

To See The Impact Of Various Interventions On Staff Knowledge And Compliances By Conducting Waste Audit In Kpj Seremban Specialist Hospital Malaysia

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Abstract: In April 2012, a survey was conducted by distributing questionnaires to all staff focusing on staff compliance and knowledge in managing hospital wastes. 500 questionnaires had been distributed. However only 363 questionnaires had been collected which is 72.6% of the sample. After the survey, various interventions had been carried out from May 2012 to September 2012 including producing the guidelines to manage hospital wastes, continuous teaching for all staff, monthly briefing at every department and monthly round by a team headed by outsource officer who is in charge of waste management to check the compliance, guidelines on audit of waste and training of head of departments on how to conduct waste audit.

In October 2012, waste audit was conducted to find out the compliance among staff including clinical waste, chemical waste, domestic and food waste, electrical and electronic equipment waste. Audit check points include consignment notes, reports as required by laws and regulations, handling, segregation, storage, collection, transportation and disposal. Results were later compared to both national and international benchmarking. The clinical and chemical waste generated in KPJ Seremban were 39% compared to 20%-40% for Malaysian hospitals and 15% for American hospital. For domestic and kitchen waste, KPJ Seremban generated 61% compared to 60%-80% for Malaysia hospitals and 85% for American hospitals. Therefore KPJ Seremban was within the national and international standards.

Key Words: Hospital wastes, survey, waste audit, benchmarking

I. Introduction

Environmental Quality Act (EQA) 1974 is the only Act so far on environmental protection in Malaysia. It was officially released in 1974, and has been amended over the years in 1986, 1996, 1998 and 2001. The Act, commonly called EQA 1974, is an "Act relating to the prevention, abatement, control of pollution and enhancement of the environment and for purposes connected therewith". The EQA 1974, should be read in conjunction with the subsidiary regulations, orders and guidelines. In the 2007 amendments, very slight changes were made on Section 34 B(4) and 43 only as noted in the EQA.

In Malaysia the clinical waste is being classified as scheduled waste that is controlled under the Environmental Quality (Schedule Wastes) Regulation, 1989. This is in line with the international classification of clinical and related wastes arising from medical, nursing, dental, veterinary or similar practices. In the course of implementing the scheduled wastes regulations, clinical waste generators may refer to this guidelines for the handling and management of clinical wastes to assist them to comply with the requirements of the Environmental Quality (Scheduled Wastes) Regulations, 1989

The safe and effective disposal of healthcare waste starts with the health care practitioner. There is a very real need to reduce both the cost and environmental impact arising from the generation and disposal of waste in health care setting (RCN Guide 2007).

In order to effectively manage healthcare waste, all those involved in the management of the waste stream should have access to an appropriate healthcare waste policy which clearly identifies who is responsible for the waste and how it should be managed. The policy should clearly identify the legal obligations set out in waste, health and safety and carriage legislation.

Healthcare waste includes all the waste generated by healthcare establishments, research facilities and laboratories. In addition it includes the waste originating from minor scattered sources originating from minor or scattered sources such as that produce in the course of healthcare undertaken in the home such as dialysis, insulin injections and so on. Healthcare waste is a byproduct of healthcare that includes sharps, non-sharps, blood, body parts, chemicals, pharmaceuticals, medical devices and radioactive materials (WHO)

The appropriate handling and disposal of wastes generated from hospital is essential *to avoid* adverse health and environmental consequences. Healthcare services have to ensure better health inevitably create waste that may itself be hazardous to health as it may contain infectious and contaminated with hazardous materials. Therefore, KPJ Seremban had conducted a study to find out the level of understanding among staff and based on that study various interventions had been implemented. Finally waste audit was conducted to see the percentage of compliance compared to local and international benchmarking. By looking at the result, the management can see the impact of various interventions that had been carried out to improve knowledge among staff so that it will improve compliances on the management of hospital waste.

Objectives

- To find out the level of understanding among staff in managing hospital waste
- To find out the result of waste audit conducted
- To see the impact of various interventions to improve level of knowledge among staff by using the outcome of waste audit

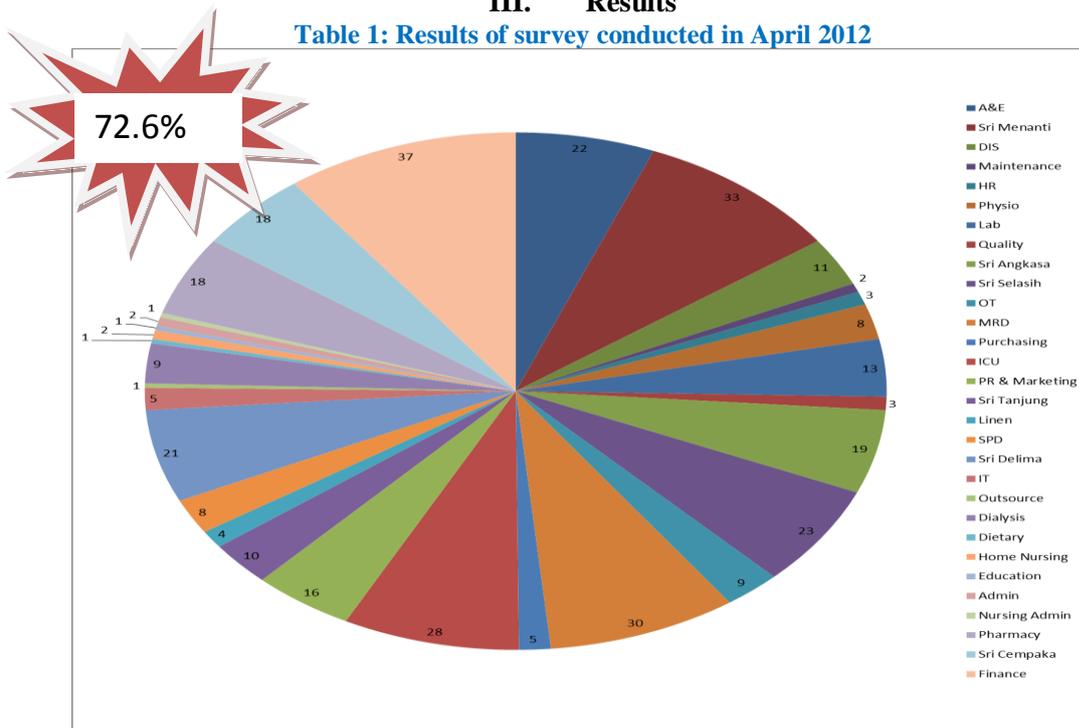
II. Methodology

A survey was conducted by distributing questionnaires to all staff in April 2012 focusing on staff compliance and knowledge in managing hospital wastes. 500 questionnaires had been distributed. However only 363 questionnaires had been collected. After the survey ,various interventions had been carried from May 2012 to September 2012 to improve knowledge of staff so that they will comply to the requirements of hospital waste management. Interventions carried out include the guidelines to manage hospital wastes, continuous teaching for all staff, monthly briefing at every department and monthly round by a team headed by outsource officer who is in charge of waste management to check the compliance, the management produced guidelines on audit of waste and training of head of departments on how to conduct waste audit.

In October 2012 ,waste audit was conducted to find out the compliance among staff. Waste audits include clinical waste, chemical waste, domestic and food waste, electrical and electronic equipment waste. Audit check points include consignment notes, reports as required by laws and regulations, handling, segregation, storage, collection, transportation and disposal. Results were later compared to both national and international benchmarking .

III. Results

Table 1: Results of survey conducted in April 2012



Total questionnaires distributed: 500
 Total questionnaires collected : 363
 Percentage collected: 72.6%

Table 2: Grading scale used for results of the survey

Wrong Answers	Grade
1	86
2	71
3	57
4	43
5	29
6	14
7	0

Grade	Points
Excellent	100-90
Very good	89-75
Good	74-60
Fail	59 and less

Grading was based on the guidelines produced by University of Economy, Parague
 (Ref: : <http://web.weatherfordisd.com/EmployeeLinks/tools/GradeCalc.asp>)

Table 3: Results for each question answered by staff

NO	TYPES OF QUESTION	RIGHT ANSWER(%)	WRONG ANSWER(%)
1.	How many types of schedule waste are there if KPJ Seremban	13.50	86.50
2.	Please select the best statement to describe schedule waste	74.66	25.34
3.	How many times the clinical waste and general waste to be collected	26.17	73.83
4.	Waste shall be collected by ?	92.20	7.80
5.	Color coding system for waste bin	65.84	34.16
6.	Color coding system for waste bag	79.34	20.66
7.	Appropriate PPE being used	85.67	14.33

Figure 1: Grading for nursing staff



Figure 2: Grading for clinical support staff

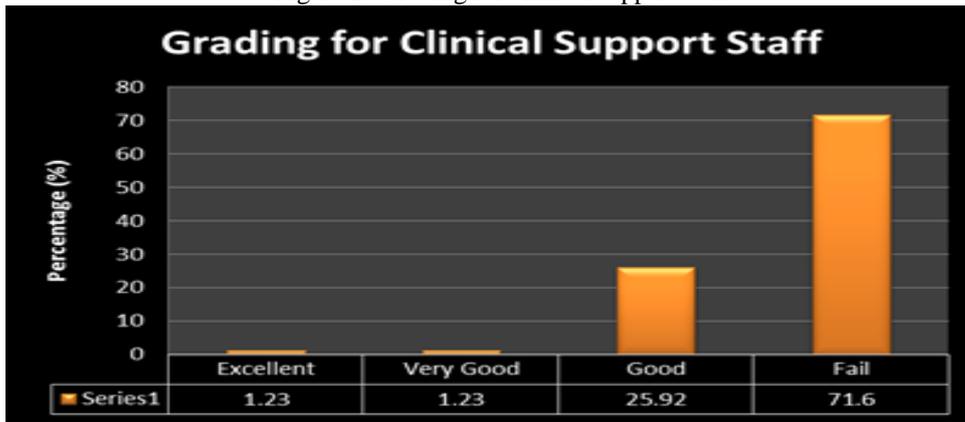


Figure 3: Gradding for non clinical support staff

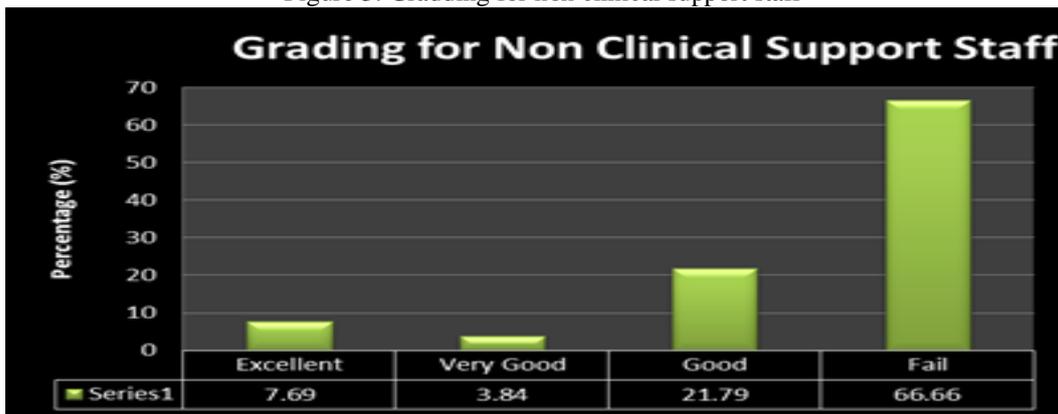


Figure 4: Overall summary for the three categories of staff



IV. Results Of Waste Audit Conducted In October 2012

Table 4: Total Medical Waste Generated at KPJ Seremban Specialist from 8/10/2012 to 12/10/2012

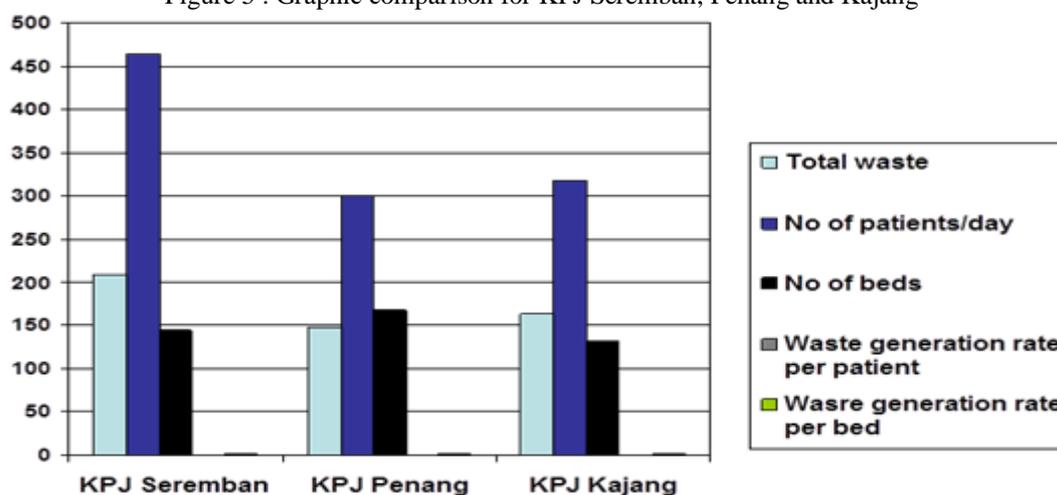
Date	Kg	Total inpatient	Total outpatient	Kg/patient per day
8/10/2012	123.65	72	432	0.24
9/10/2012	214.9	58	412	0.45
10/10/2012	303.4	59	374	0.70
11/10/2012	188.5	57	393	0.41
12/10/2012	208.9	54	411	0.44

Average medical waste generated = **208 kg and 0.45 kg/patient per day**

Table 5: Comparison with other KPJ hospitals

	KPJ Seremban	KPJ Penang	KPJ Kajang
Total waste (kg/day)	208	147.5kg	164kg
No of patients/day	464.4	300	318
No of beds	145	168	132
Waste generation rate per patient/day (inpatient and outpatient)	0.45kg/patient.day	0.49kg/patient.day	0.51kg/patient.day
Waste generation rate per bed/day (bed not occupied does not count in the calculation)	1.43 kg/bed. day	0.87 kg/bed.day	1.24 kg/bed.day

Figure 5 : Graphic comparison for KPJ Seremban, Penang and Kajang



Comparison with overseas hospitals

Table 6: Medical waste generation rate in Dar es Salaam

No	Hospital	No. of Beds	kg/patient per day
1	Hindu Mandal	70	0.37
2	Amana, Ilala	130	0.26
3	UDSM Health Centre	24	0.41
4	Temeke	140	0.15
5	Kariuki Mikochoeni	150	0.79
6	Aga Khan	88	1.30

Average waste generated = 0.55 kg/patient per day

Table 7: Chemical waste generated at KPJ Seremban from 8/10/2012 to 12/10/2012

Date	Kg	Total inpatient	Total outpatient	Kg/patient per day
8/10/2012	5.66	72	432	0.11
9/10/2012	5.66	58	412	0.01
10/10/2012	5.66	59	374	0.01
11/10/2012	5.66	57	393	0.01
12/10/2012	5.66	54	411	0.01

Average chemical waste generated = **0.03kg/patient / day**

In U.S. hospitals hazardous chemical waste generated is less than 0.57 kg/patient per day

<http://www.sustainabilityroadmap.org/topics/waste.shtml#.UdnPO5xCwrw>

Table 8: Domestic Waste Generated at KPJ Seremban from 8/10/2012 to 12/10/2012

Date	Kg	Total inpatient	Total outpatient	Kg/patient per day
8/10/2012	239.50	72	432	0.48
9/10/2012	229.00	58	412	0.49
10/10/2012	230.25	59	374	0.53
11/10/2012	231.15	57	393	0.51
12/10/2012	234.75	54	411	0.51
Average generation rate	232.93			0.50

Table 9: Domestic waste generated per kg/bed/day

Date	kg	Bed occupied	Kg/bed/day
8/10/2012	239.50	72	3.32
9/10/2012	229.00	58	3.95
10/10/2012	230.25	59	3.90
11/10/2012	231.15	57	4.06
12/10/2012	234.75	54	4.35
Average	232.93		3.92

Benchmark : UK = 2.5kg/bed/day, USA =4.5kg/bed/day, France= 2.5kg/bed/day, Spain= 3.0kg/bed/day, India =1.5 kg/bed/day

Ref: Hem Chandra, International Society of environmental botanists, Environ News, vol.5.No.3,July 1999,NBRI Lucknow

Table 10: Kitchen Waste Generation Rates for KPJ Seremban Specialist Hospital from 8/10/2012 to 12/10/2012

Date	Kg	Total inpatient	Total outpatient	Kg/patient per day
8/10/2012	100	72	432	0.19
9/10/2012	107	58	412	0.23
10/10/2012	102	59	374	0.24
11/10/2012	106	57	393	0.24
12/10/2012	81	54	411	0.11
Average generation rate	99.20			0.20

Table 11: Benchmark with Turkey hospitals

Hospital	No of beds	Kitchen Waste (Kg/day)
Sosyal Sigortalar Kurumu Hospital (Turkey)	362	167
Sivas Numune Hospital (Turkey)	319	118
Sivas Doğumevi Hospital (Maternity hospital) (Turkey)	150	19
Devlet Demir Yolları Hospital (hospital with 7 diagnosis and treatment unit)	100	13.9
KPJ Seremban	145	99.20

Figure 5: Overall waste generation rates of each category in KPJ Seremban Specialist Hospital

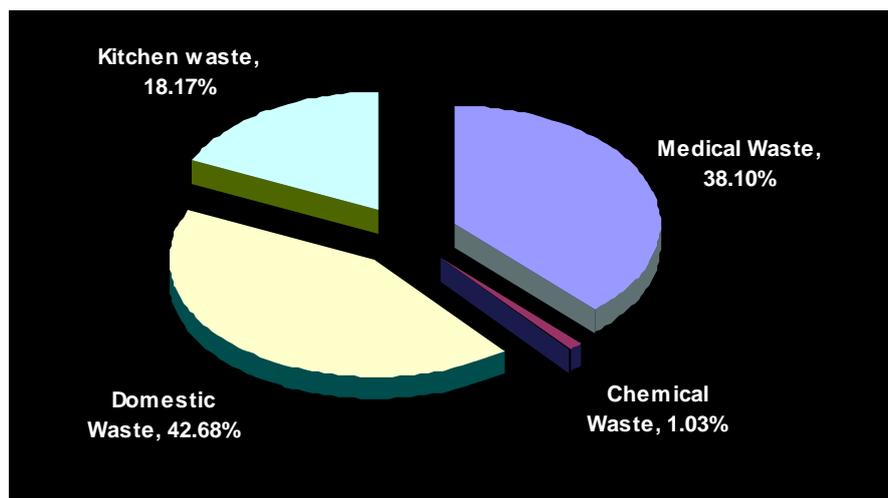


Table 12 :Comparison Analysis Waste Generated

Hospital	Hazardous waste	Non Hazardous Waste
KPJ Seremban	39 % (Clinical & Chemical waste)	61% (domestic & Kitchen waste)
Malaysia Hospital	20% - 40% (Clinical & Chemical Waste)	60% - 80% (Domestic & Kitchen waste)
American Hospital Association	15% (Clinical & Chemical waste)	85% (domestic & Kitchen waste)

V. Discussion

For the survey conducted in April 2012, 500 questionnaires had been distributed to various categories of staff. However only 363 questionnaires were returned to the management which is 72.6% of the sample. For the first question on how many types of schedule waste ,only 13.50% can give the right answer. For the second question on how best to describe the schedule waste, only 74.66% had given the right answer. 26.17% had given the right answer for the question related to the collection time for clinical and general waste. For the fourth question on who should collect the waste ,92.20 % had given the right answer . 65.84% had given the right answer on color coding of waste bin and 79.34% on color coding for waste bag. For the last question on PPE, 85.67% had given the right answer. In conclusion the understanding of staff on hospital waste management was poor and this will effect their compliances. The grading given was based on the guidelines produced by University of Economy, Parague which had given excellent rating between 90-100 points , 75-89 points as very good, 60-74 as points as good and < 59 points as fail. Based on this rating, for nursing staff, 6.86% were rated as excellent, 20.58% as very good, 33.82% as good and 38.72% failed. However for nursing the understanding should be excellent because they are the main players in term of waste management. For clinical support staff, 1.23% were rated as excellent, 1.23% as very good, 25.92% as good and 71.6% failed. The failure rate were higher compared to nursing staff. For non clinical support staff the excellent rate were 7.69%, very good 3.84%, good 21.79% and failed 66.66%. The grading for non clinical were much better than clinical support staff. Since the grading were not satisfactory for all categories of staff, the management had implemented the following interventions:

- producing book as a guidelines in managing hospital waste
- continuous teaching for all staff of various categories in managing hospital waste
- monthly briefing at every department
- monthly round by a team headed by outsource officer who is in charge of waste management to check the compliance
- producing guidelines on audit of waste
- training of head of departments on how to conduct waste audit

Those programs were carried out for five months from May to September 2012. In order to see the impact of those interventions in improving staff knowledge and compliances to the guidelines , waste audit was carried out in October 2012 to see the outcomes of various categories of waste generated based on the audit check lists .The outcomes were later compared with the national and international benchmarks. Based on the waste audit conducted from 8/10/12 to 12/10/12, the average medical waste generated were 208kg and 0.45kg/patient/bed. As a benchmark , average medical waste generated by KPJ Penang were 147.5kg and 0.49kg/patient /bed where as for KPJ Kajang, the average medical waste generated were 164kg and 0.51kg/patient /bed. Therefore the total amount of waste generated by KPJ Seremban were higher than KPJ Penang and KPJ Kajang. However in term of kg/patient/bed the amount generated by KPJ Seremban were slightly lower. When compared to international hospitals such as Dar es Salaam(Tanzanian district hospitals), the average waste generated were 0.55 kg/patient/ day. Therefore KPJ Seremban was more efficient in managing medical waste. In term of chemical waste generated, based on the audit conducted from 8/10/12 to 12/10/12, the average chemical waste generated were 0.03kg/patient/day. When compared to U.S hospitals ,their rate were 0.57kg/patient/day which is much higher than KPJ Seremban.

Based on the audit conducted from 8/10/12 to 12/10/12, domestic waste generated in KPJ Seremban were 3.92kg/bed/day. For international standards, domestic waste generated in UK=2.5kg/bed/day, USA =4.5kg/bed/day, France =2.5kg/bed/day, Spain =3.0kg/bed/day and India =1.5kg/bed/day. Therefore KPJ Seremban is between Spain and USA.

For kitchen waste, the average amount generated between 8/10/12 to 12/10/12 were 99.20 kg. For international benchmarking, the average amount of kitchen waste generated in Turkey were 79.2 kg which is slightly lower than KPJ Seremban.

Through the waste audit in KPJ Seremban, it was found that medical waste generated were 38.10%, chemical waste 1.03 %, domestic waste 42.68% and kitchen waste 18.17%

When compared to both national and international benchmarking, the clinical and chemical waste generated in KPJ Seremban were 39% compared to 20%-40% for Malaysian hospitals and 15% for American hospital. For domestic and kitchen waste, KPJ Seremban generated 61% compared to 60%-80% for Malaysia hospitals and 85% for American hospitals. Therefore KPJ Seremban was within the national and international standards.

VI. Conclusion

The waste management program conducted in KPJ Seremban had improved staff compliances in reporting, handling, segregation and disposal of hospital hazardous and non hazardous waste. The organization had identified average rate of waste generated and able to benchmark with other national and international hospitals' guidelines. This will help the hospital to ensure that wastes are managed properly to reduce the impact on the environment.

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