Computer applications in pharmacy

Computer System in Hospital Pharmacy:

The computer has become a very common tool in all areas of science and technology. With the proliferation of the Internet and the developments in computer technology and manufacturing, the ratio of price to performance of computers continues to decrease. This has resulted in the development of number of computer applications.

The field of pharmacy has immensely benefited by the use of computer and will continue to benefit as the pharmacist's gain more familiarity with computers. The complete field of pharmacy requires computers. Some of the important areas where computers are useful are new drug discovery, drug design, analysis, manufacturing of drugs and hospital pharmacy. Other than these, computers helps pharmacist collaborate with other professionals, which is very essential in today's research work. It also provides solutions for time consuming manual task.

Use of computers in hospital pharmacy

- In receiving and allotment of drugs
- Storing the details of every individual
- Professional supplies
- Records of dispensed drugs to inpatient and outpatient
- Information of patients records
- Patient monitoring (blood pressure, pulse rate, temperature)

Patterns of Computer use in Hospital Pharmacy:

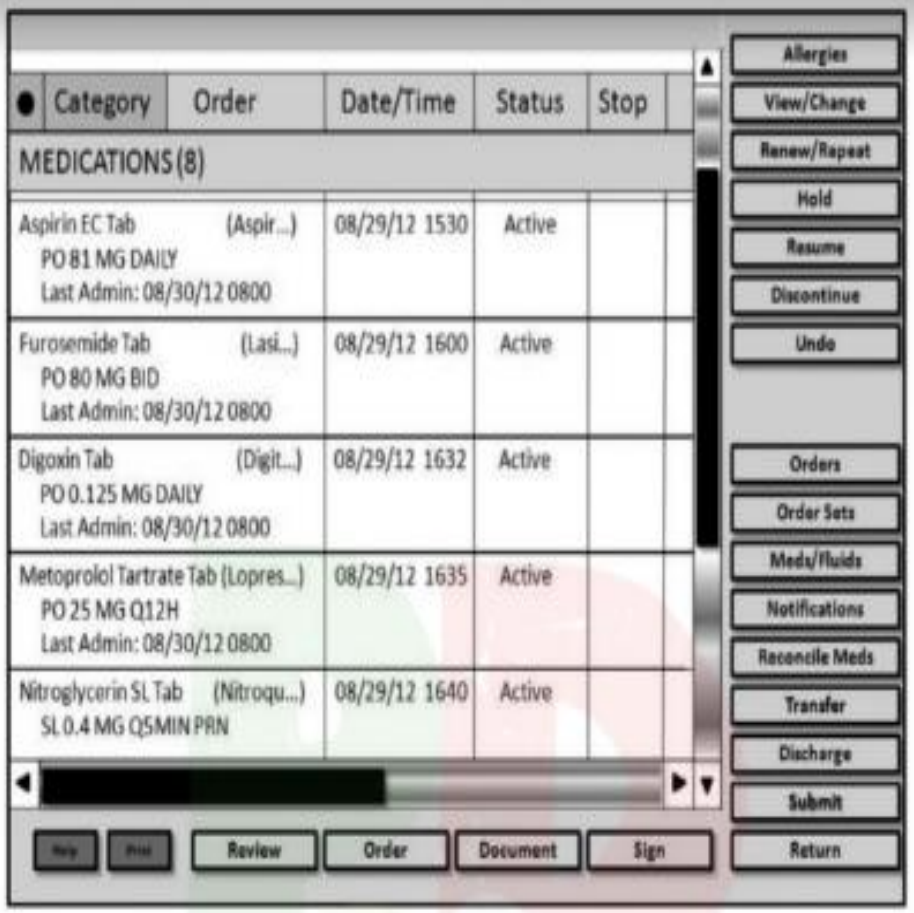
For years now, whenever it has been suggested that pharmacy could do more to improve patient outcomes, reduce General Practitioners(GP) workloads and make a bigger contribution to the healthcare system, one of the barriers that invariably gets mentioned is IT and, in particular, access to patient records. Recent trends suggest that pharmacy professionals are starting to utilize the benefits of computer systems and databases.

Patient record database management:

Slowly but surely, pharmacies are trialling access to electronic information about patients – with their consent, mostly pulled from GP records, and on a read-only basis.

Computer databases for information about medicines, and medical treatment in general, are used within pharmacies. These database systems allow pharmacy staff to find out information about any potential conflicts or health-care problems in a prescribed treatment, as well as information about the details of any particular medicine the pharmacist needs to know more about. This information may include ingredients and potential effects as well as research and scientific data.

The access of patient record database also proved beneficial in identifying prescribing errors – and the pharmacists feel they had been able to reduce the risk of patient harm. The pharmacies would mostly be accessing patient records to assist in the provision of emergency supplies to confirm what a patient was taking and at what dose.



Example of a computerized prescriber order entry (CPOE) system.

Some of the advantages of Patient record database:

- Pharmacists review the data with several key pharmacy-related aspects in mind; this will permit concise data collection while providing the pharmacist with adequate information to develop recommendations to optimize pharmacotherapy.
- Clinical pharmacist may dive right into the chart to seek out antibiotic orders and laboratory data for serum drug concentrations and renal function assessments, whereas a cardiology pharmacy specialist may initially search for blood

pressure values from the physical examination in order to assess the effectiveness of a patient's antihypertensive drug regimen.

- The pharmacist may find data lacking in some areas, which will require clarification via additional patient interviewing. For example, a patient's chart may indicate an allergy to penicillin, but the specific reaction not be identified.
- The pharmacist can identify pertinent positive and negative components that are key to the development of an assessment and plan.
- Security - Electronic medical records are stored within secure databases where they can never be lost or misfiled. For additional protection, tools like data backup ensure files are never destroyed due to fire, disaster or other unforeseeable events. In addition, only authorized users may access files.
- Safety - Efficient regulation of medications can improve a patient's quality of care and helps prevent dangerous and avoidable oversights. When a prescription is written, the advantage an patient medical record system provides is the automatic initiation of drug-to-drug and drug-to-allergy interaction checks. These checks reduce the risk of improper prescriptions and related issues that can compromise quality of care.

Medication order entry:

Prescription processing is invariably one of the main activities going on within a pharmacy on a day-to-day basis, and computers are used to make this process more reliable and efficient. Both the customer service side of pharmacy operation and the dispensing aspect are today carried out through the use of computing systems. Pharmacy computers also handle customer service activities such as sales and cash handling within the retail operation.

Medication Order Management System is a electronic-based, automated order management and robust clinical intervention tracking tool that enables hospital pharmacies to identify key safety, quality, productivity and clinical improvements.

For hospitals implementing Computerized Medication Order Management Systems, Medication Order Management System is designed to supplement a Medication Order Management Systems environment, so that your hospital truly benefits from a complete affordable order entry solution.

- Improve productivity, quality and nursing satisfaction with advanced, real-time productivity, clinical and quality reporting metrics
- Complement Medication Order Management Systems technology, utilizing flexible contract and billing terms to shift pricing models
- Improve operational efficiency and patient safety

The process of prescribing and administering a medication involves several steps, each of which has vulnerabilities that are

addressed—to greater or lesser degrees—by Medication Order Management Systems:

1. **Ordering:** the clinician must select the appropriate medication and the dose and frequency at which it is to be administered.
2. **Transcribing:** if handwritten, the prescription must be read and understood by the recipient (usually a pharmacy technician or pharmacist).
3. **Dispensing:** the pharmacist must check for drug–drug interactions and allergies, then release the appropriate quantity of the medication in the correct form.
4. **Administration:** the medication must be received by the correct person and supplied to the correct patient at the right time in the right dosage. In hospitalized patients, nurses are generally responsible for this step, but in the outpatient setting, this step is the patient's or caregiver's responsibility.

Medication Order Management Systems are generally paired with some form of clinical decision support system (CDSS), which can help prevent errors at the medication ordering and dispensing stages and can improve safety of other types of orders as well. A typical CDSS suggests default values for drug doses, routes of administration, and frequency and may offer more sophisticated drug safety features, such as checking for drug allergies or drug–drug or even drug–laboratory (e.g., warning a clinician before ordering a nephrotoxic medication in a patient with elevated creatinine) interactions.

Entering information into computer system:

a. Information required is prompted.
b. Quantities are expressed in metric units.
c. Input the correct dispense as written (DAW) code (e.g., DAW 1 would indicate the prescriber wants the brand name drug dispensed).
d. Calculate a day's supply of medication.
e. Third-party adjudication: Submitting prescription for payment by third-party drug insurance provider. If the prescription drug insurance company denies payment, the patient is responsible for full payment of the prescription unless the rejected claim is corrected and resubmitted to the third-party prescription drug provider.
f. Drug utilization evaluation (review): Process of verifying that the prescription being processed does not interact adversely with the other medications on a patient's profile. If a warning is observed, the pharmacist is to be notified immediately to determine the proper course of action in filling the prescription, such as contacting the physician or to continue filling the prescription. The pharmacist makes a decision based on the information on hand.

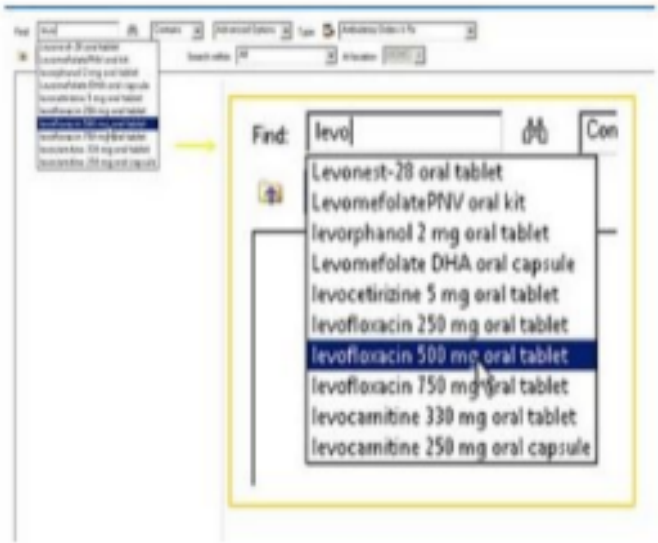
Drug labels

Computerized Medication Order Management Systems allows prescribers to create a structured sig but also offers two additional fields: "Special Instructions" and "Comments." "Special Instructions" are transmitted to the pharmacy and are intended to be printed on the label, such as "do not drive while taking" or

"avoid sun exposure." However, prescribers sometimes enter comments that contradict the sig. For example, they might order a medication with frequency "once daily" and then add the comment "take two times a day on Monday, Wednesday, and Friday." This ambiguity can lead to confusion for pharmacists (and patients), resulting in callbacks for clarifications, significant dispensing delays, and dispensing and labeling errors.

Drug Lists:

Some Computerized Medication Order Management Systems list drugs alphabetically. Most systems have support for both browsing (e.g., picking a drug from a list) alphabetically and searching for a specific drug by entering a search string; however, the latter method is by far the more common paradigm. Auto-complete is a term used for a functionalities that try to predict what the user is typing and includes both auto-suggest and auto-fill capabilities. Auto-suggest presents users with suggestions that they may choose as they are typing in the first few letters of a drug name.



Administration—Electronic Medication Administration Record (eMAR):

- **Intravenous solution and admixtures**

The combination of bar code verification technology with an eMAR was implemented to further reduce administration errors. The eMAR system electronically receives patient profile information from the pharmacy system. This process eliminates the need for nurses or unit secretaries to transcribe physician orders, therefore potentially reducing transcription errors. At the bedside, bar code/eMAR allows for real-time confirmation of patient identification, medication, dose, and time of administration by automatically checking the scanned medications against the patient's eMAR profile.

By the help of this computerized system Intravenous solution and admixtures can be rationally prescribed and administered. Together, barcode scanning in the pharmacy and bar code/eMAR systems on the inpatient units have the potential to improve medication safety by reducing post-ordering medication errors.

Including **smart pumps** in a closed-loop, point-of-care medication administration system can further improve medication safety. The goal is to provide seamless digital pathway from Computerized Medication Order Management System to the patient vein.

Patient medication profiles:

A patient medication profile is a comprehensive summary of all regular medications taken by a patient, including prescription, over-the-counter and complementary medicines. Current medication profiles may vary in format and the level and type of information provided.

The aim of the Patient Medication Profiling Program is to reduce the risk of medication-related adverse events by assisting people to understand and manage their medications, including prescription, overthe-counter and complementary medicines.

The provision of a medication profile to patients is expected to improve their awareness of their medications (i.e identifying them, understanding why they have been prescribed and when and how they should be taken). The medication profile will also give patients confidence in self medication management, and support communication between the patient and other health professionals, especially on admittance to hospitals or aged care homes.

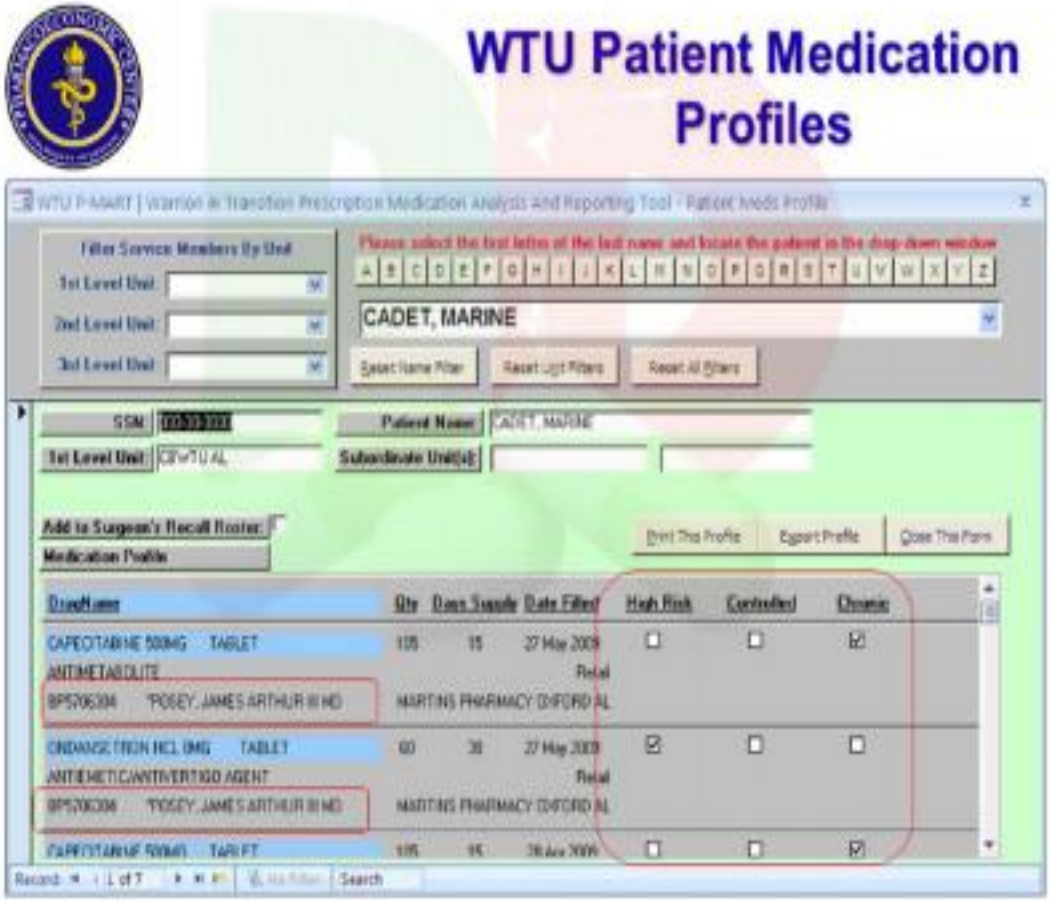
Pharmacists participating in the program will be subsidised to provide patient medication profiles to a specified number of patients who would benefit from the provision of a profile.

Patient medication profile usually includes:

- medication brand name;
- list of alternative brand names;
- medication generic name;
- medication strength and form;

- dose and frequency;
- special directions or cautions;
- reason for use; and
- a coloured pictorial representation or product description for items not on the system (eg complementary medicines).

Example of Patient Medication Profile:

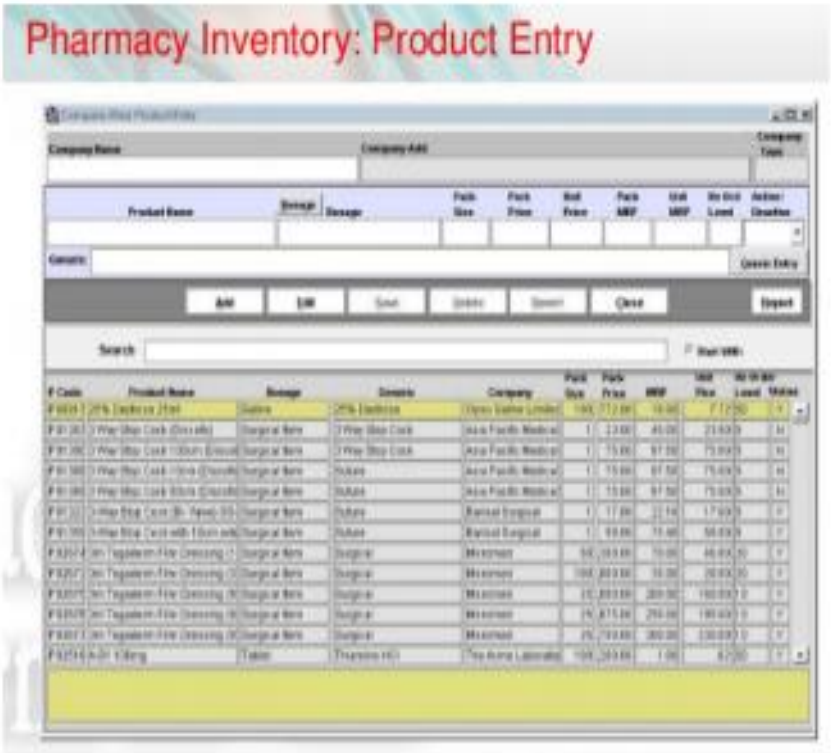


Inventory Control:

It is extremely difficult to maintain inventory details manually especially with several thousand items like drugs, instruments, linen and furniture, etc. in the hospital. The result is that most hospitals are regularly throwing away large quantities of expired drugs and by the time, one is able to do the stock checking the status gets changed entirely.

Thus, computerized systems are helpful in checking billing and accounts, obviating long line, totaling mistakes, wrong entries and quarreling of patients are the hallmarks of manual accounts. Bills of patients, staff and other things are computerized and such scenes are averted.

So in all these fields, computers are of immense help and save manual labor, time as well as money.



Management report & Statistics

The pharmacy management reports include information about the drugs that are being dispensed to gain new insight into what you dispense, to whom, how much, and from where. These reports help in

- Learning more about your drug pricing and billing workflow by facility and price options. Understanding the ins and outs of your pricing structure and the way you bill is a great way to help make more of your margins.
- Understand more about the patients you serve through searchable prescription histories. Narrow them down based on the selected criteria.

- Create reports on billing payments, prescription revenue and profit margins.
- Generate daily logs, claims reports, compliance reports and so many more.