

A CONCERN OF E-WASTE IN THE HOSPITAL SETTING AND ITS WAYS OF DISPOSAL

^{1,2}Manjula Shantaram, ³Shaistah Shafy and ³Rifna Fatimah

¹Professor of Biochemistry, Mangalore University, PG Centre, Chikka Aluwara, Somawarpet Taluk, 571232, Kodagu district, Karnataka

²Professor of Biochemistry, Yenepoya Medical College, Yenepoya University, Mangalore, 575018, Karnataka

³Medical Students, Yenepoya Medical College, Yenepoya University, Mangalore, 575018 Karnataka

Author for correspondence: manjula59@gmail.com

ABSTRACT

The most effective solution to the growing e-waste problem is to recycle raw materials from end-of-life electronics. Most electronic devices contain a range of materials, including metals that can be recovered for future uses. By dismantling and providing reuse possibilities, intact natural resources are conserved and air and water pollution caused by hazardous dumping is avoided. Objectives of our study were to understand the various issues of e-waste management in the hospital settings and ways of e-waste disposal.

Discussion: The hospitals visited by us have not considered the environmental impact of electronic waste, let alone come to terms with how they will dispose of their electronic trash. All the hospitals in the city can have agreement with one organization to collect their e-waste which should pay these hospitals for the e-waste and process it by sorting without melting. Recycling reduces the amount of greenhouse gas emissions caused by the manufacturing of new products. It simply makes good judgment and is competent to recycle and to do our part to keep the environment green.

Conclusion: With this study, we make a genuine effort to have hospitals free from e-waste, thereby leading to less carbon footprints.

Key Words: E-waste, disposal, management, hospitals, Mangalore

INTRODUCTION

Electronic waste, "e-waste" or "Waste Electrical and Electronic Equipment" ("WEEE") is a waste consisting of any broken or unwanted electrical or electronic appliance (Guptha C K N and Shekar G L, 2009). India produces 350,000 tons of electronic waste every year and further imports 50,000 tons of electronic waste (E-Waste management). It is a point of concern considering that many components of such equipment are considered toxic and are not biodegradable which include computers and their peripherals, computer monitors, telephones, cellular phones and other wireless devices, televisions, audio and stereo equipment, electrocardiogram (ECG) equipment, laboratory equipment, printers, air conditioners, electrical cables and so on. E-waste is generated due to changes and advancement in technology (UNEP, 2009), changes in fashion, style, and status, changing configuration, attractive offers from manufacturers, small life of equipments and nearing the end of their useful life (Table 1). Sources of E-waste in hospitals are medical devices. Examples are automated analyzer, spectrophotometer, pH meter, electrophoresis equipment, high performance liquid chromatography (HPLC) and clinical equipment such as ECG machine, stethoscope, etc.

Effects on human Health

E-Waste damages the central and peripheral nervous systems, blood systems and causes kidney damage. It affects brain development of children and causes chronic damage to the brain. It also leads to respiratory and skin disorders due to bioaccumulation in fishes. Asthmatic bronchitis and DNA damage are also observed (Table 2).

Table 1: Valuable Materials

Source of e-wastes	Constituent (Valuable)	Uses
Cable, Housing	Plastics	Insulation
Funnel glass in Cathode Ray Tube (CRTs), Printed Wire Board(PWB)	Lead, gold	Metal joining, Connectivity
Housing, PWB, CRT	Mercury, Zinc	Batteries, switches
Housing, CRT, PWB, connectors	Aluminum, Silver Copper, iron	Conductivity, magnetivity

Table 2: Effects of E-Waste on Human Health

Chemical	Uses in Electronics	Health effects
Lead	Glass and PC cathode ray tubes as radiation shield	Damage to nervous system, circulatory system & kidneys; serious effects on brain development
Aluminium	Conductivity	Skin rashes, asthma, linked to Alzheimer's Disease
Nickel	Magnetics	Chronic bronchitis, impaired lung functions
Beryllium	Thermal conductivity	Lung damage, chronic beryllium disease
Chromium	Decorative, hardener (steel)	Damage to liver, kidneys, increased possibility of lung cancer, asthma
Cadmium	Battery, Blue green phosphor emitter	Kidney disease, bone fragility
Mercury	Batteries, switches	Chronic brain, kidney, lung and fetal damage

Effects on Environment

It is said that ground water is polluted. Acidification of soil and air pollution occurs due to E-waste which accounts for 40 percent of the lead and 75 percent of the heavy metals found in landfills. E-waste is an acute crisis as it is composed of hazardous materials. Electronic products are quickly obsolete and discarded⁴. Electronic products are difficult to recycle and moreover, discarded electronics are managed badly. Most e-waste goes to landfills and majority of the recyclers do not recycle but they just export. Waste Hierarchy refers to the "3 R's" reduce, reuse and recycle. Its aim is to extract maximum benefits from products and to generate the minimum amount of waste. E-Waste disposal can be by recycle, landfill, incineration and reuse.

Scenario in Hospitals of Mangalore

None of the hospitals in Mangalore have taken care of E-waste. Waste dealers are ready to collect e-waste from hospitals and transport it to Bangalore or Delhi depending upon the type of e-waste. Since there are six medical colleges and many more hospitals in Mangalore, it is advisable to have a segregating, dismantling unit in Mangalore.

E-Waste Recycling

Recycling is defined as the assembling, developing, promoting, or buying of new products, which are prepared from waste materials⁵. Recycling process involves collection, recycling, certification, legal compliance and disposal of hazardous substances. Important steps in recycling are the following:

- Dismantling of E-Waste
- Removal of hazardous materials such as polychlorinated byphenyls (PCB), mercury (Hg), removal of plastic and so on.
- Strong acids are used to remove valuable metals such as gold, lead, copper, etc.

Various methods for recycling are consumer recycling, donation, take back, exchange and corporate recycling. There are advantages of recycling such as recycled materials can be used in developing new equipment, valuable materials are retrieved which help environment by avoiding pollution. Remarketing of the E-waste includes repairing, refurbishing and upgrading, sale and lease, charity and donation. Land fill is also known as dump which is a site for the disposal of waste materials by burial and is the oldest form of waste treatment. There are disadvantages such as metals like mercury, cadmium, lead leach into the soil and ground water making them polluted and require large amount of space. Moreover, it is not an environmentally sound treatment. Incineration is a controlled and complete combustion process, in which the waste material is burnt in specially designed incinerators at a high temperature (900-1000°C). The advantages are reduction of waste volume, utilization of energy of combustible substances. Further, hazardous substances are converted into less hazardous substances. The disadvantages are observed such as emission of harmful gases and residues and emission of cadmium and mercury. Reuse constitutes direct use or use after slight modifications to the original functioning equipment. There are many advantages such as electronic equipment like computers; cell phones and so on can be re-used. This method also reduces the volume of e-waste generation and there will be no wastage of time and money. Steps in processing are the collection of electronic waste, safe storage, manual dismantling and sorting, automated separation, material recovery, hazardous material segregation and disposal.

Responsibilities of each Citizen

Citizens should donate used electronics to schools, non-profit organizations, and lower-income families. E-wastes should never be disposed with garbage and other household wastes. These wastes should be collected at a separate site and they should be sent for various processes like Reuse, Recycling and Donating. The e-waste business is mainly operated by a very entrepreneurial informal sector of rag pickers and waste dealers in Mangalore too. In many cases e-waste is broken down to extract gold, silver, copper and a host of other metals embedded in the electronics, many of which are enjoying near-record prices. Proper laws and policies should be made. Awareness among consumers and manufacturers should be there. Recycling should be preferred and products should be made recyclable and use them and do not throw away old equipment.

CONCLUSION

In order to minimize the e-waste in the environment it is desirable to improve product design to use fewer materials. Let the material be biodegradable. People who work in the manufacturing units should maintain cleanliness in yards and streets. Treatment of e-waste, separation of materials should be done at source and finally encourage people to reuse materials rather than purchase new ones.

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