CHAPTER – 5

SUMMARY AND CONCLUSIONS

The method used for this research is quantitative and in that the researcher adopted an instrument to collect the data with the consent of the healthcare facilities and personnel involved in the management and disposal of the wastes. The data was collected using different questionnaires, specifically developed for the research. Site visits were conducted to support and supplement information gathered in the survey. The useful information about common practices in the management of the wastes were obtained from these visits. The forms contain data on the generation of waste and main aspects of segregation, collection, internal and external storage, transport, treatment, cost of the hospital waste administration and last dumping. Data is additionally gathered from privately owned companies in charge of accumulation and dumping of hospital waste and from public regulatory authorities. This research was done in government and private hospice care centers in Mysuru city amid May 2015 - September 2015, relied on upon the different strategies for information gathering as laid out.

A section of study is dedicated to gather and survey the discoveries identified with health care centers in Mysuru, polls and meetings were addressed with clinical staffs from various divisions who are handling or have handled hospital waste. The fundamental instrument utilized as a part of information accumulation were surveys; other information has been collected from other distributed recourses.

The World Health Organization (WHO) assessed that the aggregate of hospital waste per individual every year ranges from 0.50 to 3.00 kg/bed/day in both economically advanced and less economically advanced nations. The research has demonstrated that the aggregate waste production rate for government hospice facilities is around 5021.10 kg/month, with mean rate of 2.5 kg/bed/month. While the aggregate clinical waste creation rate in the private
facilities is about 10655 kg/month, with mean rate of 5.6 kg/bed/month. These figures are in great pact with metrics given by WHO.

The hospitals were inquired to assess the rate of clinical waste they produce in various Classification, like Type A, Type B and so on. Almost 72% of the government hospice facilities produced Type D and Type C wastes. 71% created Type A, Type B wastes, 66.7% produced Type F wastes and 33.3% produced Type E wastes. According to private facilities, we assessed the standard rate of waste generation in various waste classifications to be 74% of the private hospice facilities created Type D and Type A waste. 73% created Type C, Type B wastes and 67% produced Type F wastes and 33% produced Type E squanders.

The result of handling the waste depends on every medical facilities researched in the study. (21 of 22) 95% of the respondents said that they managed to handle their waste. 90.2% (20 of 22) of the respondents said that they handled Type D wastes. 95% (21 of 22) handled Type B, 86% (19 of 22) handled Type A, 81% (18 of 22) handled Type C, 77% (17 of 22) handled Type E and 81% (18 of 22) handled Type F.

Hospital wastes were transported to a brief stockpiling zone by clinical staff. In 50% of facilities, hospital wastes were gathered day by day and in 15%, the waste collection program was erratic. In 49% of facilities these wastes were gathered by trolley, in 43% physically and in 8% both methods of waste collection were applied. The staff managing wastes in all hospice care centers and treatment facilities are using the protective gears such as boots, masks, gloves, apron, and coveralls to some extent while handling the wastes.

Improper treatment and dumping of clinic waste creates a hazard to surrounding environment and to humans. This review shows shortcoming within the present clinical waste administration in Mysuru city. The problem created as consequence of lack of clinical staff and absence of preparedness among them about potential dangers of clinical waste and its poor administration. The Clinical
waste administration framework needs an up gradation, with advancement in gathering, isolation, transportation, fleeting capacity and treatment and dumping. Inapt measures were applied towards clinical waste treatment and transfer at the locale of study; a condition that knows about the other essential characteristics in private and government facilities in Mysuru City. Open and safe landfills, surface dumps and sub-standard burning were basic. In perspective of these issues, moderate and practicable technology arrangements are required in the city. With a strong isolation culture, such a framework ensures cost-adequacy and the incinerator (through steady support) will give consistence outflow and operational prerequisites. Ash debris from sub-standard medical waste combustion harbor a lot of PAHs, including PCDD/Fs, dioxin-like PCBs and heavy metals as has been uncovered in this review. Human contact to these composites and metals happen fundamentally through ingestion or potentially skin contacts. The demonstration of purposely applying the ash remains on agricultural area is driven by absence of proper knowledge. It must be stopped as it can transfer to food chain.

The hospital waste administration in Mysuru city, some facilities are ineffectively managed and are underneath the standard limits. The review presents that; clinical staff, patients and society who live adjacent the hospice care environment are in incredible danger of transferring infectious illnesses, for example, hepatitis can be caused by using syringes. The most striking understanding with study was the scattered syringe in open spaces of the hospital facility premises where the patient are in vicinity with them.

The research demonstrated that, all clinical staff, waste handlers have general information/understanding on health and ecological impact of hospital waste. However there are still around 56% of waste handlers who are not learned on health and natural impact of sharp waste as they need preparing on the standard procedure in handling the wastes and they don't have a clue about any medical security program, waste dumping strategies. The overview demonstrates absence of learning and an absence of coordination among various among
regulatory authorities and waste handlers about safe treatment of clinic waste. Moreover, accidents happening due to sharps injury was nil, since the clinical staff had basic training in handling and managing sharps and needles. Awareness of exposure as a work related hazard reported was lower for 75.0% in hospital. However it is the duty bound by the hospice care management to make sure that it provides a sufficient knowledge on proper clinical waste management. This will enhance individual performance which will lead to the hospital performance and hence the maximization of quality healthcare provision.

The research substantiate the harmful nature of bottom ash produced by incineration of medical waste comprising heavy metals. Combustion dose not destabilize these metals but rather simply disperses them through the incinerator stack. The present research primarily focuses on heavy metal concentrations. Far from solving a waste problem, incineration is simply creating a new and more toxic one.

Based on the research, following conclusions could be drawn:

- The Sieve analysis showed the highest fraction of bottom ash was in the group of greater than 9.5 mm particle size. The second largest fraction was in the group of 0.5-4.75 mm particle size followed by two particle sizes were 9% and 9%, respectively.

- Incinerator showed high levels of the toxic heavy metals.

- Largest quantity of metal was iron. It is due to the fact that the main elements of medical devices such as needles, hypodermic needles, scalpel, blades and others are iron. Nevertheless, the highest melting point of iron means the larger amount of its deposits followed by fractions of other metals 1.5%, 0.05%, and 0.05% for zinc, lead and silver, respectively.

- Zinc and Lead were present in smallest particle size group. For silver, 0.5 to 4.75 mm particle size group range had the highest concentration; while
for iron the highest concentration was found to be in 4.75 to 9.5 mm particle size range.

- The amount of leachable metals in incinerator ash increased as particle size decreased. The level of four heavy metals in the leachate showed in smallest particle size group. Because, the small particle size increases the available surface area exposed to leaching fluid.

- The levels of heavy metals in simulated leachate were very low when compared to bottom ash heavy metals. This due to the reason that leachability tests were undertaken in laboratory conditions with distilled water; however, leaching of the heavy metals from bottom ash can increase if acidic solutions were used which attempt to simulate acid rain conditions. Water with bottom ash produced alkaline solutions rather than acidic ones. This made the heavy metals concentrations in bottom ash leachate much less than in bottom ash.

- The levels of lead and silver were higher than the standards. So, bottom ash should be categorized to be lethat at times, and is likely to have highly mobile elements, which, if improperly managed, could affect groundwater.
**Recommendations**

Below recommendations are made for the future research on heavy metals in clinical waste incinerators bottom ash:

1. A comprehensive hospital waste representation must be carried to evaluate if a clinical waste incinerator ash should be categorized as hazardous and what leachable constituents are present.

2. Medical waste incinerator ash must be disposed by properly planned-engineered treatment methods in view of underground water supply.

3. More detailed evaluation must be conducted on the ashes produced from waste incinerators in regards to their lethal nature due to the presence of heavy metals.

4. Public knowledge about the toxicity of medical waste has to be increased so as to minimize the impact of waste on the health of human beings.

5. Incinerator handling training must be provided to waste handlers.