

METHOD FOR BUILDING A PREDICTIVE MODEL FOR THE MANAGEMENT OF PHARMACEUTICAL INVENTORY

FIELD OF THE INVENTION

This invention relates to the management of pharmaceutical inventory. More particularly, but not exclusively, the invention relates to a method of, and a system for, the management of pharmaceutical inventory. The invention also relates to a software product for the management of pharmaceutical inventory

BACKGROUND TO THE INVENTION

In general, the management of the sourcing and supply of pharmaceutical products for private health clinics and similar entities is carried out manually. Current systems are not automated and the manual methodologies that are utilised can lead to significant problems.

There are three areas in which smaller private health clinics are deficient. These are drug purchasing or procurement, drug inventory management and drug dispensation.

As far as drug purchasing is concerned, there is a lack of a broader view on what is available in the market. There is little transparent pricing on alternative products. Purchasing requires a good relationship with sales representatives in order to achieve cost effective pricing. The process generally requires informal negotiations via phone or mobile phone platforms such as Whatsapp (trade mark). Furthermore, stock refill quantities are based on doctors' or managers' estimates on what is required. Thus, broadly, procurement decisions are made with insufficient information.

The management of drug inventory requires a high level of effort. For example, it is difficult properly to write off expiring and missing drugs. Inventory tracking is inaccurate, and a large effort is required to conduct inventory audits. Also, incoming products are generally tracked manually.

Drug dispensation can be problematic in that there is generally an inability to serve customers' new needs. Without proper management of drug dispensation, clinics can suffer with long waiting lines and crowding. There is generally a difficulty with serving patients remotely and there are little or no personalised drugs based on patient needs. Furthermore, the lack of proper management of drug dispensation results in little or no referral delivery for patients with chronic ailments.

Independent health clinics generally purchase medication from pharmaceutical suppliers. Such health clinics can be small with 1-2 doctors on staff supported by clinical assistants. Typically, they see on average 150 patients per month and store approximately S\$10,000 to S\$30,000 worth of medication on site. The small nature of these clinics makes the data produced by a single clinic of little value.

Doctors at such health clinics often lack sufficient information to make the most informed decision concerning drug purchasing habits. Generally, there is little transparency around the cost of drugs or alternatives or trends in new drugs. Drugs can form an important part of the income stream of a health clinic.

Smaller health clinics have budgetary constraints that inhibit the building of fit-for-purpose medication facilities. This could include card access, climate controlled environments and computerised logging. As a result, drugs often go missing or expire at such health clinics.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided a method for the management of pharmaceutical inventory, the method including the steps of:

- extracting items of information from transaction records of at least one health provider relating to the purchase and supply of pharmaceutical inventory;

- writing the extracted items of information to a relational database management system such that the items of information are mapped to database fields and assigned to database tables to form structured data;

- fetching items of information from the database tables;

- processing the fetched items of information to generate required information relating to aspects of the pharmaceutical inventory; and

- displaying the required information.

The method may include the step of collecting external secondary data and writing the external secondary data to the relational database such that the external secondary data is mapped to database fields and assigned to database tables to form part of the structured data.

The step of collecting the external secondary data may include the step of collecting pharmaceutical product information, pharmaceutical product pricing and product purchase and inventory turnover data.

The method may include the step of cleaning and normalising the external secondary data before writing the external secondary data to the relational database.

The step of extracting the items of information from transaction records may include the steps of scanning the transaction records to obtain scanned data and applying optical character recognition to the scanned data.

The step of scanning the transaction records to obtain the scanned data may include the step of scanning invoices and purchase orders to obtain items of information including, but not limited to, one or more of the following: drug names, drug quantities, delivery dates and drug prices.

The method may include the step of generating a graphic user interface (GUI) in the form of a dashboard for use by a medical practitioner, the GUI being configured to display data stored in the relational database and to facilitate the management of drug inventory by the medical practitioner.

The method may include the step of generating a GUI in the form of a drug directory from the external secondary data, for use by a medical practitioner.

The method may include the step of generating a GUI in the form of a clinic inventory records from data stored in the relational database, for use by a medical practitioner.

The method may include the step of generating a GUI in the form of drug dispensing records, from data stored in the relational database, for use by a medical practitioner.

The method may include the step of generating a GUI in form of warehouse inventory records from data stored in the relational database, for use by a medical practitioner.

According to a second aspect of the invention, there is provided a system for the management of pharmaceutical inventory, the system including a data processing apparatus that is configured to carry out the steps of:

- extracting items of information from transaction records of at least one health provider relating to the purchase and supply of pharmaceutical inventory;

- writing the extracted items of information to a relational database management system such that the items of information are mapped to database fields and assigned to database tables to form structured data;

- fetching items of information from the database tables;

processing the fetched items of information to generate required information relating to aspects of the pharmaceutical inventory; and displaying the required information.

The data processing apparatus may be configured to carry out the step of collecting external secondary data and writing the external secondary data to the relational database such that the external secondary data is mapped to database fields and assigned to database tables to form part of the structured data.

The data processing apparatus may be configured such that the step of collecting the external secondary data includes the step of collecting pharmaceutical product information, pharmaceutical product pricing and product purchase and inventory turnover data.

The data processing apparatus may be configured to carry out the step of cleaning and normalising the external secondary data before writing the external secondary data to the relational database.

The data processing apparatus may be configured to generate a GUI in the form of a drug directory from the external secondary data, for use by a medical practitioner.

The data processing apparatus may be configured to generate a GUI in the form of drug dispensing records, from data stored in the relational database, for use by a medical practitioner.

The data processing apparatus may be configured to generate a GUI in the form of warehouse inventory records from data stored in the relational database, for use by a medical practitioner.

According to a third aspect of the invention, there is provided a software product for the management of pharmaceutical inventory, the software product being configured so that, when executed by a data processing apparatus, the data processing apparatus carries out the steps of:

extracting items of information from transaction records of at least one health provider relating to the purchase and supply of pharmaceutical inventory;

writing the extracted items of information to a relational database management system such that the items of information are mapped to database fields and assigned to database tables to form structured data;

fetching items of information from the database tables;

processing the fetched items of information to generate required information relating to aspects of the pharmaceutical inventory; and displaying the required information.

The software product may be configured so that the data processing apparatus carries out the step of collecting external secondary data and writing the external secondary data to the relational database such that the external secondary data is mapped to database fields and assigned to database tables to form part of the structured data.

The software product may be configured so that the data processing apparatus carries out the step of collecting the external secondary data in the form of pharmaceutical product information, pharmaceutical product pricing and product purchase and inventory turnover data.

The software product may be configured so that the data processing apparatus carries out the step of cleaning and normalising the external secondary data before writing the external secondary data to the relational database.

The software product may be configured so that the data processing apparatus generates a GUI in the form of a drug directory from the external secondary data, for use by a medical practitioner.

The software product may be configured to generate a GUI in the form of a drug dispensing record, from data stored in the relational database, for use by a medical practitioner.

The software product may be configured to generate a GUI in the form of a warehouse inventory record from data stored in the relational database, for use by a medical practitioner.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a system for the management of pharmaceutical inventory at a clinic level.

Figure 2 shows a system for the management of pharmaceutical inventory at a national level.

Figure 3 shows a broad overview of information flow in the system of figure 2.

Figure 4 shows a graphic user interface (GUI), for use by a medical practitioner, generated by a software product of the system of figure 1 or figure 2.

Figure 5 shows a GUI, for use by a medical practitioner to search for, and identify, drugs for dispensing.

Figure 6 shows a GUI, for use by a medical practitioner to extract and display details of an inventory of drug stock stored by a clinic, and to order inventory.

Figure 7 shows a GUI, for use by a medical practitioner to extract and display dispensing records of a clinic.

Figure 8 shows a GUI, for use by a medical practitioner to extract and display details of an inventory of drug stock stored in a warehouse.

Figure 9 shows three phases in a drug procurement and delivery process managed in accordance with one embodiment of a method of the invention.

Figure 10 shows an entity relationship chart for use in the management of pharmaceutical inventory.

Figure 11 shows a base schema for mapping drugs in a relational database.

DETAILED DESCRIPTION

In figure 1, reference numeral 10 generally indicates an embodiment of a system, in accordance with the invention, for the management of pharmaceutical inventory at a clinic level, according to an embodiment of a method, also in accordance with the invention.

The system 10 includes an inventory management tool 12. The inventory management tool 12 includes a scanning station 14 that can be used to scan purchase orders and invoices, indicated at 16.

The scanning station 14 is configured to carry out an optical character recognition (OCR) operation. The scanning station 14 is configured to extract predetermined items of information from the purchase orders and invoices. These items of information include, but are not limited to:

- drug name
- date of purchase order/invoice
- supplier of drug
- details of the associated sales representative
- total quantity of drug
- any bonus amounts provided

- unit price
- total price
- discount
- purchase terms
- delivery date.

These items of information are written to associated data fields within data tables 18. The data tables 18 can include the entities described below with reference to figure 10.

The system 10 includes a data processing apparatus 19, such as a server(s) or a desktop computer(s) or a network of the same, or a virtual server(s). The apparatus 19 is programmed with an embodiment of a software product, in accordance with the invention, to carry out a predictive modelling process, by fetching and processing the items of information stored within the data tables 18. For example, the apparatus 19 is programmed so that the apparatus 19 can generate clinic level data which can include, but are not limited to:

- average cost of a drug
- tracked drug price changes
- rising patient conditions
- patient consumption rate per drug
- drug quantity to purchase.

That clinic level data can be aggregated and made available to other clinics so that each clinic can benefit from the increased data, rather than just relying on its own data.

In figure 2, reference numeral 20 generally indicates an embodiment of a system, in accordance with the invention, for building a predictive model in the form of industry trends, for the management of pharmaceutical inventory at a national level, according to a process, also in accordance with the invention. With reference to figure 1, like reference numerals refer to like parts, unless otherwise specified.

The system 20 includes data sources 22 generated by multiple health clinic users 23. These data sources 22 can be in the form of hard copies of such documents as purchase orders and invoices. In that case, the optical scanning station 14 can be centrally located to receive such copies and to perform the scanning operation referred to above to generate electronic data. Instead, each of the health clinics can include the scanning station 14 and can generate the individual streams of electronic data. The electronic data can represent the items of information referenced above in connection with the system 10. The items of information associated with the respective health

clinics can then be written to predetermined fields in aggregated data tables 24 of the relational database described in more detail below to provide structured data.

The system 20 includes a data processing apparatus 26, such as a server(s) or a desktop computer(s) or a network of the same, or a virtual server(s). The data processing apparatus 26 is programmed with an embodiment of a software product, in accordance with the invention, to fetch and process the information written to the aggregated data tables to generate national level data which can include, but are not limited to:

- top suppliers of drugs
- top drugs
- drug pricing variables
- trending drugs
- variances by geography, clinic type, supplier.

In figure 3, reference numeral 30 generally indicates the flow of information resulting from operation of the system 20. With reference to the preceding drawings, like reference numerals refer to like parts, unless otherwise specified.

As can be seen, a provider 32 of the system 20 receives the items of information from the aggregated data tables 18, which are derived from the purchase orders and invoices that have been scanned, as indicated by an arrow 34. The items of information are processed, with the data processing apparatus 26, to generate data relating to industry trends and insights concerning respective clinics. The flow of that data back to users at the respective health clinics is indicated by an arrow 36.

In figure 4, reference numeral 40 generally indicates a graphic user interface (GUI), generated by the data processing apparatus 26, for use by a medical practitioner. The GUI 40 is in the form of an electronic dashboard that can be used by the medical practitioner to view information relating to drugs dispensed by the clinic

The data processing apparatus 26 generates various fields from data extracted from a relational database containing database fields to which the information components have been written. Further details of the relational database are set out below. The data processing apparatus 26 is programmed to display the fields in the GUI 40. In the GUI 40, the following data fields are shown:

42 - Current user of the GUI 40.

44 - Delivery schedule for various drugs ordered by the clinic.

46 - Drug dispensation rate.

48 – Total inventory value.

50 – Top selling drugs

52 – Recently ordered drugs

54 – Drug wastage

56 – Value of drugs dispensed.

58 – Value of drugs ordered.

59 – Earnings from dispensed drugs.

The GUI 40 also includes a marketplace menu 60, an inventory menu 62, and a clinic management menu 64. The marketplace menu 60 displays links to marketplace data, such as a drug directory (see below) and a sales representative. The inventory menu 62 displays links to clinic inventory (see below) and warehouse inventory (see below). The clinic management menu 64 displays a link to a clinic dashboard and links relating to patient care.

Furthermore, the GUI 40 provides an add drug link 63 to add a patient, a dispense drug link 65 to dispense to a patient and a transfer link 66 to transfer drugs.

In figure 5, reference numeral 70 generally indicates a GUI, generated by the data processing apparatus 26, for use by a medical practitioner to search for, and identify drugs for dispensing. With reference to the preceding drawings, like reference numerals refer to like parts, unless otherwise specified.

The GUI 70 contains a search field 72 with an input field 74. Parameter fields are also generated so that the search results can be filtered using various parameters. The parameter fields are drop-down selection fields so that the user can select parameters for filtering the search results. The parameter fields include a supplier selection field 76, a drug type selection field 78, a condition field 80 and an ownership field 82.

The data processing apparatus 26 is configured or programmed so that the GUI 70 can display result fields 84 that contain details of the drugs forming the search results.

In figure 6, reference numeral 90 generally indicates a GUI, generated by the data processing apparatus 26, for use by a medical practitioner to view drug inventory stock and to order drugs. With reference to the preceding drawings, like reference numerals refer to like parts, unless otherwise specified.

The GUI 90 includes a search field 92 with an input field 94. Parameter fields are also generated so that the search results can be filtered using various parameters. The parameter fields are selection fields so that the user can select parameters for filtering the search results. The parameter fields include a supplier selection field 96, a stock status selection field 98 and a delivery status selection field 100.

The data processing apparatus 26 is configured or programmed so that the GUI 90 can display result fields 102. The result fields 102 are in the form of a table 104 of results, with each row representing a drug and columns displaying details regarding the drug, including, but not limited to, Drug Name, Supplier, Strength, Form, In-Clinic amount, Warehouse amount, Pending amount, Days Left of supply, Stock Status and Delivery Status. Each column can include an order button 106 so that the user can order stock of the associated drug.

In this example, the inventory menu 62 can include a link to pending inventory.

The GUI 90 can include a patient care menu with a dispense records menu 108 to provide access to dispensing records associated with a particular patients.

The GUI 90 also includes an order button 110 allowing the medical practitioner to navigate to a site or a form for ordering drugs. A dispense button 112 is provided, allowing the medical practitioner to navigate to a site or a form to record dispensing of drugs to a patient. This information is then written to the relational database to be saved for processing during data extraction. The relational database may be represented by the entity resolution diagram described below with reference to figure 10. A transfer button 114 is provided, allowing the medical practitioner to order and record the transfer of drug stocks. This information is also written to the relational database to be saved for processing during data extraction.

In figure 7, reference numeral 120 generally indicates a GUI, generated by the data processing apparatus 26, for use by a medical practitioner to search for, and extract records from the relational database relating to dispensing records of drugs. With reference to the preceding drawings, like reference numerals refer to like parts, unless otherwise specified.

As can be seen from the drawing, the GUI 120 has a “Dispense Records” tab 122 and a “Dispense Forecast” tab 124. In this example, the tab 124 is open.

The GUI 120 has a search field 126. The search field 126 includes an input field 128, allowing the medical practitioner to search for a particular drug. The search field 126 includes a parameter field in the form of a dropdown shortfall/surplus field 128 that allows the practitioner to filter search results according to whether there is a shortfall or surplus of the drug searched.

The data processing apparatus 26 is programmed so that the GUI 120 can display result fields 130. The result fields 130 are in the form of a table 132 of results, with each row representing a drug and columns displaying details regarding the drug, including, but not limited to, Drug Name, Supplier, Strength, Form, In-Clinic Quantity, Estimated Quantity (30 days) and Shortfall/Surplus.

In figure 8, reference numeral 140 generally indicates a GUI, generated by the data processing apparatus 26, for use by a medical practitioner to search for, and extract records from the relational database relating to inventory stored in a warehouse. With reference to the preceding drawings, like reference numerals refer to like parts, unless otherwise specified.

As can be seen from the drawing, the GUI 140 has a “Warehouse Inventory” tab 142 and a “Warehouse Activity” tab 144. In this example, the tab 142 is open.

The GUI 140 has a search input field 146 allowing a user to search for a particular drug.

The data processing apparatus 26 is programmed so that the GUI can display result fields 148. The result fields 148 are in the form of a table 150 of results, with each row representing a drug and columns displaying details regarding the drug, including, but not limited to, Drug Name, Strength, Form, In-Clinic amount, Warehouse amount and Pending amount.

In figure 9, reference numeral 160 generally indicates three phases in a drug procurement and delivery process. With reference to the preceding drawings, like reference numerals refer to like parts, unless otherwise specified.

In a first phase, the data processing apparatus 26 generates and records data relating to the delivery of drugs, indicated at 162, to the clinics. The data processing apparatus 26 is configured to receive financial data, indicated at 164, from the clinics. The data

processing apparatus 26 is configured to provide user access to a marketplace directory function, using the GUI 70. A drug inventory management function 166 is also provided, with visual information regarding inventory held in clinics being presented via the GUI 90, which facilitates viewing, ordering, dispensing, and transferring drug inventory. Details regarding the possible information generated has been described above with reference to the GUI 90. A remote warehouse function 168 is provided, with visual information regarding the inventory held in a remote warehouse being presented via the GUI 140, which facilitates viewing, ordering, dispensing, and transferring drug inventory, with respect to the remote warehouse.

In a second phase, the data processing apparatus 26 generates and records data relating to the procurement of drugs, indicated at 172, from a supplier 174. The data processing apparatus 26 is configured to provide user access to a marketplace storefront function 170 with the GUI 70. As set out above with reference to figure 5, the GUI 70 allows a user to order drug stock from the supplier 174. In the second phase, the remote warehouse function 168 allows the user to track the delivery of drug stock to and from the warehouse, as indicated at 176.

In a third phase, the data processing apparatus 26 generates and records data relating to the delivery of drugs to patients 180. The data processing apparatus 26 is configured to provide user access to a patient care delivery function 182, which allows a user to view and record the delivery of drugs, indicated at 184, to the patients 180 and to view and record payments, indicated at 186, made by the patients 180.

Thus, as will be appreciated from figure 9, there is provided a holistic end-to-end drug management system.

In figure 10, reference numeral 190 generally indicates an entity resolution diagram for a relational database generated by the data processing apparatus 26, executing an embodiment of a software product, in accordance with the invention. The diagram 190 is configured to ensure that records or data collected by the data processing apparatus 26 go through a process of deduplication, record linkage and reference matching.

The entity resolution diagram 190 can represent a Strapi (trade mark) model that is comprised of a number of entities or fields, as referenced, and listed below, of a relational database generated and maintained by the data processing apparatus 26 to form structured data:

- 192 – Clinic user

- 194 – Clinic inventory
- 196 – Delivery
- 198 – Account user
- 200 – Clinic product
- 202 – Order Item
- 204 – User
- 206 – Clinic
- 208 – Order
- 210 – Warehouse
- 212 – Note
- 214 – Supplier
- 216 – Address
- 218 – Stock event
- 220 – Stock adjustment
- 222 – Sales representative
- 224 – Organisation
- 226 – Patient
- 228 – Dispense record
- 230 – Territory
- 232 – Role
- 234 – Dispensed Item
- 236 – Drug
- 238 – Permission
- 240 – Conditions
- 242 – Drug class

It will be appreciated that any number of further entities can be added, depending on the manner in which the database is to be used.

Each of the entities contains a number of attributes, with the lines indicating various relationships between the entities and the attributes. For example, a “user” attribute in the Clinic user entity 192 is associated with the Account user entity 198, while a “role” attribute in the Account user entity 198 is associated with a “clinicUsers” attribute in the User entity 204.

It will be appreciated that any number of attributes can be contained within each entity, depending on requirements. Furthermore, the attributes can be written to the various entities by the data processing apparatus 26 using any of the GUI's described above.

Thus, with a suitable configuration of the diagram 190 and with appropriate database queries, a relational database based on the diagram 190 can be used to generate useful predictive models based on attribute values written to the relational database by the data processing apparatus 26 over a period of time. These predictive models can be generated using suitable algorithms, embedded within embodiments of the software product of the invention, that process the attributes to generate, *inter alia*, the clinic level data, described above with reference to the system 10, or the national level data, described above with reference to the system 20.

In figure 11, reference numeral 300 generally indicates a base schema for a drug marketplace.

The base schema 300 represents a relational database that stores details of drugs that are available in the marketplace so that appropriate drugs can be identified and ordered by a user with the GUI 70.

The base schema 300 includes a Products List entity 302, that can be obtained, for example, from the Health Sciences Authority (HSA) of Singapore. The entity 302 can carry attributes such as license number, product name, license holder, etcetera, related to various drugs.

An ATC codes entity 304 carries attributes such as ATC code, ATC level name, full products list, etcetera, of various drugs. An ATC-ICD Map entity 306 can carry attributes such as product name, license number, ATC code, etcetera, of various drugs. A Health Conditions entity 308 can carry attributes such as product name, license no, ATC code, etcetera. A Drug Profile Entry entity 310 can carry attributes such as license no., product name, status, drug class, etcetera. A Marketplace entity 312 can carry attributes such as license no., strength, active ingredients, etcetera.

Data stored in the various entities can be vetted by a licensed pharmacist to ensure that the drug related information is accurate.

The relationships between the various entities and the attributes are indicated with the solid and dotted lines. These can be set up in various ways, depending on the required reports to be generated. For example, a Product Name attribute in the Products List

entity 302 is related to a Full Products List Roll-Up attribute in the ATC codes entity 304. Any number of relationships can be generated using the entities 304 – 312.

The data stored in a relational database using the schema 300 can provide valuable insights into overall market trends. This data can be combined with the data gathered from the purchase orders and invoices, as described above. This data can also be accessed using the GUI 70 described with reference to figure 5.

It will be appreciated that, over time, the various health clinics will generate a significant amount of data that will be stored in the relational database, represented by the entity resolution diagram 190. With suitable algorithmic functions embedded in an embodiment of a software product, in accordance with the invention, the data processing apparatus can generate useful data for predictive modelling. For example, each health clinic can create a sizeable data reservoir in which it can use historical data to generate insights to better manage its business. Data can be used by doctors and medical professionals to determine the following:

- expiring drugs
- future order requirements
- health condition trends
- margins and profitability of drugs
- top drug suppliers
- drug wastage cost

The aggregated data can also be used to generate the following data insights:

- top suppliers
- top drugs
- drug pricing variables
- trending drugs
- variances by geography, clinic type, supplier, et cetera.

Embodiments of the system, method and software product of the invention provides health clinics with an integrated solution for sourcing, purchasing, managing, and dispensing medication that is cost effective and improves efficiencies and patient outcomes.

As is clear from the above description, there is provided a number of key processes that make up an end-to-end drug management system. These are users' access to all

product options available in the market, users' ability to purchase the products, users' ability to track incoming stock, users' ability to track products stock status, and users' ability to deliver direct to patients.

The embodiments provide a process of drug management that enhances the amount of information available to doctors and clinic assistants, simplifies operations and better addresses the needs of patients, when compared with systems that are currently being used.

Embodiments of the system and software product of the invention can be created making use of open-source technology. Thus, the platform provided by the system and the software product can be built in an extensible and fungible way so that it can pivot and adjust to marketplace changes and new strategic initiatives.

The software product is configured for use with third-party integrations. These may include a platform known as Algolia (intelligent search with AI capabilities), ZenDesk (customer support email and live chat), and Airtable (data management for drug market, clinic inventory onboarding and suppliers' representatives and price list).

It will be appreciated that use of the method, system and software product of the invention can provide significant insights into a drug or pharmaceutical market. These might include data relating to bestselling drugs, top-performing sales representatives, which drugs are in decline and which health conditions are the most prevalent in a particular jurisdiction.

As set out in the background, smaller health clinics have budgetary constraints that inhibit the building of fit for purpose medication facilities. Embodiments of the system and software product, in accordance with the invention, facilitate the provision of a physical warehouse to offer a large number of smaller clinics the ability to move drug inventory back and forth between the clinic and the warehouse. This aspect is described with reference to figure 9, as set out above. Further, as described with reference to the GUI 140, the software product allows a user to generate a transfer request in the form of instructions to collect or to deliver inventory from or to the warehouse or the clinic. Benefits to the clinic include:

- reduce storage space required at clinic
- climate control facility
- simpler delivery to patient (with the introduction of direct mailing)
- fewer drugs to expire due to a notification system

The appended claims are to be considered as incorporated into the above description.

Throughout this specification, reference to any advantages, promises, objects or the like should not be regarded as cumulative, composite, and/or collective and should be regarded as preferable or desirable rather than stated as a warranty.

Throughout this specification, unless otherwise indicated, "comprise," "comprises," and "comprising," (and variants thereof) or related terms such as "includes" (and variants thereof)," are used inclusively rather than exclusively, so that a stated integer or group of integers may include one or more other non-stated integers or groups of integers.

When any number or range is described herein, unless clearly stated otherwise, that number or range is approximate. Recitation of ranges of values herein are intended to serve as a shorthand method of referring individually to each separate value falling within the range, unless otherwise indicated herein, and each separate value and each separate subrange defined by such separate values is incorporated into the specification as if it were individually recited herein.

Words indicating direction or orientation, such as "front", "rear", "back", etc, are used for convenience. The inventor(s) envisages that various embodiments can be used in a non-operative configuration, such as when presented for sale. Thus, such words are to be regarded as illustrative in nature, and not as restrictive.

The term "and/or", e.g., "A and/or B" shall be understood to mean either "A and B" or "A or B" and shall be taken to provide explicit support for both meanings or for either meaning.

Features which are described in the context of separate aspects and embodiments of the invention may be used together and/or be interchangeable. Similarly, features described in the context of a single embodiment may also be provided separately or in any suitable sub-combination.

It is to be understood that the terminology employed above is for the purpose of description and should not be regarded as limiting. The described embodiments are intended to be illustrative of the invention, without limiting the scope thereof. The invention is capable of being practised with various modifications and additions as will readily occur to those skilled in the art.

CLAIMS

1. A method for the management of pharmaceutical inventory, the method including the steps of:

extracting items of information from transaction records of at least one health provider relating to the purchase and supply of pharmaceutical inventory;

writing the extracted items of information to a relational database management system such that the items of information are mapped to database fields and assigned to database tables to form structured data;

fetching items of information from the database tables;

processing the fetched items of information to generate required information relating to aspects of the pharmaceutical inventory; and

displaying the required information.

2. The method as claimed in claim 1, which includes the step of collecting external secondary data and writing the external secondary data to the relational database such that the external secondary data is mapped to database fields and assigned to database tables to form part of the structured data.

3. The method as claimed in claim 2, wherein the step of collecting the external secondary data includes the step of collecting pharmaceutical product information, pharmaceutical product pricing and product purchase and inventory turnover data.

4. The method as claimed in claim 2, which includes the steps of cleaning and normalising the external secondary data before writing the external secondary data to the relational database.

5. The method as claimed in claim 1, wherein the step of extracting the items of information from transaction records includes the steps of scanning the transaction records to obtain scanned data and applying optical character recognition to the scanned data.

6. The method as claimed in claim 5, wherein the step of scanning the transaction records to obtain the scanned data includes the step of scanning invoices and purchase orders to obtain items of information including, but not limited to, one or more of the following: drug names, drug quantities, delivery dates and drug prices.

7. The method as claimed in claim 1, which includes the step of generating a graphic user interface (GUI) in the form of a dashboard for use by a medical practitioner, the GUI being configured to display data stored in the relational database and to facilitate the management of drug inventory by the medical practitioner.
8. The method as claimed in claim 2, which includes the step of generating a GUI in the form of a drug directory, from the external secondary data, for use by a medical practitioner.
9. The method as claimed in claim 1, which includes the step of generating a GUI in the form of clinic inventory records, from data stored in the relational database, for use by a medical practitioner.
10. The method as claimed in claim 1, which includes the step of generating a GUI in the form of a drug dispensing records, from data stored in the relational database, for use by a medical practitioner.
11. The method as claimed in claim 1, which includes the step of generating a GUI in the form of a warehouse inventory records from data stored in the relational database, for use by a medical practitioner.
12. A system for the management of pharmaceutical inventory, the system including a data processing apparatus that is configured to carry out the steps of:
- extracting items of information from transaction records of at least one health provider relating to the purchase and supply of pharmaceutical inventory;
 - writing the extracted items of information to a relational database management system such that the items of information are mapped to database fields and assigned to database tables to form structured data;
 - fetching items of information from the database tables;
 - processing the fetched items of information to generate required information relating to aspects of the pharmaceutical inventory; and
 - displaying the required information.
13. The system as claimed in claim 12, in which the data processing apparatus is configured to carry out the step of collecting external secondary data and writing the external secondary data to the relational database such that the external secondary data is mapped to database fields and assigned to database tables to form part of the structured data.

14. The system as claimed in claim 13, wherein the data processing apparatus is configured such that the step of collecting the external secondary data includes the step of collecting pharmaceutical product information, pharmaceutical product pricing and product purchase and inventory turnover data.

15. The system as claimed in claim 12, wherein the data processing apparatus is configured to carry out the step of cleaning and normalising the external secondary data before writing the external secondary data to the relational database.

16. The system as claimed in claim 13, wherein the data processing apparatus is configured to generate a GUI in the form of a drug directory from the external secondary data, for use by a medical practitioner.

17. The system as claimed in claim 12, wherein the data processing apparatus is configured to generate a GUI in the form of a drug dispensing record, from data stored in the relational database, for use by a medical practitioner.

18. The system as claimed in claim 12, wherein the data processing apparatus is configured to generate a GUI in the form of a warehouse inventory record from data stored in the relational database, for use by a medical practitioner.

19. A software product for the management of pharmaceutical inventory, the software product being configured so that, when executed by a data processing apparatus, the data processing apparatus carries out the steps of:

extracting items of information from transaction records of at least one health provider relating to the purchase and supply of pharmaceutical inventory;

writing the extracted items of information to a relational database management system such that the items of information are mapped to database fields and assigned to database tables to form structured data;

fetching items of information from the database tables;

processing the fetched items of information to generate required information relating to aspects of the pharmaceutical inventory; and

displaying the required information.

20. The software product as claimed in claim 19, wherein the software product is configured so that the data processing apparatus carries out the step of collecting external secondary data and writing the external secondary data to the relational database such that the external secondary data is mapped to database fields and assigned to database tables to form part of the structured data.

21. The software product as claimed in claim 20, wherein the software product is configured so that the data processing apparatus carries out the step of collecting the external secondary data in the form of pharmaceutical product information, pharmaceutical product pricing and product purchase and inventory turnover data.

22. The software product as claimed in claim 19, wherein the software product is configured so that the data processing apparatus carries out the step of cleaning and normalising the external secondary data before writing the external secondary data to the relational database.

23. The software product as claimed in claim 20, wherein the software product is configured so that the data processing apparatus generates a GUI in the form of a drug directory from the external secondary data, for use by a medical practitioner.

24. The software product as claimed in claim 19, wherein the software product is configured to generate a GUI in the form of a drug dispensing record, from data stored in the relational database, for use by a medical practitioner.

25. The software product as claimed in claim 19 wherein the software product is configured to generate a GUI in the form of a warehouse inventory record from data stored in the relational database, for use by a medical practitioner.