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Geospatial Assessment of Medical Emergency Response Competencies in the Federal University of Petroleum Resources Effurun, Delta State

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ABSTRACT

This research on Medical Emergency Response and Management, conducted to addresses the increasing prevalence of medical emergencies and the inadequacies in response measures. Using the Federal University of Petroleum Resources as case study, the research assessed medical emergency response resources against the Offshore Petroleum Industry Training Organization Medical Emergency Response Procedure criteria as standards to evaluate their sufficiency. Findings revealed that the competency level of medical emergency response personnel at FUPRE fell short of the criteria standard, particularly due to the absence of Tier 0 and Tier 1 competencies, as well as critical First Aid equipment such as Automatic External Defibrillator. While 71.6% of respondents reported recognizing or witnessing a medical emergency, only 9.5% were aware of the emergency call number pertaining to medical emergencies. Statistical analysis showed P-values of 1.96E-5 and 3.26654E-77 for Tiers 0 and 1 competency, respectively, indicating a significant need for formal competency development, as these values were below the 0.05 threshold. Consequently, the null hypotheses were rejected, affirming the necessity for formal competency development training for Tier 0 and Tier 1 MER personnel. The study concludes with recommendations for management and government-driven policies to establish humanitarian organizations, such as the Nigerian Red Cross, within public institutions to close competency gaps. It also advocates for continuous education to raise awareness and increase funding to address these deficiencies, in line with Sustainable Development Goal 3, which focuses on promoting health and well-being for all.

1. INTRODUCTION

Emergency situations have become a common experience in recent time and more remarkable fact is that their occurrence is not location specific. The daily commuting to and from workplaces, hostels to lectures and living generally comes with their challenges. These challenges often result in incidents of accidents leading to situations of medical emergencies

These challenges have often resulted in incidence of accidents leading to situations of medical emergencies. Reed (2010) described a medical emergency as being characterized

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by acute injury or illness that poses an immediate risk to a person's life or long-term health effect. It could be any problem of a medical and / or surgical nature that appears abruptly - often without signs prior to its appearance - in a person and that could affect the viability of any of their vital organs or has the risk of leading to a life-threatening disorder. Emergencies situations are often a product of disasters and sudden health concerns and which may require assistance from competent personnel who have received adequate training and relevant qualification.

The operationalization of Medical Emergency Response (MER) plan in Nigeria has not been well organized nor documented (Sankey *et. al* (2014); Ogunleye and Olusola 2019). Mac.et al (2019) in their appraisal of medical emergency response in Nigeria noted that the Federal Government established the Federal Road Safety Commission (FRSC) and the National Emergency Management Agency (NEMA) in 1988 and 1999 respectively as part of efforts to demonstrate readiness for medical emergency response. While the former was aimed as preventative in approach by checking to ensure vehicles are road worthy to minimize accidents on road that will lead to medical emergencies, the latter is saddled with the management of medical emergencies arising from disaster incidents like fire outbreaks, disease epidemics, flood disasters as well as road traffic accidents.

Sankey *et al.,* (2014) studied safety awareness of emergency amongst university students in North Western Nigeria and reported poor awareness amongst the study population. Indicators evaluated are first aid awareness, emergency telephone numbers to call the ambulance and fire service amongst others. Ogunleye and Olusola (2019) observed from their research on 'Evaluating Disaster Preparedness amongst University Learners' and concluded that disaster education response and preparedness mechanism amongst undergraduates in Ekiti State University was very poor, thus they proposed for a systematic disaster preparedness course that will include rescue drills in institutions of higher learning. Similarly, Ilo et al. (2020) further studied 'emergency preparedness and control' in Nigerian University libraries where they focused on Library personnel awareness of emergency response plan; their forms and roles in safety and routine preparedness and control' in Federal and State University libraries in Southwest Nigeria. They observed from their study that the libraries studied were extremely lagging in the areas of documenting plans for routine emergency response and that response preparedness from the study population whether written or unwritten was not perceived to be effective and hence concluded that emergency response in Nigerian institution is rather too simplistic and doubtful if it exists. It is obvious from the above that the level of awareness of medical emergency response plan or procedure is rather poor from the studies above.

Azumi (2021) Okpalla *et al* (2022) identified the key professionals required in medical emergency response management as first responders, first aiders, medical doctors, nurses and other paramedics. The first responder is anyone/everyone at the scene of the emergency, and represent the Tier 0 person; the first aider is the Tier 1 professional who have been trained to competency to provide skilled assistance to the injured prior to the arrival of the tier 2 who are the (Nurse or nurse) as the case maybe.

The Offshore Petroleum Industry Training Organization (OPITO) criteria used as framework for this study provide a standard

for the operationalization of medical emergency response procedure (MERP) also recognized the roles and functions of the first responders and designated First Aiders (DFAs) as frontline Medical Emergency Response Procedure (MERP) professionals. (OPITO MERP, 2019 section 2-pg 10-15).

2. MATERIAL AND METHODS

The research adopted a mixed method approach in the execution of this project. The mixed method is a blend of the quantitative and qualitative methods. The qualitative methods entail the use of Key Informant interviews (KII) and Focus Group Discussions (FGD) by engaging groups with domain experience and key stakeholders in interview session and their responses evaluated against set criteria. The quantitative methods involve the empirical collection of data relevant to the subject matter and subjecting such data to scientific analysis for the purpose of drawing conclusions that leads to formulation of theories and postulation of scientific laws.

The Offshore Petroleum Industry Training Organization (OPITO) MERP criteria was used as standard to evaluate and determine the competency development and maintenance requirement for an adequate and effective implementation of medical emergency response.

Also structured questionnaire was used to explore perception and knowledge of respondents on the theme and more specifically, Tiers 0 and 1 core competencies was explored through the questionnaire survey to determine levels of awareness and competencies for development and deployment for sustainability.

The result of the questionnaire survey is presented in tables, and figure in the proceeding sections. Also, the data was further subjected to statistical analysis to validate the stated hypotheses.

3. DATA PRESENTATION AND ANALYSIS

The data collected from the questionnaire survey was analyzed statistically and presented in tabular form and discussed in the following sub-section.

3.1 Demographic Characteristics of Respondents

3.2.1 Respondent's category

The Table 1 shows the categories of the respondents that participated in the questionnaire survey. Of the 419-questionnaire analyzed 260 representing 62.1% were students, 39 representing 9.3% were academic staff, while 120 respondents were non-academic staff, representing 28.6%.

Table 1: Categories of Respondents

Respondent's Categories	Frequency	Percentage	Cumulative Percent
Student	260	62.1	62.1
Academic Staff	39	9.3	71.4
Non-Academic Staff	120	28.6	100
Total	419	100.00	

3.2.2 Genders of Respondents

With respect to the sex of the respondents, only 65 respondents which represent 15.5% of the sample population were male, while

354 of the respondents representing 84.5% are female as shown in Table 2 which indicate that more female participated in the questionnaire survey.

Table 2: Genders of Respondents

Respondent's Gender	Frequency	Percentage	Cumulative Frequency
Male	65	15.5	15.5
Female	354	84.5	100
Total	419	100	

3.2.3 Ages of Respondents

The age distribution of the respondents as shown in Table 3 indicates that majority of the respondents are between age cohort of 15-25years and which represents 49.2% are within the age cohort of 15-25years; 54 respondents which represent 12.9% are within the cohort of 26-35years and 70 and 89 respondents representing 16.7% and 21.2% respectively belong to the age cohorts of 36-45years and 45years and above.

Table 3: *Ages of Respondents*

Age Cohorts	Frequency	Percent	Cumulative Frequency
15-25 years	206	49.2	49.2
26-35 years	54	12.9	62.1
36-45 years	70	16.7	78.8
45-above	89	21.2	100
Total	419		

3.2.4: Respondent's Academic Levels for Students

Table 4 indicate the distribution of the respondent's academic level as shown below; the table 4.4 indicate that more 100 levels students participated in the survey, 113 students representing 43.5% belong to this category, 85 respondents (32.7%) were 200levels, 300 and 400levels respondents recorded 23 and 14 (8.8% and 5.4%) respectively while 500level students recorded 25 respondents representing 9.6%.

Table 4: Respondent's Student Level

Level	Frequency	Percent	Cumulative Frequency
100	113	43.5	43.5
200	85	32.7	76.2
300	23	8.8	85.0

400	14	5.4	90.4
500	25	9.6	100
Total	260		

3.2.5 Medical Emergency Awareness and Recognition

The section sought to know if respondents know what a medical emergency means and if they had witnessed any in the study area. The response on Table 5 and Figure 1, indicate that 300 respondents representing 71.6% agree to witnessing a medical emergency in the University, 100 and 19 respondents representing 23.9% and 4.5% respectively disagreed and are not aware implying that they have neither witnessed a medical emergency nor aware of such incident in the study area.

Table 5: Medical Emergency Awareness and Recognition

Ever Witnessed a Medical Emergency	Frequency	Percentage	Percent
Agree	300	71.6	71.6
Disagree	100	23.9	95.5
N/A (Not Aware)	19	4.5	100.0
Total	419	100.0	

Figure 1 gives a visual representation of the numbers in table 5.

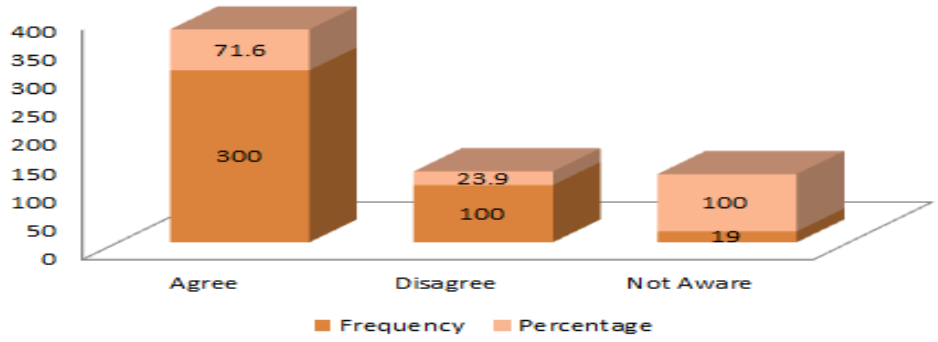


Figure 1: Awareness of Medical Emergency

3.2.6: Awareness of Health Centre Emergency Call Number

The Table 6 and Figure 4.2 below, show that only 40 respondents representing 9.5% agreed to knowing or are aware of numbers to call for help in an emergency to notify the Health Centre of a medical emergency, the remaining 379 respondents representing over 90.4% of the respondents are not aware nor disagree to knowing any number to call during a medical emergency. This result corroborates the fact that there is no sight of any emergency number posted anywhere especially in the student's hostel or lecture

theatres to make students and staff aware of emergency call numbers.

Table 6: Awareness of an Emergency Call Number

Emergency Call number	Frequency	Percentage	Cumulative Percent
Agree	40	9.55	9.5
Disagree	350	83.53	93.0
N/A	29	6.92	100.00
Total	419	100	

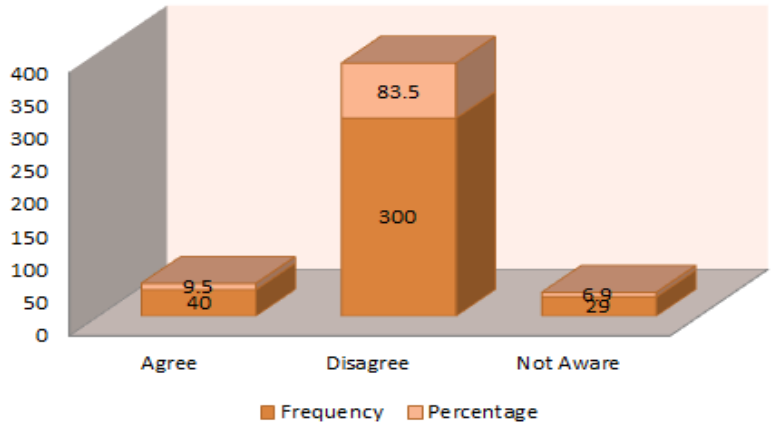


Figure 2: Awareness of an Emergency Call Number

3.2.7 Evaluation of TIER 0 Competencies by Respondents

The questionnaire survey further explored respondent's skills, competencies and knowledge on Tiers 0 and 1 competency. The questions featured the basic skills of the Tier 0 and Tier 1 core competencies and the responses tabulated and presented in percentages in Table 7.

The competencies and knowledge assessed include 'how to call for help, make incident or accident scene safe, give clear information regarding incident location and patient condition, place patient in recovery position, prescribe and give medication as first responder and deal with panic situations. The Table 4.7 below indicates their responses in percentage showing their responses regarding their knowledge and skills on the seven Tier 0 competencies assessed. From the information which summarized their responses 76.1% claim they can initiate a call for help, while 23.9% said they do not know how to call for help; 37.9% said they can both ensure an incident or accident scene is safe and can provide clear information on patient location and condition; the larger majority of over 62% confirmed they cannot. Only 34.6% agreed they can put a patient in a recovery position, the other 65.4 % said they cannot. Furthermore, 113 of the respondents totaling 27% responded impressively by disagreeing to give water or prescribe

medications to patient as Tier 0 MER professionals, and 62.1% admitted that they would panic in a medical emergency situation while only 37.9% said they can deal with panic situation and would be able to handle emergency situations as Tier 0 MER professional. From the foregoing analysis, it can be implied that majority of the sampled population don't know how to demonstrate or carry out these Tier 0 skills. The above skills or competency set is expected from everybody and anybody who is a bystander in an incident or accident scene in FUPRE, both staff and students could be bystanders and are expected to possess or acquire these basic skills.

Table 7: Respondents Response on Tier 0 competency and skills

Tier 0 Skills and Competencies	YES	NO	Total
Call for Help	319 (76.1%)	100 (23.9%)	419
Can Make Accident Scene Safe	159 (37.9%)	260 (62.1%)	419
Can Give clear information	159 (37.9%)	260 (62.1%)	419
Should Give patient water/medication	306 (73.0%)	113 (27.0%)	419
Can Place patient in recovery position	145 (34.6%)	274 (65.4%)	419
Can Panic	260 (62.1%)	159 (37.9%)	419
Should Move patient from accident scene	290 (62.2%)	129 (30.8%)	419

3.2.8 Evaluation of TIER 1 Competencies Skills of Student and Staff Respondents

Similarly, basic Tier1 skills and competencies for Designated First Aiders (DFA) were tabulated and respondent's responses recorded as indicated in the Table 8

Some basic first aid skills and competencies assessed and analyzed were ability to carry out cardio pulmonary resuscitation (CPR), treat burns and handle bleeding, carry our triage, airways management, use Automatic External Defibrillator (AED), oxygen administration and Basic life support BLS skills which are among core skills for Tier 1 MER professionals.

Respondent's knowledge and ability in the following Tier 1 (Designated First Aider) roles was explored and their responses tabulated in Table 8.

Table 8: TIER 1 Competencies of Respondents in FUPRE

Skill/Competency	YES	NO	Total
Can deploy AED	27 (6.4%)	392 (93.6%)	419
Can Conduct CPR	94 (22.4%)	325 (77.6%)	419
Can Treat burns and handle bleeding case	84 (20.0%)	335 (80.0%)	419
Can Carry out triage	95 (22.7%)	324 (77.3%)	419
Can administer Oxygen Administration and BLS	60 (14.3%)	359 (85.7%)	419
Can handle Air way Management	96 (22.9%)	323 (77.1%)	419
Can be Resourceful	86 (20.5%)	333 (79.5%)	419

From Table 8 above 27 respondents representing 6.4% of the respondents claimed they can use an AED, however their claim is not verified since such skills is very rare to find amongst non-medical personnel and its use requires highly skilled persons. 94

respondents representing 22% claim they can carry out cardio-pulmonary resuscitation (CPR) 84 respondent's representing 20% said they can treat burns and handle bleeding. 95 respondents representing 23% claimed they can carry out triage, and 60 respondents' representing 14% said they have BLS skills and can-do oxygen administration and 96 respondents' representing about 23% have skills in airways management. Whereas it is possible however to have student and staff who are members of organizations like the Nigerian Red Cross and who may have been trained on some of these skills, but the numbers and percentage of those with these skills and competency set is relatively small amongst the study population for adequacy for the management of medical emergency in the study area. It is also clear from observation of the data set in Table 4.8 that over 75% of the
respondents are lagging in all the Tier 1 skills evaluated an indication that formal training and competency development is a core requirement.

3.2.9 Determination of Competency Level

In other to evaluate the competency level of the various tiers of responders, the Table 9 adapted from the OPITO MER was adopted as standard criteria. The competency resource need and training requirement to maintain competency development for each tier of MER responder was thus used as metric to evaluate and determine the competency level available in the study area and the results is shown in the Table 10. There is no record to evidence that such formal competency development training for Tiers 0 has been done and records being maintained as observed from the key informant interview with doctors at the FUPRE Health Centre (FHC) during the fieldwork. Similarly, there is also no record to confirm that Tier 1 MER competencies are available and being maintained as per the requirement in the criteria in Table 9. However, Tier 2 competencies are available represented by the doctors and nurses and other paramedics at the Health Centre.

Consequently, the competency level of MER resource in FUPRE falls below the Offshore Petroleum Industry Training Organization (OPITO) criteria for competency development and maintenance.

3.3.0 Competency Requirement for Various Tiers of MER Professionals

From Table 9 above, the competency requirement for the various Tiers of MER professional is given as minimum criteria for the maintenance of competency as a medical emergency response professional in the industry. As shown in the Table 10, Tier 0 MER professional is deemed competent after completing the Tier 0 or First Responder's training/ course; and evidence of training completed is documented and maintained. A yearly refresher programme is also a common practice.

For Tier1 MER professional, the person must complete a 5days (40 hours contact time) training and a twice per year DFA refresher 2 hours training as a skilled maintenance requirement to be deemed competent as a Tier MER professional as indicated in Table 10

The Tier 2 MER professional must have acquired academic or professional training as a nurse as a minimum or medical doctor as the case may be and must be registered by the regulatory council, and must be in possession of professional certifications in Basic (BLS), Advance Life Support or Advanced Cardio-vascular Life Support and International Trauma Life Support (ALS/ACLS and ITLS). In addition to these requirements, refresher trainings for ALS/ ACLS is required every 3 years and ITLS is dues every

4year in addition to experiential refreshing training yearly to be deemed competent.

From this qualitative evaluation of MER competencies, it is only the Tier 2 MER competency that is available in the study area when compared with the standard. The absence of the Tier 0 and Tier 1 competencies resource is a significant gap for an adequate management of emergencies and which can result in lagging indicators such as lost time injuries (LTIs) and fatality. (OPITO,2019).

Table 9: MER Competency Evaluation Criteria.

Tier	By	At	Time (after incident)	Equipment/ Transport requirements	Training requirements	Skills maintenance requirements
Tier 0 (Initiation)	Bystander	Site	Immediate	• None	Call for help Make area safe Do's &don'ts (1 hour on induction for everyone onsite)	• Every 1-2 years
Tier 1 **(**First aid & defibrillation)	Designated First Aider (DFA)	Designated room	<4 minutes	• First aid bag • Automated external defibrillator (AED) • Oxygen for high risk activities	• Designated First Aider (DFA) Training (usually 40 hours)	• DFA skills refresher (twice per year, for 2 hours)
Tier 2 **(**Medical stabilisation)	Health Professional (Paramedic, Nurse or Doctor)	Designated medical room	<1 hour (or 20 mins depending on risk assessment)	• Trauma bag • Ambulance, equipment & supplies • Advanced life support equipment, medication & supplies • Oxygen	• Professional medical training • Advanced Life Support (ALS/ACLS) certification • International Trauma Life Support (ITLS/PHTLS/ATLS) certification	• ALS/ACLS training every 3 years • ITLS/PHTLS/ATLS every 4 years • Experiential refresher training every year
Tier 3 **(**Hospital admission and care)	*Emergency* Physician	Hospital	<4 hours (or 1 hour depending on risk assessment)	• Ensure access to ground, sea or air transportation	• N/A	• N/A

Table 10: Competency Requirement for Various Tiers of MER Professionals

Tier	Knowledge and Skill Requirement	Response Time	Skill Maintenance requirement	Location
Tier 0	Call for Help; Make area safe; give clear description of area and of patient's condition.	Immediate	Annually or once every 2years	Ubiquitous
Tier 1	40 hours Designated First Aider (DFA) Training:	Less than 4minutes	DFA Skill Refresher course (twice per year)	Emergency Rooms
Tier 2	*Professional Medical Training; (Nigeria Medical and Dental Council Registratio n, Nursing Council of Nigeria, Medical Laboratory Council of Nigeria. *ALS/ACLS certification (Advanced Life Support/ Advanced Cardio-vascular Life Support); *ITLS certification. (International Trauma Life Support)	plus or minus 1hour, but not exceeding 20mins	*ALS/ACLS training every 3years; *ITLS training every 4years *Experiential refresher training every year	FUPRE Health Centre

3.3.1: Spatial Distribution of Competencies for Medical Emergency Response

Consequent on a succinct evaluation of competency requirement for development and maintenance, it was necessary to provide visualization for of the research outcome. Thus, by taking coordinates of important landmarks in FUPRE like the Colleges, Student Hostel, Admin Block, Library, ICT unit and FUPRE Health Centre, the figure 4.3was plotted in ARCGIS to indicate the locations of these competencies in FUPRE for the management of medical emergencies in FUPRE.

Figure 4.3: Spatial Distribution of Competency Resource in FUPRE

Source: Author's Fieldwork

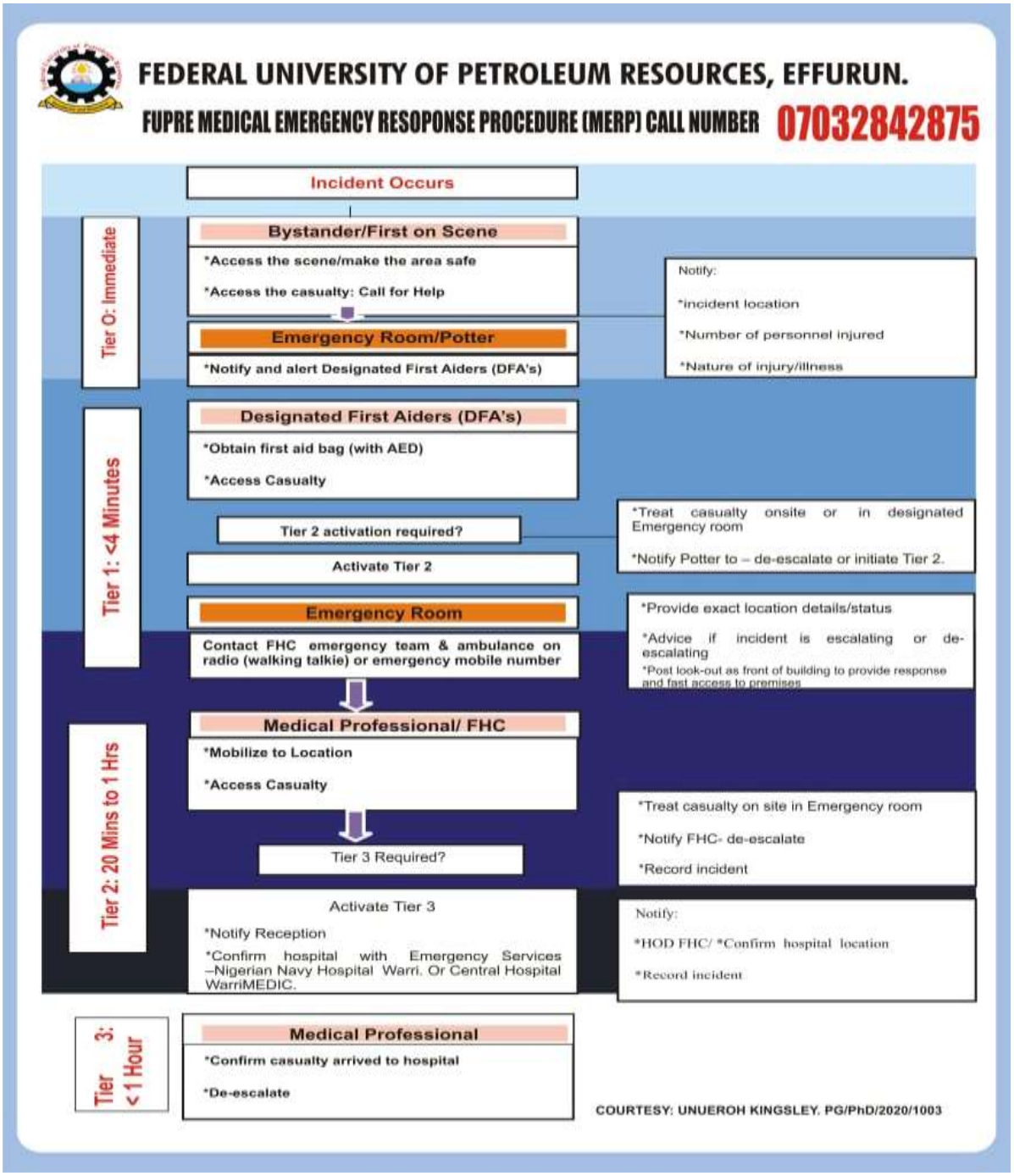
3.3.2: FUPRE MER MODEL

The medical emergency response procedure (MERP) is designed to provide a clear direction of how medical emergency situations are to be handled depending upon the scenario and severity of their occurrence. At all stages from Tier 0 - Tier 3, the aim of the MERP is to provide response to the patient as soon as possible and to provide at each stage the relevant and effective people (competencies resource) and equipment (facility resources).

The Table 4.12 –is the hypothetical MERP Model proposed for FUPRE begins with the Tier 0 MER professional who is concerned with providing immediate assistance and could be persons within or around the scene of incident that are bystander- (students and all categories of staff or any person at the scene of the incident. The aim/roles of Tier 0 is to raise alarm by calling for help to alert others especially the DFA (Designated First Aider) who is the Tier 1 professional. The response time for the Tier 0 is immediate and their competencies includes 'how to call for help, ability to give clear description of incidents and provide clear information of casualty location while observing the observe the Dos and Don't, of medical emergency response. The response time for the Tier 0 is immediate and their distribution is ubiquitous. See Table 4.11

The Tier 1 MER professional- the Designated First Aiders who is the second MER professional have a 4mins response timeline to respond and arrive at the scene of the incident with basic MER equipment available hence his/her response should include ease of access to relevant equipment/ resource to mitigate the effect of the situation on ground. The Tier 1 personnel should be able to make an assessment of the patient and perform a triage to determine the extent and level of intervention. The focus should be an immediate response, quick diagnosis, stabilization prior to any potential Tier 2 intervention. The competency requirement for this tier is a 40hour DFA training and certification and a biannual refresher training delivered by a Tier 2 MER Professional.

4.12. FUPRE MERP Model



4. DISCUSSION AND RECOMMENDATIONS

4.1 MER Competency and formal Training Requirement

In other to achieve and maintain the competencies required for Medical Emergency Response Management in schools and other institutions, education, and training is required to develop the key competencies and professional skills required in medical emergency response management. From the observation in the study area, the Tier 0 (first responders) and Tier1 (first aiders) does not exist, and which constitute a significant gap in the effective delivery and access to medical emergency services in line the sustainable development goal3 (SDG Goal3). The Tiers 0 and 1 competency are complementary to the Tier 2 arrangements that is popular and available almost all public institutions. For instance, it is common to find sick bays and Health Centre in secondary and tertiary Institutions but without the complementary Tier 0 and 1 competency. Therefore, by training student's hostel managers or Porters, students and other categories of staff on these skills, these competencies become more readily available to close the gap identified.

4.2 Emergency Awareness Education

The views of Ogunleye and Olusola (2019) on disaster education response and preparedness mechanism can be expanded to develop emergency learning resource and aids such as emergency telephone numbers pasted on bill boards every nook and corner of the school as well as on the university portal to sensitize the university community on emergency response procedure. The FUPRE MERP discussed in 4:12 above could suffice as a structured and documented procedure and awareness tool for safety and emergency education.

In addition, promoting the establishment of humanitarian organization like the International Red Cross Organization in public Institutions shall further improve the development and spread of these skilled training and competencies.

4.3 Quality Control and Assurance Monitoring

The effectiveness of the assessment of medical emergency preparedness can be determined at best by adopting a global standard that meet best practice like the OPITO MERP with definite timelines and metrics. Similarly, the University's quality assurance unit or SERVICOM maybe develop a monitoring plan to evaluate and ensure that the requirement of the standard is being met. Very important metrics like training and competency development and maintenance, drills and basic supplies as well as an efficient transport decision is in place and working as detailed in the plan.

5. CONCLUSION

The implementation of the FUPRE MERP would require a new paradigm of human capacity development to achieve the competency requirement for the sustainable deployment of Medical Emergency Response Competency required for the attainment of SDG goal 3 which aim at promoting access to health and wellbeing. And to achieve this new heights funding and management commitment to a program of continuous improvement two necessary conditions to deliver on this change.

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