International Journal of Scientific Engineering and Applied Science (IJSEAS) – Volume-6, Issue-6, June 2020
ISSN: 2395-3470
www.ijseas.com

To Study the Medicine Supply Chain Management in Hospital

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ABSTRACT

This paper focuses on supply chain management of essentials medicines, equipment's needed for all services in the hospital. SCM is widely used in almost all kind of industries across the world. There is the key importance of implementing supply chain in an organisation and some changes which must be made in supply chain practices of hospitals across India. Having a better SCM will reduce the overall cost of operations and shows more profit without compromising the quality of services. Essential medicine distribution and flow in the hospital use RFID (radio frequency identification) which enables to trace medicines used in various department of the hospital. Some hospital faces various challenges like Provider preferences, patient demand/need etc. for applying supply chain management in the hospital.

INTRODUCTION

The prime objective of the Hospital is to provide adequate health care to Patients. It primarily needs an adequate and continuous supply of high-quality medicines and essential medicines in Pharmacy and inventory. In recent times the supply of medicines is not a general problem as it was before 10 years for all hospital as many legit distributor/suppliers understand hospital requirement and are efficient in supplying medicine at expected time but difficulties such as finding time for medicine, availability in inventory, the huge quantity of expired product disposal etc. are the generalised problem which is challenged by most of the hospital for the reason that their operations are not streamlined. Supply Chain Amalgamation In hospitals helps to develop a strategy which should be to maximize patient care. The hospital supply chain enables this strategy by, ensuring product availability, minimizing storage space, maximizing patient care space, reduce material handling time and costs for all medical staff (nurses, pharmacists, doctors), Minimizing inventory cost.

SCM plays an important role for Hospital Pharmacy to ensure timely availability of medicines at the lowest possible purchasing cost. In the supply chain, it needs different Suppliers opportunities, Vendor agreements, regular meetings of negotiations, and special types of Product Delivery, as some medicines need to be transported at regulated temperatures only. It is very important to predict medicine demand in hospital pharmacy or hospital inventory and this

demand can be predicted based on consumption trends in the hospital. Common patient trends for not accessing hospital services after the first visit are Increase cost of medicine discourages the patient from post-visit leads to poor patient outcome, increase in prescription prices led to slow growth of prescription spending.

The logistics in Healthcare constitute of Pharmaceutical products (Heinbuch, E. Susan, 2005), medical and surgical supplies, devices, and other products as required by Healthcare Professionals like Doctors, nurses, and admin staff. SCM's foremost goal should be transparency in all processes. Information flows should be centralized and reviewed/corrected on time. Visibility and clarity of information should be maintained between manufacturer, distributor, insurance companies, providers and patients. Logistics is responsible for two functions, first is of Managing resources i.e. Capacity management (Wheelchair, Stretcher, Ambulance), Warehouse Management (Medical Equipment, Devices, Drugs), And Second is for Managing workflow i.e. Shipping, Routing (patient, wheelchair, stretcher, ambulance)

An RFID system may consist of several components: tags, tag readers, edge servers, middleware, and application software. The purpose of an RFID system is to enable data to be transmitted by a mobile device, or the tag, which is read by an RFID reader and processed according to the needs of an application. The data transmitted by the tag can provide identification, location information, or specifics about the product tagged, such as price, colour, date of purchase, etc. There are two types of RFID. One type of RFID can transmit information. Another type of RFID, which is called a "passive" device, can be read by a nearby, powered machine. Both types are small and cheap enough to be utilized every day in society. Everything from security and convenient cards such as ATM debit/credit cards, to antitheft devices on goods in shops, and hospitals are starting to become aware of their potential (Tainton, 2008).

RFID helps to streamline drug copying, simplifies the clinical trial process, improve the correct identification of patients, medicine inventory management, easily track patient journey inside hospital, advances communications between staff and patients, and eliminates the risk of prescribing and giving the wrong medications to patients.

The management of drug supply consists of five basic functions of the Medicines Management cycle namely, selection, quantification, procurement, distribution, and use. The core of this cycle includes the other organization department such as human resource, financing, HMIS (Hospital management information system) and quality assurance department. The success of supply of Drugs depends upon the standard quality drugs available at an affordable price in a healthcare organization.

Hospital supply chain and Pharmaceuticals both are different because pharmaceuticals have large global distribution system requires a high level of product availability and high uncertainty in the supply chain. Problems come when many hospitals do not pay attention to their supply chain system and report their performance. Even if periodic surveillance happens then it is based on poor indicators and does not help at all in improving the whole chain. To sustain and expand the successful interventions, these supply chains need to be made more robust and flexible through better management and increased investment of resources to achieve supply chain optimization.[1]

DATA SOURCE

Review of literature on medicine in hospital and supply chain in healthcare are taken from various sources, PROQUEST, EBSCO, JGATE. Papers were analysed for their relevance and implications.

MEDICINES MANAGEMENT CYCLE

Selection and Quantification

A right selection of distributor is extremely important and should be done by a well-qualified pharmacist who has relevant experience in the same field. The Pharmacist has the right to make decisions regarding product quantities, product specification, quality of the drugs, also the Pharmacist stand to choose the brands. In selecting a vendor, the hospital must consider price, terms, shipping times, dependability, quality of service, returned goods policy, and packaging[2].

WHO has defined essential drugs as "those that satisfy the needs of the majority of the population and therefore should be available at all times, inadequate amounts in appropriate dosage forms and at prices that an individual and the community can afford". This is a global concept that can be applied in any country, in the private and public sectors and at different levels of the health care system.[3]

It has been estimated that there are some 3000-4000 drugs at any point in time, registered in any country of which almost 70 per cent are non-essential.[4] But if we check there are 300 - 400 drugs listed in a national drug list as essential drugs, whereas 150-200 drugs are used in a district hospital and a community centre numbers are usually 45-50. Short and specific lists are easier to manage, procure, and offer to the patients within the resources available[5].

Rational Selection

WHO has given its Model List of Essential Drugs in the year 1977, which is updated by the WHO expert committee every two years since then? The current versions are the 19th WHO Essential Medicines List and the fifth WHO Essential Medicines List for Children updated in

April 2015.[6,7] The Model List is divided into the main list and a complementary list and drugs are specified by International Non-proprietary Names (INN) or generic names without reference to brand names or specific manufacturers.[8]

A study carried out to check the availability of Essential Drug List (EDL) and adherence to the list for the selection of drugs (give a reference) reported only 61 per cent of the health facilities with a selection policy restricted to the EDL, while just 39 per cent of the facilities used the list.

Procurement Policies and models

Countries are moving towards decentralization; roles of central medical stores are disappearing. In India, central and state government institutions follow one or more of the afore-mentioned arrangements for public procurement: central rate contract system, pooled procurement either by the government or through an autonomous corporation, decentralized procurement and local purchase. In the centralised model of pooled procurement, the distribution is managed centrally and the onus of the procurement agency is to ensure availability at the user institutions.31 In Rajasthan, India, the procurement of drugs, equipment and supplies are carried out by the Store Purchase Organization (SPO) under the Directorate of Medical and Health Services. The SPOs are entrusted with the responsibility of finalizing the rate contract for the majority of drugs and equipment. The rate contracts are finalized as per the General Finance and Accounting Rules for the State.[19]

Procurement can be defined as the acquiring supplies through the purchases from the manufacturers. Purchasing of medicines starts with the framing of the buying policies and ends with the stocking, receiving, and payment. Hospital pharmacist along with the inventory manager prepares the detailed specification of medicines, purchasing orders and memo. There are a few methods which hospitals follows. Open tenders, quotation tenders, invitation are few of them.

Distribution Management

The supply chain of drugs and its distribution is a lifeline of the healthcare organization and without it. The primary drug distribution goal to maintain a steady supply to the hospitals and for this inventory management is very important while ensuring the maximum utilization most efficiently. Various cost like Transportation cost, storage cost, is a significant expense while running a hospital. All the stakeholders comply with legislation and regulation to meet the quality of pharmaceutical drugs. Every activity in the distribution of pharmaceutical products should be carried out by the guidelines on Good Storage Practices and Good Distribution Practices as applicable.[9,10]

The supply chain of Drugs is an essential part of the hospital and without it, the hospital cannot work or perform.

A supply chain is defined as "a virtual network that facilitates the movement of product from its production, distribution, and consumption" (McFadden and Leahy, 2000). In the supply chain of drugs, Pharmacist not only ensure the quantity and quality but also keeps the good relation with the pharmaceutical companies. Healthcare managers play an important role here by keeping the track record of inventory and the relationship with the companies at the upstream source of the products to minimize their overall cost.

The following graph showing a basic distribution of drugs to the end-user.

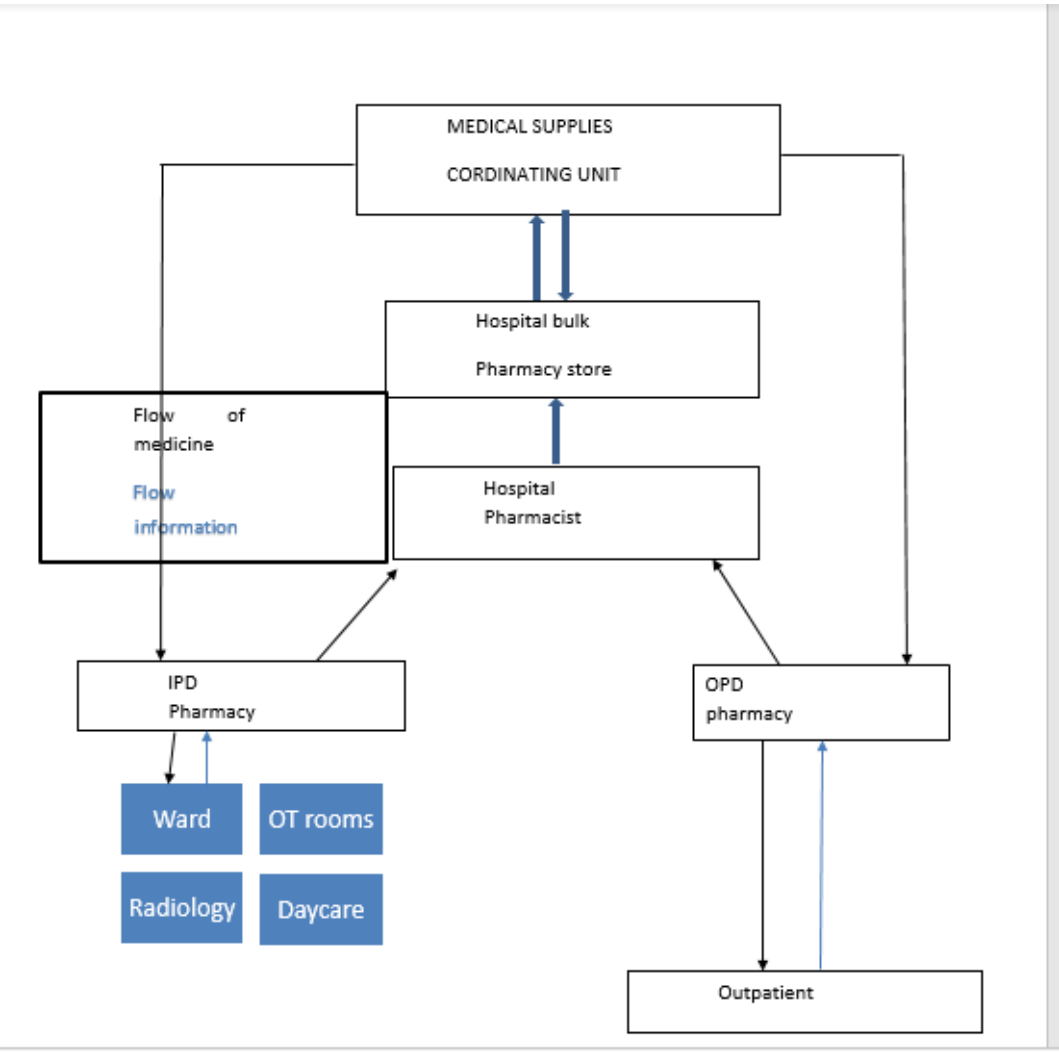
The process of manufacturing is the same as other pharmaceuticals. Companies purchase materials do research and give a final product. Product flow through manufacturers, logistic, distributors and finally to the patient. The healthcare supply chain involves a wide range of healthcare products but here we are focussing on drugs distribution.

Inside a hospital purchasing and stock management department manage hospital purchasing (pharmaceuticals, medical supplies, equipment and so forth), this department called drug stores. Here the chief pharmacist plays an important role and prepare an annual budget request for pharmaceuticals and place an order for medicines through drug stores. A single person is never responsible for pharmaceutical procurement. DTC (Drug Therapeutics Committee) manage all the functions. Proper procedures for procurement and guidelines for inventory management should be written and strictly followed by the DTC.

Hospital Drug Therapeutics Committee

This committee ensures the safe, effective use of drugs inside the hospital. DTC also plays an important role in purchasing and stock management. As daily purchasing decision can be handled buy chief Pharmacist, with supervision by the DTC. The above chart is a diagrammatic

sketch of the flow of medicines at a hospital.



Inpatient Medication flow

As we know the distribution of drugs is the primary function of a hospital, four types of distribution system exist in IPD (In-Patient Department)

1. Bulk ward stock replenishment
2. Individual medication system
3. Unit-dose system
4. Automated medication dispensing

Bulk ward stock replenishment pharmacy acts as a warehouse and dispenses bulk containers without reviewing the individual patient medication orders. The main advantage of this reduces the time frame.

Individual medication system closely resembles dispensing to outpatients on presenting a written prescription by the doctors. Compared to Bulk ward system here pharmacist can check

the appropriateness of the treatment. Here a record of the patient-specific medication profile can be maintained.

Unit dose system

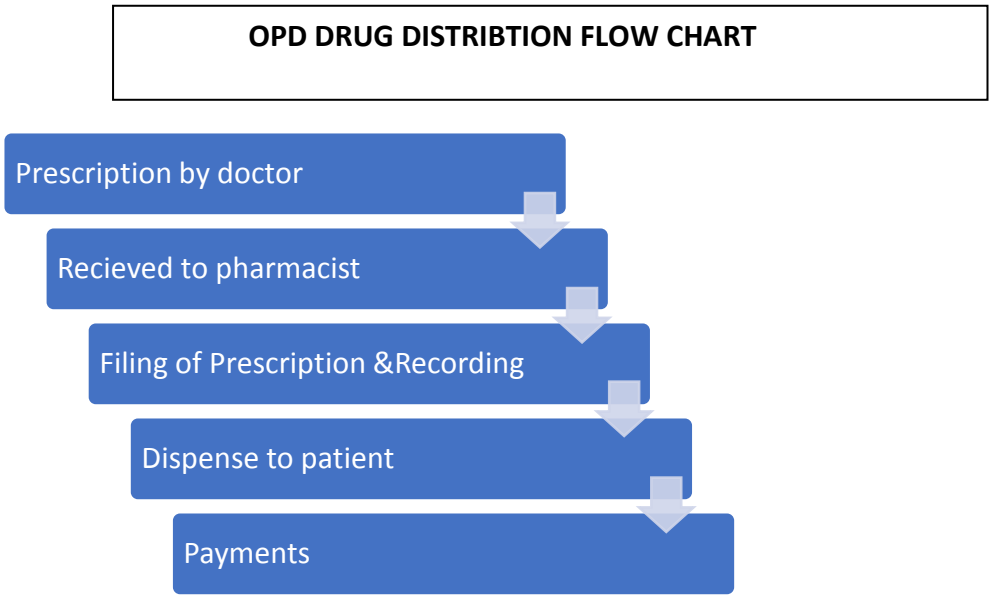
If we see from the patient perspective a preferred one is a unit dose system, which not only have the zero-error but the total control over the doses. In unit dose system medicine are dispensed in unit dose packages in separate bins or drawers for each patient. Commonly a 24hr supply is provided. Medication returned to the pharmacy can be put back without any Concern or contamination. This system is efficient but requires a large number of capital outlay for the repackaging of medicines. But some hospitals are using their inventory system to reduce the cost.

Automated medication dispensing

Technology amazingly helping the healthcare sector, various technology-based intervention helps to reduce the error and to improve the distribution of drugs in the hospital. Automated medication dispensing has become commonplace in the hospital but the cost is the major issue. This system automatically controls the distribution and track the dispensing of the medication for the patient based on each medication profile.

OPD Drug Distribution

Out-patient department of the hospital receives many patient and it is the first contact between doctor and his/her patient. The drug distribution system in OPD is not complex as in IPD but strict procedure followed by the pharmacist. Prescription written by the doctor received to the pharmacist and then pharmacist checks the prescribed medicines and dispenses it to the patient. After issuing the medicines quantities supplied recorded and then payment by the patient.



Medicine Storage and Inventory

Proper inventory management for the drugs is a crucial step for the hospital. Pharmaceutical management is needed to minimize the waste of resources and mishandling of uses. The HP director must be able to develop inventory policies by considering uncertain demands, limited storage capacity, customer service level (CSL), patient safety and various regulations that may affect supply (Uthayakumar & Priyan, 2013). Hospital industry challenged to deliver the quality services at the affordable price but increase in the price of medicine by the pharmaceuticals and the new technology introduction requires the hospital to reduce operating cost

Without compromising patient's health and the quality of the service. The provision of pharmaceutical services in hospitals can absorb some 40-50 percentages of the total hospital costs.[11]Then these services must be maintained effectively and efficiently. Environmental controls like temperature, humidity, light, condition of sanitation, lightning for the storage of drugs. It is extremely important to have a warehouse with a big space, fitted with heavy-duty racking system. The American Production and Inventory Control Society (APICS) defines inventory management as the branch of business management concerned with planning and controlling inventories.35 The role of inventory management is to maintain the desired stock level of specific products or items. The systems that plan and control inventory must be based on the product, the customer, and the process that makes the product available.[12] A good effective storage system for the drug inventory and to assist the efficient flow of supplies. Storage maintenance and security are really important and all the drugs including samples should be separated from the non-medication in a closed locked container and should be accessible to authorised personnel only.

Information and Inventory Management System

Drug inventory management is a critical process and also a complex process in the healthcare organization and without having a proper inventory management system healthcare organizations could fail to deliver the adequate amount of supply to their users. Hospitals utilize their pharmacy bulk store inventory system to ensure the appropriate accountability over the pharmaceutical companies and ensuring the traceability of the purchasing order from the administration to the patient. In this process, a healthcare manager plays a very important role and responsibility for the quality, quantity and dispose of. A pharmacist ensuring the first in first out (FIFO)and last in last out(LIFO) of the drugs. The goal of the hospital supply system is

to ensure that there is adequate stock of the required items so that an uninterrupted supply of all essential items is maintained.[12]

A study conducted by the Department of Personnel and Administrative Reforms in India has revealed that not only does the number of medicines received fall short of the requirement but also the supply is often erratic. Even common medicines are out of stock and remain so for a considerable period.[13]A hospital materials manager must establish efficient inventory system policies for normal operating conditions that also ensure the hospital's ability to meet emergency demand conditions.

In Uganda, it was estimated that 86 per cent of the facilities had regular inventory controls. Record-keeping practices on stocks using bin cards were being poorly done. There were several mistakes in filling out bin cards, and stock balances were frequently not recorded. On the reliability of bin/stock card records, there were discrepancies between card balances and physical balances (after on-the-spot physical counts) at all levels[14]. The ABC and VED (vital, essential, desirable) analysis in the pharmacy store of PGIMER Chandigarh, India conducted to identify the categories of items needing strong management[15].

VED analysis is based on critical values and shortage cost of the item. Based on their criticality, the items could be classified into three categories: vital, essential and desirable. There could be a serious functional dislocation of patient care services in a hospital when vital drugs are not available even for a short period. If essential items are not available beyond a few days or a week, the functioning of the hospital can be adversely affected. The shortage of desirable items would not adversely affect patient care or hospital functioning even if the shortage is prolonged.16,17,18

Hospital inventory management system is crucial and plays a vital role especially when people's lives at stake. It lets the hospital about the stock, detail information of medicines batch, inventory purchases, sales, orders.

Importance of Inventory management in Hospitals:

Hospitals are very complicated organizations because they are not just providing care but handling other operations like physicians, staff, administration, laboratory, pharmacy, housekeeping, dietary, linen services. Each area has specific and unique material and supply need creating a requirement in these facilities for the supply management system that can provide the necessary supplies when needed. In the current scenario of increasing health care cost, systems inventory must be optimised without sacrificing the level of service provided. Good inventory management is essential to the successful operation of any healthcare

organization. Drugs &Medicines being expensive and resources limited, it becomes imperative to improve their supply, increase the use, and minimize the cost through a pharmaceutical management system to be effectively put in place. There are some 3000-4000 drugs at any point in time, registered in any country; of which almost 70% are non-essential (WHO).[26]

CHALLENGES

Some roadblocks for the hospital to adapt the supply chain in the hospitals

it is very difficult to choose an appropriate provider or supplier for inventory many hospitals and health organisation face challenges foe selecting distributor who provides the best quality and low price.

Health IT application integration in departments to keep track of inventory, inside distribution and expired product help us to get better insights about the goal which we are going towards but to operate those applications and to check the accuracy of data there are extra resources and expenditures involved.

All department of hospital, suppliers and patients must be integrated with a supply chain which is a very challenging task because all different individual has different interest and different way of doing things which we have to keep in mind while streamlining process and demands of stakeholders keeps on changing.

As different physicians, surgeons and healthcare professionals have different preferences for the products and tools that they use and how they are used during a procedure. Many organisations believed that inventory management cannot solely depend on the medical professionals' preferences because it will not be a cost-efficient method to purchase those equipment's and medicines in bulk amount. A failure of preferences of inventory by professionals can lead to inefficient use of supplies, excess products wasted and a loss of costs.

High spending and accountability control is also one of the important factors and generally, it gets ignored by the staff. On hand stock control by the manager of the supply department manually which counts individual products and generate orders to keep stock replenished for that day.

There are also some organisations which allow preferences of professionals while planning inventory purchase which results in more expenses by hospitals and the profit curve starts to decrease.

RFID (Radio Frequency Identification)

RFID technology has been used in supply chain management, primarily to track goods in warehouses (Bowen, Wingrave, Klanchar, and Craighead, 2013). RFID has been found to improve cost-saving measures and increase efficiency in a range of enterprises (Gulcharan et al, 2013). In recent years, RFID now is used in healthcare industry to keep track of inventory and medicine movement in hospital, best part of this technology is that it works smoothly without help of human hand.

RFID is a type of automatic identification technology, which stores and gather data in form of RFID readers and tags, these tags can be used as stickers or can be kept inside the object which have been traced .tags receive signal and answer queries made by the authority via antenna or silicon chip . In a typical RFID system, individual objects are equipped with a small, inexpensive tag. The tag contains a digital memory chip that is given a unique electronic product code. The interrogator, an antenna packaged with a transceiver and decoder, emits a signal activating the RFID tag so it can read and write data to it. When an RFID tag passes through the electromagnetic zone or the antenna, it detects the reader's activation signal. The reader decodes the data encoded in the tag's integrated circuit and the data is passed to the host computer. Passive tags require no internal power source, whereas active tags require a power source.

- In smart hospital patients in IPD who are under anaesthesia and are going to operation room for surgeries they will be having RFID wrist band which consist of name, medical summary, picture etc. which is then read by RFID receiver. Medical staff does not have to cross check every time during the treatment procedure staff can just scan the wrist band and they will have all the information they need.
- The distinct speciality of radio frequency identification (RFID) can provide the exact information and does not put extra burden on staff.
- If RFID is integrated well in system of hospital it can help in examination of prescription denial, and identification of medication dosage errors.
- One more benefits of having RFID is during pre-surgery preparation all the equipment's can be traced and the time taken to collect all equipment can be shorten and which lead to proper utilisation of time ,patient safety, exact equipment selection.

INVENTORY CONTROL PROBLEM

In inventory such as lab accessories, pieces of equipment, and medications are often not arranged, out of stock, or expired because these changes in inventory are cannot be monitored accurately. Unauthorized access of staff and due to rush to fulfill patient needs inventory stocks are not entered or it is not correctly registered in the inventory management system. the pharmacy and the emergency room are the best examples of such kinds of problems.

Visibility Achieved with RFID

Hospitals need to have an idea when their stocks are in the status of reordering or expired without wasting much time on staff. RFID-enabled cabinets and refrigerators, as well as fixed RFID readers installed at supply room doors, provide automated, continuous monitoring of inventory levels, with alerts issued when present minimum levels are reached. Handheld RFID readers, which provide an on-the-spot reading of RFID tags, allow workers to perform quick and accurate inventories or search for specific items that could be misplaced in the supply room. RFID-enabled cabinets and refrigerators can also provide critical inventory and supply visibility.

BENEFITS

- Exact track of inventory of critical supplies ensures that it can be readily available for patient needs and cannot be purchased at a high price in less time.
- With real-time inventory counts, stock held in inventory can be reduced without risking out-of-stock situations.
- RFID tags on medical supplies of patients' treatment will be entered directly in the patient's bills while dispensing.
- Reduces replacement cost as the warranty and inventory is managed and checked properly.
- Automated inventory updates help reduce lost and stolen supplies, non-charged consumables and the time spent locating supplies.
- Automated alert for expiry product helps management staff to reorder the supplies and keep it in stock for the patient's needs.

CONCLUSIONS

Hospitals are providing a large variety of services to patients.they have a large number of patient inflows and less professional staff to deal with the daily problems in hospital operations. Superspeciality hospitals need smart solutions to there inventory management problems like high replacement cost, less stock of critical supplies, high amount of expired medicines and equipment, etc this all are basically problems that come when they concentrate less on the supply chain in their organizations.

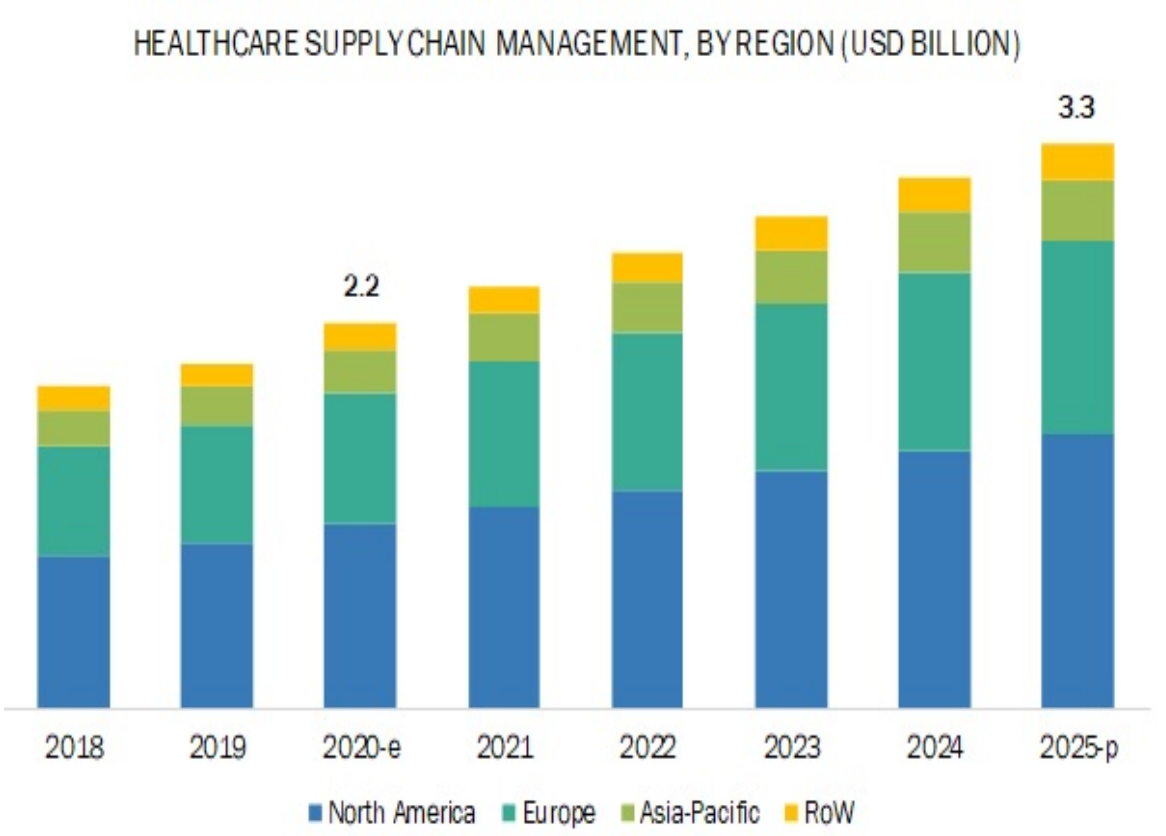
Good supply chain management is the way of ROI (return of investment) and it should be in more focus. Inventory management plays a very important role in cost-effectiveness, time consciousness, and safety of the patients. RFID has been the ultimate solution for the hospital supply chain. It is not the only solution but it is one of the widely used technologies which helps in less expenditure on inventory management and reduces the extra expenditure which hospital spent to buy in emergency at high price due to out of stock. Although there is some concern with this technology particularly the issue of privacy, there is a general conviction that hospitals, by deploying RFID in its supply chain, can minimize medical error, improve quality of care, increase patient satisfaction, and create a safer environment for patients and healthcare personnel alike.

GROWTH OF SCM

Growth of Supply chain management in the healthcare sector is going to increase by 8.4% according to CAGR. Healthcare Supply Chain Management Market report is forecast to succeed in $2.31 billion by 2022 from $1.55 billion in 2017 at a CAGR of 8.4% during (2017-2022) driven by the increased pressure on healthcare providers to enhance operational efficiency & profitability, the adoption of the GS1 System of standards within the healthcare industry globally; implementation of the unique device identification initiative by the FDA; emergence of cloud-based solutions; continuous support within the sort of funding, investments, and partnerships; and therefore the growing efforts to scale back the large-scale counterfeiting of medicine to its huge database.

According to CAGR manufacturers are said to account for the most important share within the HSCM market, by the end-user.Based on the end-user, the healthcare supply chain management market is segmented into manufacturers, providers, and distributors. Manufacturers must cater to the increasing demand for products from their end-users. due to this, manufacturers mainly search for supply chain management solutions for transportation and warehouse management to

make sure faster, more accurate, and more efficient functioning. This has resulted in an increased demand for supply chain management solutions during this segment.



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Supply chain management is going to be the next big thing in India, and it will create new job opportunities in India. The value of mergers and acquisition (M&A) deals in healthcare sector jumped by 155% at Rs 7615 crore in FY19.

Recommendations:

Some healthcare organizations have found success with supply chain management through cost transparency. By harnessing price and utilization data, healthcare organizations can track and manage inventory more efficiently and construct more informed purchasing contracts with manufacturers. Engaging clinical staff can also help to establish cost-saving habits, discourage hoarding, and empower providers to keep cost concerns in mind when delivering care

SCOPE OF SUPPLY CHAIN MANAGEMENT

IS SUPPLY CHAIN MANAGEMENT A GOOD OPTION AS A CAREER?

Supply Chain Management *is the next big thing in the Indian industrial scenario. According to Management Experts there is a lot of scope for supply chain management (SCM) in India due to increasing uncertainty of supply networks, globalization of businesses, proliferation of product variety and shortening of product life cycles. Personalized content and services for customers add to the cause. The employability potential of graduates is very high here.*

WHERE CAN I BE PLACED AFTER STUDYING SUPPLY CHAIN MANAGEMENT?

Any business, be it retail, or manufacturing, FMCG, healthcare, transportation and logistics or even e-commerce, all thrives on the expertise of Supply Chain and Logistics. So, you can join any industry of your liking. You can even make your career in Supply Chain Management Consulting in the IT Big brothers like IBM, Accenture, Capgemini etc.

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