



Research Article

A STUDY ON INVENTORY MANAGEMENT PRACTICES OF CSSD IN A TERTIARY CARE TEACHING HOSPITAL IN NORTH INDIA

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Background: Optimal amount of inventory should be maintained in storage units of Central Sterile Supply Department (CSSD) to address the issue of overstocking and space constraints. Aim: To determine the daily requirement for individual instruments and consumables of CSSD, as well as the optimal number of packs to sterilize per day and the ordering pattern (frequency and numbers) for consumables. Material and Methods: A retrospective study was conducted to investigate the inventory management strategies employed by CSSD at Sher-i-Kashmir Institute of Medical sciences (SKIMS) Srinagar to gain insight into CSSD inventory management practices. Data was compiled over a three-month period from Jan 2022 to March 2022. The sources of the data included supply registers, standard operating procedures (SOPs), inventory statements, records and registers of inventory items, and content details. Results: The total monthly supply for the Main CSSD and Theatre Sterile Supply Department (TSSU) amounted to 76,028 packs each (2,534 packs per day). The analysis revealed that on average, 2,516 packs of CSSD are required (demand) from each of the two brands daily. An average of 9,947 instruments and 26,779 consumables are needed (demand) from Main CSSD and 2,264 instruments from TSSU are needed (demand) every day to fulfill daily packs requirement. Ideally a total no. of 12,211 instruments required per day for both the CSSD, and through monthly supply data of 3 months (Jan, Feb, March 2022) daily supply was recorded 3,57,473 (per day 11,915). Conclusion: The ideal per day demand estimation should be calculated frequently (once in 3 months) so that Administrators can take better procurement decisions related to CSSD inventory items.

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INTRODUCTION

The Central Sterile Supply Department is an integral part of the healthcare system, providing hospitals and other organizations with reliable and effective sterilization techniques to reduce infection and to provide quality sterile supplies. It is essential for the smooth, uninterrupted, and standard quality of healthcare treatment processes. (1) Additionally, CSSD plays a critical role in ensuring that expensive medical instruments are sterilized and delivered to the appropriate user departments, such as operating theatres, wards, obstetrics departments, and day care facilities. To ensure that sterile items are available at the appropriate time, in the appropriate place, with the appropriate quantity and quality, CSSD employs inventory management techniques. As the healthcare industry continues to expand due to the increasing demand for

Healthcare, the number of hospitals with inventory has increased significantly. Having an effective inventory system can be beneficial for organizations in terms of increasing efficiency and productivity, as well as providing a strong foundation for growth. However, if not managed properly, it

can have a detrimental effect on established organizations if not managed properly. (2) The utilization of inventory management techniques can assist departments in organizing, sorting, and managing a vast amount of inventory in a highly efficient manner. Adopting the correct procedures for inventory management can lead to an increase in the cost of quality assurance and the preservation of an appropriate, timely, and consistent stock level (3) The inventory management techniques help departments sort, arrange and manage a large quantity of inventory very effectively. (3) Following appropriate practices of inventory management will add cost of good quality to organization and maintain an adequate, timely and continuous supply of inventory. Simultaneously if inventory is not accounted properly it can lead to overstocking or stock-out issues which can pose a threat to patient's life. Unnecessary inventory keeping practices block the capital and eventually make loss to the hospital. (4) SKIMS hospital has two CSSD units; one in the supportive service area of the hospital building and the other T.S.S.U unit adjacent to Main OT. This study was conducted SKIMS, a tertiary care teaching institution in Northern India to focus on Inventory management of Sterile Packs containing

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reusable Instruments and Consumables that are managed and distributed by the hospital CSSD. This study determines the daily requirement for individual instruments and consumables of CSSD, as well as the optimal number of packs to sterilize per day & the ordering pattern (frequency and numbers) for consumables

METHODOLOGY

A retrospective study was conducted to investigate the inventory management strategies employed by CSSD at SKIMS. The purpose of the study was to gain insight into CSSD inventory management practices. Data was compiled over a three-month period beginning on April 03, 2022, and ending on April 7, 2022. The sources of the data included supply registers, standard operating procedures (SOPs), inventory statements, records and registers of inventory items, and content details. The inclusion criteria included Instruments, Packs and Consumables sterilized in CSSD. Company sets (Instrument content and supply details not available) were excluded. Data collected for the included list of Packs supplied and their respective numbers per month (Jan, Feb, Mar 2022). Instruments and Consumables details for each Pack. Inventory Instruments & Consumables as on March 2022 for Main CSSD & Feb 2022 for TSSU respectively. Purchase order details for consumables (Date of Purchase, Date of Invoice, Quantity ordered) were taken. Monthly Supply detail for packs (Feb & Mar 2022) was obtained. Based on this the weekly demand was calculated. One week’s actual supply detail (1-7 Mar 2022) was obtained. Weekly demand based on monthly data and actual weekly

demand was compared. The higher among two was considered as the Ideal weekly demand for each Pack, Instrument and Consumable. Ideal daily demand was arrived based on the ideal weekly demand. To determine the ordering pattern (frequency and numbers) for consumables, the purchase details along with order frequency were obtained for 3 months (Jan, Feb & Mar 2022). Based on this, the order frequency and average quantity per order was arrived at for consumables. The Statistical analysis was done using the MS-Excel.

RESULTS

It was observed that on an average, 2,455 CSSD Packs are needed (demand) from Main CSSD and 61 Packs from TSSU every day. An average of 9,947 instruments and 26,779 consumables are needed (demand) from Main CSSD and 2,264 instruments from TSSU are needed (demand) every day to fulfill daily packs requirement. (Table: 1)

Table 1 Ideal daily demand of packs, instruments and consumables for Main CSSD and TSSU

	TOTAL NO. OF PACKS	MONTHLY CONSUMPTION	DAILY DEMAND
MAIN CSSD	67	74,707	2,455
TSSU	26	1,321	61
	TOTAL NO. OF INSTRUMENTS	MONTHLY CONSUMPTION	DAILY DEMAND
MAIN CSSD	84	3,08,735	9,947
TSSU	292	48,738	2,264
	TOTAL NO. OF CONSUMABLES	MONTHLY CONSUMPTION	DAILY DEMAND
MAIN CSSD	13	8,30,174	26,779

A total of 108 types of consumables were purchased over a period of 3 months (Jan, Feb and March 2022) for Main CSSD and TSSU. For Main CSSD 42 lacs 63 thousand 5 hundred and 6 unit was the total purchase for 58 consumables and 31 thousand 9 hundred and 10 units of total purchase for overall 50 consumables available at TSSU. Average quantity for each purchase order was determined for Main CSSD approx. 9 lacs. Consumables purchased per order and 23 thousand for TSSU. Most of the consumables are procured once in 90 days predominantly for both the CSSD units (Main & TSSU). (Table: 2)

Table 2 Purchase of consumables for both the Main CSSD & TSSU

CONSUMABLES ORDERING PATTERN (JAN, FEB & MAR '22)		
PARAMETERS	MAIN CSSD	TSSU
TOTAL NO. OF CONSUMABLES	58	50
TOTAL PURCHASE	42,63,506	31,910
AVERAGE QUANTITY PER ORDER	8,84,179	22,909

DISCUSSION

The total monthly supply for the Main CSSD and TSSU amounted to 76,028 packs each (2,534 packs per day). An ideal daily demand analysis was conducted to

determine the average daily demand for CSSD for both Main and TSSU. The analysis revealed that on average, 2,516 packs of CSSD are required (demand) from each of the two brands daily. This indicates that CSSD is currently processing packs in accordance with the minimum requirement for ideal daily demand. An average of 9,947 instruments and 26,779 consumables are needed (demand) from Main CSSD and 2,264 instruments from TSSU are needed (demand) every day to fulfill daily packs requirement. Ideally a total no. of 12,211 instruments required per day for both the CSSD, and through monthly supply data of 3 months (Jan, Feb, March 2022) daily supply was recorded 3,57,473 (per day 11,915) which is like ideal daily demand of instruments with (97%). The actual ordering pattern followed in both the Main CSSD & TSSU was found, that most of the consumables are procured once in 90 days predominantly for both the CSSD units Main & TSSU. One of the reasons for having storage problem specially in TSSU. Ahmadi et al., (3) carried out a review of literature on Inventory Management of Surgical Supplies and Sterile Instruments in Hospitals, in the University of Ohio, Athens, USA. The retrospective study was conducted using a descriptive and analytical model, which included a comprehensive examination of 40 relevant studies from articles and publications. The purpose of the study was to identify the optimal amount of inventory to be maintained in storage units of CSSD to address the issue of overstocking and space constraints. The study focused on the optimization of Preference Cards to reduce costs. The study identified the items and their optimum quantity required daily to meet the demand and supply requirements of user departments. As per the study of Mercado Luévano, Samara Xarenit (5) done in 2019 with the purpose of determining the inventory stock level for reusable instrument sets by minimizing the purchase and holding cost. The analysis shows the result that there were too many laparoscopy instruments sets available in the storage unit of OR. The present study also aims to provide an insight into the current inventory situation of instruments and packs

available at CSSD. 2,516 CSSD packs are needed (demand) from Main CSSD and TSSU per day which are same as monthly supply. A similar study conducted by Adam Diamant et al. (6) on Inventory management of reusable surgical supplies of OR, at a large tertiary care hospital in Toronto, Ontario. The purpose of this study was to determine the optimal base stock level for the surgical instruments that should hold in inventory. Based on analyzed dataset it was recommended that— with the use of flash sterilization, the hospital can reduce its number of reusable instruments sets while maintaining suitable service levels. In the present study ideal daily demand was derived for each pack, instrument and consumables processed in CSSD. Sabnis NV (7) conducted a case study of inventory management using ERP (Enterprise resource planning) system in 2022. The study discussed the various features of inventory management systems such as: Identifying the inventory levels, detect stock levels, alert system for stock-outs, automatically replenishments and to calculate reorder points. The study concluded that with the help of ERP systems, organizations can perform better analysis of various Stock keeping units. Managers can take better purchasing decisions by accurately forecasting the demand.

CONCLUSION

The objective of the study was to analyze the sterile inventory provided by CSSD, to identify the overall need and supply gap, to enable inventory managers to make informed procurement decisions and maintain an optimal inventory based on the demand analysis. A retrospective study design was conducted to collect data over a three-month period (January, February, and March 2022). This included a list of the packs supplied and their associated numbers per month, as well as details of the tools and consumables included in each pack, to determine the optimal daily demand for the packs, instruments, and consumables. The study also provides a strong base for doing further research in inventory management for sterile supplies.

RECOMMENDATIONS

The ideal per day demand estimation should be calculated frequently (once in 3 months) so that managers can take better procurement decisions related to CSSD inventory items. Multiple ordering can be done for procuring consumables to avoid maximum load of inventory at once, creating storage problem. It can be achieved through demand forecasting of each consumable and vendor selection criteria to ensure timely and adequate supply of items.

CONSENT FOR STUDY

Informed consent was taken from all participants.

CONFLICT OF INTEREST

The authors have no conflict of interest to declare.

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References

1. Welch JD. The organization of central sterile supply departments. *Journal of Clinical Pathology*. 1961 Jan; 14(1):69.
2. Allison VD. Hospital central sterile supply departments. *British medical journal*. 1960 Sep 9; 2(5201):772.
3. Ahmadi E, Masel DT, Metcalf AY, Schuller K. Inventory management of surgical supplies and sterile instruments in hospitals: a literature review. *Health Systems*. 2019 May 4; 8(2):134-51
4. Saha E, Ray PK. Modelling and analysis of inventory management systems in healthcare: A review and reflections. *Computers & Industrial Engineering*. 2019 Nov 1; 137:106051.
5. Mercado Luévano SX. From 'just-in-case' to 'just-in-time': Modelling the optimal stock level of reusable instrument sets of Medisch Spectrum Twente (Master's thesis, University of Twente).
6. Diamant A, Milner J, Queresby F, Xu B. Inventory management of reusable surgical supplies. *Health care management science*. 2018 Sep; 21(3):439-59.
7. Sabnis NV, Sagare PM, Khan AS, Khan R. Case Study of Inventory Management using ERP system.

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