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Evaluating Logistics and Supply Chain Management in Nigerian Health Sector

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Abstract: *This paper evaluated logistics and supply chain management in Nigeria with focus on the health sector. In healthcare system, managing the supply chain is typically a very complex and fragmented process. The healthcare supply chain starts at the medical product manufacturer where items are produced and sent to a distribution center. Healthcare Supply Chain Logistics is series of processes, workforce involved across different teams and movement of medicines, surgical equipment, and other products as needed by healthcare professionals to do their job. The paper observed that in Nigeria, the National Health Supply Chain Strategic and Implementation Plan (NHSCSP), 2021 – 2025 is the policy documents that focuses attention on the strategic plan to contribute to the achievement of the Sustainable Development Goal (SDG) 3.8. It was recommended that the implementation framework of the NHSCSP should be designed to ensure easy integration of medicines' safety monitoring practices into the overall health care delivery system since it sets out clear targets that encourage collaboration and cooperation among stakeholders, which is particularly important as COVID-19 vaccines are introduced and monitored.*

Keywords: Logistics, Supply Chain Management, Healthcare Supply Chain Management. Nigerian Health Sector

1.0 INTRODUCTION

Supply chain generally refers to the resources needed to deliver goods or services to a consumer. In healthcare, managing the supply chain is typically a very complex and fragmented process. The healthcare supply chain starts at the medical product manufacturer where items are produced and sent to a distribution center. Depending on the type of product, hospitals can either purchase inventory directly through the manufacturer or distributor, or the transaction can be conducted through a group purchasing organization, which establishes a purchasing contract with the manufacturer on behalf of the hospital. Medical products are then sent to the healthcare organization, where the goods are stocked into inventory for providers and patients. The organization ensures that providers are not left without essential medical products and patients have access to potentially life-saving tools (LaPointe, 2016). Logistics is the operational elements of supply chain management. It involves activities which include quantification, procurement, inventory management, transportation and fleet management, and data collection and reporting. Supply chain management includes the logistics activities plus the coordination and collaboration of staff, levels, and functions. The supply chain includes global manufacturers and supply and demand dynamics, but logistics tends to focus more on specific tasks within a particular program health system (Kumurya, 2015).

In order to achieve effective supply chain management, logistics needs to be optimized. Like Nikolaou and Konstantinos (2013) observed, logistics optimization is a key driver for achieving a sustainable supply chain (Nikolaou & Konstantinos, 2013; Dubey et al., 2016) and having a centralized warehouse is proposed as an ideal choice for healthcare institutions. The purpose for designing a framework for the evaluation of healthcare logistics is to achieve an efficient supply chain supply chain and this will be achieved through logistics evaluation and optimization (Kumurya, 2015). Logistics is an essential component of supply chain management, with responsibilities that include generating detailed processes to plan and coordinate the complex transportation of goods by providing timely, safe, and reliable shipping. At the heart of any well-run supply chain is a logistics department designing innovative ways to facilitate the flow of products and information from suppliers to consumers (Cohen, 2019). Logistician Peter Reed describes the relationship between logistics and the supply chain in the following way: "supply chain comprises all aspects of a product cycle from origin to end user, for example from farm to fork. Logistics relates to one component of supply chain, addressing efficient product movement, such as from manufacturer to retail store (See https://www.inboundlogistics.com/cms/article/good-question/).

Understandably, logistics activities in healthcare centres, hospitals or clinics have been indicated to provide a significant avenue for cost containment in healthcare if best practices are implemented (Feibert, 2017). Since businesses including healthcare industries depend on their supply chains to provide them with what they need to survive and thrive (Hugos, 2017) there is validation to develop a framework that could ensure a more efficient supply chain. Jawab et al. (2018) established that hsospital logistics, viewed as a vital part of a hospital that is in charge of purchasing, receiving, stock management etc., accounts for up to 46% of hospital budget—and since this amount is considered a very substantial proportion, especially in the context of budgetary restrictions applied to all organizations including hospitals and healthcare centres, they identified exhaustively logistics activities based on determining logistics manifestations within hospitals—healthcare centres.

The logistics function has gained a strategic place in the management of hospitals (Volland et al., 2017). Nowadays, we are also witnessing several strategic decisions related to logistics such as the outsourcing of certain activities in the hospital supply chain (purchasing and supply management, sterilization, stock management or intra and inter-site transport, etc.). Hospital managers have also implemented various tools and methods of lean management allowing a continuous improvement approach (Mazzocato et al., 2010).

The objective of this paper was to evaluate logistics and supply chain management in Nigeria with focus on the health sector.

2.0 CONCEPTUAL REVIEW OF LITERATURE

2.1 Concept of Healthcare Supply Chain Management

Healthcare supply chain management involves obtaining resources, managing supplies, and delivering goods and services to providers and patients. To complete the process, physical goods and information about medical products and services usually go through a number of independent stakeholders, including manufacturers, insurance companies, hospitals, providers, group purchasing organizations, and several regulatory agencies. However, by promoting efficiency in the healthcare supply chain, hospitals and physician practices can create substantial cost-reducing opportunities across their organization (LaPointe, 2016).

The management of logistics activities goes beyond traditional physical flows, and it considers other flows such as patients throughout the care chain. Patient management incorporates several multidisciplinary and interdependent medical and administrative steps that require controlled interconnection and synchronization to avoid problems with wait times, misuse of medical resources etc (Ageron et al., 2018). The application of SCM concepts in healthcare is most visible in the goods flow of materials used in health care. Already in 1996 an Efficient Healthcare Consumer Response (EHCR) document was produced by five healthcare-related trade groups, to investigate opportunities and strategies available to eliminate costs and improve value in the healthcare supply chain. Savings were possible in the areas of inventory management, order management, transportation and physical distribution. In 2002 McKesson in collaboration with the Healthcare Financial Management Association produced a resource management update on the health care supply chain (McKesson, 2002).

Healthcare is a special type of service industry, with a very close interaction between the client and the provider in the delivery of the service. The primary process in healthcare is represented by the flow of patients through the system. Providers add value to the patient by diagnostic and therapeutic services in order to find an answer for the patient's request for help. The flow of goods (supplies for wards, drugs, operating theatre supplies, food, office supplies) is secondary. Sometimes the goods flow is coupled on a one-to-one basis with the patient flow, for instance, a prosthesis that is implanted in a hip of a patient during a surgical procedure by an orthopaedic surgeon in an operation theatre. Most of the time the goods flow is decoupled from the patient flow by departmental stores (Vissers & Huijsman). The supply chain is quickly becoming the main area of focus for all cost reduction efforts in hospitals as well as medical organizations, having eclipsed labour as the prime cost reduction area. This means that many of today's medical organizations have already implemented or are in the process of implementing data-driven supply chain enhancements, for the purpose of improving patient care. The leader of a supply chain department in today's hospitals is most likely to be a c-level manager, which is an accurate reflection of the degree of importance now associated with optimizing hospital supply chains (Pruitt, 2020). Another aspect of healthcare supply chain management involves the participation of regulatory agencies, such as the Federal Drug Administration, and healthcare payers, including Medicare and private health insurance companies. Regulatory agencies and payers determine if a medical resource is fit for consumer use and whether providers will be reimbursed for using it on specific patients (LaPointe, 2016).

2.2 The Concept of Healthcare Logistics

Healthcare logistics is the function which deals with the use of material resources essential to the efficiency, quality and cost-efficiency of health activities within the programmes and structures (in satisfactory conditions in terms of safety and security). The Health Logistician is responsible for optimizing the use of technical means and material resources available to health systems for efficiency, quality and traceability of health operations. Though with technical knowledge and practical experience, he is first a manager and coordinator of logistics (Arora & Gigras, 2018). Healthcare supply chain logistics is series of processes, workforce involved across different teams and movement of medicines, surgical equipment, and other products as needed by healthcare professionals to do their job. The aim of supply chain in healthcare is to find the vulnerabilities among departments and propose measures to reduce them. It aims to identify weak areas to achieve targeted health outcome and increases investments in global health. The advantages of efficient supply chain in healthcare is improved processes, efficient utilization of resources, satisfied employees, effective treatment and happy Patients (Silver, 2008)

In a 2019 Cardinal Health survey, 42% of respondents said supply chain work takes too much time away from patient care and 45% of front-line providers say that manual supply chain tasks have a "very" or "somewhat" negative impact on patient care. By rethinking the supply chain to make it work for clinicians, we can develop logistics services to reduce clinician burnout while

enabling caregivers to spend more time interacting directly with patients (Cardinal Health Hospital, 2019). Health logistics is a multi-sectoral function consisting of a number of different integrated programmes. It may, and should be, incorporated into the organization charts of public institutions (Ministry of Health), international organizations (WHO, UNICEF, etc.), NGOs (Oxfam, MSF, etc.) and private bodies and enterprises. The health logistics function both at the central and intermediate levels involves the skills, knowledge and professional competencies reflected in the seven fields of competency that make up the job description (Silver, 2008).

The different skills sectors of the Health Logistician are based on 7 key areas of expertise (Silve, 2008):

i. Plan logistical activities of health structures and programmes at the district level.

ii. Administrate and coordinate logistics of health programmes and structures.

iii. Manage the supply chain.

iv. Coordinate the use, maintenance (including subcontracting) of medical and technical equipment.

v. Coordinate the maintenance of facilities and housing, including water and sanitation of health structures.

vi. Ensure effective logistical support of Health Emergencies and Humanitarian operations.

vii. Foster intersectoral collaboration and community participation.

From delivering prescriptions to providing patients transportation to and from the doctor, innovation in healthcare logistics facilitates the evolution of a new kind of value-based supply chain. The healthcare supply chain's goals must be reexamined in order to fit a new patient-centred model of care delivery, adapting to the individual needs of agencies along the way. This will help improve patient outcomes while also strengthening long-term supply chain goals between partners by utilizing a holistic approach to supply chain management that centres both patients and clinicians. Some of the biggest challenges in healthcare logistics include waste management, storage and inventory management, device maintenance and sanitation, and shipping. And it can be difficult to build alternative solutions when you're dealing with a lack of efficient storage space, increasing labour costs, and frustrating manual procedures that need to be carried out by clinicians (Arora & Gigras, 2018).

3.0 DISCUSSION

3.1 Areas of Supply Chaim in Healthcare System

There are three areas of supply chain in healthcare, which according to Arora and Gigras (2018) include: Pharmacy Supply Chain, Blood Bank Supply Chain, and Patient Safety Supply Chain.

3.1.1 Pharmaceutical Supply Chain

The primary objective of every hospital and the entire healthcare system is to make available required healthcare service to patients. This can only be achieved with adequate supply of high quality medicines by pharmaceutical companies. Supply chain management plays an important role for hospitals and pharmaceutical companies to ensure timely availability of medicines at lowest possible purchasing cost. In supply chain, it needs different suppliers (Narasimhan et al., 2001), vendor agreements, floating of tenders, rounds of negotiations, and freezing on processes of product delivery, as some medicines need to be transported at regulated temperatures only (Arora & Gigras, 2018).

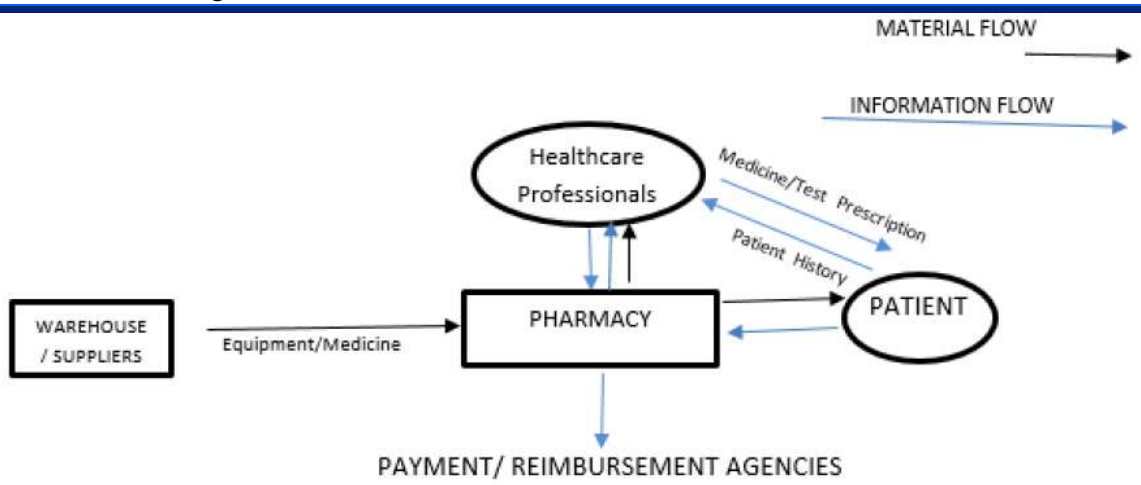

Figure 1. Drug Flow Supply Chain
Source: Arora and Gigras (2018)

The pharmaceutical supply chain is complex and pharmaceutical companies must address the most common challenges in order to get patients their needed medications efficiently. A wide range of stakeholders are also involved in the pharmaceutical supply chain, including manufacturers, wholesale distributors, and pharmacy benefit managers (PBM). In such a complex process, the stakes are high for pharmaceutical companies. Drugs that are distributed incorrectly affect both the company's reputation and customer satisfaction, as well as potential profit. An ineffective supply chain could also disrupt the healing processes of patients and produce negative effects on public health, a Kaiser Family Foundation report found (McGrail, 2020).

At the most basic level, there are five-steps in the pharmaceutical supply chain to ensure that drug inventory is readily available for distribution to providers and patients, according to an Avalere report. Those five steps are (McGrail, 2020):

i. Pharmaceuticals originate in manufacturing sites

ii. Pharmaceuticals are transferred to wholesale distributors

iii. Stocked at retail, mail-order, and other types of pharmacies

iv. Subject to price negotiations and processed through quality and utilization management screens by pharmacy benefit management companies

v. Dispensed by pharmacies; and ultimately delivered to and taken by patients

It is difficult to predict exact demand for medicines. Hence, it is important to capture accurate data on consumption of medicines, to get a trend of same. In today's hospitals, general store keepers manage the supply chain, but they are not well aware of supply chain management principles, and hence at times, it ends up in either high demand, low availability or reverse as low demand but high availability for some of the medicines, leading to increased shelf life, and hence risk of expiry of medicines in Pharmacy (Shah, 2004).

3.1.2 Blood Bank Supply Chain

The management of blood supply is the critical issue for healthcare. The goal of hospital is to dynamically manage the blood supply chain. As per study, the supply of donor blood is irregular, so following points should be taken care: Locations selected for blood collections, depending on the transfusion services commodity required should be stored, number of regional blood bank, how supply and demand should be coordinated to meet the purpose, transportation of blood on demand, delivery system be closely connected to meet the run time requirement and blood banks should be open 24/7 for any emergencies in hospital or near-by hospitals (Bhutta & Huq, 2002).

Blood supply chain management (BSCM) has long interrelated sequences, which consist of collecting, producing, maintaining the inventory, and distributing processes to the patients in need (Osorio et al., 2015). It is very urgent to control BSCM accurately

because blood and is perishable, which means that it has limited life cycle, and it needs a tight security regulation (Mansur et al., 2018).

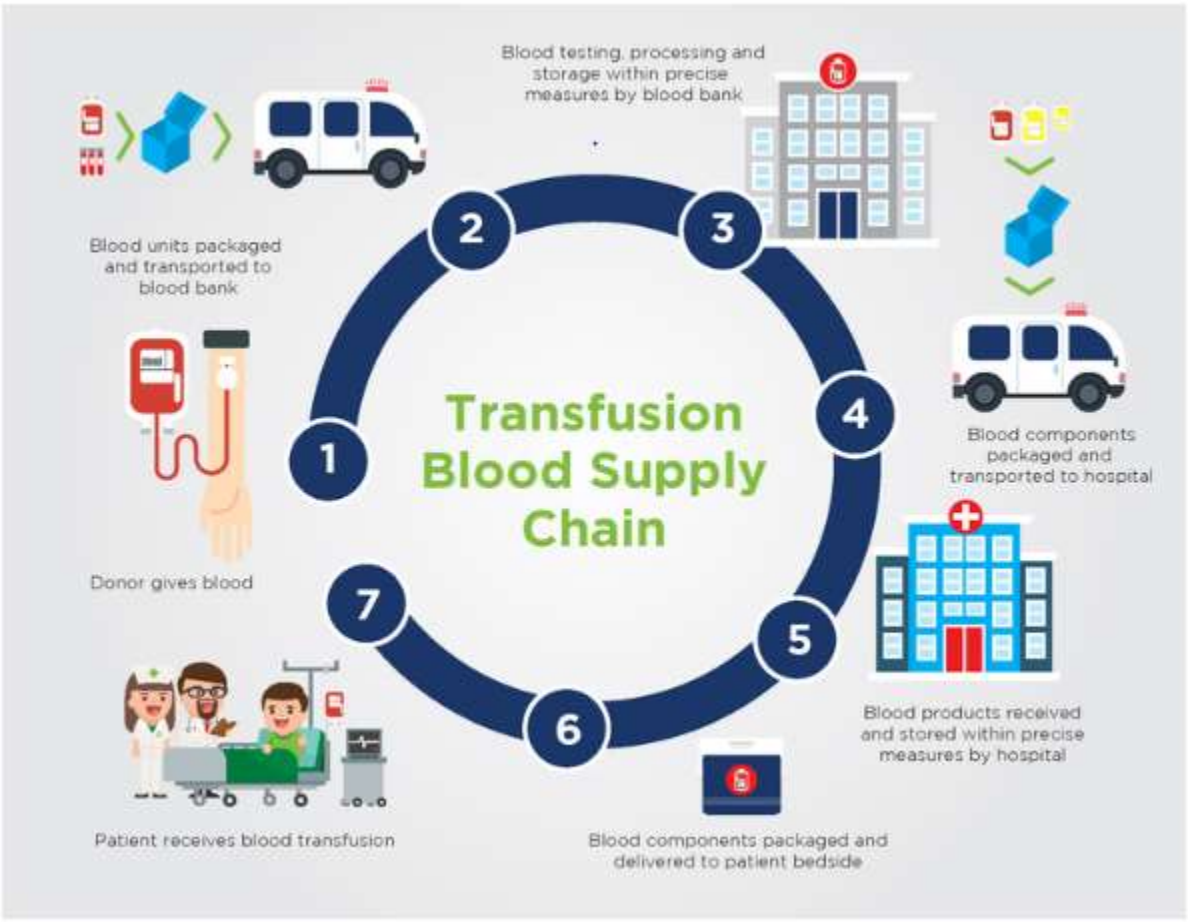

Figure 3. Steps in the Blood Supply Chain
MaxQ Technical Services. (2020)

Steps in the Blood Supply Chain

MaxQ Technical Services. (2020) identified seven steps in the blood supply chain (Figure 3).

i. The donor gives blood.

ii. After donation, blood units and donor blood specimens are placed into cold storage containers and transported to the blood bank which may be many miles away.

iii. At the bank, blood is tested, processed, and stored according to precise specifications determined by the blood bank in compliance with AABB standards.

iv. When ordered, blood products are again placed within cold storage containers and transported to the hospital or other location where blood is needed.

v. When received by the hospital, the blood products are again stored according to precise specifications determined by the hospital in compliance with AABB standards.

vi. When ordered by the physician, blood products are packaged and delivered to the patient's bedside.

vii. Finally, the blood is transfused into the patient as needed.

According to Standards for Blood Banks and Transfusion Services (2016), each of these 7 steps represents a possible point of failure where any delays, miscommunications, or procedural issues can cause serious problems. And if any blood products must be returned, several steps on the supply chain must run in reverse following an equally strict protocol. MaxQ Technical Services. (2020) concluded that any failure in the protocol can mean wasted products. To create a reliable BSCM, a precise planning system is required, which takes into account all the resources and service target provided by stakeholders (Ghandforoush & Sen, 2010). Therefore, good coordination among stakeholders is needed to achieve effective and efficient BSCM performance (Stanger, 2013).

3.1.3 Patient Safety Supply Chain

The healthcare supply chain plays a crucial role in maintaining the valuable life and flow of business. Better supply chain in healthcare leads to better quality of care and supports patient safety. Research suggested that 440,000 patients die annually just because of preventable medical errors, and poor safety cultures (Arora & Gigras, 2018). As many hospitals have linked the patient safety and all other processes in proper format that is, manage the expired medicines by automating the medicine/product tracking and identifying, accordingly taking actions so that staff and patient are confident about treatment done. Streamline all time consuming supply chain processes to reduce the medicines finding times, human errors, redundant processes. All the data sheet captured by doctor should be electronically captured using RFID technology eliminating redundancy and human errors (Acharyulu, 2012). All the processes should follow supply chain transparency to gain patient satisfaction and considering human life the most important.

Global economic growth is creating an increasing demand for healthcare products which are effective and affordable. Quality and patient safety issues are becoming more apparent as more is known about the world of illicit supply chains (Mansur, 2017). Most hospitals today rely on manual supply chain management processes that require intensive staffing to handle multiple, redundant systems. These systems typically lack the data sharing and transparency necessary to provide hospital staff with vital information (Seeger, 2017).

The internal supply chain of a healthcare organization is often a silent service that can be dependent on various clinical departments manning and managing the processes separately and not in a systematic approach; often it is reliant on certain individuals as an addendum to their other duties. Supply chain management remains an issue across the healthcare sector and undertaking programmers or initiatives that support transformation provides an opportunity to improve efficiencies at a critical time; helping healthcare organizations cut costs, implement smarter processes and deliver better patient care. Improvement in supply chain processes helps healthcare organizations achieve long-term financial and operational efficiencies and contribute to better patient safety. An example of this is tracking and tracing medical supplies throughout the supply chain, such as high-value implants, from point of manufacture to point of care; allowing organizations to build a picture of usage – who, what, where and when products are used on patients (Narwani, 2019).

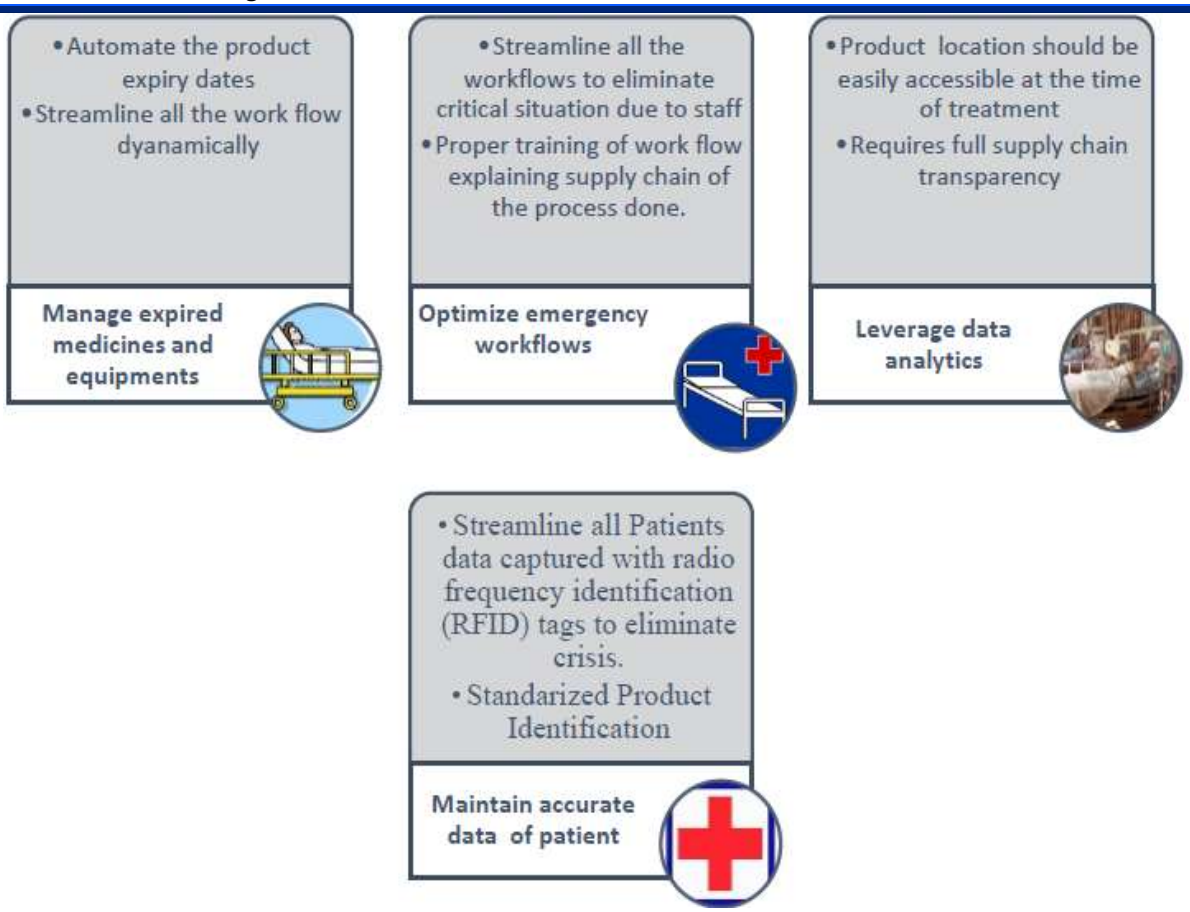

Figure 2. Patient Safety Practices
Source: Arora and Gigras (2018)

Ruth Damron, a Strategic Solutions Consultant at Cardinal Health identified four supply chain opportunities and practices that will help to overcome some obstacles in ensuring patient safety.

They are (Damron, 2017):

i. **Manage Expired and Recalled Items:** One in four hospital staff report an expired or recalled product being used on a patient. It is imperative for healthcare organizations to stay ahead of device recalls and looming product expirations before they occur to support patient safety. At the same time, it is difficult for tightly staffed procedural areas to keep up with monitoring all products to ensure that they do not expire on the shelf or stay on the shelf after a recall.

Tip: Automate product tracking and utilization so that supply chain leaders are alerted to expirations and recalls as soon as possible, and clinicians can be confident that patients will get the supplies they need.

ii. **Optimize Clinical Workflows:** Nurses typically spend as much as 30% of their time searching for products. A recent survey found that, if clinical hospital staff could reallocate this time, most would spend it with patients. It has been observed that when caregivers have sufficient time to care for patients – rather than forage for products – employee satisfaction increases which, in turn, supports patient satisfaction.

Tip: Streamline time-consuming supply chain tasks to empower hospital staff to work more efficiently and to focus on direct, patient care responsibilities. Effective automation can help eliminate manual and human errors while reducing redundant process steps.

iii. **Maintain Accurate Charge Capture:** There are many reasons hospital supply chain leaders should view accurate charge capture as patient care tool, one being that accurate charge capture supports patient safety. When hospital staff have the

ability to track every product to each specific case and patient, they can also match item recalls to an individual patient. Identifying and recovering these items is a critical safety process for both the patient and for the hospital.

Tip: Streamline the charge capture processes during a procedure to mitigate human errors. For example, rather than manually tracking each product used in a procedure, use automated technology combined with radio frequency identification (RFID) tags to track products. In this case, staff can simply wave an item by an RFID-reader to assign it to the patient's billing record.

iv. **Leverage Data Analytics:** According to a recent survey, more than half (57%) of hospital staff recall a time when a physician did not have a product that was needed for a patient during a procedure; most concerning, this same study found that 18% are aware of a patient being harmed for not having the right supplies at the right time. It is possible that events that negatively impact patient care can be avoided when clinicians know where a product is in the supply chain and how easily they can have located the product when needed. This requires full supply chain transparency.

Tip: Do not rely on intuition, emotional stocking, or order history to determine how much and when to order products. Leverage automated tracking technology to acquire real-time product data, and integrate this system with cloud-based analytics to form a strong supply chain business intelligence strategy that allows you to access, analyze and collect vast amounts of supply chain data – such as order history, utilization and expiry alerts. Doing so will help ensure that the right products are in the right place for the right patient at the right time.

3.2 Logistics and Supply Chain Management in Nigerian Health Sector

On March 4, 2021, at an event attended by government officials at federal and state levels, donor agencies, technical partners, and implementers in the health sector, the Hon. Dr. Osagie Emmanuel Ehanire officially launched integral supply chain policy documents developed in collaboration with Management Sciences for Health (MSH) and Nigeria under the Resilient and Sustainable Systems for Health (RSSH) project, supported by the Global Fund. All organizations in attendance—which included the World Health Organization (WHO), the US Agency for International Development (USAID), the Clinton Health Access Initiative, state directors of Pharmaceutical Services, and private sector partners—pledged their support to the Health Ministry in the implementation of the policy guidelines (See https://www.msh.org/news-events/stories/strategic-policy-documents-enhance-health-supply-chain-management-in-nigeria).

The policy document is termed National Health Supply Chain Strategic and Implementation Plan, (NHSCSP) (2021 – 2025). The cardinal objective of the policy is to empower governments at the three levels to function effectively as stewards of the supply chain. It aims at forging a collaboration to implement a single channel of service delivery to the Nigerian clients using lessons from the private sector and existing public health programme to implement a sustainable, cost effective, universal Healthcare-aligned and dynamically responsive management system. In other words, the strategy will leverage private sector resources, synergy in public-private participation, lessons from current practices, consideration of future fitness and system maturity aspirations to design or operationalize a cross-level organizational system that integrates the management of public health programme products and essential medicines for the provision of one stream of service for the Nigerian patient in defined quality standards that can be measured (Federal Ministry of Health, 2020).

The strategic and implementation plan is an expression of the supply chain focus areas that the Federal Ministry of Health has prioritized over the strategic plan period. It therefore provides a guide on interventions that will lead to better supply related outcomes, as well as a guide for partner support and investment. The National Supply Chain Strategic Plan also considered the Public Procurement Act (2007), which is a statute document that establishes the National Council on Public Procurement and the Bureau of Public Procurement as the regulatory authority responsible for the monitoring and oversight of public procurement, harmonizing the existing government policies and practices. This Public Procurement Act does this by regulating, setting standards and developing the legal framework and professional capacity for public procurement in Nigeria.

NPSCMP is set to become the compass and radar of the supply chain system in Nigerian's Healthcare Sector in the following ways:

i. Providing direction for medicine supply chain systems in Nigeria for the next five years, this new policy is expected to strengthen governance in supply chain management across the country. The policy will optimize donor intervention through improved coordination among all stakeholders. In developing this document, MSH in collaboration with the National Product Supply Chain Management Programme (NPSCMP), worked with public and private sector actors and donor organizations through a multi-level, multi-disciplinary process aimed at finding localized solutions to supply chain systems that are appropriate and specific to the country. The implementation of the policy will accelerate efficient and effective delivery of medicines and other health products to Nigerians.

ii. MSH's collaborative work with government entities–the National Agency for Food and Drug Administration and Control (NAFDAC) and the NPSCMP–enabled both regulatory bodies to improve the safety and quality of medicines in the supply chain system. This was achieved through the review of the country's existing pharmacovigilance policy, which was due for review since 2018. In updating this vital framework, MSH collaborated with the NAFDAC and NPSCMP to address gaps in the pharmacovigilance policy and to reflect current best practices in line with WHO guidelines. A key expectation of the framework is that it will help the national regulatory bodies mitigate risks associated with medicine use, and as such, build trust in medicines, vaccines, and technologies among the Nigerian populace.

iii. In the bid to advance an integrated approach to managing the supply chain for effectiveness and efficiency, through RSSH, MSH helped finalize the signed copy of a systematized standard operating procedure (SOP) for the supply chain of health commodities in Nigeria. Prior to this, different health programs had separate SOPs. The national SOP contains 12 SOPs and 5 guidelines for managing all public health commodities, including vaccine and nutrition products. Managing health products in line with the provisions of the SOP guidelines will ensure that the right products are delivered to the right client, at the right time. The document, which is the first of its kind, will better organize reviews and updates by all health programs in Nigeria.

iv. Recognizing the importance of having quality assured health products across all programs in Nigeria, MSH collaborated with the NAFDAC, NPSCMP, and national health programmes and their corresponding implementing partners to develop the first integrated national quality assurance/quality control guidelines for public health commodities. Incorporated in the guidelines is the annual schedule for sampling and testing. In addition, a joint memorandum of understanding (MOU) was signed between the NAFDAC and the national programmes for sampling and testing when using NAFDAC ISO-certified laboratories. Due to the development of these guidelines, it is expected that Nigerians will have access to the highest quality products within the supply chain system for optimal therapeutic outcome.

4. CONCLUSION

Healthcare supply chain logistics is series of processes, workforce involved across different teams and movement of medicines, surgical equipment, and other products as needed by healthcare professionals to do their job. The aim of supply chain in healthcare is to find the vulnerabilities among departments and propose measures to reduce them. It aims to identify weak areas to achieve targeted health outcome and increases investments in global health. The advantages of efficient supply chain in healthcare is improved processes, efficient utilization of resources, satisfied employees, effective treatment and happy patients. The significance of the research paper is to analyze possible loopholes in the healthcare and recommended controls which can be applied practically so as to bring improvement in the healthcare. In hospitals, integrated supply chain should be implemented to meet the objectives. The supply chain ensures proper linkage of hospitals department, operations, and revenue cycle. The supply chain can be visualized as a backend program running which is necessary to integrate all the different processes together. The supply chain implemented ensures availability of medicine/product at right time, minimizing inventory wastage, maximizing patient care, coordination in all departments minimizing human error/medication errors. This can be accomplished by using possible measures i.e. integrating subsystems (Smith, 2011).

The National Health Supply Chain Strategic and Implementation Plan development was motivated by the desire to create a patient oriented supply chain master plan to achieve high levels of efficiency and effectiveness in the delivery of medicines and other health products to the people of Nigeria. The strategy document takes forward the various Government policies and legal documents by articulating various areas of performance required to achieve the policy goals (FMoH, 2020).

5. RECOMMENDATIONS

i. The implementation framework of the policy (that is, National Health Supply Chain Strategic and Implementation Plan) should be designed to ensure easy integration of medicines' safety monitoring practices into the overall health care delivery system since it sets out clear targets that encourage collaboration and cooperation among stakeholders, which is particularly important as COVID-19 vaccines are introduced and monitored.

ii. A successful supply chain system can only be built on the foundation of a strong domestic pharmaceutical sector and its participation in the public health supply chain. It is therefore recommended that there should full engagement of the pharmaceutical sector**.**

iii. Some of the biggest challenges faced by public health supply chains are high inventory cost, high product cost, inadequate shelf life, high expiry, high stock-outs, poor quality and lack of suppliers' confidence. One of the key causes of this is an inappropriate procurement system. To this end, it is further recommended that there should be a framework contract, open tendering and quality policy based on the Public Procurement Act, 2007.

iv. Furthermore, it is essential to keep updating our supply chain strategies in line with the current and expected future growth of commodity flow. A static strategy cannot keep up with the changing requirements of the supply chain management system. Hence, strategic evolution and the entire system strengthen.

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