnosis with highest reimbursement.

Figure 6A illustrates an example of raw data having been converted into outcome reports.

Figure 6B illustrates an example of the data that has been sorted by the system.

Figure 6C illustrates an example of possible billing outcome analyses done by the system.

Figure 6D illustrates an example of the outcome measure process flow for determining an optimal treatment.

Figures 7A-C illustrate user interfaces for initiating a user session.

Figure 7A illustrates a user interface for accessing the system.

Figure 7B illustrates a user interface as the user enters security data to access the system.

Figure 7C illustrates a user interface after the user gains initial access to the system.

Figures 8A-B illustrate user interfaces for transferring of scheduling data and patient files.

Figure 8A illustrates a user interface for accessing an appointment schedule.

Figure 8B illustrates a user interface for transferring data to and from the user's site.

Figures 9A-C illustrate user interfaces for entering and displaying patient information.

Figure 9A illustrates a user interface at the beginning of a patient session.

Figure 9B illustrates a user interface for entering patient background.

Figure 9C illustrates the user interface of Figure 9B after patient background information has been entered.

Figure 10 illustrates an example of a patient questionnaire that is entered into the system.

Figure 11 illustrates a user interface at the beginning of a patient encounter.

Figure 12 illustrates a user interface displaying encounter components.

Figures 13A-M illustrate user interfaces within a submodule of the encounter.

Figure 13A illustrates a user interface opening the "history" component within the encounter.

Figure 13B illustrates a user interface for entering data within the "history of present illness" section.

Figure 13C illustrates the user interface in Figure 13B after data entry.

Figure 13D illustrates a user interface for entering data within the "past medical history" section.

Figure 13E illustrates the user interface in Figure 13D after data entry.

Figure 13F illustrates a user interface for entering data within the "past surgical history" section.

Figure 13G illustrates the user interface in Figure 13F after data entry.

Figure 13H illustrates a user interface for entering data within the "medication history" section.

Figure 13I illustrates the user interface in Figure 13H after data entry.

Figure 13J illustrates a user interface for entering data within the "social history" section.

Figure 13K illustrates a user interface for entering data within the "review of systems" section.

Figure 13L illustrates the user interface in Figure 13K after data entry.

Figure 13M illustrates the user interface after completing the data entry into the "History" submodule shown in the user interfaces 13A-13L.

Figure 14A illustrates a user interface at the beginning of the "Physical Exam" submodule within the encounter.

Figure 14B illustrates a user interface for entering data in the "motor exam" section.

Figure 15 illustrates the user interface for entering data in the "radiological findings" section of the patient encounter.

Figure 16A illustrates an example of an algorithm for determining possible diagnoses.

Figure 16B illustrates an example of the diagnosis identifying logic.

Figure 16C illustrates an example of the diagnosis selector process flow.

Figure 16D illustrates an example of the diagnosis profile comparison.

Figure 17 illustrates a user interface displaying possible diagnoses.

Figure 18 illustrates a user interface displaying a clinical pathway.

Figure 19 illustrates a user interface for determining the course of treatment.

Figure 20 illustrates an example of a document, "Patient Instructions Before A Procedure," generated by the system.

Figure 21 illustrates illustrate a user interface for viewing documents generated by the system.

Figure 22A and 22 B illustrate an example of the initial consult document that is generated from the data obtained from user interfaces in Figures 9B-C, 10, 13B-13L, 14A-B, and 15.

Figure 23 illustrates a user interface for finalizing documents produced by the system.

Figure 24 illustrates a user interface showing a subsequent patient session.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The present invention relates to a fully integrated, interactive, medical management system. In a preferred embodiment, all or part of the system is maintained at a central location and a community of healthcare providers, patients and other parties access the system remotely, most typically via the Internet. As will be discussed herein, the maintenance of a central medical management system allows the system to be more readily updated with treatment, medication and insurer information and more easily accessed by all users.

Users interact with the system through a series of user interfaces designed to allow healthcare providers and patients to rapidly record information used in diagnosis and treatment. Once raw patient data has been entered into the system, the system processes the information with logic stored in the system to suggest diagnoses and treatment approaches for patients. By recording the diagnoses, treatments and outcomes of patients treated using the system, the effectiveness of various treatment approaches can be rapidly and effectively reevaluated by the system and then communicated to the community of healthcare providers and insurers through the system. As a result, the community of healthcare providers using the system benefit not just from lessons learned from their own patient data but also from patient data from the entire community of healthcare providers.

The system also automatically documents patient treatments and generates reimbursement request documentation customized for the patient and the treatment performed. The system is periodically updated in response to changes in reimbursement requirements by various insurers. This central updating of the system reduces the number of denied reimbursement requests due to a lag between changes in reimbursement requirements and practitioner response. As a result, the system allows healthcare providers using the system to benefit from a higher percentage of reimbursed services and a substantially lower frequency of reimbursement denials.

The system may also track reimbursement outcomes including the rate of payment, days in accounts receivable, number of denied claims and percent reimbursement. This reimbursement data may be compared with diagnoses and treatment plans, documentation and coding. By monitoring billing outcomes, it is possible to detect changes in insurer reimbursement practices and modify the system's billing documentation to improve healthcare provider reimbursement outcomes.

This process of using information obtained from healthcare providers using the system is used throughout the system, for example, in regard to diagnoses, clinical pathways, outcome measures, and reimbursement. Thus, use of the system by the community of healthcare providers provides valuable feedback data for continually improving the performance of the system.

By creating a community of system users, the system also serves as a conduit of information regarding new diagnoses and treatments, treatment outcome data, and changes in reimbursement procedures and requirements. Overall, healthcare providers using the system are able to generate more revenue and provide better pain management care to their patients.

Figure 1 illustrates a general information flow for features of the system. As illustrated, information is entered into the system by office personnel, patients, and/or healthcare providers. The information may include background patient information, insurer information, present illness history, past medical history, social history, family history, medications, allergies, physical examination, diagnostic studies and any other information which is either provided by the patient or garnered from a medical or diagnostic exam.

The information may be entered into the system by any mechanism known in the art including, but not limited to manual data entry (e.g. menu driven, word-processing), voice-

recognition data entry, or scanning of forms. In one embodiment, a portion of the data to be entered into the system is entered via a personal data assistant (PDA) type device that is later hot-synced into the system. The PDA may optionally have voice-recognition capabilities. In another embodiment, a portion of the data is entered into the system by scanning forms into the system. The system can include user feedback which instructs the user when data is missing.

A feature of the present invention is that patients can enter data into the system by themselves when they are outside the healthcare provider's office by accessing the system over the Internet. This reduces the amount of time the patient has to spend in the waiting room and reduces the workload of the healthcare provider staff.

As also illustrated in Figure 1, the system takes the information (histories, physical findings and diagnostic studies) and suggests possible diagnoses and treatment approaches for the different diagnoses. The system may also request additional data to be obtained in order to help make diagnoses or decide on a treatment plan. The system can also guide the user through a clinical pathway or explain outcome reports to the user.

The system can include a variety of applications to assist the healthcare provider including a complete medical thesaurus and a medical dictionary that translates medical terminology into lay terminology so that users may include healthcare providers and patients. An example of a translation might be "hypertension: high blood pressure".

The system can include information necessary for the diagnosis and treatment of diseases. The system has stored onto it the information necessary to serve as a comprehensive medical textbook. This may include descriptions of symptoms, physical findings, diagnostic studies, diagnoses, treatment plans, and procedures. Other applications can include how-to guides for performing physical examinations, tests and procedures. Users may obtain the information within the system through a user interface. For example, selecting a field displaying the diagnosis, "spinal stenosis," results in information on the diagnosis and treatment of this condition.

The system can include a variety of applications that assist the healthcare provider in caring for the patient. These applications may include a database of information on various medications and their side effects.

The system may also include a database of clinical pathways where each clinical pathway is associated with a different diagnosis or group of diagnoses. Once one or more diagnoses are selected, the appropriate clinical pathway(s) are provided.

The system also contains a database of outcome measures, a description of those measures, and the parameters for measuring and reporting the outcomes. For example, "return to work rate" is an outcome measure that is defined as the ability to return to work. It is measured as the percent of patients returning to work in a defined time period. Outcomes are measured for quality of medical care, responsiveness to treatment and cost-effectiveness.

The system may also include an outcome database which may be used to monitor and report the effectiveness of various treatments for different diagnoses. Data from nationally recognized outcome measures may be incorporated into the system to serve as a benchmark. Data from the community of healthcare providers using the system can also be used to measure outcomes. System administrators may use the data in the outcome database to modify and improve the performance of the system.

The system may also include templates for reporting the data collected in the database of outcome measures described above. The system may also contain the logic for users and system administrators to generate outcome reports independent of pre-existing templates.

The system may also include a database of current billing requirements. The system contains information regarding insurers and insurance requirements for obtaining reimbursement. This information may include needs for pre-certification, co-payments, referral patterns and payment schedules. The system may also include current codes for coding diagnoses and procedures.

The system may also include logic to integrate an individual patient's information that is entered into the system with a database of current billing requirements to provide documentation needed for reimbursement and record keeping. One piece of information requested by the system is the patient's insurer information. Insurer information allows the system to generate documentation that may be used to meet the billing requirements of that patient's insurer. For example, the system identifies the patient's insurer as requiring evidence of documentation of "medical necessity" prior to authorizing a procedure. The system may contain information regarding the definition of "medical necessity" for the patient's insurer. The system then uses the patient's data to produce a letter of medical necessity that fulfills the insurer's requirements.

The system may also include logic for providing the healthcare provider with billing comments or suggestions, inform the healthcare provider of documentation requirements, and provide the healthcare provider with documentation suggestions. For example, the system can recognize that there is inadequate data to establish medical necessity. The system then informs the healthcare provider that medical necessity has not been established and provides suggestions to establish medical necessity based on the patient's insurer's requirements.

The system may also be used to track reimbursement outcomes including the rate of payment, days in accounts receivable, number of denied claims and percent reimbursement. This reimbursement data may be compared with diagnoses and treatment plans, documentation and coding. By monitoring billing outcomes, it is possible to detect changes in insurer reimbursement practices and modify the system's billing documentation to improve healthcare provider reimbursement outcomes. Monitoring of billing outcomes may be performed manually by users or system administrators. Alternatively, the system may include logic which monitors for changes in reimbursement outcomes and notifies users and/or system administrators of those changes in order to suggest that a change in insurer reimbursement practice has occurred.

In a preferred embodiment, the system is maintained on a central location and independently accessed remotely by a plurality of different users. Various portions of the system may be stored at the user site. Access may be by a variety of connections, most preferably by the Internet or by phone lines. By maintaining the system in a central location, the system may be continuously updated. This allows each of the plurality of users to have the most current medical information. In addition, as diagnoses and clinical pathways change, these changes can be rapidly and effectively communicated to the community of users through the system.

The system may also include a security system that insures privacy of medical records. Patient privacy is a key concern. Users of the system require security access to enter the system. Users may be required to enter their security code at multiple points within the system, for example, to access patient files, to print documents and to electronically sign any document. The system's security system can also prevent data from being transferred from one user to another without the permission of the patient.

Physician practices take many forms. For example, there may be an individual practitioner or a multi-specialty group. However, patients rarely see a single healthcare provider. Usually, patients have a primary care provider (PCP) who is the overseer of the patient's overall

healthcare. PCPs refer patients for care provided by specialists or ancillary services such as physical therapy. Managed care describes the process of coordinating healthcare to provide the optimal healthcare while utilizing the fewest resources. Figure 2 is an example of a sample multidisciplinary medical practice. As can be seen, multiple healthcare providers can typically treat each patient. Several features of the present invention, including a centralized database of patient information, and the Prescription Safety Module, serve to help coordinate multiple healthcare providers treating a single patient.

Patient data storage by the system provides several advantages in regard to coordinating treatment between multiple healthcare providers. For example, assuming that patient confidentiality issues are addressed, any healthcare provider treating a given patient may have access to that patient's database. This allows care to be coordinated between healthcare providers. Each healthcare provider is allowed to view all the data in the system but may only alter or edit their own data. If a patient is seen by multiple healthcare providers, the patient does not have to retell the same data (e.g. past medical history, past surgical history) to each of the healthcare providers.

The system may also function as an automated medical record where the system keeps track of when data is obtained and from whom the data is obtained. The system thus creates a fully historical medical record. Data is obtained during each patient visit. When the patient returns to see the healthcare provider, the system has already incorporated data from the previous visit into the system. The healthcare provider may add additional data into the system without having to restate the data from the last visit. For example, a patient's database may include an initial visit, a procedure, and a follow-up visit. At each visit, the appropriate fields are completed on the user interface and stored in the system. When multiple healthcare providers see the same patient, the system allows each provider to see the entire patient record and also determine who entered what data.

The system may also incorporate a practice management database and processing system for controlling patient scheduling. The patient scheduling database is linked to the billing database. Prior to scheduling a visit, the system analyzes the insurance requirements for that patient. For example, the system includes logic for determining whether pre-certification from the referring physician is required prior to the patient's next appointment. Once a pre-certification is determined by the system to be necessary, a user interface of the system may

display a field asking whether the healthcare provider wishes to submit a pre-certification request at that time. If the healthcare provider replies affirmatively, the system directs the healthcare provider to complete any information necessary for the system to submit a pre-certification request to the insurer.

The system is also designed to be used by patients. Because the system can be accessed by patients over the Internet, patients can obtain information about their diagnoses, treatment plan, and medications in the privacy of their homes. Further, the system can be used by healthcare providers to create information packets for the patient based on the patient's diagnoses, treatment plan and medication. In one embodiment, the system automatically creates a packet of patient information from information stored on the system based on data stored in the system regarding the diagnoses that have been made, the treatment plans that have been selected, and medications that has been prescribed. This information can be provided to the patient in paper form or electronically via the Internet or in an email message.

The system and its operation will now be described in greater detail and with reference to the figures. The system may be viewed as incorporating multiple databases that are arranged in submodules and modules. These modules may be vertically and horizontally stacked to form an exponential number of databases.

Users of the system, generally healthcare providers, patients and insurers, access the system through a series of user interfaces. Data entered into the system is incorporated into a series of databases located within modules. Each patient's data is entered into the modules as an individual database. Each patient's data may be accessed as an individual database consisting of the conglomerate of data from all modules within the system. This enables system users to obtain information regarding a single patient as a medical record. The individual patient's data is also incorporated into a larger database represented by the system.

The databases within the modules may also be vertically stacked in order to compare large groups of patients with regard to each aspect of the system. For example, databases of symptoms, physical findings, and diagnoses can be compared across patients. This is a mechanism by which outcome data for a large population of patients can be achieved.

a. MEDICAL MODULE

The Medical Module is comprised of a series of modules that contain the medical data within the system. "Patient History" is an example of a medical module. Other modules within the Medical Module can include Physical Exam, Diagnostic Studies, Diagnoses, and Treatment Plan. Within each module is a group of submodules. For example, submodules within the "History" module may include medical history, surgical history, medications, allergies, and review of systems.

Each submodule can include a subset. For example, subsets within the "History of Present Illness" submodule may include onset of problem (symptoms), duration of symptoms, location of symptoms, and characteristics of symptoms.

User interfaces are used to display and record data. The data is transferred into the system and placed in appropriate databases. For example, history data is entered into the History module.

The system is interactive and may be utilized during all points in a patient encounter. Applications and information databases within the system interact with patient data. As data is entered, the system prompts the user to ensure that data is entered correctly and completely. The system includes logic for suggesting when additional data is needed or desirable in order to determine diagnoses and construct treatment plans.

Diagnoses are suggested by the system by analyzing pertinent positive and negative responses to questions regarding a patient's medical history, physical findings and results of laboratory and diagnostic studies. The system contains a database of profiles for a series of possible diagnoses and logic for comparing patient data to these profiles. Diagnoses are suggested by the system when patient data sufficiently matches a diagnoses profile. For example, a patient cannot have a diagnosis of diabetic neuropathy without having diabetes. Similarly, women cannot have a diagnosis of prostate cancer since women do not have a prostate. However, a diagnosis of lumbar radiculopathy = radiating + pain + leg + electrical + burning + numb + tingling + decreased quadriceps femoris motor strength + MRI evidence of nerve root compression. The system recognizes that a patient may have all of these points or the key features of radiating pain, decreased quadriceps strength and MRI evidence of nerve root compression.

The system interacts with the user through user interfaces to facilitate the search for matching diagnosis profiles. The system has the ability to search for pertinent positive and negative responses as data is entered. If the system recognizes that there is insufficient data to match a patient profile to a diagnosis profile contained within the system, the system may prompt the healthcare provider to obtain certain additional data in order to confirm or rule out certain diagnoses. The healthcare providers can query the system for potential diagnoses at multiple points along a patient encounter to help guide the healthcare provider to proper diagnoses.

The system provides the user with one or more diagnoses that best match the data provided to the system. Using the medical knowledge base intrinsic to the system, a ranking of the diagnoses is made based on the closeness of the match (i.e. all components match=most likely diagnosis, some of the components match=less likely diagnosis). The user chooses diagnoses from a list of diagnoses or their own clinical impression. The user may override the system at any time and choose a diagnosis not generated by the system.

Once one or more diagnoses have been chosen, the user is given a choice of viewing one or more clinical pathways for the one or more diagnoses selected. The system has a database of clinical pathways. A clinical pathway is a comprehensive treatment algorithm. Clinical pathways provide standardization of care by providing a suggested course of treatment for a diagnosis or set of diagnoses. The clinical pathways within the system are based on the scientific literature and may also be based on outcome measures reflecting the relative effectiveness and risks associated with a particular clinical pathway.

Outcome measures are used by the system to provide a feedback loop for the clinical pathways within the system. More specifically, outcomes from following clinical pathways are monitored by the system. Based on these outcomes, the system may be modified to suggest clinical pathways which appear to be most effective based on the outcome measures. This process is described in the Outcome Measures module which is described herein.

The system may have a clinical pathway associated with different diagnoses and with different groups of diagnoses. Multiple alternative clinical pathways may also be associated with a particular diagnosis or group of diagnoses. When one or more diagnoses are chosen, the user is given a choice of viewing one or more clinical pathways for the one or more diagnoses selected.

The system may also contain a Prescription Safety Module. The system is designed to accommodate a plurality of healthcare providers who are treating the same patient. One of the

risks associated with a plurality of healthcare providers treating a single patient is the issuance of multiple conflicting prescriptions. In this module, the system has logic which searches for medications prescribed to a patient. The system updates its prescription database each time a healthcare provider indicates that a prescription has been given. The system tracks and reports prescription medications prescribed to patients by users of the system. The system may inform the healthcare provider of all medications regardless of which healthcare provider has provided the prescription. If a patient receives a prescription for the same drug by another healthcare provider, both healthcare providers are alerted. The system may search its drug library for possible drug interactions and alert healthcare providers to possible drug interactions as illustrated in Figure 3. The system may also provide information to healthcare providers and patients regarding medications. Healthcare providers may utilize the prescription database to track patient compliance. For example, tracking refill requests may inform the healthcare provider that a patient is not taking a medication as prescribed. The prescription database may also interact with patient data to determine drug effectiveness, incidence of side effects and other outcome measures. For example, the system has the ability to compare one or more medications with a diagnosis to determine which is most effective.

b. PRACTICE MANAGEMENT MODULE

The Practice Management Module is composed of a series of modules containing nonclinical data. Examples of modules in the Practice Management Module include Demographic, Scheduling, Documentation, Billing and Outcome Measures. Each module can consist of submodules. Examples of submodules within the Billing module can include insurer, reimbursement, charges, and patient information.

The Demographic module contains data regarding patient information such as name, address, phone numbers, date of birth and sex. In one embodiment, the Demographics Module is accessible to the patient via the Internet or email so that the patient can introduce his or her patient information directly into the Demographics Module.

The Scheduling module contains data regarding the healthcare provider's schedule. It is used to schedule patient appointments. The Scheduling module may interact with other modules

to improve utilization. For example, data stored in the Scheduling module can be compared with data in the Medical module to determine average length of visit for a given medical problem.

The Scheduling module may interact with the Outcome Measures module to determine flow of patients. For example, by comparing scheduling to outcome measures, the system makes various correlations including whether there are fewer complications following procedures done in the morning than procedures performed in the afternoon.

The Scheduling Module also includes logic of analyzing data in the Demographic Module and notifying healthcare providers and patients when additional patient information is needed.

The Documentation module comprises a series of submodules which contain possible templates for documentation as well as logic for using data entered into the system to create documents from those templates. Examples of documents which the system can create from these templates include an initial visit medical record, follow-up visit medical record, letter to referring physician, letter of medical necessity and procedure note. As illustrated in Figure 4A, the system includes logic for searching for data in the system to complete the templates and generate documents. The system also has logic for determining what additional data is needed to complete the documentation and for notifying the user that the additional data is needed.

Figure 4B illustrates an example of a process flow used to obtain data from the multiple databases that is integrated into the templates to form a document. Figure 4C illustrates an example of an initial visit template that has been created using data from a patient database.

The Billing module is composed of a series of submodules that can include patient information (insurer name, policy and group number), insurer information including requirements for pre-certification, co-payment, and reimbursement rates.

The system has information regarding insurers and requirements regarding reimbursement. The information is preferably regularly updated for each insurer. The system has logic for notifying the healthcare provider through a user interface of insurance requirements. Each time a visit is scheduled, the system may search the Billing module for insurer information as illustrated in Figure 5A. As illustrated in Figure 5B, the system may search for insurer requirements by insurer. The system has logic for alerting the healthcare provider of the need to comply with an insurer requirement, e.g. the need for a referral or pre-certification prior to the

patient visit. The system may locate the template needed and search the modules to obtain the data necessary to complete the required documentation to meet the insurer's requirements.

It is often required to document medical necessity in order to receive reimbursement. The system contains information regarding what particular documentation insurers require to show medical necessity and the information that needs to be provided to the insurer. The system interactively prompts healthcare providers to complete the data necessary to demonstrate medical necessity as defined by that insurer. If the healthcare provider is unable to satisfy the documentation requirements, other options are given for documentation and/or procedure that may result in reimbursement or higher levels of reimbursement.

The Billing module is responsible for generating a bill based on several factors. One factor is the level of service provided. As illustrated in Figure 5C, the system searches for key elements within the Medical module in order to determine the level of service that has been provided. The system has logic for notifying the user of any suggestions or additional requirements that affect the level of service and hence the level of reimbursement.

What diagnosis a healthcare provider makes and reports to an insurer can affect reimbursement. The system has logic for searching for encounter and diagnosis codes that yield the highest reimbursement for the services rendered. As illustrated in Figure 5D, the system takes the diagnoses that have been selected and analyzes each diagnosis iteratively for whether patient data supports a more highly reimbursed diagnosis. For example, a patient with a diagnosis of lumbago (low back pain) may also have a diagnosis of lumbar radiculopathy. Lumbago, which is a less specific diagnosis, may generate lower reimbursement than lumbar radiculopathy. Assuming that the system recognizes the diagnosis profile consistent with lumbar radiculopathy from the data within the medical module, a bill is generated with the diagnosis code for the higher reimbursable diagnosis, lumbar radiculopathy. Alternatively, the system may prompt the healthcare provider to consider lumber radiculopathy in view of its higher level of reimbursement.

The system may generate a bill for either a patient or third party payors. The system can transmit the bill electronically and/or may produce printed versions.

The Billing module, in addition to creating the bills, also functions as a monitoring system to track payments, rejected reimbursement requests, and bills which have not received a response after a predetermined period of time. The Billing Module also tracks other

reimbursement data such as days in accounts receivable, what diagnoses or documents have a higher rate of rejection or lowered reimbursement levels as well as changes in the way insurers are making reimbursements. All this is used by the system administrators to identify changes in reimbursement patterns. Optionally, the system may include logic which detects significant changes in frequencies of reimbursement rejections or other reimbursement behavior and notifies users and system administrators of such changes. This allows users and system administrators to continually monitor insurers and reimbursement for rules changes. By continuously monitoring insurer reimbursement practices, the system can be continuously updated to maintain the highest level of reimbursement and the lowest level of rejected reimbursement requests.

The system is also designed to serve as an interface between insurers and healthcare providers. Insurers may utilize the system to obtain the most effective services using known, quantifiable outcome measures; the best documentation of provided services; and the best utilization of resources.

The Outcome Measures module is comprised of a series of submodules for tracking outcome measures. The system also has the capability for users to construct additional submodules to track outcomes not otherwise tracked by the user. System administrators can opt to add these outcome measures to the system. This is a further example of how system administrators are able to monitor how users use the system and improve the system based on that feedback.

The system may contain statistical programs that can analyze data to determine whether differences in outcome are statistically important. As illustrated in Figure 6A, the system utilizes data collected in its modules to measure outcomes. For example, a patient having an epidural steroid injection may have a clinical outcome measure of "response to epidural steroid injection." The system can compare one treatment with another for a given variable. For example, epidural steroid injection versus epidural steroid injection in patients with lumbar radiculopathy (or men, or people over 65).

The system is able to access data from its databases to sort data in a variety of ways. Both the system administrators and the users can tap into the system's databases to analyze data stored in the system, for example, in order to create customized outcome measure reports.

As illustrated in Figure 6B the system may include logic for defining different patient populations and for searching its databases to compare one patient population with another. For

example, the system may compare all of the user's patients, the user versus all other users, patient populations within a user's practice (lumbar radiculopathy versus low back pain), patient populations across multiple practices (all patients with a diagnosis of lumbar radiculopathy) and patients versus healthy controls. The system is able to sort data by any variable and be compared to any variable.

The system also includes logic for comparing resource utilization as illustrated in Figure 6C. Examples include comparing the cost of one treatment versus another, and the number of visits required to treat a diagnosis. Billing comparisons are also available. For example, the average number of days in accounts receivable for one insurer versus another, the average reimbursement for one diagnosis code versus another, the number of rejected claims for a insurer versus another insurer, and more. The system also includes logic for generating reports and suggesting the use of these reports to influence various aspects of their practice.

The system also includes logic for generating reports based on the outcome measures monitored. The user may access outcome reports that the system offers or may request the system to generate an individualized report. Reports of outcome measures are used to provide quality assurance. These reports may also be utilized to demonstrate excellence of treatment. Outcome measures derived from the system may also be used to justify reimbursement from insurers. The system integrates data obtained from the outcomes measures and the billing modules to make suggestions regarding contracting for services to the user.

In addition to providing outcome reports to users of the system, the outcome information can be used to continuously modify the system's diagnosis logic, its clinical pathways, and its billing and reimbursement practices.

The system represents a large database of many user practices. The Outcome Measures module provides a process for the continuous validation, updating and improvement of diagnosis profiles and clinical pathways. Figure 6D illustrates an outcome analysis process flow that may be used. As illustrated, the process flow takes a diagnosis and analyzes whether one treatment versus a second treatment results in an improvement in a defined patient outcome. If two treatments are found by the system to be equivalent in outcome, the system can analyze other variables such as cost. When an improvement in a defined outcome measure is defined, the system may be modified to incorporate that improvement, for example, by modifying the clinical pathway for that diagnosis. This process of using information obtained from users using the

system is used throughout the system, for example, in regard to diagnoses, clinical pathways, outcome measures, and reimbursement. Thus, use of the system by the community of healthcare providers provides valuable feedback data for continually improving the performance of the system. Knowledge obtained from outside the system (third party payors, medical studies) is also used to enhance the system's performance.

EXAMPLE

A specific embodiment of the system, of the present invention, its operation and use will now be described.

Figure 7A illustrates a user interface that includes icon 12 that represents the system's software. Selecting the icon causes the system's software to become activated and causes a user interface for the system to become an active window on the screen.

Figure 7B illustrates the user interface for the system once the icon has been selected. The first time the system is accessed during a session, users are required to enter security information in window 14. Once this information is entered, the user selects the "submit" button 16. This may cause the system to log on. The system can verify the security information and access to the system is granted.

Figure 7C illustrates a user interface for displaying information that the system is reporting to the user. For example, window 18 informs the user of generated documents that need to be reviewed. Selecting symbol 20 provides files of documents for review. Additional information may be accessed using the toolbar 22.

One use of the system is for patient scheduling. Figure 8A illustrates a user interface that may be used to obtain today's schedule or schedule future patients.

Figure 8B illustrates a user interface for transferring patient files from one site to another. For example, a pull-down menu 24 accesses files that may include the patients for today, patients for a future day, or scheduling information.

When a patient requests an appointment, the system is accessed. Figure 9A illustrates the user interface for accessing patient demographic information. Selecting "new" (menu 26) produces a new patient information interface to enter the patient into the system. Choosing

existing patient (menu 26) provides the user with the opportunity to enter demographic data to access the existing patient's demographic information.

Figure 9B illustrates the patient information screen to be completed by the user. The user enters the requested data into the data fields. A pull-down menu 28 allows the user to select the appropriate visit type. Another pull-down menu 30 allows the user to select the gender of the patient. The "Reason for Consult" menu 32 allows the user to select from a list of possible reasons or the user may enter a reason. Possible reasons may include evaluate and treat intractable pain, manage angina, or treat refractory seizures. Under "primary insurer" menu 34 and "secondary insurer" menu 36 are lists of insurers. The system contains a directory of insurers and insurers' requirements. Once the data is entered, the user pushes the "submit" button 38.

Figure 9C illustrates the user interface that is produced after the data has been submitted. The system identifies the patient as a new patient coming for an initial visit in system comment 40 (as compared to for a procedure). The system highlights any missing data. The system informs the user of any insurance requirements regarding pre-certification, documentation of medical necessity, co-payments and so on (system comment 42). Once the user has reviewed the screen and any missing data is completed, the "submit" button 38 is pushed. If any required data fields are not completed, the system notifies the user and does not allow the user to proceed to the next step.

Data may be entered into the system by a number of mechanisms including transferring of data from one user of the system to another (provided they have patient authorization). Frequently, users may utilize patient questionnaires to obtain patient information prior to an encounter. Figure 10 illustrates a sample patient questionnaire that may be entered into the system. Other examples of data that may be obtained include previous medical records, laboratory and other diagnostic studies. Data entered into the system appears in data fields in the appropriate submodule.

A feature of the present invention is the fact that at least a portion of the system is maintained remote from the healthcare provider and may be accessed via email or the Internet. As a result, it is possible for the patient to enter the patient demographic data and other needed data into the system remote from the office. For example, the patient may fill out an email version of an information form or may enter data over the Internet. This flexibility reduces

clerical demands upon the healthcare provider and also makes it easier for the patient to provide the healthcare provider with necessary information.

When the healthcare provider is ready to see the next patient, the "patient" pulldown menu 44 on the toolbar is selected illustrated in Figure 11. The healthcare provider may locate the patient from a list of today's patients or by searching for a piece of their demographic information.

When the healthcare provider accesses the patient's file, a user interface, illustrated in Figure 12, provides an outline of the visit type (window 46) and a summary statement is provided to inform the user of the purpose of the patient's visit (window 48). Each component within the visit represents a series of submodules. The healthcare provider may follow the format outlined in this interface or may access any portion in any order.

Figure 13A illustrates a user interface for accessing the "History" submodule. Figure 13B illustrates a user interface of the section, "History of Present Illness." As can be seen, the user interface comprises a series of questions. The data entered in the fields on the right represent information obtained prior to the patient visit. A missing field is highlighted as illustrated by the dotted field 50. The user reviews this information and conducts the patient interview. The interface is completed as illustrated in Figure 13C. Each question within the interface represents a list of possible answers as illustrated by the choices under "characteristics" (menu 52). Although some of the patient responses were obtained prior to the interview and shown in Figure 13B, note that additional responses have been added as displayed in Figure 13C-54, 56, 58. The user is able to review and edit each screen as it is completed.

The system includes logic for continuously analyzing the data inputted into the system. Incorporated into the sytstem are diagnosis profiles and logic for comparing the data entered to the diagnosis profiles in order to identify potential diagnoses. The system may utilize all available data to generate a list of possible diagnoses based on the data currently entered into the system. As illustrated in Figure 13C, these diagnoses are suggested to the user in window 60. Accessing the FAQ button 62 allows the user to obtain information regarding any of the listed diagnoses. The user may also access information from "Help" on the toolbar 64. The system also includes logic for distinguishing between potential diagnoses by taking available data and potential diagnoses and identifying to the user questions useful for confirming or dismissing potential diagnoses. For example, if a patient presents with symptoms consistent with diabetes,

the system may direct the user to ask questions about possible interrelated organ systems and associated disease processes, e.g. cardiac symptoms, high blood pressure, and vision problems.

Figure 13D illustrates a user interface for obtaining data on the "Past Medical History." Data obtained prior to the visit appears in the field and missing fields are identified (dotted field 50). If a particular area is important for establishing a diagnosis, the system alerts the user to this section. Figure 13E illustrates a completed user interface for "Past Medical History." Under each organ system is a menu 66 displaying a list of possible medical problems.

Figures 13F and 13G illustrate the user interface for entering data into the "Past Surgical History" section. Types of surgery are classified by organ system. Within the window 68 for each organ system is a list of possible surgeries. Data may be entered to indicate the year as seen in window 70 in which the surgical procedure took place.

Figures 13H and 13I illustrate the user interface for entering data in the "Medication History" section. Data is obtained regarding the medication 72, dose 74, response to the medication 76 and any side effects 78. The patient's responses are indicated under each section as indicated by field 80. Missing data is highlighted by dotted field 50. It is also possible to have partially missing data as seen in Figure 13H. Within the "past medications" section, it is indicated that the patient had taken two drugs but there is no dose, response or side effects noted. Figure 13I illustrates that each section represents a menu 82 that contains a list of possible answers. For example, under medications there is a list of drug types, e.g. anticonvulsant, antihypertensive, antiinflammatory. Within each of the drug types is a list of drugs.

Figure 13J illustrates a user interface for data in the "Social History" section. Each section represents a series of menus (example menu 84) with a list of possible responses. Completed fields are displayed for the user to view and edit.

Figures 13K and 13L illustrate a user interface for entering data in the "review of systems" section. The "review of systems" is the part of the medical history during which the user may review organ systems not included during the "history of present illness" portion of the medical history. It is relevant to document both pertinent positive and negative responses. The "review of systems" is often used to identify other symptoms that may be relevant to the diagnosis. The "review of systems" is broken down by organ systems. Under each organ system (menu 86) is a list of symptoms pertinent to that section. The fields completed in Figure 13K were indicated by the patient prior to the visit.

Using the available data, the system includes logic for suggesting areas within the "review of systems" for the user to focus upon. This is illustrated in Figure 13L system comment 88. The user is able to provide either a positive or negative response (window 90) to each symptom within the "review of systems." These responses are then shown to the user in the adjacent data field 92.

Figure 13M illustrates a user interface at the end of the "History" submodule. The system has logic for reviewing each submodule and indicating any missing data. Missing data may indicate that the data may be mandatory for documentation requirements, necessary to rule in or rule out diagnoses, or affect the level of reimbursement. The information regarding missing data is communicated to the user as seen in window 94. The user may elect not to complete missing data fields. While the system makes suggestions, it may be overriden by the user at any point.

Figure 13M also illustrates field 96 displaying billing comments provided by the system. The "level of service provided" is based upon documentation. Based on the data entered into the system to this point, the system is able to determine a level of service provided. A field 96 notifies the user of the level of service provided. In addition, the system includes logic for using the inputted data and insurer documentation requirements to identify additional documentation which would achieve a higher level of service, as seen in field 96. The user may select a field 98 to obtain help from the system in completing any additional documentation requirements.

Similar to Figure 13C, Figure 13M illustrates a window 60 listing possible diagnoses based on the patient's data. At each step, the list is refined based on additional information. The user may access information regarding any of the listed diagnoses by selecting button 62. Reviewing the list of possible diagnoses guides the remainder of the patient encounter.

Figure 14A illustrates a user interface as the user selects the "Physical exam" submodule from the toolbar 100. The user selects the the motor examination within the neurological examination from the menu 102.

Figure 14B illustrates a user interface for documenting the assessment of motor strength during a neurological examination. Under each menu 104 is a list of the possible muscle groups to test and the nerves that innervate those muscles. When the user selects the muscle group to be tested, the system provides a system comment 106 that displays a description of how to test this muscle group. This feature may be hidden by the user.

As illustrated in Figure 14B, adjacent to "left plantar flexion" is a box 108 indicating that muscle strength is scored on a scale of 0-5. The user simply chooses the appropriate score. The system also provides a guide to the user to facilitate completing the exam. For example, the box 110 "Motor Strength 0-5 Scale" is included to guide the user in determining the appropriate score. The system also includes logic for directing the user to aspects of the physical examination that are necessary for determining a diagnosis. The completed responses appear on the user interface so that the user may review and edit any aspect of the exam.

Figure 15 illustrates a user interface for reviewing radiological findings. Most of the data obtained for radiological and diagnostic studies should be available and entered into the system prior to the patient encounter. The user reviews the data and has full editing capabilities. As illustrated in Figure 15, the user may select a study by selecting the field in which it appears. For example, to add data to the MRI, the user selects the MRI field 112 and indicates spine, lumbar. The user is then is able to edit (add, delete, comment, change interpretation) this section. The system may also include logic for analyzing the data in the system and suggesting additional diagnostic studies that may be performed in order to confirm suspected diagnoses.

The system utilizes a database of diagnosis profiles and the patient data to suggest possible diagnoses. For each diagnosis in the system there is an associated diagnosis profile comprised of symptoms, physical findings, and diagnostic studies.

Figure 16A illustrates an embodiment of a process by which the system can determine a list of possible diagnoses from the data. As illustrated, the system has logic for taking the medical data in the system and searching through the database of diagnosis profiles in order to determine potential diagnoses based on the medical data. Once selected, these potential diagnoses are further analyzed with regard to how well the clinical data in the system matches the diagnosis profiles.

Figure 16B illustrates a logic tree structure by which diagnoses in the system may be divided. This allows the system to reduce the number of potential diagnoses that need to be analyzed. As illustrated, potential diagnoses are divided into male, female and sex independent diagnoses. Prostate cancer would be placed in the male diagnosis branch while ovarian cancer would be placed in the female diagnosis branch. Certain diagnoses are dependent on their being an underlying condition, such as diabetes as illustrated. By dividing the diagnoses in this

manner, it is possible for the system to use the clinical data that is available in order to substantially reduce the number of diagnoses that need to be analyzed.

Figure 16C illustrates a diagnosis selector process flow that may be used. As noted at the top of the process flow, all diagnoses in the system may be analyzed. Alternatively, a subset of all diagnoses may first be selected, for example by the process illustrated in Figure 16B.

As illustrated the process flow takes a set of diagnoses that are to be analyzed and compares the medical data in the system to each diagnosis in the set. Those diagnosis profiles which are sufficiently matched by the patient data are selected and reported to the user. The degree of similarity required for a diagnosis match can optionally be varied by the user.

Figure 16D illustrates a diagnosis profile comparison. Each selected diagnosis and the associated diagnosis profile is compared with the patient's data. Matches between the diagnosis profile and patient data are identified. Some identifying factors are definitive in determining the diagnosis. In other cases, the system has the ability to weight the likelihood of a correct diagnosis based on how many and which identifying features match.

Figure 17 illustrates a user interface that displays a list of possible diagnoses. Adjacent to the diagnosis is a number which indicates the degree of similarity between the diagnosis profile and the patient's data. The user may select the diagnosis (window 114) to view the comparison of the diagnosis profile and patient data (Figure 16C). As in Figure 13C and 13M, the user may query the system for information regarding any diagnosis. In order to choose a diagnosis not listed, the user may select "Diagnoses" as seen in menu 116.

Once diagnoses are chosen, the user may select button 118 to view clinical pathways for the treatment of those diagnoses. The user may exercise the option to view clinical pathways for selected diagnoses at any point after a diagnosis is established.

As used herein, a clinical pathway refers to a suggested course of treatment for a specific diagnosis. The system has multiple clinical pathways and preferably at least one for each diagnosis or set of diagnoses. This is important because patients may have multiple diagnoses. For example, there is a clinical pathway for herniated disk, herniated disk and lumbar radiculopathy, lumbar radiculopathy, and lumbar radiculopathy and facet arthropathy. Figure 18 illustrates the clinical pathway for the diagnoses chosen by the user. The user reviews clinical pathways as a guide for treating diagnoses.

Figure 19 illustrates a user interface for establishing the treatment plan. The healthcare provider may select the treatments desired using the menus. As illustrated, the healthcare provider selects the menu 120 to begin the patient on new medications. Under menu 120 is a list of medications similar to the list in Figure 13I. If the healthcare provider is unfamilar with the dose, the healthcare provider may access information from the system regarding the recommended dose. In a similar fashion, selecting physical therapy may generate a prescription for physical therapy.

The healthcare provider is also given the choice of having the system generate the prescription for the medication by selecting button 122. Once selected, the system is able to print prescriptions or electronically communicate prescriptions to a pharmacy. Scheduling is done directly from the treatment plan. As illustrated in Figure 19, menu 124 indicates that the patient is to be scheduled for an "epidural steroid injection" at the next available appointment (menu 126). This information is communicated to the scheduling component. The system includes logic for determining an available appointment time.

At the conclusion of the patient encounter, a number of documents may be generated using the system. As illustrated in Figure 19, the system displays a system comment 128 informing the healthcare provider of the documents that are required and that is generated by the system. The healthcare provider may choose not to generate any document by electing to remove that document. In addition, the healthcare provider may elect to obtain other documents by accessing the "additional forms" menu 130. At the conclusion of the patient encounter the healthcare provider closes the patient file. The healthcare provider is asked if the changes are to be saved. If yes, the data is saved in the file. The data is incorporated into the system's multiple databases.

Figure 20 illustrates an example of a document generated by the system to inform a patient of instructions for a procedure. Documents may be standardized to reflect a healthcare provider's usual practice. An example of this is "Do not eat or drink anything for 6 hours before your procedure" (132). Documents also contain data obtained from the patient's database. For example, instructions regarding specific medications (134).

The system takes patient data from the multiple databases to form the required/requested pieces of documentation. The system has a database of possible documentation templates.

These templates are used as the basis for the document. The healthcare provider also has the ability to dictate a document independent of the templates.

Figure 21 illustrates a user interface that displays a menu 136 with a list of documents for review. The user interface displays a system comment 138 that informs the healthcare provider of any missing data or any suggestions regarding documentation and billing. The healthcare provider selects the document for review from window 140. All documents may be edited by the healthcare provider.

Figure 22A and 22B illustrates a medical record document that may be generated by the system from the initial visit.

Figure 23 illustrates a user interface that illustrates the user's ability to finalize each document. A menu 142 lists each of the documents. After reviewing a document, the healthcare provider may select a button 144 to electronically sign it. Alternatively, the healthcare provider may print the document without electronically signing it. A system comment 146 reminds the healthcare provider that both the bill and the medical documentation (i.e. initial visit) must be finalized in order for the system to submit the bill. If the healthcare provider chooses the print option, the data used to complete the document is maintained within the system's database but the document is not. Copies of documents that are electronically signed are kept within the system.

Figure 24 illustrates a user interface that may be displayed by the system when the patient returns for a subsequent visit. The system provides a system comment 148 that displays a summary of the data contained within the database for the healthcare provider's review. Each type of patient encounter contains the necessary data fields to complete that visit. These data fields are similar to those in Figure 11. The system may notify the healthcare provider of a change in data. For example, during the initial visit the patient complains severe pain. At the follow-up visit, the pain is improved.

While the present invention is disclosed by reference to the various embodiments and examples detailed above, it should be understood that these examples are intended in an illustrative rather than limiting sense, as it is contemplated that modifications readily occur to those skilled in the art which are intended to fall within the scope of the present invention.

What is claimed is:

1. A medical management system comprising:

a database of diagnosis profiles;

logic of entering patient information into the medical management system;

logic for comparing the patient information relative to the diagnosis profiles; and

logic for selecting one or more possible diagnoses which have a diagnosis profile sufficiently similar to patient information entered into the system.

2. The medical management system according to claim 1, further including a database of clinical pathways where different clinical pathways are associated with different diagnoses, and logic for displaying those clinical pathways associated with the selected one or more possible diagnoses.

3. The medical management system according to claim 1, further including outcome reports associated with the plurality of clinical pathways, and logic for displaying outcome reports associated with those clinical pathways associated with the selected one or more possible diagnoses.

4. The medical management system according to claim 1, further including information regarding the one or more possible diagnoses, and logic for displaying the information regarding the one or more possible diagnoses.

5. The medical management system according to claim 1, wherein the logic of entering patient information is adapted to receive patient information selected from the group consisting of background patient information, insurer information, present illness history, past medical history, social history, family history, medications, allergies, physical examination, and diagnostic studies.

6. The medical management system according to claim 1, wherein the logic of entering patient information is adapted to receive physical examination information and information from one or more diagnostic studies.

7. The medical management system according to claim 1, wherein the logic of entering patient information is adapted to receive information entered into the system by a method selected from the group consisting of manual data entry, voice-recognition data entry, and scanning of a form.

8. The medical management system according to claim 1, wherein the system includes logic for suggesting to a user when additional patient information is needed.

9 The medical management system according to claim 1, wherein the system includes logic for suggesting additional patient information to obtain from the patient by a physical examination or a diagnostic study.

10. The medical management system according to claim 1, wherein the system includes logic for suggesting additional patient information to obtain from the patient in order to obtain a higher level of insurer reimbursement.

11. The medical management system according to claim 1, wherein the system is adapted to be simultaneously used by a plurality of healthcare providers remote from each other.

12. The medical management system according to claim 1, wherein the system is adapted to have a patient enter a portion of the patient information by an Internet connection to the system.

13. The medical management system according to claim 1, wherein the system is adapted to be accessed by the plurality of different users through the Internet.

14. An automated method for suggesting patient diagnoses comprising:
entering patient information into a medical management system;

having the medical management system compare the patient information relative to a plurality of diagnosis profiles stored in the medical management system; and

having the medical management system select one or more possible diagnoses which have a diagnosis profile sufficiently similar to the patient information entered into the system.

15. The automated method according to claim 14 wherein the medical management system includes a plurality of clinical pathways, the method further including displaying one or more clinical pathways associated with the one or more diagnoses selected by the medical management system.

16. The automated method according to claim 14 wherein the medical management system includes outcome reports associated with the plurality of clinical pathways, the method further including displaying at least one of the outcome reports.

17. The automated method according to claim 14 wherein the medical management system includes information regarding the one or more possible diagnoses, the method further including displaying the information regarding the one or more possible diagnoses.

18. The automated method according to claim 14 wherein the patient information comprises information selected from the group consisting of background patient information, insurer information, present illness history, past medical history, social history, family history, medications, allergies, physical examination, and diagnostic studies.

19 The automated method according to claim 14 wherein the patient information is entered into the system by a method selected from the group consisting of manual data entry, voice-recognition data entry, and scanning of a form.

20. The automated method according to claim 14 wherein entering patient information into the medical management system includes having the system suggest to a user when patient information is needed.

21. The automated method according to claim 14 wherein entering patient information into the medical management system includes having the system suggest additional patient information to obtain from the patient by a physical examination or a diagnostic study.

22. The automated method according to claim 14 wherein entering patient information into the medical management system includes having the system suggest additional patient information to obtain from the patient in order to obtain a higher level of insurer reimbursement.

23. The automated method according to claim 14 wherein entering patient information into the medical management system is performed by a plurality of healthcare providers.

24. The automated method according to claim 14 wherein entering patient information into the medical management system includes having a patient enter a portion of the patient information by an Internet connection to the system.

25. The automated method according to claim 14 wherein the medical management system is maintained in a central location and accessed remotely by a plurality of different users.

26. The automated method according to claim 14 wherein access to the medical management system is achieved by the plurality of different users through the Internet.

1. A medical management system comprising:

a database of insurer requirements for a plurality of different insurance coverages;

logic of entering information about a patient encounter into the medical management system;

logic of entering information identifying a patient's insurance coverage into the medical management system; and

logic for producing documentation regarding the patient encounter customized to the insurer requirements of the patient's insurance coverage.

2. The medical management system according to claim 1, wherein the database of insurer requirements includes information selected from the group consisting of information regarding precertification, patient co-payments, payment schedules, and codes for coding diagnoses and procedures.

3. The medical management system according to claim 1, further including logic for providing billing suggestions based on the patient's insurance coverage and the insurer information stored in the system.

4. The medical management system according to claim 1, further including logic for providing documentation suggestions based on the patient's insurance coverage and the insurer information stored in the system.

5. The medical management system according to claim 1, further including information regarding the one or more possible diagnoses, and logic for displaying the information regarding the one or more possible diagnoses.

6. The medical management system according to claim 1, wherein the logic of entering patient information is adapted to receive patient information selected from the group consisting of background patient information, insurer information, present illness history, past medical history, social history, family history, medications, allergies, physical examination, and diagnostic studies.

7. The medical management system according to claim 1, wherein the system includes logic for suggesting additional patient information to obtain from the patient by a physical examination or a diagnostic study.

8. The medical management system according to claim 1, wherein the system includes logic for suggesting additional patient information to obtain from the patient in order to obtain a higher level of insurer reimbursement.

9. The medical management system according to claim 1, further including logic for transmitting at least a portion of the documentation produced electronically to the insurer.

10. The medical management system according to claim 1, wherein the system is adapted to be simultaneously used by a plurality of healthcare providers remote from each other.

11. The medical management system according to claim 1, wherein the system is adapted to have a patient enter a portion of the patient information by an Internet connection to the system.

12. The medical management system according to claim 1, wherein the system is adapted to be accessed by the plurality of different users through the Internet.

13. An automated medical documentation method comprising:

entering information identifying a patient's insurance coverage into a medical management system, the medical management system including insurer requirements for a plurality of different insurance coverages;

entering information about a patient encounter into the medical management system; and

having the medical management system produce documentation regarding the patient encounter customized to the insurer requirements of the patient's insurance coverage.

14. The automated method according to claim 13, wherein the insurer requirements include information selected from the group consisting of information regarding precertification, patient co-payments, payment schedules, and codes for coding diagnoses and procedures.

15. The automated method according to claim 13, wherein entering information about the patient encounter includes entering physical examination information or information from one or more diagnostic studies.

16. The automated method according to claim 13, the method further comprising having the system provide billing suggestions based on the patient's insurance coverage and the insurer information stored in the system.

17. The automated method according to claim 13, the method further comprising having the system provide documentation suggestions based on the patient's insurance coverage and the insurer information stored in the system.

18. The automated method according to claim 13 wherein information about the patient encounter is entered into the system by a method selected from the group consisting of manual data entry, voice-recognition data entry, and scanning of a form.

19. The automated method according to claim 13 wherein at least a portion of the information about the patient encounter entered into the system is entered using a personal data assistant device that is later hot-synced into the system.

20. The automated method according to claim 13 wherein entering information about the patient encounter into the medical management system includes having the system suggest to a user when patient information is needed.

21. The automated method according to claim 13 wherein entering information about the patient encounter into the medical management system includes having the system suggest additional patient information to obtain from the patient by a physical examination or a diagnostic study.

22. The automated method according to claim 13 wherein entering patient information into the medical management system includes having the system suggest additional patient information to

obtain from the patient in order to obtain a higher level of insurance reimbursement based on the insurer requirements of the patient's insurance coverage.

23. The automated method according to claim 13, further including transmitting at least a portion of the documentation produced electronically to the insurer.

24. The automated method according to claim 13 wherein the medical management system is maintained in a central location and accessed remotely by a plurality of different users.

25. The automated method according to claim 13 wherein access to the medical management system is achieved by the plurality of different users through the Internet.

Figure 1

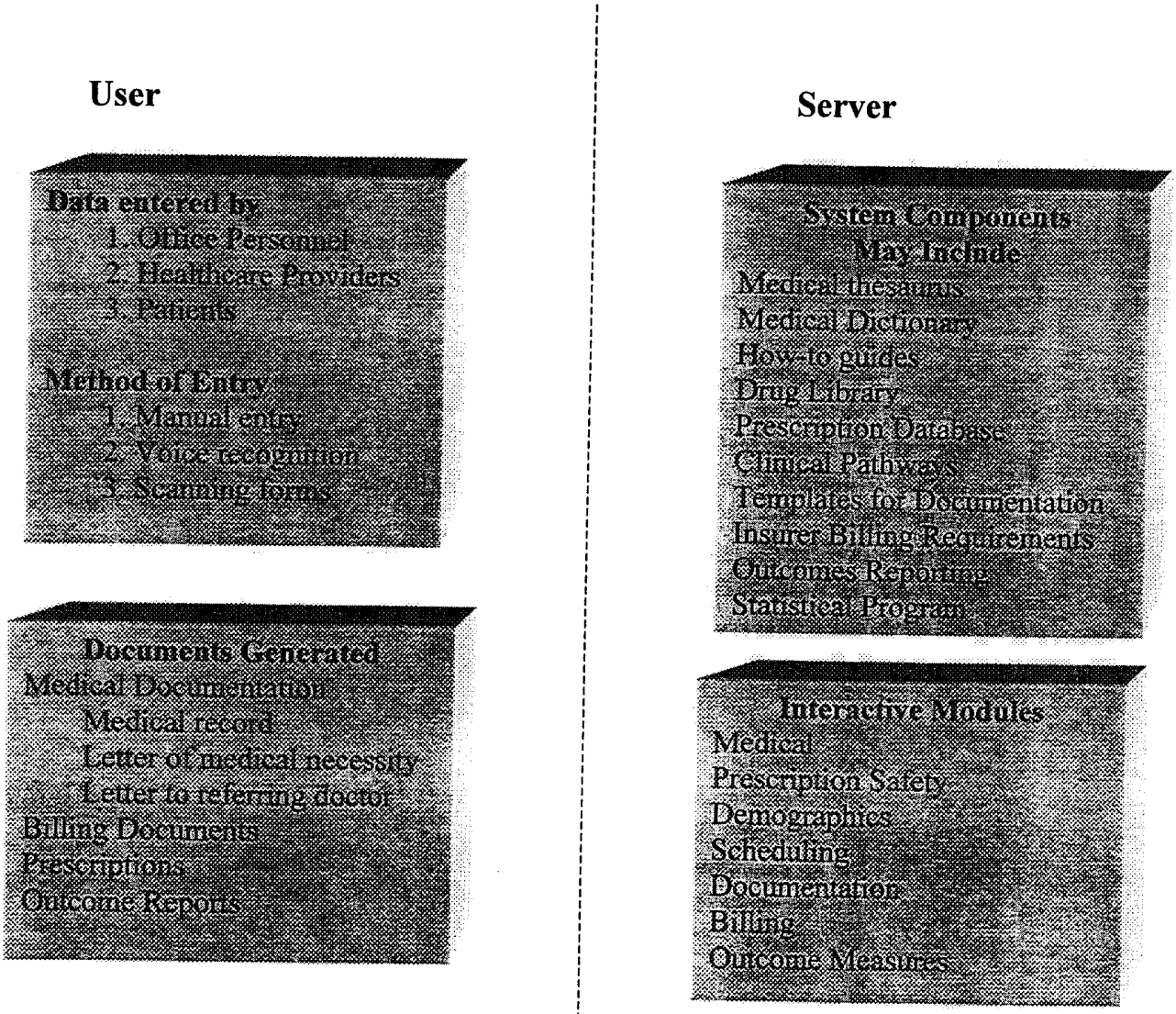

User
Server
Data entered by
1. Office Personnel
2. Healthcare Providers
3. Patients
Method of Entry
1. Manual entry
2. Voice recognition
3. Scanning forms
Documents Generated
Medical Documentation
Medical record
Letter of medical necessity
Letter to referring doctor
Billing Documents
Prescriptions
Outcome Reports
System Components May Include
Medical thesaurus
Medical Dictionary
How-to guides
Drug Library
Prescription Database
Clinical Pathways
Templates for Documentation
Insurer Billing Requirements
Outcomes Reporting
Statistical Program
Interactive Modules
Medical
Prescription Safety
Demographics
Scheduling
Documentation
Billing
Outcome Measures

Figure 2

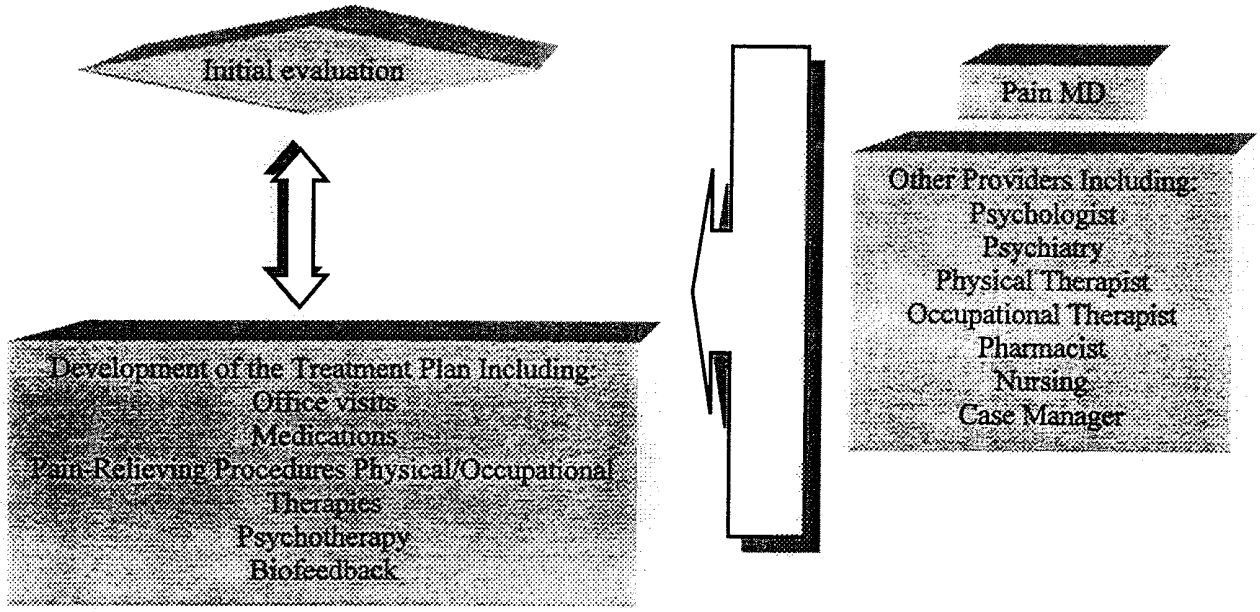

Initial evaluation
Development of the Treatment Plan Including:
Office visits
Medications
Pain-Relieving Procedures Physical/Occupational Therapies
Psychotherapy
Biofeedback
Pain MD
Other Providers Including:
Psychologist
Psychiatry
Physical Therapist
Occupational Therapist
Pharmacist
Nursing
Case Manager

Figure 3

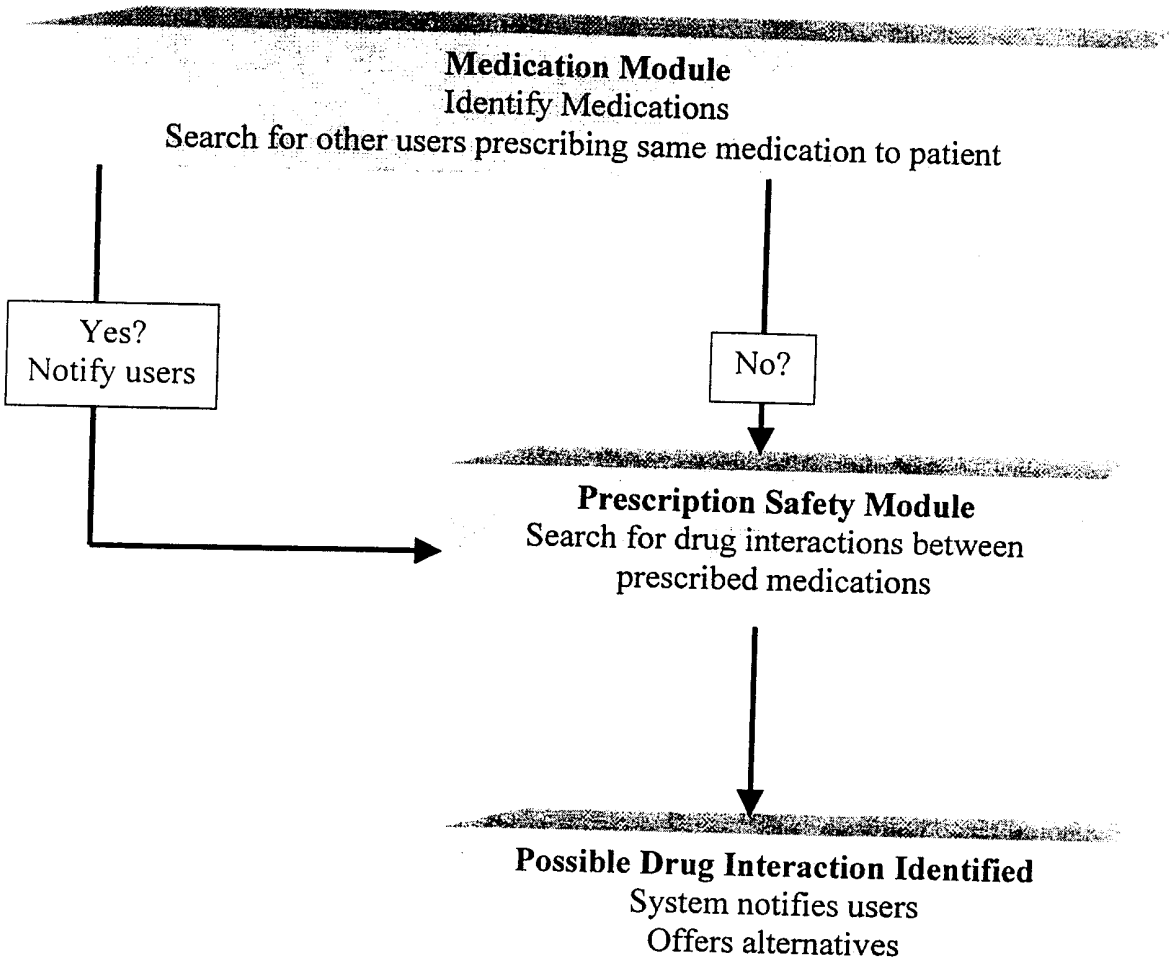

Medication Module
Identify Medications
Search for other users prescribing same medication to patient
Yes?
Notify users
No?
Prescription Safety Module
Search for drug interactions between
prescribed medications
Possible Drug Interaction Identified
System notifies users
Offers alternatives

Figure 4A

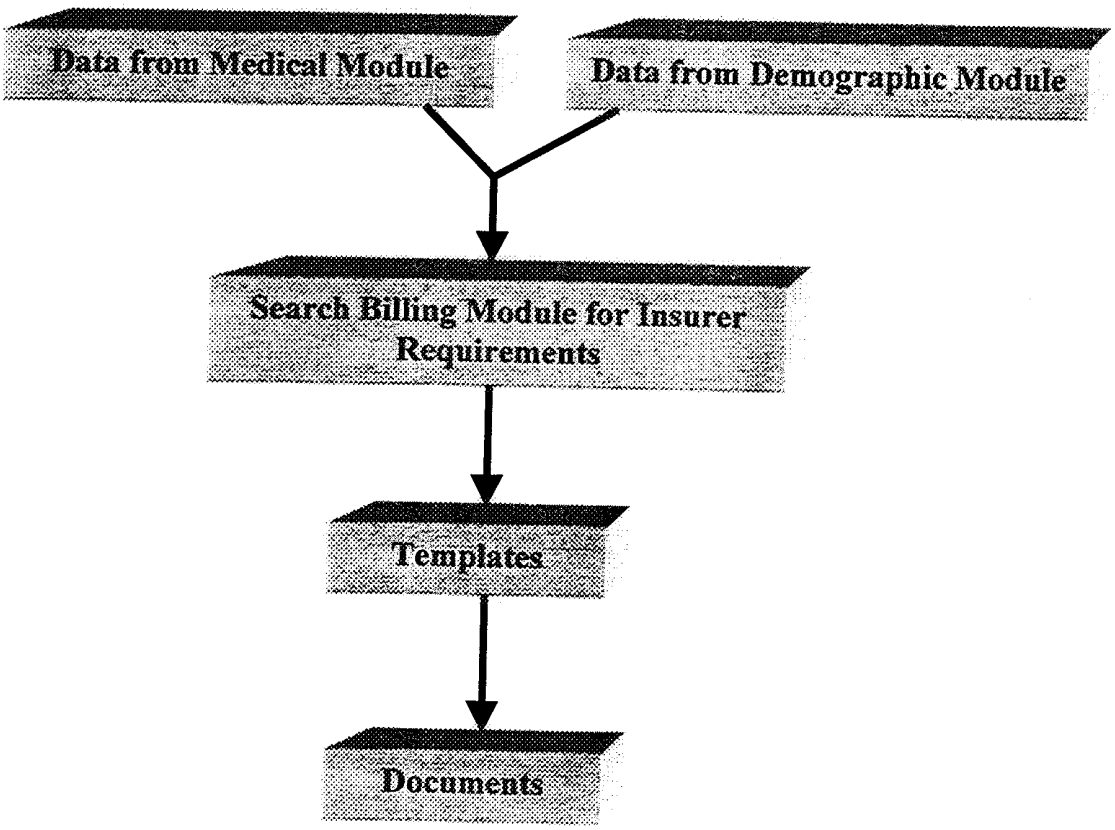

Data from Medical Module
Data from Demographic Module
Search Billing Module for Insurer Requirements
Templates
Documents

Figure 4B

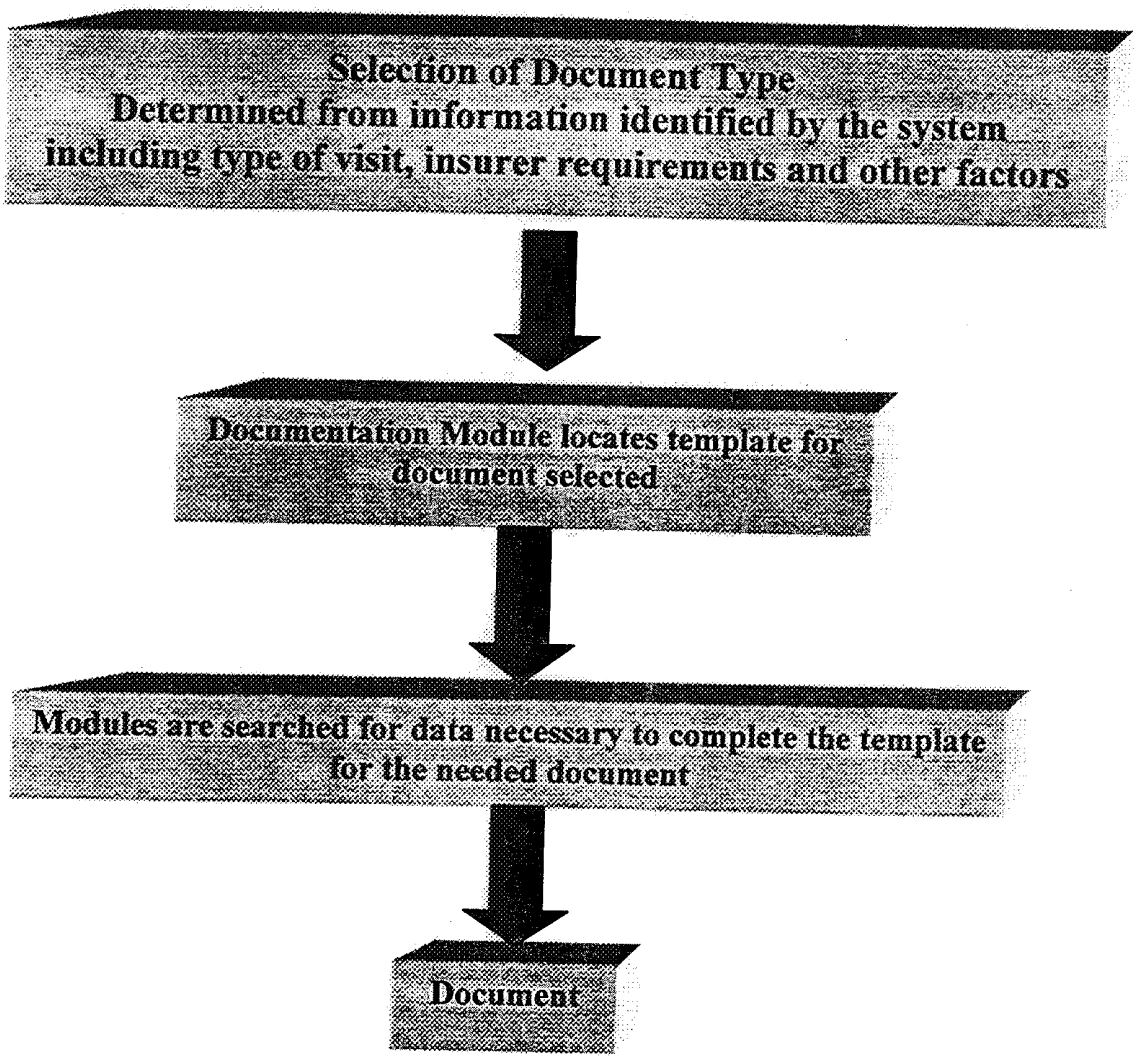

Selection of Document Type
Determined from information identified by the system including type of visit, insurer requirements and other factors
Documentation Module locates template for document selected
Modules are searched for data necessary to complete the template for the needed document
Document

Figure 4C

Initial Consult Template
History of Present Illness:
Patient's name is a *age* year-old *sex* who presents with a *duration* history of *complaint*. The *complaint* started *how started. Characteristics of the complaint. ...*
Past Medical History
The past medical history is significant for:
1. Diagnosis #1
2. Diagnosis #2
Past Surgical History
The past surgical history is significant for:
1. Type of surgery #1, Year
2. Type of surgery #2, Year
Medications
1. Drug #1, Dose
2. Drug #2, Dose
Allergies
List
Review of Systems
List pertinent organs systems and responses
Physical examination
Organ system #1
Organ system #2
Diagnostic Studies
1. Laboratory findings
2. Radiologic studies
Impression:
Patient's name has *symptoms* and *findings* consistent with a diagnosis of *insert diagnosis*. *He(she)* also has a diagnosis of *insert additional diagnoses*.
Treatment Plan:
The treatment plan for *Patient's name* will consist of *insert treatment choices.*

Figure 5A

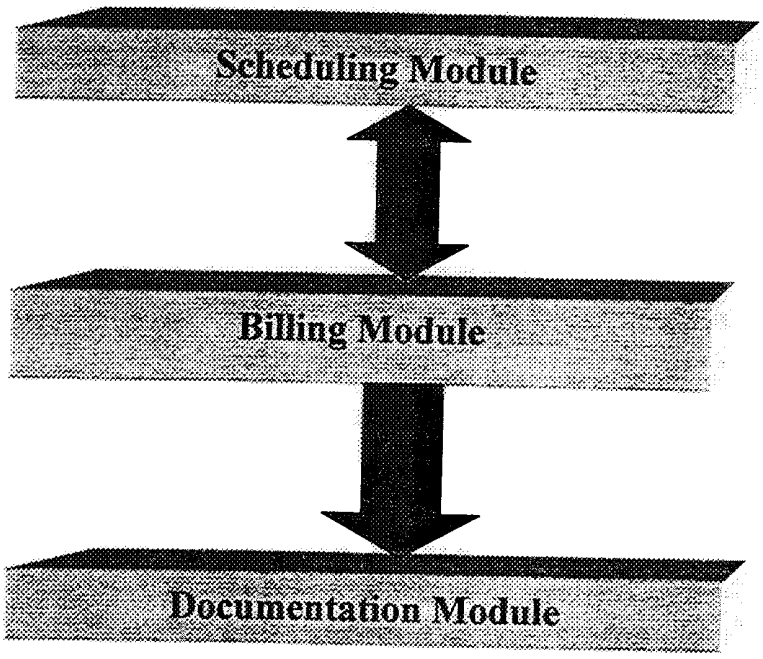


Figure 5B

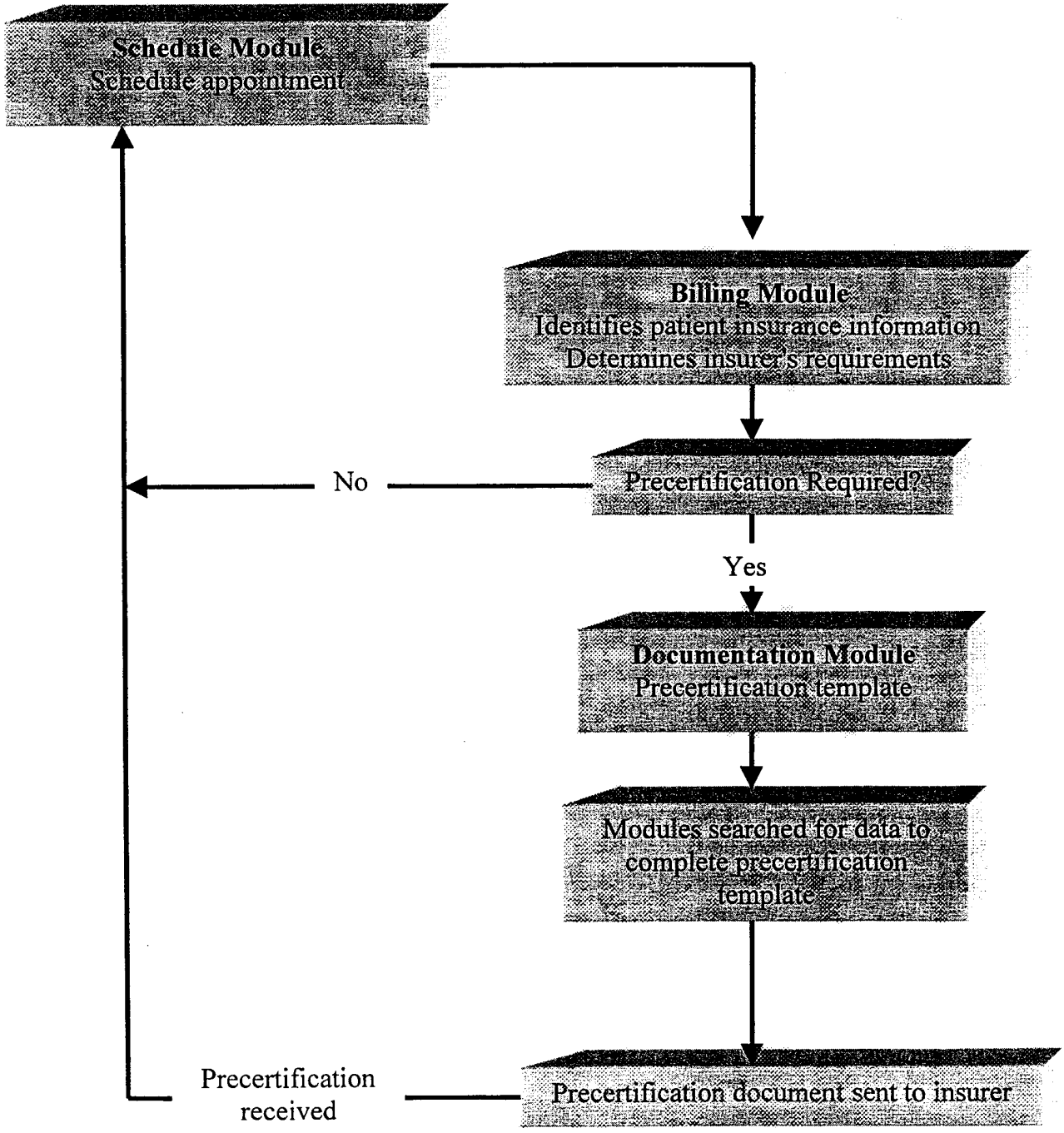

Schedule Module
Schedule appointment
Billing Module
Identifies patient insurance information
Determines insurer's requirements
Precertification Required?
No
Yes
Documentation Module
Precertification template
Modules searched for data to complete precertification template
Precertification document sent to insurer
Precertification received

Figure 5C

History

	Problem Focused	Expanded Problem Focused	Detailed	Comprehensive
History of Present Illness	**Brief**	**Brief**	**Extended**	**Extended**
Review of Systems	**N/A**	**Problem Pertinent**	**Extended**	**Complete**
Past Medical, Family and/or Social History	**N/A**	**N/A**	**Pertinent**	**Complete**

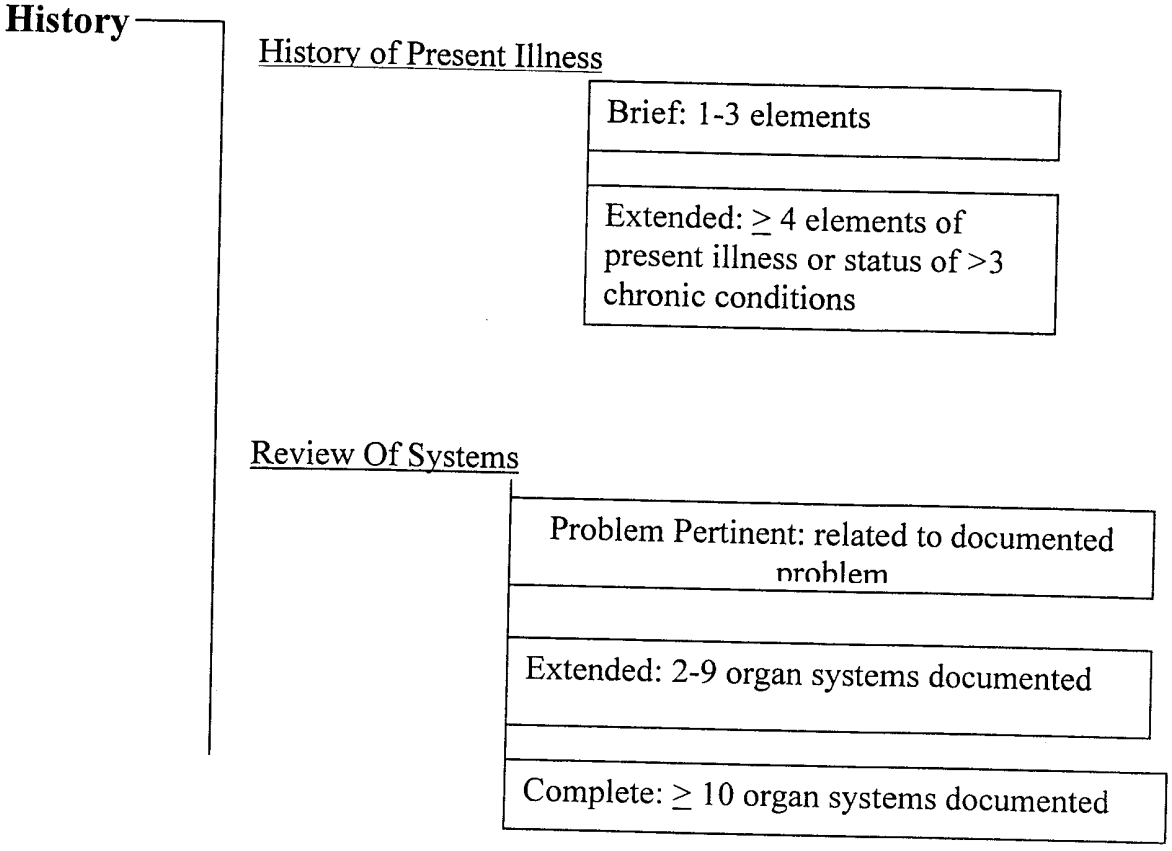


Figure 5D

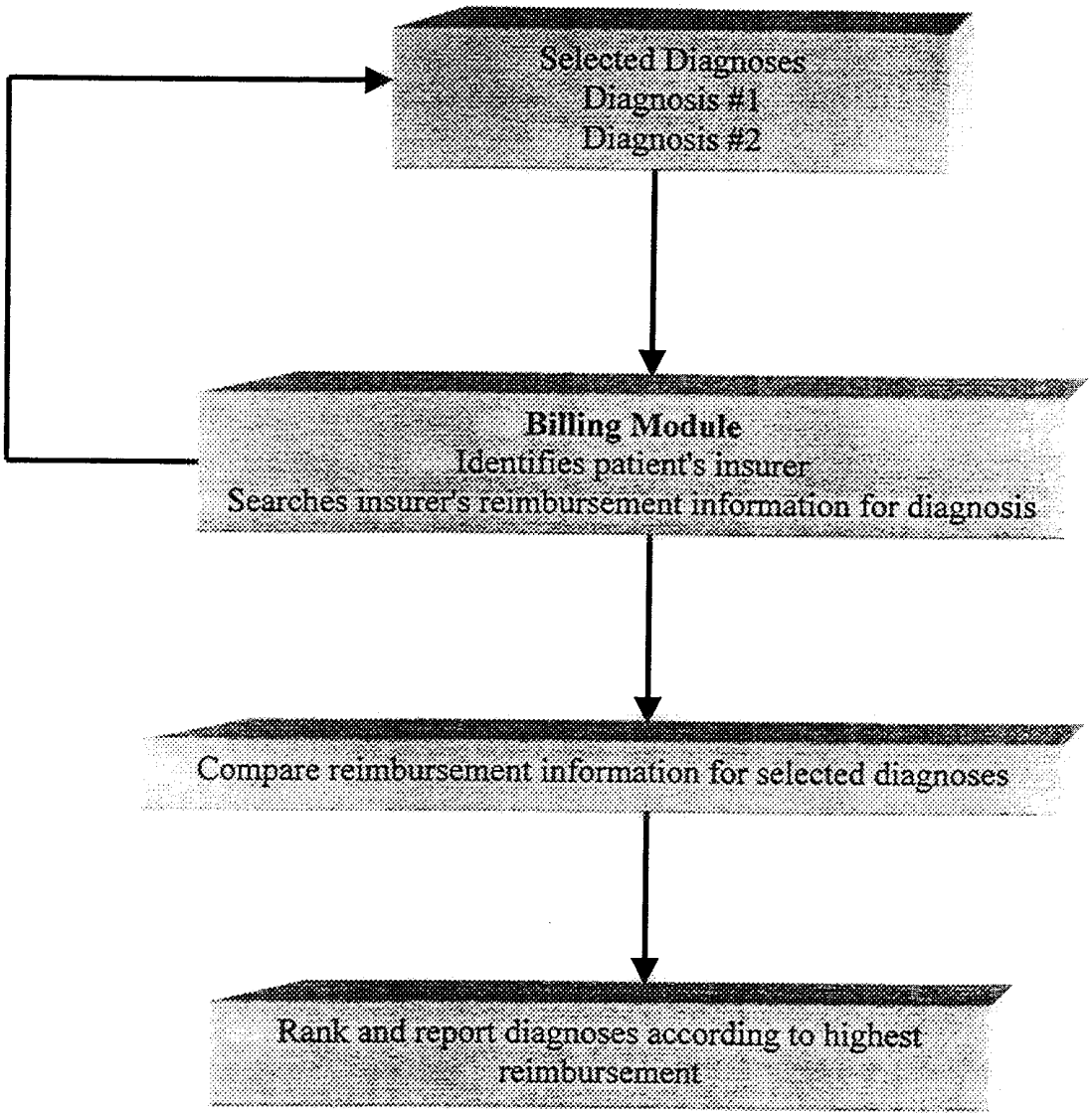

Selected Diagnoses
Diagnosis #1
Diagnosis #2
Billing Module
Identifies patient's insurer
Searches insurer's reimbursement information for diagnosis
Compare reimbursement information for selected diagnoses
Rank and report diagnoses according to highest reimbursement

Figure 6A

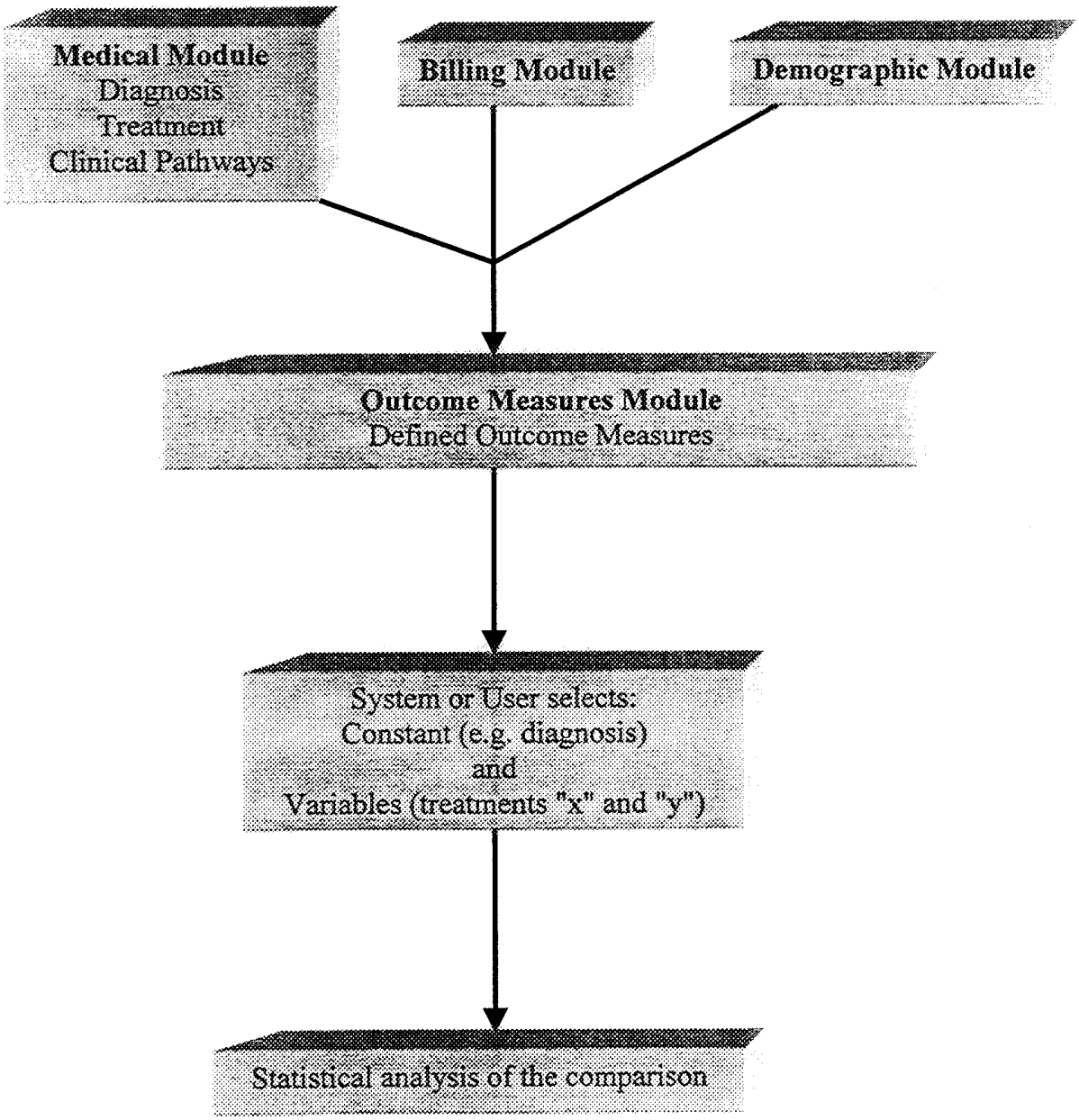

Medical Module
Diagnosis
Treatment
Clinical Pathways
Billing Module
Demographic Module
Outcome Measures Module
Defined Outcome Measures
System or User selects:
Constant (e.g. diagnosis)
and
Variables (treatments "x" and "y")
Statistical analysis of the comparison

Figure 6B

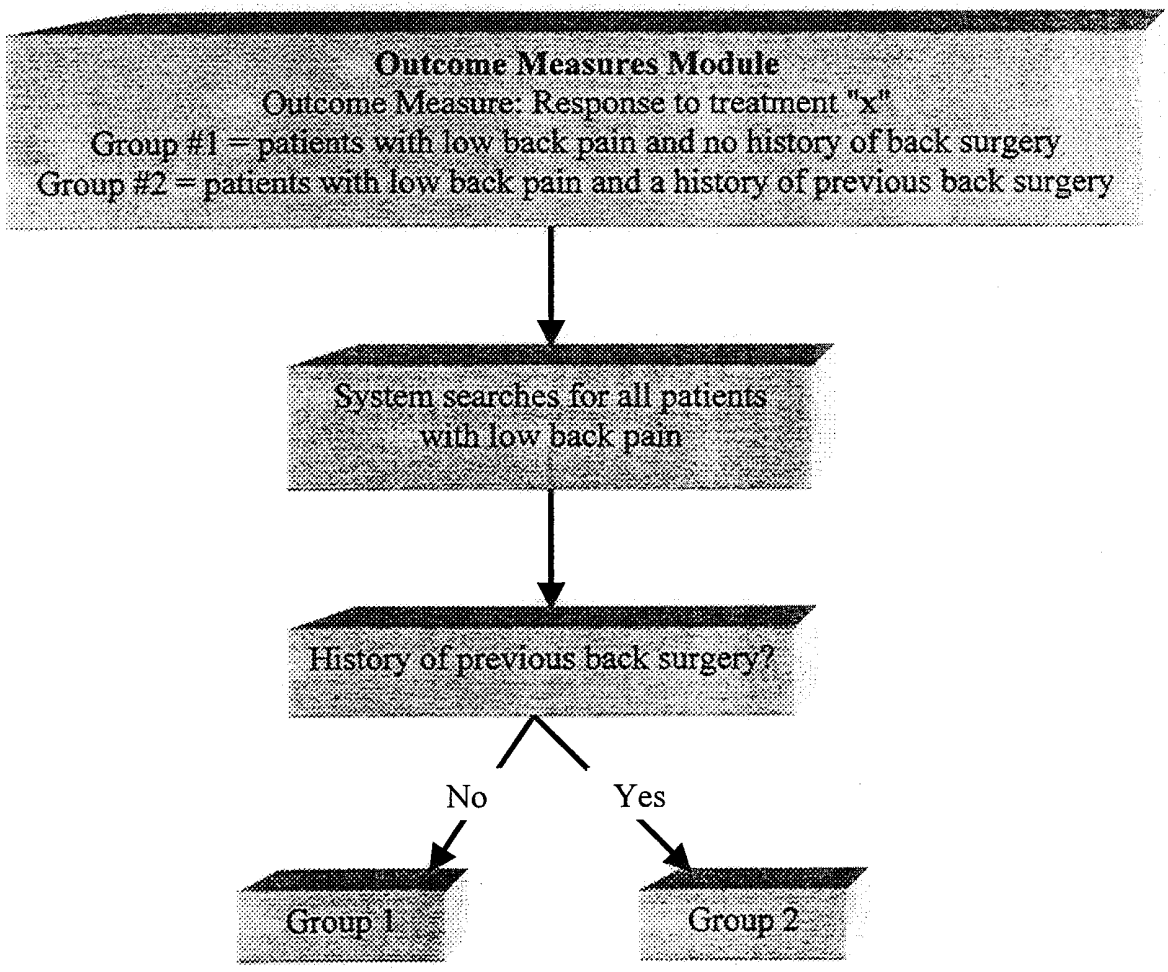

Outcome Measures Module
Outcome Measure: Response to treatment "x"
Group #1 = patients with low back pain and no history of back surgery
Group #2 = patients with low back pain and a history of previous back surgery
System searches for all patients with low back pain
History of previous back surgery?
No
Yes
Group 1
Group 2

Figure 6C

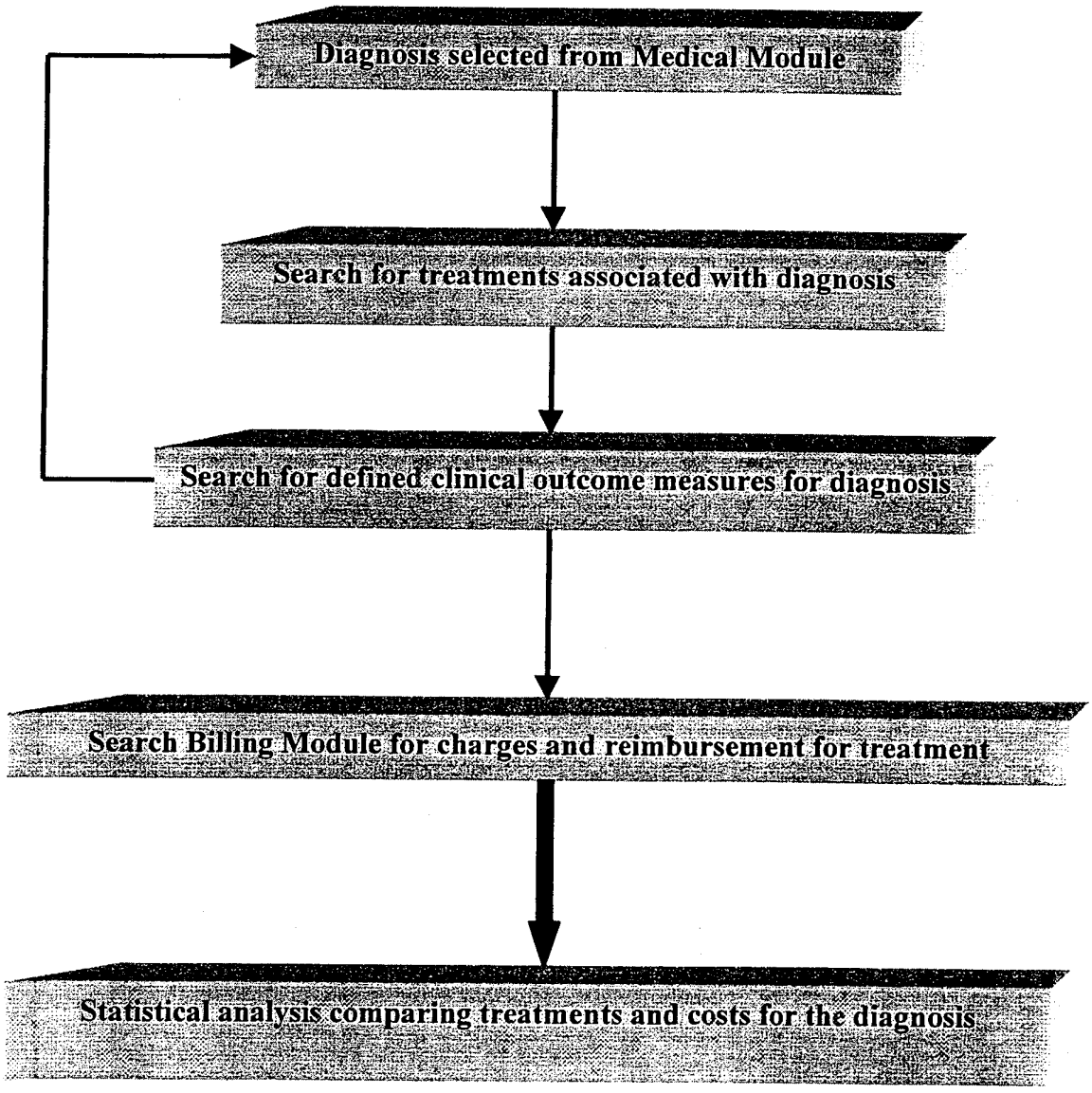

Diagnosis selected from Medical Module
Search for treatments associated with diagnosis
Search for defined clinical outcome measures for diagnosis
Search Billing Module for charges and reimbursement for treatment
Statistical analysis comparing treatments and costs for the diagnosis

Figure 6D

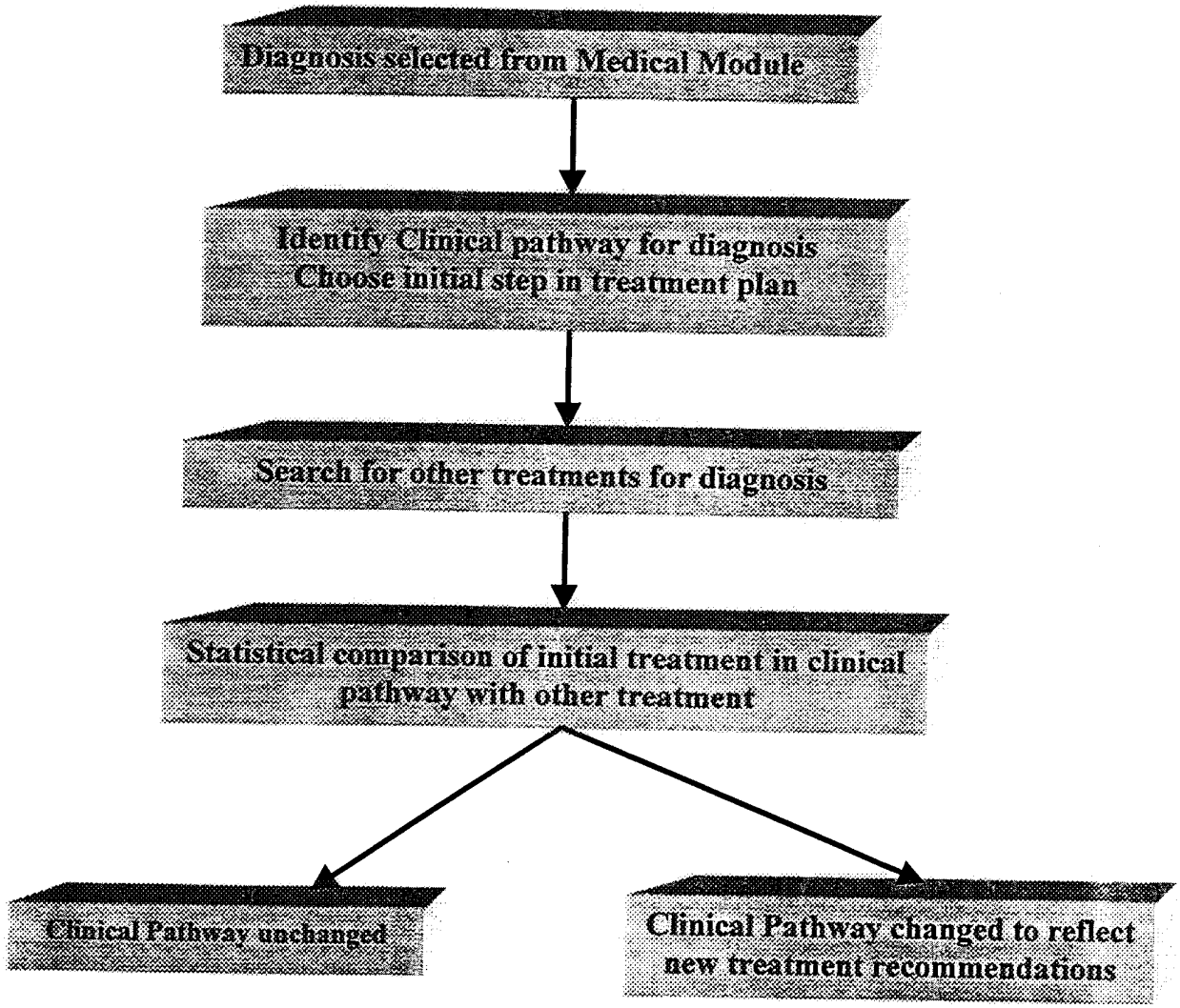

Diagnosis selected from Medical Module
Identify Clinical pathway for diagnosis
Choose initial step in treatment plan
Search for other treatments for diagnosis
Statistical comparison of initial treatment in clinical pathway with other treatment
Clinical Pathway unchanged
Clinical Pathway changed to reflect new treatment recommendations

Figure 7A

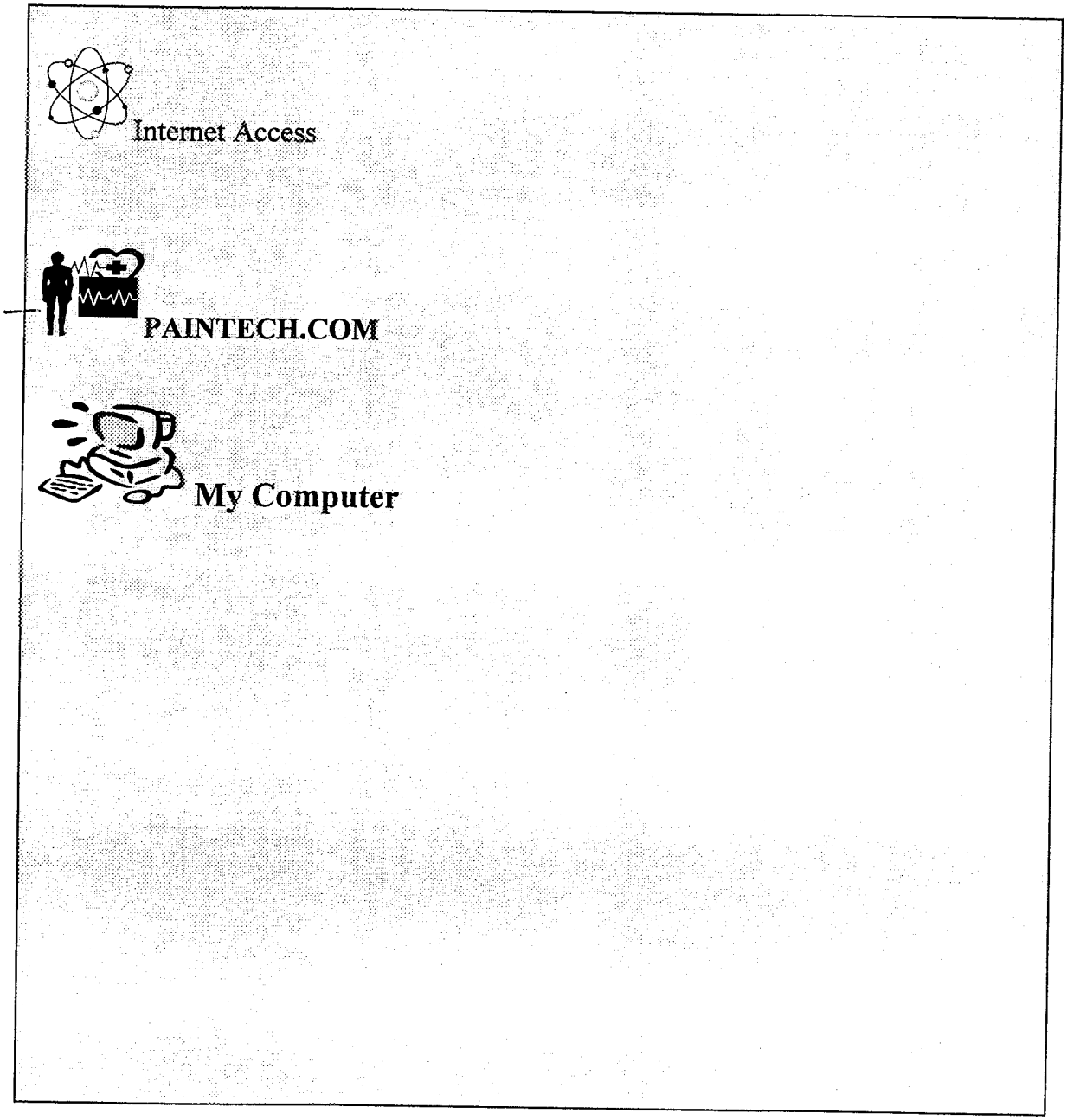


Figure 7B

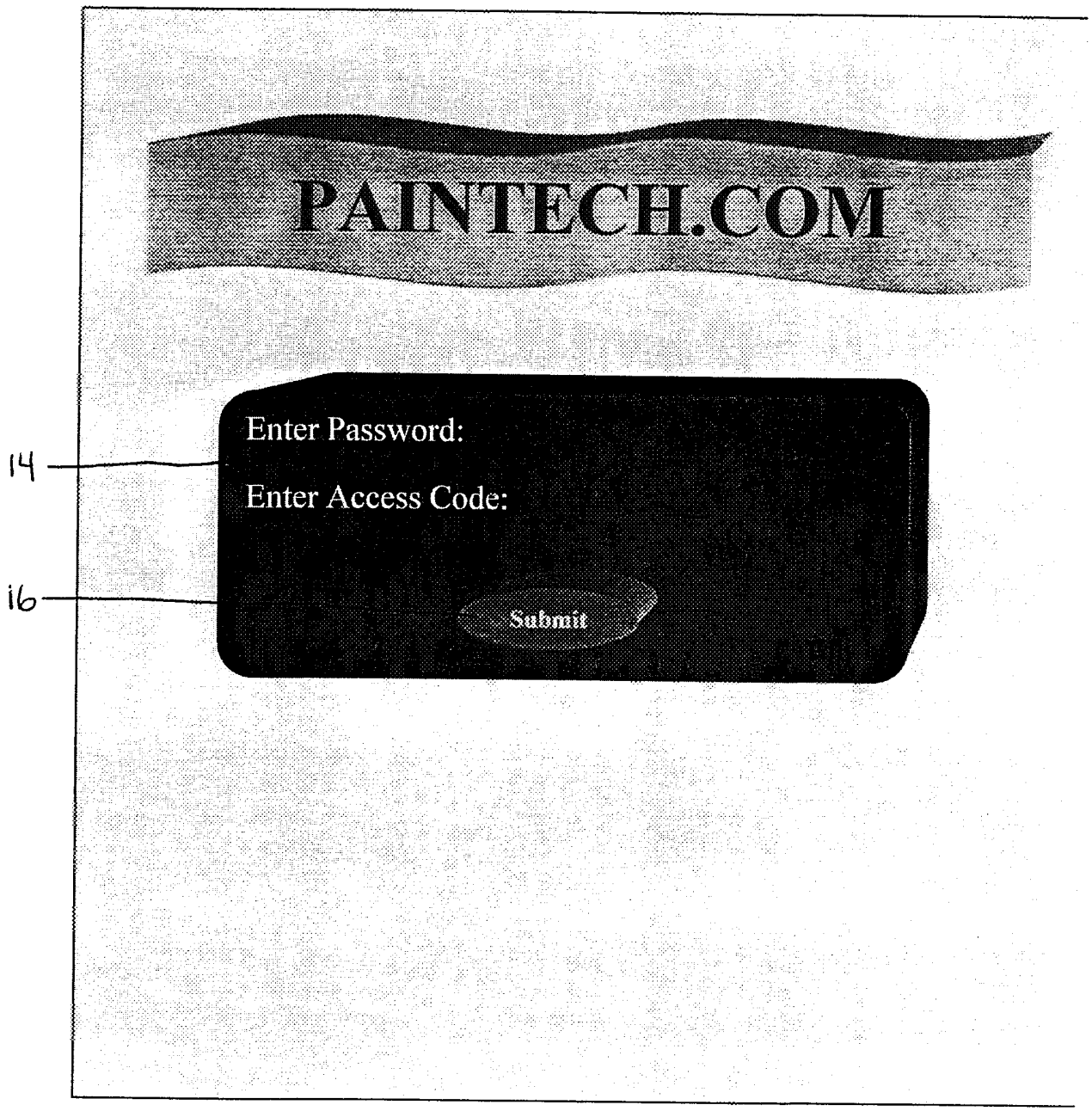


Figure 7C

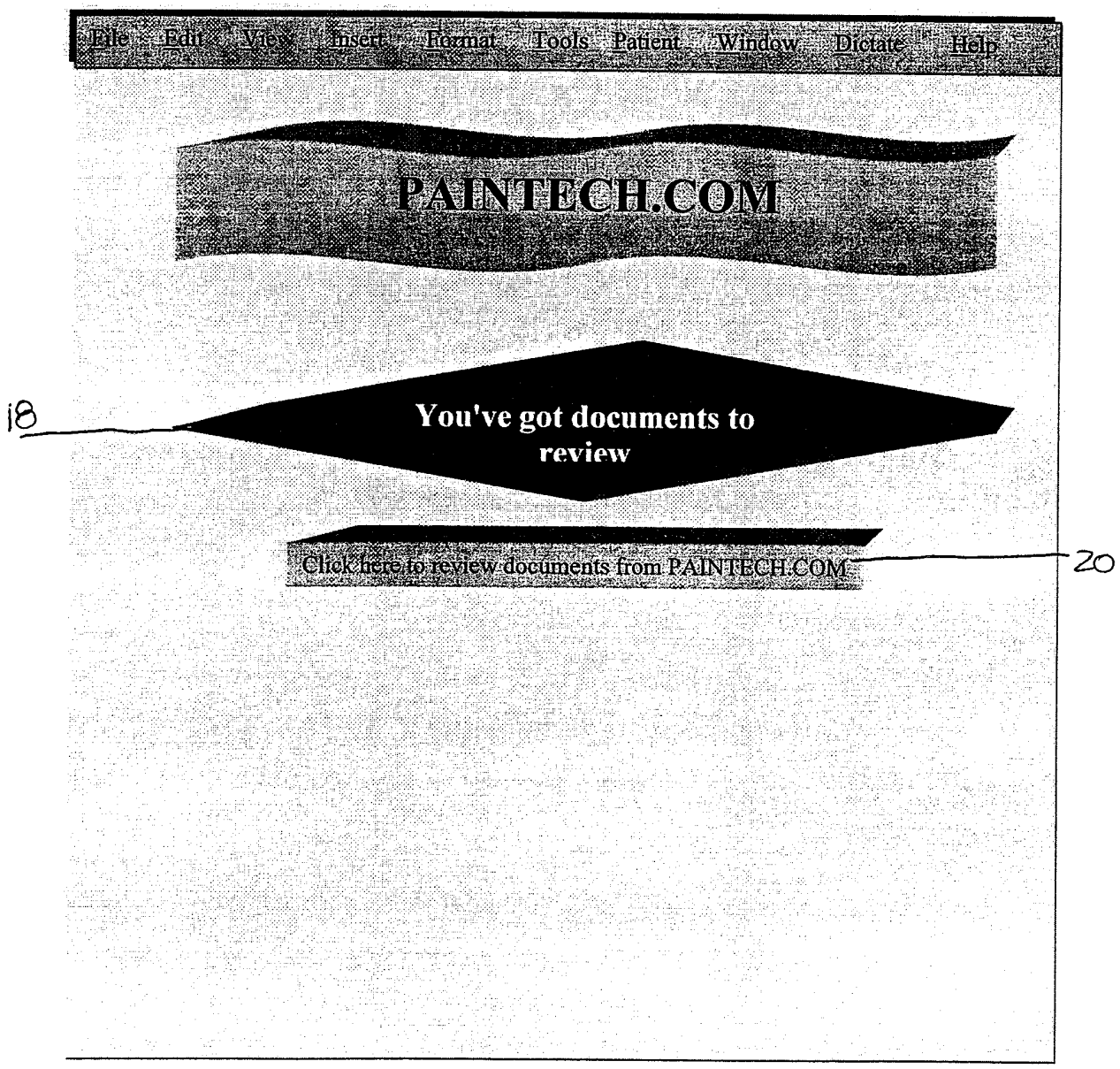
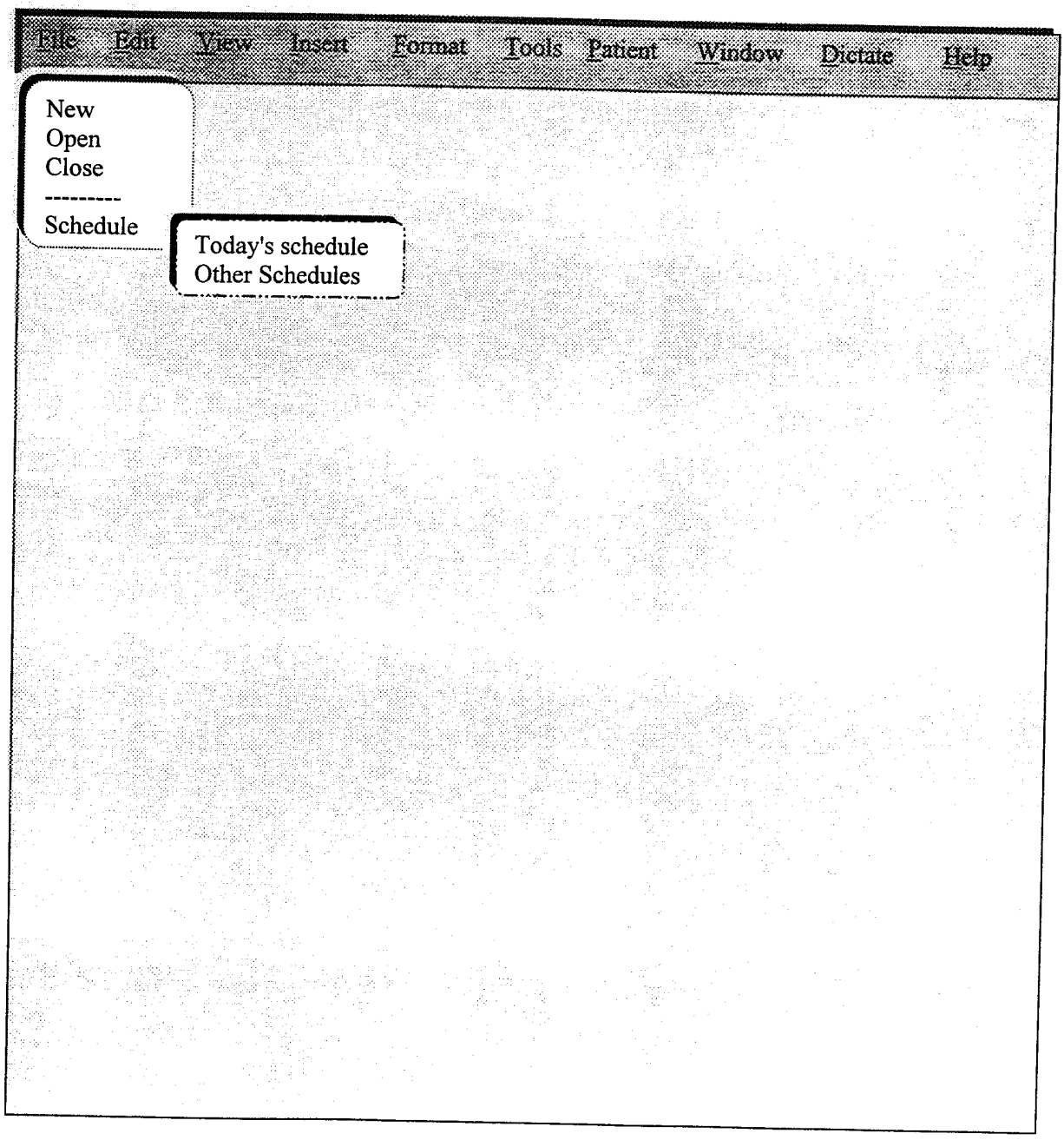
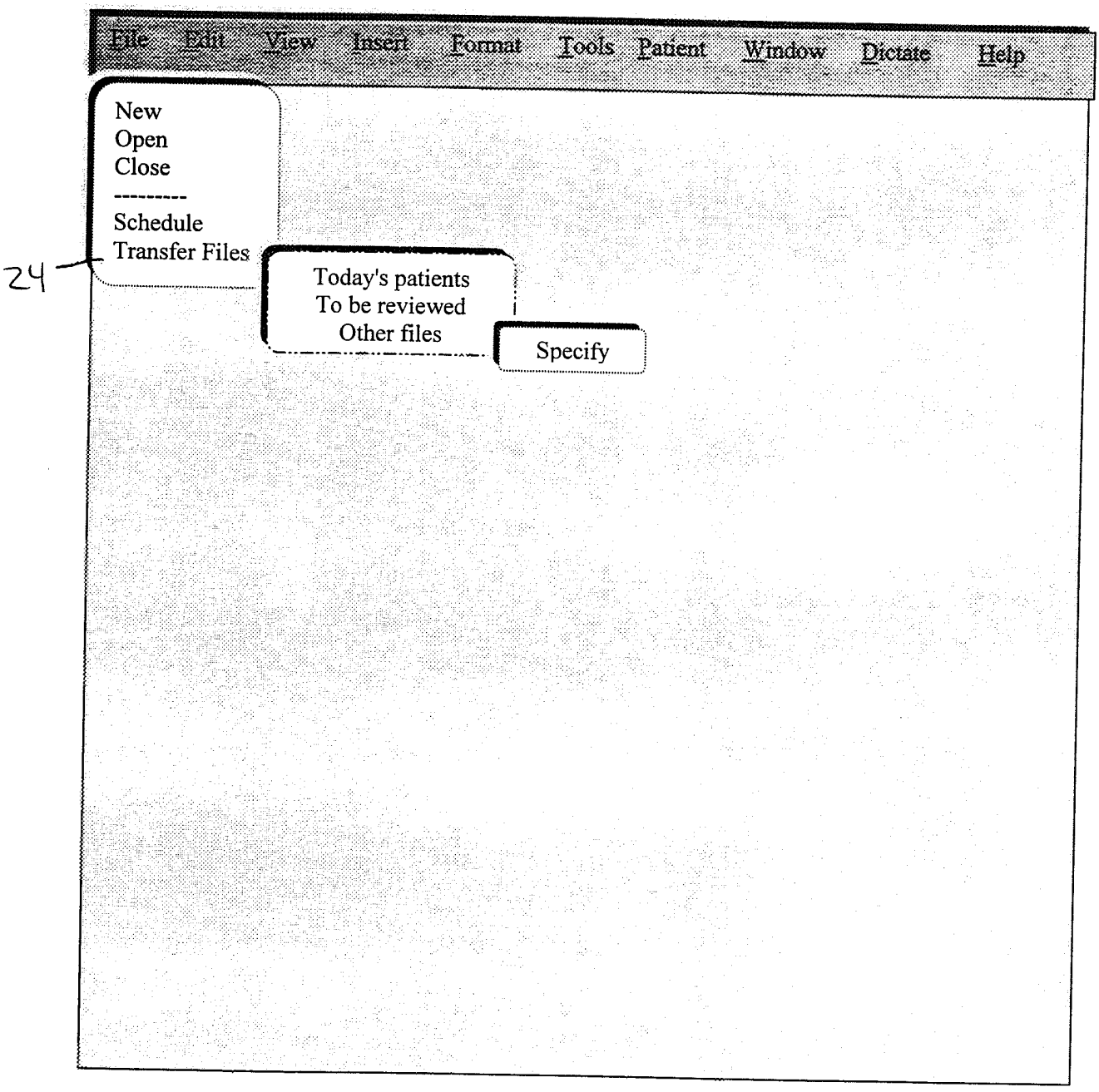

File Edit View Insert Format Tools Patient Window Dictate Help
PAINTECH.COM
18
You've got documents to review
Click here to review documents from PAINTECH.COM
20

Figure 8A


File Edit View Insert Format Tools Patient Window Dictate Help
New
Open
Close

Schedule
Today's schedule
Other Schedules

Figure 8B


File
Edit
View
Insert
Format
Tools
Patient
Window
Dictate
Help
New
Open
Close

Schedule
Transfer Files
24
Today's patients
To be reviewed
Other files
Specify

Figure 9A

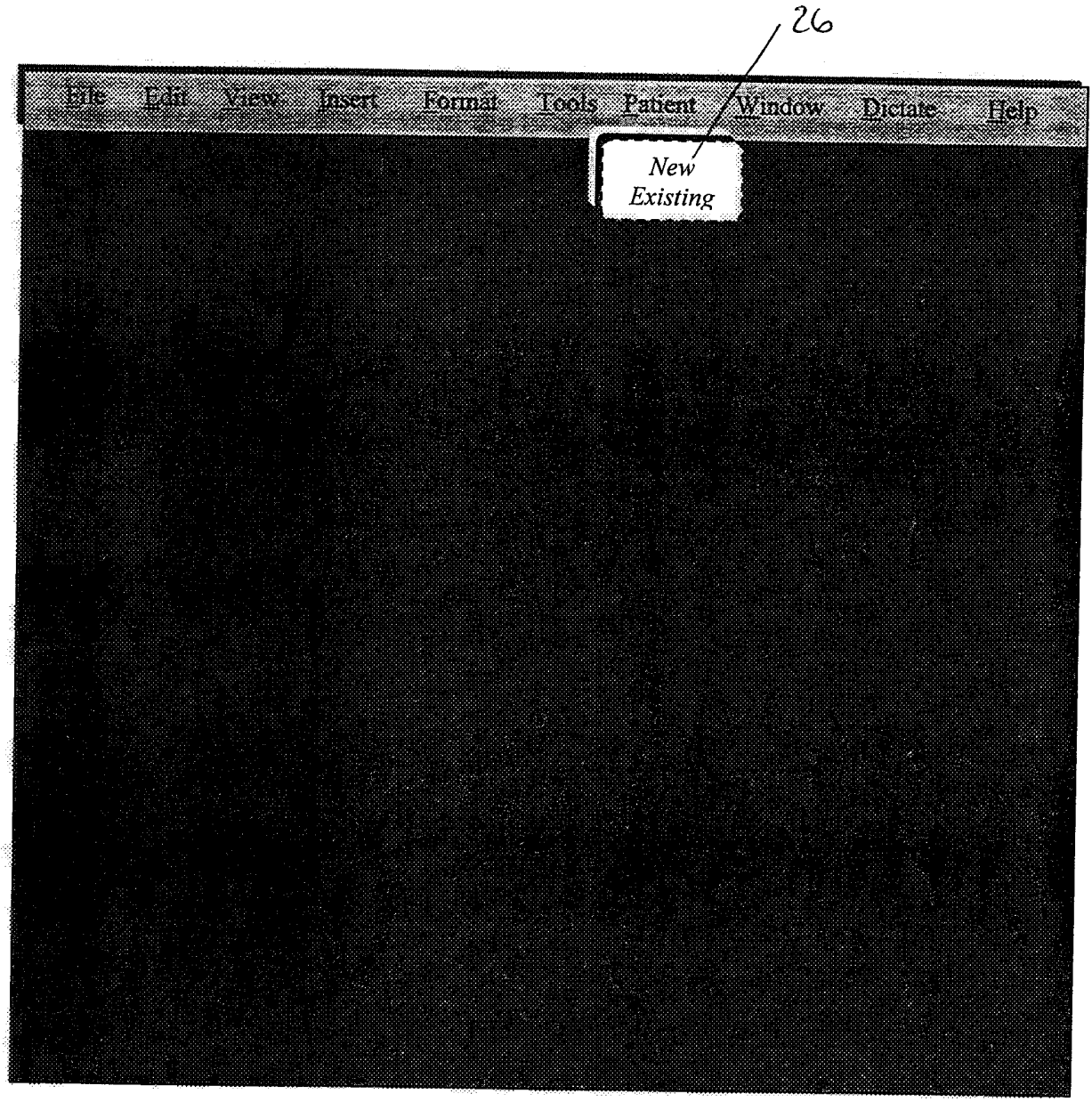

26
File Edit View Insert Format Tools Patient Window Dictate Help
New
Existing

Figure 9B

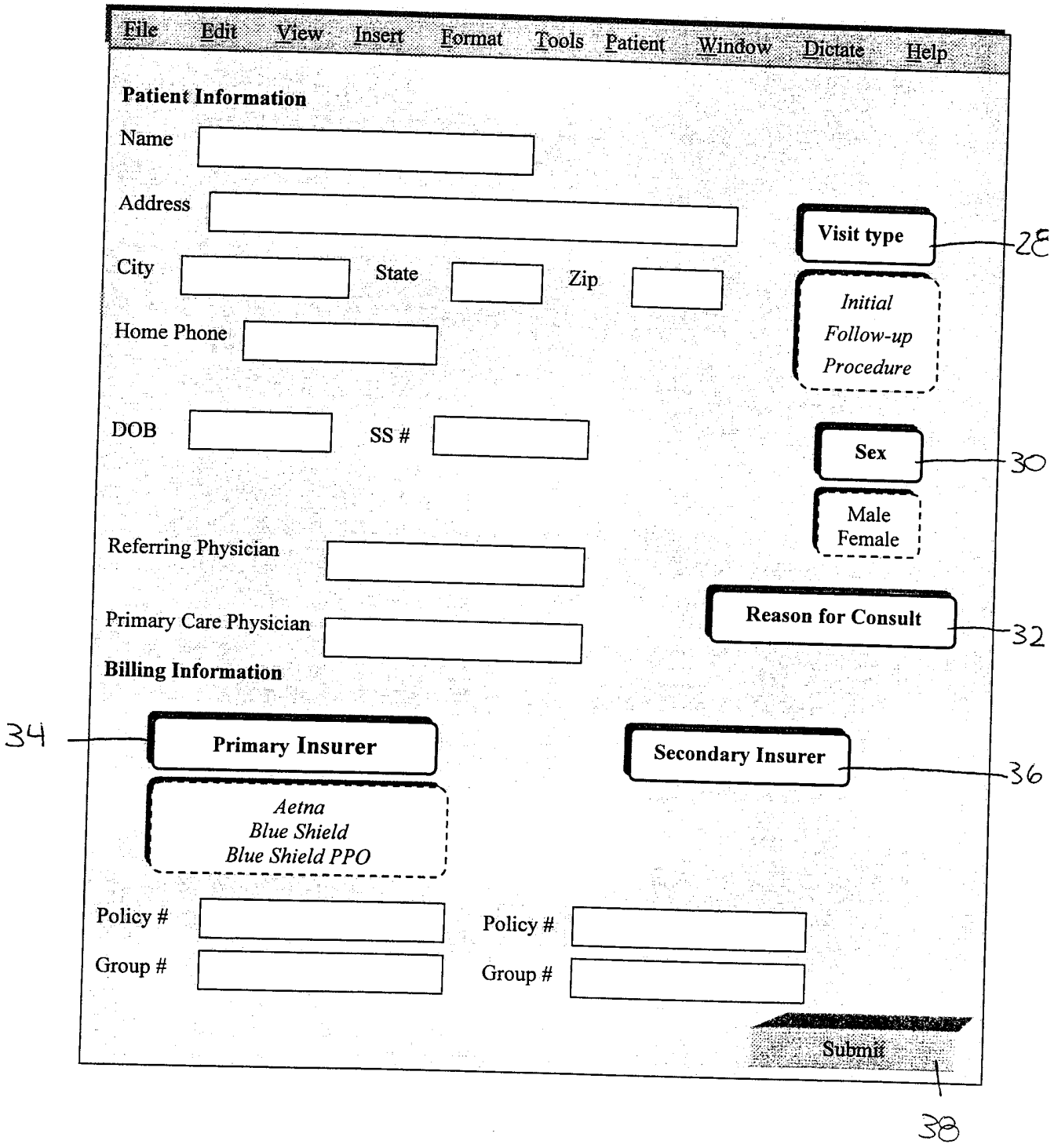

File Edit View Insert Format Tools Patient Window Dictate Help
Patient Information
Name
Address
City
State
Zip
Home Phone
DOB
SS #
Referring Physician
Primary Care Physician
Billing Information
Visit type
28
Initial
Follow-up
Procedure
Sex
30
Male
Female
Reason for Consult
32
34
Primary Insurer
Aetna
Blue Shield
Blue Shield PPO
Secondary Insurer
36
Policy #
Group #
Policy #
Group #
Submit
38

Figure 9C

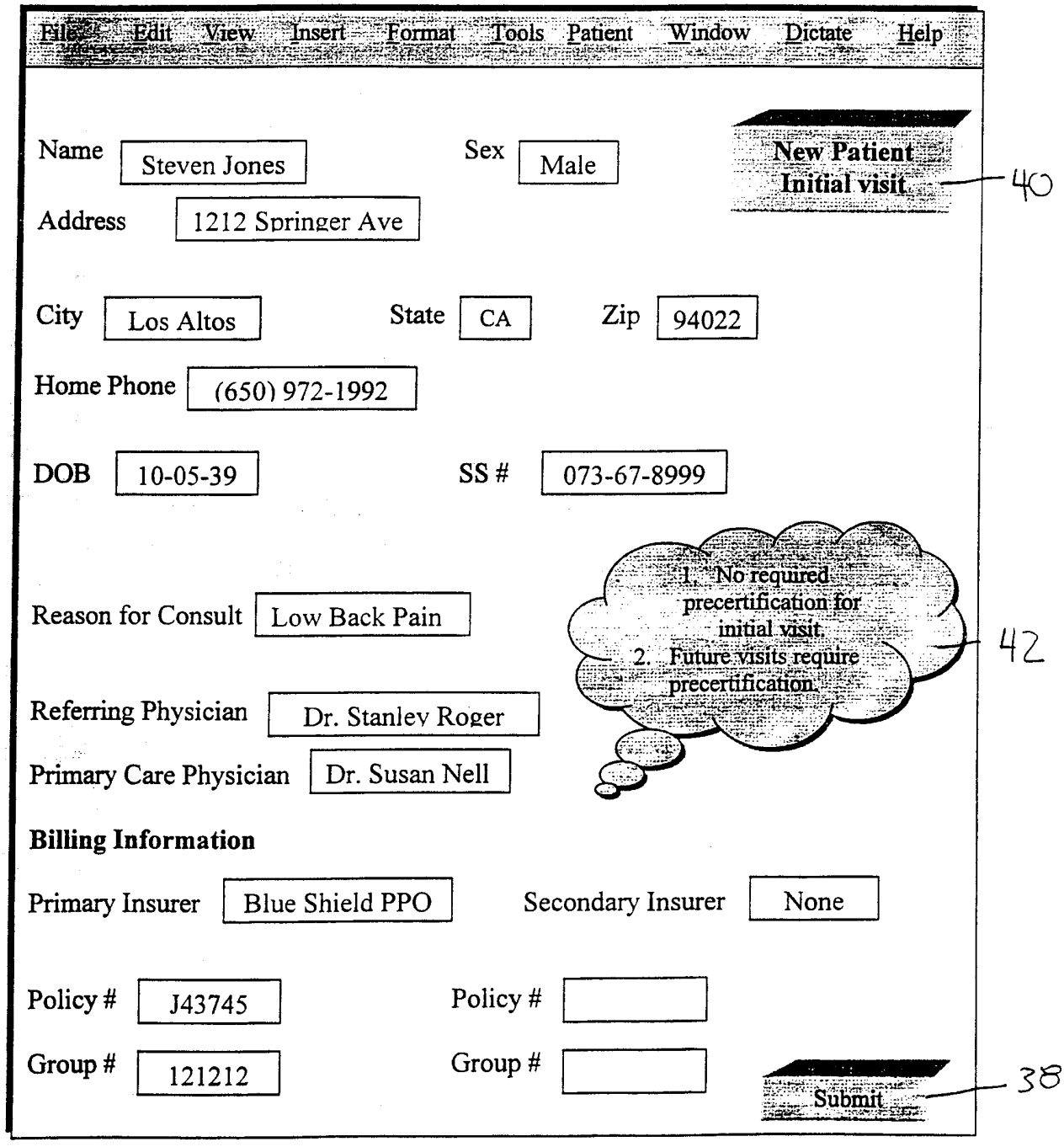

File Edit View Insert Format Tools Patient Window Dictate Help
Name Steven Jones
Sex Male
New Patient Initial visit
40
Address 1212 Springer Ave
City Los Altos
State CA
Zip 94022
Home Phone (650) 972-1992
DOB 10-05-39
SS # 073-67-8999
1. No required precertification for initial visit.
2. Future visits require precertification.
42
Reason for Consult Low Back Pain
Referring Physician Dr. Stanley Roger
Primary Care Physician Dr. Susan Nell
Billing Information
Primary Insurer Blue Shield PPO
Secondary Insurer None
Policy # J43745
Policy #
Group # 121212
Group #
Submit
38

Figure 10

Patient Questionnaire

Pain History

Pain is affected by: (check all that apply)

Pain Affected by	Increases Pain	Decreases Pain	No Change
Liquor			
Stimulants(Coffee			
Eating			
Heat			
Cold			
Damp			
Weather Change			
Physical Activity			
Massage			
Pressure			
Movement			
Sleep			
Lying Down		X	
Sitting			
Walking	X		
Sexual Activity			
Distraction (TV)			
Urination			
Bowel Movement			
Tension			
Bright lights			
Loud Noises			
Fatigue			
Standing	X		
Sneezing			
Coughing			
Pain Medicine		X	
Anti-Inflammatory Medicine			
Muscle Relaxants			
Other			

Pain Description: (check all that apply)

Aching		Shooting	X	Hotness		Tight	
Tingling		Burning	X	Stinging		Itchy	
Numbness		Cramping		Sharp		Weak	
Soreness		Coldness		Tight		Disabling	
Dull		Stabbing		Radiating		Wrenching	
Heavy		Annoying		Throbbing		Worrisome	
Intense		Severe		Excruciating		Miserable	
Unbearable		Transient		Brief		Electric	
Constant		Intermittent	X	Pulling		Devastating	

Figure 11

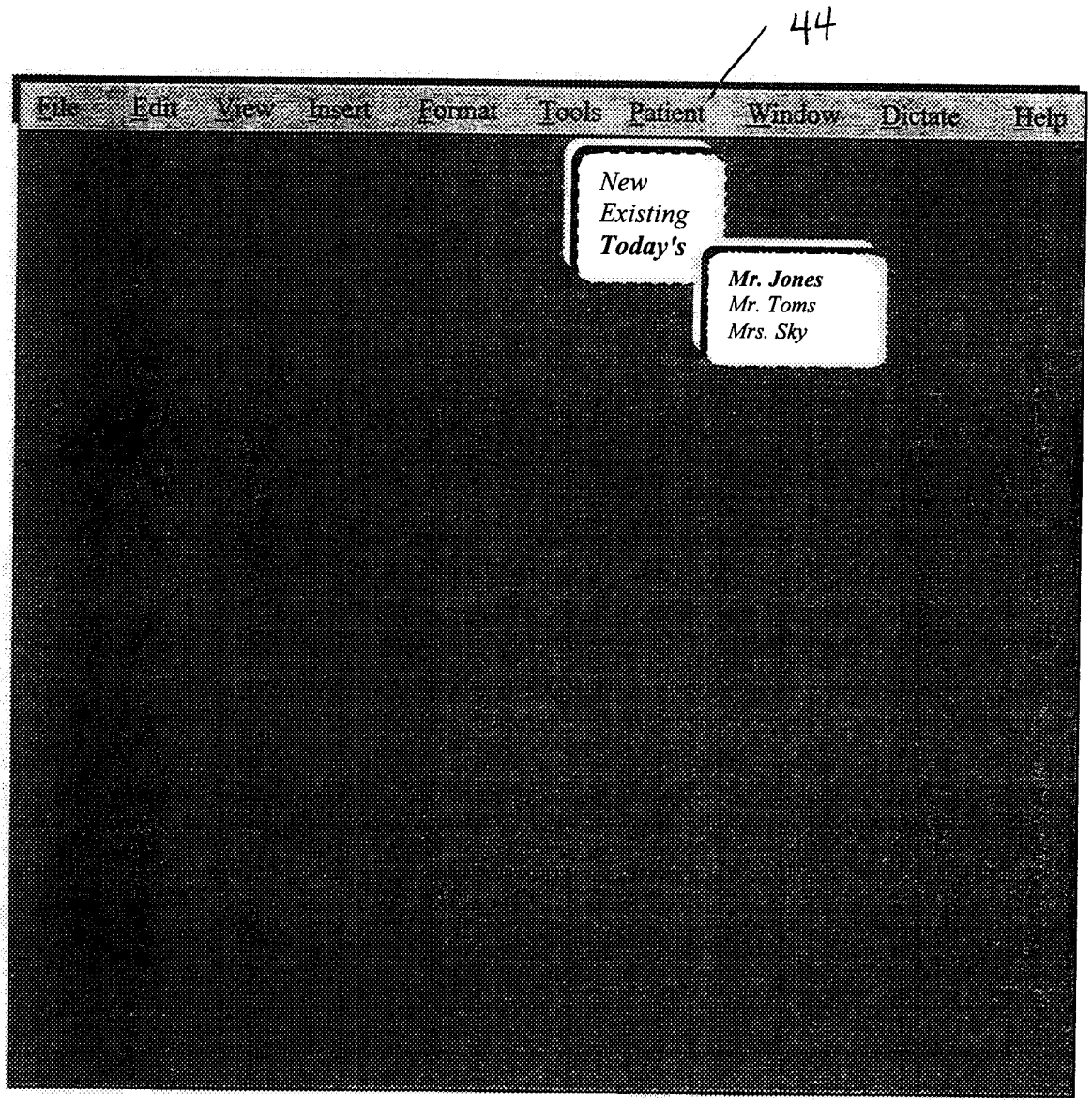

44
File
Edit
View
Insert
Format
Tools
Patient
Window
Dictate
Help
New
Existing
Today's
Mr. Jones
Mr. Toms
Mrs. Sky

Figure 12

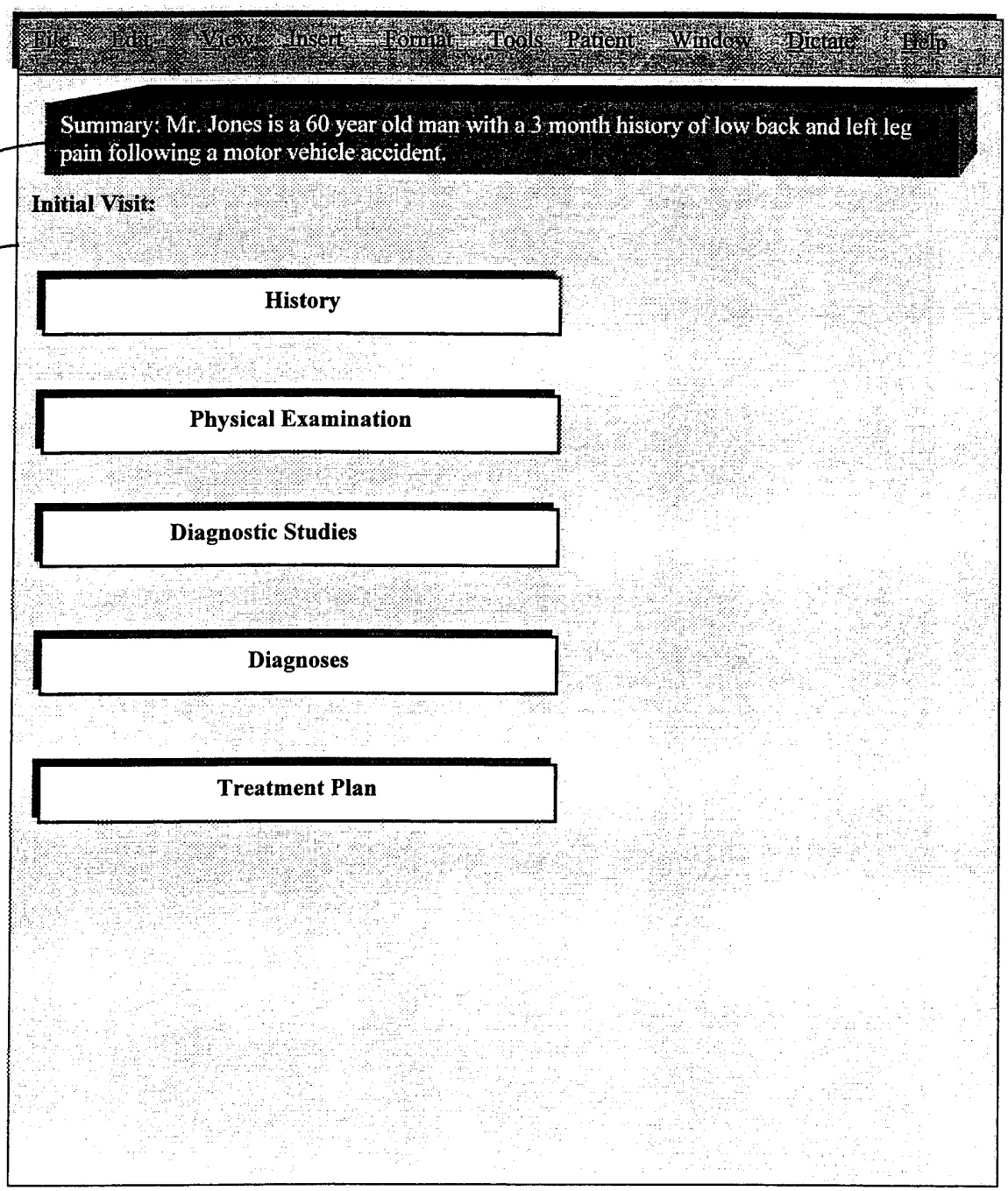

File Edit View Insert Format Tools Patient Window Dictate Help
48
Summary: Mr. Jones is a 60 year old man with a 3 month history of low back and left leg pain following a motor vehicle accident.
Initial Visit:
46
History
Physical Examination
Diagnostic Studies
Diagnoses
Treatment Plan

Figure 13A

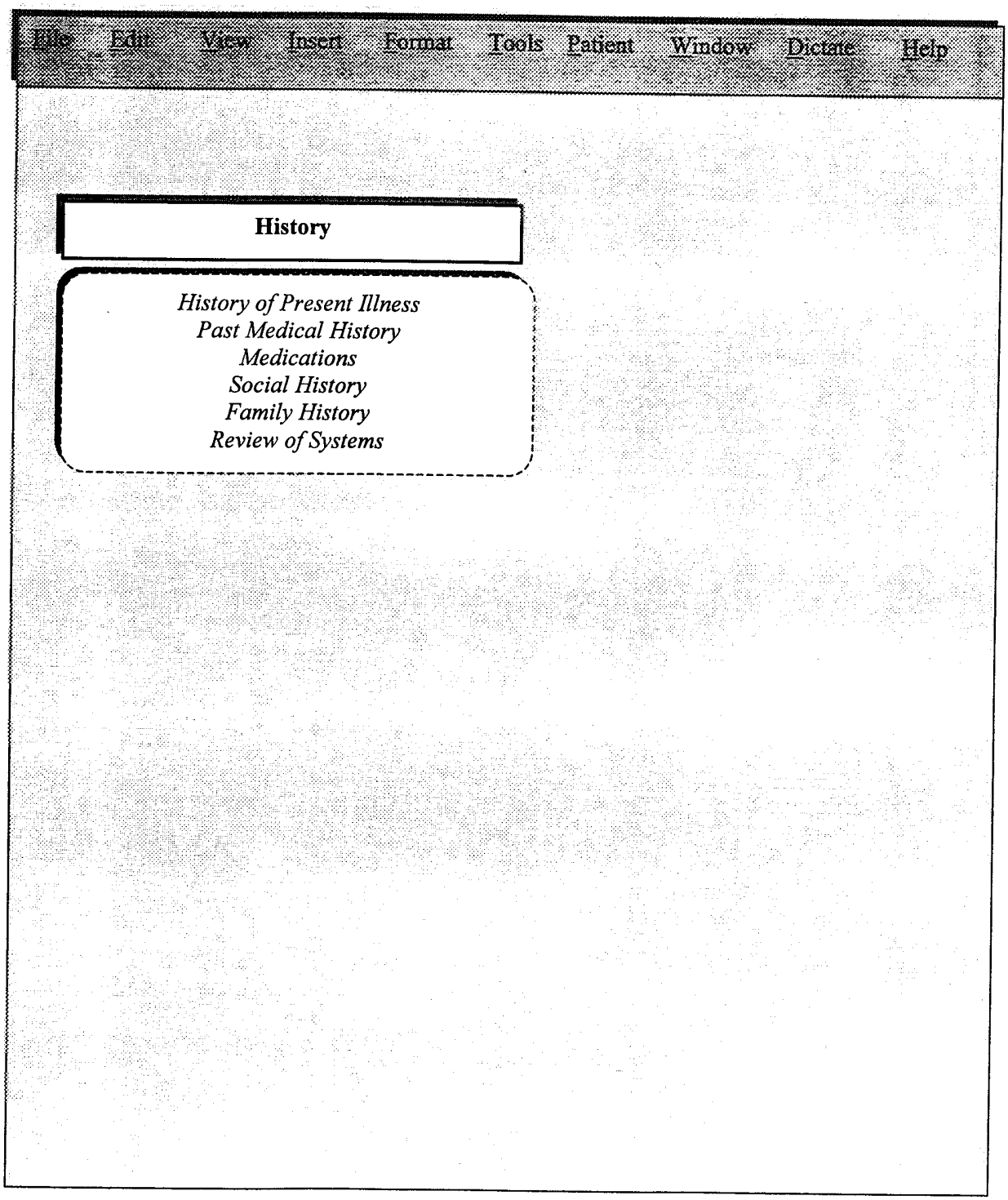

File Edit View Insert Format Tools Patient Window Dictate Help
History
History of Present Illness
Past Medical History
Medications
Social History
Family History
Review of Systems

Figure 13B

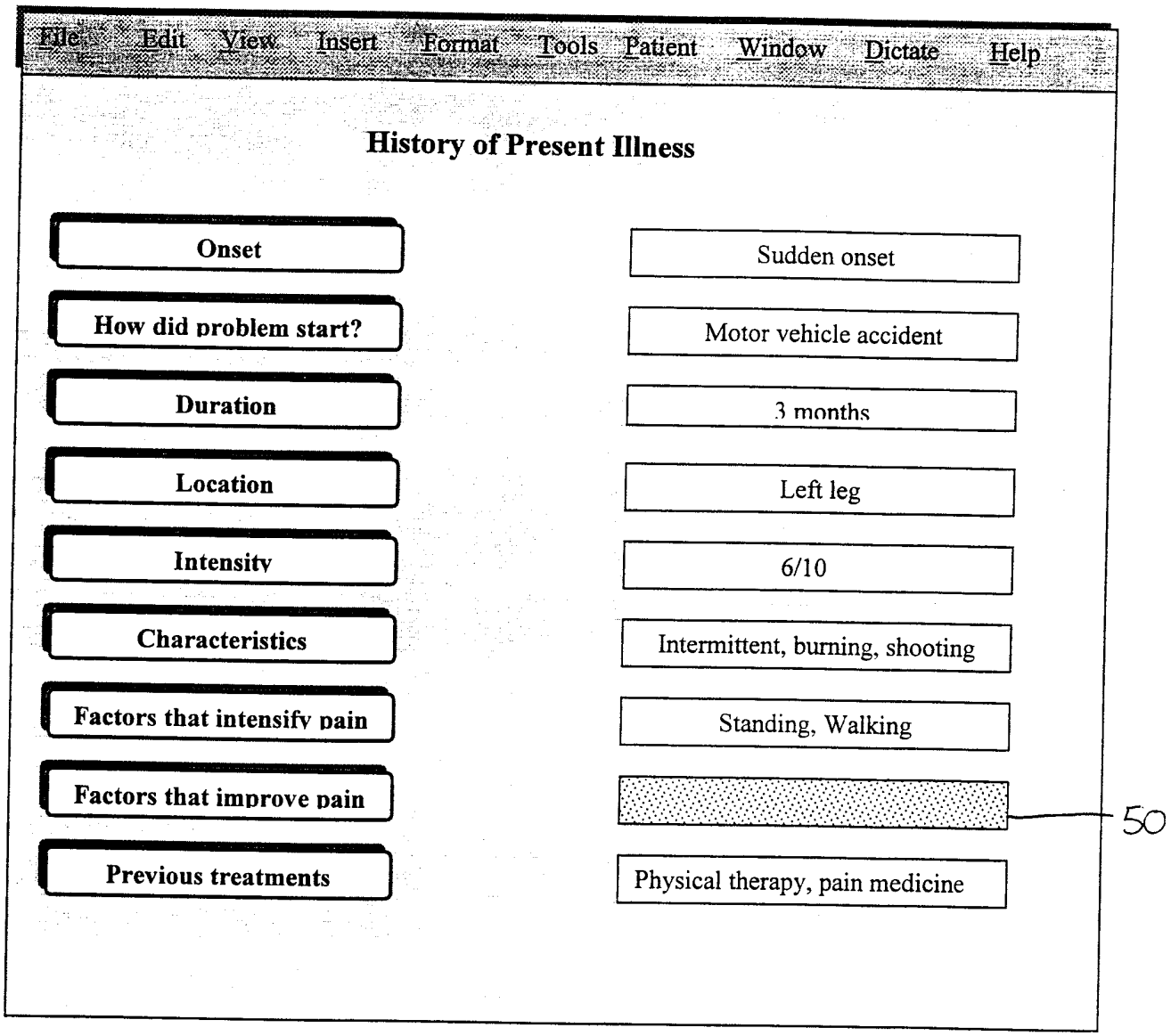

File Edit View Insert Format Tools Patient Window Dictate Help
History of Present Illness
Onset
Sudden onset
How did problem start?
Motor vehicle accident
Duration
3 months
Location
Left leg
Intensity
6/10
Characteristics
Intermittent, burning, shooting
Factors that intensify pain
Standing, Walking
Factors that improve pain
Previous treatments
Physical therapy, pain medicine
50

Figure 13C

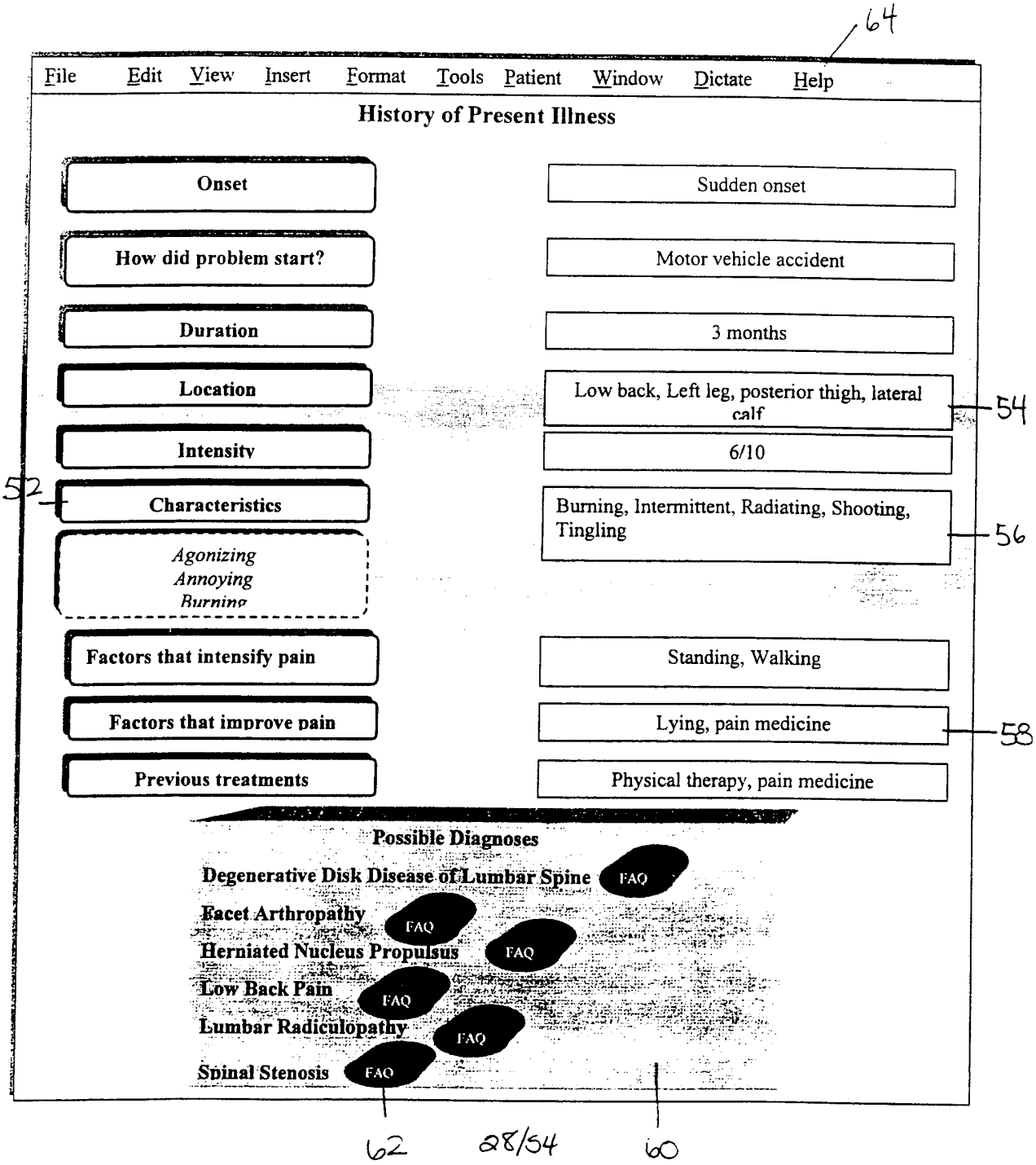

64
File Edit View Insert Format Tools Patient Window Dictate Help
History of Present Illness
Onset
Sudden onset
How did problem start?
Motor vehicle accident
Duration
3 months
Location
Low back, Left leg, posterior thigh, lateral calf
54
Intensity
6/10
52
Characteristics
Burning, Intermittent, Radiating, Shooting, Tingling
56
Agonizing
Annoying
Burning
Factors that intensify pain
Standing, Walking
Factors that improve pain
Lying, pain medicine
58
Previous treatments
Physical therapy, pain medicine
Possible Diagnoses
Degenerative Disk Disease of Lumbar Spine FAQ
Facet Arthropathy FAQ
Herniated Nucleus Propulsus FAQ
Low Back Pain FAQ
Lumbar Radiculopathy FAQ
Spinal Stenosis FAQ
62
28/54
60

Figure 13D

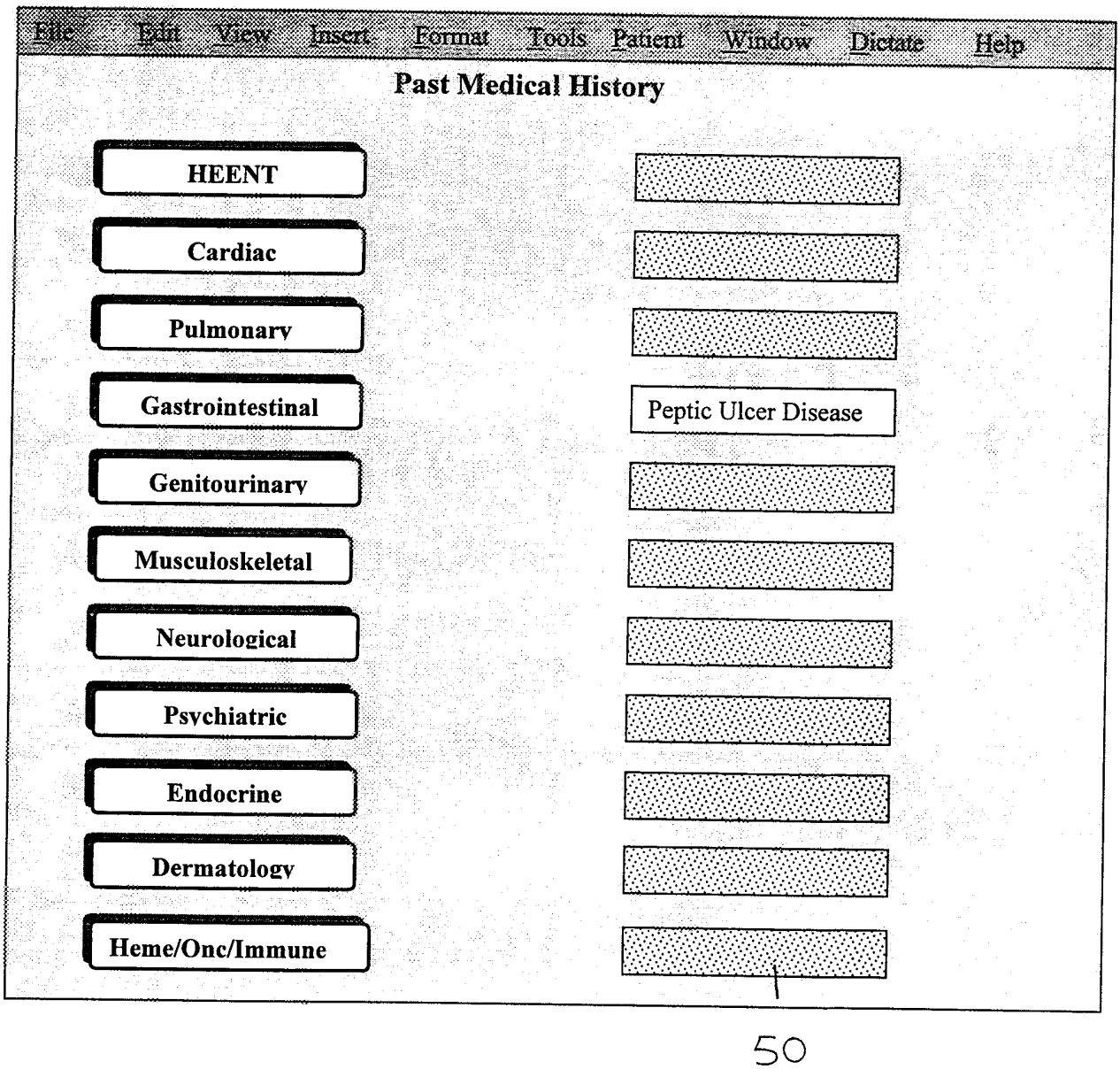

File Edit View Insert Format Tools Patient Window Dictate Help
Past Medical History
HEENT
Cardiac
Pulmonary
Gastrointestinal
Genitourinary
Musculoskeletal
Neurological
Psychiatric
Endocrine
Dermatology
Heme/Onc/Immune
Peptic Ulcer Disease
50

Figure 13E

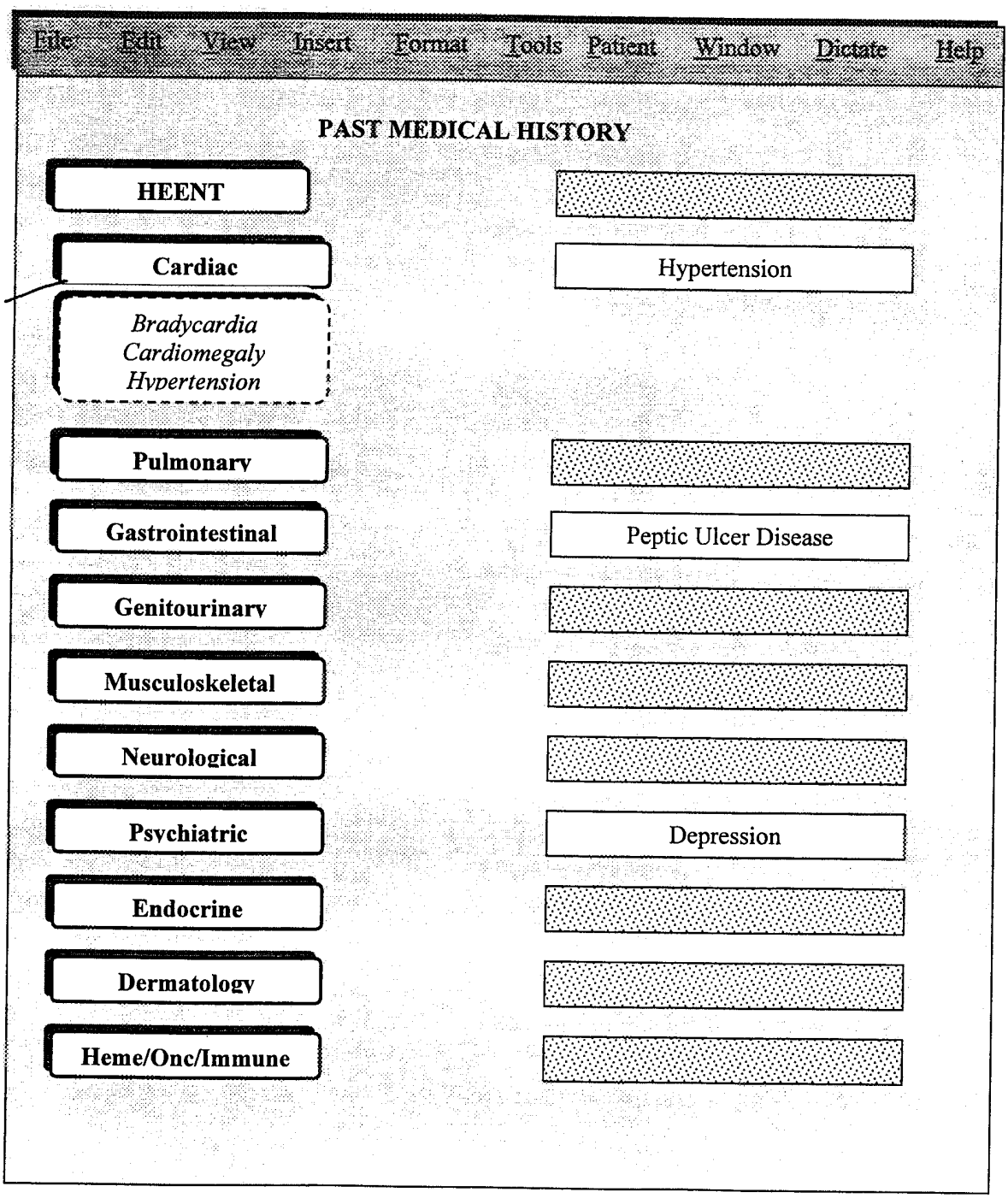

File Edit View Insert Format Tools Patient Window Dictate Help
PAST MEDICAL HISTORY
HEENT
Cardiac
Hypertension
66
Bradycardia
Cardiomegaly
Hypertension
Pulmonary
Gastrointestinal
Peptic Ulcer Disease
Genitourinary
Musculoskeletal
Neurological
Psychiatric
Depression
Endocrine
Dermatology
Heme/Onc/Immune

Figure 13F

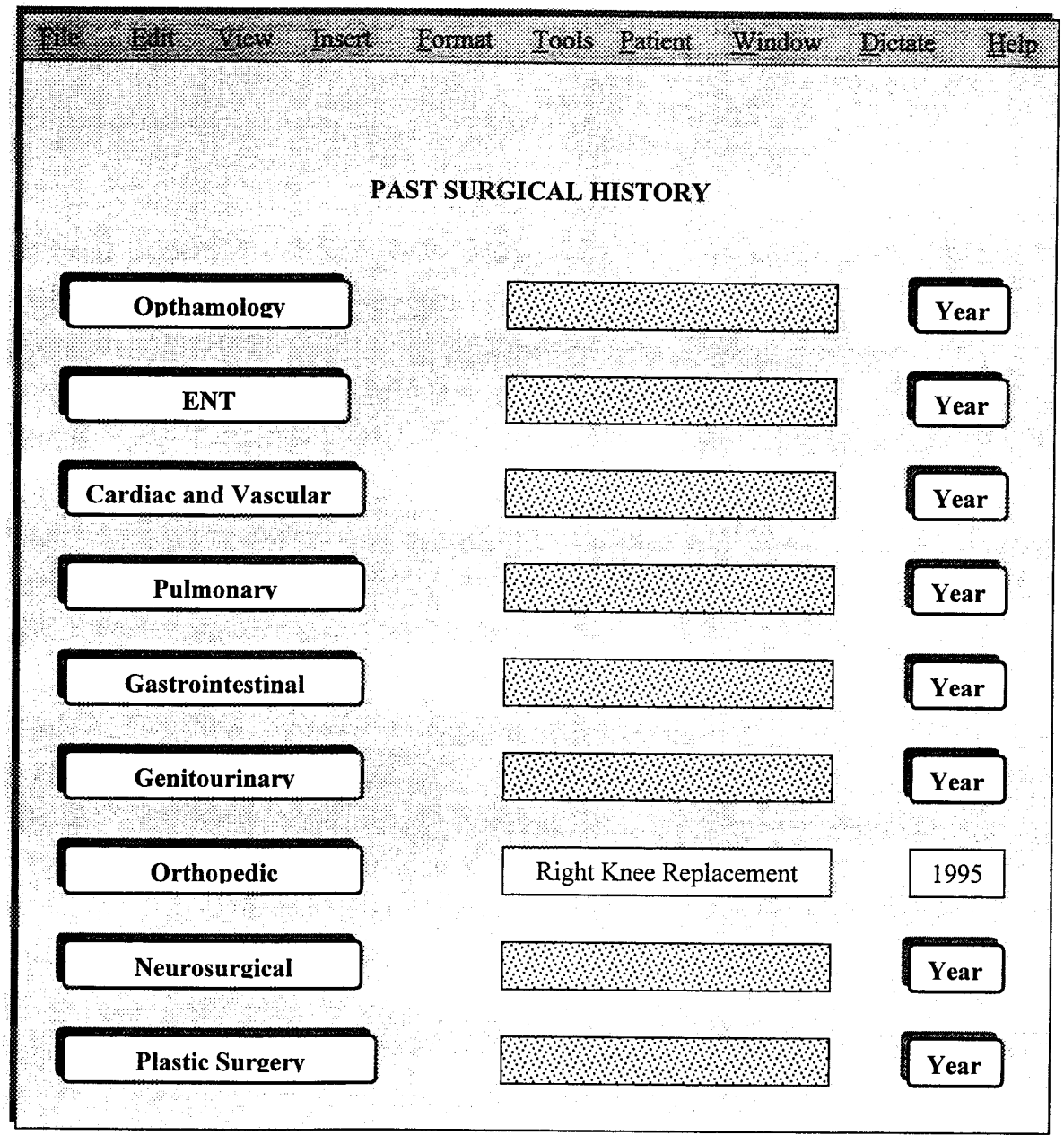

File Edit View Insert Format Tools Patient Window Dictate Help
PAST SURGICAL HISTORY
Opthamology
Year
ENT
Year
Cardiac and Vascular
Year
Pulmonary
Year
Gastrointestinal
Year
Genitourinary
Year
Orthopedic
Right Knee Replacement
1995
Neurosurgical
Year
Plastic Surgery
Year

Figure 13G

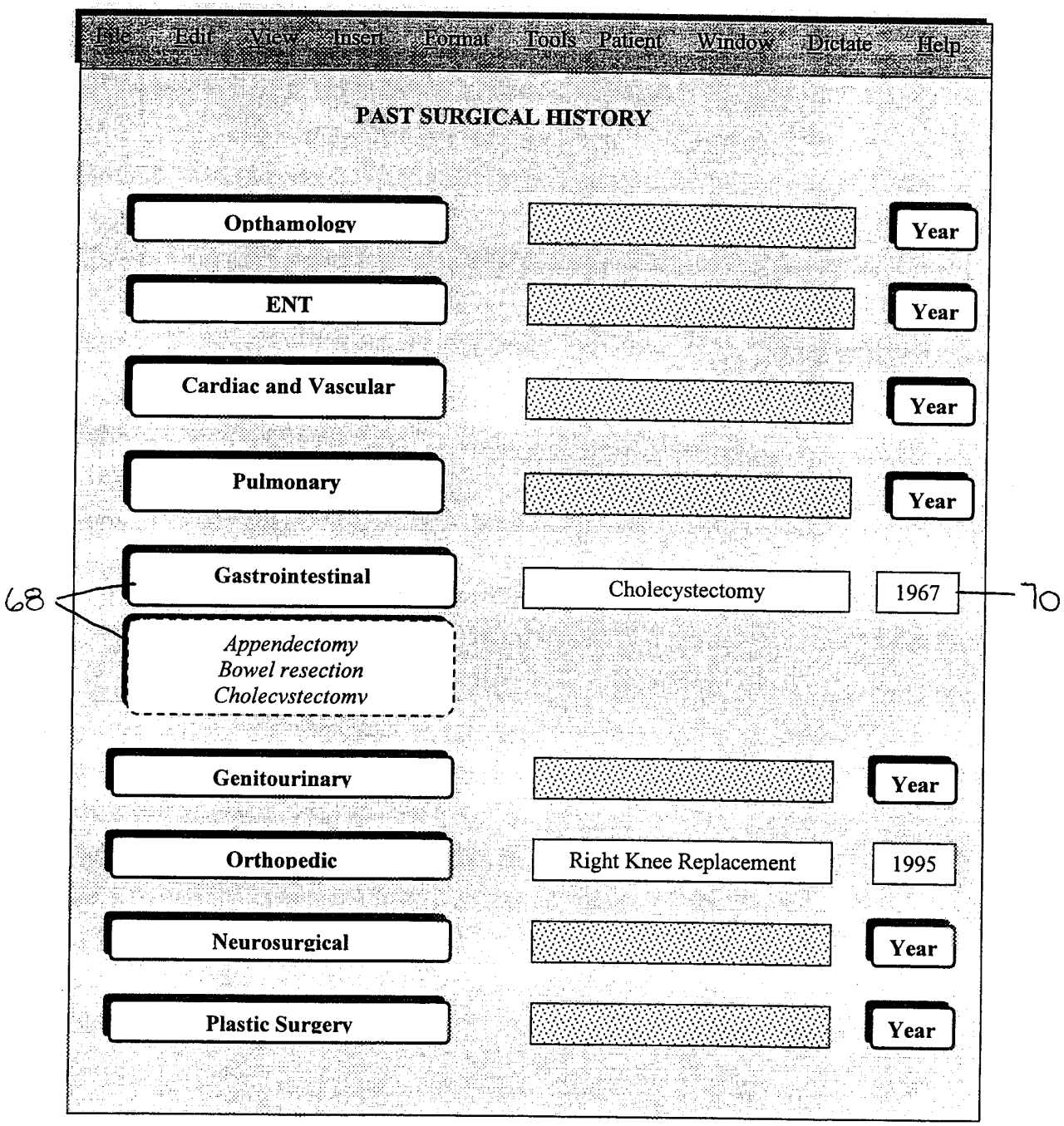

File Edit View Insert Format Tools Patient Window Dictate Help
PAST SURGICAL HISTORY
Opthamology
Year
ENT
Year
Cardiac and Vascular
Year
Pulmonary
Year
Gastrointestinal
Cholecystectomy
1967
68
70
Appendectomy
Bowel resection
Cholecystectomy
Genitourinary
Year
Orthopedic
Right Knee Replacement
1995
Neurosurgical
Year
Plastic Surgery
Year

Figure 13H

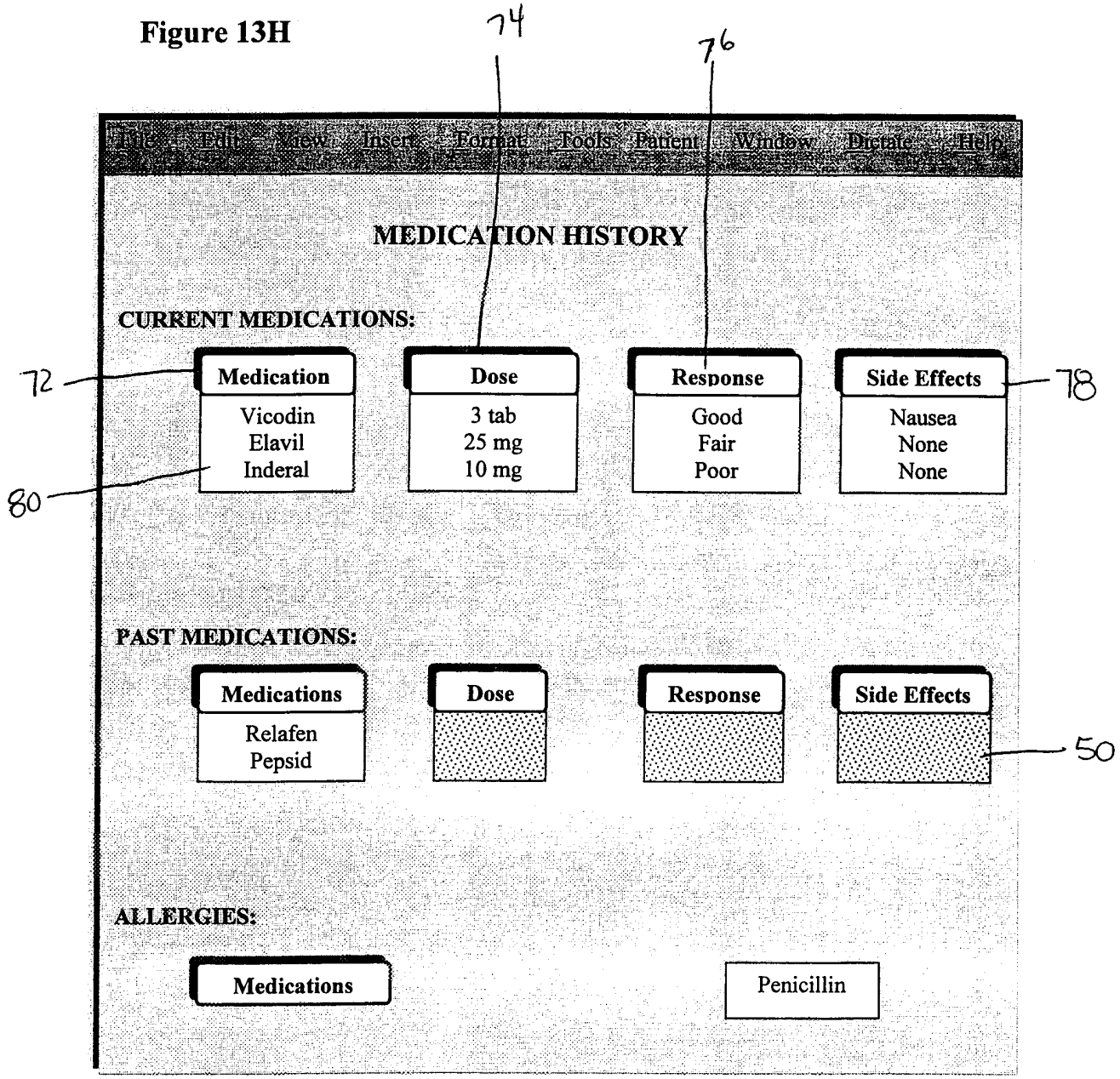

74
76
File Edit View Insert Format Tools Patient Window Dictate Help
MEDICATION HISTORY
CURRENT MEDICATIONS:
72
Medication
Vicodin
Elavil
Inderal
Dose
3 tab
25 mg
10 mg
Response
Good
Fair
Poor
Side Effects
Nausea
None
None
78
80
PAST MEDICATIONS:
Medications
Relafen
Pepsid
Dose
Response
Side Effects
50
ALLERGIES:
Medications
Penicillin

Figure 13I

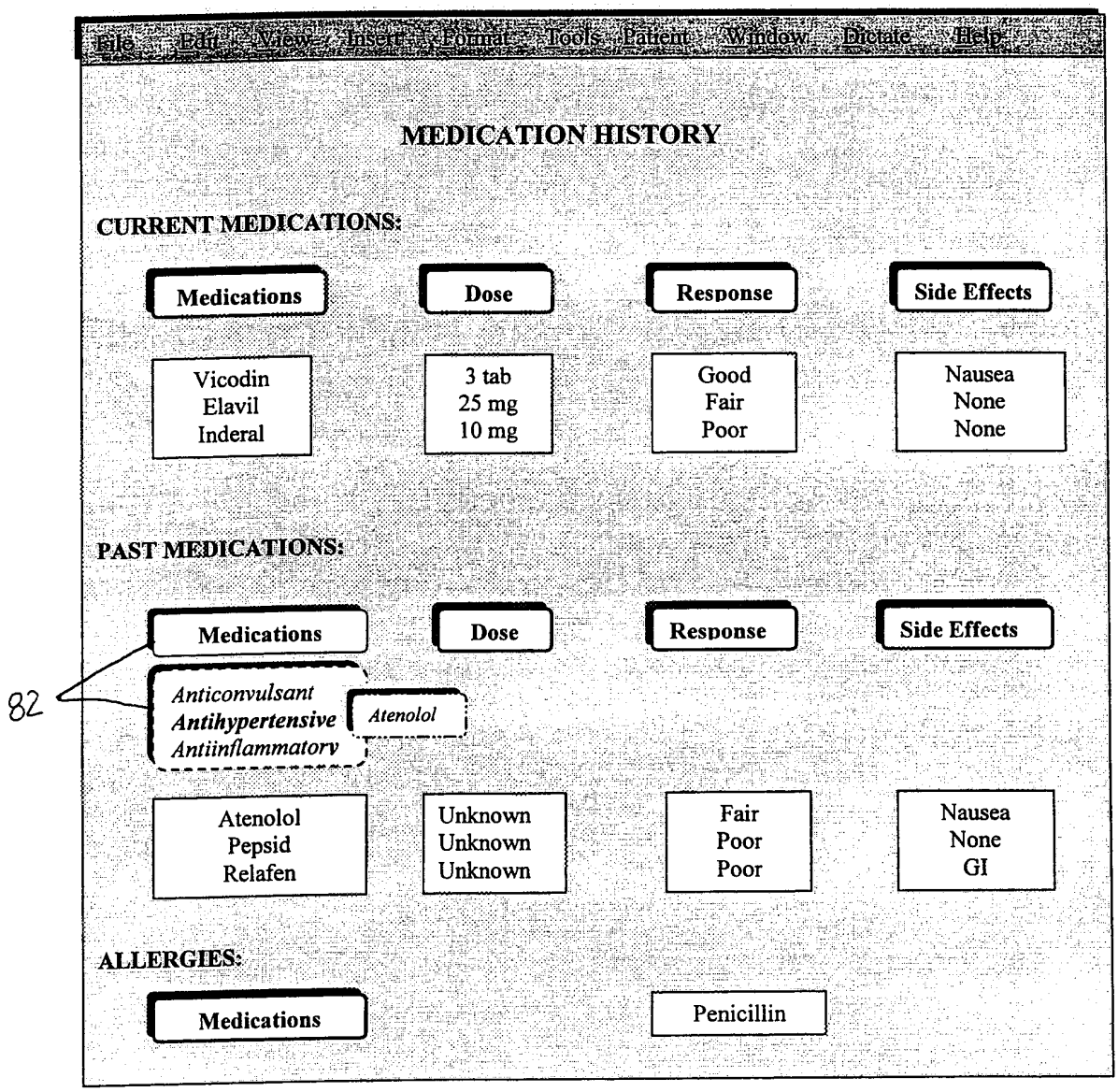

File Edit View Insert Format Tools Patient Window Dictate Help
MEDICATION HISTORY
CURRENT MEDICATIONS:
Medications
Dose
Response
Side Effects
Vicodin
Elavil
Inderal
3 tab
25 mg
10 mg
Good
Fair
Poor
Nausea
None
None
PAST MEDICATIONS:
Medications
Dose
Response
Side Effects
82
Anticonvulsant
Antihypertensive
Antiinflammatory
Atenolol
Atenolol
Pepsid
Relafen
Unknown
Unknown
Unknown
Fair
Poor
Poor
Nausea
None
GI
ALLERGIES:
Medications
Penicillin

Figure 13J

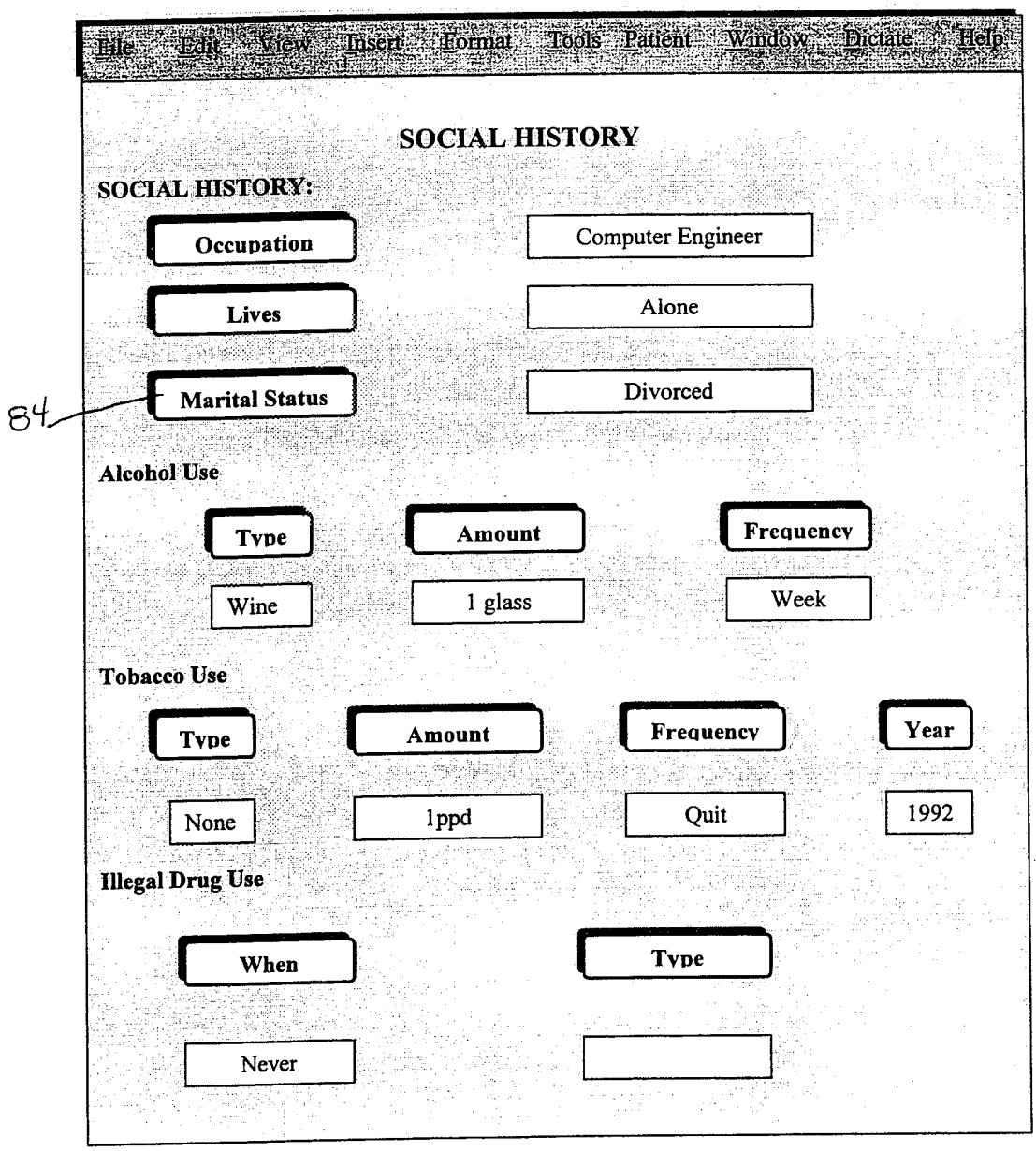

File Edit View Insert Format Tools Patient Window Dictate Help
SOCIAL HISTORY
SOCIAL HISTORY:
Occupation
Computer Engineer
Lives
Alone
84
Marital Status
Divorced
Alcohol Use
Type
Amount
Frequency
Wine
1 glass
Week
Tobacco Use
Type
Amount
Frequency
Year
None
1ppd
Quit
1992
Illegal Drug Use
When
Type
Never

Figure 13K

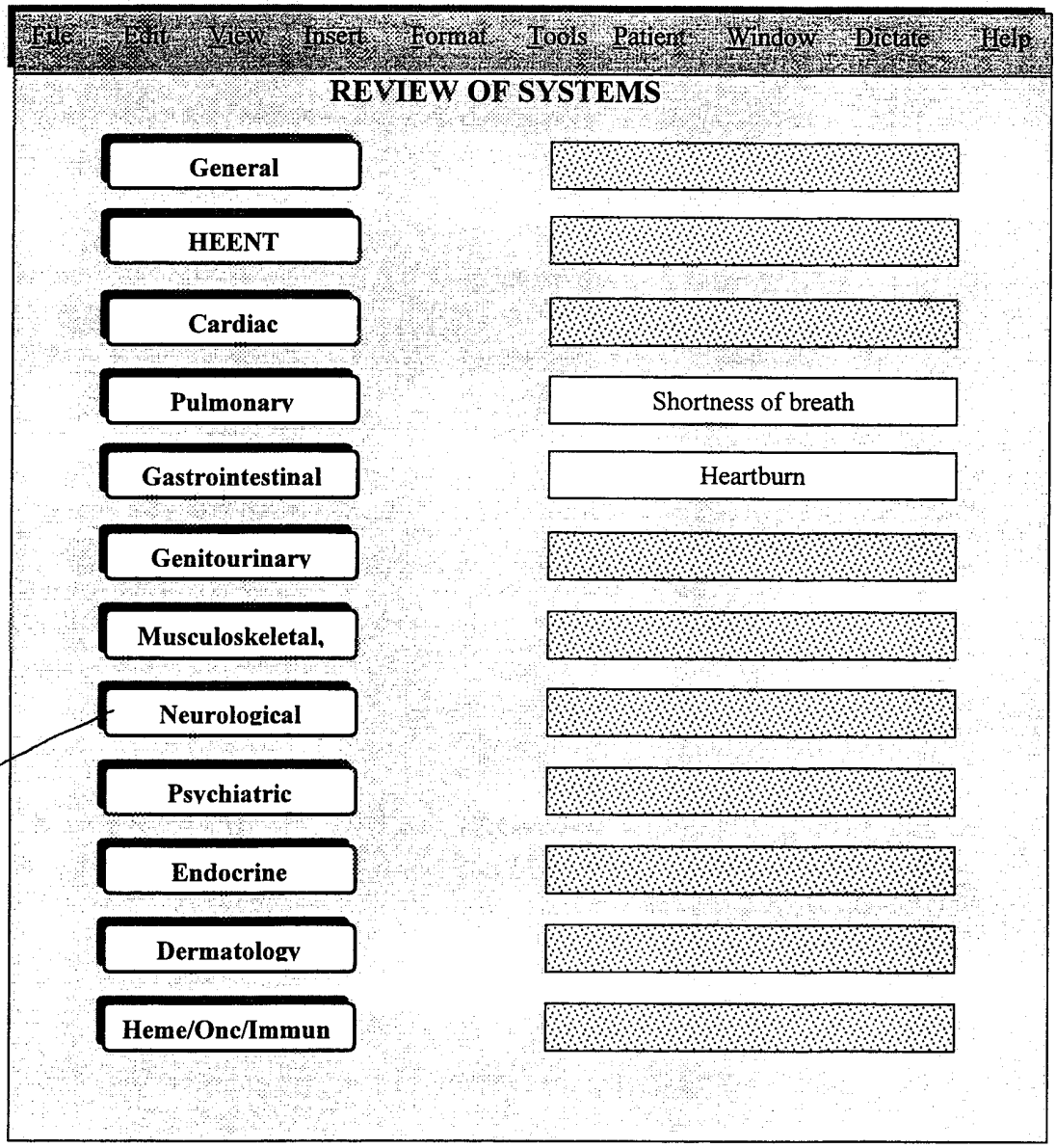

File Edit View Insert Format Tools Patient Window Dictate Help
REVIEW OF SYSTEMS
General
HEENT
Cardiac
Pulmonary
Shortness of breath
Gastrointestinal
Heartburn
Genitourinary
Musculoskeletal,
Neurological
Psychiatric
Endocrine
Dermatology
Heme/Onc/Immun
86

Figure 13L

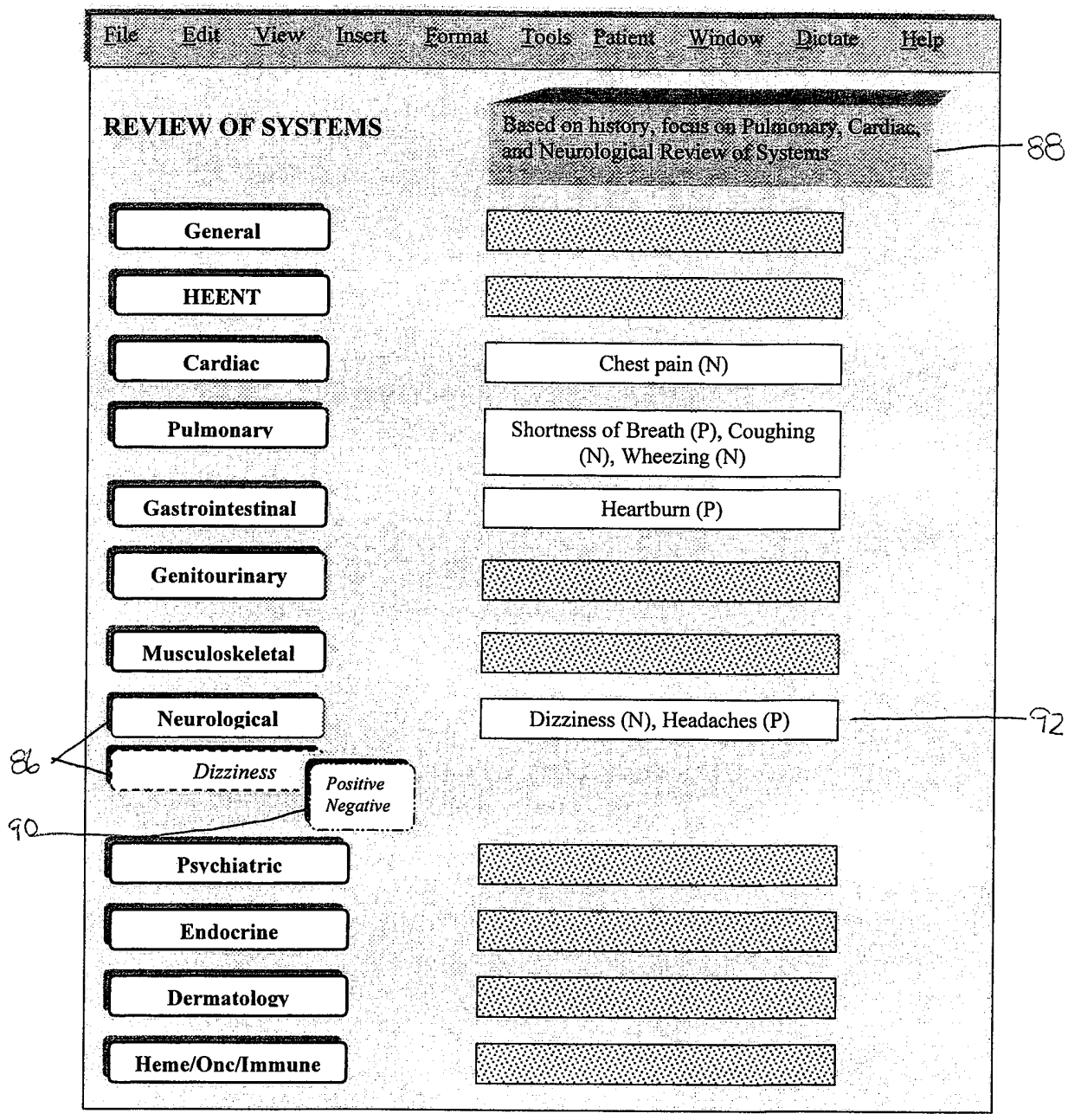

File Edit View Insert Format Tools Patient Window Dictate Help
REVIEW OF SYSTEMS
Based on history, focus on Pulmonary, Cardiac, and Neurological Review of Systems
88
General
HEENT
Cardiac
Chest pain (N)
Pulmonary
Shortness of Breath (P), Coughing (N), Wheezing (N)
Gastrointestinal
Heartburn (P)
Genitourinary
Musculoskeletal
Neurological
Dizziness (N), Headaches (P)
92
86
Dizziness
Positive
Negative
90
Psychiatric
Endocrine
Dermatology
Heme/Onc/Immune

Figure 13M

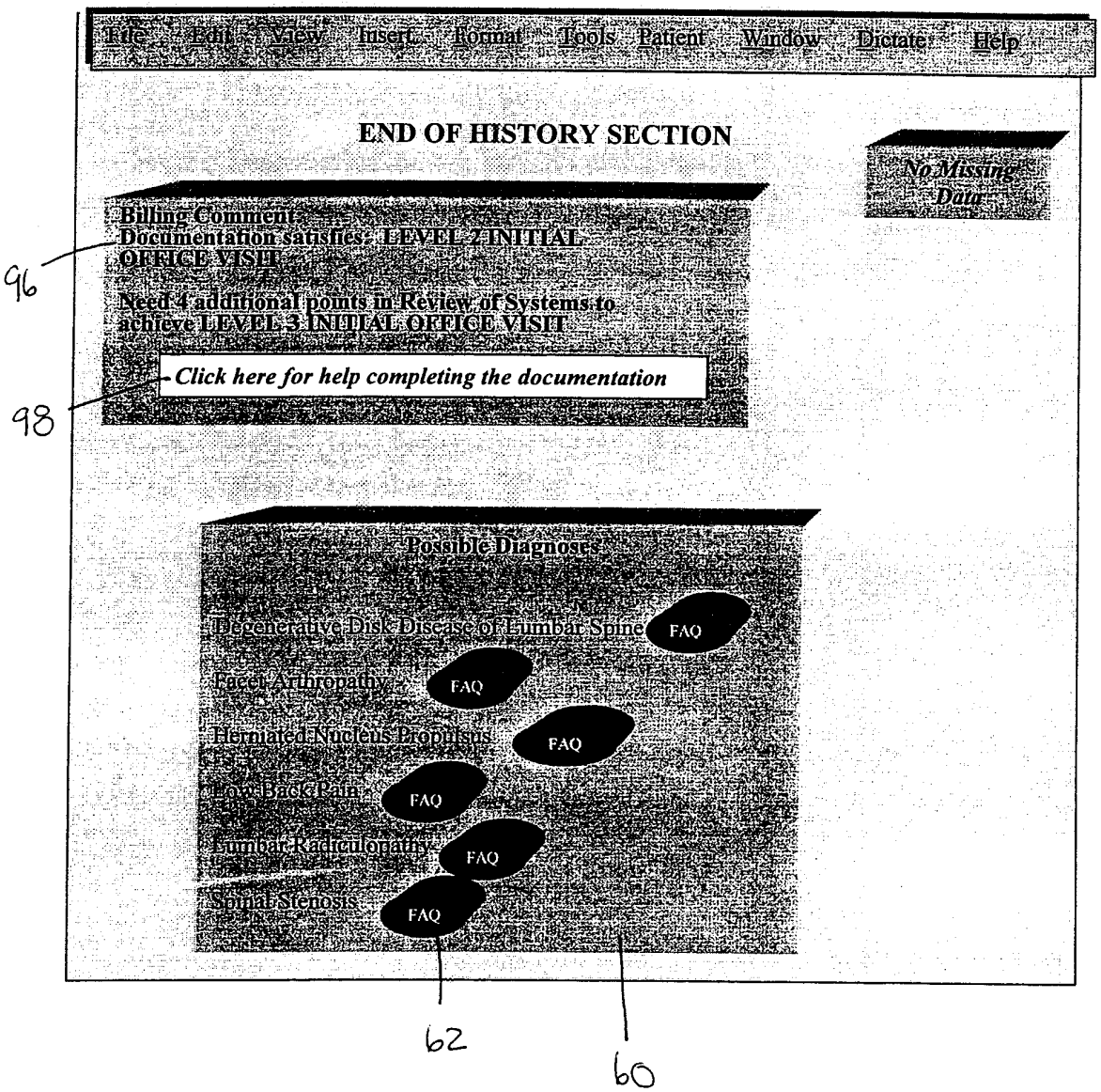

File Edit View Insert Format Tools Patient Window Dictate Help
END OF HISTORY SECTION
No Missing Data
Billing Comment:
Documentation satisfies: LEVEL 2 INITIAL OFFICE VISIT
Need 4 additional points in Review of Systems to achieve LEVEL 3 INITIAL OFFICE VISIT
Click here for help completing the documentation
Possible Diagnoses
Degenerative Disk Disease of Lumbar Spine
Facet Arthropathy
Herniated Nucleus Propulsus
Low Back Pain
Lumbar Radiculopathy
Spinal Stenosis
FAQ
96
98
62
60

Figure 14A

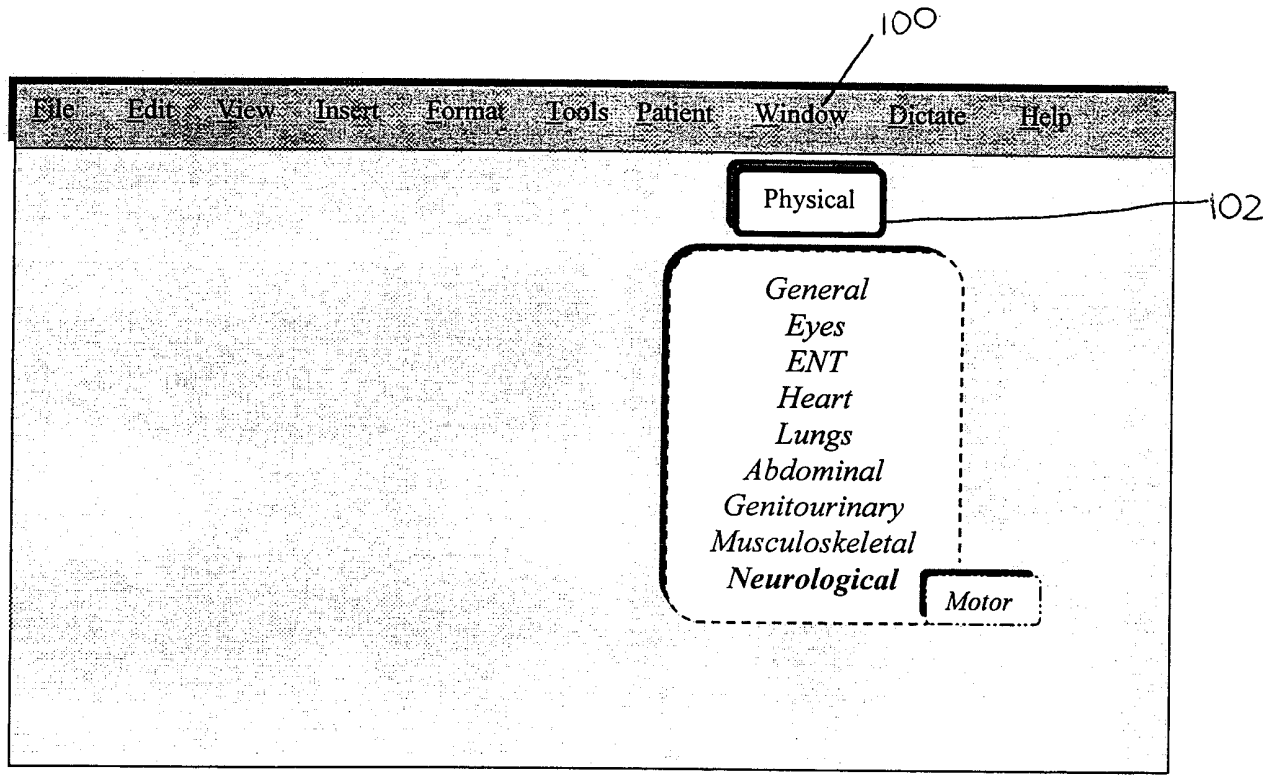

100
File
Edit
View
Insert
Format
Tools
Patient
Window
Dictate
Help
Physical
102
General
Eyes
ENT
Heart
Lungs
Abdominal
Genitourinary
Musculoskeletal
Neurological
Motor

Figure 14B

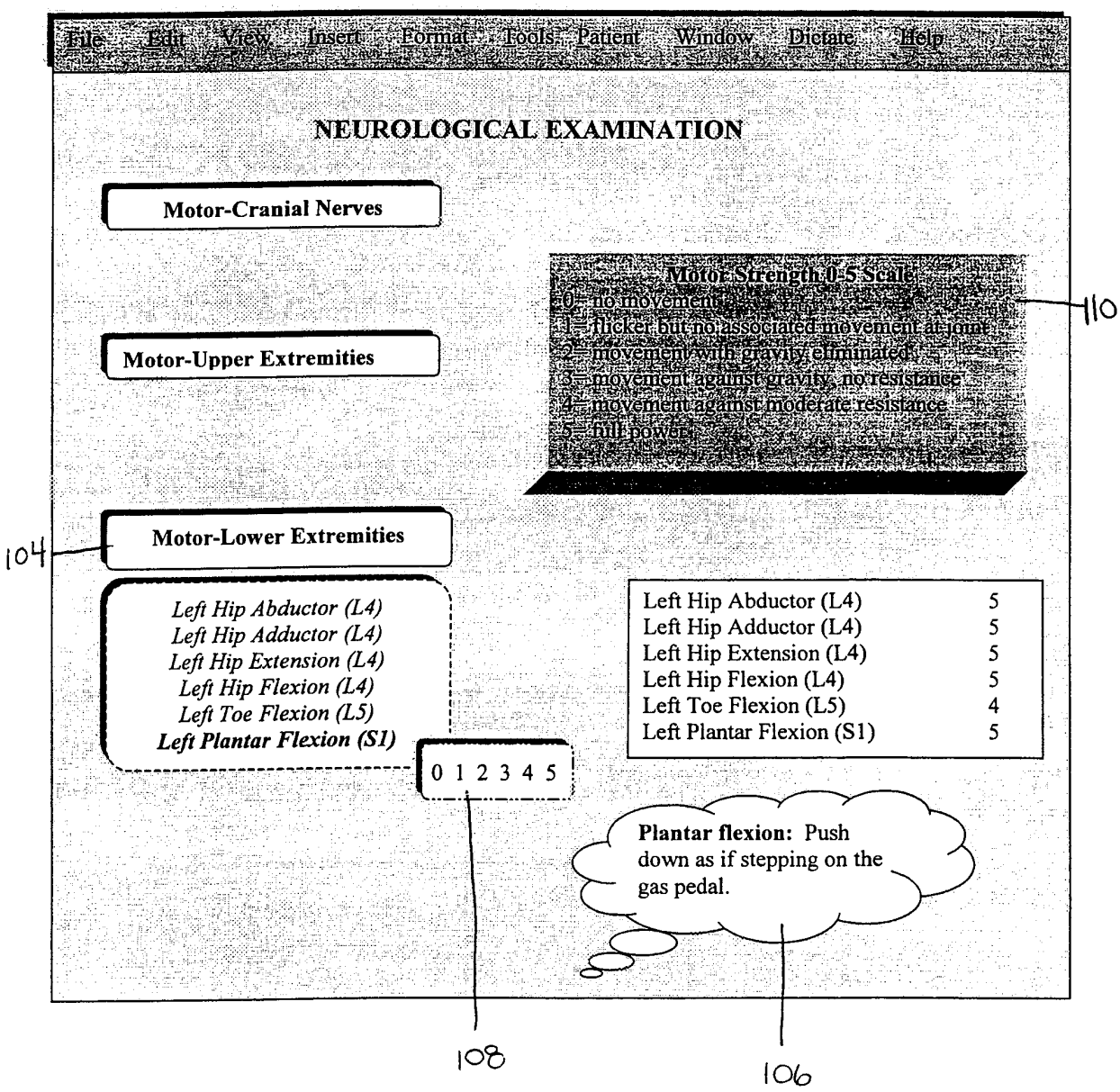

File Edit View Insert Format Tools Patient Window Dictate Help
NEUROLOGICAL EXAMINATION
Motor-Cranial Nerves
Motor-Upper Extremities
Motor-Lower Extremities
Motor Strength 0-5 Scale
0= no movement
1= flicker but no associated movement at joint
2= movement with gravity eliminated
3= movement against gravity, no resistance
4= movement against moderate resistance
5= full power
110
104
Left Hip Abductor (L4)
Left Hip Adductor (L4)
Left Hip Extension (L4)
Left Hip Flexion (L4)
Left Toe Flexion (L5)
Left Plantar Flexion (S1)
0 1 2 3 4 5
Left Hip Abductor (L4) 5
Left Hip Adductor (L4) 5
Left Hip Extension (L4) 5
Left Hip Flexion (L4) 5
Left Toe Flexion (L5) 4
Left Plantar Flexion (S1) 5
Plantar flexion: Push down as if stepping on the gas pedal.
108
106

Figure 15

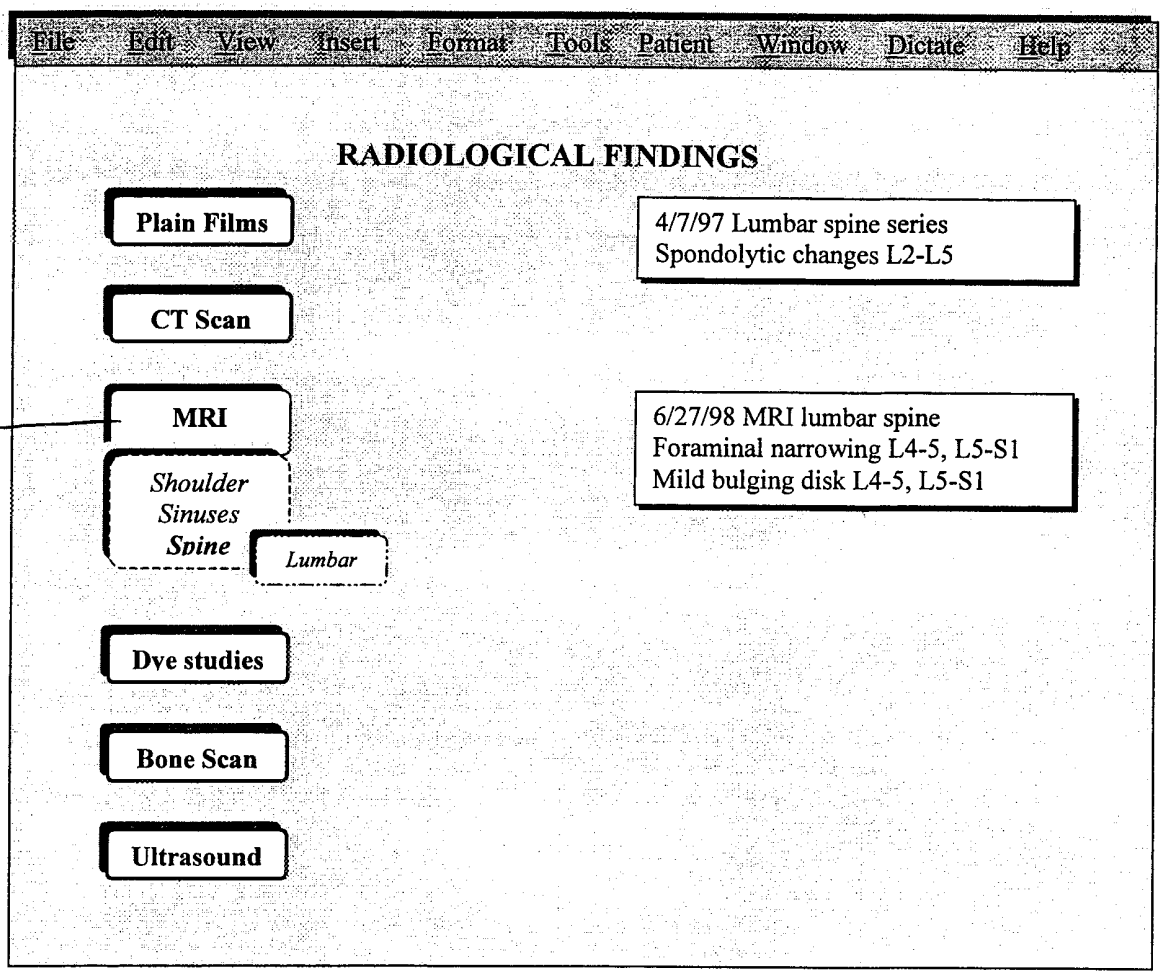

File Edit View Insert Format Tools Patient Window Dictate Help
RADIOLOGICAL FINDINGS
Plain Films
CT Scan
MRI
Shoulder
Sinuses
Spine
Lumbar
Dye studies
Bone Scan
Ultrasound
4/7/97 Lumbar spine series
Spondolytic changes L2-L5
6/27/98 MRI lumbar spine
Foraminal narrowing L4-5, L5-S1
Mild bulging disk L4-5, L5-S1
112

Figure 16A

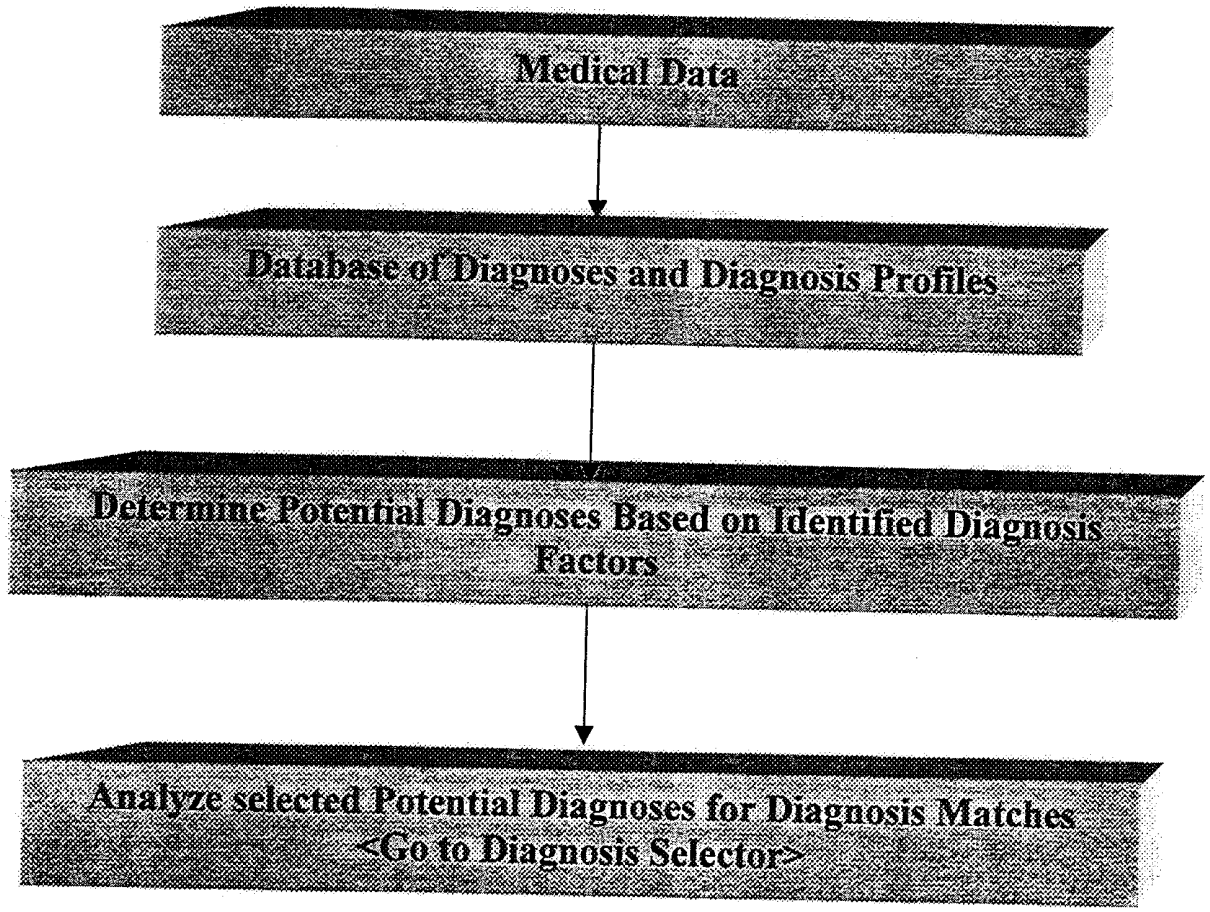

Medical Data
Database of Diagnoses and Diagnosis Profiles
Determine Potential Diagnoses Based on Identified Diagnosis Factors
Analyze selected Potential Diagnoses for Diagnosis Matches
<Go to Diagnosis Selector>

Figure 16B

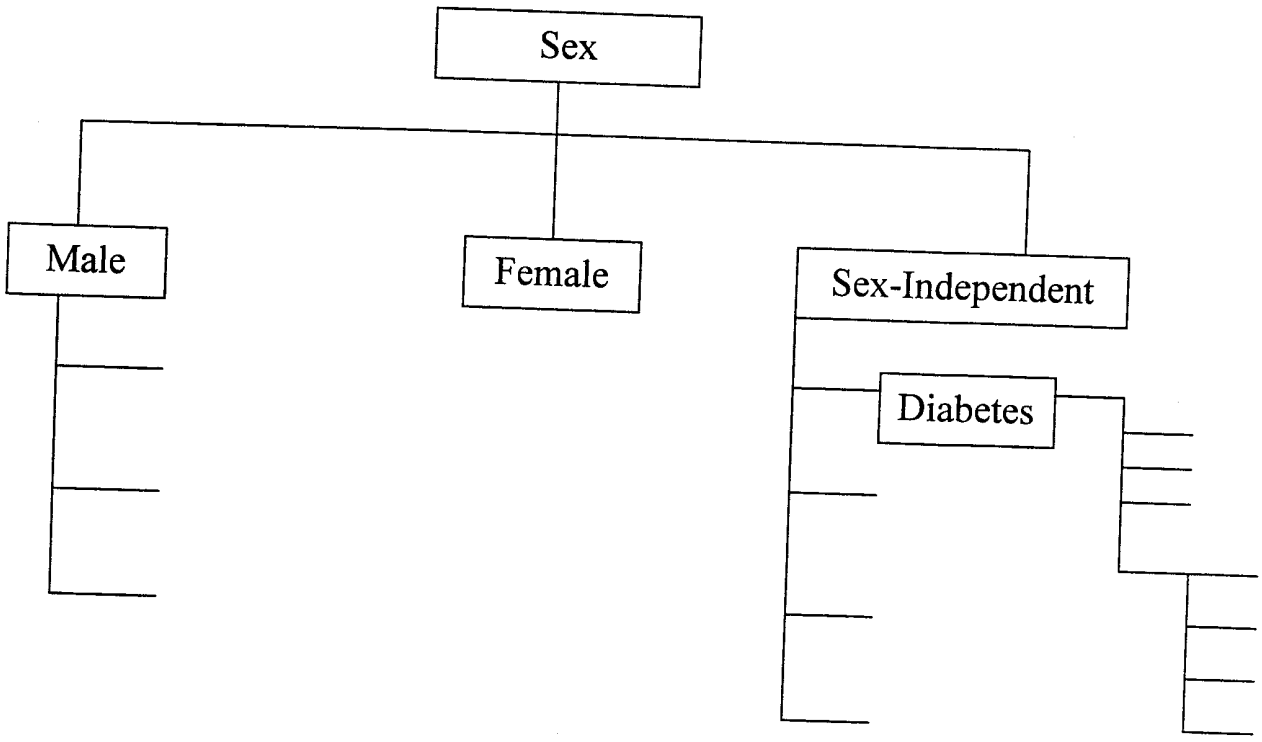


Figure 16C

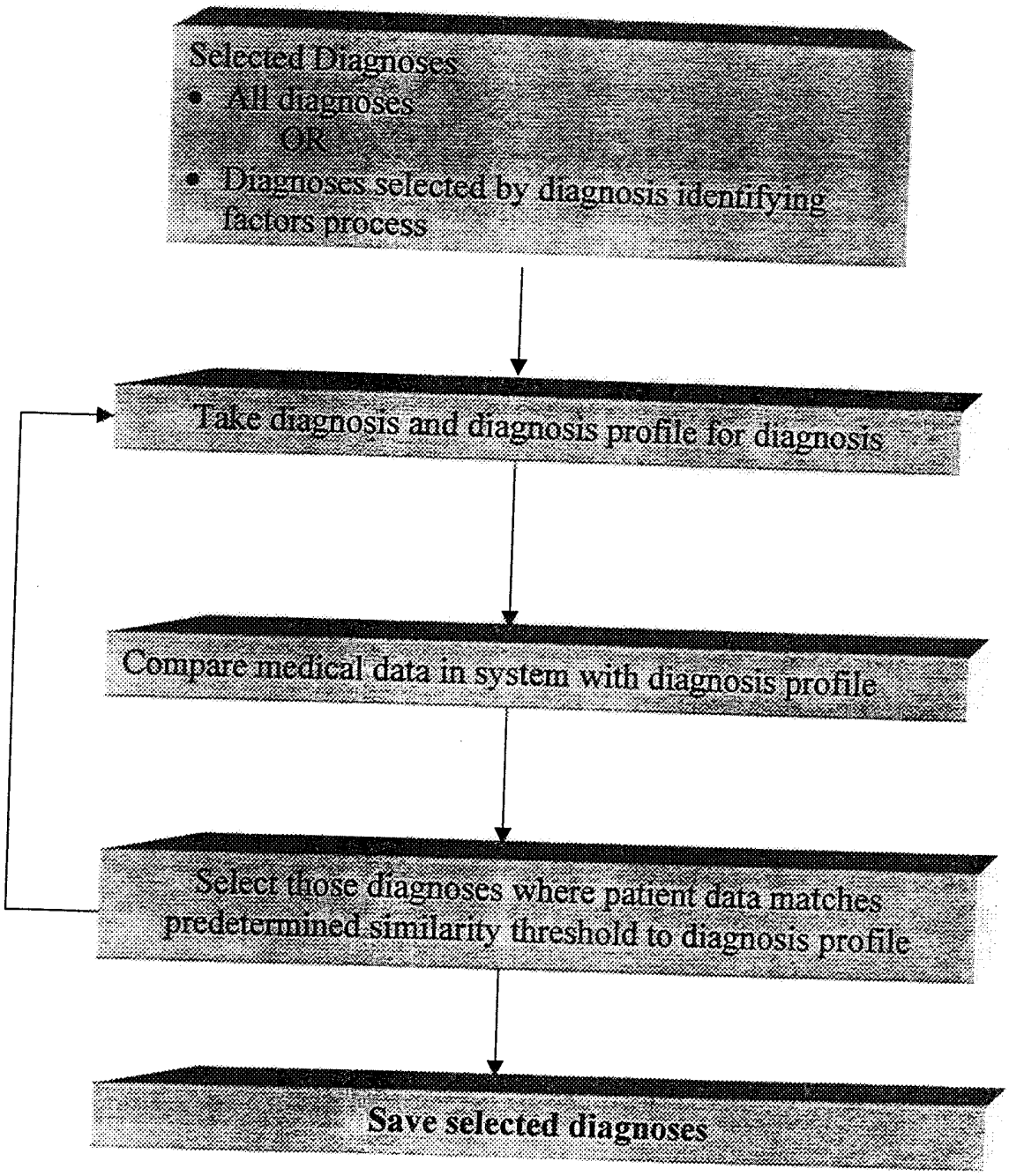

Selected Diagnoses
• All diagnoses
OR
• Diagnoses selected by diagnosis identifying factors process
Take diagnosis and diagnosis profile for diagnosis
Compare medical data in system with diagnosis profile
Select those diagnoses where patient data matches predetermined similarity threshold to diagnosis profile
Save selected diagnoses

Figure 16D

Diagnosis: Diabetic Neuropathy

	Diabetic Neuropathy	Patient Data **Bold=Match**
History: Pain Location	Feet, legs, hands, arms	**Leg**
Pain Onset	Gradual	Sudden
Pain Cause	Unknown	Injury
Past Medical History: Diabetes	Yes	No
Physical Exam: Motor	No	Yes
Physical Exam: Sensory	Multiple dermatomes	No
Radiologic Findings	None	Yes

Diagnosis: Lumbar Radiculopathy

	Lumbar Radiculopathy	Patient Data
History: Pain Location	Back, Leg, Feet	**Back, Leg**
Pain Onset:	Sudden	**Sudden**
Pain Cause	Injury	**Injury**
Physical Exam: Motor	Yes	**Yes**
Physical Exam: Sensory	Single dermatome	No
Radiologic Findings	Degenerative disk Nerve root impingement Herniated or bulging disk, etc	**Yes**

Figure 17

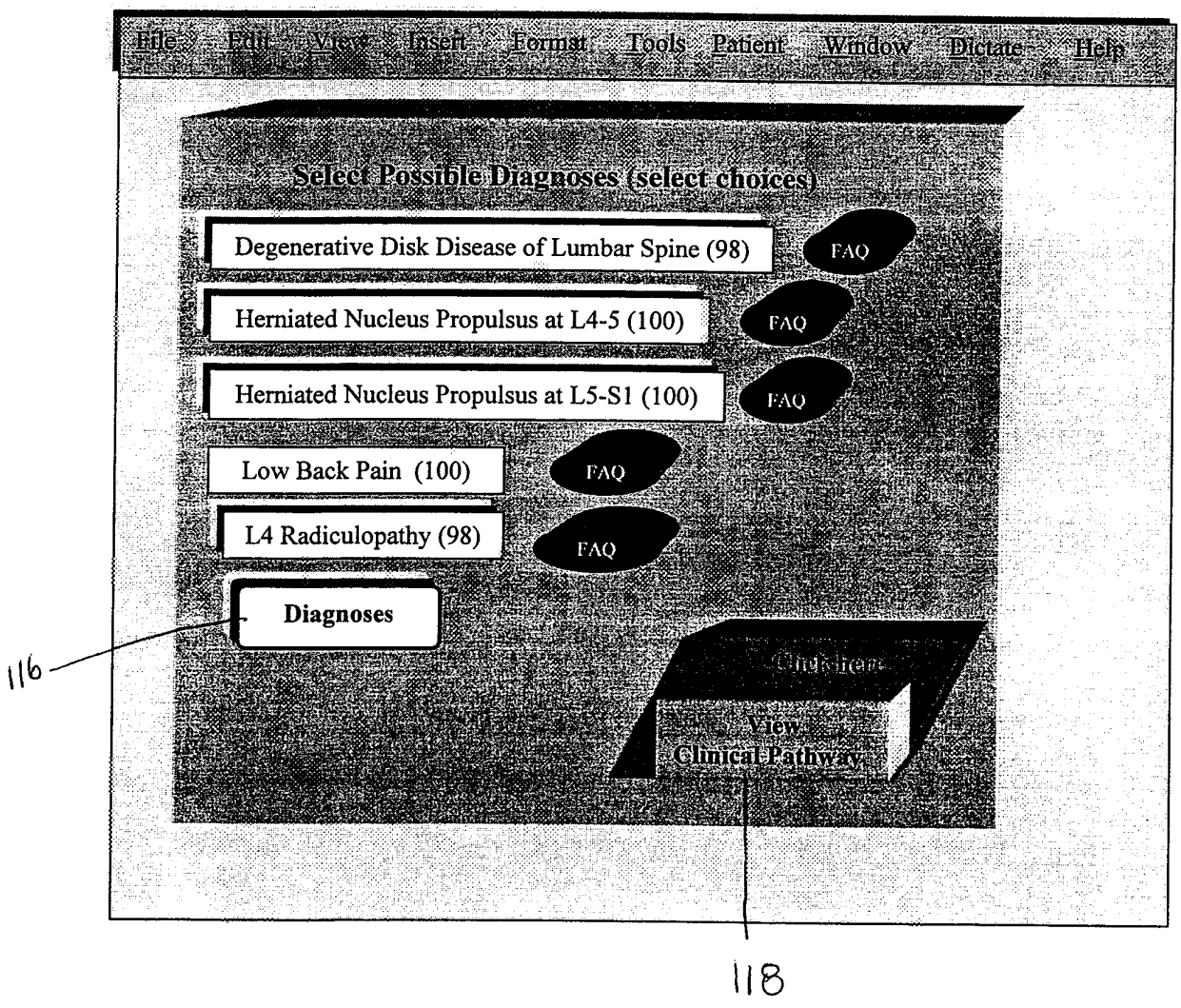

File Edit View Insert Format Tools Patient Window Dictate Help
Select Possible Diagnoses (select choices)
Degenerative Disk Disease of Lumbar Spine (98)
FAQ
Herniated Nucleus Propulsus at L4-5 (100)
FAQ
Herniated Nucleus Propulsus at L5-S1 (100)
FAQ
Low Back Pain (100)
FAQ
L4 Radiculopathy (98)
FAQ
Diagnoses
116
Quick Items
View
Clinical Pathway
118

Figure 18

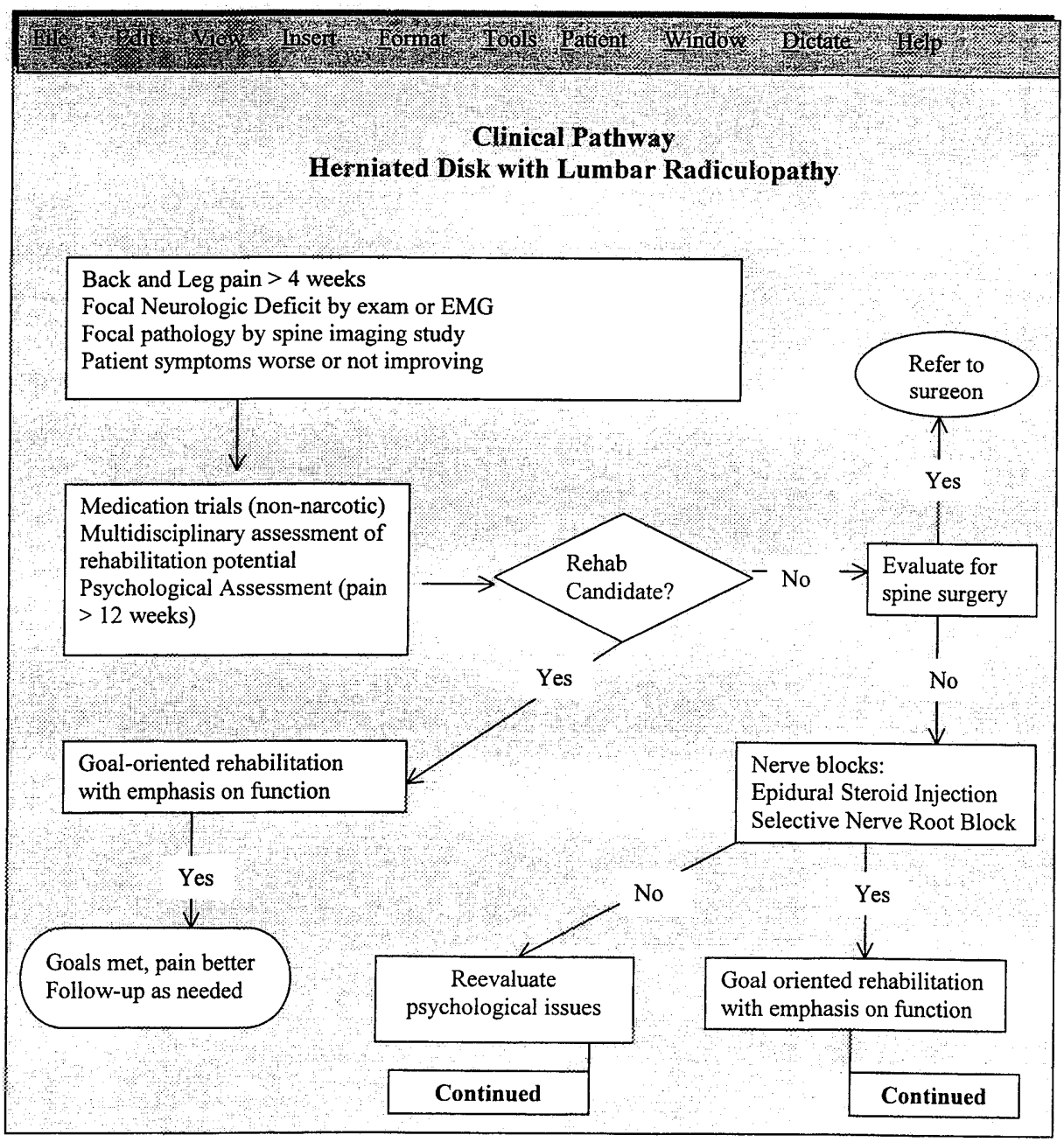

File Edit View Insert Format Tools Patient Window Dictate Help
Clinical Pathway
Herniated Disk with Lumbar Radiculopathy
Back and Leg pain > 4 weeks
Focal Neurologic Deficit by exam or EMG
Focal pathology by spine imaging study
Patient symptoms worse or not improving
Refer to surgeon
Yes
Medication trials (non-narcotic)
Multidisciplinary assessment of rehabilitation potential
Psychological Assessment (pain > 12 weeks)
Rehab Candidate?
No
Evaluate for spine surgery
Yes
No
Goal-oriented rehabilitation with emphasis on function
Nerve blocks:
Epidural Steroid Injection
Selective Nerve Root Block
Yes
No
Yes
Goals met, pain better
Follow-up as needed
Reevaluate psychological issues
Goal oriented rehabilitation with emphasis on function
Continued
Continued

Figure 19

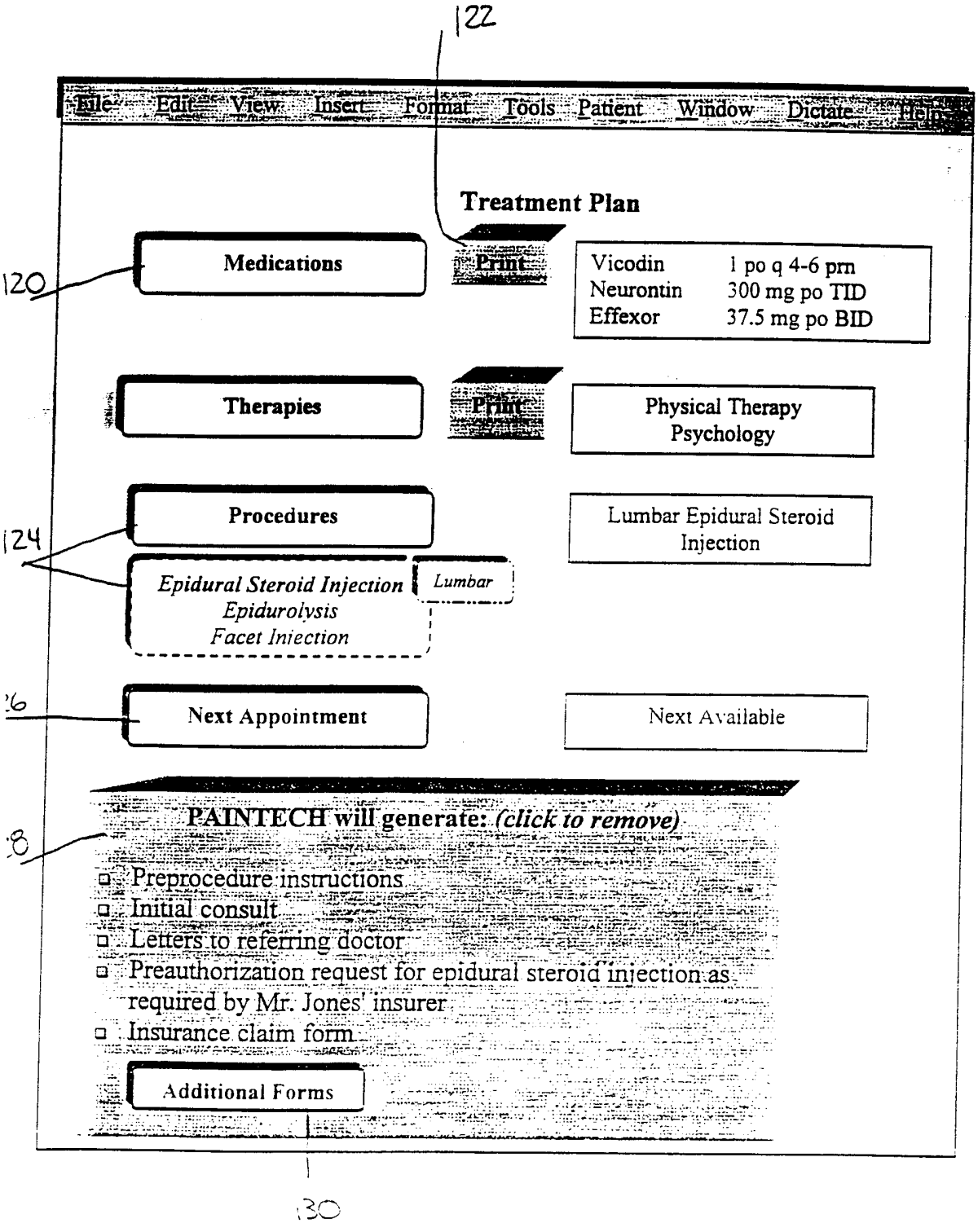

122
File Edit View Insert Format Tools Patient Window Dictate Help
Treatment Plan
120
Medications
Print
Vicodin 1 po q 4-6 prn
Neurontin 300 mg po TID
Effexor 37.5 mg po BID
Therapies
Print
Physical Therapy
Psychology
Procedures
124
Lumbar Epidural Steroid Injection
Epidural Steroid Injection
Lumbar
Epidurolysis
Facet Injection
Next Appointment
Next Available
PAINTECH will generate: (click to remove)
Preprocedure instructions
Initial consult
Letters to referring doctor
Preauthorization request for epidural steroid injection as required by Mr. Jones' insurer
Insurance claim form
Additional Forms
130

Figure 20

Robert Smith MD
Pain Management Center
Instructions Before Your Procedure

Please report to Los Gatos Surgicenter on 12/10/98, Friday at 9:30 AM/PM. Your appointment has been scheduled with Dr. Smith. You will find parking at the front of the building. Please check in at the front desk. Please follow these important instructions. They are for your safety and comfort.

- ☐ You must have a responsible adult drive you home after the procedure.
- ☐ Do not eat or drink anything for 6 hours before your procedure.
- ☐ Please bring your pain medicine with you but do not take it before your procedure. This will help us to determine if the procedure has helped your pain.
- ☐ Take your Inderal, medication for your blood pressure, at the normally scheduled time with a sip of water.
- ☐ Leave all jewelry, money, and other valuables at home.
- ☐ Wear comfortable clothes that are easy for you to change.
- ☐ Please be sure to notify our office 24 hours in advance if you are unable to keep your appointment.
- ☐ If you have any questions, please feel free to call us at (650) 776-9342.

The undersigned certifies that he/she has read these instructions and is the patient or the duly authorized agent for the patient and accepts and understands these instructions. A copy of the instructions will be given to the patient.

Patient _____ Witness _____
Date_____ Time _____ AM/PM Date____ Time_____ AM/PM

Figure 21

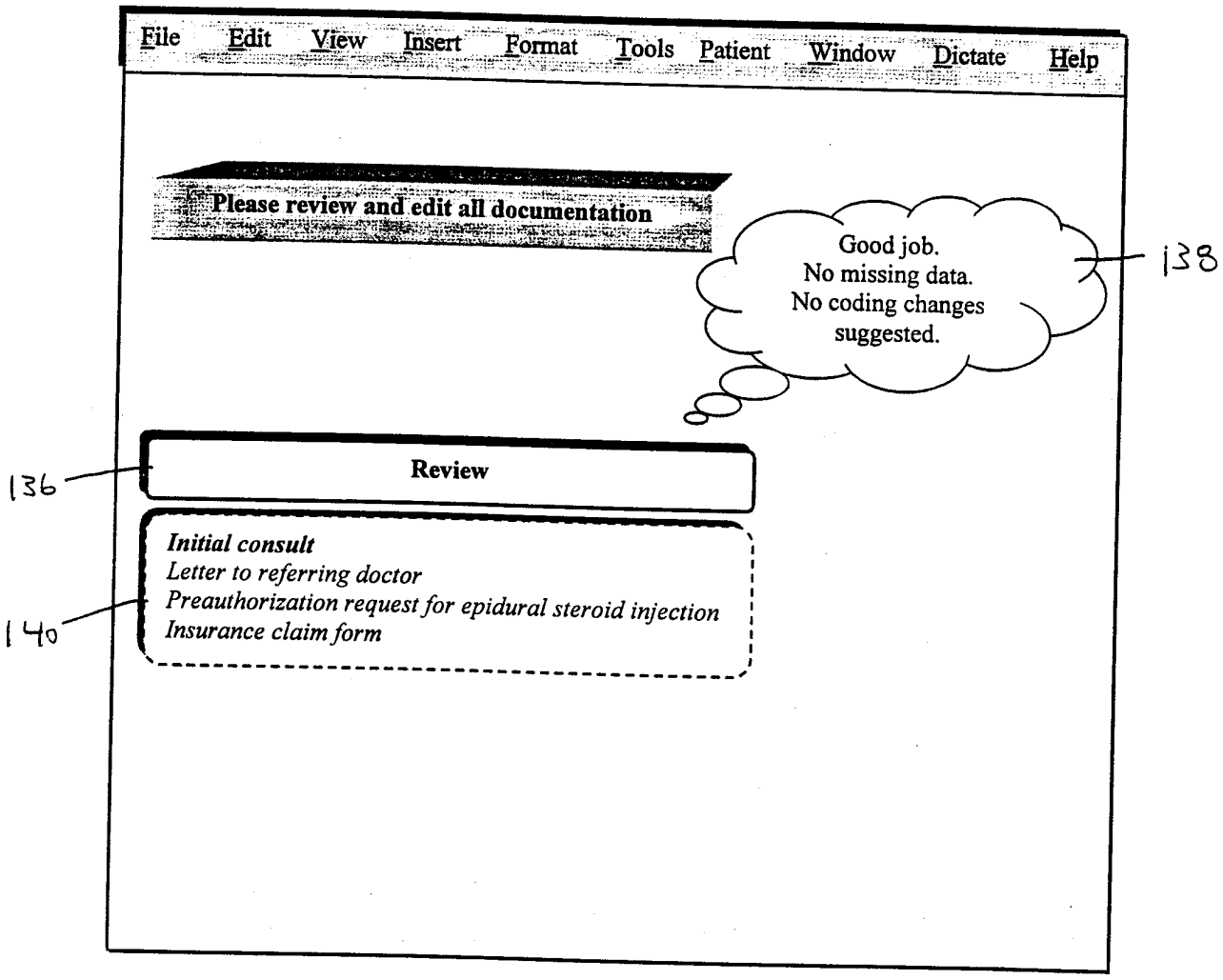

File Edit View Insert Format Tools Patient Window Dictate Help
Please review and edit all documentation
Good job.
No missing data.
No coding changes
suggested.
138
136
Review
Initial consult
Letter to referring doctor
Preauthorization request for epidural steroid injection
Insurance claim form
140

Figure 22A

Patient Name: Steven Jones
DOB: 10-05-39
Account #: 4242357
Date of visit: 12.6.98

Initial Visit
Steven Jones is a 60-year-old man who presents with left leg pain.

History of Present Illness:
Mr. Jones' pain started three months ago following a motor vehicle accident and was sudden in onset. The pain is located in the left leg, posterior thigh and lateral calf. The pain is burning, intermittent, radiating, shooting, and tingling in quality. He states that standing and walking make the pain worse. Lying down and taking pain medicine improves the pain. His previous treatments for the pain have included physical therapy and pain medication. Mr. Jones denies any weakness in his lower extremities, and bowel or bladder incontinence.

Past Medical History:
1. Hypertension
2. Peptic Ulcer Disease
3. Depression

Past Surgical History:
1. Cholecystectomy 1967
2. Right Knee Replacement 1995

Current Medications:
1. Vicodin 3 tablets q D
2. Elavil 25 mg qHS
3. Inderal 10 mg q D

Allergies:
Penicillin

Social History:
1. Lives alone, Divorced, Computer Engineer
2. Tobacco: Quit 1992
3. Alcohol: 1 glass wine per week

Review Of Systems:
1. General: Denies weight gain, weight loss, sleeping problems
2. Pulmonary: (+) Shortness of breath, denies cough, wheezing
3. Gastrointestinal: (+) Heartburn, denies nausea, vomiting, diarrhea, constipation, melena
4. Neurological: (+) Headaches, denies dizziness, paralysis, seizures, tremor, ataxia

Physical Exam:
Vital Signs: BP 145/89 HR 78 Wt. 200 lb

Neurological exam:
1. Motor: 5/5 except Left toe flexion = 4/5
2. Sensory: Intact to light touch and pinprick

Figure 22B

3. Deep tendon reflexes: 2+ bilateral and symmetrical
4. Left Straight leg raise positive at 45°, Right negative
5. No paraspinous muscle spasm
6. No spinous process tenderness
7. No sacroiliac joint tenderness

Radiological Findings:
9/98 Lumbar Spine Series:
Spondolytic changes L2-5
10/98 MRI Lumbar Spine:
Foraminal narrowing L4-5, L5-S1; Mild bulging disk L4-5, L5-S1

Impression:
1. **Degenerative Disk Disease of Lumbar Spine**
2. Low Back Pain
3. Herniated Nucleus Propulsus L4-5, L5-S1
4. Left L4 Radiculopathy

Plan:
1. Medications:
   a) Vicodin 1 po q 4-6 prn
   b) Neurontin 300 mg po TID
   c) Effexor 37.5 mg po BID
2. Therapies:
   a) Physical Therapy
   b) Psychology
3. Procedures
   a) Lumbar Epidural Steroid Injection

Mr. Jones' epidural steroid injection will be scheduled for the next available appointment.

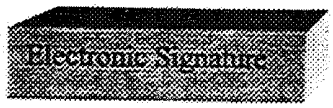


Figure 23

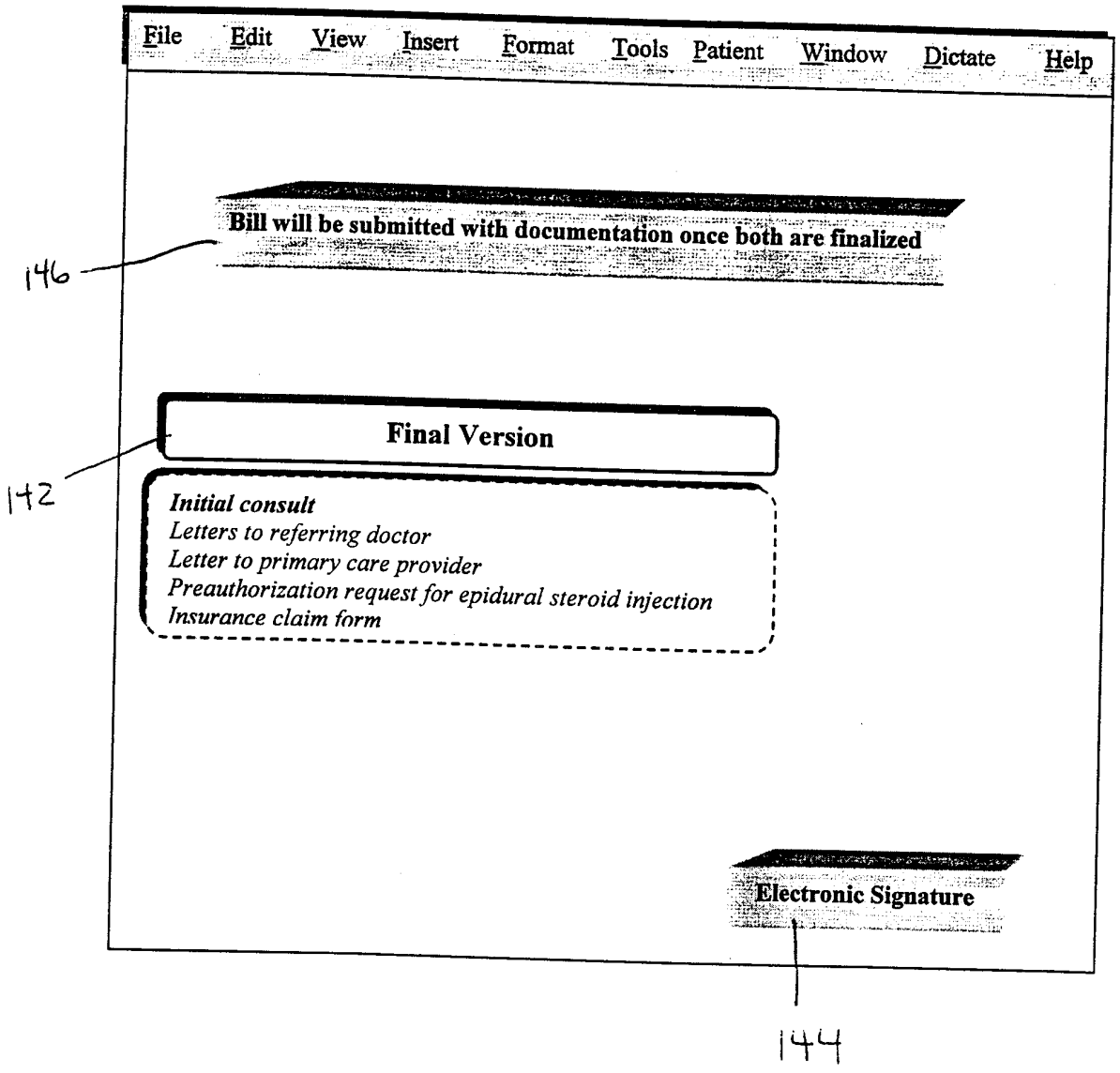
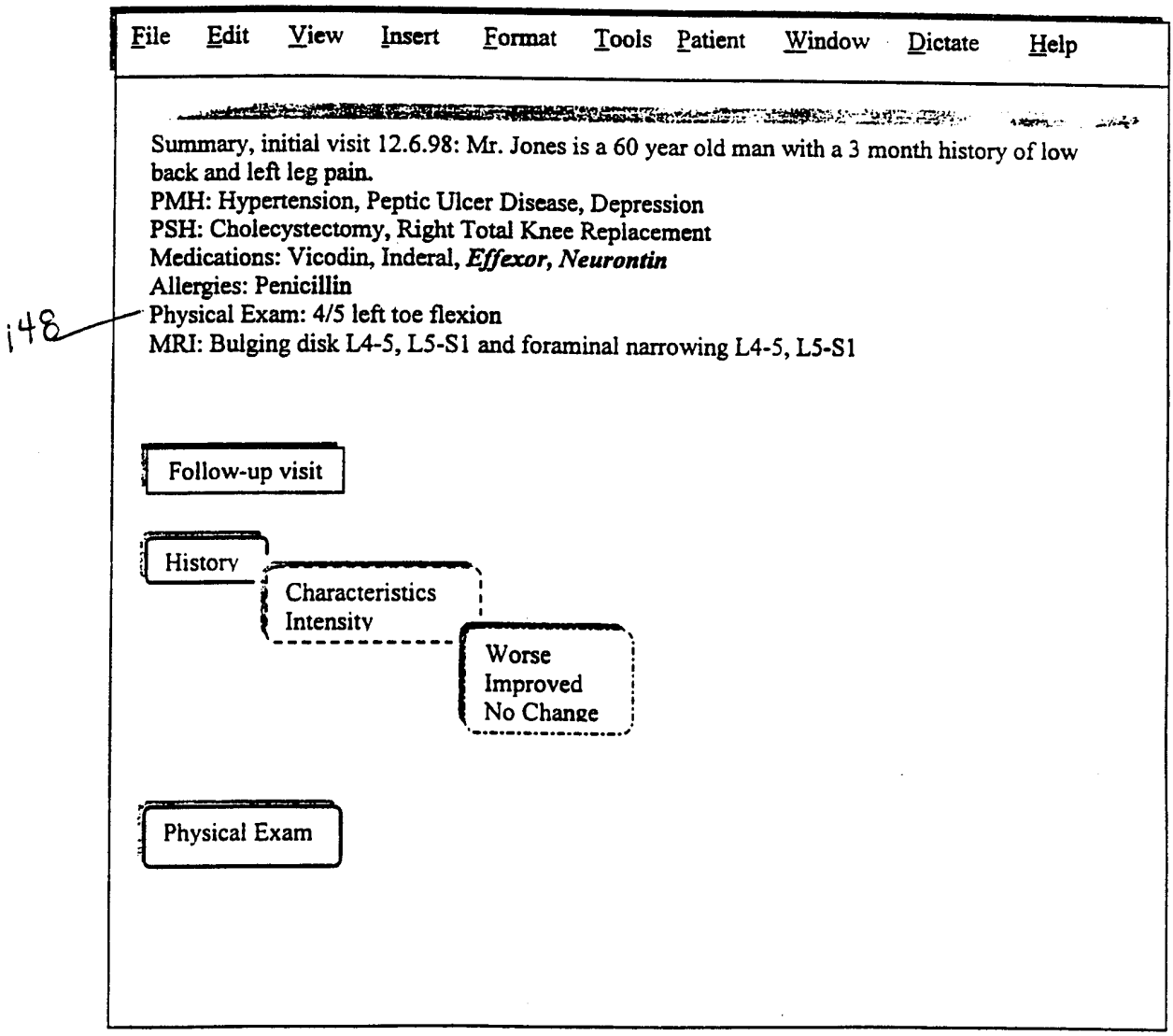

File Edit View Insert Format Tools Patient Window Dictate Help
Bill will be submitted with documentation once both are finalized
146
Final Version
142
Initial consult
Letters to referring doctor
Letter to primary care provider
Preauthorization request for epidural steroid injection
Insurance claim form
Electronic Signature
144

Figure 24


File Edit View Insert Format Tools Patient Window Dictate Help
Summary, initial visit 12.6.98: Mr. Jones is a 60 year old man with a 3 month history of low back and left leg pain.
PMH: Hypertension, Peptic Ulcer Disease, Depression
PSH: Cholecystectomy, Right Total Knee Replacement
Medications: Vicodin, Inderal, Effexor, Neurontin
Allergies: Penicillin
Physical Exam: 4/5 left toe flexion
MRI: Bulging disk L4-5, L5-S1 and foraminal narrowing L4-5, L5-S1
148
Follow-up visit
History
Characteristics
Intensity
Worse
Improved
No Change
Physical Exam

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07773

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G06F 3/00, 7/00, 15/21, 15/42, 159/00; G07G 7/48
US CL :705/1, 2, 3, 4, 34, 40; 706/924

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)

U.S. : 705/1, 2, 3, 4, 34, 40; 706/924

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

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

APS,DIALOG,EAST
diagnosis profiles, symptoms, insurance database, facilitating bills to be paid, patient, customer, selecting,choosing

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,491,725 A (PRITCHARD) 01 January 1985, col. 4, lines 49-, col. 8, lines 1-63.	1-51
Y	US 4,858,121 A (BARBER et al) 15 August 1989, Abstract.	1-51
Y	US 5,070,452 A (DOYLE, JR. et al) 03 December 1991, Abstract.	1-51
Y	US 5,253,164 A (HOLLOWAY et al) 12 October 1993, Abstract.	1-51
A	US 5,235,507 A (SACKLER et al) 10 August 1993, Abstract.	1-51
A	US 5,359,509 A (LITTLE et al) 25 October 1994, Abstract.	1-51

[X] Further documents are listed in the continuation of Box C. [ ] See patent family annex.

*	Special categories of cited documents:	"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
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier document published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"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		

Date of the actual completion of the international search 28 JUNE 2000	Date of mailing of the international search report 28 AUG 2000
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer TODD VOELTZ Telephone No. (703) 305-9714

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/07773

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No
A,P	US 5,915,241 A (GIANNINI) 22 June 1999, Abstract.	1-51
A	US 4,667,292 A (MOHLENBROCK et al) 19 May 1987, Abstract.	1-51