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Research Article

Investigation of Healthcare Waste Management Practices in Healthcare Departments of Federal University of Allied Health Sciences Enugu (FUAHSE) Nigeria

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Abstract

The alarming rate at which healthcare wastes are produced in healthcare setting has become a great source of concern due to the dangers associated with them. This research investigated the practical ways of managing biomedical wastes produced by the healthcare departments of Federal university of Allied health Sciences Enugu (FUAHSE). This study established common practices used in managing healthcare wastes in the university, the types of biomedical wastes generated within healthcare departments, assessed their compliance to standard regulations, ascertained how the healthcare care workers manage the wastes generated, identified barriers the healthcare departments face in implementing regulation and identified strategies for improving practices within the departments. The Health Belief Model theory which helps to explain the knowledge, attitude and respondents' behaviors, the planned behavior theory which examined the effects of the respondents' attitude on their practices, environmental management theory and Systems theory which examined how the interdependent units within the university interact to influence the effectiveness of practice in the university formed the theoretical basis of the study. Sixty-five respondents were chosen randomly with each department treated as a stratum and the respondents were selected within each stratum. Structured questionnaires and observation checklists were used as instruments for data collection while data was analyzed using descriptive statistics. The outcome of the study, indicates that the practices of the healthcare departments regarding healthcare wastes were very poor. The major challenges identified were inadequate training, lack of sufficient resources and equipment, lack of standard regulation enforcement. The study recommended provision of adequate resources and equipment, continuous staff training and improved policies enactment to enhance practices.

Keywords

Healthcare Departments, Polices, Practice, Regulations, Questionnaire, Fuahse

1. Background of the Study

Health care wastes produced during patient treatment can pose great dangers to the surrounding environments. Effective management of such wastes remains critical in ensuring public and environmental safety especially in public healthcare institutions where there is a daily generation such hazardous waste. The different categories of healthcare wastes include

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dental wastes, pressured container wastes, pathological wastes, chemical, pharmaceutical wastes among others. Inadequate management of these categories of wastes can cause disease spread, contamination of the environment as well as result to serious legal consequences for such healthcare institutions. The management of healthcare wastes produced during treatment procedures in developing countries particularly Nigeria has raised a growing concern as a result of key challenges such as limited resources, weak enforcement of standards and regulations as well as lack of training and awareness among healthcare workers. These challenges appear very relevant especially in academic healthcare institutions where multiple departments generate diverse categories of healthcare wastes on daily basis. This research studied the healthcare waste management practices of the healthcare workers in the healthcare departments of Federal University of Allied Health Sciences Enugu (FUAHSE), Nigeria. The current practices of health care waste management were assessed and the gaps on compliance with regulatory standards were identified and improved practice strategies were recommended.

1.1. Statement of Problem

Health care waste have become a major public health issue in developing nations of the world. In a university with health care departments, there are large populations who may be exposed to health dangers due to poor management of the wastes produced from such departments. There are the students, staff, patient who come for treatment and the neighboring communities in and around the university. Although there are existing regulations regarding the management of such wastes, literature revealed that health care workers have neglected these regulations and exhibited very poor practices regarding health care waste management. Similar studies have been carried out in other universities with health care departments in other African countries and in other parts of Nigeria but no such study has been undertaken in the healthcare departments of federal university of allied health sciences Enugu, Nigeria, which is currently beaming with academic activities, increased staff and student population as well as influx of patients visiting the dental clinic, dental laboratory and the medical centre of the university on daily basis. Moreover, the university is located in the urban center of the state surrounded by many office accommodations and houses occupied by families and nearby communities whose lives may be exposed to serious health dangers if proper practices of healthcare waste managements are not adhered to. There exist no current empirical data showing the level of practice and compliance to standard waste handling procedures for health care wastes within the various healthcare departments of the university. Hence the relevance of this study to fill these existing gaps and improve the practice of health care waste management among the healthcare workers of the university.

1.2. Research Questions

1) What practices regarding healthcare waste management exist in the healthcare departments of FUASE?
2) What categories/types of health care wastes are produced by the healthcare departments of FUASE?
3) What level of compliance to standard health care wastes management regulations exist in healthcare departments of FUAHSE?
4) What barriers/challenges militate against standard practice of health care waste management protocols in the health care departments of the university?
5) What strategies are recommended for improving health care waste handling practices in health care departments of FUAHSE?

1.3. Objectives of the Study

1) Identify Practices regarding healthcare wastes existing in healthcare departments of FUAHSE.
2) Highlight categories/types of healthcare wastes produced by healthcare departments of FUAHSE.
3) Show compliance level to standard health care waste management regulations by FUAHSE healthcare departments.
4) Identify the barriers/ challenges militating against standard practice of healthcare waste management protocol in the healthcare departments of FUAHSE.
5) To recommend strategies to improve health care waste handling practices in the health care departments of FUAHSE.

2. Literature Review

“Getasew, Amha, Amsalu & Wubamte, conducted a cross-sectional study to assess the biomedical waste management practices and associated factors among healthcare workers during Covid-19 pandemic in Ethiopia using a simple random sampling technique to select 431 participants with questionnaire and observational checklist as instruments for data collection [1]. The outcome of their study showed low standard practice of healthcare waste management. The study area was significantly influenced by educational level, color-coded three bins availability, training on management of healthcare waste, healthcare workers attitudes among other factors. The study recommended an in-service training for the healthcare workers to improve biomedical waste management practices.

“Nazia, Zaid, Babak, evaluated the level of practice regarding the management of healthcare wastes among health practitioners in public sector health institutions in Faisalabad Punjab Pakistan using quantitative design with 500 respondents comprising of 280 Doctors and 220 Nurses in the various departments of the health institution [2]. Questionnaires were used as instrument for data collection. The result of the study

showed that despite the existing hospital waste management rules and the biomedical waste management committees of the hospital, the healthcare waste management practices does not meet up to the national and international standards on biomedical waste management practices.

"Aruna, Khaiwal, Manmeet, Rajesh, evaluated the practice employed in managing biomedical wastes in Punjab India among health care facilities with WHO modified tool across 120 healthcare facilities using random sampling from rural and urban environments [3]. The result of study showed that regular training on how to manage biomedical wastes, multi-sectoral coordination and improved infrastructure can greatly improve practices.

"Afesi-Dei, Appiah-Brempong & Awuah, evaluated the knowledge and practice of healthcare workers on guidelines for managing healthcare wastes, rate of waste generation and frequency of sharp injuries in a Ghanaian health care institution [4]. Their study employed the use of questionnaire and observations as instruments for data collection from 100 participants. The result revealed that 52% had a knowledge of the hospital waste management policy, 89% had training on biomedical waste management though with a non-functional waste management committee. They recommended that encouraging the waste management team to ensure strict adherence to waste management rules will improve the waste management practice in the hospital.

"Agyekum & Ansah, investigated the knowledge of healthcare and management staff of Cape coast hospital regarding health-related hazards during medical procedures [5]. The study randomly selected 320 health personnel from two selected hospitals and interviewed seven management staff. The result showed that over 90% of health professionals where properly informed about management of biomedical waste and hence exhibited high compliance with safety guidelines, but the facility had very poor arrangements for managing health care waste. Hence the study recommended that a well-arranged training with an adequate storage facility for biomedical waste and a good supervision at the point of waste generation should be encouraged.

"Ironkwe, investigated the patterns of healthcare waste management among health professionals at the primary healthcare centres in South-east Nigeria and found a strong pattern of healthcare waste management among the professionals working at the health centers which showed a reasonable level of practice [6].

"Abdulla, Qdais & Rabi, evaluated the common practices employed in handling medical wastes by health institutions in Northern Jordan using observations, inspections and field visits [7]. The result showed a predominant improper method of medical waste segregation in the health institutions indicating the need for training and capacity building programs for all staff of the hospitals involved in medical waste handling.

"Adede & Sawyeri, assessed the influencing factors for choosing methods and equipment for handling health care wastes among tertiary health care facilities in Ekiti state Nigeria, using questionnaire and descriptive research design [8]. The outcome of the study showed that all factors tested had a 0.01 significance level. Infectious waste had a maximum relative importance index of 0.831 while cultural and social basis had the least relative importance index of 0.597. The study concluded that the tested factors inform the choice of method employed in managing biomedical wastes.

"Shalini, Harsh & Marthur, studied the current healthcare waste practices in tertiary healthcare facilities using semi structured interview for data collection [9]. The result showed that M. L. B medical college generated the highest quantity of medical waste from the wards with a daily quantity of 0.52kg. The segregation practice was poor despite the existence of separate color-coded bins. There was also poor observance of safety measures among the health workers due to poor knowledge of the health hazards associated with improper practice of biomedical waste management.

"Davou, Gbegnide, Aina & Ouendo, in a study used descriptive cross-sectional design to evaluate the practices employed in managing solid health care wastes in Southern Benin using six selected healthcare facilities [10]. They used questionnaires, interviews and observations for data collection from 431 healthcare agents and 12 administration agents selected by convenience and reasoned choice respectively. Their result showed lack of solid biomedical waste management database, nonsystematic sorting of the waste, non-standard compliant storage facility and exposure of one in every 4-health worker to injuries associated to biomedical waste. Hence recommendations were based on ensuring continuous training for all the medical staff and setting up of an efficient and sustainable solid healthcare waste handling system with effective monitoring.

"Uzeudu, Ezeudu, Ugochukwu, Tenebe, Ajogu, Nwadi & Ajaero, examined previous researches to assess the practices of medical waste management in Nigeria [11]. They highlighted the waste generation, segregation, collection, containment, conveyance, treatment and disposal. Other factors such as regulatory framework, waste categorization, staff training as well as obstacles and prospects facing impactful healthcare waste management in Nigeria were also reviewed by the study. Poor financial support, substandard training of health personnel, weak legislative body were isolated as barriers to effective practices of healthcare waste management in Nigeria.

"Raji & Adeogun, carried out a study on the overview of the earlier works done globally on healthcare waste management practices particularly on low- and middle-income countries [12]. The study laid strong emphasis on how the healthcare wastes are segregated, treated, collected, carried, relocated and discarded. The research underscored the environmental threats associated with every stage of the management of the healthcare waste as well as the various factors that affect the practices. The outcome of the study unveiled the fact that low- and middle-income countries of the world

showed proof of poor practices of healthcare waste management. The influence of manmade and natural factors on the practices of healthcare waste management was also disclosed. Factors such as appropriate budget, detailed records, regular workshop for health personnel, design of local instructional materials and guidelines along side reliable provision of materials for health facilities waste management were listed as fundamental requirements for the achievement of efficient and long-lasting healthcare management system of any nation. The study suggested the exploration of contemporary technology such as Artificial intelligence (AI) and geographic information system for real-time prediction and monitoring of healthcare waste.

"Affordofe, Udofia, Koranteng, Tetty, Botwe, Akyeampong, Andoh, Peprah, Attah, Tabong, Boateng &Quansah, conducted a study using a descriptive phenomenology design [13]. Thirty-one participants from three hospitals namely: Korle Bu Teaching hospital, Tema General hospital and Shai-Osudoku hospital were used to evaluate the knowledge and practice of solid healthcare waste management among waste handlers in southern Ghana. Focus group discussion guide, transcribed audio-recorded interviews and NVivo 14 software for coding uploaded data were used in the study. The result revealed that many of the participants were not vaccinated for infection control, the various categories of wastes were not managed at all and the wastes were poorly transported which resulted in injuries to the waste handler from sharp wastes and exposure to infections. Though the participants had knowledge of the various healthcare wastes, they lacked the ability to label the waste containers according to national codes for identifying dangerous and general wastes. The research suggested the improvement in the use of Personal protective equipment (PPE), immunization, use of color-coded waste containers and regular training of the personnel to enhance effective practice of healthcare waste management and the promotion of public health.

"Ibanez-Cruz, Vergara-Florian & Algoner, conducted a research on mitigating the risk of nosocomial infections in healthcare personnel exposed to bloodborne pathogens among private clinics with emphasis on hospital solid waste management and the effects on occupational health and safety [14]. Six sessions were used to highlight safety, collection, segregation, storage and transportation of solid wastes. The result revealed that 232.76kg waste produced per day was bio contaminate, 11.23kg waste produced per day was special waste while 218.58kg waste produced per day was joint waste. The study showed that only three cases of infection were reported, two cases in the month of August and one case in September and non in the remaining months of the year. The study showed that efficient solid hospital waste management, good practices supported by proper training of staff reduced the spread of hospital infection to a very great extent.

"Çetin, Hussein, & Durak, in a study, evaluated the patterns of waste generation, accuracy of classification and the influence of training on compliance to regulatory protocols in a microbiology laboratory of a university hospital using survey [15]. The study was used to assess the knowledge of handling medical waste among the three-hundred and four (304) healthcare workers who participated in the research. Wastes obtained from six units were categorized and weighed daily for more than 45 days. 22.78kg of the waste generate per day was medical waste, 11.6kg waste per day was liquid and 5.61kg waste per day were sharps, with the bacteriology unit contributing the largest waste daily. The result showed that the frequency of training is an important factor in predicting compliance when compared with years of experience which showed no observable effects. Serious lapses were observed in the practices irrespective of the existence of general awareness among the participants. This was made obvious as 15% of the health workers still could not classify toxic wastes appropriately. The study reenacted the importance of continuous training of personnel, enhanced systems for monitoring, improved labelling of medical waste containers as well as the introduction of digital tracking tools to help in reducing environmental problems and to improve sustainability of the healthcare system.

3. Methodology

The study was conducted using a descriptive cross-sectional design focusing on the four healthcare departments of the university namely: Medical center, Dental surgery clinic, Dental Therapy clinic and Dental Technology Laboratory. The study population include doctors, nurses, dental technologists, dental therapists, laboratory staff, cleaners and university administrators in the selected departments. Structured questionnaires, observation check list as well as oral interviews were used for data collection. A sample size of sixty-five participants were selected with stratified random sampling technique with each department treated as a stratum and the participants were selected within each stratum. Descriptive statistics were used to summarize findings. Data from interviews were analyzed to identify insight and patterns. The ethical committee and review board of the university provided the ethical approval following a formal request by the researchers. Participant's information was anonymized to maintain confidentiality and to protect their identity.

4. Result and Discussions

Sixty -five questionnaires were distributed among the participants and sixty were properly filled and returned. Hence the analysis was based on the sixty participants who filled and returned the questionnaire properly.

Table 1. *Showing Healthcare waste practices in the healthcare departments at Federal University of Allied Health Sciences Enugu. (FUAHSE).*

Knowledge of healthcare waste practices	Frequency of responses	Percent
Yes	30	50%
No	30	50%
Total	60	100
Responses on Receiving training on biomedical waste management	Frequency	Percent
Displayed improved practices especially on use of personal protective equipment for safety and disinfection of solid surfaces	31	51.7%
Displayed no change in practice following training	29	48.3%
Total	60	100
Methods for Treating Biomedical Waste	N	Percent
Autoclaving	10	16.7%
Incineration	25	41.7%
Microwaving	2	3.3%
Chemical disinfection	13	21.7%
Other treatment methods	10	16.6%
Total	60	100
How Treated Biomedical Wastes are disposed	N	Percent
Landfill	13	21.7%
Burial	13	21.7%
Open burning	26	43.3%
Other disposal methods	8	13.3%
Total	60	100

Results obtained from Table 1, showed that 30 (50%) of the respondents had knowledge of health care waste practices with a "YES" response and acknowledged that the healthcare workers of the university were not adhering to the standard protocol on healthcare waste management, while 30 (50.0%) of respondents had no knowledge of the ideal practices expected of them indicated with their "NO" responses. These respondents could not say whether the healthcare workers of the university were compliant to the healthcare waste standard protocols or not. This result showed that half of the population of healthcare worker at Federal University of Allied Health Sciences Enugu state Nigeria, knew about the regulations but were not adhering to them while the other half had no knowledge of these regulations at all and could not have practiced the ideal protocols of healthcare wastes. 31 (51.7%) of the health workers of the university had received training on how to manage healthcare waste which improved their methods of handling the wastes especially in the use of personal protective equipment for safety and solid surfaces disinfection, while 29 (48.3%) had displayed no change in practices following training. The result also showed the incineration method 25 (41.7%) as the commonest method for treating biomedical waste in the healthcare departments of the university while microwaving 2 (3.3%) was the least used method. Methods such as autoclaving, 25 (41.7%), chemical disinfection 13 (21.7%) and other treatment methods 10 (16.6%) were also used in the healthcare departments.

Disposal of the treated biomedical wastes section from this table, showed that open burning method of disposal ranked the highest with 26 (43.3%), Other methods of disposal had the least responses with 8 (13.3%) while Landfill and burial methods got equal responses of 13 (21.7%) each. This result showed that open burning was the common practice for disposing treated biomedical waste in the health care departments of the University.

Table 2. *Categories/ types of healthcare Wastes produced by healthcare departments of FUAHSE.*

Categories of Biomedical Wastes	Responses	Percentage
Infectious Waste	36	60.0%
Sharps	10	16.7%
Pathological Wastes	8	13.3%
Chemical Wastes	6	10.0%
Total	60	100%

The Healthcare Wastes generated by healthcare departments within the university were categorized into four as shown on Table 2, namely: Infectious waste, Sharps, Pathological and Chemical Wastes. Infectious waste ranked highest s with 36 (60%) responses, sharps had 10 (16.7%) responses, pathological waste had 8 (13.3%) responses, with chemical waste as the least in the category having only 6 (10%) responses.

Table 3. *Compliance level to standard healthcare waste management regulations by FUAHSE healthcare departments.*

Medica l center		Dental surgery clinic	Dental Therapy Clinic	Dental technology laboratory	
Section A: Waste Segregation					
1	Segregation At Source				
	Availability of waste bins in all relevant area	NIL	NIL	NIL	NIL
	Availability of different colored bins for different types of waste	NIL	NIL	NIL	NIL
	Availability of staff trained in waste segregation practices	NIL	NIL	NIL	NIL
	Availability of labels/signs on waste bins.	NIL	NIL	NIL	NIL
2	Compliance And Monitoring				
	Regular monitoring of segregation practice	NIL	NIL	NIL	NIL
	Are records of waste segregation maintained?	NIL	NIL	NIL	NIL
	Availability of penalties for noncompliance	NIL	NIL	NIL	NIL
Section B: Waste Storage					
1	Storage Conditions				
	Availability of designated storage area for biomedical waste	NIL	NIL	NIL	NIL
	Availability of secured storage area with restrained access.	NIL	NIL	NIL	NIL
	Availability of clearly labelled storage containers	NIL	NIL	NIL	NIL
	Different types of waste stored separately	NIL	NIL	NIL	NIL
	Storage conditions compliant with regulatory standards	NIL	NIL	NIL	NIL
	Proper management of overfilled storage containers	NIL	NIL	NIL	NIL
2	Storage Duration				
	Biomedical waste stored more than 48hrs	YES	YES	YES	YES
	Availability of records of the duration of waste storage?	NIL	NIL	NIL	NIL
Section C: Waste Transportation					

Medica l center		Dental surgery clinic	Dental Therapy Clinic	Dental tech-nology la-boratory	
1	Internal Transportation				
	Availability of trolley/carts for biomedical waste transportation within the facility?	NIL	NIL	NIL	NIL
	Availability of clearly defined waste transport routes.	NIL	NIL	NIL	NIL
	Availability of sealed and leak proof transport containers.	NIL	NIL	NIL	NIL
	Availability of protocols to minimize spillage during transportation.	NIL	NIL	NIL	NIL
2	External Transportation				
	Availability of a licensed external agency for waste transportation	NIL	NIL	NIL	NIL
	Compliance of transportation vehicles with safety regulations	NIL	NIL	NIL	NIL
	Availability of maintained transport manifest	NIL	NIL	NIL	NIL
	Waste tracking from generation point to final disposal	NIL	NIL	NIL	NIL
Section D: Final Disposal					
1	Disposal Methods				
Use of standard disposal methods.		NIL	NIL	NIL	NIL
Availability of disposal methods compliant with national regulations?		NIL	NIL	NIL	NIL
2	Disposal Facilities				
Availability of licensed and regulated disposal facilities.		NIL	NIL	NIL	NIL
Availability of regular audits of disposal Facilities		NIL	NIL	NIL	NIL
Availability of documented of waste disposal methods Section E: Staff Training and Safety		NIL	NIL	NIL	NIL
1	Training Programs				
	Staff trained on waste management practices	NIL	NIL	NIL	NIL
	Availability of a documented training schedule	NIL	NIL	NIL	NIL
	New staff induction and training on waste management	NIL	NIL	NIL	NIL
2	Safety Measures				
	Provision of Personal Protective Equipment (PPE) for staff	YES	YES	YES	YES
	Awareness of protocols by staff in case of exposure or spillage	NIL	NIL	NIL	NIL
	Availability of recordings of staff injuries related to biomedical waste management	NIL	NIL	NIL	NIL
Section F: Documentation & Compliance					
1	Records And Documentation				
Availability of comprehensive records of waste generation, segregation, storage, transportation and disposal		NIL	NIL	NIL	NIL
Availability of regularly updated and reviewed records		NIL	NIL	NIL	NIL
Availability of a waste management policy in the facility		NIL	NIL	NIL	NIL
2	Regulatory Compliance				
Compliance with national and state Regulations		NIL	NIL	NIL	NIL
Regular inspections by health authorities in the healthcare facilities of the university		NIL	NIL	NIL	NIL
Availability of corrective action plan for non-compliant issues.		NIL	NIL	NIL	NIL

Information in Table 3 shows the responses obtained using the observatory check list for the four healthcare departments in the university namely: medical center, dental surgery clinic, Dental therapy clinic and the Dental technology laboratory to determine the compliance level to standard healthcare waste management regulations. Observatory checklist was divided into sections A to section F, capturing all the required standards and regulations for healthcare waste practices. Result showed a very poor compliance to the regulations. There was no form of biomedical waste segregation, no form of monitoring for compliance, no clearly labelled storage containers for wastes, no form of compliance to standard internal and external transportation of healthcare wastes within healthcare departments of the university. Training and safety programs to comply with standards were lacking with the exception of provision of personal protective equipment which was insufficient to establish compliance to the international and national regulatory standards and there were no penalties for non-compliance. The result also showed that there were no comprehensive records of how healthcare wastes are generated, separated, stored, transported and disposed in the departments hence there were no records to be reviewed or updated in the future. The university healthcare departments lacked policies on healthcare management to monitor compliance by the healthcare workers. Further observations revealed that there were no inspections by health authorities and no action plan in place for non-compliant issues in the departments.

The barriers/ challenges militating against standard practices of healthcare waste management in the healthcare departments of FUAHSE is shown on Table 4. The result showed that insufficient resources and equipment 20 (33.3%) posed the greatest challenge and was a big barrier to practice of standard protocols of healthcare waste handling in the university healthcare departments. The result also indicated that even though few equipment and resources were available, they were grossly insufficient to enable standard practices in the departments. Other barriers and challenges identified in their ranking orders were; No training for healthcare workers 18 (30.0%), inadequate staffing 10 (16.7%), lack of awareness 7 (11.7%), financial constrains 4 (6.7%) and others 1 (1.6%).

Table 4. *Barriers/Challenges militating against standard practices of health care waste management in healthcare departments of FUAHSE.*

Responses		Percent
No Training for healthcare workers	18	30.0%
Insufficient resources and equipment	20	33.3%
Inadequate staffing	10	16.7%
Lack of awareness	7	11.7%
Financial constraints	4	6.7%
Others	1	1.6%
Total	60	100

Table 5. *Showing recommended Strategies for improving health care waste handling practices in health care departments of FUAHSE?*

Responses		Percent
Regular training programs	49	81.7%
Improved waste segregation practices	2	3.3%
Better waste collection and transportation system	1	1.7%
Enhanced waste treatment and disposal facilities	2	3.3%
Increased funding and resources	2	3.3%
Stronger regulatory enforcement	3	5.0%
Other strategies	1	1.7%
Total	60	100%

Information from Table 5 shows the recommended strategies for improving healthcare waste handling practices in the health care departments of the university. Result showed that regular training programs for staff with the highest response 49 (81.7%) is a major recommended strategy for improving standard practices in healthcare waste handling in the health care departments of the university. Other recommended strategies include improved waste segregation practices 2 (3.3%), better waste collection and transportation system 1 (1.7%), enhanced waste treatment and disposal facilities 2

(3.3%), increased funding and resources 2 (3.3%), strong regulatory system 3 (5.0%) and other strategies 1 (1.7%).

5. Discussions

The practices of health care waste handling in FUASE have been shown to be very poor from the present study. Results indicate that the practices fall significantly below the standard protocols for healthcare waste handling. while some health workers had knowledge of the protocols on health care waste management, lack of a structured system, inadequate resources and infrastructures as well as lack of policy enforcements negatively affected the practices in the departments of the university. This result aligns with that obtained by [1]. Their study similarly reported low level of practice due to inadequate infrastructure, poor staff training and absence of policy enforcement. No correlation existed between staff knowledge and practices as highlighted in this study. This also aligns with [5, 9], who noted that awareness alone does not ensure effective waste management unless supported by consistent policy implementation and resources. Key challenges and barriers identified notably insufficient resources equipment, lack of training, inadequate staffing financial constraint and lack of awareness are consistent with challenges and barriers reported by [3, 10]. Their findings highlighted the systemic nature of healthcare waste handling failures in similar low-resource settings such as the University under study.

6. Conclusion

The health care waste handling practices in the health care departments of FUAHSE fall significantly below the standard protocols. This study showed that insufficient resources and equipment, no training for the healthcare workers, absence of a structured healthcare waste handling policy system and its enforcement in the University healthcare departments have hindered standard practices. However, the findings of this study mirror the trends observed in similar contexts across Africa and Asia, emphasizing that successful healthcare waste handling practices depend on a coordinated approach involving policy formulation, staff training, equipment and infrastructure provision, with regular monitoring. Therefore, it is recommended that immediate interventions on healthcare waste handling be enacted in the university to bridge these gaps identified in this study in order to safeguard public and environmental health. Also, adequate resources and equipment for managing healthcare wastes be provided in the various healthcare departments, regular staff training programs and improved policies and monitoring strategies on health care waste practices be enacted in the university.

Abbreviations

Fuahse	Federal University of Allied Health Sciences Enugu
Who	World Health Organization
MLB Medical College	Maharani Laxmi Bai Medical College
AI	Artificial Intelligence
PPE	Personal Protective Equipment

Conflicts of Interest

The authors declare no conflict of interest.

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