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# Effect of Peer-Led Educational Intervention On Occupational Risk Prevention Practices Among Medical Waste Handlers in Tertiary Hospitals, Southwest, Nigeria

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**ABSTRACT:** *This study was undertaken to assess the effect of peer led educational intervention programs on the occupational risk prevention practices among the medical waste handlers in some selected tertiary hospitals in South west, Nigeria. The specific objectives were to determine the baseline occupational risk prevention practices among the participants; and assess the effect of peer- led educational intervention on the occupational risk prevention practices at 12$^{th}$ week post intervention follow up among the participants. The study was an interventional study and adopted a two group quasi-experimental design. Participants of the study were the hospital attendants that served as medical waste handlers working at Olabisi Onabanjo University Teaching Hospital, Sagamu and Federal Medical Centre, Ebute Meta, Lagos. The instrument for the study was a structured questionnaire developed to determine the baseline assessment and outcome evaluation of the intervention. Data collected were analysed using descriptive and inferential statistics. The findings of the study revealed that the mean score of risk prevention practices at 12$^{th}$ week post intervention for control group is 11.12±3.20 while the experimental group is 17.32±4.78 with mean difference of 6.20 in favour of the experimental group. The study concludes that peer led educational intervention programs was effective in improving risk prevention practices among the medical waste handlers. It was recommended among others that major stakeholders in the ministry of health and health institutions should adopt peer led education in the training of the medical waste handlers.*

**KEYWORDS:** peer-led education, occupational risk prevention, practices, medical waste handlers

## INTRODUCTION

Hazards from sharps, needles, and splashes though common among health care workers (Girmaye, 2015) are more pronounced among medical waste handlers and lead to morbidity and mortality

among them from unprotected exposure (Alkhaqan, 2022). There are around twenty (20) different blood-borne organisms, however the Hepatitis B virus (HBV), the Hepatitis C virus (HCV), and the Human immunodeficiency virus (HIV) are responsible for the majority of occupationally acquired infections (Denault & Gardner, 2021). Medical wastes are materials that are generated from medical diagnosis, treatment, research, and immunization. These materials have constituted environmental and public health issues that need urgent attention both in developed and developing countries (Chukumah, et al., 2019; WHO 2013). Occupational risks that expose workers to blood borne organisms include HIV, HBV, and HCV. About 75–80 percent of the waste that is produced in medical facilities is recyclable and can be used to benefit other people. However, the remaining 20 percent of the waste is hazardous or infectious and sharps, which contain body and blood borne pathogens that can be harmful to one's health if they are not handled in a dependable, safe, and appropriate manner (Carnero, 2020).

According to the Occupational, Safety and Health Administration (OSHA, 2017), the risk of catching Hepatitis B (HBV) is approximately 30%, the risk of contracting Hepatitis C (HCV) is 1-3%, and the risk of contracting HIV is 0.3% from patients to health workers by percutaneous injury. Every year, nearly 3 million people working in health care around the world are put in situations where they could be exposed to bloodborne pathogens, which results in around 170,000 new HIV infections, 2 million new HBV infections, and 0.9 million new HCV infections. Incidence of sharp injury among health care workers in Africa is 2.1% annually (Auta, et al., 2017). Hospital cleaning workers are at the greatest risk, with up to 40% of all needle stick injuries (WHO, 2016). Sharp/ needle stick injury rate among medical waste handlers was between 5-17% (CDC, 2013), In Nigeria, accidents and injuries among medical waste handlers ranged between 47%-64.2%, blood/body fluid splashes ranged between 7.7%-71.4% (Onoja- Alexander, et al., 2020), needle stick injury prevalence was 47% by Mokuolu and Olawunmi (2016) and 50% by Enwere and Diwe (2014).

Medical waste handling predisposes handlers to risk of sharp injuries, splashes, and infections all over the world. The health impacts lead to the development of Hepatitis B, C and HIV which do not only affect them but also other health care workers, relations, and the community (WHO, 2016). While many of the health care workers are professionals and had had training on risk reductions while in school, the medical waste handlers needed no qualification to obtain the job hence they lack the skills and competence to adhere to risk reduction strategies that are available due to low literacy level (Mengiste, et al., 2020; Nwankwo, et al., 2020).

When they get infected after exposure, the infection is widely spread through them to the environment and to other staff because they are the ones that clean the environment. Though their job is seen as inconsequential yet if not properly carried out, it can wipe off the entire staff (Maduka, 2017). Though some facilities give some form of trainings, these may be too technical for them to be adequately comprehended because of their literacy level and there were several

reports of the medical waste handlers being neglected from trainings and studies (Abah & Ohianim, 2018). The medical waste handlers are at the greatest risk of needle stick injuries globally, they accounted for 40% of total needle stick injuries incidence among health care workers (WHO, 2016). In Nigeria, accidents and injuries ranged between 47%-64.2%, blood/body fluid splashes ranged between 7.7%-71.4% (Onoja-Alexander, et al, 2020). The prevalence of HBV was about 13% in a study in Enugu (Orji, 2020), while in Southwest, the medical waste handlers accounted for 57.1% of HBsAg detected among health care workers and was attributed to occupational risks exposure related to poor waste management (Elikwu, et al., 2016).

Prevention practices are behaviour exhibited regularly to reduce risk exposure; it is important that medical waste handlers adhere to safety measures. Sometimes knowledge do not affect practice positively, behaviour exhibited may depend on perception and attitude of an individual, some of the reasons given by waste handlers for not adhering to preventive measures were that it is burdensome, discomfort with protective equipment, lack of supplies, carelessness, wastes time, hand washing damages skin, unexpected body fluid contact (Odunsi & Kio 2021). Among the best practices in any organization is making sure that everyone working there is up to date on their occupational immunizations and clearances. Clinical waste, including assembled sharp containers, must be disposed of in accordance with institutional policy (NHS, 2013). Display of graphic safety measures, ongoing education, and monitoring were recommenced after a study by Elamin, et al. (2020) in Sudan found that medical waste handlers' safety practice was poor despite strong knowledge, likely as a result of their literacy level. Only 38.4 percent of people in a survey conducted in Eastern Ethiopia wore gloves whenever they came into contact with blood or other bodily fluids. Knowledge and practice were reported to be low in a study in South west Nigeria (Olukanni, et al 2014).

A study among the medical waste handlers in Northern Nigeria revealed that all the respondents affirmed that wearing PPE can reduce risk of infection, knew the PPE to use but only few used the appropriate PPE, but there were non-availability and insufficient PPE in the hospital (Kaoje, et al., 2018). Aworhi, et al. (2022) in a study on assessment of waste practices among health care workers in Nigeria reported that the hospital attendants were responsible for collection and segregation of medical wastes from different units and department of the hospitals surveyed, only utility gloves and boots were worn by some while majority wore rubber gloves when handling wastes.

A systematic review by Cheetham, et al., (2021) to assess the effects of education and training interventions on prevention of sharp injuries and splash exposures, showed that the education produced small reduction in the rate of sharp injuries, but it was a short-term improvement on the knowledge and behaviour so there is need for reinforcement which will help in the maintenance of the behaviour**.** Kumar, et al (2015) in an interventional study in India among 100 medical waste handlers posits that continuous training on medical waste management and risk prevention will

increase the medical waste handler's knowledge but the study did not assess the effect of the intervention on the practice. The study revealed over 50% increase in knowledge after intervention. According to a study conducted by Pratinidhi, et al. (2014), an interventional study assessing the effectiveness of educational intervention on risk preventive practices among 187 waste handlers in Karad, India found that safety practices such as washing hands before and after waste handling, using PPE, and spillage management were poor before intervention but improved after it. After the educational intervention, students' results on tests measuring their knowledge and ability to apply it rose significantly. Training that included both audio and visual elements was found to have a more profound effect on respondents than audio alone.

Onoja, et al., (2020) in a cross-sectional study among 79 medical waste handlers on occupational health hazards in Zaria, reported that about half had poor knowledge of use of safety equipment hence they were prone to health hazards. 60.8% had had injury but only 45.6% had post exposure prophylaxis (PEP). Standard precaution practice was fair among them, Apron was not used by many probably because they were not provided. The authority was encouraged to make effort to ensure the safety of the waste handlers.

Peer based instructions have been reported to be close to reality and of better acceptance by the peers and have impact in their skills and practice (Molazem, et al., 2018). Integration of peer led education will make the intervention more effective and improve the knowledge, perception, attitudinal disposition and practices of preventive measures which will contribute to reduced risk exposure and occupationally acquired diseases (Chandra-Mouli, et al., 2015). This study will be an innovation that others may follow.

There has not been adoption of peer-led education on medical waste handlers despite reports of impact on skills and practice of respondents, positive role model by peers which help in reinforcing the behaviour change (Farhana, et al., 2020). This study was undertaken to assess the effect of peer led educational intervention programs on the occupational risk prevention practices among the medical waste handlers in some selected tertiary hospitals in South west, Nigeria. The specific objectives were to:

1) determine the baseline occupational risk prevention practices among the participants; and
2) assess the effect of peer- led educational intervention on the occupational risk prevention practices at $12^{th}$ week post intervention follow up among the participants

**Research Questions**

These research questions were raised

1) What is the baseline assessment of risk prevention practices adopted by the participants?
2) How will the risk prevention practices among the participants be affected by the intervention at 12 weeks follow up?

**Research hypotheses**
The study hypothesizes that:

**Ho1:** There is no significant difference in the effect of the intervention on occupational risk prevention practice in the control group between baseline and 12th week follow up.

**Ho2:** There is no significant difference in the effect of the intervention on occupational risk prevention practice in the experimental group between baseline and 12th week follow up.

## METHODOLOGY

The study was an interventional study and adopted a two group quasi-experimental design (one experimental group and one control group) which assessed the outcome of the educational intervention. Participants of the study were the hospital attendants that served as medical waste handlers working at Olabisi Onabanjo University Teaching Hospital, Sagamu and Federal Medical Centre, Ebute meta, Lagos who have direct contact with the segregating, collecting, transporting and disposal of patient's wastes.

Sample size was calculated using simplified form of comparison between two proportions given as:

$$n= \frac{(Z\alpha +Z\beta)^2 (p1(1-p1)+p2(1-p2)}{(p1-p2)^2}$$ ( Cochran ,1977)

Where;
n= Minimum sample size
Zα= 1.96 level of significance (Two sided)
Zβ =0.84- 80% powers
P1= 0.44 - 44.2% (assessment of safety practices among medical waste handlers Tekle, et al., 2021)
P2= 0.74- 74% (Anticipated 30% increase in prevention practices against occupational risks at post intervention)

$$n= \frac{(1.96+0.84)^2(0.44(1-0.44) +0.74(1-0.74)}{(0.44-0.74)^2}$$

$$n=\frac{7.84x0.24+0.19}{0.09}$$

n = 39
However, Estimated Population size (N) was used to determine the number of respondents for the study after calculating the minimum sample size (n), using the formular
N= n / 1-nr
n = minimum sample size
nr = nonresponse rate 10% or 0.1

N = 39/ 1-0.1
N= 39/ 0.9
N=43 + 4 (10% attrition)
N =47

A minimum of forty-seven (47) participants was required but made up to fifty (50) for each study group, totalling one hundred (100) participants. Multistage and Purposive sampling technique was adopted to select the participants for peer led education from the tertiary hospitals.

The instrument for the study was developed to determine the baseline assessment and outcome evaluation of the intervention. It was a structured questionnaire which sought information on the respondent's behavioural factors (practice) which assessed the behaviour of the respondents towards risk prevention practices. The instrument was validated by experts in the field of Nursing, Tests and Measurement. Data collection was carried out using the instruments designed for the baseline assessment before commencing the intervention and end line at 12$^{th}$ week post intervention to measure changes that would have occurred. Data collected were analysed using descriptive and inferential statistics.

## RESULTS

**Research Question 1:** What is the baseline assessment of risk prevention practices adopted by the participants?

**Table 1: Descriptive statistics for risk prevention practices at baseline for control and experimental groups**

| VARIABLES | Maximum Points on Scale of Measure | CONTROL GROUP N=50 | | EXPERIMENTAL GROUP N=50 | |
|---|---|---|---|---|---|
| | | $\overline{X}(SE)$ | ±SD | $\overline{X}(SE)$ | ±SD |
| Infection Prevention Practices | 27 | 14.38(0.63) | 4.45 | 16.92(0.64) | 4.49 |

Table 1 shows the descriptive statistics of risk prevention practices adopted by the participants at baseline for control and experimental groups. The baseline risk prevention practices adopted by the participants mean score of the control group is 14.38±4.45 while the experimental group is 16.92±4.49.

**Research Question 2:** How will the risk prevention practices among the participants be affected by the intervention at 12 weeks follow up?

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**Table 2: Descriptive statistics for risk prevention practices at 12th week post intervention for control and experimental groups**

| VARIABLES | Maximum Points on Scale of Measure | CONTROL GROUP N=50 | | EXPERIMENTAL GROUP N=50 | | Mean Difference |
|---|---|---|---|---|---|---|
| | | $\overline{X}(SE)$ | ±SD | $\overline{X}(SE)$ | ±SD | |
| **Infection Prevention Practices** | 27 | 11.12(0.45) | 3.20 | 17.32(0.34) | 4.78 | 6.20 |

Table 2 shows the descriptive statistics for risk prevention practices at 12th week post intervention for control and experimental groups. The mean score of risk prevention practices at 12th week post intervention for control group is 11.12±3.20 while the experimental group is 17.32±4.78 with mean difference of 6.20 in favour of the experimental group. It could be concluded that the peer-led intervention was effective as there was considerable difference between the risk prevention practices of control and experimental group at 12th week post intervention.

**Test of Hypotheses**

**Ho1:** There is no significant difference in the effect of the intervention on occupational risk prevention practice in the control group between baseline and 12th week follow up.

**Table 3: Inferential statistics of the difference in the effect of the intervention on occupational risk prevention practice in the control group between baseline and 12th week follow up**

| VARIABLES | Maximum Points on Scale of Measure | Baseline N=50 | | Follow-up Post-Intervention N=50 | | *ES (95%CI) | p-value |
|---|---|---|---|---|---|---|---|
| | | $\overline{X}(SE)$ | ±SD | $\overline{X}$ (SE) | ±SD | | |
| **Infection Prevention Practices** | 27 | 14.38(0.63) | 4.45 | 11.12(0.45) | 3.20 | 0.62(0.32 to 0.93) | 0.000 |

**ES; effect size of the control group between baseline and follow-up evaluation computed from Cohen's D, the corresponding 95% CI; and p-value is level of significance*

To determine whether this observed difference was of statistical significance, t-test with effect size was carried out as shown in Table 3 above affirming that, there is significant difference in the effect of the intervention on occupational risk prevention practice in the control group between baseline and 12th week follow up except for infection prevention practice. The difference in the effect of the intervention on infection prevention practices in the control group between baseline and 12th week follow up was significant (ES= 0.62, $p$<0.05).

**Ho2:** There is no significant difference in the effect of the intervention on occupational risk prevention practice in the experimental group between baseline and 12th week follow up.

**Table 4: Inferential statistics of the difference in the effect of the intervention on occupational risk prevention practice in the experimental group between baseline and 12th week follow up**

| VARIABLES | Maximum Points on Scale of Measure | Baseline N=50 | | Follow-up Post-Intervention N=50 | | *ES (95%CI) | p-value |
|---|---|---|---|---|---|---|---|
| | | $\overline{X}(SE)$ | ±SD | $\overline{X}$ (SE) | ±SD | | |
| **Infection Prevention Practices** | 27 | 16.92(0.64) | 4.49 | 17.32(0.68) | 4.78 | -0.7(-0.40 to -0.21) | 0.614 |

**ES; effect size of the control group between baseline and follow-up evaluation computed from Cohen's D, the corresponding 95% CI; and p-value is level of significance*

To determine whether this observed difference was of statistical significance, t-test with effect size was carried out as shown in Table 4 above affirming that, there is significant difference in the effect of the intervention on occupational risk prevention practice in the experimental group between baseline and 12th week follow up except for enabling factors and infection prevention practices. The difference in the effect of the intervention on infection prevention practices in the experimental group between baseline and 12th week follow up was significant (ES= -0.70, $p$>0.05).

## DISCUSSION OF FINDINGS

It was revealed that the baseline risk prevention practices adopted by the participants mean score of the control group is 14.38±4.45 while the experimental group is 16.92±4.49. The mean score of risk prevention practices at 12th week post intervention for control group is 11.12±3.20 while the experimental group is 17.32±4.78 with mean difference of 6.20 in favour of the experimental group.

Display of graphic safety precautions, ongoing teaching, and monitoring were recommenced after the study by Elamin et al. (2020) in Sudan found that medical waste handlers' safety practice was poor despite strong knowledge, likely due to their literacy level. Although Kumar, et al. (2015) hypothesized that ongoing training on medical waste management and risk reduction would raise the knowledge of medical waste handlers, their study did not evaluate the impact of the intervention on the practice. After the intervention, students' knowledge increased by over 50%, according to the study.

In an interventional study on the effectiveness of educational intervention on risk preventive practices among 187 waste handlers in Karad, India, Pratinidhi, et al. (2014) found that safety practices such as hand washing before and after waste handling, the use of personal protective

equipment (PPE), and spillage management were subpar prior to intervention, with a mean of 7.8 + 3.8 and 21.6 + 3.8. Following the educational intervention, students showed statistically significant gains in both knowledge and application. Training that included both audio and visual elements was found to have a more profound effect on respondents than audio alone.

About half of the participants in an Egyptian study on the effects of training health workers to be more knowledgeable about waste management were illiterate, while only 28% had received risk exposure prevention training in the year prior to the study. However, participants' knowledge of the health risks posed by waste was high before the training (91%), and it rose to 97.5% afterward. However, only 53% had implemented proper waste segregation practices. Prior to the course, nearly all participants displayed a lack of adherence to using proper, adequate, and complete PPE. The training resulted in an improvement in participants' ability to practice safety, thus the group argued for further training, along with improved administration, sufficient regulation, and sufficient funds for waste management.

## CONCLUSION

The study concludes that peer led educational intervention programs was effective in improving risk prevention practices among the medical waste handlers.

### Recommendations

Based on the findings from the study, the following are hereby recommended

1. Major stakeholders in the ministry of health and health institutions should adopt peer led education in the training of the medical waste handlers
2. Developing and making available information, education and communication (IEC) materials and other job aids on standard precaution in all health institutions
3. The employers of health should regularly provide safe environment, safe equipment and personal protective equipment to aid risk prevention practices
4. Stakeholders should provide adequate vaccination against blood borne infections in the health institutions

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