



Title: Assessment of warehousing and inventory management performance after HCMIS implementation in TASH.

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Background: The health commodity management information system (HCMIS) has been implemented in Ethiopia to serve the country's public health commodity supply chain since 2009. It is claimed to improve health commodities management, data visibility and the overall performance and can be used by personnel of various backgrounds including those with limited computing experience. In order to improve its supply chain process, Tikur Anbessa Specialized Hospital (TASH) implemented this system in 2017. However, there is no evidence thus far on changes in the performance of the warehouse and inventory management practices since the implementation of the HCMIS. zzzz

Methods: Mixed method research designs using quantitative and qualitative methods were used in this study. For the quantitative part, facility based retrospective method was applied to survey data for the years 2015/2016 and 2017/2018. Qualitative interview method was used to assess associated factors which support and challenge the performance of warehousing and inventory management using in-depth interview method with purposively selected key informants, and observational method was also used. The collected quantitative data was entered and analyzed using Microsoft excel and SPSS version 20 computer software while the qualitative data was thematically analyzed manually.

Result: The current study revealed a well utilized warehouse system following the implementation of the HCMIS. The warehouse however had inadequate space and limited resource allocated to it. It was also found there was a significant improvement in order fill rate, line fill rate, inventory turnover rate, stock wastage amount and rate, and order turnaround time with percentage improvements of 14.06%, 4.48%, 42.85%, 50%, 1.25%, and 26.1% respectively following HCMIS implementation. Qualitative investigation revealed that the HCMIS had brought many advantages through real time data visibility and information sharing. Limitations of the HCMIS were external ownership issues and the inability to manipulate the system fully. Additional challenges to the pharmacy service identified by the study participants were the inaccessible warehouse location and manual auditable pharmaceutical transaction services (APTS) adopted by the hospital.

Table 5.2 comparison of two years performance measurement in TASH warehouse

HCMIS	Performance indicators					
	Order fill rate (%)	Line fill rate (%)	Inventory turnover rate	Wastage rate (%)	Wastage amount (%)	Order turnaround time (days)
Before implementation	70.56	82.38	3.78	0.058	3.85%	3.45
After implementation	84.62	86.86	5.4	0.029	2.60%	2.55
% improvement	14.06%	4.48%	42.85%	50%	1.25%	26.1%

The study also showed that improvement in the time required to process orders from different pharmacy outlets (figure 5.6).

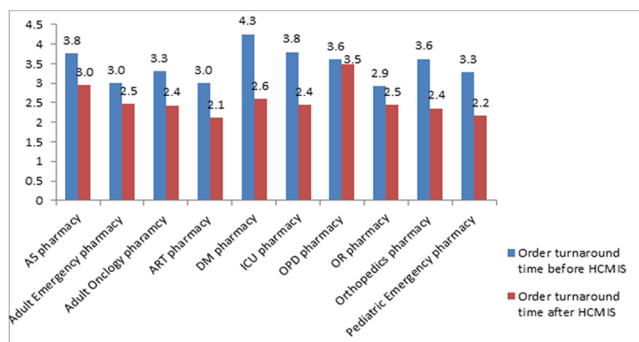


Figure 5.6 Order turnaround time before and after HCMIS implementation for the pharmacy outlets

It's found that a one-tailed paired sample T-test revealed that warehousing and inventory management performance has improvement after HCMIS implementation when compared to before the implementation of HCMIS in TASH (Table 4).

Indicators	Mean(m)	Standard deviation(s)	t	df	p-value
Order fill rate after HCMIS	84.62	4.85			
Order fill rate before HCMIS	70.56	4.47	8.637	9	<.0005
Line fill rate after HCMIS	83.928	1.73	2.281	9	.024
Line fill rate before HCMIS	81.05	4.15			
Order turnaround time after HCMIS	2.547	.401	-6.247	9	<.0005
Order turnaround time before HCMIS	3.45	.427			
HCMIS					
Inventory turnover rate after HCMIS	.9012	.0402	10.089	5	<.0005
Inventory turnover rate before HCMIS	.633	.0344			
HCMIS					
Wastage rate after HCMIS	.0049	.00190	-2.613	5	.024
Wastage rate before HCMIS	.0098	.00545			
Wastage amount after HCMIS	.4398	.096	-5.385	5	.0015
Wastage amount before HCMIS	.6384	.048			

Discussion:

The study found wastage value costing of 2,870,413.89 ETB (with wastage rate of 0.029) after the implementation was significantly lower (mean = 0.0049, SD= 0.00190) when compared to before the implementation of HCMIS value costing 4,831,847.16 ETB (with wastage rate of 0.058) (Mean = 0.0098, SD = 0.00545, t(5) = -2.613, p = 0.024) which is utmost to TASH, because it is explained as; apart from hampering therapeutic benefits, the financial burden resulting from medicines wastage (expiry) is very huge (MSH, 2012). It is still important to decrease further medicines expiry to optimize overall financial loss incurred and to compromise frequent stock out of pharmaceuticals in the TASH which in turn would have a positive implication for the achievement of HSTP target of below 2% average rate of medicine wastage in Ethiopia (FMOH, 2015).

Inventory turnover rate which is a significant increment after the implementation of HCMIS, (mean = 0.9012, SD = 0.0402) compared to before the implementation (mean= 0.633 and SD = 0.034, t(5) = 10.089, p= <0.0005). This is supported in study conducted by Rossetti, (2008) presented a large amount of inventory in a traditional healthcare supply chain, resulting in a relatively small number of deliveries and consequently low transportation and ordering cost but high inventory holding cost. The study revealed that statistically significant decrement after HCMIS implementation in order turnaround time (mean = 2.547, SD = 0.401) when compared to (mean =3.45, SD = 0.42, t(9) = -6.247, P = < 0.0005). Though decrement was seen for each pharmacy outlets, overall there was a decreased processing time from 3.45 to 2.55 days. This is in line with study conducted by Hui Nee Au Yong (2009) that warehouse management system (WMS) provided better workload control for view of completed and upcoming activities. An average incoming cycle has been reduced from average 3.71 days to 1.02 days which was observed that the lead-time has been reduced by 73% in the period.

Conclusion:

The HCMIS has improved the warehousing and inventory management of TASH. However the system needs to be linked to the pharmacy units and fully controlled and managed by the hospital in order to reap the full benefit of the system. It requires automating and integrating the manual, time consuming and tedious APTS in the pharmacy outlets and other hospital units with HCMIS. Also need to investigate on hospital supply chain process mapping, analyze key warehouse resources utilization, Modeling Hospital pharmaceutical Management Processes, and the impact of warehouse management system on hospital service quality; as quality health care services deal with life than merely financially productive.

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