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## THE EVALUATION OF SAFETY, HEALTH, AND ENVIRONMENTAL RISKS IN WASTE UNIT OF IMAM REZA HOSPITAL IN KERMANSHAH BASED ON WILLIAM FINE'S METHOD

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### Abstract

**Introduction:** Risk evaluation is one of the original pillars of management system which in health, safety, and environment (HSE) is aimed to identify, assess, and control hazardous factors affecting staff health and safety.

Furthermore, hospital wastes are very dangerous for environment and for public health.

The purpose of the present research is to evaluate safety, health, and environmental risks in waste unit of Imam Reza hospital in Kermanshah based on William Fine's method

**Methods:** The study was carried out in the unit of waste collection, separation and excretion of Imam Reza hospital city Kermanshah. This study is based on William Fine's method which encompasses organized and systematic techniques of risk evaluation to identify potential risks, to estimate the level of danger in order to manage and reduce risk to a plausible level.

**Results:** Totally, 73 cases of danger were identified in the waste unit of Imam Reza hospital, of which 18 cases were at normal level, 34 at abnormal range, and 21 at top range. The topmost obtained danger referred to waste collection and separation unit and the lowest related to laundry room.

**Conclusion:** Regarding the obtained results, it is suggested to provide necessary education, to hold assessment and identification courses of risks to hospital staff, and, also, to codify regulations to emphasize on management and separation of hospital waste.

### Keyword:

Safety, Environmental, Waste, William Fine

## **Introduction**

Risk is uncertainty about an incident in the future, whatever the uncertainty is higher, the risk is higher (1). Risks are along all human activities. The risks lead to different problems including increasing safety, health, and environmental difficulties. The issue has caused to consider risk evaluation more attentively. So far, several methods have been applied to identify, classify, and evaluate risks (2). Risk assessment is the process of qualitative analysis of risk potentials and coefficient factor to become actual risks; in addition to sensitivity or damage of peripheral environment. Accordingly, besides checking and analyzing different aspects of risks with a full recognition of the environment and region, the level of affected environment sensitivity, as well as the area's environmental values is employed in the analysis of risks. The main purpose of risk analysis and assessment is to determine the system's amount of uncertainty, resultant cost, and to offer solutions to decrease, in addition to resultant cost aggregation (3). In the past, the causes of occurrence of the events and outbreak of non-compensable losses were investigated and defects of a system or process were determined. But, nowadays, the dangerous and critical areas can be specified as a result of availability of different types of risk assessment methods prior to occurrence. Furthermore, prevention of event occurrence and its control can be obtained (4). Waste materials are one of the greatest environment contaminants, the most important of which is hospital waste. Unhealthily hospital waste excretion can encompass many infectious diseases. In addition, it has bad effects on environment. Problematic waste materials of hospitals not only may cause disease increase but also the possibility of being wound. Possibility of disease and wound occurring may result from either inherent risk possibility of hospital waste materials or other danger possibilities during waste excretion steps (5). Accordingly, regarding extensive dimensions of difficulties and issues of hospital waste, risk assessment can help as a management method for evaluating health and environmental effects of hospital waste. According to mentioned words, the purpose of the present research is to evaluate safety, health, and environmental risks in waste unit of Imam Reza hospital in Kermanshah based on William Fine's method.

## **Methods**

The present study, based on a descriptive – cross sectional method, was performed in waste unit of Imam Reza hospital in Kermanshah, in 2015. At first, conditions and waste resources of the hospital were identified and assessed using a provided checklist. All wards of waste recycling in the hospital were investigated. Checklists were completed by trained colleague experts of the design recourse via personal observation, visit, and registration of necessary and remarkable details and hints, aided by officials of therapeutic and office wards. Besides, statistics of all units relevant

to waste ward of the hospital were collected from environmental health unit in the hospital, in addition to the checklist information and William Fine's formula, by which risk was assessed in different wards linked to waste. The statistical group of the study was all relevant wards to waste unit (laundry room, garbage carrying, garbage isolating, and ...) of Imam Reza hospital in Kermanshah, in each one of which incoming risks on people and environment. Data gathering of the research was provided using an own made checklist. Information of the checklist consists of two parts: first part contains the unit's information including the following items: unit's name, unit's director, work shift conditions, unit duties, and a summary of unit activities. Second part contains the primary checklist of risk identification of the unit. Finally, applying William Fine's method, considered risks were identified and classified in each ward. The obtained data were analyzed by SPSS-16 statistical program.

**Results**

According to the obtained results, 73 cases of danger were identified in the waste unit of Imam Reza hospital, of which 18 cases were at normal level, 34 at abnormal range, and 21 at high range. Risk level ranking in William Fine's method is shown in Table 1. Number of risks based on investigated units is shown in Table 2. Maximum and Minimum Risks of each Unit is shown in Table 3. Frequency of obtained risks in respect of risk rank, frequency of environmental and health risks based on unit and frequency of safety risks based on unit are shown in Chart 1, Chart 2 and Chart 3, respectively.

**Table-1: Risk level ranking in William Fine's method.**

Rank	Proceedings	risk level
>200	Immediate information to control the risk is emergent. Stopping unit activities is under investigation.	High
90-199	Emergency conditions. Necessary proceedings should be done immediately	Abnormal (Medium)
89>	Potential risk agent is under the control and supervision.	Normal (Low)

**Table-2: Number of risks based on investigated units,**

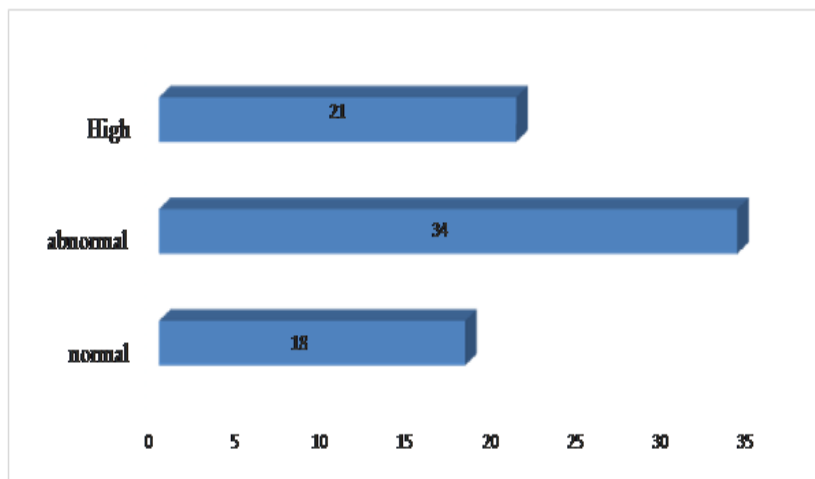
Unit	Normal risk (Frequency)	Abnormal risk (Frequency)	High risk (Frequency)	Total
waste Collection, separation, and excretion unit	6	21	11	38
Kitchen	9	7	5	21
Laundry	3	6	5	14

Total	18	34	21	<b>73</b>
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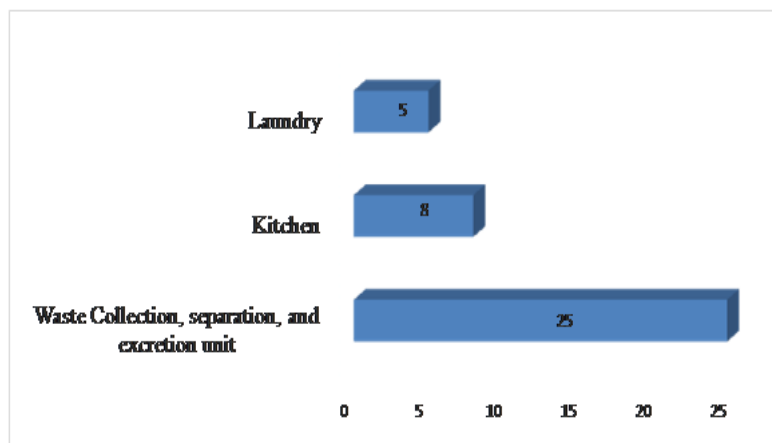
According to Table 2, highest risk was related to collection and separation of waste and the lowest was in the laundry.

**Table-3: Maximum and Minimum Risks of each Unit.**

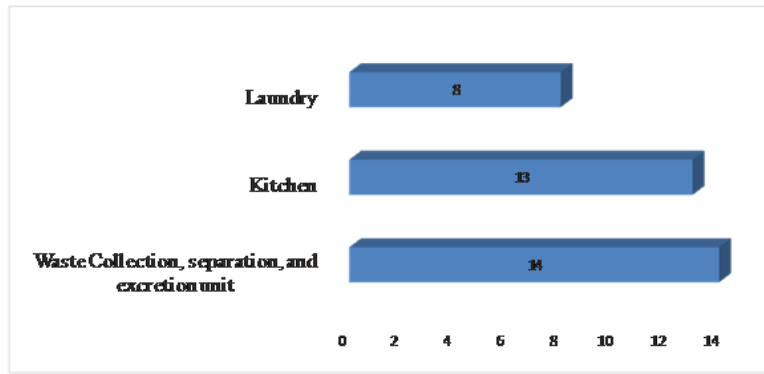
Unit	Maximum risks	Minimum risks
Waste Collection, separation, and excretion unit	Encountering infectious garbage including blood and discharge (450) Exposure to radioactive waste (450)	Encountering infectious garbage including blood and discharge (18)
Kitchen	Exposure to sharp and cutting objects (540)	kitchen floor slippery (30)
Laundry	Face to infectious materials including blood and discharge (450)	slipping (45)



**Chart-1: Frequency of obtained risks in respect of risk rank.**



**Chart-2: Frequency of environmental and health risks based on unit.**



**Chart-3: Frequency of safety risks based on unit.**

## Discussion

According to the present research, 73 cases of risk were identified in the waste unit of Imam Reza hospital, of which 18 cases were at normal level, 34 at abnormal range, and 21 at high range. In a study aimed to investigate management and assessment of health and environmental risks in the waste ward of a hospital in Bandarabbas in 1390, Zelikani Talavaki et al, applying FMEA method, concluded that 10 cases of risk sources in the whole process of waste management of the hospital were specified. Results of the process analysis showed that 42 cases of risk priority were identified; also, the results showed that priority risk numbers according to definition were 29 percent of low- level risks, and 71 percent of medium- level risks. Based on the number of riskiness degree, and checking and comparison with criteria and medical waste excretion methods, corrective proceedings were suggested for all RPNs higher than the number, and the final risk priority number was anticipated (5). The present study demonstrated contact with sharp and cutting materials as the most dangerous. Asefzadeh and colleagues assessed risks in ICU ward of social security hospital in Qazvin using FMEA. the results showed that from 48 identified clinical errors, the maximum error score belonged to respiratory care unit due to ventilators alarm dysfunction with score 288, and the minimum related to health care ward because of not washing NG tube with score 8 (6). Awareness of the necessity to strict control in order to manage waste medical care services throughout the world has increased (15). There are two major problems: staff and managers unawareness of the issues and risks of hospital waste; and lack of enough investment to procure riskless objects (16). The results of the present study showed that in waste unit of Imam Reza hospital the separation is done truly which causes the decrease of incoming risks on environment, water, soil, and air. The results of a research by Masum Beygi et al based on a intermediated study aimed to check the methods of hospital waste decrease showed that separation and collection of quasi household and infectious waste was separately proceeding in 96 percent of the wards, in which doctors and nurses had the least and the most cooperation, 10 percent and 40 percent respectively. Of the most important ways to decrease the waste production, is the necessity of true

pattern of purchasing, storing, distribution and consumption of items, equipment and accessories appropriate to the approach of waste decrease and hospital needs (11). World Health Organization emphasizes on separation and classification of the waste, which is waste producer's obligation, as the most important step toward lessening the difficulties of waste management in health - therapeutic centers. The most appropriate method of separation of different waste groups in health - therapeutic centers, is to separate the waste in bags or colored dishes. For example, (quasi household) black plastic bags and blue buckets are used for public waste, and yellow or red bags for totally infectious waste (17). Fortunately, in the hospital under investigation, garbage has been separated in the separation unit and procured riskless by the waste unit prior to transferring to excretion location by municipality organization. Furthermore, all garbage bags and dishes must have labels on them representing necessary information about producer and contents. For instance, infectious, cytotoxic and radioactive waste bags and dishes should be specified using labels of special and international signs (17). There were not appropriate labels on garbage in the hospital of Imam Reza; even though, they could be totally identified via garbage bags' color and the kind of garbage bucket. During the last years, garbage burners had been remarkably used in order to make the dangerous waste of hospitals, and health and therapeutic centers, riskless. Whereas, at the present time, regarding the risks of the process such as potential risks of airborne pollutants, other alternative procuring riskless methods have been increasingly spread (15). Before prohibition, garbage was burnt using garbage burner in Imam Reza hospital. After prohibition, the unit of waste separation was set up. The input garbage to the unit was separated appropriately and made riskless; afterwards it was properly packed up by autoclave devices, and then transferred to burial location.

## **Conclusions**

Regarding the point that education is considered as one of very important pillars of waste management and risk decrease which reinforces staff education, policies and methods of hospital waste management; in addition, it provides the staff to be aware of the risks of infectious garbage (18), therefore, focusing on mentioned words it is suggested (19):

- For each unit and ward, to procure operating program of special medical waste and to educate the staff on the matter.
- To maintain and reinforce the controlling committees of hospital infections, and to control continuous plans of education to the staff constantly, by the committee.
- To monitor and control the process of hospital waste management, permanently.

- to make the period of effective training compulsory to the staff, in the field of separation, maintenance and excretion of hospital waste, and in general, hospital waste management.

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