INFORMATION AND COMMUNICATION TECHNOLOGY IN PHARMACY PRACTICE

Credit Units – 2

- Overview of Computer use in Pharmacy

- ICT in inventory Management

- Telepharmacy

- ICT in Drugs and Poison Information services (including useful websites)

Scope/Learning Objectives

The proportion of Pharmacists that use computers in their practice has increased over the years. The advent of the internet has further widened the scope of services that the Pharmacist can offer. The use of ICT has many advantages for the Pharmacist and the patients including cost savings, convenience, accessibility and improved privacy and communication.

The Resource Persons are expected to primarily discuss the importance and consequences of ICT in pharmacy practice.

At the end of the learning session, participants are expected to:

(1)   Understand the Application of ICT in Pharmacy Practice;

(2)   Discuss the challenges of the on-line sales and dispensing of prescription drugs and controlled substances;

(3)   Be conversant with websites that are relevant to Pharmacy Practice.

OVERVIEW OF COMPUTER USE IN PHARMACY

Computers in Community Pharmacy

Challenges in Retail Practice

One of the biggest challenges in community pharmacy practice is the ability to collect and interpret the data that are available in the community. The information is useful in deciding trends, significant changes in prescription pattern, development of new or emerging diseases, need for important new services, etc. Collection of these data is not a fad in pharmacy but an important regulatory function and a must for every customer-centric practice/ business.

For transparency in business processes and product tracking, the pharmacist must maintain records which can be assessed in the case of auditing e.g. poisons disposal books with appropriate records signed (digital and hard copy), contact details of patients who purchase POMs from the practice (for tracking or product retrieval in case of recall), insurance documentation/ payment records and patient case notes for collaborative practices etc.

As health commodity distribution becomes smart, the manufacturers supply chain models must begin to utilize information flow from the retail/ community pharmacies where the products are utilized. The use of product bar coding and RFIDs (radio frequency identifier tags) is becoming frequent on health commodities of significant worth (either in dollar value or in their availability within the health system) and they significantly impact the way information is exchanged between the Point of Sale (POS), through the Management Information System and the speed with which the information is acted upon (improving efficiency and accuracy through data currency).

Similarly, a community pharmacy practice is a for-profit enterprise and pharmacists must be able to decide if their practice is turning in a profit (or loss), is growing (or dying), is able to withstand economic stress (or not) etc. Although the pharmacist is not professionally trained to do all of these, computer applications have been developed which enable the pharmacist do all of these managerial functions without the 'retainership' of expensive finance professionals. The benefits a community pharmacy provides for a community are suddenly non-existent in case of a business failure, hence all

patient-centered practices must begin to consider this as part of their fiduciary responsibilities to their clients/ patients.

Utilization of social media is also a frontier that needs exploring by community practices. It can be a useful tool for public health education and interventions to improve the health of the public.

Benefits of Computer Deployed Solutions

1. Improved information collection, flow and interpretation.
2. Efficient provision of pharmaceutical care- in a timely, professional and cost effective manner that is relatively free of errors.
3. Reduction in time wasted in generation of stock requisition and other administrative tasks, freeing up pharmacist time to meet with patients.
4. Improved service delivery time and higher patient satisfaction with overall service.
5. Better retail analytics leading to reduction in amount of stock held at hand, increasing stock turnover/momentum, improved ability to respond to or discover bucking trends etc.

Specific Process Automation

1. Inventory, Point of Sale and Finance/ Accounting
   The process of products acquisition in a retail premises can be very key in determining its viability and profitability. However, this process can also be automated to ensure the company gets products at the lowest cost while being able to maximize its position to the client.
   Software that manage inventory may also incorporate accounting to the package allowing for integration.
   Most software offer:
   - Providing a receipt for patient.
   - Patient records organized as for families, or tracked for paying company.
   - Generation of a hard copy of record of transactions, with options to send via email to patient or third party payer.

- Calculating total prescription cost, including using codes to generate payment for pharmacy services that are reimbursed by third party payers or client.

- Ability to schedule patients for services or refills.

- Automatically ordering the low quantity products via electronic transactions,

- Generation of soon-to-expire product list.

- Preparation of annual withholding tax, payrolls (and tax) and VAT on non-medicine products.

- Managing product exchange, returns and reduction of fraud.

- Generation of barcode, print barcode (price guns or thermal printers), and maintain a large number of SKUs (Store Keeping Units).

- Managerial functions including generation of multiple sales analysis for a day, week and month.

- Retail analytics are also an important part of the managerial function.

Software varies in level of security and performance but the major differences appear to be the specificity for pharmacy services. Some are customized to aid the pharmacist in several care functions e.g. generation of product labels, screening of prescriptions for medication errors or product interactions. This becomes a significant consideration as pharmacies are professional practice environments beyond their business service.

Some excellent software made in Nigeria that incorporate the pharmacy aspect include GenRx software, Electroclerk etc.

2. Communication and Management Information System

The flow of information in a business was described by Bill Gates (Business at the Speed of Thought) as similar to the neuron network within the body of human beings. Information is the life wire of the business but the information flowing within a system must be current, accurate and useful for it to result into the appropriate action that it should elicit.

Business information is the bed rock of e-commerce, hence businesses that aim to adopt the responsiveness of successful e-commerce sites must begin to think about how long it takes for management (decision maker) to get information from the POS/ customer feedback (if it

exists). Information currency must be improved to increase the company's ability to respond to opportunities as they arise and quell threats that come up.

Solutions for communication include:

1. Email- use of a structured communication system must be enforced. This enhances documentation, reduces errors and contributes to institutional memory. Standard Operating Procedures (SOPs) must be instituted for communication with the aim to reduce bureaucracy of the process and improve the efficiency.

   Solutions include Google's Gmail solutions, Microsoft's Outlook or other third party client email solutions.

2. Real-time Processes and Management Information System- allowing cloud support of the data from POS and other points within the process flow improves the currency of the information available to management. Managers must be able to view what is available in the store (or at other branches in chain pharmacies), what will be delivered (or has been ordered and their datelines for delivery both at the store and at POS if the pharmacy provides e-commerce), cost elements of every process (including professional services), human resource available or dedicated to each process etc.

   The software used in this is usually custom-made but may include enterprise solutions that are built for the mass retail market. They typically manage the entire process from SCM to finance, marketing to POS. Retail information system should support basic retail function like material procurement, storage, dispatch, etc. It should allow the manager to monitor sales of product mix and daily sales volume. An information system should help in inventory management. Oracle is a company providing leading solutions in this field.

3. Automated Dispensing Systems

   Some companies have also gone a step further in automating the dispensing function or some aspects of it. This may include prescription vetting, prescription verification, prescription filling, counselling, refills and billing.

   These machines improve patient safety, reduce errors in the dispensing process and track controlled substances, improve documentation processes but ultimately require pharmacists to approve critical processes hence do not act in isolation.
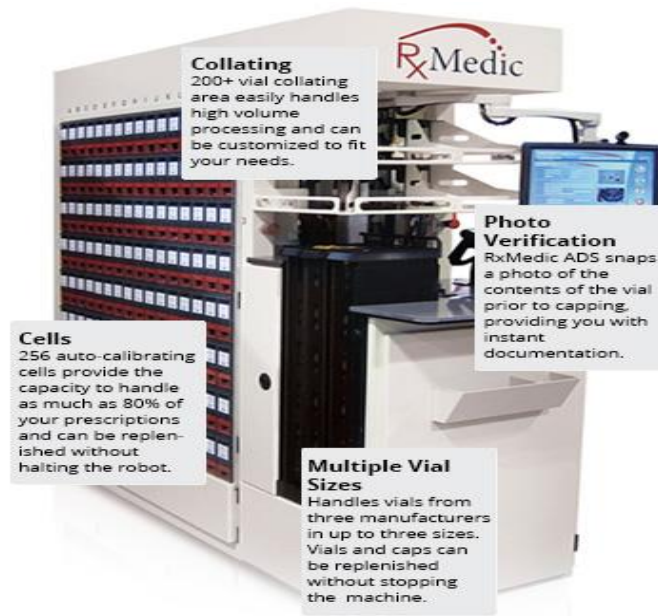
Benefits of adoption of this process include:

a. A reduction in dispensing errors.

b. Rationalisation of the dispensing process, leading to efficiencies in dispensary throughput and turnaround times.

c. The enabling of a re-engineering of pharmacy services, which might include developing a more patient-centric service and decentralization of the clinical pharmacy service.

Computers in Hospital Pharmacy Practice

The hospital practice environment is a very technical space with documentation as a legal requirement for all processes and procedures carried out. All processes within the hospital practice environment require documentation and have a minimum standard.

1. Prescription documentation.
2. Prescription vetting.
3. Unit dose dispensing system.

   Using robotic dispensing systems or robotic dispensing cupboards, the UDDS can be automated reducing time to perform these activities, improving record making or even delegating the process to a lower skill position e.g. pharmacy technician, with oversight by a pharmacist.
4. Collaborative practice agreements and Pharmaceutical care.
5. Research and clinical trials.

The use of computers has demonstrated the potential to decrease adverse events, preserve financial and medical resources, and improve patient management.

The computer is becoming the key factor of hospital pharmacy practice. Enhancement of computer technology is essential to assist the hospital pharmacist in keeping all relevant data in order to provide optimal oversight of drug therapy. As more data become available on drugs and the factors which place the patient at risk for developing reactions to a drug, the pharmacist must place less reliance on committing all facts to memory and recognize that the computer is a necessary solution to optimizing patient care.

Handwriting interpretation errors are estimated to cause 9% of all medication errors. Although electronic prescribing (e-Rx) is not yet a requirement in Nigeria, it is well underway in the United States and it has been for several years the norm in many European countries. As recommended by the federal government and other national health care improvement organizations, the use of electronic prescribing applications in pediatric practice should be encouraged.

Computer applications are one approach to reducing medication errors and are by no means the only method. In emergencies, Computer-assisted prescription writing represents a new tool to reduce errors and promote rational drug use.

Computer technology is becoming more universally accepted in hospital pharmacy, and research on the diffusion of innovations suggests that acceptance will continue to increase.

Computers in Industrial Pharmacy

By effective utilization of computer technology, pharmaceutical industries increase production by eliminating non-value-adding steps, reduce costs and improve the quality of drugs.

Computers do not only maintain the record of raw material but are helpful in planning the future production of drugs.

Computers reduce costs, errors and duplications of documents. The computer system can also save data entry for batch order processing. Paperwork is completely eliminated in pharmaceutical industries. Automated computer-to-computer transmission of data eliminates human errors.

Pharmaceutical industries can acquire specific software systems which are helpful in the quality control laboratories, quality assurance and in the production department.

Computers in Pharmacy Education and Research

Computers and information technology have become essential to pharmacy field education and teaching. Various methods are getting integrated into the teaching process.

"Chalk to talk" approach is changing to the "Display and deliver" approach. Use of multimedia packages, hypertext video chats, web based education, multimedia based education, intelligent tutoring system, digital libraries, simulation laboratories, tele-education are finding place in normal teaching process at postgraduate as well as undergraduate levels and the trend is increasing day by day. Sensible use of computers in imparting education to pharmacy students has been found attractive and satisfying.

"Computer Aided Learning" (CAL) is becoming an important part of E-learning. It is commonly referred to as the intentional use of networked information and communication technology in teaching and learning. A number of other terms that are also applied to e-learning include online learning, virtual learning, distributed learning, network and web based learning. Some learning models for e- learning are as follows;

• working over an Intranet, where exchanges among participants occur with a time delay (i.e., not in real time). Typical examples of this kind of activity include on-line discussions via electronic mailing lists and text-based conferencing within learning managements systems.

• Digital libraries are an electronic collection of real or virtual resources which is available anywhere in the world online or offline. Digital Libraries have received large interest in the recent years because they allow access to digital information from anywhere across the world. They have become widely accepted and even preferred information sources in areas of education, science and others. The speedy expansion of the internet and the increasing interest in development of digital library related technologies and collections have helped to speed-up the digitization of printed documents in the past few years.

Beside these aspects, computers are finding their place in classrooms for the purpose of presenting data in the form of PowerPoint, which allows easy understanding for the student by using graphics, animation and attractive presentation. Students are also using various computer programs for completing their projects and assignments.

Publication of research work is an important aspect in any field and pharmacy field is not an exception to it. Publishing research is a vital element of the researcher's professional life. However, writing is not every researcher's desired activity and the difficulty of getting a paper published can be nerve-wracking. However, use of computers in writing and editing makes it very effortless and versatile to prepare and publish articles. Computer may be required at the different stages for the author, publisher and reviewer.

Computers in other Pharmacy Areas

Other areas of pharmacy in which computers find application include but are not limited to Health Commodities Supply Chain Management, Drug Information Centres, Pharmacy Regulation (Practice and Product Regulation) and Public Health.

Case Study 1

The Central Medical Store (CMS) of a sub-Saharan African country was computerized as part of efforts to strengthen the processes that support the Ministry of Health through ICT integration. Unfortunately, the firm chosen to do the work did not know that there were two previous attempts at doing the same thing but failed due essentially to issues unrelated to computers or their use. This firm repeated many of the mistakes of its predecessors and failed because it did not understudy the existing structure within CMS- or how it interphases with its customers (internal and external).

An ambitious plan to computerize the inventory and financial accounts within three months was made. The result was computer hardware that could not be serviced locally and inadequate training of the key staff that needed to utilize the service. Meetings with the management of the CMS were poorly attended by the key staff and for many reasons, the data entered in the inventory was never accurate or updated.

After nine months, the main CMS computer was stolen. No backup data was made because no external hard drives were available. The data in the last four months were lost and no one thought the system could be revived. No maintenance budget had been set aside for recurring costs such as printer toners, diskettes etc.

TELEPHARMACY

This is the delivery of pharmaceutical care via telecommunications to patients in remote locations where they may or may not have direct contact with a pharmacist e.g. a rural area, medically underserved areas, specialized clinics etc. Telepharmacy practice may produce the same effect as traditional mode of pharmacy delivery while producing other value-added services that are not found in traditional practice. It is an instance of the wider phenomenon of telemedicine, as implemented in the field of pharmacy.

Services

- Drug therapy monitoring
- Patient counselling
- Prior authorization and refill authorization for prescription drugs
- Monitoring of formulary compliance
- Remote dispensing by robotic systems
- Provision of medical/disease state education to patients
- Provision of education, training and management services to pharmacists and other pharmacy staff remotely

Infrastructure

- Internet access
- Electronic medical records
- Secured transmission and storage of medical records
- Audio/video compression algorithms
- Microphones
- Video cameras
- Robotic dispensing systems

Benefits

1. Potential to expand access to pharmaceutical care in smaller rural communities that may not support a full-time pharmacist.

2. Access to professional care which could lower costs, and improve patient safety through better patient counselling, drug administration monitoring and adherence monitoring.

3. Sharing of pharmacists between facilities can also reduce costs in existing facilities that may no longer need to employ a full-time pharmacist.

Drawbacks

1. Potential decrease of human interaction between the pharmacist and the patient.

2. An increased risk of error during remote delivery of specialized services.

3. Increased risk of compromising protected healthcare information through transmission and storage.

4. The costs of rolling out infrastructure are high.

INFORMATION & COMMUNICATION TECHNOLOGY IN DRUG AND POISON INFORMATION SERVICES

Information & Communication Technology

ICT is an umbrella term that includes any communication device or application encompassing: radio, television, cellular phones, computer and network hardware and software, satellite systems and so on, as well as the various services and applications associated with them, such as video conferencing and distance learning. It underscores an integrated system of communication and delivery of services. The importance of ICT lies not in the infrastructure itself but in its ability to create greater access to information and communication in underserved populations.

Drug Information Services

Drug information itself covers all types of information including objective and subjective information on substances used in the diagnosis, prevention and treatment of diseases. Drug information services are a group of specialized activities undertaken by pharmacists through provision of drug related information to optimize drug therapy by promoting rational use of drugs and medical devices, promotion of evidence based practice, improvement of adherence etc. These services may be directed at other caregivers but may be provided to the patient too. The services provided must be timely and of the highest possible standards.

Functions of a DIC

1. **Drug Evaluation.** Assessment of therapeutic drugs is the most frequent enquiry received at drug information centres (DICs); from care providers seeking information about new drugs and from patients who have just received new prescriptions. This requires critical assessment of available medical, biomedical and other data gathered during a literature search including a critical analysis of the published data to show relevance to local practice. For example, consider the statement "which of the two cough syrups is stronger?"
    Contacts must be maintained with the industry to obtain information as quickly as they are available or as quickly as they are deemed important by experts.

2. **Therapeutic Advice.** This is more directed at patients and it is geared to answer questions and enhance 'qualitative adherence'. The nature of patient request is urgent and requires

summarized but qualitative facts that enable the patient make informed decisions. It may lead the patient to make what the medical worker thinks is a wrong decision or suboptimal decision- but the information given should be factual, comprehensive (but summarized) and contextual at the time of delivery. Questions may cover range such as efficacy of different therapeutic substances, alternative therapy, optimum dosage, interactions (most frequent request), effects of other disease state, how to promote adherence etc

Consider this statement "Do you think I should use Seretide diskus® daily rather than my reliever medicine when I have episodes?" (This question may unmask issues such as fear of thrush or if an infant, questions about growth retardation).

3. **Pharmaceutical Advice.** Substitution of brand name POMs has become an important jurisdiction of practice for pharmacists as it may account for 5-20% savings in certain chronic diseases. Now that the question of substituting biologics with bio-similars has come up, both caregivers and patients are looking up to pharmacists to aggregate the data and give unbiased clinical evidence of the efficacy and safety of bio-similars **in practice**.

   Enquiries in this form may present about options for pharmaceutical dosages, availability, cost, storage, stability, insurance copay, programme subsidies (e.g. in cancer chemotherapy in University of Ilorin Teaching Hospital, first twenty patients at oncology clinic get their treatment free) etc.

4. **Education and Training.** Education activities may be disease specific (diabetes foot self-care), medication specific (drugs with narrow therapeutic index or other special considerations e.g. HAART), complications specific (drugs that increase incidence of falls in the elderly e.g. barbiturates), programme specific (teaching of young women and mothers on the utility of the rotavirus vaccine and preparation of ORS) etc. These activities improve the rational use of drugs and medical equipment. These activities may also include disseminating education and training to care providers to encourage rational prescribing (e.g. the use of prescription indicators to teach pharmacy students on the need to follow treatment guidelines, benefits to undergraduate pharmacy students on the professional responsibility of pharmacists to evaluate prescribing indicators at health facilities).

5. **Dissemination of Information.** The traditional dissemination utilizes drug monographs, bulletins and brochures. The utilization of social media is innovative and time saving while

engaging the recipients in a timely and efficient manner. The developer must have editorial skills and use language that is easy to understand without losing quality of the message

6. **Research.** These centers can be actively involved in research e.g. pharmacoepidemiology (drug utilization studies and pharmacovigilance).

   Well-developed DICs may eventually develop critical clinical practice documents like the Cochrane Reviews on different diseases that are widely respected in clinical practice.

7. **Pharmacovigilance and toxicology.** These are not the core practice in DICs but due to reputation of reliable data aggregation, the centers may serve as aggregators of trusted pharmacovigilance and toxicology reports. Specialized training and accreditation is required to offer this service.

References

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