Evaluation of Cost / Utility of Parenteral Antibiotics Consumption
In a Tertiary Health Care Facility: A Cross sectional Study

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Received on: 07-04-2012; Revised on: 12-05-2012; Accepted on: 16-06-2012

ABSTRACT

Background Irrational use of antibiotics has resulted in costly budget, emerging resistant strains of microorganisms and adverse drug reactions. We conducted cross sectional aggregate data analysis on parenteral antibiotic (PA) on consumption and cost during year 2010 in a government tertiary care hospital in Sri Lanka. Materials and methods Data for 2010 was collected from pharmacy records and unit prices were obtained from medical supplies division. Initial and final stocks of the PA, quantities received, quantities issued and consumed per year were obtained. Data for VEN analysis was collected. Data was analyzed to identify the top ten for total cost (TTTC) and top ten for consumption (TTCS) PA according to the total cost and the consumption separately. Results Twenty two percent of total cost of TTTC was utilized only for 3 drugs in top ten consumed. There was not a single vital drug in TTTC in this hospital. This means 78% of money had been used to order the drugs which are not in the top ten of consumed. Sixty two percent of the drugs in top ten consumed have not contributed to the cost of TTTC. Hospital had spent 64.5% of money of total cost of TTTC to purchase only for three drugs (imipenem, meropenem and vancomycin) which are even not in TTCS. Conclusion According to the data most of the money had been utilized for less consumed but expensive PA. This shows costliest drugs had been utilized. To overcome this excessive expenditure we suggest analyzing clinical indications of these ordered drugs and substitute with low cost generics or alternative antibiotics. We continue our research work with this plan and hope to contribute to the better budgetary recommendations for low health cost.

Key words: Cost effective analysis, parenteral antibiotics, Drug utilization patterns

INTRODUCTION

Antibiotics are one of the most commonly used medicines in hospitals worldwide and has substantial share in the hospitals’ budget. As inappropriate antibiotic usage is associated with many medical problems including therapeutic failure, economic frustration and public health consequences (selection of resistance) and therefore considerable efforts should be taken to improve the accurate use. It is widely accepted that large portions of drug expenditures in a tertiary care hospitals in most of the countries are spent for acquisition of PA. Most of the previous research had shown that total cost for purchasing PA were for 30% - 40% of the total drug budget. Because of the high cost for PA most of hospitals had started to prepare an own set of procurement plan which is prepared according to the drug utilization protocols of the preceding year.

WHO has already given the guidelines about the assessment methods of drug usage patterns and the importance of applying the DDD analysis which indicates the quantitative measurement of individual drug utilization. Some of the researchers have done qualitative research on antibiotics usage in hospitals to identify the common prescribing drugs and the relevant cost. Some of the works have done retrospective data analysis and papers related to the cross sectional or longitudinal analysis were also found. Considering all we decided to conduct a retrospective aggregate data analysis to collect data for whole year.

Although most to the hospitals in developed and developing countries monitor antibiotic usage patterns for the budgetary purposes, analysis of such expenditures and predictions are not commonly used for the management interventions of the mainly in the government health institutes. Some of the researchers had focused on microbiological surveillance in relation to the practical application and clinical utility which will be helpful to do the cost utility analysis. Development of policy to antibiotic usage is an important factor. Antibiotic utilization after introducing such policy has also been investigated and we wound the importance. After reading some of the papers related to the cost analysis we decided to do the cost for parenteral antibiotics in our closes hospital because the hospital management intervention system monitoring the budgetary cost for the annual PA usage will be a good practice to reduce the cost for health sector.

In Sri Lanka, we could not find any relevant data related to the cost analysis of the PA usage. Considering all these data we conducted a study to evaluate both the oral and PA usage at this tertiary hospital in Galle at different levels of outdoor, indoor. We included data collection in relation to identify the top ten drugs commonly used in parenteral and oral forms per this year and the data on the relationships between top ten for costly drugs with the top ten for totally consumed drugs per this year.

We also feel that intervention programme is needed to improve this situation to all health sector employers including the governing bodies. We should be ready with the significant data with relevant sections in the relevant places where the implementation is planned. Aiming to optimize antibiotic use, we had decided to do the data collection and evaluation to identify problematic fields in this tertiary hospital in our area.

Methods

Aggregate data for 2010 was collected using an instrument specifically designed and validated through a pilot model. The unit prize was obtained from Medical Supplies Division (MSD). We collected the data related to the drug
cost, drug consumption, drug usage, final stock, initial stock, identification of VEN category for every PA. Considering initial and final stocks of the each and every PA used during year 2010 was obtained from hospital pharmacy records. In addition to that quantity of drug received from MSD was also obtained for year 2010. Further, the quantity issued from the hospital to all wards and emergency units in the health care sector was calculated. Annual drug consumption for all considered PA was calculated for the year 2010. Drugs were allocated to different group according to the VEN analysis of the hospital drug utilization.

Baseline data obtained from hospital pharmacy records were tabulated in table 1A for top ten for consumption. Table 1A shows the usage of most of the ordered PA. It indicates the initial stock, final stock, quantity issued and quantity consumed for the year 2010. It also indicates that final stock for the most of the PA for year 2012 is zero for the most of the drugs except cefotaxime, meneropenem and ceftriaxone.

Table 1A indicates the initial stock, final stock, quantity received and quantity issued of individual PA considered for this study.

Baseline data for top ten for total costly drugs were also included in table 1B. It indicates the initial stock, final stock, quantity received, quantity issued and quantity consumed for the year 2010.

It also indicates that final stock for the most of the PA for year 2012 is zero for the most of the drugs except for vancopycin, merepenem and clarithromycin and cefotaxime.

Table 1B indicates indicates the initial stock, final stock, quantity received, quantity issued and quantity consumed for the year 2010 for this study.

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As we have prioritized the PA drugs according to the price we have calculated the total cost for the highly consumed PA for 2012 in this hospital. Table 2B indicates the data related to the unit prize, total cost and VEN categories of top ten costly parenteral antibiotics (TTTC) in 2010.

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After calculating the total cost for the top ten costly drugs we further analyzed the total cost of the top ten for higher consumed drugs. Figure 1 shows the different percentages of the cost values in the top ten costly PA lists in this hospital. Twenty two percent and 19% of the money had been spent for the purchasing of imipenum/cilastin infusion and meropenem respectfully.

Figure 1 indicates the percentage of individual drug cost out of the total cost for top ten.

Figure 2 indicates the percentage of utilization of total cost of TTTC for the PA top ten consumed drugs (TTCS) and the percentage utilization of total cost of TTTC for PA not included in TTCS.

Total Cost analysis in Parenteral Drugs

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Figure 1 indicates the percentage of individual drug cost out of the total cost for top ten.

Figure 2 indicates the percentage of utilization of total cost of TTTC for the PA top ten consumed drugs (TTCS) and the percentage utilization of total cost of TTTC for PA not included in TTCS.
This 22% of expenditure for TTTC has been utilized only for 3 drugs in TTTC. It is also important to note that there was not a single vital drug in TTTC in this hospital. Seventy eight percent of money had been used to order the drugs which are not in the top ten of the consumed.

Total Consumption Analysis of Parenteral Drugs

Figure 3 indicates the analysis of the total Consumption of the PA drugs in relation to the cost.

DISCUSSION

Our main objective was to find out the parental antibiotic usage according to the cost and the utilization pattern. By identifying this pattern in a government hospital sector we hoped to analyze the cost for PA which will be helpful to adjust the effective budgetary allocations to the hospital for the next year hoping to reduce health cost at least by 30%. Using the current data we like to recommend cost effective antibiotic orders for the institute to forthcoming year.

Our analysis showed that 22% of total cost of top ten of the total costly drugs was utilized only for 3 drugs included in top ten consumed in this hospital. We could not find a single vital drug (from VEN category) in TTTC in this hospital. In addition to that we found that 78% of the cost for top ten costly drugs had been utilized for less consumed expensive PA and significant percentage of high usage of imipenem and meropenem in this hospital for year 2010. Imipenem is a broad spectrum antibiotic which should be indicated for the treatment of mixed infections, and caused by multi resistant microorganisms, where therapeutic alternatives do not exist. It is a reserve PA for the terminal treatment strategy. This type of high usage can increase the irrational usage indiscriminately, elevating the costs of assistance and also it will expose patients to larger number of adverse effects with high incidence of bacterial resistance to this antibiotic, mainly among gram-negative bacilli that cause nosocomial infections.

There was another study reported the association between periods of elevation of the consumption of imipenem and the increase in the resistance of Pseudomonas aeruginosa not only to this antibiotic but also to other beta-lactams such as ceftazidime and piperacillin-tazobactam. [16] Our findings are compatible with the research findings related to the high costly PA usage. A study carried out at an academic hospital in Taiwan between 1991 and 2003 demonstrated an increase of 4.2, 5.1 and 801.3 times in the consumption of extended-spectrum cephalosporines, carbapenems and fluorquinolones, respectively. [15] The elevation in the consumption of cephalosporines and carbapenems demonstrated a significant association with the increase in the resistance of Actinobacter spp. to meropenem. [17]

This shows costliest drugs had been ordered for less usage. Because of these results it is needed to analyze clinical indications of costliest drugs and to seek for low cost generics or alternative antibiotics if possible. We understand that there is a need for better management strategies for the reduction of the inappropriate high costly parenteral antibiotic usage in this hospital.

Unfortunately, the present study was not able to address the cost benefits of this costly PA usage in this hospital and our next research extension is targeted to that area.

REFERENCES