

**STAFF PERCEPTION AND HOSPITAL PRACTICES
TOWARDS RECYCLING OF THREE LIBYAN
HOSPITALS**

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ABSTRACT

This study was designed to examine the factors influencing the knowledge and attitudes of hospital workers towards recycling of hospital waste. A total of 1500 were sent to the three Libyan hospitals , 500 questionnaires were distributed to the each hospitals, the response rate were (83.33%). Females workers and nurses responded significantly more frequently than men workers and physicians. In general there were relatively low levels of knowledge about waste management and recycling practice. None of the Libyan hospitals practiced any recycling and the hospital workers in Libya were significantly enthusiastic towards recycling. Training in hospital waste management and education were found to be weak predictors of positive attitudes. The results showed that it is difficult to predict the recycling behaviours among hospital workers. However, waste management staff were more positive towards recycling than those without training in waste management. The present study opens doors for larger studies to investigate factors influencing recycling attitudes, and encourages hospitals to commence recycling practicing and provide whatever infrastructures to make this possible. More education and training on hospital waste management should be encouraged in three hospitals. Introducing new technologies in hospital waste management, particularly recycling of hospital house hold waste may change the future prospective of hospital waste disposal. More studies intervening with educating the hospital workers in waste management, particularly in

recycling of hospital waste and it's relatively safety should be encouraged.

Key words: Clinical waste, Household, Recycling, waste management, Attitude, knowledge

INTRODUCTION

Within the healthcare network, the term Hospital household waste (HHW) is simply used to describe non-infectious, non-hazardous waste. It is similar to the domestic or municipal waste that comes from homes (Feuilade, et al., 2008). This definition becomes more practical after the introduction of the unified approach in the classification of Healthcare waste(HCW) on the basis of hazardous characteristics and point of production, which recognises only two types of HCW, hazardous and non-hazardous regardless of the waste category (Costa-Font, et al., 2008; The Department of Health, 2006). HCW is composed of hazardous waste (HW) and non-hazardous waste (NHW). HHW is part of the (NHW), which according to the current guidelines should be segregated from the hazardous waste from the first chain of collection point (The Royal College of Nurses, 2007).The logistics management of HCW include collection, transportation, interim storage, and disposal, whether HW or NHW. The segregation and separation processes of HW and NHW should be carefully instituted continually during all of these stages of HCW management (Belnkarn, 2006). In fact, identification, separation and segregation of HCW are inevitable if recycling is planned (Tudor, et al, 2006: Belnkarn, 2007). Different case studies performed in different hospital setting in developing and developed hospitals have demonstrated that HHW represents substantial proportion of HCW. Rayner, 2003, suggested that about 25% of the HCW could be classified as domestic (HHW). Tudor et al., (2006) showed that with careful segregation, the percentage of the HHW in the HCW main stream could be reduced by as much as 60%. The same author showed that the proportion of HHW in HCW stream varied from department to another with an average percentage of 50% (Tudor, et al., 2006). In addition, the same authors demonstrated in the same study that as much as 40-50% of the HHW stream consisted of recyclable items such as office papers, cardboard, newspaper/magazine, metal and plastics. Swalem et al., (2009) who published case studies from different Libya hospitals, showed that the

hospital waste analysis comprised of 72% general waste and 28% hazardous waste. When looking at what they called general waste, it was comprised of 38% organic waste, 24% plastic, 9% textile, 8% glass and 1% metals, which suggests that this is actually domestic HHW. This suggests that up to 62% of the HCW in the Libyan hospitals are recyclable. Jang et al., (2005) have suggested that with good waste management, HHW may represent up to 90% depending on the healthcare setting and local hospital policy therefore is considered the largest waste stream for hospitals.

In Libya, there has not yet been widely published research that has described attitudes to recycling. In fact, there has been very little published work about municipal waste management from Libya. According to (Etriki, and Deutz, 2012) both the national government and the Municipality of Tripoli have expressed an interest in promoting recycling. Just under a third of waste collected is being sent to waste sorting facilities. However, separation is a manual process and only the most conspicuous and easily separated items can be salvaged. Currently, there are no reprocessing facilities in Libya. The major markets for recycling are in the neighbouring countries of Tunisia and Egypt. Tripoli has a composting plant that has been in operation since the 1980, but owing to the inefficient separation process, the compost is commonly contaminated with glass and especially plastic, which limits the potential market (Etriki, and Deutz, 2012). According to Sawalem et al., (2009) 24% of the average general waste composition was plastics, 20% was paper and 38% was organic. This is similar to the results demonstrated by Tudor, et al., (2007). According to this, we estimate the percentage of the potential recycling waste to range between 44 to 74%, depending if the organic waste is included or not. Plastics and papers were no doubt highly recyclable materials.

Materials and Methods

The aim of this study is to evaluate the recycling practices in the management of hospital waste (house hold) and the attitudes and knowledge of the hospital waste workers and (clinical staff) towards sustainable waste policy in the three Libyan Hospitals(Tripoli Medical Centre Hospital, Benghazi Medical Centre Hospital, Miusrata Teaching Hospital).

In order to obtain accurate information, this tool proposes methods which obtain information using a combination of questionnaires.

- Data request from the hospital management.
- Distributing questionnaires to healthcare providers (clinical staff) and hospital waste collectors (all clinical waste staff).

Questionnaires were distributed to a randomly selected sample of waste managers and healthcare providers, namely physicians, nurses, pharmacists, lab technicians. Responses have been analysed quantitatively, initially using descriptive statistics to provide an indication of opinions and knowledge about various recycling procedures of hospital waste among staff groups. In order to assess if there were statistical differences in knowledge and opinion further tests were anticipated. Initially a univariate series of analyses was utilized that will allow us to identify potentially significant factors that may influence knowledge and opinions. As the majority of variables are categorical, we have utilised Chi Squared test as the test of significance, further testing was then conducted using a multivariate linear regression model.

All of questionnaires distributed were completely anonymous. A total of 1500 were sent to the three hospitals in Libya, 83.33% (no 1250) returned completed questionnaires from all three hospitals . All row data of the hospital details and questionnaires were tabulated into the SPSS statistics 17.0, which was used to perform the statistical analysis. Quantitative data were represented in the form of numbers (No.) and percentages (%), The results were tabulated and analysed statistically to determine the proportions of respondents answering questions in a similar manner. The attitudes and behaviours of the waste workers and healthcare providers towards general waste management recycling and sustainable policy analyzed to determine the adherence to the best practices and to evaluate the acceptance and behaviours towards recycling and sustainability, conclusions drawn accordingly.

Results and Discussion

The information about the study sample was extracted from the hospital capacity section of the structured self-administered survey, which was completed by the waste manager/administrator of each studied hospital.

Tripoli Medical Centre Hospital (LBH1): Upon the conduct of this study in 2010, (LBH1) had 1438 beds and there were 2891 staff working in this hospital. Out of them, 52.4% were medical doctors and dentists (n=1516),

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34.3% were nurses (n=993) and 13.2% were other professionals, administrators and employees of different categories (n=382), table 1.

Benghazi Medical Centre Hospital (LBH2): Upon the conduct of this study in 2010, (LBH2) had 1200 beds and there were 1304 staff working in this hospital. Out of them, 40% were medical doctors and dentists (n=524), 40.6% were nurses (n=530) and 19% were other professionals, administrators and employees of different categories (n=250), table 1.

Miusrata Teaching Hospital (LBH3): Upon the conduct of this study in 2010, (LBH3) had 480 beds and there were 841 staff working in this hospital. Out of them, 38.7% were medical doctors and dentists (n=326), 41% were nurses (n=345) and 20.2% were other professionals, administrators and employees of different categories (n=170), table1.

Table 1 The details of the three Hospitals

	1	2	3
	% (n=)	% (n=)	% (n=)
Beds	1438	1200	480
Physicians	52.4% (n=1516)	40% (n=524)	38.7% (n=326)
Nurses	34.3% (n=993)	40.6% (n=530)	41% (n=345)
Others	13.2% (n=382)	19% (n=250)	20.2%
(n=170)			
Total employees	2891	1304	841

Among the 3 Libyan hospitals, LBH1 produced the largest amount of hospital waste compared to LBH2 and LBH3, $p < 0.05$, table 2. None of the Libyan hospitals reported any recycling practice, Table2.

Table 2 Total and recycled waste in three hospitals

	Total	Generation Rate	Recycled
Recycled			
Waste/year (tones)	patient/day (Kg)	waste per year	(%)
LBH 1	828.288	1.6	Nil
0%			
LBH 2	604.800	1.4	Nil
0%			
LBH 3	190.08	1.1	Nil
0%			

The Attitudes of the respondents

The general attitudes of the respondents were generally low. The respondents demonstrated a more neutral rather than positive attitude, where 44.1% (n=45) to 69.3% (n= 70) of all the respondents demonstrated neutral attitudes versus 23.8% (n=24) to 55.9% (n=57) who demonstrated positive attitudes, $p < 0.0001$, table 3. Very few respondents demonstrated negative attitudes; 6.9% (n=7) from LBH2 and 1% (n=1) from LBH1. No single respondent from LBH 3 demonstrated negative attitudes and no single respondent from any of the three hospitals showed “very positive attitude”. Respondents from LBH 3 demonstrated the most positive attitudes compared to the other two studied hospitals LBH 1 and LBH 2, $p < 0.0001$, Fig1.

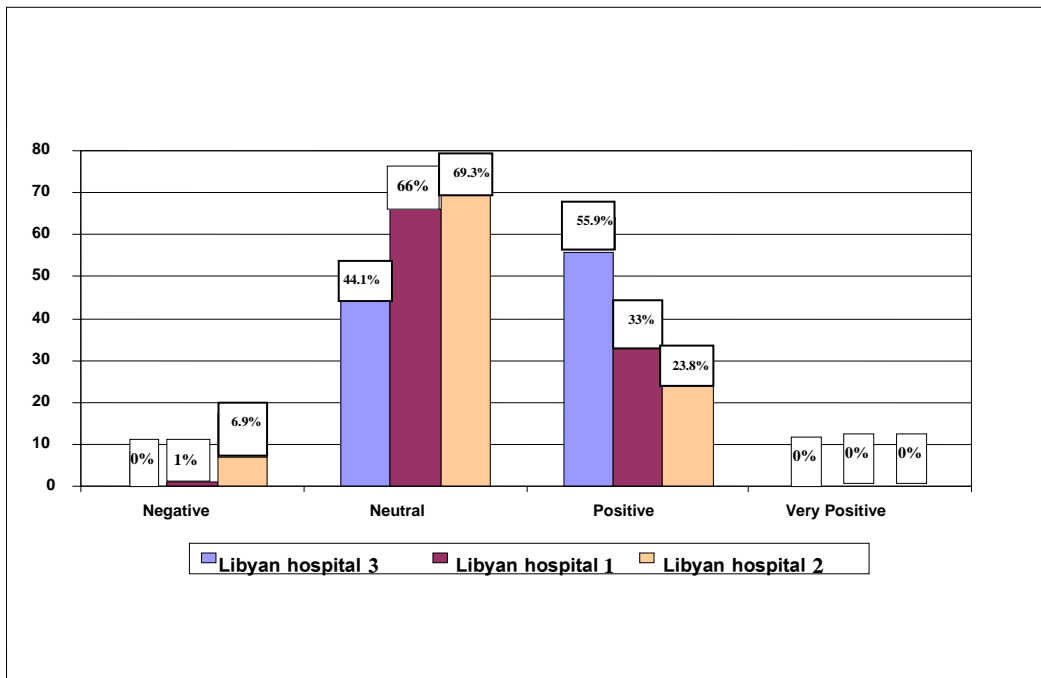


Figure 1 The general attitudes of the respondents

The knowledge of the respondents

The level of knowledge in waste management including waste recycling among the respondents was generally low and comparable in the three hospitals included in the study. LBH3 demonstrated the lowest knowledge, where 99% (n=101) demonstrated weak knowledge compared

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to 84% (n=84) and 84.2% (n=85) in LBH1 and LBH2 respectively demonstrated weak knowledge, ($p < 0.0001$), Figure 2,

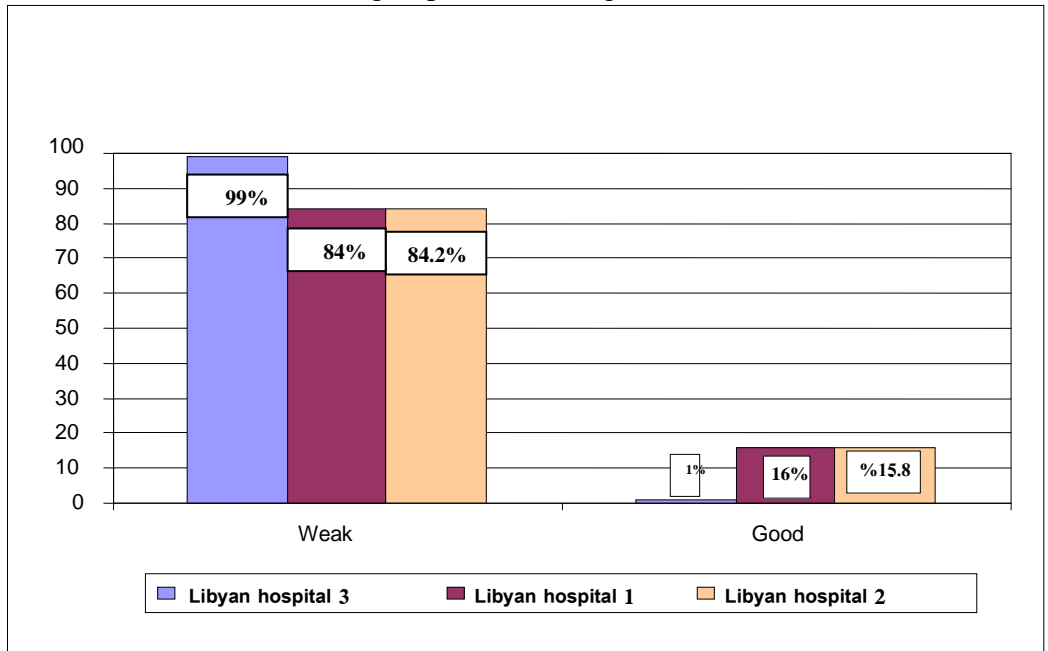


Figure 2 The levels of knowledge among respondents

A study conducted by Begum et al., (2009) have demonstrated that recycling represents a modern concept in Health care waste (HCW) management and recycling was among the most important and significant factors that affect contractor attitudes toward waste management. Tudor et al., (2007) have shown that the concepts of sustainability as evidenced by the levels of recycling behaviour did not play a role in the way National health service(NHS) managed their waste. Tudor showed that the main factors that influence staff recycling behaviour are the individuals' attitudes and circumstances plus the culture of the organization, and hence according to his results, any attempt to improve recycling behaviour would have to target these two factors.

The results showed that hospital environment and setting and the individuals' perception are important factors that explain how health workers explain their attitudes towards recycling in three Libya hospitals .

The outcome of this study showed that factors may play a role in determining positive perception of hospital workers about good practice in HCW management including recycling, based on Chi square testing were age, work category, hierarchical positions, education level and previous training in waste management. Gender has not been shown in this study to play a significant role although females demonstrated slightly better attitudes than males in three hospitals. A weak association was found between knowledge and attitudes in this study among Libyan candidates but not at a statistically significant level. However, regression modelling applied in this study demonstrated that education and training were predictive of good awareness and positive attitudes towards good practice of HCW management in HHW recycling in three hospitals. Teo and Loosemore, (2001) showed that the behaviours and attitudes of hospital staff towards waste recycling are influenced by organizational culture, waste management policies and size of waste subcontractors.

Previous studies showed that environmental concern has a positive impact on the recycling behaviours Schultz et al., (1995). This showed non-recyclers (the Libyan candidates), similar to results demonstrated by Vining and Ebreo, (1990) who claimed significant differences in the attitudes between recyclers and non-recyclers. The intervention with educating the hospital workers about HCW, HHW, recycling telling the audience the truth behind it seems to be an important approach. Karout and Altuwaijri, (2012) have provided educational sessions for 320 randomly selected participants in Beirut, Lebanon and showed that their awareness and even attitudes were improved following the education session. It seems that educational training dedicated to inform the hospital workers about HCW management and recycling increases the awareness and improves the attitudes of the hospital workers. The results of this study showed that there is a link between training and good knowledge and attitude.

The present study shows that the attitudes to recycling are not easy to predict. There were no clear variables that could predict attitudes to recycling in any of the staff groups. This should be studied in future research, particularly if some Libyan hospitals start recycling, so that an internal comparison between recycling and non-recycling hospitals could be performed. Schultz.,(1995) pointed out that the relationship between demographic variables like age and education level and recycling

behaviours were generally unclear, except for gender whereby men and women were equally likely to recycle (Vining and Ebreo, 1990; Gamba, and Oskamp, 1994). Studies performed to find relationship between personality construct and recycling behaviour tended to agree that recyclers seemed to have a higher sense of social responsibility (Simmons and Widmar, 1990).

It was not among the aims of this study to intervene with the recycling attitudes but rather to observe and compare. However, various interventional manoeuvres such as rewards and feedbacks have been widely investigated and research findings suggested both strategies caused an increase in recycling behaviours and to encourage recycling behaviours with some positive effects (Needleman and Geller, 1992; Katzev and Mishima, 1992). (Karout, and Altuwajri, 2012) have studied the effects of education on the attitudes and behaviours towards solid waste management in Lebanon and found out that the intervention group showed highly significant improvements in all items.

In addition to the above, the results showed that participation in training and development opportunities in environmental management could also be a key factor to improve recycling attitudes and behaviours (Robbins, 2000). The results show no strong links between education level and attitudes towards HCW management and HHW recycling. However, those who have undergone training in waste management showed statistically significant increases in awareness and attitudes. (Teo and Loosemore, 2001) showed that the size of waste contractors may affect recycling behaviours, and attitudes towards waste are influenced by organizational culture and waste management policies.

In this study, we did not involve the waste management contractors but the waste management teams showed a high perception of waste management and recycling processes and were generally positive. The behavioural intentions of respondents show that the respondents are likely to be willing to recycle in three hospitals. Also there are no waste management policies and the more extensive practice of waste management. The absence of recycling practice in three hospitals may contribute to the lower orientation and lower attitudes towards good practice of HCW management including the recycling.

Conclusion

The level of the knowledge of the responders was not optimal. It is still significantly in three hospitals, which means that there is an educational gap in understanding the process of hospital management, HHW and recycling in developing countries. This makes it a global problem with special consideration in developing countries, where the lower level of knowledge may reflect the absence of recycling and proper management systems for hospital waste in general. Unexpectedly, our results did not show strong ties between the level of knowledge about hospital waste in general and the attitudes and perception of the hospital workers. Our results reported the low levels of positive attitudes towards good disposal and recycling practices for HCW among hospital workers, This study showed when using regression analysis, a weak link between the level of knowledge about hospital waste in general and the attitudes towards HCW and recycling of HHW. Also the results showed that the waste generation rates in three Libyan hospitals are significantly lower. The results shows that three hospitals do not practice any recycling upon disposal of HCW and that even HHW is being disposed almost like other types of HCW. Recycling is a relatively new trend in the management of HCW and requires knowledge and infrastructure to segregate the HCW into hazardous and non-hazardous waste, and then recycle the HHW and other recyclable waste. The present study shows that very limited segregation is being practiced in three hospitals, but not up to any standard level. The outcome of this study demonstrate the low level of awareness about HCW, management and HHW recycling among hospital workers in Libya. It is also explore the levels of awareness of hospital health workers on this subject, the present study is report the low levels of positive attitudes towards good disposal and recycling practices for HCW among three hospital workers. This study showed when using regression analysis, a weak link between the level of knowledge about hospital waste in general and the attitudes towards HCW and recycling of HHW.

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