Efficiency Fast-Moving Drug Plan with Reorder Point Intervention at a Private Hospital in Bandung

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Abstract

Drug supplies are the major portion of the hospital expenses. The rising of drugs cost directly affect the total expenses of the hospital. Thus, their procurement, especially for fast-moving drugs, should be managed effectively. This study aimed to examine the efficiency of fast-moving drug plan after reorder point (ROP) intervention at a private hospital in Bandung. We conducted a pre-experimental study and used turn-over ratio (TOR) as a parameter. Data were taken from the stock of antibiotics in May-June of 2013 and May-June 2014. Cost components were collected; included the amount of stock, the cost of goods sold, and daily drug use. We did pre-test and post-test analysis to check the efficiency of intervention. The results showed that ROP intervention increased the efficiency of fast-moving drug plan. The comparison of pre- and post- intervention resulted a lower inventory value and a greater TOR value. We concluded that the increase in efficiency will eventually require a smaller budget of drug expenses.

Keywords: Antibiotic, fast moving, efficiency, reorder point, turn-over ratio

Introduction

Hospital pharmacy services are inseparable parts of the hospital health care system. These services are based on the quality of drugs and affordable services. The quality of drugs is produced from a good procurement by pharmacist. In developing countries, pharmaceutical purchases represent the single largest health expenditure after personnel cost, they usually spent 40-50% of the hospital expenses.[1,2]

Procurement for antibiotics is an important part of efficient drug management and supply. An effective procurement ensures the availability of the right drugs in the right quantities, available at the right time, for the right patient, at reasonable prices, and recognizable standards of quality.[3] The stock systems that support sufficient products for each department are needed. However, overstock causes more financial problems and spends more time to resolve. Conversely,

drug shortages may unpleasantly affect drug treatment, delay medical processes, and result in medication error.[4] Many causes of drug shortages were described, including unexpected demand or natural disasters.[5] Thus, overstock and insufficient stock should be prevented.[6]

The efficiency of antibiotics procurement in a hospital can be arranged by TOR calculation.[7] TOR is a critical performance metric to assess the effectiveness of inventory management. It is so extensively used as a diagnostic tool; hence, it is imperative that inventory turnover needs to be calculated using appropriate and valid techniques. It can be considered efficient if the capital turnover of inventory is equal or reach the value range of 10-23/year.[7] On the other hand, ROP is the basic approach method in the procurement process of antibiotics.[7,8]

Infectious diseases are still the highest ranks of the cause of illness in developing countries.[9] Many cases of infections that occur in hospitals are nosocomial infections[10] that need antibiotics for the treatment. This study aimed to examine the efficiency of fast-moving drug plan after reorder point (ROP) intervention at a private hospital in Bandung. Antibiotics are fast-moving drugs because they are widely prescribed and mostly used to cure various infections.

Methods
This research is a pre-experimental design by employing two groups; pre-test with TOR (May-June 2013), ROP intervention (April 2014), post-test with TOR (May-June 2014). The data were statistically analyzed.

Study Population
The population was all drugs used at Pindad General Hospital Bandung. The drug use and financial data were observed in periods of May-June 2013 and May-June 2014. Inclusion criteria were:
1. Antibiotic with the most frequently prescribed (fast-moving) at pharmacy of Pindad General Hospital Bandung
2. Its use was more than or equal to 1000 pieces per month

Research Procedures
1. Pre-test
   TOR value was calculated using following formula:
   Inventory TOR = cost of goods sold/inventory average
2. ROP Intervention
   ROP value was calculated using following formula:
   ROP = daily drug needs x order waiting time (day)
3. Post-test
   TOR value was calculated.

Statistical Analysis
Data were statistically analyzed by paired t-test SPSS.

Results and Discussion
There were 16 antibiotics with a large average of use 200 per month, but we only

Table 1. Fast-Moving Antibiotic

Drug	Dosage Form	Average Monthly Use
Amoxicillin 500 mg	Tablet	1302
Cefadroxil 500 mg	Capsule	1672
Cefixime 100 mg	Capsule	1340

Table 2. TOR Value of Fast-Moving Antibiotic before the Research, June 2013

Fast-Moving Antibiotic	Week-	Number of Use (1)	Average of Inventory (Rp) (2)	Cost of Goods Sold (Rp) (3)	TOR (4) = (1)X(3)/(2)
Amoxicillin 500 mg	1	830	510692		0.52
	2	500	523411		0.31
	3	300	448224	322	0.22
	4	200	183379		0.35
Cefadroxil 500 mg	1	520	914.742		0.46
	2	700	1315242		0.43
	3	600	1635642	801	0.29
	4	602	1811061		0.27
Cefixime 100 mg	1	553	2484543		0.47
	2	360	3474528		0.22
	3	300	3056179	2129	0.21
	4	198	2090678		0.20

used 3 antibiotics that have been used more than 1000/month. The drug data are provided in Table 1.

Inventory Value and TOR Pre-Intervention (Pre-test)
TOR value was calculated and the result is provided in Table 2.

The TOR value of all antibiotics is 0.2-0.5/ week, or approximately 9.6-24/year. We compared our result with previous studies that showed TOR value ranges 7.25-10.67 or 10-23/year means there is no overstock of drugs.[7,11-12]

ROP calculation
ROP value was calculated and the result is provided in Table 3.

Procurement will be carried out when the inventory has reached the ROP point, for example when the Amoxicillin 500 mg stock has reached 962 tablets, it will be ordered according to the plan. ROP intervention is done in order to avoid gaps or excess stock that can be detrimental to hospitals. This determination will continue to maintain both the availability of antibiotic despite an increase in usage and delay in delivery of antibiotics.

Table 3. ROP Value for Fast-Moving Antibiotics

Fast-Moving Antibiotic	Lead Time (Day) (1)	Daily Use (2)	Safety Stock (3)	Reorder Point (1) X(2)+(3)
Amoxicillin 500 mg	1	43	919	962
Cefadroxil 500 mg	1	56	267	323
Cefixime 100 mg	1	45	662	706

Table 4. TOR Value of Fast-Moving Antibiotics

Fast-Moving Antibiotic	Week-	Number of Use (1)	Average of Inventory (2)	Cost of Goods Sold (Rp) -3	TOR (4) = (1)X(3)/(2)
Amoxicillin 500 mg	1	349	314111		0.36
	2	278	349853	322	0.26
	3	563	342125		0.53
	4	478	266616		0,58
Cefadroxil 500 mg	1	478	445756		0.86
	2	273	46458	801	0.47
	3	723	386883		1.49
	4	624	536670		0.93
Cefixime 100 mg	1	468	1286980		0.77
	2	429	1821359	2129	0.50
	3	1220	2660185		0.98
	4	445	2354674		0.40

Inventory Value and TOR Post-Intervention (Post-test)
TOR value was calculated and the result is provided in Table 4.

The TOR value ranged 0.26-1.49/week or 13.92-71.52/year which means the inventory was efficient. Moreover, TOR value of pre- and post- intervention data were calculated.

Comparison of Inventory Value and TOR, Pre- and Post- Intervention
The TOR value was calculated and the result is provided in Table 5.

Data showed that TOR value increase in all antibiotics, except in Amoxicillin 500 mg at week 1 and week 2. TOR value in June 2014 was significantly increase and it showed a

Table 5. TOR Value Comparison of Fast-Moving Antibiotic, Pre- and Post- Intervention

Fast-Moving Antibiotic	Week-	TOR, Pre-	TOR, Post-
Amoxicillin 500 mg	1	0.52	0.36
	2	0.31	0.26
	3	0.22	0.53
	4	0.35	0.58
Cefadroxil 500 mg	1	0.46	0.86
	2	0.43	0.47
	3	0.29	1.49
	4	0.27	0.93
Cefixime 100 mg	1	0.47	0.77
	2	0.22	0.50
	3	0.21	0.98
	4	0.20	0.40

better efficiency of procurement.[10] Planning and procurement after the intervention get a lower inventory value and a greater TOR compared to before the intervention. The greater TOR value after this intervention occurred because the average value of the supply of each drug in this study became smaller than the average inventory before the intervention. This increase in efficiency is due to the low inventory value which will require a smaller budget as well. Thus, it can be concluded that the ROP intervention is effective in improving the efficiency of managing fast-moving drugs at Pindad General Hospital Bandung.

Conclusion

Based on the results of research we concluded that:

1. Drug plan with ROP intervention in June 2014 at Pindad General Hospital Bandung could improve the efficiency of drug management.
2. The efficiency of the fast-moving antibiotic increased by decrease the inventory value and increase TOR.

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Conflict of Interest

None declared.

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