

## Original Research Article

### Health consequences of medical students in health-related fields in the post-Covid period in Nigeria

#### ABSTRACT

**Background:** Medical students represent a population that is at high risk for surgical hazards in the course of their medical education. It is therefore essential for them to have adequate information regarding possible hazards as well as risk reduction precautions to take.

**Objective:** This study was aimed at assessing the knowledge and awareness level of medical students at the University of Nigeria, Enugu, about surgical hazards as well as identify their various views towards hazard risk reduction.

**Method:** The study was a descriptive cross-sectional study of 133 final year medical students at the University of Nigeria, Enugu, in Enugu State. Data was collected using digitalized self-administered questionnaire (Google Form) and a descriptive and inferential analysis was done using statistical package for social sciences (SPSS). Consent was obtained from all respondents.

**Results:** A total of 133 final year medical students filled and submitted the form, with a response rate of 71%. Majority (72.2%) of the respondents were aware of chemical hazards during surgery, 94% of respondents were aware of equipment hazards in surgery. 92.5% were aware about needle stick injuries, 76.7% were aware about radiation exposure risks. Only 67% had suggestions for risk reduction measures which included wearing of protective work wears, proper labelling and careful use of chemicals, proper handling and use of equipment with increased education on the prevention of surgical hazard risks.

**Conclusion:** The knowledge levels regarding risk reduction measures were not adequate among the participants.

**Recommendation:** We recommend that the bodies in charge of medical education consider strengthening training regarding surgical hazards and infection prevention practices.

**Keywords: Hazards, Medical Students, Medical Education.**

## **INTRODUCTION**

The novel corona virus (COVID-19) was first diagnosed in Wuhan, China in December 2019 and has now spread throughout the world, being verified by the World Health Organization as a pandemic on March 11, 2020 and declaration as a global emergency.

“Healthcare workers, particularly medical students, are at risk of acquiring infection, due to their reduced experience, through occupational exposure, including needle-stick injuries, radiation injuries, allergic reactions and invasive procedures that carry a risk of acquiring human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), hepatitis B virus (HBV) and hepatitis C virus (HCV)”<sup>1</sup>.

“According to Merriam Webster dictionary, a hazard is source of danger or the effect of unpredictable and unanalyzable forces in determining events. Risk is the possibility of loss or injury and can also be someone or something that creates or suggests a hazard. Surgical risks are activities related to the day-to-day job of professionals that have the potential to cause or enhance the risk of harm or illness. To attain an acceptable risk level in the workplace and theatre, safety control measures must be implemented. This typically refers to the process of safeguarding the health and safety of health care professionals while on the job, regardless of occupation or level in school”.<sup>2</sup> “Since the Corona virus pandemic was declared a public health emergency of international concern in January 2020”<sup>3</sup>. It has become necessary that medical students doing their surgery rotation be properly educated.

These hazards could be accidental, chemical, biological, ergonomics or psychosocial hazards as well as health care associated infections.<sup>4</sup> A study done<sup>5</sup> found that “hand hygiene, isolation of infection, vital signs, medication delivery were some of the points at which some occupational hazards can be encountered in surgical wards. The respiratory tract can be exposed to gas (volatile anaesthetics) and aerosols (smoking gas via coagulation) in the operation room can pose possible health risks if precautions are not taken and these can predispose to potential gravidity and fertility disruptions, neurotoxicity, and cancer development”<sup>6,19,20</sup>. “Other hazards include radiation, noise, and pathogenic agents. Ergonomics is another factor that can pose some hazards to the medical students and has been understudied among healthcare workers in general”<sup>7</sup>. It is important to note that according to WHO estimates, health care associated

infections are higher in developing countries.<sup>8</sup>“Standard precautions are designed to prevent healthcare staff from being exposed to droplets and body fluids by applying the basic principles of infection control through hand washing, utilization of appropriate protective barriers, such as gloves, masks, gowns, and eyewear; and safe handling of needles”.<sup>9</sup>“Surveys have shown that the use of these standard precautions significantly decreases the number of incidents of occupational exposure to body fluids and decreases the incidence of nosocomial infection”.<sup>10, 11</sup>

“Consistent implementation and adherence to these safety measures can help with risk reduction while also contributing to health. However, despite detailed guidelines, the knowledge and understanding of standard precautions and compliance to these precautions among physicians has been found to be inadequate, even in developed countries”.<sup>12</sup>“In developing countries, including Nigeria, the situation is worse, and the occupational safety of healthcare workers remains a neglected issue”.<sup>13</sup> The weakest aspects reported include not practicing hand decontamination<sup>14</sup>, not using barrier protection, and the practice of recapping needles.<sup>15</sup> Further research is required to determine the knowledge levels among final year medical students because many studies have been performed on professional healthcare workers, and few studies have involved undergraduate medical students. This study aims to identify the knowledge of medical students about these hazard risks they face during their day-to-day activities and available preventive measures that can be implemented.

## **MATERIALS AND METHOD**

### **Study Area and design**

This was a prospective cross-sectional study conducted among the final-year medical students in Enugu State, Nigeria which is classified as a low-income country according to the World Health Organization. There are a total of six universities in Enugu, of which four are private, one federal and one state. Among these six universities, only two offer medicine and surgery as a discipline and these include: University of Nigeria, Enugu Campus, a subset of the University of Nigeria, Nsukka, Enugu, Nigeria. For both institutions, the final year students spend a total of 11 to 13 weeks (approximately 3 months) in Surgery rotations.

### **Study population and procedure**

Final year medical students in Enugu state participated in the research. Questionnaires were distributed through online forums. Responses were collected from the respondents who agreed to the terms of the research and willingly gave their consents. Measures were put in place to minimize all forms of survey research bias.

### **Data collection and methods**

The data was collected with digitalized self-administered questionnaire created using Google form. The questionnaire design was guided by recommendations from the strategic advisory group of experts on immunizations (SAGE) vaccine hesitancy survey sample questions which were adapted to suit the Nigerian setting.

The questionnaire has two sections-

Section 1 assessed socio-demographic characteristics of the respondents like age, sex, marital status, religion, and ethnicity.

Section 2 assessed knowledge and awareness of surgical hazards and measures to reduce these hazards. In this section, a Likert scale was used to assess the knowledge of some surgical hazards; a range of score 1-5 was assigned with one as the lowest and five as the highest.

### **Statistical Analysis**

Data analysis was carried out using Statistical package for Social Sciences (SPSS) version 25 by IBM. Descriptive analyses were conducted to determine frequencies and proportions of categorical variables in the total study sample.

### **Ethical Considerations**

Information obtained from the study was handled confidentially. Personal identifications of respondents were precluded from the study tool. Respondents were informed that their participation was voluntary and consent was implied by completion of the questionnaire.

## **RESULTS**

A total of 133 responses were received from the final year medical students.

**Table 1. Socio-demographic characteristics of the study participants (n= 133)**

<b>Variables</b>	<b>Frequency (n, %)</b>
<b>Age(y)</b>	
16-20	2(1.5)
21-25	104(78.2)
26-30	25(18.8)
>30	2(1.5)
<b>Gender</b>	
Male	71(53.4)
Female	62(46.6)
<b>Religion</b>	
Christian	131(98.5)
Muslim	1(0.8)
African traditional religion	Nil
Others	1(0.8)
<b>Marital status</b>	
Single	130(97.7)
Married	3(2.3)
Divorced/separated	Nil
<b>Ethnicity</b>	
Igbo	126(94.7)
Yoruba	3(2.3)
Others	4(3.0)

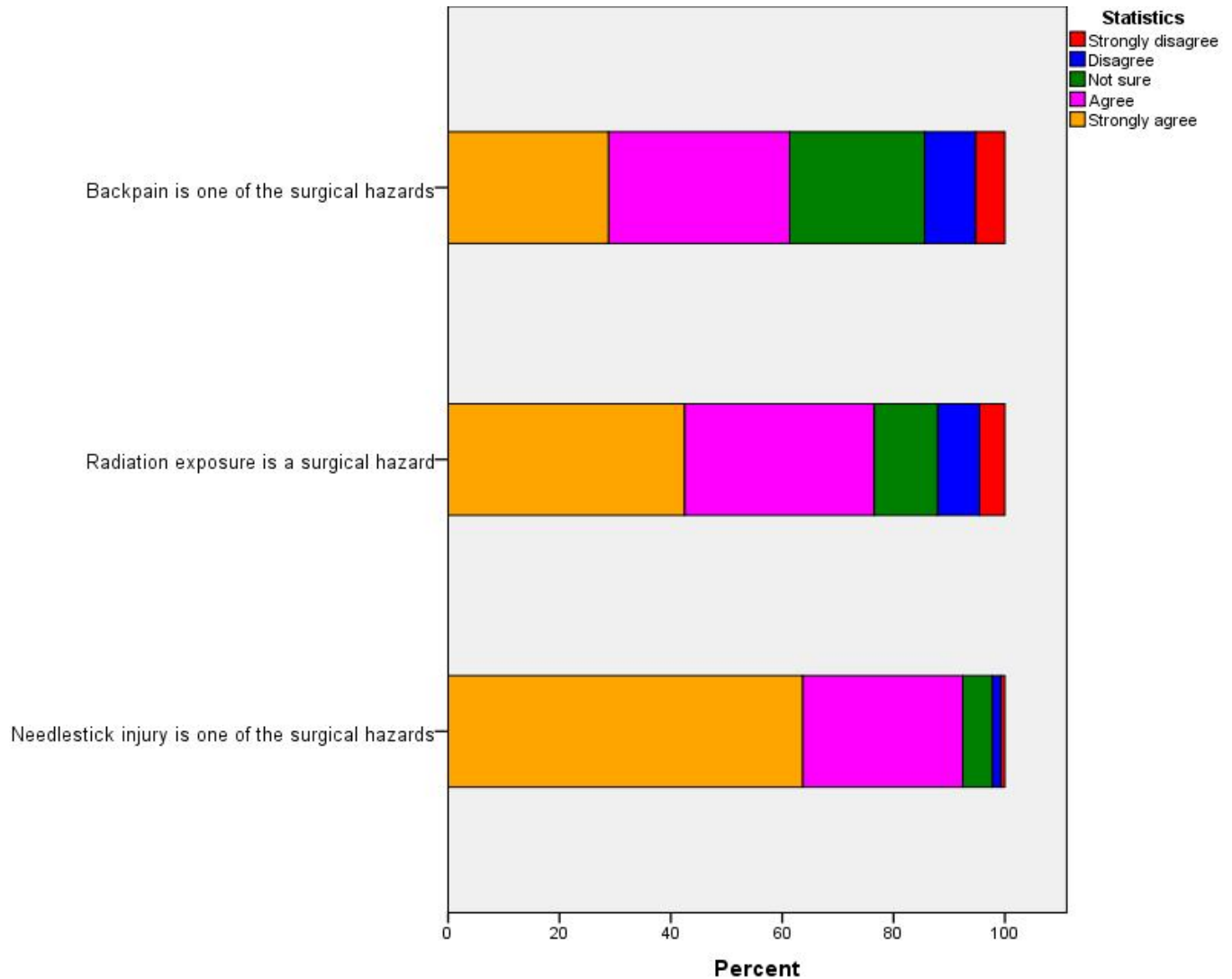


Figure 1: Perceptions of surgical hazards by final year medical students

As can be inferred from figure 1, with regards to needle stick injury, a huge majority (92.5% of the respondents) agreed that it is one of the surgical hazards, 5.3% were not sure while 2.3% disagreed. Following that, a significant percentage (87.2%) agreed that sharps collection devices can help reduce these needle stick injuries, 6.85 were not sure while 6% disagreed. Also slightly above half (60.9%) agreed that needle recapping will reduce the incidence of surgical hazard, 20.3% were not sure while 18.8% disagreed.

Regarding the fact that radiation exposure has detrimental effects, 76.7% respondents agreed, 11.3% were not sure while 11% of the respondents disagreed. 93.3% of the respondents were of the opinion that a lead shield will reduce radiation exposure while the rest were not sure.

Regarding back pain as one of the surgical hazards, 61.7% were in support, 24.1% were not sure and 14.3% of the respondents disagreed.

Figure 2 shows an illustration for measures recommended to reduce these risks. Regarding the use of ergonomics in reducing the incidence of back pain, 64.7% of the respondents agreed it was helpful, 32.3% were not sure and 3% disagreed. Also, 90.9% of the respondents agreed that noise reduction devices are helpful in reduction of hazards from noise pollution, 6.8% were not sure and 2.3% disagreed.

Majority (72.2%) of the respondents were aware of chemical hazards during surgery while 27.8% were not. On the other hand, 94% of respondents were aware of equipment hazards while 6% were

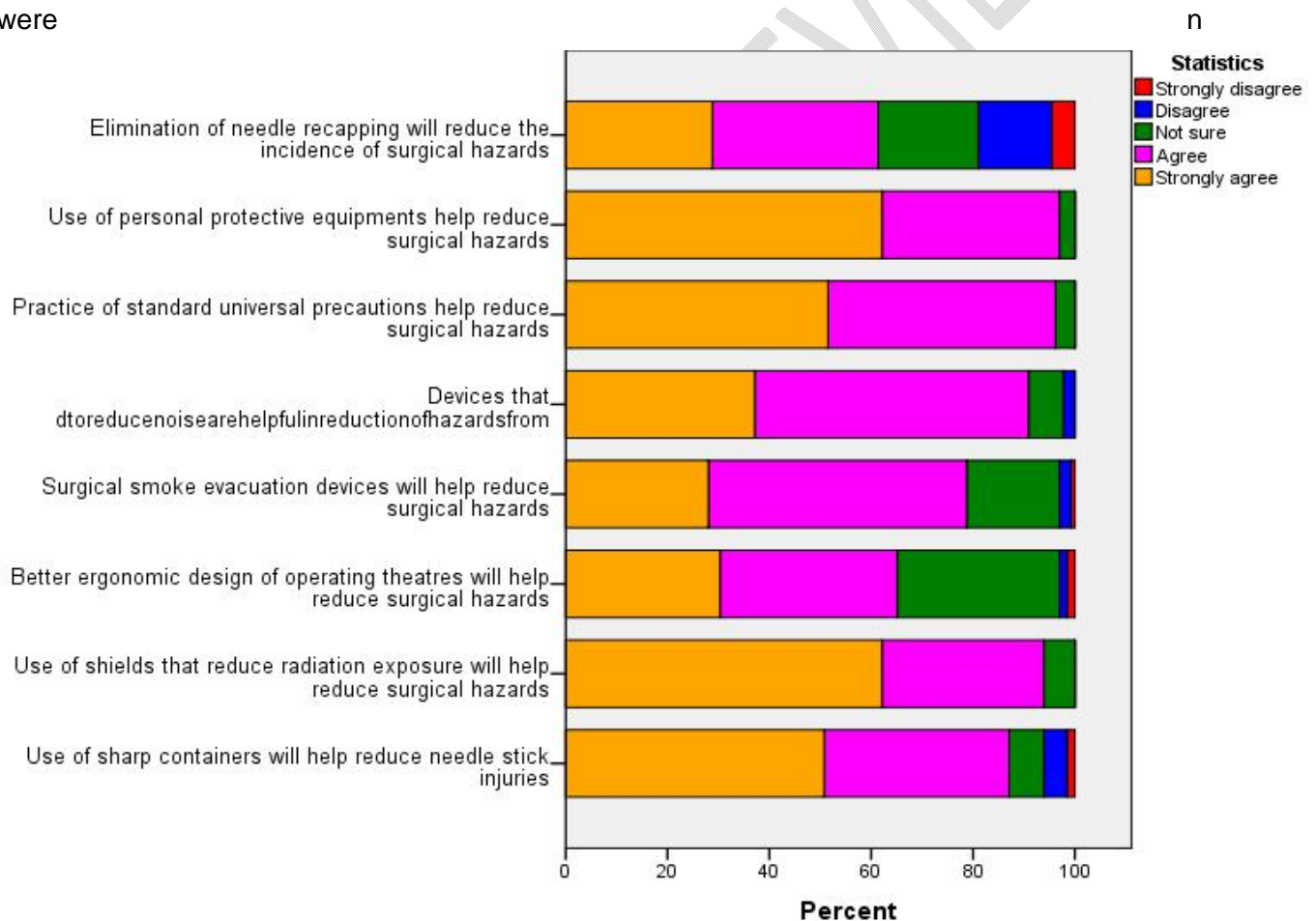


Figure 2: Recommendations for reduction of surgical hazards.

Regarding the use of surgical smoke evacuation devices in reduction of smoke hazards, 78.9% agreed it was helpful, 18% were not sure and 3.1% disagreed. The majority (96.2%) of the respondents agreed that practice of standard universal precautions will help reduce surgical hazards while the rest were not sure. Similarly, a greater percentage of the respondents (97%) agreed that personal protective equipment helps to reduce the incidence of surgical hazards while the rest were not sure.

Out of one hundred and thirty two (132) final year medical students who suggested risk reduction measures, 67% had suggestions for risk reduction measures. 15.8 % suggested the use of appropriate protective work wear, 5.2% suggested proper labeling and correct use of chemicals. Concerning surgical equipment, 3.7% highlighted the importance of care of equipment while 17.3% advocated for appropriate and careful handling. 12.8% suggested more awareness of these hazards across medical professionals via education and training. 7.5% suggested adjustment of operating room to make it more spacious. Safety precautions being practiced was suggested by 8.2%. Only 1.5% talked about the importance of ergonomics. Other suggestions were colour coding and proper refuse disposal while the rest had no suggestions.

## **DISCUSSION**

The results show that most of the respondents are aware of the common surgical hazards encountered in surgical training although knowledge about preventive protocols should be improved in the future. There was higher male participation in the study compared to female participation. This finding can be attributed to the slightly higher male enrollment in these institutions. It was encouraging to note that majority of the respondents are aware of both chemical and equipment hazards. 92.5% of the respondents agreed that needle stick injuries are one of the surgical hazards. This is in contrast to a study conducted in Italy<sup>16</sup> in which only 14.3% of participants felt that healthcare associated infections, which we know are mostly gotten from needle stick injuries, constitute a significant problem.

76.7% respondents agreed that radiation exposure has detrimental effects as opposed to a survey of Australian students<sup>17</sup> which revealed that 59% underestimated the radiation risks.

The economic costs of managing surgical hazards is substantial. Some of these hazards can lead to life threatening infections and side effects. The associated emotional repercussions must also be considered. Cost analyses indicate that the use of risk reduction equipment e.g. needle stick prevention devices will be effective in the long term<sup>18</sup>.

It was encouraging to note that most of the respondents advocated for universal safety precautions and personal protecting equipment. The response was not as enthusiastic when knowledge of risk reduction measures was assessed. Less than half of the respondents had suggestions on possible measures to reduce the risk of these surgical hazards. Unlike in a previous study<sup>5</sup> where risk reduction measures are implemented simultaneously, most of the respondents suggested single precautionary measures.

Deciphering from the responses gotten from the respondents, a significant number of students are not sure if the different risk reduction measures are helpful or not and this re-enacts the need for further education of these students.

## **CONCLUSION**

The knowledge levels regarding risk reduction measures were not adequate among the participants. Other important aspects, such as needle-stick injuries, use of personal protective equipment and the use of standard precautions, were better understood, although improvements are still necessary. These findings suggest the need to consider strengthening training regarding infection prevention practices and including them as a separate entity in the existing curriculum. Further research needs to be conducted in this area to identify other important aspects of hazard reduction especially radiation hazards and to understand better the concept of ergonomics.

**Ethics approval and consent to participate:** Ethical clearance was obtained from the Health, Research and Ethical Committee of the University of Nigeria Teaching Hospital, UNTH, Enugu, Nigeria.

**Consent for publication:** Participation was voluntary, and the purpose of the research was explained to each respondent. Informed consent was obtained before inclusion into the study and also anonymity of participants was ensured.

**Availability of data and material:** Additional data from the research project could be made available by the author on request.

#### **Disclaimer (Artificial intelligence)**

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- 2.
- 3.

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