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Awareness of Universal Work Precautions Among Medical Laboratory Technology Students

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Overseeing laboratory safety at university is necessary because of countless laboratory accidents occurring around the world, many of which involve students. This study primarily aimed to assess the awareness of universal work precautions among medical laboratory technology students. Methods: A descriptive research design was used.Department of Medical Laboratory Technology, Faculty of Applied Medical Sciences, University of Tabuk, Kingdom of Saudi Arabia. Sample: Eighty undergraduate medical laboratory technology students. Tool: Self-administered questionnaire consisting of two parts—demographic data and student awareness assessment.Most of the studied students had attended training courses regarding safety precautions and training on first aid. However, just one-quarter of them had been immunised against hepatitis B, while a small percentage of the students had sustained an injury while working in a laboratory. The medical laboratory technology students agreed that there were generally universal work precautions. There were statistically significant differences between the students' awareness level and receiving of vaccination.The medical laboratory technology students had a good level of awareness of universal work precautions. Application of educational sessions to increase students' awareness of universal work precautions is recommended.

Keywords: Awareness, Medical Laboratory Technology, Universal Work Precautions

INTRODUCTION

Laboratories can be risky work environments because they usually contain chemical, microbial, equipment, radiation and explosion hazards. Consequently, those working in laboratories are typically confronted with different dangers at work. Workers' wellbeing and security may be seriously compromised unless suitable preventive safety measures are followed (Withanage & Priyadarshani, 2016).

Among health workers, the prevalence of blood-borne microbes are as follows: 2.6% for hepatitis C virus (HCV), 5.9% for hepatitis B virus (HBV) and 0.5% for human immunodeficiency virus (HIV), compared with around 16 000 HCV and 66 000 HBV infections among medical services labourers around the world. Nonetheless, these workers appear to be unaware of the danger of infection, and they do not comply with the fundamental standards of precautionary safety measures (Pradeep et al. 2020).

Medical field workers are frequently injured by needles, scalpels and other sharp instruments that are contaminated with blood and other body fluids. Contamination control is imperative to limit the danger of transmission of diseases in research centres because workers may not know the disease status of blood and fluid samples until they are examined (Yunihastuti et al. 2020).

Among laboratory students, 7% of the occurrences of these injuries are because of cuts by sharp objects. About 27% of the wounds are

because of workers may be splashed with blood or synthetics and contaminated. There hazards as the following: contact with bio-hazard liquid, excessive touchiness responses and unintentional drinking of disinfectant (Álvarez-Chávez et al. 2019).

Awareness of hazards of chemical compounds, radiation, fire and waste disposal is crucial. Work-related explosions and fires represent as more than 5000 injuries each year in the United Kingdom (Ting, 2020). In any case, laboratory students' knowledge and practice of security safeguards are crucial. Prevention of accidents in laboratories requires careful measures, and research centre faculty should be acclimated to 'general insurances' (Abdullah & Abd Aziz, 2020). Particularly, college research facilities is where undergraduates initially build up their lab experience, and the training they gain from the lab may serve them throughout their professions. Therefore, our study aimed to evaluate students' awareness of medical laboratory safety measures.

Significance of the study

Medical laboratory students have to learn and receive many lab-based learning strategies and extensive courses, including in such subjects as parasitology and pathology (Withanage & Priyadarshani, 2016). Notwithstanding the university setting, students gain comprehensive laboratory exposure from the medical laboratories. Consequently, these students perform laboratory procedures on various clinical samples, including blood, urine, faeces, sputum and tissue, from patients with many different diseases. Therefore, there is a likelihood of exposure to such diseases as HBV, HCV, HIV and other blood-borne viruses if acceptable security measures are not taken (Santiago, 2018).

Degree programmes offer various types of function-based training in college. Notwithstanding, students develop clinical experience in an assortment of settings, particularly medical clinics, over the entire course. Understanding the safeguards in place is critical for clinical lab programmes because an important part of the healthcare profession is managing clinical issues. It is clear from these points that awareness regarding universal precautions is extremely important for students of the department of medical laboratory technology in general and in our study participant specially.

MATERIALS AND METHODS

Aim of the study

The aim of the study is to assess the awareness level of universal work precautions among medical laboratory technology students.

Research question

The research question is as follows: What is the awareness level of universal work precautions among medical laboratory technology students?

Study design

A descriptive research design is utilised in this study.

Subjects and setting

The questionnaires were administered to 80 medical laboratory technology students at the Department of Medical Laboratory Technology, Faculty of Applied Medical Sciences, University of Tabuk, Saudi Arabia.

Data collection tool

The data collection tool is a self-administered questionnaire consisting of two parts:

Part (1): Demographic data and medical data of the students.

Part (2) Student awareness assessment developed by Odeyemi (2012). It consists of five standardised questions covering the following topics related to universal work precautions: (I) aspects related to general precautions in the laboratory, for example, the importance of using universal work precautions laboratory, proper disposal of waste in the incinerator only, types of hazards associated with working in the laboratories; (II) awareness of practices that increase the risk of being infected, for example, eating in the laboratory, storage of food and water in the laboratory refrigerator, putting on cosmetics in the laboratory, smoking in the laboratory, etc… (III) biological hazards, for example, biohazardous materials present in the laboratory, association of infectious agents and toxins with disease, etc….(IV) physical hazards, for example, compressed gases, pressure, vacuums and temperature extremes, etc…..and (V) chemical hazards, for example, hazards associated with chemicals used in laboratory procedures, material safety data sheets and other sources of information regarding chemicals used in laboratory procedures, etc……..

Scoring system

The questionnaire was developed by adapting guidelines on universal work precautions; it was

measured using the five-item scale developed by Neal and Griffin, (2000). A 5-point Likert scale was used to obtain feedback from the respondents (1 = strongly disagree; 5 = strongly agree).

Data collection technique

The researchers collected necessary information through reviewing the current local and international literature in books, articles, periodicals and magazines.

Content validity

1-The content validity was determined by a panel of five experts, in medical laboratory fields who reviewed the tool for clarity, relevance, understanding, applicability and ease of administration. Minor modifications were required.
2-Before questionnaires were distributed to the studied students, the aims and objectives of the study were disclosed to them to start the correspondence.
3-The students gave their verbal agreement to participate in this study.
4-Questionnaires were passed out to the participants under the management of the researchers. Students were asked to complete the questionnaires according to their understandings and not to consult each other or the literature.
5-Voluntary participation was sought, and students who declined to participate in the study were excluded.
6-The researcher gathered the required information from medical laboratory technology students; participants' names were coded to protect their identities.
7-Data were recorded anonymously, and confidentiality was maintained.
8Completed questionnaires were retrieved immediately by the study researchers.

Data analysis

After the data were collected, information was coded in Excel. The information was analysed utilising SPSS version 16. In the statistical analysis, frequencies, mean values and percentages were introduced in the examination of studied students. A chi-square *p*-value < 0.05 was considered statistically significant.

RESULTS AND DISCUSSION

Table 1 shows that most participating students had attended training courses regarding safety precautions and training on first aid (75% and 83.75%, respectively). However, just one-quarter had received immunisation against hepatitis B, and a small percentage of the studied students had sustained an injury while working in the laboratory**.**

Table 2 and Figures 1 and 2 reveal that nearly half (46.25%) of the studied students agreed regarding the importance of general precautions in the laboratory and the presence of risks of infection and contamination. They strongly agreed on the biological and physical hazards and agreed regarding chemical hazards. For overall awareness, more than half of the studied students agreed (56.25%).

This investigation was intended to survey clinical research facility undergraduates' mindfulness towards widespread work safeguards. This was done on the grounds that awareness refers to the capacity and determination of people to uphold safety through the learning cycle, for example, by taking an interest in preparation to enhance wellbeing.

Subsequently, wellbeing information obtained through safety preparations critically affects the security responsibility among undergraduates in reacting to crises and safety measures in the laboratory**.**

The current study found that most students attended training courses regarding safety precautions and training on first aid. However, just one-quarter of them had received immunisation against hepatitis B, and only a small percentage had an injury while working in the laboratory. This result is supported by Gouda et al. (2020), who found that medical students generally ought to attend instructional classes on first aid and receive appropriate vaccinations for infectious workplace diseases.

The present study found that more than half the students agreed on the existence of general universal work precautions. Another investigation by Withanage and Priyadarshani (2016) reported on the proportions of accidents happening in the pathology labs as follows: Histology, 40%; Microbiology, 33%; Haematology, 20%; and Cytology, 7%. In their results, workers in laboratory had a low degree of awareness towards the general work precautionary measures.

The results of this study support the findings of Al-Zyoud et al. (2019), who found that the inadequate safety behaviour among students was because of an absence of safety information and restricted safety training.

Table 1: Demographic Characteristics of Medical Laboratory Technology Students on Universal Work Precautions (*N* = 80)

Demographic characteristics	*N*	%
Attended any training courses regarding safety precautions	60	75
Attended training on first aid	67	83.75
Immunisation against hepatitis B	20	25
Had injury while working	8	10

Table 2: Percentage Distribution of the Studied Students' Awareness (*N* = 80)

Awareness	Strongly Agree *N* (%)	Agree *N* (%)	Neutral *N* (%)	Disagree *N* (%)	Strongly Disagree *N* (%)
General precautions in the laboratory	16 (20%)	37 (46.25%)	15 (18.75%)	10 (12.5%)	2 (2.5%)
Risks of infection and contamination	17 (21.25%)	44 (55%)	10 (12.5%)	8 (10%)	1 (1.25%)
Biological hazards	32 (40%)	28 (35%)	10 (12.5%)	9 (11.25%)	1 (1.25%)
Physical hazards	35 (43.75%)	30 (37.5%)	8 (10%)	7 (8.75%)	0 (0%)
Chemical hazards	20 (25%)	37 (46.25%)	15 (18.75%)	6 (7.5%)	2 (2.5%)
Overall awareness	**10 (12.5%)**	**45 (56.25%)**	**22 (27.5%)**	**15 (18.75%)**	**8 (10%)**

Figure 1: Percentage distribution of the detailed awareness of medical laboratory technology students' awareness (*N* = 80).

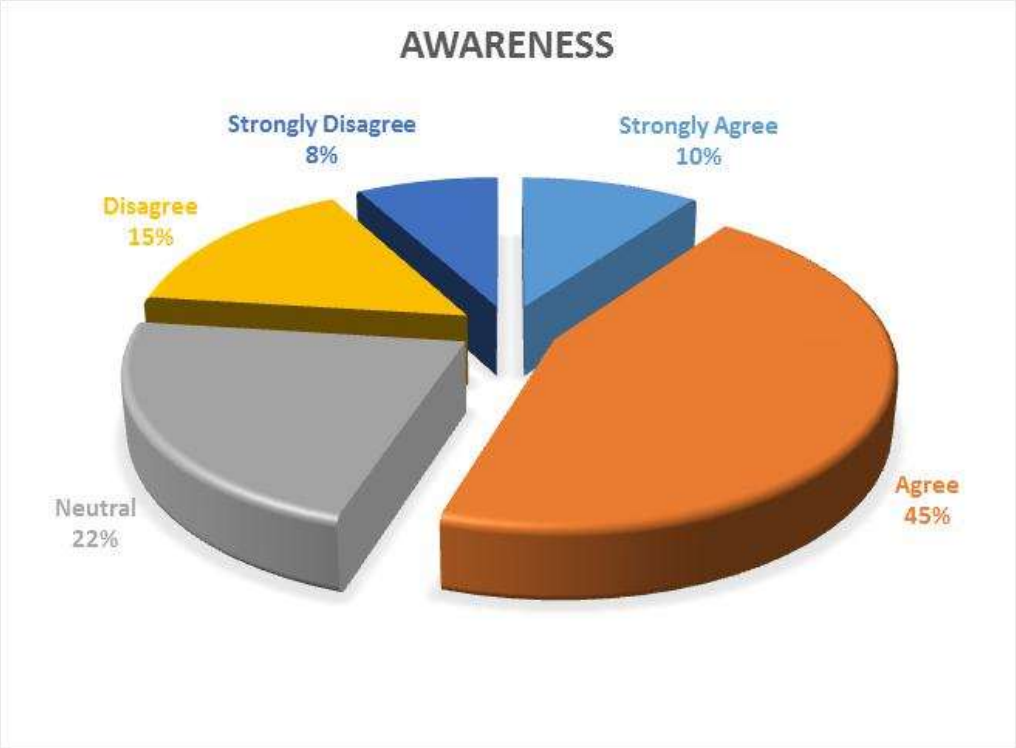

Figure 2: Percentage distribution of the overall awareness of medical laboratory technology students (*N* = 80).

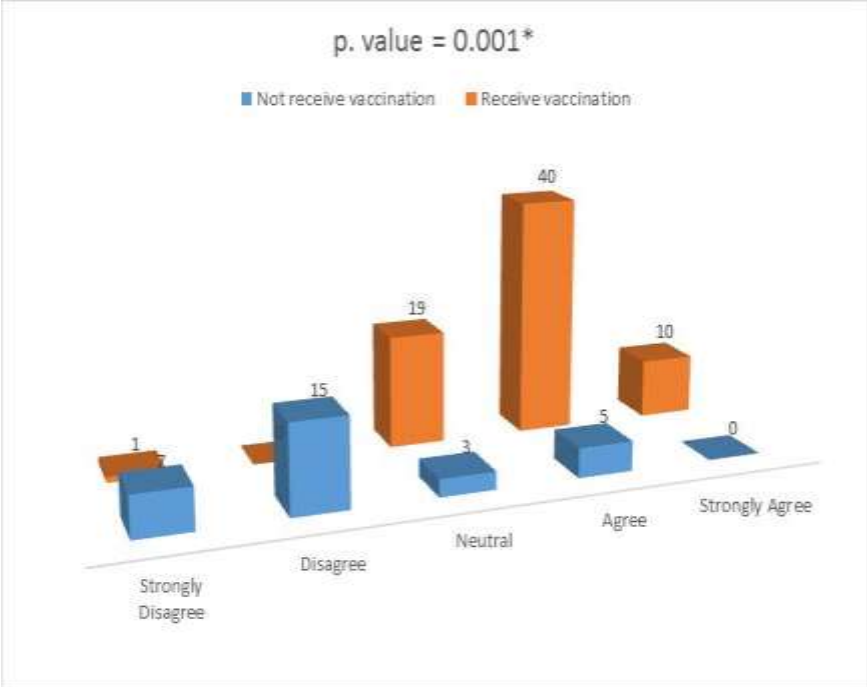

Figure 3: Relationship between receiving hepatitis B vaccination and students' overall awareness level.

Figure 3 shows that there was a statistically significant association between the students' total awareness and whether they had received a vaccination (*p*-value = 0.001*).

Likewise, this investigation is in accordance with the study by García-Fayos et al. (2020), who found that safety information about the hazards and safety guidelines extended through security training. Thus, laboratory safety training for students is important, and it should be an obligatory practice in first year at university or before the beginning of any lab-related work in college.

As anticipated, safety awareness directly influences safety behaviour. The findings in this study affirmed the finding of Panuwatwanich et al. (2017) who reported that safety awareness has a positive relationship with safety practices, and a person with high awareness will be more likely to follow the safety rules and guidelines. Likewise, instructors demonstrating consistent safety practices could affect students' safety by elevating their feelings of obligation to lessen the risk of accidents and urging others to act safely in the lab (Wen Lim et al. 2018). The responsibility of instructors to keep a security log \-book may have been a positive factor in the safety awareness achieved in this study. Security banners and posters are an important way to affect students' safety behaviour and should be organised in the university.

Safety responsibilities could mediate the connection between safety awareness, and past physical injury. The safety responsibility among students included in this study was associated with their readiness to adhere to safety regulations, follow safety guidelines, upgrade the laboratory's safety, assess safety enhancements, authorise a standard working methodology, maintain the neatness of labs and maintain of safety equipment.

A study of all the data identified with safety responsibility demonstrated a huge influence. Students' safety responsibility may be influenced by their mentality related to partaking in safety preparation at college. The interest of undergraduates in safety preparation may build their obligation to deflect the risks present in the laboratory (Whithanage & Priyadarshani, 2016).

The safety responsibility of students may diminish injuries and accidents in the laboratory. This study supports the findings by Taylor and Snyder (2017), who reported that safety responsibility among students urges them to act safely in the lab. University executives should improve and make it a compulsory practice for all students who need to utilise the labs to complete laboratory safety training and projects to guarantee safety responsibility among students.

The study showed that a commitment to safety could have a significant mediating effect on the relationship between safety knowledge and safety behaviour (reduction of injury). Consequently, the outcomes in this study show that safety awareness is fortified through learning exercises that can expand students' comprehension of security in the lab. Moreover, safety awareness can build students' goals to improve safety knowledge in the research facility. By implication, the blend of safety knowledge and safety responsibility can strengthen safety behaviour in the laboratory among students. If students do not have appropriate safety awareness, they will be less likely to engage in lab safety testing, and they will develop bad habits such that they cannot easily change their behaviour to engage in good safety practices.

The discoveries of this study support a past report by Hill et al. (2019), who found that students' ability to conform to safety empowers them to analyse safety by following laboratory safety guidelines. This confirmation gave a superior comprehension of the examination directed by Jeknavorian (2016), who found students' needs a moral obligation to safety through the eagerness of students, for example, investment in safety preparation and adherence to safety guidelines and standard working methodology.

CONCLUSION

Based on the results of the current study, the following conclusions can be made:

Most participants had attended training courses regarding safety precautions and training on first aid. However, only one-quarter of them had been immunised against hepatitis B, and a small percentage had had an injury while working in the laboratory.

The medical laboratory technology students had a good level of awareness towards universal work precautions.

There were statistically significant associations between the students' awareness levels and whether they had received vaccinations.

It is recommended that educational sessions be applied regarding students' awareness of universal work precautions. In future work, this study could be replicated with a larger study sample including medical laboratory technology students at each year of academic levels

CONFLICT OF INTEREST

The authors declared that present study was

performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

AS designed research together with ZM, ZM and AS have analyzed the data ,ZM and AS wrote the manuscript and approved its final version.

REFERENCES

Abdullah, K. H., & Abd Aziz, F. S. (2020). Safety behavior in the laboratory among university students. *The Journal of Behavioral Science*, *15*(3), 51–65.

Álvarez-Chávez, C. R., Marín, L. S., Perez-Gamez, K., Portell, M., Velazquez, L., & Munoz-Osuna, F. (2019). Assessing college students' risk perceptions of hazards in chemistry laboratories. *Journal of Chemical Education*, *96*(10), 2120–2131.

Al-Zyoud, W., Qunies, A. M., Walters, A. U. C., & Jalsa, N. K. (2019). Perceptions of chemical safety in laboratories. *Safety*, *5*(2), 1–18. https://doi.org/10.3390/safety5020021

García-Fayos, B., Arnal, J. M., Sancho, M., & Ruvira, B. (2020). Process safety training for chemical engineers in Spain: Overview and the example of the polytechnic university of Valencia. *Education for Chemical Engineers*, *33*, 78–90.

Gouda, P., Kirk, A., Sweeney, A. M., & O'Donovan, D. (2020). Attitudes of medical students toward volunteering in emergency situations. *Disaster Medicine and Public Health Preparedness*, *14*(3), 308–311.

Hill, D. J., Williams, O. F., Mizzy, D. P., Triumph, T. F., Brennan, C. R., Mason, D. C., & Lawrence, D. S. (2019). Introduction to laboratory safety for graduate students: An active-learning endeavor. *Journal of Chemical Education*, *96*(4), 652–659.

Jeknavorian, A. A. (2016, November 2016). Preventing lab accidents. *Chemical and Engineering News*. https://cen.acs.org/articles/94/i44/Preventing-lab-accidents.html

Neal, A., & Griffin, M. A. (2002). Safety climate and safety behaviour. *Australian journal of management*, *27*(1_suppl), 67-75.

Odeyemi, O. A. (2012). Knowledge, awareness and compliance of postgraduate students to laboratory safety procedures. *Bioresearch Bulletin*, *4*, 180–184.

Panuwatwanich, K., Al-Haadir, S., & Stewart, R. A. (2017). Influence of safety motivation and climate on safety behaviour and outcomes: evidence from the Saudi Arabian construction industry. *International Journal of Occupational Safety and Ergonomics*, *23*(1), 60–75.

Pradeep, S. S., Raghu, S. G., Prathab, A. G., Rudresh, B. G., & Kunnavil, R. (2010). Study of sharp injuries and blood splash exposures among health care workers in a tertiary hospital in Bangalore. Int J Infect Control 2016, v12:i3.

Santiago, J. (2018). *Medical laboratory science program students' learning experiences: The virtual microscopy technology* [Doctoral dissertation, Capella University]. Faculty Mentor and Chair, 37:45. https://search.proquest.com/docview/2071926994?pq-origsite=gscholar&fromopenview=true.

Taylor, W. D., & Snyder, L.A. (2017). The influence of risk perception on safety: A laboratory study. *Safety Science*, *95*, 116–124. https://doi.org/10.1016/j.ssci.2017.02.011

Ting, J. M. (2020). Safety moments in chemical safety education. Journal of Chemical Education. https://doi.org/10.1021/acs.jchemed.0c00220

Wen Lim, H., Li, N., Fang, D., & Wu, C. (2018). Impact of safety climate on types of safety motivation and performance: Multigroup invariance analysis. *Journal of Management in Engineering*, *34*(3), 1–14. https://doi.org/10.1061/(ASCE)ME.1943-5479.0000595

Whithanage, N. D., & Priyadarshani, A. M. B. (2016). An assessment on laboratory safety knowledge among allied health sciences students at the University of Sri Jayewardenepura. *International Journal of*

Multidisciplinary Studies, *3*(2), 17–34.

Yunihastuti, E., Ratih, D. M., Aisyah, M. R., Hidayah, A. J., Widhani, A., Sulaiman, A. S., . . . Soejono, C. H. (2020). Needlestick and sharps injuries in an Indonesian tertiary teaching hospital from 2014 to 2017: A cohort study. *BMJ Open*, *10*(12), e041494.