

# Cost of Pediatrics Drug Therapy Services at Ministry of Health in Saudi Arabia

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## ABSTRACT

**Objectives:** The aim of this study is to explore the estimation cost of delivery drug therapy services for pediatrics by using American Model with local cost in the Kingdom of Saudi Arabia. **Methods:** It is a cross-sectional 6-months analysis of drug distribution services for pediatric conducted in 2016. It was at 300-bed maternity and pediatrics Hospital in Riyadh, Saudi Arabia. The cost was calculated pediatrics drug therapy management services delivered to 55 beds. The physician prescribed the medications. The pharmacist reviewed and prepared drugs and distributed through unit dose system, floor stock distribution and discharge medications services. The medications were prepared through ASHP standards and facilities. The fast moving oral and topical medications were included in the study. The cost model was calculated based on variable expenses including personal cost, material and supply cost. Fixed cost was including direct cost, non-salary cost and overhead cost. All cost was used of US dollar currency and local prices. **Results:** The estimated cost of delivery of drug therapy services for all total number pediatrics beds per day was (1,214.68 USD). It consisted of three types; the unit dose system (771.89 USD), drug floor stock distribution system (350.32 USD) and discharge medication services (92.47 USD). The majority of cost came from overhead cost in floor stock services and discharge medication delivery; compared to the personal cost in unit dose services delivery. The total estimated annual expenditures of Drug distribution services were (443,358.20 USD). The highest budget expenditures from unit dose services 63.55% (281,739.85 USD), followed by floor stock medication delivery 28.84% (127,866.80 USD) and discharge drug therapy 7.61% (33,751.55 USD). **Conclusion:** The estimation cost of delivery pediatrics drug therapy is the first study in the Middle East, Gulf countries and Saudi Arabia. It is basic element of cost calculation of pediatrics-related health care services.

**Key words:** Cost, Pediatrics, Drug, Therapy, Services, Ministry of Health, Saudi Arabia.

## INTRODUCTION

Information on cost of health services in emerging countries including Saudi Arabia is infrequent. Such information can possibly be used for development of health services. A cost analysis of the prevailing health care system also helps in classify inadequacies of the system.<sup>1</sup> The update is about pharmacy strategic plan with New Saudi vision 2030 in late 2018.<sup>1</sup> The plan consisted of five strategic goals and more than ninety projects. The pharmacoeconomic concept is one of the primary goals in the strategic plan.<sup>1</sup> Several services had been included in the economic goal including but not limited to the cost analysis of all pharmacy services, cost avoidance of pharmacist and pharmacy services, healthcare insurance of medications.<sup>1</sup> The prices of pediatrics medications are well established by the Saudi Food and Drug Authority in the Kingdom of Saudi Arabia. However, the cost of pharmacy services, the cost of pediatric illness, or cost drug distribution services for pediatrics was not well established yet. Actual costs of various components of health care delivery system are often not available in emergent countries. This is because budgetary necessities cover only the recurrent expenses like salary and drugs but do not reflect the investments previously done in the form of infrastructure and equipment. The healthcare system is changing to privatization its requirement to

calculate everything of Health services by cost.<sup>2</sup> To calculate income and economical outcome and earning system. Based on the pharmacy plan, several local investigations released of a cost analysis of several services including pediatrics total parental nutrition, cost analysis of drug information services, cost of adults clinical pharmacy services.<sup>3-6</sup> However, medications distribution system services are not well established yet in pediatrics. The drug distribution system for pediatrics consisted of three types implemented at ministry of health institutions. Drug distribution to the discharge patients, drug distribution as a unit dose system and drug distribution as floor stock system.<sup>7,8</sup> The authors based on best of their knowledge are not familiar with publications of a cost analysis of pediatrics drug distribution services in Saudi Arabia or Gulf and Middle East countries.<sup>9-11</sup> The aim of this study is to explore the pediatrics drug distribution system in the Kingdom of Saudi Arabia.

## METHODS

It is a cross-sectional 6-months analysis of drug distribution services for pediatric patients conducted in 2016. It was at 300-bed maternity and pediatrics hospital in Riyadh, Saudi Arabia. The cost analysis consisted of three domains. Domain 1; the cost of delivery of adult's drug therapy

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management with 144 beds. Domain 2; the cost of delivery of pediatrics drug treatment services with 55 beds. Domain 3; the cost of delivery for neonate's therapy services with 82 beds. The study was conducted at pediatrics and maternity hospital ambulatory care patient. The hospital had 2801 bed capacity and consisted of maternity and operation related pediatrics section. It had a different type of pediatrics specialties for instant pediatrics endocrinology, pediatric neurology, pediatric infectious disease. The hospital had neonatal critical care and critical maternity sections. The pharmacy distributed the medication through a unit dose system responded to electronic prescriptions. The pharmacy had provided the services 24x7 to hospital sections. The pharmacy had inpatient and outpatient pharmacy, big extemporaneous preparation section and active medications safety officer. The pharmacy had a drug information center and patient education clinic as part first clinical pharmacy services at the hospital. For each domain, the physician prescribed the medications. The pharmacist reviewed and prepared drugs and distributed through the unit dose system, floor stock distribution and discharge medications. The nurse administered drugs and followed up with doctors. The medications were prepared through American Society of Health-System Pharmacist (ASHP) standards and facilities. The oral and topical ready to deliver drugs included in the study while sterile product and compounding formulations were excluded from the study. The cost was derived from ministry of health information database. The cost model was calculated based on variable expenses including personal cost, material and supply cost. Fixed costs including direct cost, non-salary cost and overhead cost.<sup>12</sup> All price was used US dollar currency and local prices. This study analyzed the two domains. The format analyzed through the Microsoft Excel sheet.

## RESULTS

The estimated daily cost of pediatrics' unit dose drug distribution system for all total pediatrics 55 beds was (771.89 US) and (5.29 USD) per bed. The estimated daily cost of adult's floor stock drug distribution system for all total pediatrics 55 beds was (350.32 US) and (2.43 USD) per bed (Table 1). The majority of cost came from overhead cost (57.36%) and personal cost (23.84 %) (Table 2). The estimated daily cost of pediatrics' discharge medication services for all total 15 pediatrics discharge was (92.47 US) and (6.16 USD) per patient. The majority of cost came from overhead cost (75.24%) and non-salary cost (19.30%) (Table 3). The cost of delivery of medicines to single bed per day was (13.96 USD) with

**Table 1: Cost analysis of pediatrics unit dose drug distribution system.**

Type of Cost	Content of Items	unit dose system Cost (USD)	Percent
Personal cost	Salaries of Physicians, pharmacist and nurses	505.55	65.50%
Over Head cost	Rent, Bed, Computer, Zebra label printer (Direct Thermal), Equipment: Refrigerator Medication trolley, shelves, creaser and Chairs	200.93	26.03%
Material and Supply cost	Average cost of empty zip lock bag small and big.	2.93	4.69%
Non Salary cost	Education and Training Inpatient pharmacy resources	62.48	8.09%
Total cost (USD)		771.89	

**Table 2: Cost analysis of pediatrics floor stock drug distribution system.**

Type of Cost	Content of Items	drug floor stock distribution system Cost (USD)	Percent
Personal cost	Salaries of Physicians, pharmacist and nurses	83.52	23.84%
Over Head cost	Rent, Bed, Computer, Zebra label printer (Direct Thermal), Equipment: Refrigerator Medication trolley, shelves, creaser and Chairs	200.93	57.36%
Material and Supply cost	Average cost of empty zip lock bag small and big.	3.39	5.43%
Non Salary cost	Education and Training Inpatient pharmacy resources	62.48	17.84%
Total cost (USD)		350.32	

**Table 3: Cost analysis of pediatrics Discharge Medication services.**

Type of Cost	Content of Items	Adults Discharge Medication services Cost (USD)	Percent
Personal cost	Salaries of Physicians, pharmacist and nurses	2.49	2.69%
Over Head cost	Rent, Bed, Computer, Zebra label printer (Direct Thermal), Equipment: Refrigerator Medication trolley, shelves, creaser and Chairs	69.57	75.24%
Material and Supply cost	Average cost of empty zip lock bag small and big.	2.56	14.34%
Non Salary cost	Education and Training Inpatient pharmacy resources	17.85	19.30%
Total cost (USD)		92.47	

the highest estimated cost of delivery from discharge medication (6.16 USD), followed by unit dose services (5.36 USD) and floor stock therapy (2.43 USD). The total estimated annual expenditures of drug distribution services were (443,358.20 USD). The highest budget expenditures from unit dose services 63.55% (281,739.85 USD), followed by floor stock medication delivery 28.84% (127,866.80 USD) and discharge drug therapy 7.61% (33,751.55 USD) (Table 4).

## DISCUSSION

The pediatrics drug distribution system according to the standards of the accreditation body and international pharmacy society implemented through many hospitals in the Kingdom of Saudi Arabia.<sup>8</sup> The unit dose drug distribution system and other type of drug delivery started implementation in the 1980s at King Khalid University Hospital and King Faisal Hospital and Research center.<sup>13</sup> The exact date of pediatrics drug distribution system implementation at MOH was not definite. The New

**Table 4: Cost analysis of comparisons of all Medication distribution services.**

No	Method of drug delivery system	Cost per day	Cost per bed per day	Total cost per bed annually	Cost percent
1	Unit dose drug distribution system Cost (USD)	771.89	5.36	281,739.85	63.55%
2	Discharge Medication services Cost (USD)	92.47	6.16	33,751.55	7.61%
3	Drug floor stock distribution system Cost (USD)	350.32	2.43	127,866.80	28.84%
	Total cost (USD)	1214.68	13.96	443,358.20	

automation drug distribution services implemented over several Ministry of Health hospitals and Non-MOH governmental organizations.<sup>8</sup> However, the cost analysis of pediatrics drug distribution system was not determined. In the current study showed the high estimated cost came from the unit dose system that's related the high number of personal staff working related cost and the equipment requirement for the unit services. The other pediatrics drug distribution was floor stock system because it required the equipment and personnel related cost. While the least costly type of drug distribution services was discharge drug distribution similar to the previous studies<sup>9,11</sup> and higher than other study due to different site setting,<sup>10</sup> that is a related number of patients few if compared with the number of beds. In the highest estimated was unit dose system cost with high personal cost while floor stock system similar to previous study,<sup>12</sup> while discharge distribution services the majority of the cost came from overhead cost because they do not need higher of staff while the unit dose system they required a higher number of staff with results of higher personal cost. This is a new investigation about cost analysis of pediatrics drug distribution services in the Kingdom of Saudi Arabia. More data is needed on cost of health services from dissimilar types of hospitals in the public sectors to reach at a good approximation of cost of public health services in the country. The periodical estimated the cost of pharmacy services, including medications distribution services, is highly recommended in Saudi Arabia to meet the new Saudi vision 2030.<sup>2</sup>

## CONCLUSION

The estimation cost of delivery pediatrics drug therapy is the first study in the Middle East, Gulf countries and Saudi Arabia. It is basic element of cost calculation of pediatrics-related health care services.

## ACKNOWLEDGMENT

None.

## CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

## ABBREVIATIONS

**MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **USD:** United State Dollars; **ASHP:** American Society of Health-System Pharmacist; **CBAHI:** Saudi Center of Healthcare Accreditation.

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