Original Research Article

THE EFFECT OF INVENTORY CONTROL UPON PATIENTS WITH ACUTE AND CHRONIC ILLNESS DURING PRE, PERI & POST PANDEMIC AND BETTER WAY OF INVENTORY METHOD TO OVERCOME

ABSTRACT

Aim: To suggest a better inventory method for the pharmacy to make ends meet and run a successful dispensary that does not compromise the patient's health.
Study design: An analytical observation type of study.
Place and duration of study: A tertiary care hospital, between December 2022 and January 2023.
Methodology: We collected the stock movement data of 10 brand drugs that include Acute disease medications and Chronic condition medication, from hospital pharmacies, at pre, peri & post **C**ovid times. These drugs were chosen by their common usage. The study of inventory based on data collected, will show how the pharmacy managed its inventory during the pandemic *era*. The pharmacy practiced the collaborative method of ABC – FSN inventory method to meet demands and the same was continued during **C**ovid too.
Results: Data collected on 5 drugs for acute diseases showed an average percentage increase of 62.33% in drug consumption between the pre and post Covid period whereas the 5 drugs for chronic conditions shows an increase of 86.39%. The hospital pharmacy managed the high range of demand with the successful model of inventory control. It is evidence of the successful use of ABC – FSN analysis in the hospital sector during the pandemic (COVID-19).
Conclusion: The study concluded that the pre-existed inventory method helped during the pandemic *era*, its impact on health, and is mainly focused on the effect of inventory control directed towards patients with chronic & acute illnesses.

Keywords:

Inventory control, Pandemic, COVID – 19, Acute disease, Chronic disease, ABC analysis, FSN analysis, ABC – FSN analysis.

INTRODUCTION

1.1 Drug Inventory Control:

Inventory control of drugs plays a *pivotal* role in hospital management. Drug inventory control of hospital pharmacies is very essential in order to provide continuous supportive services. The inventory management of drugs is very essential, as it is adversely affected by the consumption rate and purchasing cost of drugs. Vital drugs are necessary to keep in stock to preserve precious human life. [1]

1.2 Pandemic – COVID – 19:

A pandemic is defined as "an epidemic occurring worldwide or over a very wide area, crossing international boundaries and usually affecting a large number of people." [2]

COVID-19 is a new coronavirus disease identified in December 2019. Patients have clinical symptoms such as dry cough, dyspnoea, fever, and bilateral lung infiltration imaging. On 7th January 2020, the causative agent was identified from throat swab samples conducted by the Chinese Centre for Disease Control and Prevention and was named Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Furthermore, it was called as COVID – 19 by the World Health Organization (WHO). [3]

1.3 Acute illness:

Any illness that develops quickly, is intense or severe, and lasts a relatively short period of time. Any condition e.g., infection, trauma, fracture with a short (often less than 1 month) clinical course. Acute illnesses usually respond to therapy; a return to a state of complete pre-morbid health is the norm. [4]

1.4 Chronic illness:

A human health condition or disease that is persistent or otherwise long-lasting in its effects or a disease that comes with time. The term chronic is often applied when the course of the disease lasts for more than three months. Common chronic diseases include arthritis, asthma, cancer, COPD, diabetes, and viral diseases such as hepatitis C and HIV/AIDS. [5]

1.5 Drugs:

The most used drugs for acute and chronic patients during the period of pre - COVID, COVID, post – COVID are being surveyed and analyzed drugs are: -

1.5.1 Drugs for Acute Disease:-

1.5.1.1 Pan – 40

Generic name: - Pantoprazole

It is a medicine that reduces the amount of acid produced in your stomach. It is used for treating acid-related stomach and intestine diseases such as heartburn, acidity, and peptic ulcer disease. [6]

1.5.1.2 Dolo 650

Generic name: - Paracetamol or Acetaminophen

Dolo 650 Tablet is a medicine used to relieve pain and reduce fever. It is used to treat many conditions such as headaches, body aches, toothaches, and the common cold. [7]

1.5.1.3 Montek LC

Generic name: - Levocetirizine

It belongs to a class of drugs called antihistamines or anti-allergic. It treats sneezing, runny nose, and allergic skin due to various allergies and hay fever (seasonal allergy). It is commonly used to diagnose or treat Allergic conditions, dust allergies, pet allergies, and nettle rash. [8]

1.5.1.4 Loparet

Generic name: - Loperamide

It is commonly used for the diagnosis or treatment of loose stools, mild traveller's diarrhea, and idiopathic diarrhea in aids patients. [9]

1.5.1.5 Dulcoflex

Generic name: - Bisacodyl

It is commonly used for the diagnosis or treatment of labour or radiological investigation, bowel clearance before surgery, constipation, laxative and suppository. [10]

1.5.2 Drugs for chronic disease:-

1.5.2.1 Glycomet 500

Generic name: - Metformin (Fortamet)

Glycomet (500 mg) is an oral antidiabetic agent, prescribed for type 2 diabetes. It helps control blood sugar levels. Metformin is the active ingredient. [11]

1.5.2.2 Udiliv 300

Generic name: - Ursodeoxycholic Acid (Destolit)

Udiliv (300mg) is a biliary agent, prescribed for gallstones. It helps to dissolve the stone by reducing the amount of cholesterol released by the liver into bile. It is also used to treat a type of liver disease called primary biliary cirrhosis. [12]

1.5.2.3 Capetero 500
Generic name: - Capecitabine

Capetero 500mg Tablets is an anticancer medication. Inside the body, this medicine gets converted into 5-fluorouracil (chemical). These chemicals hamper the synthesis of genetic materials (RNA and DNA) in the cancer cells, thereby interfering with their growth. [13]

1.5.2.4 Clopitab - A
Generic name: - Clopidogrel (Plavix)

Clopitab (75mg) is an anti-platelet agent, that is, a drug that inhibits the ability of platelets to clump together as part of a blood clot. Clopitab Tablet is an antiplatelet medicine or a blood thinner that helps to prevent the formation of harmful blood clots in your blood vessels. [14]

1.5.2.5 Orcibest 10mg
Generic name: - Orciprenaline

This medication is a Metaproterenol which is used to relieve symptoms associated with chronic bronchitis, asthma, emphysema, and other related lung conditions. It is a moderately selective adrenergic receptor agonist. Thus, the tablet stimulates receptors found on the smooth muscle in the uterus, lungs, and vasculature supplying the skeletal muscle. [15]

The following drugs are being estimated by their consumption of patients and a comparative study is being made.

1.6 Difficulties Faced by Acute & Chronic Patients:

Most chronic diseases are silent killers. According to the WHO report of 2018, a mortality of 63% was recorded related to chronic diseases like heart disease, diabetes, cancer, and respiratory disease. COVID-19 patients having cardiovascular diseases (CVDs) are associated with a higher risk of mortality. Routine care for chronic diseases during the pandemic is the most challenging. [16]

1.6.1 Mentally:-
“Corona phobia,” which is the fear of COVID-19 has become an emerging issue among different communities and healthcare workers. Stress is one of the mental health disorders that occurred as a result of the COVID-19 outbreak. Society has developed fears for themselves and their families, manifesting feelings of helplessness, boredom, loneliness, and depression. [16]

Economically: -

The healthcare costs from NCDs are high and projected to increase. Significant costs to individuals, families, businesses, governments, and health systems add up to major economic impacts. Cardiovascular disease, stroke, and diabetes cause billions of dollars per year. Healthcare systems in LMICs are mainly affected by COVID-19 due to the unorganized health care system. [16]

1.7 Rural *versus* Urban patients:

Rural participants were disproportionately affected by the COVID-19 lockdowns compared with urban participants. A greater proportion of rural participants experienced acute medical illness (rural 14.2%; urban 6.4%), difficulties in accessing health facilities (rural 95.0%; urban 75.0%) and medicines (rural 36.9%; urban 10.9%), worsened diabetes or hypertension symptoms (rural 16.0%; urban 11.0%), a lower treatment satisfaction rate (rural 3.5%; urban 23.8%), reduced fruit or vegetable consumption (rural 68.8%, urban 28.7%), and loss of household income (rural 67.3%, urban 56.9%). [17]

Thus, we can have a clear understanding that during the pandemic compared to the urban population the rural population had suffered the most. The major reason for this worst condition during a crisis is the improper management of medicines without proper inventory control and outdated knowledge. This condition can be overcome through the right awareness by the respective authorities. By providing the new type of combination inventory model we can manage for longer term periods.

1.8 Objectives of research:

i. To show the effects of COVID-19 on inventory.
ii. To exhibit how inventory would affect acute and chronic patients.
iii. To emphasize the way to overcome pharmacy demands with a better inventory method.
iv. To put on the advantages of combined inventory methods rather than using sole methods.
v. To highlight the ABC-FSN method's success.

1.9 Data collection:

The data is secondary which are collected from the database of pharmacy in a tertiary care hospital, located in an urban area of Chennai, Tamil Nadu. The software used for inventory data collection is Kranium Health. Data were collected in the hospital pharmacy under the knowledge of the manager.

The drugs which are being used are: - Pan – 40, Dolo 650, Montek LC, Loparet, Dulcoflex, Glycomet 500, Udiliv 300, Capetero 500, Clopitab – A, Orcibest 10mg.

2 METHODOLOGY:

2.1 Materials

The data has been collected from the tertiary hospital. Were they using a software called "Kranium Health"? The software aided as our main tool to collect data accordingly with respect to specific months of pre, peri & post-COVID – 19. The data from 10 drugs have been collected for the analysis.

2.2 Methods

2.2.1 The current use of Inventory control:

Various methods of inventory control are practiced to procure the medicines to the pharmacy to meet the day-to-day demands within the assigned budget without stock out or overstock situations. Following are the methods of inventory control. [18]

2.2.1.1 ABC analysis (Always Better Control method)

ABC method of inventory control is also called the always better control method. This method is based on the cost of the medicines. Medicines can be classified based on cost as high-cost medicines, moderate-cost medicines, and low-cost medicines. As per the ABC analysis, 'A' category items are costly items, B category items are moderate cost items and C category items are economical items.

As per the investment, 75% of the total allocated budget will be spent on category A items, 20% of the budgeted amount should be spent on 'B' category items, and 5% of the budget should be spent on purchasing category 'C' items. For efficient management of category 'A' items, strict control should be exercised to avoid pilferage and other losses.

VED analysis (Vital, Essential, and Desirable)

Vital (V): These are essential materials whose non-availability while putting a halt to business operation. These materials need to be always in stock else, production will be affected. Essential (E): This refers to materials that you require a certain amount of. You just require a minimum amount of them to keep production active. Desirable (D): This refers to materials that do not really affect production. Production can run with or without these materials.

2.2.1.2 EOQ method (Economic Order Quantity)

Economic Order Quantity is one of the best-known inventory models that are commonly utilized in purchasing medicines for pharmacies. Economic Order Quantity (EOQ) is defined as the optimum quantity to be ordered at once. In order to minimize such costs without affecting the demand and supply, possible minimum numbers of orders are required to be placed. The minimum number of units placed in each order is called Economic Order Quantity. This can be calculated by using the following formula.

$$EOQ = \frac{\sqrt{2} \times PC \times Q}{CC}$$

PC = Procuring cost.
CC = Carrying Cost.
Q = Quantity of the product ordered in the number of units.
Procuring Cost includes communication expenditure, media cost, cost made on purchasing, receiving, and checking goods, and marking and stocking of goods.
Carrying Cost includes expenditures incurred due to the storage, insurance, interest on the loan, deterioration of products or damage during the storage, etc.

2.2.1.3 Open to buy budget system

Open to buy budget system is another method of inventory control commonly practiced in hospitals. In the preparation of the hospital budget, based on the previous year's sales record a stipulated amount is allocated as pharmacy budget for pharmacy requirements. Based on the sales requirement, the pharmacy manager will order the stock and the amount will be debited to the account. In this method, the pharmacy manager will know the unwanted stock purchases and minimize the overstock and stock-out situation.

2.2.1.4 Bin card system

The Bin Card system is a most simple and reliable method of inventory control. In this method, a separate card sheet is prepared for every product. The card contains the details such as the manufacturer's name, date of supply, price, stock quantity, daily sales, etc. In the bin card system, the details should be updated daily to get the accurate stock position and also helps the pharmacist to follow the First in First Out (FIFO) system to liquidate the old stock.

2.2.2 Major Difficulties for Chronic (or) Acute Towards Inventory?

Patients, majorly chronically ill patients, dealt with a major problem during the pandemic. According to the studies, there was a little increment in the price of drugs during COVID - 19 era. In India, the prices were 8.1% increased in antibiotics; 23.4% increased in analgesics and 54.1% increased in vitamins. Whereas, the price of face masks increased by over 91.0%.

Alongside the cost hike, the other major problem that led down the country was an economic crisis. It made the situation even worse. So, financial stability became a big deal for the patients. [19]

On the other hand, patients with stable financial status could have dealt with a shortage of medications, in case of poor inventory management.

2.2.3 The Inventory Control in the rural places of India:

Stock management in all the visited primary health centers on a similar stand. Only the drugs enlisted in the essential drug list are available. Settlement of drug receipts with the exchange of supplies and issues with the other health facilities are practiced. Bin cards and stock ledgers book are used to document the stock movement in the health facility.

The major drawbacks of inventory in a rural area:

i. Computers are not utilized for stock management.
ii. Instances of stock out remain common in most of the PHCs. Due to the availability of required drugs the patients are forced to purchase drugs from local pharmacies, increasing out-of-pocket expenditure.
iii. Blacklisted and expired drugs are accumulated over the years and there is no recent event of disposing of such drugs by the authority. [20]

2.2.4 The major limitations of current inventory methods:

In India, the inventories majorly followed by pharmacies are ABC model of analysis. But this model of analysis did not keep up during the time of a pandemic like COVID–19. The major limitations are as follows:

The ABC analysis only considers volume. But what about the frequency, regularity, variability, and urgency of demand? [21]

2.2.4.1 Complex and Time Consuming:

It is a very complicated task to categorize materials into different groups. It consumes more resources such as time, labour and cost to group materials in case of a large group of inventories. [22]

2.2.4.2 Possibility of Loss:

It gives less attention to B and C grouped materials. Therefore, there is a chance of loss because of over stock, damage, and wastage of these items. [22]

2.2.4.3 Requires Substantial Resources:

The ABC method requires more resources to maintain than traditional costing systems. When cycle counts are performed, class A inventory must be routinely analysed to determine if the inventory still consists of high-priority items. If an inventory piece is no longer used or demanded as frequently, it is moved to another inventory classification. This constant process requires much more data measurement and collection. [23]

2.2.4.4 Loss Risk:

Just because B and C items do not have as high a value as Class A products does not mean they have no value. One of the limitations of ABC analysis is that excess stocks are always in jeopardy of obsolescence or damage. Therefore, the inventory that habitually goes uncounted or unmonitored may be subject to theft. [24]

2.2.4.5 Value Blindness:

The ABC classification captures only a small part of the total value of each item. [25] And the analysis is based on the monetary value of the items in use. Other important factors one ignored. [26]

2.2.5 The transition of consumption for Acute & Chronic drugs during Pre, Peri & Post COVID – 19 *era*:

The data has been collected from a respective tertiary hospital for 10 different brand drugs and the rate of consumption for specific months has been observed and noted. With the data, we made a comparative study over each month of the specific drug. And the consumption has been presented in a graphical way.

The drugs used, Acute disease: Pan – 40, Dolo 650, Montek LC, Loparet, Dulcoflex, Chronic disease: Glycomet 500, Udiliv 300, Capetero 500, Clopitab – A, Orcibest 10mg.

The ABC – FSN method of inventory is been followed by the hospital during the pandemic.

Table 1. The number of COVID – 19 cases during selective months of pre-COVID, COVID, and post-COVID times

Time period	*Month*	*Cases*
Pre - COVID	June 2020	70977
COVID	June 2021	2455332
Post – COVID	November 2022	3594035

The rates of consumption of the medicines are accelerated from the pre – COVID conditions to post – COVID conditions for both Acute and Chronic diseases, As shown below in graphical figures (Fig. 1 to Fig. 10).

2.2.5.1 Drugs for Acute disease: -

2.2.5.1.1 Pan – 40

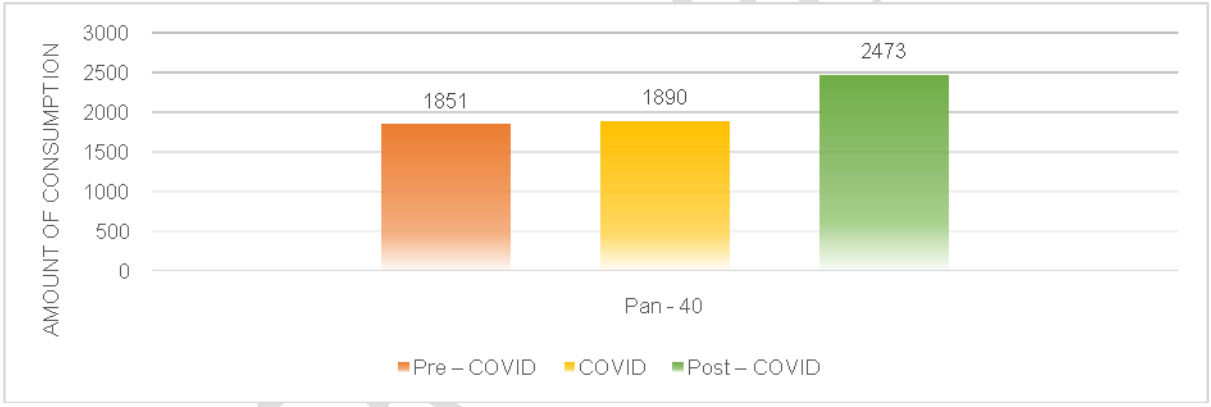

Fig. 1. Amount of consumption of Pan – 40 at specific time periods.

2.2.5.1.2 Dolo 650

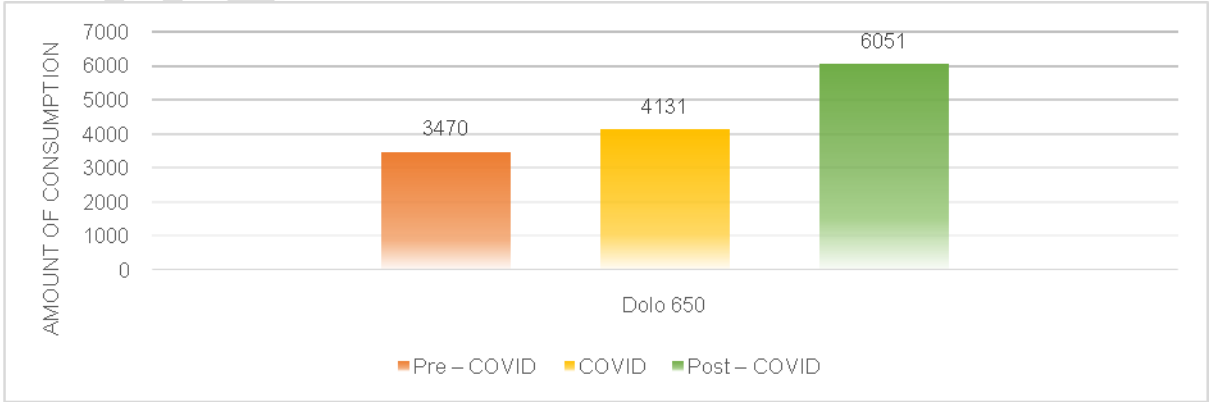

Fig. 2. Amount of consumption of Dolo 650 at specific time periods.

2.2.5.1.3 Montek LC

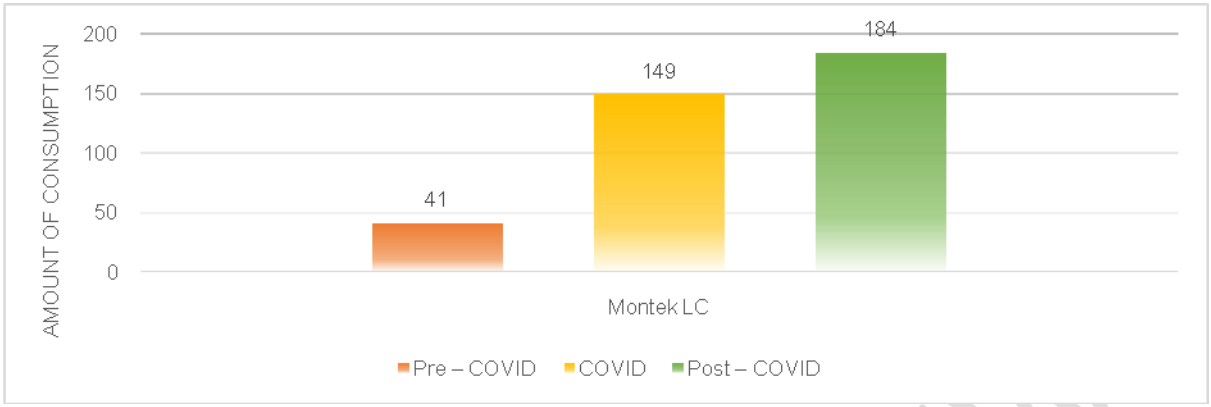

Fig. 3. Amount of consumption of Montek LC at specific time periods.

2.2.5.1.4 Loparet

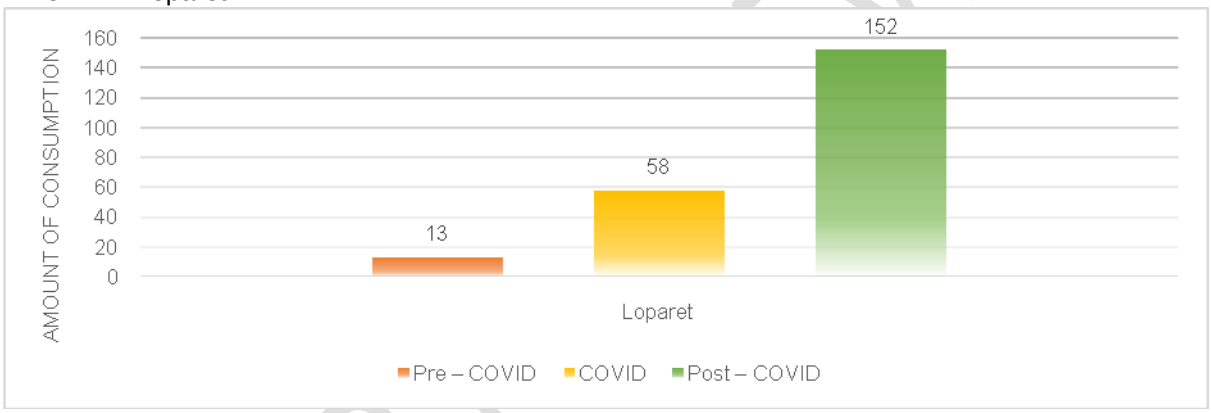

Fig. 4. Amount of consumption of Loparet at specific time periods.

2.2.5.1.5 Dulcoflex

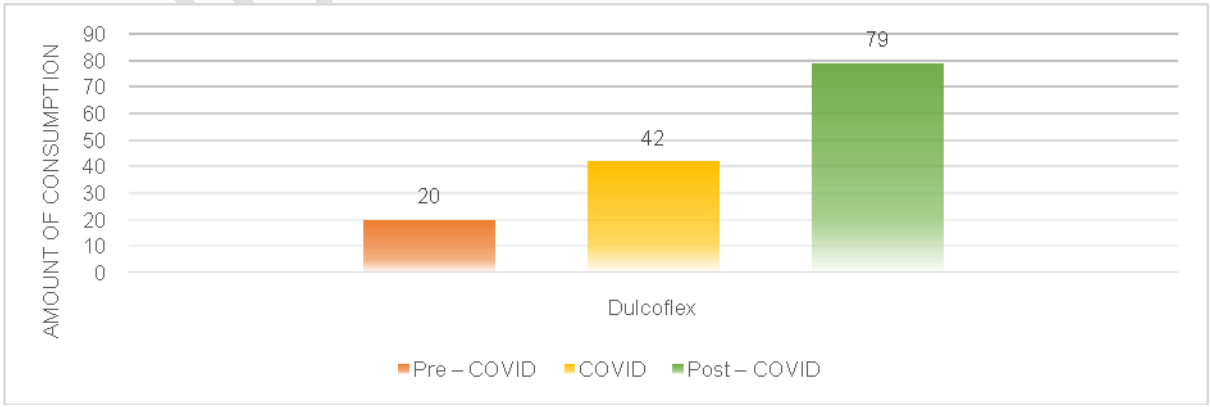

Fig. 5. Amount of consumption of Dulcoflex at specific time periods.

2.2.5.2 Drugs for chronic disease: -

2.2.5.2.1 Glycomet 500

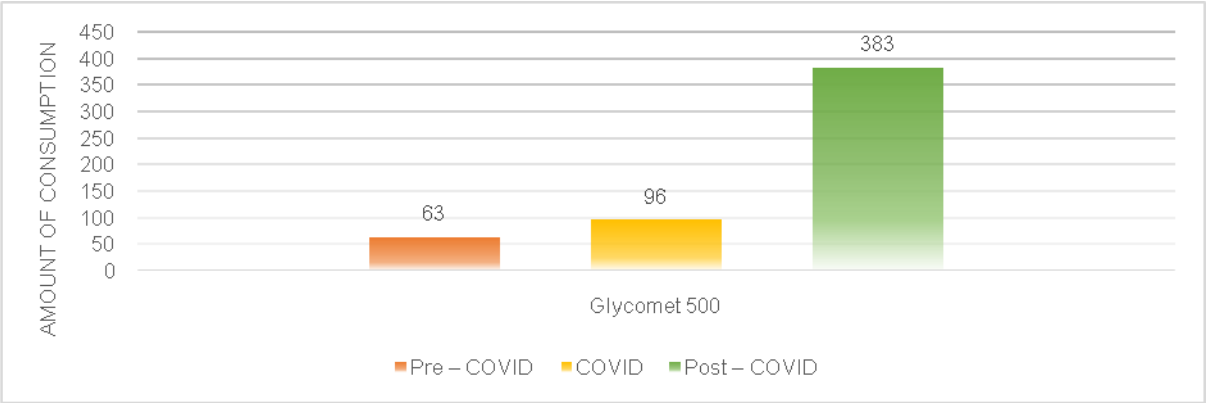

Fig. 6. Amount of consumption of Glycomet 500 at specific time periods.

2.2.5.2.2 Udiliv 300

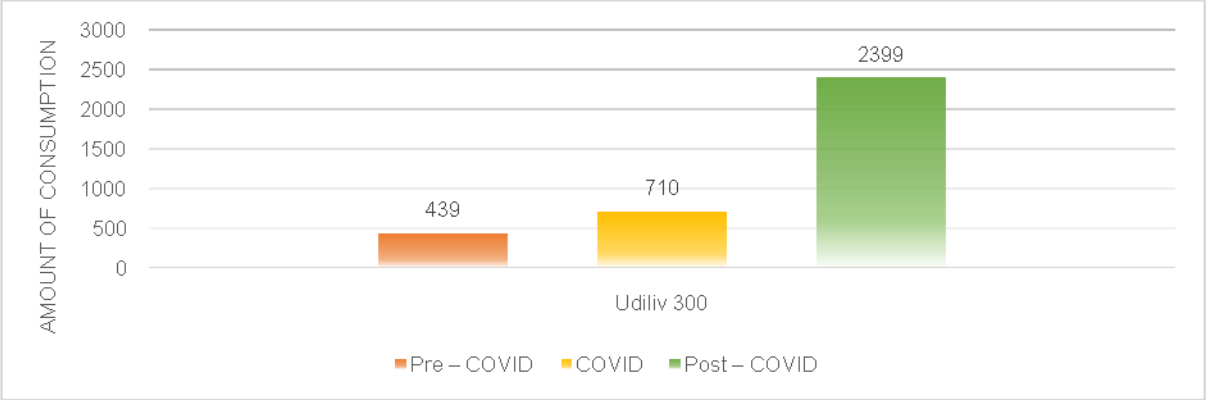

Fig. 7. Amount of consumption of Udiliv 300 at specific time periods

2.2.5.2.3 Capetero 500

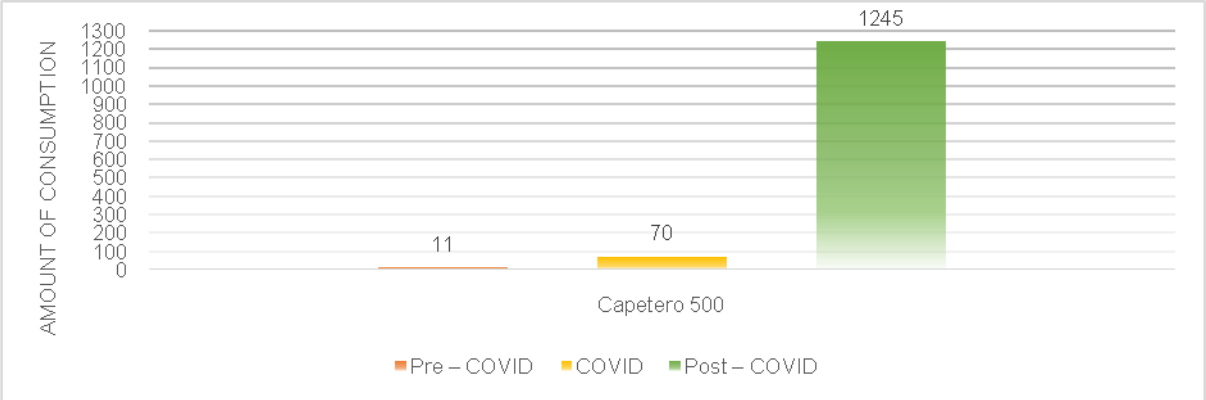

Fig. 8. Amount of consumption of Capetero 500 at specific time periods.

2.2.5.2.4 Clopitab – A

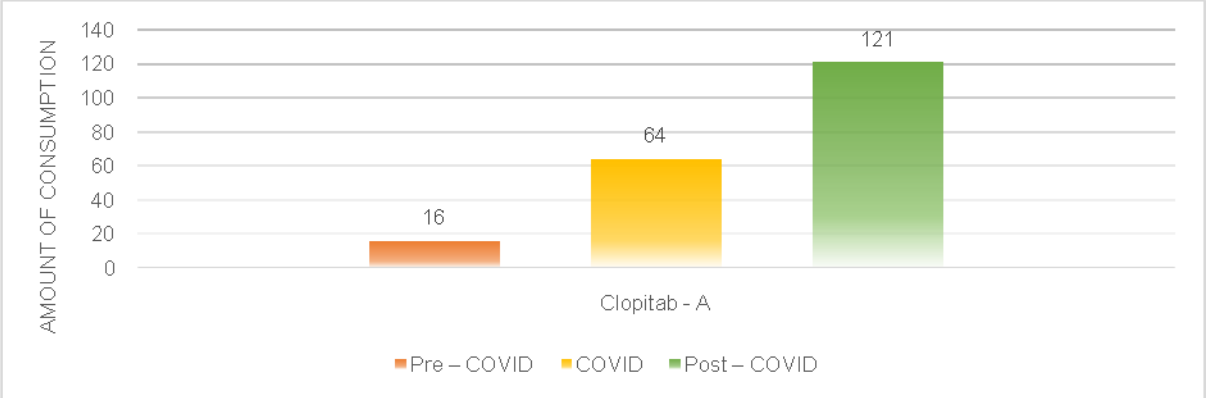

Fig. 9. Amount of consumption of Clopitab – A at specific time periods.

2.2.5.2.5 Orcibest 10mg

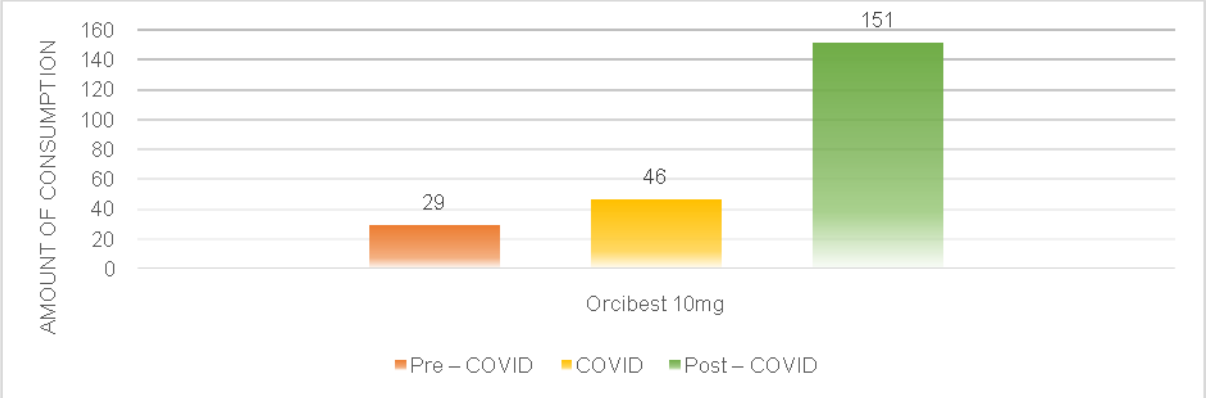

Fig. 10. Amount of consumption of Orcibest 10mg at specific time periods.

2.2.6 Reasons for the increased consumption for Acute and Chronic disease medications:

The data collected for the acute and chronic disease medications from tertiary hospital shows that there is a drastic increase in the consumption of the medications. Each and every drug has the graph of exponential rate. The reasons for the increase in the consumption are as follows:

2.2.6.1 Acute diseases:

After the outbreak, many health problems are followed along the way of COVID – 19. Some of the common acute diseases like fever, common cold, constipation, diarrhoea and especially allergies and lung problems.

2.2.6.1.1 Fever: -

The reason for the persistence of fever remains unclear, but it may be due to the proportion of lymphocytes. Interestingly, fever recurred, except when the ratio of lymphocyte count to white blood cell counts improved. [27]

2.2.6.1.2 Allergy: -

Anaphylaxis is potentially life-threatening and requires immediate treatment. The allergy conditions increased after vaccination. In nine of 10 cases of anaphylaxis after receipt of Moderna COVID–19 vaccines, patients had symptom onset within 30 minutes of vaccination, and nine anaphylaxis patients

also had a history of allergies or allergic reactions, including some with previous anaphylaxis events; up to 30% of persons in the general population might have some type of allergy or history of allergic reactions. [28]

2.2.6.1.3 Constipation: -
Research shows COVID – 19 may also change the gut microbiota, and once inside the GI tract, they can also travel through the portal vein that drains blood from the digestive tract. Thus, lead to intestinal disorders. [29]

2.2.6.1.4 Diarrhoea: -
There has been a rise in the number of people showcasing gastrointestinal symptoms, including diarrhoea, acid reflux, cramps, nausea during the second wave of the coronavirus. Scientists also believe that one of the primary reasons the gastrointestinal system is so acutely affected is because of the high presence of ACE2 receptors near the gut, which makes it easier for the spike protein of the coronavirus to latch itself onto, spreading and causing symptoms. Since the gut could be so acutely affected signs of lasting gut infection can be a common long COVID – 19 manifestation and concern a patient, weeks after recovering from the virus. [30]

2.2.6.1.5 Common colds: -
After the COVID – 19, the affected patients had a weakened condition of the respiratory system thus it led to the high chance of infection to easily communicable and seasonal diseases like common cold, flu, etc.

2.2.6.2 Chronic disease:

2.2.6.2.1 Diabetes:
The risk of diabetes increased after COVID – 19 infections compared to patients with general upper respiratory tract infections. Patients with severe COVID – 19 were at higher risk of diabetes after COVID-19. There is also new evidence regarding the effect of the SARS-CoV-2 virus on pancreatic β-cell function. It has been suggested that SARS-CoV-2 may affect the pancreas by acting on the mRNA of angiotensin-converting enzyme 2 (ACE2) in the endocrine and exocrine glands of the pancreas. [31]

2.2.6.2.2 Liver diseases:
Corticosteroids, such as dexamethasone, significantly increase survival and reduce morbidity among hospitalized patients with COVID–19 and in patients with moderate or severe COVID–19. Because corticosteroids are derived from cholesterol metabolism, which can interfere with multiple aspects of glucose homeostasis, attention should be paid to the possible effects of these compounds on liver metabolism and hepatic steatosis. Indeed, corticosteroid treatment in severe COVID–19 has been associated with significant liver injury. [32]

2.2.6.2.3 Cancer:
Immune responses in COVID–19 patients are orchestrated by proinflammatory cytokines (IL-1, IL-6, IL-8, and TNF-α), which are also known to drive tumorigenesis. Additionally, COVID–19 has been associated with T-cell depletion and activation of oncogenic pathways, including JAK-STAT, MAPK, and NF-κB, potentially increasing the risk of cancer development. Hypoxia due to inflammation or virus-induced angiotensin-converting enzyme 2 depletion can induce oxidative stress and malignant transformation. Over time, both chronic inflammation and oxidative stress can lead to DNA damage and subsequent carcinogenesis. Moreover, COVID – 19 is known to cause multiorgan damage, and extensive tissue damage is an oncogenic driver. [33]

2.2.6.2.4 Cardiovascular disease:
Coronavirus infection also affects the inner surfaces of veins and arteries, which can cause blood vessel inflammation, damage to very small vessels, and blood clots and leads to Myocarditis. Viral infections can cause cardiomyopathy, a heart muscle disorder that affects the heart's ability to pump blood effectively. When attacked by a virus, the body undergoes stress and releases a surge of chemicals called catecholamines, which can stun the heart. [34]

2.2.6.2.5 Lung disease:
In COVID – 19 if pneumonia progresses, more of the air sacs can become filled with fluid leaking from the tiny blood vessels in the lungs. Eventually, shortness of breath sets in, and can lead to acute respiratory distress syndrome (ARDS), a form of lung failure. [35]

3 RESULTS:

Data collected on 5 drugs for acute diseases shows an average percentage increase of 62.33% (Table 02) in drug consumption between pre and post COVID – 19 period whereas the 5 drugs for chronic conditions shows an increase of 86.39% (Table 03). The graphical representation (Fig. 1 to Fig. 10) of every drug is exponential. Here it states that the demand of drug is accelerated from 2020 to 2022, So did its sale, showing that the pharmacy followed a good inventory control method to match with the hike of demand.

Table 2. Average percentage change for Acute disease drugs.

Drugs for Acute disease conditions				
Percentage change of consumption during pre and post COVID – 19				
S. No	Drug name	Pre - COVID	Post- COVID	Percentage change
1	PAN - 40	1851	2473	25.15%
2	DOLO - 650	3470	6051	42.65%
3	MONTEK LC	41	184	77.72%
4	LOPARET	13	152	91.45%
5	DULCOFLEX	20	79	74.68%
Average percentage change for Acute disease drugs				62.33%

S. No – Serial number.

Table 3. Average percentage change for Chronic disease drugs.

Drugs for Chronic disease conditions				
Percentage change of consumption during pre and post COVID – 19				
S. No	Drug name	Pre - COVID	Post- COVID	Percentage change
1	GLYCOMET - 500	63	383	83.55%
2	UDILIV - 300	439	2399	81.70%
3	CAPETERO - 500	11	1245	99.12%
4	CLOPITAB - A	16	121	86.78%
5	ORCIBEST - 10	29	151	80.79%
Average percentage change for Chronic disease drugs				86.39%

S. No – Serial number.

3.1 Advantages of ABC – FSN model of Inventory:

The ABC analysis is the widely used model of inventory control in most of the health care fields, but as we have seen the ABC analysis has many limitations which are reducing the efficiency and profit outcome. Thus, this type of limitations can be overcome by following a new type of criteria. The FSN model of inventory control has many pros which follows [36]: -

i. FSN is a simple method to identify deadstock, preventing you from stacking products that barely have any demand in the market.
ii. FSN analysis also enables you to decide on the budget of a particular product and the quantity that should be bought. As a result, it helps to avoid blocking money in slow-moving or non-moving goods.
iii. Based on FSN analysis, you can keep the fast-moving goods closer to you in a warehouse that is easily accessible and it reduces time.

Thus, FSN analysis has the potential to overcome the limitation of ABC. Therefore, the ABC – FSN model of inventory method is a successful method in practice.

4 DISCUSSION:

As compared to ABC analysis, FSN works with usage rate and ABC works with annual consumption value. As per the importance of materials in production ABC and FSN are used. FSN techniques significantly reduces unnecessary motions while issuing materials if they are arranged accordingly. From the classification F items on the basis consumption rate F items are those which moves Fastly and constitutes 60% of total components. S items are those which moves Slowly constitute 20% of total components and N items are those which do not move (Non-moving items) constitute 20%. [37]

The ABC- FSN matric shows that there are 3x3=9 elements indicate nine different class as AF, AS, AN, BF, BS, BN, CF, CS, and CN. All nine class has its own priorities. So, based on the priorities all nine classes are categorised in only three categories say category I, category II, and category III. [38]

Based on the priority matrix, elements of ABC-FSN matrix AF, AS, AN, BF, and CF, being the most important inventory are grouped together into sub-category I, BS, BN, and CS having medium importance are grouped together into sub-categories II, and only CN being least important or have no important at all are grouped into subcategory III.

This categorization of drugs based on ABC – FSN matrix analysis helps identify the group of drugs that need strict monitoring and control. The drugs are narrowed down by the priority-based analysis and it is simplifying monitoring and control strategies of pharmaceutical drugs and leads the pharmacy to provide customer requirements in an efficient manner. [39]

5 CONCLUSION:

From this study, we can understand that during the pandemic (COVID-19) the ABC – FSN method holds hands with the pharma sector to meet the essential needs of the patients.

Thus, the constraints and problems faced during COVID – 19 by the hospital inventory management to be overcome by implementing a new inventory model and attaining serviceability in an effective and efficient way. The initial step of achieving an efficient inventory model, the inventory analysis to be selected based on the present situation. The priority-based ABC – FSN inventory matrix and narrowed down the drugs for monitoring and control strategies of pharmacy drugs. In the future, if all these are done with high-quality service to the customer can be provided and there will be an adequate supply of the items in the pharmacies. [40]

Better ways of inventory methods to manage stressful conditions like the pandemic (COVID–19) can be developed in the upcoming days of future. The ABC – FSN inventory method provides us with a positive side. But in the future, better ways can bring new changes and development in pharmacies.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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7 ABBREVIATIONS USED:

WHO: World Health Organization; PHC: Primary Health Centres; FIFO: First in First Out; NCD: Non-communicable diseases; ABC: Always Better Control; FSN: Fast Slow & Non-moving; CDC: Centres for Disease Control and Prevention; ICD: International Classification of Diseases; HBV: Hepatitis B Virus; HCV: Hepatitis C Virus.