Original Article

Evaluation of Procurement & Storage of Medicine at Rural Health Centers in District Chiniot

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Objective: To assess the process of procurement and storage of medicines at rural health centres (RHCs) in District Chiniot.

Material & Methods: A cross-sectional study was conducted. All 5 RHCs in the District were included in the study and in charge of the RHCs were interviewed on a prescribed questionnaire to assess the procurement of medicines. The condition of stores was assessed by a separate structured check list.

Results: Eighty percent of the officers in charge were Senior Medical Officers, 40% had post graduation qualification and majority had 15-20 years experience. 20% had less than 1 year experience in purchase. Forty percent had Pull and Push both drug procurement systems and 100% calculated their demand on the basis of average monthly consumption, buffer stock and review period basis. All procured major chunk of medicine through District Medical Store but purchase from local market and petty purchases were also made to meet the demand of the patients. Tender was called, and the rate contract was done by District Health Authority and all in charges submitted their demands and supply orders. Majority (80%) of them accepted the drug having more than 75% shelf life. Eighty percent had more than 1 drug store at their health facility and only 40% had got the store white washed annually. 100% maintained their stock by following FIFO and FEFO methods. Despite only 40% received budget in time, 80% utilized the budget 100% and only 60% faced some sort of audit paras. Custodian of RHCs were dispensers at 100% RHCs. 60% in charges had got logistics management training for less than 2 weeks whereas non of the store keeper had got any such training. None of the store had adequate space i.e. 250 sq. ft. 20% stores had leaking roofs. 60% stores had pellets, shelves and racks. Space between stacks and wall was not present in any of these stores. In majority 80% stores the cartons were placed on the floor instead of on the racks. To maintain the cold chain and storage temperature of controlled items, functional refrigerator was present in 80% stores, whereas deep freezer was present in only 20% stores. Tripping and power supply failure is very important issue especially in rural areas. Generators were present in 40% RHCs out of which 20% were not functional.Cleanliness was satisfactory in 100% stores. None of the store was white washed. Exhaust fans were not present in any of these stores. Direct sunlight was not coming into 80% stores. Cross ventilation was ensured in only 60% stores and 80% stores had separate cool place for temperature controlled items. At 100% RHCs stock registers were maintained but stock was physically present as per record at only 20% RHCs. Physical verification of stock by in charge, DOH or EDOH was conducted at 80% RHCs during the year. Major issues / constraints at RHCs were: delay in budget provision and rate contract, insufficient store space and difficulty in unloading the stock.

Conclusion: These results indicate that although the in charges had successfully completed the process of procurement, yet there is need for logistics management training. As the store space is insufficient at all RHCs, there is need to build new medicine stores according to the international standards at all RHCs. Timely provision of efficient drugs at RHCs will decrease the morbidity and mortality in the rural community and will help reduce the poverty.

Keywords: Procurement, Stores, Primary Health Care, Logistics

Background

Procurement & storage of medicines is a very important component in hospital administration & requires competent knowledge & skills. Drugs require suitable temperature for storage. Many other factors also are important in procurement & storage of these drugs. If the required standards are not met, drugs loose their efficacy & effectiveness, which may result in ill effects or severe reactions . Hence, the concerned persons should have sound & optimal

knowledge to avoid any untoward reaction to the patients using these drugs.

Pharmaceutical procurement is a complex process which involves many steps, agencies, ministries and manufacturers.[1] Timely procurement of these medicines necessitates the completion of all these steps efficiently.

Drugs are chemicals that react to external stimulus such as heat, light and moisture leading to reduction or elimination of its efficacy and causing adverse effects on health due to improper storage. Results of a recent study in India show, that drugs lose 3-4% of their potency at chemists' shops because they are not stored properly.[2]

According to National Drug Policy, the existing conditions of storage both in the public sector and the private sector require a lot of improvement.[3,4]

Rural Health Centre is a first level care facility (hospital) specially aimed at curatives and preventive services for the community at primary health care level. The allocated funds are at the disposal of Senior Medical Officer (SMO) in charge of the hospital. SMOs play a pivotal role in provision of health services to the community. These RHCs are the only source of medicine for most of the rural population due to non existence of private medical stores.[5]

The in charges of these facilities had either no logistics training or only some had very minute training. This hampered the efficient and effective procurement of the medicines in these facilities leading to many gaps. Although procedures for monitoring and evaluation of procurement and storage of medicines exist in the public sector, yet practically it is not implemented in its true spirit even in the Government Medical Store Depot (MSD).

No study has so far been conducted regarding storage of medicines at RHC level in Pakistan which provides the rationale for the current research.

Introduction

Procurement is a process, under which, commodities, equipment and services are procured/ hired to meet the emerging requirements of an organization/ masses.[5]

Four strategic objectives of pharmaceutical procurement are:

1. Procure the most cost-effective drugs in the right quantities
2. Select reliable suppliers of high-quality products
3. Ensure timely delivery
4. Achieve the lowest possible total cost.

An easy term used to describe these objectives as "the six rights" is "getting right quantities of right goods for right places in right condition on right time at right cost."[6]

Guidelines For Proper Storage

Ministry of Health Government of Pakistan, National Program for Family Planning and Primary Health Care has devised guidelines for proper storage of medicine as a component of the logistics management training of their staff. The salient features are:

Managing Material: The Storage Environment

- Must be kept clean and cleaned regularly
- Must be cross-ventilated and have installed ceiling and exhaust fans.
- Ceiling fan must be turned on during day light hours.
- Exhaust fans must be turned on at all, times when temperature exceeds 25° C.
- Thermometer must be displayed on wall on center point of warehouse and two readings per day must be recorded in a separate register i.e. 9:00 a.m and 2:30 p.m.
- Incandescent lighting fixtures (no tube lights) to be positioned at suitable intervals.
- Store walls must be painted with a lime based substance annually (white washed)
- Roofs must not leak; rain/floodwater must be managed by proper drainage arrangement installed externally.
- The sun must not shine directly on stored commodities.
- Floor must be raised at least 6 inches above the plinth and must be flat and Pukka (cemented).
- The walls and under-ceiling must be disinfected periodically with a mild commonly available household spray.
- Store rooms must be equipped with pallets, racks, shelves and almirahs with locks.
- Store rooms must be equipped with functional (up-to date) fire extinguishers.
- Physical security must be ensured by the presence of designated security guards (at-least three in number).
- Visitors' book is to be maintained for signature and comments of authorized personnel who visit store room/ warehouse.[6]

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Management Materials: Arrangement of Stock

Cartons must be stacked on pallets with minimum of 4 inches (9-10cms) of space between floor &bottom of carton.

Carton label must be visible with right side up.

Bin cards, containing up-to-date information, must be positioned/affixed on stacks, on shelves, almirah (outside) and / or on racks.

Space between stacks and walls must be 12 inches (33 cm).

Stacks must not be higher than 8 feet (2.5 meters). If at the height the lower cartons show squashing/buckling/compression, etc then this rule has to be amended.

Stacks must be vertically aligned/straight, & must not lean to left or right.

At least 3 feet or one meter space, between stacks must be maintained.

Medicines, drugs and contraceptives must not be stored in same room with Insecticides volatile chemicals and fluids (like alcohol, kerosene, diesel and petrol), non-usable equipment, machinery, spare parts, expired drugs, obsolete materials, old files, obsolete stationary and other printed materials.

FIFO and FEFO: While issuing commodities, First In /First Out and First Expiry/First Out method must be adopted and practiced.[6]

Effect of Temperature and Humidity on Drugs:

Results of a recent study show from India show that drugs lose 3-4% potency at chemists' shops because they are not properly stored. The drugs showed various levels of degradation in potency, far higher than the permissible limits, at the outlets that did not maintain specified temperature, light or humidity levels.One study on the effect of various temperature and humidity conditions on the disintegration time of different brands of packaged Paracetamol tablet formulations was conducted over a period of six months. Under all the storage conditions paracetamol tablets showed an increase in disintegration time ranging from 9.1 to 65.5% (200 mg tablets) and 1.2 to 150% (500 mg tablets) on increasing the temperature from 25 to 45°C, 75% relative humidity (RH). The increase in disintegration time on increasing the temperature from 25 to 45°C (100% RH) ranged from 14.3 to 157.7% (200 mg tablets) and 15.3 to 92.3% (500 mg tablets). The overall increase in disintegration time from 25-45°C at 75% and 100% RH is 36.4 to 564% (200 mg tablets) and 10.0 to 140.5% (500 mg tablets) and 101.3 to 122.9% (200 mg tablets) and 2.6 to 46.8% (500 mg tablets) respectively. These results indicate that PVC/PVDC/Al foil packaging cause relatively less change in disintegration time of the tablets compared to that of the polycoated paper and viscose film.[15] In another study by Malokia, three brands of locally available Cephalexin capsules were stored in paper bags at 40°C/90% relative humidity. Samples were taken at different time intervals and tested for the effect of storage on disintegration, dissolution and drug content for up to 70 days. Bioavailability testing was carried out by administering the capsules to four volunteers before storage and after 70 days of storage. Two brands A and B showed increase in disintegration time associated with decrease in the rate of dissolution. The third brand C showed similar effect but later on irregular disintegration and dissolution were observed. Such behavior was found to be a result of storage effect on the capsule shell. No effect on drug content was observed for brands A and B but significant loss of activity was observed with some samples of brand C. Bioavailability testing based upon urine analysis for excreted drug indicated that the rate but not the extent of drug absorption for brands A and B decreased by storage. The results with brand C showed serious fluctuations in absorption after storage for more than 25 days. These findings point out to the importance of proper formulation and protection of solid dosage forms handled in places where high temperature and humidity conditions are likely to exist.[7]The stability of dacarbazine in commercial glass vials and polyvinyl chloride (PVC) bags in various storage conditions and the emergence of 2-azahypoxanthine, a major degradation product possibly linked with some adverse effects, were studied.[20] The storage and handling of dacarbazine should take into account both the loss of the drug and the production of its potentially toxic degradation product. Dacarbazine must be carefully protected from light, administered using opaque infusion tubing, and, if necessary, refrigerated before administration to reduce 2-azahypoxanthine formation. [8]

Manipulation of The Procurement Process

Overall: Head of procuring agency certifies that procurement process is urgent, thereby avoiding requirement for competitive bidding; projects /contracts split to avoid competitive bidding requirements above a certain cost ceiling; officials take advantage of the year-end (May-June) period, when departments are trying to spend their budget allocations, to rush through procurements which

then escape proper procedures and monitoring;

Technical feasibility: Improper feasibility studies may be undertaken to overvalue projects, to the benefit of officials; studies may also be undertaken by consultants with links to contractors.

Tender documents: Project specifications are prepared to favour particular contractors; Registration/pre-qualification and Invitations for bids: process is kept bureaucratic (e.g. numerous unnecessary conditions to fulfill) and lengthy to deter competition; advertisements in low circulation publications; published tender notices are followed by a number of short addenda, which if missed by bidders in their tenders would lead to their disqualification; short notice for submission of bids whilst favoured bidder had prior notice and time to prepare; officials will create their own fictitious companies to bid and approve them through this stage of the process.

Preparation of bids: Collusion between competitors will lead to inflated pricing; 'pooling', whereby one bidder "buys" his competitors' bids, changing their values, submitting the lowest bid far in excess of the market price; multiple bids by contractor operating under different names.

Bid evaluation: Financial envelopes are often opened before technical; unrealistic and outdated Schedules of Rates are used to defeat good bids by "outsiders"; delays are created to generate kickbacks.

Negotiations: No rule exists for the negotiation period, but is often the period when collusion and coercion occurs. Prices may be renegotiated and adjusted after contracts have been let. This manipulation of often quite acceptable rules only allows corruption because of the inherent lack of transparency and public participation in the procurement process. Without this, any set of procurement laws and rules can be manipulated for self enrichment.

The public are usually denied the opportunity to be informed of, monitor or participate in aspects of the procurement or development affecting their community and country. There is no other mechanism by which the public may be satisfied about the integrity of the process.

The blame does not lie entirely with the government side of course. There are bidder mafias, collusion between bidders and widespread bribery by national companies. However, in terms of grand corruption, multinationals, and therefore their governments must share the blame, as many tend to view corruption as a Pakistani trait, which they are content to accept, by the use of "agents."

Objective:

To assess, the process of procurement and storage of medicines at Rural Health Centers in District Chiniot.

Methodology

Study Design:

Cross-sectional

Study Area:

The study was conducted in District Chiniot. It is 140 km away from Lahore, 25 km away from Sahinwala interchange of M3 motorway and 22 km from Faisalabad. The total population of District Chiniot is 1,170,535 with 47,991 women of child bearing age, 41,355 children under 01 year & birth rate of 2.61. This District has 44 union councils, 36 BHUs and 5 RHCs.

Study Population:

Rural Health Centres in District Chiniot.

Sampling Method:

District was selected based on convenience, and all the five RHCs in this District were included in the study.

Data Collection Instruments and Procedure:

Data was collected using structured questionnaire comprising of two separate parts. First part (Part A) questionnaire was designed to assess the procurement system at RHCs. The information sought included training and experience of the person in charge of procurement, drug procurement system, mode and process of procurement, annual budget and its utilization, training in logistics management, space of drug stores, and problems faced during procurement . The second part of questionnaire (Part B) was developed to assess the condition of the medicine stores. The items included physical condition of the stores, maintenance of cold chain, alternate arrangements of power supply and record keeping of medicines.

Data Analysis:

Data entry and analysis were performed using Epi Data 3.0, a word processing, data base and statistical program for public health. Data analysis included calculation of frequencies for categorical variables and descriptive statistics (Mean, SD and Range) for continuous variables.

Ethical Considerations:

Written permission from relevant authorities was obtained before collection of data. Confidentiality of the data was ensured.

The information about the procurement of medicines at RHCs was obtained by interviewing the person in charge of procurement at each RHC using the same questionnaire. The second questionnaire

was filled by inspection and physical verification of medicine stores at each RHCs by the researcher.

Results

The service experience of person in charge RHCs ranged from 18 to 25 years. 60% had more than 10 years experience and 40% less than 1 year experience in purchase. Regarding the qualification of the incharge RHCs, 30% had only MBBS degree, whereas 40% had done post graduation.

As far as procurement system at RHCs was concerned, 40% had pull system, 20% had push system and 40% had adopted both pull and push systems.

All in charges calculated the demand by keeping in mind the average monthly consumption, buffer stock, and review period. All three modes of procurement were used by these in charge RHCs namely through MSD, bulk purchase, and petty purchase. All in charges submitted their demand to EDOH who called tender or got rate contract to various firms/ companies and gave supply orders to the relevant supplier only.

Majority of the RHCs (80%) accepted more than 75% shelf life during delivery of drugs. 60% had procurement committee, whereas 80% got the quality verified from drug testing laboratory. Most of the RHCs (80%) kept the drugs in two stores and only 40% drug stores were white washed annually. All were using first in first out (FIFO) and first expiry first out (FEFO) method for the maintenance of the medicine stock.

Stock out were faced only at 60% RHCs during the year. The various reasons of stock out were; received short supply (20%), increased drug utilization 20%, and medicines were used in crises (20%).

All custodians of stores were dispensers. Regarding the logistics management training, only 3 (60%) in charges of RHCs had got less than 2 weeks training, whereas none of the store keeper had received any sort of training.

Regarding the space of stores at RHCs, none of RHCs had the desired 250 sq.ft. store space. Majority (60%) had less than desired space by 50-100 sq.ft. Regarding the condition of medicine stores, in one store the roof was leaking. Pellets, shelves and racks were available in 3 (60%) stores. Stacks at all RHCs were less than 8 feet high, at only at 1 (20%) store the cartons were on the stacks and were 6 inches above the floor as per criteria.

The cold chain of medicines / vaccines at 80% RHCs had been maintained only by a functional refrigerator. Only 1 (20%) had functional deep freezer. Only 1 RHC had functional generator in case of power failure whereas none of the RHCs had uninterrupted power supply (UPS) as an alternate arrangement.

As far as cleanliness was concerned, all drug stores at RHCs, had satisfactory level of cleanliness. All drug stores were not white washed, and exhaust fans were not installed in any of the RHCs. Direct sunlight was restricted in drug stores in 4 (80%) RHCs. Arrangement of cross ventilation was present in 3 (60%) drugs stores. Separate cool places for temperature controlled items were present at 4 (80%) RHCs.

Regarding the record keeping at RHCs, 4 (80%) had affixed updated bin cards. Stock registers were maintained at all RHCs but only at one RHC stock was physically present as per record.

At 4 (80%) RHCs, stock was physically verified by the in charge or EDOH / DOH.

The problems regarding procurement and storage of medicines at RHCs were; delay in budget provision (20%), delay in rate contract (80%) by the district health authorities, problem of insufficient space at the RHCs for medicine storage (80%), whereas, 3 (60%) RHCs were facing the problem of unloading the logistics supply at RHCs.

Discussion

Purchase of drugs and maintaining a satisfactory inventory of drugs, chemicals account for a substantial amount of money, next only to salaries and wages. Approximately 20% of the hospital costs are accounted for the medicines and pharmaceutical supplies. Availability of the right drug at the required place at the time of need is the key to the hospital's existence. Delay can be disastrous, and the effect of non-availability of the right drug at the right time can be horrifying in terms of mortality and morbidity. A high percentage of the total expenditure of the hospital on pharmaceutical stores and the harmful effect of a poor pharmacy service emphasizes the need for very careful attention to the effect of pharmacy service on clinical services in the hospital.[9]

As it is apparent from the study that most of the (60%) in charges of RHCs had more than 18 years service experience, they did not have good experience of procurement. Although 40% in charges at RHCs had less than 1 year experience in procurement, yet they had participated in procurement process and timely completed the process. This may be due to their prolonged service experience and better

supervision and guidance of district health authorities. Out of 5 in charges, 3 (60%) had got post graduation and this may be another reason for having good procurement of medicines due to better management practices. Majority (80%) being most of them Senior Medical Officers, they had good access to the district health authorities as well as the suppliers which enabled them to timely complete the process. Although various systems of procurement were adopted at various RHCs, yet all in charges calculated their demand by observing all the three procedures, average monthly consumption, buffer stock and lead time period. This clearly indicates that they were well aware of the protocol of procurement. Although major chunk of medicines was purchased through district MSD yet all had purchased medicines locally as well to meet the demands of the patients.

As tender and rate contract was conducted by Executive District Officer Health, yet most of them had active procurement committees at RHCs for local and petty purchase of medicine and the committee accepted the medicines having more than 75% shelf life at the time of delivery.

Although all in charges were quite efficient in procurement, yet some faced stock out in lead time period which was due to increased utilization of drugs, short supply by the district stores and the drugs were used in crises but not due to submission of incorrect demand. Despite the fact that 40% in charges received their budget late, all of them utilized 100% budget, in the best interest of patients. Although only 60% in charges received less than 02 weeks training in procurement, it is important to note that all in charges completed the procurement process efficiently.

The minimum area for the pharmacy of the smallest hospital should not be less than 250 sq.ft. The estimated range starts from 10 sq.ft. in a 200 bedded hospital, and 5 sq.ft. per bed in larger hospital.[19] Store space was deficient at all the RHCs as compared to the international standards and this may be due to the fault in design during construction and lack of future vision. This was the major problem due to which the medicines were not kept in these stores according to standard protocol, as some of the stores had 100-200 sq.ft deficient than the required space. Hence, the medicines were dumped at various places in these hospitals.

The risk of cold chain failure is greatest at village level.[29] It is quite satisfying that 80% RHCs had functional refrigerators for storage of temperature controlled drugs and vaccines yet it is very distressing that only 1 RHC had functional generator in case of power failure. This thing is very alarming as RHCs cater a vast population and a huge stock of vaccines is stored in these facilities for timely availability. In the recent years, the country is facing power shortage, with rural areas more drastically affected. If power outage is prolonged it may result in wastage of vaccines / drugs. There is great need for the proper functional generators or any other alternate arrangement at each RHC.

The recommended maximum storage and transit temperature for most medications is 25°C and are set by the pharmaceutical manufacturers;[10] it is an established fact that rise in temperature may result in decrease in efficacy of various drugs, yet none of the RHC in charges had got exhaust fans installed in the drug stores. The medicines were kept in these stores without following the standard protocol and this may be due to insufficient store space. This renders the physical verification of store very difficult for the in charge or any other officer. Hence the proper storage of medicines is of immense importance and the government should pay special attention to this very particular issue since 80% in charges showed their concern about the insufficient space for storage of drugs.

Regarding other problems of procurement and storage of medicines, delay in receipt of budget and unavailability of human resource for unloading the medicines were of immense importance. This may be due to the reason that often the suppliers send trucks of medicine during odd times when the menial staff has gone home and only one or two persons are available at the facility. The delay in receipt of budget is also a serious issue, which adversely affects the process of procurement and demand for rectification.

It is pertinent to state that the study was conducted in a very small sample of 5 RHCs of a district; a larger sample might help identify further issues and gaps required for proper addressing and rectification. The importance of the topic increased much as these facilities are catering about 70 % population of the country but are being less utilized. This may be due to the fact that improper storage rendered the drugs less efficacious resulting in loss of confidence of the patients. The government of the Punjab has started Health Sector Reforms Program (HSRP) which is providing huge inputs in health /infrastructure, human resource, finances & operational issues. This alarming issue should be given due consideration.

Conclusion

It is concluded from above discussion that the in charges of RHCs need "Logistics Management Training." None of the RHCs had proper storage of medicine facility which is mandatory for efficacy of the drugs and the drugs had dumped in various rooms with out following the storage criteria.

Recommendations

The following recommendations are made, based on of this study:

1. Interventions are urgently needed to improve procurement and storage of medicines at RHCs.
2. Need base training for capacity building of RHC staff to better manage drug supplies, distribution & other related logistics procedures, to achieve better availability of medicines at primary health care level
3. The existing stores have insufficient space for proper storage of medicines. Hence there is need to build new stores at RHCs.
4. There should be refresher courses regarding procurement and storage of medicines for store keepers and in charges of these facilities.
5. There should be accreditation of these medicine stores.

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