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Short Communication

Pharmacology Section

Cost-analysis of the WHO Essential Medicines List in A Resource-Limited Setting: Experience from A District Hospital in India

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ABSTRACT

The World Health Organization (WHO) has been publishing the essential medicines list (EML) since 1977. The EML includes the most efficacious, safe and cost-effective drugs for the most relevant public health conditions worldwide. The WHO performs a cost-effectiveness analysis within each therapeutic group, but very little is known about which therapeutic groups are costliest for hospitals that adopt the WHO EML concept. In this study, we have described the annual consumption of medicines in a district hospital in India, that limited the list of available drugs according to the WHO EML concept. Only 21 drugs constituted 50% of the hospital spending. Anti-infective medicines accounted for 41% of drug spending, especially antiretrovirals which were used to treat HIV infection. Among other therapeutic groups, insulin had the highest impact on the hospital budget. We identified medicines used in perinatal care, which included anti-D immunoglobulin and lung surfactants, that were used rarely, but bore a relatively high cost burden. The results of this study indicate that, in district that adopt the WHO EML, antiretrovirals and antibiotics were the top therapeutic groups for the drug hospital budgets.

Keywords: Anti-infective agents, Budgets, Cost and cost-analysis, Essential drugs, World Health Organization

INTRODUCTION

In 1977, the World Health Organization (WHO) published the first Essential Medicines List (EML) and, since then, the list is being updated approximately every two years [1]. The WHO EML has been described as a peaceful revolution in international public health, because it presents the most efficacious and safe drugs for the most relevant public health conditions worldwide [2]. The intention behind the EML concept is intended to be flexible and adoptable to local situations [1]. The adoption of the EML concept by governments and non-governmental organizations (NGOs) has helped in obtaining a continuous supply of the most cost-effective medicines in developing countries [1].

The EML has been divided into 29 therapeutic groups of medicines, as per their pharmacological effects [2]. One of the most important aims of the EML is to reduce the cost of medical treatments in resource-limited settings, by using the most cost-effective medicines. However, a cost-effective analysis is performed only within each WHO therapeutic group [3]. Despite the fact that the EML has been published for more than 30 years, it is not well known what therapeutic groups are costliest for hospitals adopting the WHO EML concept in resource-limited settings. The objective of this study was to describe the annual costs of medicines in a district hospital in India that limited the number of available drugs according to the WHO EML. In particular, we wanted to analyzse what drugs and therapeutic groups carried the highest costs after adopting the WHO EML.

METHODS

The study was conducted in the RDT Hospital, Bathalapalli, which is a non-profit, 300-bed, secondary level care facility in a rural area of Anantapur, Andhra Pradesh, India. The hospital belongs to an NGO called Rural Development Trust, and provides free consultation and medicines at reduced costs to people of low socioeconomic status. In 2010, the hospital adopted the policy of limiting the list of available drugs, according to the WHO EML concept [4]. For that, a local formulary was created and all departments of the hospital implemented clinical protocols for the treatment of the most common diseases in the area by using exclusively medicines which were included in the formulary.

For this study, we collected information from the hospital database, of all medicines which were issued in the hospital pharmacy from January 11th 2011 to January 10th 2012. During this period of time, the hospital had 325,463 outpatient visits and 20,331 admissions, with an average stay of 4.35 days. We analyzed the total costs and the utilization of the medicines by WHO EML therapeutic groups. A Cost-analysis of the individuals drugs that comprised 50% of the drug expenditure, was also performed. The study was approved by the hospital's ethical committee.

RESULTS

The total annual medicine expenditure was 25,784,681.42 INR (USD 416,474.17 at the rate of 1 USD = 61.91 INR). Cost-analysis studies by WHO EML therapeutic groups is presented in [Table/Fig-1]. Anti-infective medicines had the highest costs, followed by solutions correcting water, electrolyte and acid-base disturbances; hormones, other endocrine medicines and contraceptives; gastrointestinal medicines; immunologicals; and medicines affecting the blood. Among anti-infective medicines, antiretrovirals and beta-lactam antibiotics had the highest impact on the hospital budget [Table/Fig-2].

Only 21 drugs constituted approximately 50% of the total expenditure [Table/Fig-3]. Lopinavir/ritonavir, amoxicillin/clavulanic acid, atazanavir, insulin, and normal saline accounted for 6.2%, 6%, 4.6%, 4.4%, and 3.9% of the hospital drug budget, respectively. Four drugs, anti-D immunoglobulin, hepatitis B immunoglobulin, natural phospholipids and dalteparin (a low molecular weight heparin), bore a high costs despite the fact that they were rarely used.

DISCUSSION

To the best of our knowledge, this is one of the first studies to analyzse the costs of the WHO EML in a resource-limited setting. Almost 41% of drug spending is allocated to anti-infective medicines. This finding

is in clear contrast to the situation in developed countries, where the therapeutic groups with highest expenditure are cardiovascular, oncological, respiratory and psychiatry medicines [5].

Due to concerns about their costs, antiretrovirals which to treat HIV infection were not included in the WHO EML until 2002 [1]. The results of this study confirmed that antiretrovirals bear the highest costs for the WHO EML. However, HIV is a communicable disease and a major public health problem in low and middle-income countries, and recent studies have demonstrated a reduction in HIV transmission in areas where the roll-out of antiretroviral therapy has been successfully implemented [6,7].

In this study, oral antidiabetic drugs, such as metformin and glibenclamide, were frequently prescribed, but they did not have a big impact on the drug budget due to their low costs. However, insulin had the highest cost among non-anti-infective drugs. Insulin is necessary to treat diabetic patients with a poor metabolic control, chronic renal failure or pancreatic exhaustion [8]. However, the results of this study suggest that many diabetic patients in resource-limited settings might not be able to afford insulin.

We found that two drugs from the WHO EML involved in perinatal care (anti-D immunoglobulin and lung surfactant), were used rarely, but carried a high cost to the hospital. The inclusion of these drugs in the WHO EML was performed, based on evidence obtained from studies done in developed countries [9,10]. However, due to their high costs, it would be desirable to perform cost-effectiveness analysis of these medicines in low or middle income countries, in order to decide whether these medicines are a public health priority or should be reserved for tertiary care centres.

S. No.	WHO therapeutic groups	Cost (%)	Utilization* (%)
1	Anti-infective medicines	40.7	15.22
2	Solutions correcting water, electrolyte and acid-base disturbances	8.65	1.76
3	Hormones, other endocrine medicines and contraceptives	7.48	9.38
4	Gastrointestinal medicines	5.41	10.83
5	Immunological	5.39	0.022
6	Medicines affecting the blood	5.18	12.65
7	Vitamins and minerals	4.79	21.59
8	Medicines acting on the respiratory tract	4.62	1.65
9	Analgesics, antipyretics, NSAIMs, medicines used to treat gout and DMARDs	3.77	11.78
10	Anticonvulsants/antiepileptics	2.62	5.35
11	Cardiovascular medicines	2.43	4.86
12	Specific medicines for neonatal care	2.19	0.0024
13	Anaesthetics	1.71	0.24
14	Antiallergics and medicines used in anaphylaxis	1.03	2.2
15	Dermatological medicines (topical)	0.79	0.099
16	Diuretics	0.66	1.02
17	Ear, nose and throat conditions in children	0.65	0.14
18	Muscle relaxants (peripherally-acting) and cholinesterase inhibitors	0.57	0.035
19	Antineoplastic, immunosuppressive and medicines used in palliative care	0.57	0.07
20	Oxytocics and antioxytocics	0.53	0.42
21	Antidotes and other substances used in poisonings	0.22	0.05
22	Medicines for mental and behavioral disorders	0.08	0.5
23	Ophthalmological preparations	0.07	0.01
24	Anti parkinsonism medicines	0.01	0.024

[Table/Fig-1]: Cost-analysis by therapeutic groups

*Quantity of items dispensed. NSAIMs, non-steroidal anti-inflammatory medicines; DMARDs, Disease-modifying antirheumatic drugs; WHO, World Health Organization

The study has some limitations. Three therapeutic groups from the WHO EML were not included in the analysis (blood products and plasma substitutes; diagnostic agents; and disinfectants and antiseptics) because they were not dispensed through the pharmacy of the hospital and we did not have information about the costs of these products during the study period. In addition, the results of this study cannot be generalized to tertiary care hospitals, where the presence of specialties not present in our hospital, such as Oncology or Psychiatry, may increase the costs of other therapeutic groups.

Anti-infective medicines	Utilization (count)	Utilization (%)	Cost (INR)	Cost (%)
6.1 Antihelmintics				
06.1.1 Intestinal anthelminthic	14172	0.11	20905	0.08
06.1.2 Antifilarials	1898	0.01	498.2	0.00
06.1.3 Antischistosomals and antitrematode medicine	441	0.01	1473.7	0.00
6.2 Antibacterials				
06.2.1 Beta Lactam medicines	485565	3.62	2831718	10.81
06.2.2 Other antibacterials	805746	6	1446202	5.52
06.2.3 Anti leprosy medicines	4464	0.03	1377.1	0.00
06.2.4 Antituberculosis medicines	312008	2.32	1147477	4.38
06.3 Antifungal medicines	28020	0.21	196037	0.75
06.4 Antivirals				
06.4.1 Antiherpes medicines	8544	0.06	146107.8	0.56
06.4.2 Antiretrovirals				
06.4.2.1 Nucleoside reverse transcriptase inhibitors	163323	1.22	1240333	4.74
06.4.2.2 Non-nucleoside reverse transcriptase inhibitors	40211	0.23	337621.6	1.29
06.4.2.3 Protease inhibitors	153845	1.15	2958152	11.3
06.5 Anti-protozoal medicines	16848	0.13	124995.6	0.48

[Table/Fig-2]: Cost-analysis of anti-infective medicines

S. No.	Drug	Cost (INR)	Utilization (count)	Total cost (%)
1	Lopinavir + ritonavir	1,376,529.2	63532	6.2
2	Amoxycillin + clavulanic acid	1,349,056.2	99520	6.0
3	Atazanavir	1,022,714.10	44156	4.6
4	Insulin	992,516.1	9600	4.4
5	Sodium chloride solution	870,948.8	70706	3.9
6	Anti-D immunoglobulin	678,161.3	340	3.0
7	Rifampicin + isoniazid + pyrazinamide + ethambutol	608,091.0	134553	2.7
8	Salbutamol	599,319.3	191169	2.7
9	Ritonavir	558,907.9	46157	2.5
10	Lactated Ringer's solution	530,885.2	35658	2.4
11	Hepatitis B immunoglobulin	517,440	105	2.3
12	Cefixime	472,191.7	128245	2.1
13	Paracetamol	456,716.2	792353	2.0
14	Sulfamethoxazole + trimethoprim	453,546.1	465308	2.0
15	Lung surfactant	446,880	52	2
16	Calcium + vitamin D3	410,276.9	1778746	1.9
17	Tenofovir + lamivudine	396,110.5	44057	1.8
18	Glucose + sodium chloride solution	377,446.3	28795	1.7
19	Dalteparin	362,668.2	135	1.6
20	Heparin sodium	355,247.3	2798	1.6
21	Omeprazole	342,821.5	761181	1.5

[Table/Fig-3]: Individual drugs with highest cost ordered by annual expenditure

CONCLUSION

This is one of the first studies to describe the drug spending in a hospital from a resource-limited setting after adopting the WHO EML. Anti-infective medicines contributed the highest expenditure to the hospital, especially antiretrovirals. Among non-anti-infective medicines, insulin was the drug with the highest cost.

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