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Logistics Support for the Ambulance Services at Industrial City Qatar

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ABSTRACT---- ***In order to plan for logistics needs, data regarding availability of logistics and consumption of logistics is required. Disposable logistics needs are adjusted to meet the minimum standards required by the ambulance unit, both for medicine and supplies. AIM: We are conducting this research mainly for field experience in analyzing ambulance logistics systems at Industrial City locations Qatar as well as for referral purposes and emergency response purposes. Method: Logistics data reports will provide information and facilitate decision-making at various levels of detail. Result: Logistics support for ambulance services consisted of the following activities: (1). Presenting stock inventory report; (2) Predicting logistics availability; (3) Reporting estimation size of logistics; and (4) Reporting analysis stock availability. Conclusion: A logistics information system for Ambulance services can be seen in the fact that it provides decision-makers with information for the purposes of procurement, purchasing, storage, and distribution of logistics to users. Recommendations: The availability of a logistics information system, which will increase the capacity of ambulance services, is expected to improve the capacity.***

Keyword--- Ambulance services, Ambulance nurses, Paramedics, Stock on hand, stock consumed report, Point – reorder.

1. INTRODUCTION

Qatar is a country on the Arabian Peninsula that geographically shares land borders with the King Saudi Arabia, and sea borders with Bahrain, Uni Emirate Arab, and Iran. Qatar is a country in the form of a kingdom, with the Emir as the head of state and Doha as the country's capital. Arabic is the official language and English is the second language used in government facilities, communication with immigrants, and professional workers [1].

Qatar has 3 industrial city areas as a place for oil and gas processing. One of the industrial city areas in Qatar is RLC. RLC has an area of 4500 hectares, is the largest natural gas producer in the world, supported by ports and the development of power plants and drinking water. The number of employees who work in the RLC industrial city is around 15,000 people and the majority live in camps provided by contractors or companies supporting the RLC industrial city[2].

The RLC industrial city has 1 main Healthcare Center, 2 supporting satellite clinics, several company clinics, and 4 Ambulance stations. Ambulance services in the industrial city of RLC operate 24 hours, with a fleet of 4 units and a total of 39 personnel staff Ambulances from several different countries. Ambulance services required setting staff work schedules and logistics planning. In logistics planning, data on the availability of logistics and the consumption of logistics are needed. Disposable logistics needs are adjusted to the minimum standards required by the ambulance unit, both medicines, and disposable supply. Ambulance operations required adequate logistical support and skilled ambulance personnel [3].

Logistics data is needed to formulate logistics replacement requests through the existing logistics system, while the average usage data is not evaluated effectively. Logistics delivery from the logistics warehouse takes 1 day, and if the request falls on a weekend, the logistics delivery takes the next 2 days [4].

2. PURPOSES OF THE RESEARCH

The general purpose of this research is to gain field experience on how to analyze the logistics system of ambulance services, for referral needs and for emergency response purposes at one of the Qatar Industrial City locations. The specific objectives of this research are as follows: (1) Gain experience in how to display the availability and use of logistics data needed in Ambulance services in Qatar Industrial City; (2) Gaining field experience in explaining how to analyze the availability and use of logistics data needed in Ambulance services in Qatar Industrial City; (3) Gaining field experience in estimating the logistics needs needed in the management of Ambulance services in the Industrial city of Qatar; and (4) Provide recommendations and implementation of logistics management systems needed in Ambulance services in Qatar Industrial cities.

3. PROBLEM ANALYSIS

Fishbone diagrams are used to identify possible causes of problems and especially when a team tends to fall into thinking routines [5]. In making a Fishbone Diagram of the logistics of Ambulance services, there are several stages that must be done[6]:

1. **Identifying the problem:** the logistical problem found by the Ambulance service is that the logistical planning is not adequate.

2. **Identify the main factors of the problem:** the factor method finds the possible causes of each factor:

    a. Human factor: In the ambulance service logistics system, there is one person who is appointed as the person in charge. Ambulance officers are not consistent in making reports on the use of goods. Ambulance officers did not report the collection of goods in the temporary warehouse.

    b. Environmental factor: Hot weather causes goods and packaging to be easily damaged. Not all ambulance stations have inventory storage warehouses. Centralized supply warehouse.

    c. Facility Factor: The main logistics warehouse is far from the location 1-hour drive. Temporary logistics warehouse, in one location for 4 station units.

    d. Fund Factor: Funds are available for ambulance logistics.

    e. Method Factor: A request form is available. A consumed report is available. An expired form (Disposed of the report) is available. Logistics inventory form (Stock report) is available. Logistics usage average report is not available. The monthly requirement estimation form is not available.

Analyze the results of the diagram: from the root causes that have been found, it is necessary to further analyze the priority and significance of the causes.

4. PRIORITIY SETTING

One of the most widely used methods is to calculate the weight of the problem based on URGENCY, SERIOUSNESS, and GROWTH:

- Urgency: Urgency is how urgent the need/problem is in terms of time.
- Seriousness: In this aspect, we look at how serious/severe the impact of the problem is on the productivity of the organization, how dangerous it is to the system, and how the impact can affect success.
- Growth: In this aspect, we examine how much the issue can grow/expand/develop into another problem or get worse if the problem is not addressed immediately

This assessment can be done by calculating the series of problems obtained from the identification of needs and logistics information management problems with a range of 0-10.

PROBLEM LIST	Urgent	Seriousness	Growth	Total
Information min stock level	**6**	**7**	**10**	**420**
Information max stock level	**6**	**7**	**10**	**420**
Information stock analysis	**5**	**5**	**10**	**250**
Information Stock prediction for 3 months ahead	**6**	**4**	**10**	**240**
Information expired report	**8**	**3**	**8**	**192**
Information stock on hand report	**8**	**3**	**4**	**96**
Information consumed report	**8**	**3**	**4**	**96**

5. ANALYSIS OF LOGISTICS SUPPORT

Logistics data reports will provide information and facilitate decision-makers at various levels of information. The right logistics data information, at the right time, in the right place, in the right quantity, with the right quality, and at the right

cost can support the implementation of health service goals, especially in ambulance services [7]. Before deciding on the magnitude of the logistics need for ambulance services, it must first be done: (1) mapping the existing logistics situation; (2) predict how long the existing logistics can be used; (3) estimate additional needs; (4) analyze the existing logistics situation [8].

Activity 1: Stock Inventory Report

The stock inventory report consists of initial inventory data, usage data, adjustment data, and ending inventory data for a certain period. Generally, inventory reports are made monthly. Ending inventory data can be used to predict how long the inventory can be used, while inventory usage data can be used to estimate the next inventory procurement (point of re-order). Table 1 describes the formatting of monthly inventory reporting. Inventory at the beginning of the month there are 100 ampoules, new receipt data is 40 ampoules, usage data for that month is 40 ampoules, and damage/expired data is 10 ampoules, so at the end of the month you can know how much ending inventory is available (100+40)- (40+10) =90. End of month availability data can be used to determine how many ampoules must be provided to reach the beginning of the month, for example, from the available data, it is known that at the beginning of the month there are 100 ampoules, there are 90 ampoules at the end of the month, so additional 50 ampoules are needed (point of return). orders). The amount of beginning inventory plus the number of new receipts is considered a minimum inventory.

Table 1 Example stock on hand report
Adrenalin 1000 unit/1 ml, Unit: Ampoule, Expired: 1 January 2024

Beginning stock	QTY Received	QTY Consumed	QTY Expired	End of the Stock	QTY Re-order
100	40	40	10	90	140-90=50

Activity 2: Predicting Logistics Availability

Table 2 will explain in a simple way how to predict logistics availability. Predicting the length of use of inventory, is done by estimating the remaining inventory that can be used within a certain period. For example, it is known that the average use of Adrenaline 1000 units/ml is 400 ampoules per month, while the end-of-month inventory is 4000 ampoules, so we can predict that the supply is considered sufficient to be used for 10 months (4000 ampoules/400 ampoules =10).

Table 2 *Predicting Logistics Availability* of Adrenalin 1000 /1 ml

Activity	Remark
Average consumed per month	400 ampoules
Last stock	4000 ampoules
Predicting Logistics Availability	4000/400 = 10 month

Activity 3: Estimation Size Re Order Point

The simplest determination of the availability requirement estimate is to use the results of the monthly report on monthly inventory activities as described previously. However, it must consider fluctuations in the use of logistics by a load of ambulance activities. There are 2 approaches in determining the estimation of logistics needs, namely: first by using an approach based on the estimated maximum inventory (3 months); second, by using the inventory distribution time approach (lead time). Table 3 will explain the magnitude of the need for new inventory submissions. The maximum supply level of Adrenaline 1000/1ml is calculated based on the need for supplies for 3 months, the average monthly use is 100 ampoules, while the end-of-month inventory is 200, so it can be predicted how large the amount of Adrenaline 1000/1ml that must be held again is calculated as follows: (3x100) - 200 = 100 ampoules that must be provided again so that the supply reaches 300 ampoules. This calculation with an easy record of getting inventory in 24 hours.

Table 3 Estimation Size of Re Order Point

Activity	Remark
Max stock level	3 months
Average monthly consumption)	100 ampoules
Maximal stock quantity)	(3x100) =300 ampoules
S*tock on hand*)	200 ampoules
Prediction re-order point)	300-200=100 ampoules

Table 4 explains how to determine the estimated amount of inventory that must be submitted again (re-order) based on the length of distribution of supplies determined by the distributor so that the existing inventory does not interfere with service activities. The data needed is the average usage, duration of distribution, and existing inventory. Procurement plan Adrenaline 1000/1ml for 3 months. From the previous data, the average monthly consumption is 500 ampoules. How much needs should be provided for 3 months? The answer is 3 x 500 = 1500 ampoules. From distributor data, item delivery

requires a maximum processing time of 2 months, so additional items are needed as safety stock as much as the average usage per month times the length of procurement distribution, namely 500 ampoules x 2 = 1,000 ampoules. The estimated minimum requirement is calculated from the average monthly usage times the length of distribution plus the safety stock, namely (500x2) +1,000=2000. The maximum amount of inventory is calculated from the minimum estimated times of how many months of need, for example, the need for 3 months then the maximum need is 3 times 2000 ampoules = 6000.

Table 4 Estimation of Minmax Model

Activity	Remark
(AMC=*Average monthly consumption*)	500 ampoules
(LT=*Lead Ti*me)	2 months
Safety Stock (SS=AMC x LT)	500x2=1.000
(MSL=Max stock level)	3 months
Estimation min stock AMCxLTxSS)	(500x2) +1.000=2000
Estimations max stock (MSLxMin)	3 x 2.000=6.000
Mid stock level)	6.000:2=3.000
Stock on Hand)	1000 ampoules
Prediction re order point for 3 months	(3.000-1.000) =2.000 ampoules

Activity 4: Analysis Stock Availability

In analyzing the availability of both drugs and non-drugs, the person in charge of logistics must analyze whether the inventory is insufficient or excess. Execution of the Availability analysis process requires Minmax Level data. Table 5 will simulate how to analyze availability (analysis of stock availability). After the inventory is calculated how much is in stock (stock on hand), then look for the min-max stock level as simulated in table 5. Availability analysis activities should be done every day to monitor existing inventory, must be ready to be used in ambulance service activities. Availability is lacking if the existing inventory is below the minimum amount, while availability is declared overstock if the amount of availability is above the maximum value. Existing inventory is declared sufficient if it is between the minimum and maximum value levels.

Table 5 Analysis Stock Availability
Date: 1 Nov 2021

No	Description	Unit	Quantity	Min Level	Max Level	Remark
1	Adrenalin 1:1000/ml	Ampules	200	320	520	Less
2	Adrenalin 1:10000/ml	Ampules	300	240	390	Good
3	Adrenalin jet 300 mcg	Ampules	100	80	130	Good
4	Atropine 500 Mcg/ml	Ampules	10	40	65	Good
5	Amiodarone 150 mg/ml	Ampules	400	320	520	Good
6	Glucagon gel	Tube	15	12	19.5	Good
7	Dextrose 50% 50 ml	Ampules	50	80	130	Less
8	Nitro-glyceryl spray	Botle	5	4	6.5	Good
9	Aspirin tab 300 mg	Tablet	200	80	130	Over
10	Charcoal emulsion	Botle	10	8	13	Good
11	Penthrox inhaler	Ampules	50	40	65	Good
12	Water for injection 10 ml	Ampules	150	120	195	Good

6. CONCLUSION AND RECCOMENDATIONS

Conclusion

The Qatar Industrial City Ambulance Service is needed for referral needs as well as for emergency response purposes around the city. For the smooth running of Ambulance service activities, adequate logistical support is needed. Logistics support for Ambulance services can be seen from the existence of a logistics information system required by decision-makers for the purposes of procurement and purchasing, storage, and distribution of logistics to end-users of logistics. A minimal logistics information system, data on current logistics availability (stock on hand), average consumption (average consumed report), transaction information on logistics receipts and expenditures, as well as information on logistics data

for adjustments due to damaged or expired goods. All of this information can be used by the person in charge of logistics to estimate, predict and analyze logistics availability. The minimum and maximum levels of logistics are needed to analyze the availability of logistics, and how many existing logistics can be used (prediction), and can estimate future logistics needs (estimation of logistics need).

Recommendations

To increase the capacity of Ambulance services, it is hoped that there will be logistical support through the availability of an Ambulance service logistics information system. It is hoped that all end-users, namely the Ambulance staff unit, can access existing logistics information to replace logistics after they are used, or the logistics in the Ambulance unit that are almost out of date can be replaced immediately. The results of the analysis of the availability of existing logistics can be disseminated to Ambulance units so that Ambulance officers can be aware of any type of stock that has a low level of consumption. Low logistics consumption can cause the stored logistics stock may be damaged or expired.

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