Bangladesh Pharmaceutical Journal ***20****(2): 180-187, 2017*

Hospital Pharmacy Management System and Future Development Approaches in Bangladeshi Hospital

Tushar Saha[1], Robiul Hasan Bhuiya[2], Zia Uddin Masum[1], Muhammad Rashedul Islam[1] and Jakir Ahmed Chowdhury[1]

[1]Department of Pharmaceutical Technology, Faculty of Pharmacy, University of Dhaka, Dhaka-1000, Bangladesh.
[2]Department of Pharmacy, Faculty of Pharmacy, University of Dhaka, Dhaka-1000, Bangladesh.

Received: May 13, 2017; Accepted: May 31, 2017; Published (Web): July 31, 2017

Abstract: The aim of this present work is to find out a suitable and updated hospital pharmacy management system for Bangladesh. Hospital pharmacy is considered as the heart of any hospital because all the departments like surgery, cardiology, nephrology, medicine, pediatric etc. are linked up with pharmacy section. Although the pharmaceutical sector of Bangladesh is enriched so much and the product is up to the mark but the improper management system in hospital pharmacies make the patient's burden high. So, development is required in hospital pharmacy to ensure the proper choice, preparation, store, compounding and dispense of medicine as well as medical devices along with counseling for patient's safety and compliance.

Key words: Hospital pharmacy management, developed hospital pharmacy, patient's safety and compliance.

Introduction

Hospital pharmacy in a hospital is very much needed as it plays an important role in patient's compliance. Currently, a few hospitals in Bangladesh like Square Hospital, Apollo Hospital etc. are maintaining the hospital pharmacy although the quality is not reaching to the peak level. In government hospitals of Bangladesh, the pharmacies mainly act as drug store and drug dispensing unit. Bangladesh has vast opportunities to improve in this section by using information and communication technology (ICT) which will digitalize the system, by ensuring the other requirements and newer techniques (Buchanan *et al.*, 1995). Applying digitalized and modern hospital pharmacy, the health sector of Bangladesh can be improved dramatically (Basher and Roy 2011). It is very much possible to introduce newer techniques and newer sections in hospital pharmacy with the compulsory sections which can be a paragon to the others. Graduate pharmacists play an important role in a hospital pharmacy for patient compliance and welfare. They are clinically trained and have adequate knowledge which helps them to deliver a good quality of service in hospital pharmacy. Certain departments can only be run by graduate pharmacists like extemporaneous preparation, prescription review and patient counseling. In developed countries, hospital pharmacies are mainly supervised and serviced by clinically experienced graduate pharmacists (Simpson, 2017). They along with physicians and nurses ensure the quality treatment and patient compliance. They work with physicians in selection of appropriate drugs and treatment strategies. The main benefit of having graduate pharmacists in hospital pharmacies is that they reduce the tendency of prescribing irrational and high cost. They can individualize the drugs and their dosing according to the patient needs which can reduce medication costs for treatment. But in Bangladesh, graduate pharmacists are not directly involved in patient care. Here, hospitals pharmacies are mainly run by

Correspondence to: Jakir Ahmed Chowdhury, Tel.: 880-2-9661920, Ext. 8178; Fax: 880-2-9667222; Email**:** jakir@du.ac.bd

diploma pharmacists who are not clinically trained. They cannot review prescriptions as a result proper care cannot be taken. In Bangladesh, graduate pharmacists work in pharmaceutical companies rather than in hospitals. Adverse drug reactions (ADRs) occur mainly due to prescription errors. The Good Pharmacy Practice Guidelines developed by the FIP, and subsequently adopted by the World Health Organization, state that a pharmacist's first concern should be the welfare of the patient.

Methodology

Hospital pharmacy management system is directly related with the health of the people, so it was very sophisticated to choose a suitable method. Three hospitals which were Dhaka Medical College and Hospital, Shaheed Shuharawardi Medical College and Hospital and Square Hospital Limited, Bangladesh were chosen and their management system was monitored. After monitoring the current trends and facilities, extensive literature review of modern hospital pharmacy of different developed countries were performed from the reputed journals, books, magazines as well as websites. After monitoring and literature review, some management systems was proposed for the hospital pharmacy of Bangladesh.

Discussion

In Bangladesh hospital pharmacy is not well developed and thats why patients are suffering a lot. Improper patient counseling and management of drugs are the main issues. Again, the drug storage condition is not so high which causes the damage of the drugs as well as the medical devices. Digitalized systems are not adopted in most of the hospitals and that take lot of time to serve a patient. Following measurements can be taken under consideration to make the hospital pharmacy management up to the mark in order to get the patient compliance.

Expert personnel with proper clinical training: In Bangladesh, the hospital pharmacy is mainly handled by the diploma pharmacists but they have inadequate knowledge about hospital pharmacy and improper clinical training. In developed countries like USA and UK, hospital pharmacy is maintained by the professional graduate pharmacists along with the diploma pharmacists. Graduate pharmacists have proper clinical knowledge and have the capability to review the prescriptions for any error, drug-drug interactions and irrational use of drugs. If only diploma pharmacists handle the pharmacy, patients will not get the proper care. It is necessary to introduce professional graduate pharmacists in hospital pharmacy for proper patients counseling as well as to check out the prescriptions in order to maximize the patient compliance by minimizing the risk factors like contra-indicatory drugs and so on (McGregor *et al.*, 2001). On the other hand, expert personnel are needed in the other sections of hospital pharmacy like in QC department, extemporaneous preparation department etc.

Adequate manpower: Lacking of manpower in pharmacy is one of the main problems in Bangladesh. It is not possible to run and maintain a hospital pharmacy without adequate number of personnel. Mainly three types of personals are needed in a hospital pharmacy. They are- graduate pharmacist, diploma pharmacist and technical or supportive pharmacist. graduate pharmacists are mainly responsible for the pharmacy. They review prescriptions, prepare extemporaneous preparation, supervise diploma pharmacists, maintain liaise with the doctors. The diploma pharmacists are responsible for inventory control, dispensing and supervise technical pharmacists. Technical pharmacists only help the diploma pharmacists in inventory control, packaging and in collecting of drugs from the shelves etc. So, adequate manpower is extremely needed for proper functioning of a pharmacy (Alomi, 2016). Otherwise there will be lacking of services provided to the patients.

Proper storage condition and storage facilities of drugs and devices: Storage condition and storage facilities play an important role in a hospital pharmacy. Storage condition can hamper the drugs quality. This drug may be a cause of patient's sufferings and the drugs may be turned into lethal one

or the efficacy of the drugs may be reduced (BP, 2009). Temperature and relative humidity (RH) should be controlled according to the specifications of the drugs. The drugs like insulin, suppositories and vaccines should be refrigerated and the temperature of the refrigerator should be monitored regularly. Attention should be given in case of photo sensitive products.

Medical devices loss its efficiency if it is not stored in proper manner. Nebulizer, syringes etc. need to be stored in a specified environment. Medical devices should be stored in a dust free environment. Devices perform well if they are stored by maintaining proper temperature. Rodent traps and light traps may be used to prevent rodents and mites in the store room (BP, 2009).

Attention should be given in storage facilities of Look-a-like and sound-a-like (LASA) products. LASA are those products whose names are similar or they look similarly. Some examples of common LASA products are given and shown in table 1 and figure 1. It causes confusion and wrong drugs are dispensed. LASA products should be placed in different areas so that no problem can be occurred during handling.

Drugs should be stored according to their dosage form. Fast moving and slow moving drugs have to be placed differently. Fast moving drugs have to be placed in the insight areas.

Table 1. Examples of some sound-a-like products.

Generic name	Generic name
Aminophylline	Amitriptyline
Anafranil	Enalapril
Azithromycin	Erythromycin
Baclofen	Bactroban
Clobazam	Clonazepam
Tramadol	Trazodone
Vinblastine	Vincristine

Figure 1. Look-a-like products.

Proper supply, availability and authentic source of drugs and devices: Proper supply and availability of drugs and devices should be ensured in hospital pharmacy. Requisitions of drugs should be sent to the suppliers before they are short in the inventory. Inventory of life saving drugs and injections should be adequate all the time. Fast moving drugs should be ordered accordingly with the consumption. Drugs should be procured by keeping in mind the seasons like demand of antihistamines increase in cold season. Drugs and medical devices should be procured from the sources which have authenticity or

registration from government as well as legal authority.

Digital inventory control management system: Inventory control should be computerized and all the systems should be maintained by software systems like system analyses and data processing (SAP) software. Computerized input should be given in the SAP when the drugs get in or get out from the inventory. Thus any authorized person can track any drug in any time and can see how much inventory is left on that day. Analog systems should be removed as it is time consuming and sometimes it is impossible to find out all the data as there is chance of lost the data.

Digital record keeping systems for patients, drug and diagnostics: Patient's history, their prescribed drugs (prescriptions) as well as diagnostics data should be stored in a computer system. From there, pharmacists will be able to get the information about their disease and diagnostic patterns. Pharmacists can compare the chosen drugs and can take decision either it is correct or not. By this system it is possible to reduce the harmful effects as well as correct medicines can be prescribed easily (Elias-Al-Mamun *et al.*, 2016).

Extemporaneous section: It is not always possible to treat the patients with the available marketed dosage form. Extemporaneous section helps to provide special dosage forms according to the individual patient needs. It is specially occurred for the pediatrics, geriatrics and emergency cases. For example pediatrics need relatively low strengths drugs and especially in solution form for their convenience.

In case of geriatric patients, dose can be adjusted according to their body condition as they have different problems like diabetes, kidney failure etc. Dose adjustment is needed for them.

In emergency or special cases, when it is impossible to administer oral dosage form for a continuous vomiting patient, oral dosage form can be replaced by suppositories, patches etc.

Mainly total parenteral nutrition (TPN), tablet, solution, suspension which are not commercially available in desired dosage and strength are prepared in the extemporaneous section. Proper equipment, facilities and environment are necessary to run this section with expert personnel. Now-a-days, it is becoming very important as doctors prefer individualized treatment strategies rather than traditional treatment (Woods, 1997).

Service Assurance Unit (SAU): Service assurance unit (SAU) will be similar to quality control and quality assurance department in developed countries. SAU will ensure the authenticity and validation of the sources of drugs, medicine and devices. They will also check out the expiry date, storage condition and personnel. They can give required training to the personnel. (Sewell, 1995).

Proper dispensing: Proper dispensing is very much important in treatment procedure. Without proper dispensing it is not possible to ensure the patient compliance (Dooley*et al.*, 2005). At the beginning, the prescription prescribed by a doctor should be checked by a professional graduate pharmacist and then he will transferred that to the diploma pharmacist. Diploma pharmacist will check and ask the patient about his requirements and after proper counseling, he will transfer the data to the supportive personnel in the storage and within this time he will perform the billing process which should be automated. Dispensing of drugs should be in a unique plastic pack or pouch individually with proper label. For example, different generic drugs should be packed in different plastic pouch. A model sticker is shown in figure 2.

Research and Development Unit (RDU): The research and development unit (RDU) will track the new drugs available in the market. They will research for better drug application, new drugs which can be applicable and safe for patients (Dooley*et al.*, 2005). They will monitor all the prescriptions in a time basis periods. If they find any fault, they will discuss with the physicians as well as the pharmacists. Any suitable and cost effective method that may be used for better patient's compliance will also be their concern. For example, a physician is treating a

patient with medicine which is conventional but a new novel dosage form is available in the market. RDU department will consult with the physician and the pharmacist about the new dosage form either it is possible to adopt it or not.

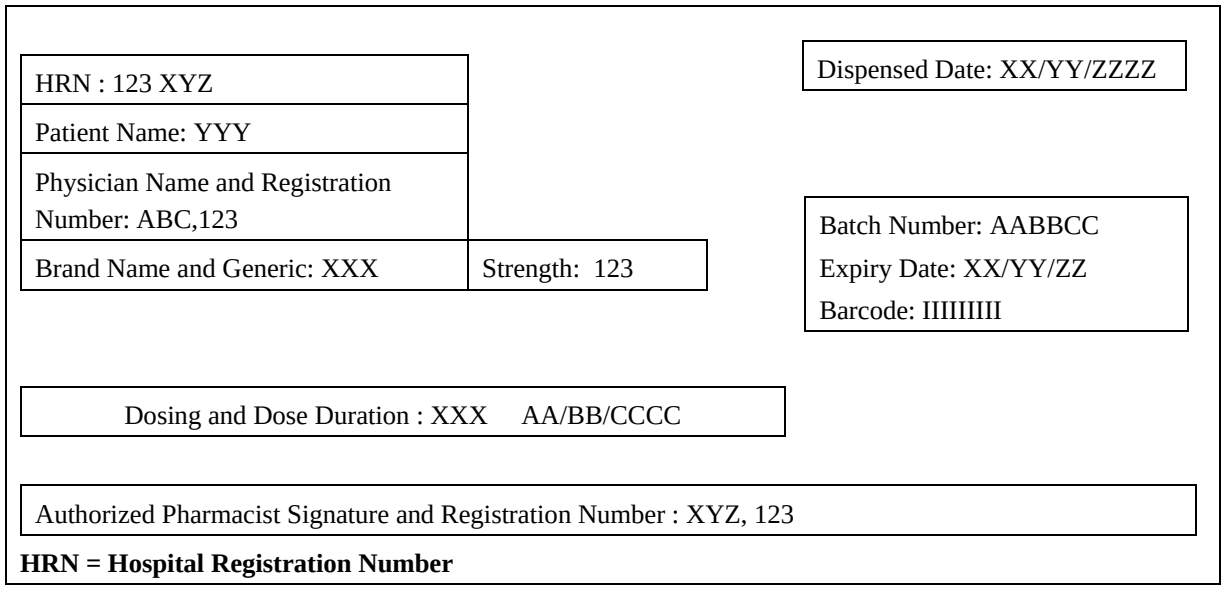

Figure 2. A sticker model of dispensed packets or containers

Drugs return system: It is very common in hospital that a patient is treated with multiple drugs. These drugs are often changed before completing the course for better outcomes. For example, a physician prescribes drugs to a patient for one month. But after a week the same physician change the drugs for better option. Patients have to suffer with this as they had already bought drugs for one month. It is an economic loss to them. So drugs return system can be introduced. In this system a patient can return the drugs which are prescribed by the physicians of the same hospital and if a certain criteria is maintained. For this, categorization of drugs based on storage condition is necessary. Return of drugs is only applicable where storage condition is not a big issue. Return should not be applicable for injections, vaccine, insulin etc. and drugs that haven't the expiry date written on them as well as the dispensing packet.

Complain Box and Call Center or Information Center: Complain box and call center may be added for better patient compliance. Through complain box one patient can share his/her complain to the hospital pharmacy. On the other hand, they can get information by calling to the call center if they have any problem and need any types of information regarding medicines, drugs or related to his/her prescription (Mcnulty, 1977). This section also maintains the email and all type of communication. They will also give alarm to the patients if they need further medicines or anything.

EMI and Health Insurance: Sometimes, it is not possible for a patient to pay a huge amount of money at a time in an emergency case. So, equated monthly installment (EMI) or health insurance system can be applied here. People will be able to pay as EMI method or the insurance company can pay for the patient (Kleiman, 1974). National health insurance policy can be applied for better patient compliance.

Intra and Inter Hospital Pharmacy-Research Center Connection (IIHPRC): Some rare medicines are not found in the market all the time. It may be found in research centers or specialized hospitals. Again, in big hospitals, the dispensing units are divided into many parts and they are in different parts of the hospital. For example, one hospital may have

different building for patient's treatment and their pharmacy dispensing unit may be segregated in different buildings. A dispensing unit of one building may have the shortage of medicines because of heavy load of people where as other dispensing unit in different building may have that medicines in their counter. They can easily overcome these problems if they have intra hospital pharmacy connection. On the other hand, in case of rare or specialized diseases like cancer, HIV, it is not possible to get the medicines from a normal hospital pharmacy. It can be found from specialized hospitals or research center. In this time, the medicines can be collected via inter hospital or inter research center connection server. So, through intra-inter connection server hospital pharmacies can exchange their medicines and drugs information and if they needed, they can exchange the drugs according to their memorandum of understanding (MoU). These exchanges may be medicines, technologies as well as research and information. Hospitals may get this facility from different research centers also. The server is shown in figure 3.

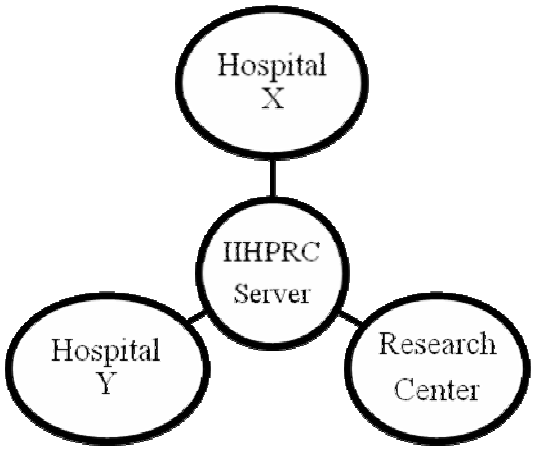

Figure 3. Intra and Inter Hospital Pharmacy-Research Center Connection (IIHPRC)

Future Opportunities

In future, some developed systems can be adopted for further patient compliance and for better treatment. Following futuristic approaches will be beneficial for the patients.

Department wise Pocket Pharmacy System (DPPS): This system will be a new and unique out-patient pharmacy. In this system, there will be an outpatient department (OPD) pharmacy desk beside every nurse stations of OPD consultants in every department of hospital like cardiology, medicine, orthopedics, endocrinology etc. The OPD pharmacy desk will be known as pocket pharmacy. A graduate pharmacist will be appointed in this pharmacy. When a physician generates a computerized prescription, it will be automatically transferred to the nearest pocket pharmacy in the same department where the pharmacist will review the prescription for any drug-drug interaction, contra indication and special precaution. At first, the patient will go to the pocket pharmacy for his / her prescription and drugs. The pharmacist will counsel the patient about his / her prescription and drugs and will answer any query of the patient. Medications error will be reduced because of this as the patient is getting the full guidelines from the pharmacist (Madden, 1973). Then the pharmacist will take the drugs order from the patient and transferred the order to the central dispensing booth of the hospital pharmacy through computer. The patient will be provided with an order number to collect the drugs from the central dispensing booth. Advantage of this system is that; every prescription will be reviewed by a qualified graduate pharmacist, so it is very much patient

oriented. Moreover, mounseling of the patient is possible in a shortest possible time and hence it is not time consuming.

Automatic Prescription and Review Manager (APRM): This will be all-in-one automated software through which physicians will generate prescriptions. At first, the physician will write the chief complains of the patient. Then, he will enter on examination findings. After that he will write the investigation names that the patient needs to be done for proper diagnosis. Then the physician will select the drugs, strengths, dose, and dose duration from the drop down menu of the software. He will also write any instruction for the patient as well as for the pharmacist. The APRM software will have intelligent algorithm. It can detect any contra indicatory drug in the prescription based on patient hypersensitivity history, contra indicative situation, patient condition, drug-drug interaction. The software will mark the contra indicatory drug red and will present it to the physician for confirmation and correction. Some drugs for which special precautions need to be taken will mark blue and will present it to the physician for confirmation and correction. After proper confirmation and recheck, the prescription will be transferred to the hospital pharmacy. There are some advantages of this software as proper review can be done of every prescription, so error free prescription will be generated. Fewer pharmacists will be needed and this system will also reduce the workload of pharmacist.

Automated Inventory Storage and Dispensing System (AISDS): Automated inventory storage and dispensing system (AISDS) can be applied. It is a totally automated system. Pharmacist has to press the programmable logic control (PLC) and the desired medicines will be came automatically to the counter from the storage with proper packaging and labeling. Robotics can be used to get the correct medicines quickly in the counter by using barcode system.

IPD pharmacy dispensing: In case of in-patient department (IPD) pharmacy, the drugs will be dispensed as unit dose. This will reduce the burden of nurse station‘s workload. Nurses will get more time for patient take care thus the error of works will be reduced, the safety and efficacy will be enriched.

Conclusion

Hospital pharmacy management system is very much needed for patient compliance. Patient counseling, proper dispensing of drugs and other patient oriented issues can be managed properly if the hospital pharmacy is developed. By ensuring a quality management system of hospital pharmacy, it is possible to enrich the health sector. It may be a paragon to the others. As advanced hospital pharmacy requires number of technical sections which makes the drugs costly, the government should increase the budget in health sector. Again to implement this system, funding and loan can be managed from financing organizations like world bank, UNDP, ADP, EUC, USAID, IDB, JAICA, AUSAID, corporate social responsibilities of different organizations and companies, NGOs and etc.

References

Alomi, Y.A. 2016. A New Guidelines on Hospital Pharmacy manpower in Saudi Arabia. *J. Pharm. Pract. Community Med.* **2**, 30-31.

Basher, M.A. and Roy, P.C. 2011. Introducing an e-Health card for Developing Countries: A case study of Bangladesh. Master Thesis, Stockholms University, Sweden., p. 38.

British pharmacopoeia. 2009. 1141-1149.

Buchanan, B.G., Moore , J.D., Forsythe, D.E., Carenin , G., Ohlsson, S. and Banks, G. 1995. An intelligent interactive system for delivering individualized information to patients. *ArtifIntell. Med.* **7**, 117-154.

Dooley, M., Bogovic, A., Carroll, M., Cuell, S., Galbraith, K. and Matthews, K. 2005. SHPA Standards of Practice for Clinical Pharmacy. *J. Pharm. Pract. Res.* **35**, 122-146.

Elias-Al-Mamun, MD., Saha, T. and Islam, M.R. 2016. Initiation and Maintenance of Diseases and Diagnostics Database for Bangladeshi Individuals. *Am. J. Pharm Health Res.* **4**, 30-42.

Kleiman, E. 1974. In: *The Determinants of National Outlay on Health.* (Perlman, K. Eds.), Palgrave Macmillan UK, Chapter 5, pp. 66-88.

Madden, E.E. 1973. The Development and Evaluation of an Outpatient Pharmacy Program Designed to Maximize the Pharmacist's Contribution to Patient Care. *J. Am. Pharm. Assoc.* **13**, 437-443.

McGregor, K., Millin, B., Aro, S. and Samuelson, A. 2001. An Information Paper on the Role of the Pharmacy Technician. *Can. J. Hosp. Pharm.* **54**, 293-296.

Mcnulty, H. 1977. Hospital pharmacy information centres and their role as suppliers of information. *Postgrad. Med. J*. **53**, 556-558.

Simpson, S.C. 2017. The Roles We Have as Hospital Pharmacists. *Can. J. Hosp. Pharm.* **70**, 3-4.

Sewell, G. J. 1995. Practical guides 11: Hospital pharmacy quality control services. *J. Cli. Pharm. Thera*. **20,** 149-157

Woods, D.J. 1997. Extemporaneous formulations – problems and solutions. *Paediatr Perinatal Drug Ther*. **1**, 25-29.