Original Article

Assessment of cold storage medications transportation to and from main medical stores in the Royal Medical Services, Amman, Jordan

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Objectives: To explore the condition of cold storage drug transportation to and from the main medical stores and the Royal Medical Services hospitals, according to the Jordan (MOH) regulations and standard guidelines of cold storage drugs transportation.

Methodology: This cross sectional survey collected data by a questionnaire during October and November 2012. Companies delivering cold storage drugs to main medical stores, pharmacists who received drugs at hospitals responded to the survey. The questionnaire included two conditions listed as the quality of cold storage drugs transportation condition and three for the general problems of cold storage drugs delivery.

Results: Drugs that were transported by vehicles controlling the temperature in the storage compartments <25c° were always happened in 35.9%, rarely happened in 1.6% and never happened in 60.9%. Cold storage drugs were delivered by proper number of ice packs in cool box six sides at the box, always happened in 34.4%, often happened in 14.1%, rarely happened in 6.3% and never happened in 39.1%. Cold storage drugs were delivered by ice packs that melted to water in the cool boxes when arrived to hospitals always in 77.8%, often in 14.8%, rarely in 1.9% and never in 5.6%.

Conclusion: Cold storage drugs were not transported and delivered in recommended state in this study. (Rawal Med J 201;39: 362-364).

Key words: Drug delivery, cold chain, cold storage drugs.

INTRODUCTION

All medicines must be stored and handled in accordance with the manufacturer's guidelines in order to maintain the quality of the product. The World Health Organization (WHO) recommends special storage conditions, such as the need for refrigeration, are checked and monitored to ensure appropriate data is recorded for refrigerated medicines. Manufacturers must follow good manufacturing practice (GMP) during production, storage and transportation.[1,2] Storage outside the recommended temperature range can result in chemical and/or physical changes in the product.[3-5] This may lead to loss of efficacy and/or altered patient response, with potential to cause harm.[6] This may result in potential spoilage of the medicines and consequent financial impact for the facility. Vaccines are sensitive biological substances that can lose their potency and effectiveness if they are exposed to temperatures (heat and/or cold) outside the required temperature range of +2 °C to +8 °C or when exposed to light.[7,8]

Drug transportation including, cold storage drugs, is one of the main activities of logistics process in drug management. At every point, precautions should be taken to minimize the effect of adverse external conditions on the quality and stability of product.[4] There are many guidelines that have been developed to assist health facilities in managing appropriate transport and handling of refrigerated medicines. A study on cold storage drug transportation and delivery to Thai hospitals showed serious problems due to the lack of regulations and guidelines set by Thai FDA.[9] In Jordan, there are regulations and standard guidelines set by the Ministry of Health (MOH) to control the quality of drug distribution and cold storage drug transportation. The present study aimed to explore the condition of cold storage

drug transportation in Royal Medical Services Hospitals according MOH regulations.

METHODOLOGY

In this cross sectional survey, the data collection was done by a direct questionnaire during October and November 2012. Companies delivering cold storage drugs to main medical stores and pharmacists who were involved in receiving drugs at hospitals and in piece keeping force missions responded to the survey. There are 48 health care facilities in the Royal Medical Services e.g hospitals, small units and missions and 18 companies were included for this survey.

The Questionnaire included two conditions listed as the quality of cold storage drugs transportation condition and three for the general problems of cold storage drugs delivery. These conditions were:

Condition 1: medicines were transported by vehicles controlling temperature in the storage compartments less than 25 C. **Condition 2**: proper amount of ice bags in the cool box (six sides of the box). **Condition 3:** ice bags melt to water in the cool box. **Condition 4:** cold storage drugs (2C 8C). **Condition 5:** cold storage drugs (< 20 C, freezer compartment).

The condition 1+2+4+5 were to reveal the quality of cold storage drug transportation condition, which the expected answer should be: "always happened", so other answers were considered problems of storage drugs transportation. The condition 3 was to reveal the general problems of cold storage drugs delivery were the expected answer should be "never happened". The data were analyzed by the application of the statistical package for the social sciences (SPSS) version 13.0.

RESULTS

A total of 66 questionnaires were completed; 11 represented major hospitals, 32 smaller medical centers, 6 medical centers assigned to missions, and 16 drug stores. 64 of them were valid.

Drugs that were transported by vehicles controlling the temperature in the storage compartments <25c° never happened in 60.9% (Table 1).

Table 1. Medicines transported by vehicle controlling temperature in the storage compartment < 25C.

	Number	Percent
No allotment	1	1.6
Always	23	35.9
Rarely	1	1.6
Never	39	60.9
Total	64	100.0

Cold storage drugs were delivered by proper number of ice packs in cool box to hospital in freezing status always in 34.4% times (Table 2).

Table 2. Proper amounts of ice bags in the cool box.

	Number	Percent
No allotment	4	6.3
Always	22	34.4
Often	9	14.1
Rarely	4	6.3
Never	25	39.1
Total	64	100.0

Cold storage drugs were delivered by ice packs that melted to water in the cool boxes when arrived to hospitals always in 77.8%, often in 14.8%, rarely in 1.9% and never in5.6%. Cold storage drugs between (2 c°- 8 c°) were delivered without controlled temperature boxes, always in 32.8%, rarely in 1.6% and never in 59.4%. Cold storage drugs (-20 c° freezes compartment) were always delivered in 3.1%, never in 3.1%, while no allotment percentage was 93.8%.

DISCUSSION

The drugs that were transported by vehicles controlling the temperature in the storage compartments <25c° (2.84 ± 1.48) indicated that the major problem occurred when storing and transporting medicines in compartments <25c°. The lowest mean was for item cold storage drugs (-20 c° freezes compartment) (0.15 ± 0.71), which indicated that the best results were obtained when cold storage drugs (-20 c°) were stored and transported in freezes compartments.

For comparison between setting the highest mean was for drugs that were transported by vehicles

controlling the temperature in the storage compartments <25c° and the lowest item were for cold storage drugs (-20 c° freezes compartment. Drugs that were transported by vehicles controlling the temperature in the storage compartments <25c° (2.84 ±1.48) and **c**old storage drugs were between (2 c°- 8 c°), (2.75 ± 1.56) showed a not acceptable adherence to the storage guidelines.

This could be because of lack of air conditioning in the transport vehicle and due to the high temperature climate and travelling for long time.[10]

Cold storage drugs were delivered by proper number of ice packs in cool box six sides at the box (2.37 ± 1.45) shows moderate adherence to the storage guidelines. The very important condition of cold storage drugs (-20 c° freezes compartment), (0.15± .71) showed an excellent adherence to the storage guidelines. However, condition 3, as a reverse item the mean was 1.35 ± .78, it reflects that the hospitals and centers had acceptable adherence to storage guidelines related to this item.

The differences in the quality of cold storage conditions showed that hospitals and centers need to give extra attention to the importance of logistics management and control the quality of cold storage transportation.[11] This, in the long run, will save money by reducing the deterioration of drugs during transportation and provide a better life for the sick and most importantly save life by providing effective drugs when they need them.

CONCLUSION

Drug products that must be stored under defined conditions require appropriate transportation instructions. As shown in this study, some problems were seen with the cold transportation for drugs, therefore, standard guideline on the cold transportation should be employed and monitored consistently. The management in each hospital should emphasize on making all necessary arrangements to provide the right vehicles and the right equipment needed for drugs to store, transport and reach the desired destination efficiently and effectively.

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