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Original Article

Indicator Based Assessment of Medicine Storage and Inventory Management Practices in various Public Sector Hospitals of District Srinagar

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ABSTRACT

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Introduction: The role and relevance of medicines, vaccines and other health supplies are critical, as they are considered important building blocks of the health care system. Well-located, well-built and secured storage facilities are an essential component of a pharmaceutical supply system.

Methodology: This study was carried out at various public sector hospitals of District Srinagar using a set of 138 assessment indicators to study the drug storage and inventory management practices in terms of storage facilities and procedures, inventory and stock management practices and daily, monthly, yearly storage and inventory related activities.

Results: Indicator based assessment for drug storage and inventory management practices revealed highest percentage adherence of 80% in managing expired drugs followed by 55.4% in daily, monthly, yearly storage and inventory control activities, 48% adherence in storage procedures, 46.1% in receiving supplies, 42.5% in stock positioning, 40.9% in storage space, 38% in stock management, 26% in stock-outs and the lowest percentage adherence of 22.9% was observed in inventory management. Facility-wise assessment revealed highest overall percentage adherence of 64.1% at Children's Hospital (CH) followed by 54.3% at District Hospital (DH), 49.3% at Medical College (MC), 29.6 % at Sub-District Hospital (SDH) and 24.4% at Primary Health Centre (PHC).

Overall percentage availability of indicator medicines was found to be 32.5% (CH=56.2% & DH=18.6%). Stock cards were not found in any of the health care facility and no expired products were found stocked in CH, MC and DH. Average indenting frequency was found to be 31 days (PHC=60; MC=10) whereas average numbers of medicines indented in one go were found to be 24. Average lead time was found to be 15 days (CH=15; MC=60) whereas average no of stock out days was found to be 66.6 days (CH=10 & PHC=115).

Conclusion: Overall adherence towards various storage conditions was found to be less than 50% and lack of adherence to the basic inventory management principles was found to be common.

Keywords: Indicator Assessment, Storage Inventory, Stock-out.

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INTRODUCTION

Health is recognized as a fundamental human right by international treaties and governments all over the world. In health care systems, medicines always play a crucial role and have made a significant contribution towards improving the health status of populations over time.[1] Well located, well-built, well organised and secure storage facilities are an essential component of a Pharmaceutical Supply System. An effective and dedicated storage space provides the correct environment for the storage of medicines and commodities and assists the efficient flow of supplies.[2]

Pharmacy inventory management is a complex but critical process within the healthcare delivery system. Without adequate pharmacy inventory management practices, hospitals run the risk of not being able to provide patients with the most appropriate medication when it is most needed. Addressing pharmacy inventory management and the revenue cycle effectively can enable organizations to improve

financial performance, adhere to regulatory requirements, reduce risks relating to patient safety and ensure availability of drugs without frequent stock outs.[3,4,5] Many organizations utilize pharmacy management systems as a means of ensuring appropriate accountability over pharmaceuticals and ensuring the traceability of inventory from purchase through administration to the patient or disposal level. Effective and transparent tracking systems that allow pharmacies to accurately record inventory components, such as medication expiration dates and physical quantities, also have the potential to reduce adverse patient outcomes.[6, 7] In absence of detailed information, it becomes difficult to devise and recommend appropriate interventions for improvement. An important and vital step towards improving medicines management in hospitals is to assess the current practices being followed at these hospitals and then recommend the interventions accordingly wherever needed. Given the paucity of published data on medicine management practices in J&K, state this study tried to evaluate the storage and inventory management practices currently being followed in govt. hospitals across all the three level of care in District Srinagar.

MATERIALS AND METHODS

Duration and design of study

A cross-sectional survey at public health facilities in district Srinagar was carried out over a period of 6 months i.e. from June 2014 to December 2014. Selection of public health facilities was done in a manner to ensure that the findings are representative of the entire district. One super speciality children's tertiary care hospital (CH), one Govt. Medical College (MC), one district hospital (DH), one Sub-District Hospitals (SDH) and one Primary Health Centre (PHC) (Table 1) were selected for the study. CH, MC, DH and SDH chosen were the only health facilities available in the selected district, thus a total of 5 public hospitals were included in the study.

This study was carried out to assess various drug storage and inventory management practices prevalent at these healthcare facilities. A set of 124 qualitative and 14 quantitative indicators were developed, validated and used to study the storage facilities and storage procedures like maintenance of storage conditions, available space, temperature control, light, humidity, sanitation, ventilation, method of inventory management including indenting of medicines, maximum and minimum stock levels demarcated, availability and maintenance of stock cards etc. Protocol for receiving supplies, stock management, stock positioning, stock outs, etc. Qualitative and quantitative indicators were developed in tune with statutory requirements and norms as per well-established drug storages and inventory management practice guidelines published by various agencies like WHO, UNO, FIP etc.

RESULTS

Across the survey facilities data was collected on several key indicators for storage conditions and inventory management practices (Table 3). Indicator based assessment revealed the highest percentage adherence of 80% in managing drug expiry followed by 55.4% in daily, monthly, yearly storage and inventory control activities performed, 48% adherence was observed in storage procedures, 46.1% in receiving supplies, 42.5% in stock positioning, 40.9% in storage facility, 38% in stock management, 26% in stock-out management and least percentage adherence of 22.9% was seen in inventory management. Facility wise assessment revealed highest overall percentage adherence of 64.1% at Children's Hospital (CH) followed by 54.3% at District Hospital (DH), 49.3% at Medical College (MC), 29.6% at Sub-District Hospital (SDH) and 24.4% at Primary Health Centre (PHC) (Table 5).

Overall percentage availability of indicator medicines was found to be 32.5% (CH=56.2% & DH=18.6%). Stock cards were not found in any of the health care facilities and no expired products were found stocked in CH, MC and DH. Average indenting frequency was found to be 31 days (PHC=60; MC =10) whereas average numbers of medicines indented in one go were found to be 24. Average lead time was found to be 15 days (CH=15; MC=60) and average stock out period was found to be 66.6 days (CH=10 & PHC 115) with percentage of incomplete delivery found to be 18% and percentage of late delivery found to be 50% (Table 4).

DISCUSSION

Yearly IPD and OPD patient loads (Table 2) of the surveyed health facilities revealed that local hospitals are overburdened and there is a heavy patient load at all levels of care making it a very challenging job for all health care professionals to provide continued care. Storage space and conditions are very significant because drugs are chemicals that react to external stimulants such as heat, moisture, light, dust, etc. In many cases, such reactions not only lead to superficial changes, such as discoloration but may also affect the drugs more seriously, leading to reduction of their efficacy.[8,9] Complete adherence in storage and inventory practices were followed in terms of protection from direct sunlight, separate & locked storage space for narcotics and psychotropic drugs, following FEFO, cleaning of bins, shelves, and cupboards, and assessment of stock situation including utilisation patterns. Overall, highest percentage adherence of 80% was found in managing drug expiry and least percentage adherence of 22.9% was observed in inventory management. Facility wise assessment revealed highest overall percentage adherence of 64.1% at Children's Hospital (CH) followed by 54.3% at District Hospital (DH), 49.3% at Medical College (MC), 29.6 % at Sub-District Hospital (SDH) and 24.4% at Primary Health Centre (PHC). Deficiencies found in storage and inventory practices were inadequate storage space, equipments and fire prevention and extinguishing equipments, signs of pest infestations, irregular inspections to determine if there is any deterioration of drugs, non-availability of computerized inventory system. Drugs were found stored directly on the floor, with delay in delivery and excessive lead times. Possible reasons for this include lack of infrastructure, inadequate availability of racks, lack of human

resource and huge space occupancy by large volume parenterals.

Table 1: Details of public health facilities surveyed

Health Facility	Children's Hospital (CH)	Medical College (MC)	District Hospital (DH)	Sub- District Hospital (SDH)	Primary Health Centre (PHC)	Total
Public	1	1	1	1	1	05

Table 2: Yearly OPD-IPD patient load at public health facilities surveyed

Health Facility Surveyed	OPD Load (in lakhs)		Average OPD Load (lakhs)	IPD Load (in lakhs)		Average IPD Load (lakhs)
	2011-12	2012-13		2011-12	2012-13	
CH	2.44	2.97	2.70	0.21	0.22	0.215
MC	6.98	7.54	7.26	0.51	0.56	0.536
DH	2.70	2.45	2.58	0.09	0.07	0.830
SDH	1.44	1.13	1.29	0.03	0.02	0.262
PHC	0.17	0.21	0.19	NA	NA	NA

NA=Not applicable

Table 3: Assessment of storage conditions and inventory management practices using qualitative indicators at surveyed facilities

S.No	Qualitative Indicator	Facility wise adherence					Percent adherence
STORAGE FACILITY		**CH**	**MC**	**DH**	**SDH**	**PHC**	
1.	There is adequate storage space.	2	2	1	2	2	20
2.	There are adequate storage equipments.	2	2	2	2	2	0
3.	Area is free from moisture.	1	2	1	2	2	40
4.	Drug products are protected from direct sunlight	1	1	1	1	1	100
5.	Products stored in a systematic way (in alphabetical order).	2	2	1	2	2	20
6.	Adequate security measures to avoid theft	1	1	1	1	1	100
7.	Doors with adequate locks and keys.	1	1	1	1	1	100
8.	There are windows in storage area that can be opened.	1	1	1	1	2	80
9.	There is a cold chain maintained in storage.	1	1	1	1	2	80
10.	There is a method to monitor temperature.	1	2	2	2	2	20
11.	Proper temperature & humidity controls are maintained.	1	1	1	1	2	80
12.	There is a separate room / warehouse for drug storage.	1	1	1	2	2	60
13.	Dispensing is not done from the main warehouse.	1	1	1	1	2	80
14.	Store is kept locked at all times when not in use.	1	1	1	1	1	100
15.	Facility is well maintained—no cracks, holes, or signs of water leakage.	1	2	1	2	2	40
16.	Store ceiling is in good condition without any dampness.	1	2	1	2	2	40
17.	Air is moving freely in the store; fans and screens are in good condition.	2	2	1	2	2	20
18.	There are proper fire prevention and extinguishing equipments present.	2	2	2	2	2	0
19.	Windows have curtains and are secured with grills.	1	2	1	2	2	40
20.	Store is free of pests (i.e. cockroaches, rats, mice) with no sign of infestations.	2	2	2	2	2	0
21.	Store is tidy. Shelves are dusted, floor is swept, and walls are clean.	1	2	1	2	2	40
	Percentage adherence	71.4	42.8	33.3	38.1	19	50.5

STORAGE PROCEDURES							
1.	Medicines are properly stored (on pallets and shelves)	2	2	2	2	2	0
2.	Supplies are stored neatly on shelves or inboxes.	1	1	1	1	2	100
3.	Supplies are arranged alphabetically on shelves as per the storage procedures.	2	2	2	2	2	0
4.	Tablets and other dry medicines e.g., ORS are stored in airtight containers.	1	1	1	1	1	100
5.	Liquids, ointments and injectables are stored on middle shelves.	2	2	2	2	2	0
6.	Supplies, such as surgical items, condoms and bandages are stored on bottom shelves.	2	2	2	2	2	0
7.	Temperature-sensitive items are stored in refrigerator and cold chain is maintained at all levels.	1	1	1	1	2	80
8.	Items are grouped in quantities that are easy to count.	1	2	1	2	2	40
9.	Narcotic and psychotropic substances are stocked in a separate double-locked storage space.	1	1	1	1	1	100
10.	There are no expired drugs in the store.	1	1	1	1	2	80
	Percentage adherence	60	50	60	50	20	50
TECHNICAL AND ADMINISTRATIVE PRODUCT RECEIPT							
1.	Suppliers deliver supplies directly to warehouses or store-rooms.	1	1	1	NA	NA	100
2.	There is a defined procedure and criteria for the inspection of product on receipt.	1	1	1	2	2	60
3.	Good storage and distribution practices are applied.	1	2	1	2	2	40
4.	Performance of the storage and distribution network is regularly evaluated	2	2	2	2	2	0
	Percentage adherence	75	50	75	0	0	50
PROTOCOL FOR RECEIVING SUPPLIES							
5.	Proper procedures are followed for receiving supplies.	1	2	1	2	2	40
6.	Condition of boxes at the time of delivery is checked by a health worker.	1	1	1	1	1	100
7.	Deliveries are acknowledged and dated on standard forms.	1	1	1	1	1	100
8.	Delivery person signs form before leaving the facility or warehouse.	1	1	1	1	1	100
9.	Supplies received match items listed on delivery forms.	1	1	1	1	2	80
10.	Expiry dates of all items are checked before receiving supplies.	2	2	2	2	2	0
11.	There are regular inspections to determine if there is any deterioration of drugs.	2	2	2	2	2	0
12.	Prompt and proper action is taken if the deterioration of drugs received is suspected.	1	1	1	1	1	100
13.	Discrepancies are being documented and reported: unacceptable expired drugs or drugs of poor quality are identified.	1	1	1	2	2	40
	Percentage adherence	53.8	46.2	53.8	38.5	38.5	43.1
INVENTORY MANAGEMENT PRACTICES							
1.	Pharmacy is computerized.	1	1	1	2	2	60
2.	Pharmacist is responsible for inventory control.	1	2	1	1	1	80
3.	Pharmacy has a formalized stock management system based on stock cards or a computerized inventory control system.	2	2	2	2	2	0
4.	Computerized system is used for stock management.	1	2	2	2	2	20
5.	Pharmacy uses centralized, MIS-based inventory management system for real-time monitoring of stock levels in various wards and pharmacy stores of the hospital.	2	2	2	2	2	0
6.	Stock management system is in place for calculating/controlling reorder levels, known from records, stock cards or similar sources.	2	2	2	2	2	0
7.	There is a computerized system using FEFO/FIFO.	2	2	2	2	2	0
	Percentage adherence	42.9	14.28	28.6	14.28	14.28	22.9

STOCK MANAGEMENT							
1.	Pharmacist is responsible for stocking and receiving medicines.	1	1	1	1	1	100
2.	Maximum stock level is defined/demarcated	2	2	2	2	2	0
3.	Minimum stock level is defined/demarcated	2	2	2	2	2	0
4.	Stock cards are available.	2	2	2	2	2	0
5.	Stock cards exist for each item in the store.	NA	NA	NA	NA	NA	-
6.	Stock card kept on the same shelf as the item.	NA	NA	NA	NA	NA	-
7.	Information recorded on stock card at the time of movement of drug or item.	NA	NA	NA	NA	NA	-
8.	Drugs requisitioned by various departments are recorded	1	2	2	2	2	20
9.	Accurate running tally is kept in balance column.	1	1	1	2	2	60
10.	Physical count is made at regular intervals (at least once a month) and regularly.	1	1	1	2	2	60
11.	Replenishing is practiced when the minimum level is reached.	1	2	2	2	2	20
12.	Traceability of batches is assured.	1	1	1	2	2	60
13.	Drugs with shorter expiry dates are exchanged and documented.	1	1	1	2	2	60
	Percentage adherence	**70**	**50**	**50**	**10**	**10**	29.2
STOCK POSITION							
1.	Medicines are stored on shelves.	1	1	1	1	1	100
2.	Medicines are stored systematically (alphabetically).	2	2	1	2	2	20
3.	Shelves for medicines are labelled.	2	2	1	2	2	20
4.	Shelves are easily removable through drawers.	2	2	2	2	2	0
5.	Storage cupboards have a lock.	2	2	2	2	2	0
6.	Storage rooms have a lock.	1	1	1	1	1	100
7.	There are lids on opened containers.	1	1	1	1	1	100
8.	Drugs are not stored directly on the floor	2	2	2	2	2	0
	Percentage adherence	**37.5**	**37.5**	**62.5**	**37.5**	**37.5**	42.5
REASONS FOR STOCK OUTS AT ALL LEVELS							
1.	There is no delay in delivery.	2	2	2	2	2	0
2.	Lead times are not excessive.	2	2	2	2	2	0
3.	There are no errors in forecast.	1	1	1	1	1	100
4.	Maximum and minimum stocks are regularly updated.	2	2	2	2	2	0
5.	There is no lack of funds.	2	2	2	2	2	0
6.	Treatment guidelines do not change often.	NA	NA	NA	NA	NA	-
7.	Hospital medicines are commonly prescribed and used.	1	1	1	1	1	100
8.	There is expected increase in patients.	1	1	2	2	2	40
9.	Warehouse is not small in size.	2	2	2	2	2	0
10.	Suppliers are paid on time.	2	2	2	NA	NA	0
11.	Procurement procedure is not too long.	2	2	2	NA	NA	100
	Percentage adherence	**30**	**30**	**20**	**25**	**25**	30.9
DRUG EXPIRY MANAGEMENT							
1.	There is a record for expired drugs.	1	1	1	1	1	100
2.	Expired drugs are stored separately.	1	1	1	1	1	100
3.	There is a set procedure for disposal of expired medicines.	1	1	1	2	2	60
4.	Expired drugs are reimbursed.	1	1	1	2	2	60
	Percentage adherence	**100**	**100**	**100**	**50**	**50**	80
REASONS FOR EXPIRY							
1.	FEFO/FIFO rule is followed.	1	1	1	1	1	100
2.	There is modification of the STG in the course of the financial year.	NA	NA	NA	NA	NA	-
3.	Suppliers do not provide short expiry products.	1	1	1	2	2	60
4.	Prescribers adhere to STGs.	NA	NA	NA	NA	NA	NA
5.	There is a stock control situation.	2	2	2	2	2	0
6.	There is no un-qualified staff.	1	2	2	2	2	20
7.	Supplies are not in excess of orders.	1	1	1	2	2	60
	Percentage adherence	**80**	**60**	**60**	**20**	**20**	34.2

ACTIVITY INDICATORS (DAILY/WEEKLY)							
1.	Regular monitoring of storage conditions.	1	1	2	2	2	40
2.	Cleaning of receiving, storage, packing, and shipping areas done regularly.	1	1	1	2	2	60
3.	Regular sweep or scrubbing of floors.	1	2	1	1	2	80
4.	Regular removal of garbage.	1	1	1	1	1	100
5.	Cleaning bins, shelves, and cupboards available, if needed.	1	1	1	1	1	100
6.	Ensuring that aisles are clear.	1	1	1	1	1	100
7.	Ensuring adequate ventilation and cooling.	1	2	2	2	2	80
8.	Ensuring that products are protected from direct sunlight.	1	1	1	1	1	100
9.	Monitoring store security and safety.	1	1	1	1	1	100
10.	Checking the store roof for leaks, especially during the rainy season and during or after a storm.	2	2	2	2	2	0
11.	Monitoring product qualities (visually inspect commodities and check expiration dates).	2	2	2	2	2	0
12.	Ensuring that products are stacked correctly, (are the lower cartons getting crushed)	1	2	1	2	2	20
13.	Updating stock records and maintaining files.	1	1	1	2	2	20
14.	Whether cycle counting, conducting physical inventory and updating stock keeping records.	1	2	1	2	2	40
15.	Monitoring stock levels, stock quantities, and safety stocks.	1	2	2	2	2	20
16.	Submitting an emergency order (as needed, using local guidelines).	1	1	2	2	2	40
17.	Updating back-up file for computerized inventory control records.	2	2	2	2	2	0
18.	Separating expired stocks and shifting to secure area.	1	1	1	2	2	0
MONTHLY							
19.	Conducting physical inventory or cycle count, and updating stock keeping records.	1	1	1	1	2	80
20.	Using established procedures to dispose of expired or damaged products.	1	2	2	2	2	20
21.	Tasks according to reorder interval and reporting schedule	2	2	2	2	2	0
22.	Assessing the stock situation.	1	1	1	1	1	100
23.	Completing and submitting requisition forms (indent or “pull” systems).	1	1	1	1	1	100
YEARLY							
24.	Conducting complete physical inventory and updating stock keeping records.	1	1	1	1	1	100
25.	Reassessing maximum/minimum stock levels, and adjusting if needed.	1	1	1	2	2	60
26.	Utilisation patterns.	1	1	1	1	1	100
Percentage adherence		84.6	61.5	53.8	42.3	34.6	56.2
TOTAL PERCENTAGE ADHERANCE		64.1	49.3	54.3	29.6	24.4	44.5
1=Yes, 2=NO, NA=Not applicable							

In a similar study carried out in Rajasthan, India in 2014 it was found that half of the total number of PHCs and CHCs surveyed do not maintain temperature charts; 41% of PHCs and 42% of CHCs had stored medicines directly on the floor whereas only 29% facilities had stored medicines in systematic manner; only 13% PHCs, 18% CHCs had storage with temperature control, proper ventilation and systemic storage of medicines in this very study.[10] The possible reason that could be attributed to lowest storage adherence in PHCs could be because of lack of basic infrastructure at lower level of health care leaving a lot of scope for improving the current situation. Overall percentage availability of indicator medicines was found to be 32.5% (CH=56.2% & DH=18.6%). Stock cards were not found in any of the health care facilities surveyed and no expired products were found in CH, MC and DH. Average indenting frequency was found to be 31 days (PHC=60; MC=10). However, average number of medicines indented each time was found to be 24. Average lead-time was found to be 15 days (CH=15; MC=60). Maximum and minimum stock levels were not demarcated whereas none of the facilities had bin-cards for any products. These results reveal lack of adherence towards basic inventory management principles, which need to be adopted in order to enhance and ensure all time medicine availability within healthcare facilities without any stock-outs. In a similar kind of study it was found that on an average, 95% of public health facilities

had maintained scientific and practical inventory management methods (First Expiry First Out i.e. FEFO); average interval of indenting at PHC level was 56 days whereas it was 32 days at CHC level and 13 days at district hospital level.[10]

Table 4: Assessment of storage conditions and inventory management using quantitative indicators in health facilities surveyed

S.No	Quantitative Indicator	Health care Facility					
		CH	MC	DH	SDH	PHC	%
1.	Percentage availability of indicator medicines	56.2	32.5	18.6	20.1	34.9	32.5
2.	Percentage of items with stock cards	0	0	0	0	0	0
3.	Percentage of items with updated stock cards	NA	NA	NA	NA	NA	-
4.	Percentage of stock card balances physically available	NA	NA	NA	NA	NA	-
5.	Number of drugs that are expired	0	0	1	1	2	0.8
6.	Frequency of indenting medicines (in days)	15	10	30	40	60	31
7.	Average number of medicines indented each time	20	15	35	40	10	24
8.	Average time to receive indented medicines	15	60	30	28	25	31.6
9.	Average number of requisitioned drugs available	7	4	2	3	NA	4
10.	Percentage of requisitioned quantity issued against quantity ordered	75	30	15	25	NA	36.3
11.	Number of stocks out days during the last year	10	77.6	67.3	61.5	115	66.3
12.	Percentage of incomplete delivery	5	15	10	30	30	18
13.	Percentage of late delivery	20	40	40	70	80	50
14.	Percentage of non-conformity to orders placed	5	10	5	60	75	31

1=Yes, 2=NO, NA=Not applicable

Table 5: Overall percentage adherence of storage conditions and inventory management in surveyed health facilities

S. No.	Qualitative Indicator Category	No. of indicators	Facility wise percentage adherence					
			CH	MC	DH	SDH	PHC	Total
1.	Storage facility	21	71.4	42.8	33.3	38.1	19.0	40.9
2.	Storage procedures	10	60.0	50.0	60.0	50.0	20.0	48.0
3.	Technical product receipt	4	75.0	50.0	75.0	0.0	0.0	40.0
4.	Receiving supplies	13	53.8	46.2	53.8	38.5	38.5	46.1
5.	Inventory Control	7	42.9	14.3	28.6	14.3	14.3	22.9
6.	Stock management	13	70.0	50.0	50.0	10.0	10.0	38.0
7.	Stock positioning	8	37.5	37.5	62.5	37.5	37.5	42.5
8.	Stock outs	11	30.0	30.0	20.0	25.0	25.0	26.0
9.	Expiry	4	100	100	100	50.0	50.0	80.0
10.	Reasons for expiry	7	80.0	60.0	60.0	20.0	20.0	48.0
11.	Activity (daily/monthly/yearly)	26	84.6	61.5	53.8	42.3	34.6	55.4
Total	Percentage adherence	124	64.1	49.3	54.3	29.6	24.4	44.3

1=Yes, 2=NO, NA=Not applicable

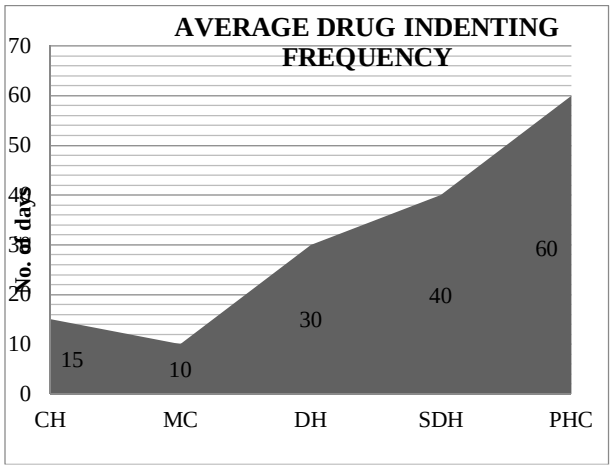

Fig 1: Average-indenting frequency in public health care facilities.

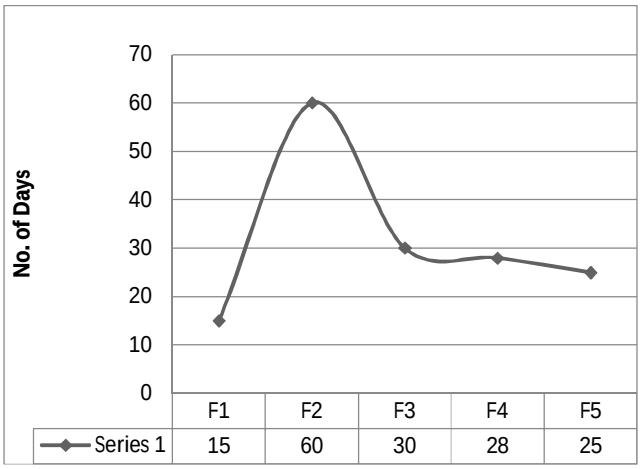

Fig 2: Average time to receive drugs after ordering (Lead-time).

CONCLUSION

Medications have to be stored in accordance with regulatory requirements and manufacturer recommendations since decomposition of a drug may result not only in a decrease in their efficacy but also in the possible presence of toxic degradation products. Storage of drugs therefore should not be taken lightly. In the present study, overall adherence towards various storage conditions was found to be less than 50% and lack of adherence to the basic inventory management principles was found to be common. The results of this study call for a change and improvement in the present drug storage and inventory management practices being followed in our public health care facilities. This can be done by adopting relevant national and international guidelines on medicine management practices. However, there is a dire need to devise our own medicine management policy framework, which can guide us in efficient management of medicine supplies in terms of their selection, quantification, procurement, distribution and safe use.

What this study adds:

1. What is known about this subject?

Indicator based assessment and evaluation in medicine management is very important and is well practiced in developed world. However among developing countries including India such practices are not being routinely carried out and there are no country or facility specific indicators, which have been developed to carry out such assessments. International organizations like WHO USAID,MSH have devised some indicators for the evaluation of medicine management practices but these indicators need to be tailored and validated further.

2. What new information is offered in this study?

This study has resulted in development and validation of a comprehensive indicator based tool which can be used to carry out in-depth assessment and evaluation of medicine storage and inventory management practices followed within a health care system.

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