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Drug wastage and its financial implications: A first study in paediatric inpatient set up from India

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Abstract

Purpose: Drug wastage is a very common yet undocumented aspect in health care set up. A literature study indicates that there are no studies in the branch of paediatrics on this aspect. The principal objective of this study was to ascertain the extent of drug wastage and calculate the financial costs of it at a tertiary care hospital.

Methods: This was a prospective study and was conducted to ascertain the quantity of drug wastage at a tertiary care inpatient facility of a hospital in the month of August 2016. The prescription of the drugs, the recommended dose, the quantity used and remainder (waste) left were noted. The cost for the actual use and the waste was performed to understand in which drug the maximum wastage generated and the financial loss.

Results: The results of this study indicated that during the study period wastage of drugs was seen in for 24 of the 51 (47.05%) drugs used and that the wastage proportion of drugs varied from 0.39% to 64.29%. Paracetamol was the most wasted drug (42.95%) and amounted for 28.84% of the total wastage cost.

Conclusion: The results indicate that the quantity and the financial impact of drug wastage were substantial and that efforts should be at minimizing expenditure. This is very important in developing countries like India, where every molecule of drug is precious.

Keywords: Paediatric drugs; wastage; cost; paracetamol

Introduction

Medicines form an integral part of the healthcare delivery system and more so in the care of children. Medicines are important in both prevention as well as cure of diseases, thus delivering ideal health care to the people and their judicious use is important. To summarize this World Health Organisation (WHO) has stated that "medicines are appropriately used when patients receive medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community"^[1]. However this is not a universal aspect and wastage of drug is a major but neglected aspect.

Studies have shown that drug wastage may be due to inefficient prescription and stockpiling to patient recovery and non-adherence. Pharmaceutical wastage can occur through failures in existing processes or patient behaviour^[2]. This can consequentially cause danger to humans, damage environment, result in inefficient use of resources and cause considerable loss of money^[3]. Reports published from the UK approximate that the value of waste medicines amounts up to £3 billion^[4]. Medicines wastage is a major problem in healthcare delivery system in India. Surprisingly there are very few studies^[5-7] in these lines and none in the clinical discipline of paediatrics. Therefore the present study was planned to investigate the wastage of drugs in a hospital setting

Methodology

This was an observational pilot study and was carried out in the inpatient services of the Father Muller Medical College Hospital, Mangalore. The objective of the study was to assess the quantity of drugs issued, to their actual use and wastage for each drug. As this study did not focus on the nature of the illness or require any patient details/or medical information, a waiver of consent was obtained from the IEC.

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The data was collected in the paediatric department's ward and day care unit over a one month period (May 2016). Ethical committee clearance and consent of study patients were not needed, as the study did not involve any alteration or intervention in the patient management plan. The amount of drug issued, used and the drug left were documented. An estimation of the wastage of the drugs was calculated in percentages. A cost estimation of the amount of drugs wasted was done. The amount of drug wasted was multiplied by the maximum retail price of the drug per unit available in market at the time of study. The average daily financial loss was also calculated and expressed as frequency and percentage.

Results

A total of 60 pediatric cases were analysed in this study. Among the study population 34 (57%) were males and 26 (43%) were females. Most of the patients were between age group of 1-5 yrs (56.67%). The average duration of stay in the hospital was 4.5 days. The most common diagnosis was upper respiratory tract infection (URTI) (15%) followed by wheeze associated lower respiratory infection (WALRI) (8.33%). The drugs used during the study period was 51 in number but wastage was seen only for 24 (47.05%) (Table 1). From a quantitative perspective, the wastage proportion

of drugs varied from 0.39% to 64.29%. Paracetamol was the most used drug in our study (53 cases 88.3%) and resulted in wastage of 42.95%. The combination of dextromethorphan + phenylephrine + chlorpheniramine liquid formulation consumed by a single patient caused wastage of 37.5%. Liquid formulation of mefenamic acid was used in 2 cases. We observed a per drug wastage proportion of 62% with mefenamic acid. Amoxicillin + clavulanic acid consumed by 28.33% patients caused a wastage of 1.02%.

Cost analysis results indicated that the total cost of the drugs issued during study period was Rs.42, 587.00 of which drugs amounting to Rs.1, 994 were wasted. The cost of wastage of Paracetamol was 28.84% of the total wastage cost (Table 2). Though per drug wastage of mefenamic acid was higher (62%), the economic impact was low as it was used in only 2 patients and is a cheaper drug. Amoxicillin + clavulanic acid being a minimally wasted drug, contributed significantly to the total economic loss (10.89%) as it is an expensive product. The fixed drug combination of chlorpheniramine maleate + pseudoephedrine consumed by 12 patients caused a low financial impact amounting to a loss of 2.45 % of the total loss although the per drug wastage proportion was considerably high (15.22%).

Table 1: Drug wastage in the Pediatrics unit

| S. No | Drug | No. of patients | Issued quantity | Used Quantity | Remaining/ Unused drug | Wastage (%) |
|-------|--|-----------------|-----------------|---------------|------------------------|-------------|
| 1 | Amoxicillin+clavulanic acid | 17 | 88470 | 87566 | 904 | 1.02 |
| 2 | ORS | 7 | 68800 | 68800 | 0 | 0.00 |
| 3 | Ceftriaxone | 8 | 67500 | 67000 | 500 | 0.74 |
| 4 | Paracetamol | 53 | 36305 | 35135.4 | 1109.6 | 3.06 |
| 5 | Cefotaxime | 4 | 29250 | 29250 | 0 | 0.00 |
| 6 | Cefuroxime axetil | 1 | 15750 | 15750 | 0 | 0.00 |
| 7 | Amoxicillin | 3 | 10620 | 10620 | 0 | 0.00 |
| 8 | Dextrose+Sodium chloride | 11 | 9500 | 9500 | 0 | 0.00 |
| 9 | Aciclovir | 1 | 7000 | 7000 | 0 | 0.00 |
| 10 | Deferasirox | 4 | 4500 | 4500 | 0 | 0.00 |
| 11 | Ranitidine | 5 | 3750 | 3550 | 200 | 5.33 |
| 12 | Naproxen | 2 | 3250 | 3250 | 0 | 0.00 |
| 13 | Amikacin | 2 | 3000 | 2150 | 850 | 28.33 |
| 14 | Vitamin E | 1 | 2400 | 2400 | 0 | 0.00 |
| 15 | Phenytoin | 1 | 1400 | 1400 | 0 | 0.00 |
| 16 | Azithromycin | 4 | 1325 | 1322 | 3 | 0.23 |
| 17 | Hydroxychloroquine | 2 | 1280 | 1280 | 0 | 0.00 |
| 18 | Ibuprofen | 2 | 1260 | 1245 | 15 | 1.19 |
| 19 | Dextromethorphan+Phenylephrine | 7 | 700 | 301.5 | 398.5 | 56.93 |
| 20 | Fosphenytoin | 1 | 600 | 400 | 200 | 33.33 |
| 21 | Lansoprazole | 5 | 600 | 600 | 0 | 0.00 |
| 22 | Salbutamol | 18 | 537.5 | 412.5 | 125 | 23.26 |
| 23 | Doxycycline | 1 | 500 | 500 | 0 | 0.00 |
| 24 | Zinc acetate | 5 | 500 | 500 | 0 | 0.00 |
| 25 | Albendazole | 4 | 430 | 430 | 0 | 0.00 |
| 26 | Multivitamin | 2 | 400 | 400 | 0 | 0.00 |
| 27 | Nifedipine | 3 | 390 | 390 | 0 | 0.00 |
| 28 | Prednisolone | 3 | 360 | 287.5 | 72.5 | 20.14 |
| 29 | Chlorpheniramine maleate+Pseudoephedrine | 12 | 345 | 285 | 52.5 | 15.22 |
| 30 | Iron+Folic acid | 2 | 300 | 300 | 0 | 0.00 |
| 31 | Ondansetron | 9 | 238 | 89 | 119 | 50.00 |
| 32 | Metronidazole | 1 | 200 | 120 | 80 | 40.00 |
| 33 | Bromhexine+Guaifenesin+Terbutaline | 2 | 200 | 117 | 67 | 33.50 |
| 34 | Calcium carbonate+Zinc gluconate | 1 | 200 | 200 | 0 | 0.00 |
| 35 | Sodium chloride | 7 | 140 | 50 | 90 | 64.29 |
| 36 | Mefenamic acid | 2 | 120 | 45.5 | 74.5 | 62.08 |
| 37 | Chlorpheniramine+Dextromethorphan | 2 | 120 | 90 | 30 | 25.00 |

| | | | | | | |
|----|---|---|------|------|------|-------|
| 38 | Furosemide | 1 | 120 | 120 | 0 | 0.00 |
| 39 | Lactulose | 1 | 100 | 50 | 50 | 50.00 |
| 40 | Chlorpheniramine maleate | 1 | 100 | 60 | 40 | 40.00 |
| 41 | Clobazam | 6 | 95 | 95 | 0 | 0.00 |
| 42 | Dextromethorphan+Phenylephrine+Chlorpheniramine | 1 | 60 | 22.5 | 37.5 | 62.50 |
| 43 | Bromhexine+Pseudoephedrine | 1 | 40 | 40 | 0 | 0.00 |
| 44 | Cefixime | 1 | 30 | 30 | 0 | 0.00 |
| 45 | Montelukast+Levocetirizine | 1 | 30 | 30 | 0 | 0.00 |
| 46 | Folic acid | 4 | 25 | 25 | 0 | 0.00 |
| 47 | Dicyclomine+Paracetamol | 1 | 20 | 10 | 10 | 50.00 |
| 48 | Macrogol | 1 | 13.8 | 13.8 | 0 | 0.00 |
| 49 | Oxymetazoline | 1 | 10 | 4 | 6 | 60.00 |
| 50 | Xylometazoline | 1 | 10 | 6 | 4 | 40.00 |
| 51 | Clonidine | 1 | 0.5 | 0.5 | 0 | 0.00 |

Table 2: Cost of the waste drugs in Pediatrics

| S. No | Drug | Cost of issued drug (Rs.) | Cost of consumed drug(Rs.) | Drug waste cost (Rs.) | Proportion of total drug waste cost (%) |
|-------|---|---------------------------|----------------------------|-----------------------|---|
| 1 | Amikacin | 468.3 | 336.84 | 131.46 | 6.59 |
| 2 | Amoxicillin+clavulanic acid | 16927.37 | 16710.32 | 217.05 | 10.89 |
| 3 | Azithromycin | 282.36 | 275.46 | 6.9 | 0.35 |
| 4 | Bromhexine+Guaifenesin+Terbutaline | 129.4 | 75.7 | 43.35 | 2.17 |
| 5 | Ceftriaxone | 4747.96 | 4701.98 | 45.98 | 2.31 |
| 6 | Chlorpheniramine maleate | 58.85 | 35.31 | 23.54 | 1.18 |
| 7 | Chlorpheniramine maleate+Pseudoephedrine | 295.99 | 240.89 | 48.85 | 2.45 |
| 8 | Chlorpheniramine+Dextromethorphan | 136 | 102 | 34 | 1.71 |
| 9 | Dextromethorphan+Phenylephrine | 497 | 214.07 | 282.94 | 14.19 |
| 10 | Dextromethorphan+ Phenylephrine+ Chlorpheniramine | 31.51 | 11.82 | 19.69 | 0.99 |
| 11 | Dicyclomine+Paracetamol | 2.8 | 1.4 | 1.4 | 0.07 |
| 12 | Fosphenytoin | 145.98 | 97.32 | 48.66 | 2.44 |
| 13 | Ibuprofen | 15.14 | 11.85 | 3.29 | 0.17 |
| 14 | Lactulose | 75 | 37.5 | 37.5 | 1.88 |
| 15 | Mefenamic acid | 60 | 22.75 | 37.25 | 1.87 |
| 16 | Metronidazole | 25.28 | 15.17 | 10.11 | 0.51 |
| 17 | Ondansetron | 332.55 | 121.9 | 177.89 | 8.92 |
| 18 | Oxymetazoline | 46 | 18.4 | 27.6 | 1.38 |
| 19 | Paracetamol | 1338.43 | 730.8 | 574.89 | 28.84 |
| 20 | Prednisolone | 135.94 | 68.27 | 67.66 | 3.39 |
| 21 | Ranitidine | 3383.79 | 3370.55 | 13.24 | 0.66 |
| 22 | Salbutamol | 483.25 | 463.88 | 19.38 | 0.97 |
| 23 | Sodium chloride | 168.7 | 60.25 | 108.45 | 5.44 |
| 24 | Xylometazoline | 31.13 | 18.68 | 12.45 | 0.62 |
| | Grand Total | 42586.51 | 40510.87 | 1993.53 | 0 |

Discussion

Drug wastage is an important yet neglected aspect in healthcare and may be seen in both in community as well as in healthcare delivery settings. The drug wastage is a concept that is been ignored in healthcare delivery but its credence cannot be compromised. The pattern of medicine wastage in healthcare delivery systems varies depending upon services which are rendered by the hospital. There are few reports on the wastage of prescribed medicines and have been in the medical disciplines of oncology [8-12] and anaesthesia [12-14]. To date there are no reports on audit on drug wastage in paediatrics and its financial implications. The limitation of this study is the small sample size, short data collection period and audit from a single centre. But then we also feel that the observation will be almost the same in all other hospitals in India as increasing the sample size may not have a significant bearing on the observations. The drug wastage reduction and cost minimization strategies should also be priority and adhered to by all centres. In addition to these seminars/discussions on drug wastage and cost reduction strategies should be emphasized in conferences and in continuing medical education programs. Other suggested methods include implementation of practice guidelines for drug wastage, providing feedback on drug

wastage to provider, involvement of senior faculties in monitoring the practice of waste reduction protocols and yearly audits.

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