



AN ASSESSMENT OF BIOSAFETY AWARENESS, SAFETY ATTITUDES, AND LABORATORY PRACTICES AMONG BIOTECHNOLOGY AND LIFE SCIENCE STUDENTS

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Abstract:

Laboratory biosafety is essential for preventing occupational exposure, contamination, and laboratory-associated risks. This study assessed the knowledge, attitudes, and self-reported practices (KAP) related to laboratory biosafety among biotechnology and allied life-science students and identified areas requiring improvement in biosafety education. A descriptive cross-sectional survey was conducted among students from higher education institutions in the Mumbai and Navi Mumbai region during August–September 2026. Data were collected using a structured questionnaire comprising 15 knowledge, 10 attitude, and 13 practice items. Descriptive and inferential statistical analyses were performed, with $p < 0.05$ considered significant. Overall, students demonstrated generally favourable KAP. Mean knowledge, attitude, and practice scores were 12.49 ± 3.09 , 40.33 ± 10.72 , and 43.46 ± 10.43 , respectively. Knowledge was highest for biological spill management (96.3%) and lowest for aerosol hazards during sonication or centrifugation (68.8%). Avoiding eating or drinking in laboratories showed the highest practice adherence (80.6%), while eye protection during splash or corrosive hazards was lowest (56.3%). Knowledge correlated significantly with attitude ($p = 0.162$, $p = 0.041$) and practice ($p = 0.322$, $p < 0.001$), while attitude showed the strongest correlation with practice ($p = 0.615$, $p < 0.001$). Previous biosafety training was associated with higher knowledge scores ($p = 0.006$).

Keywords: Biosafety, Biotechnology Students, Laboratory Safety, Attitudes, Practices, Biosafety Training.

1. Introduction

Biosafety is an essential component of laboratory practice that encompasses the appropriate handling, containment, and management of biological materials to minimize risks to laboratory personnel, the surrounding environment, and the wider community. Effective biosafety practices are particularly important in laboratories

where biological agents, clinical specimens, contaminated materials, and laboratory-generated waste are handled. Laboratory-acquired infections (LAIs) and accidental pathogen releases remain important biosafety concerns worldwide, demonstrating that laboratory work can involve occupational and environmental risks when appropriate preventive measures are not consistently followed (1,2). The occurrence of laboratory-acquired infections has been associated with multiple factors, including inadequate adherence to safety procedures, inappropriate handling of biological materials, exposure to infectious aerosols, and deficiencies in laboratory safety management (2,3). Therefore, maintaining appropriate biosafety practices is an important part of responsible laboratory work.

University laboratories represent an important setting for biosafety education because students are frequently exposed to biological materials and laboratory procedures during their academic training. Students may handle microorganisms, biological samples, cultures, chemicals, sharps, and laboratory waste without having extensive professional laboratory experience. Studies among university and medical laboratory students have reported variations in biosafety knowledge, perceptions, and practices, indicating that familiarity with laboratory procedures does not necessarily ensure consistent application of safety measures (4,5,6,7). These findings highlight the importance of establishing appropriate biosafety knowledge and practices during undergraduate education, before students enter professional laboratory environments.

The Knowledge, Attitudes, and Practices (KAP) approach provides a structured framework for assessing how individuals understand safety requirements, perceive their importance, and apply them during laboratory activities. Previous biosafety KAP studies have demonstrated that knowledge, attitudes, and practices may not always develop uniformly. Differences in knowledge and practice have been observed among students and laboratory personnel, with factors such as training, laboratory exposure, and institutional practices potentially influencing biosafety behaviour (9,10). Thus, evaluating these three dimensions together can provide a broader understanding of students' preparedness to follow laboratory biosafety requirements.

Although biosafety among laboratory users has received increasing attention, existing studies have largely focused on specific student groups, medical laboratory students, or individual institutional settings (4,5). Broader studies of student safety culture have further indicated that individual safety behaviour can be influenced by institutional safety, climate, management systems, awareness, motivation, and laboratory conditions (11,12). However, differences in academic background, laboratory exposure, and institutional training may produce different levels of biosafety knowledge and behaviour among biotechnology and life science students. This creates a need for context-specific assessment of biosafety knowledge, attitudes, and practices within this student population.

Therefore, the present study aims to assess the knowledge, attitudes, and practices related to laboratory biosafety among biotechnology and life science students. By identifying areas of adequate understanding as well as potential gaps between knowledge and practical application, the study seeks to provide evidence that may support targeted biosafety education, training, and improvement of laboratory safety practices among undergraduate students.

2. Materials and methods

2.1 Study design

A descriptive cross-sectional study was conducted to assess the knowledge, attitudes, and practices (KAP) related to laboratory biosafety among biotechnology and allied life-science students.

2.2 Study design and area

A descriptive, cross-sectional survey design was used to evaluate biosafety awareness, safety attitudes, and laboratory practices among undergraduate and postgraduate students. The study was conducted between July, 2026 and September, 2026 at various higher education institutions in Navi Mumbai & Mumbai region.

2.3 Participants and sampling design

The target population for this study consisted of a total of 162 undergraduate and postgraduate students enrolled in biotechnology and life science disciplines. Due to practical constraints in accessing an exhaustive registry of all eligible students, a non-probability convenience sampling method was utilized to recruit participants.

To be included in the final analysis, respondents had to meet the following criteria:

- Inclusion Criteria: (1) Being an actively enrolled student in a higher education institution; (2) pursuing a degree explicitly within biotechnology, microbiology, biochemistry, or related life science streams.
- Exclusion Criteria: Students enrolled in non-science disciplines, distance-education students without physical laboratory exposure, and individuals who did not consent to the digital participation terms were excluded from the dataset.

2.4 Ethical considerations

Participation was voluntary, and an electronic consent statement was provided at the beginning of the questionnaire. Participants were informed that their participation was voluntary and that their identity and responses would remain confidential. No financial incentives or rewards were offered for participation. Only respondents who indicated consent proceeded to the study questionnaire.

2.5 Questionnaire development

The research instrument was developed by reviewing standard institutional biosafety guidelines, including the World Health Organization (WHO) Laboratory Biosafety Manual (8). Questions were carefully structured to directly align with the core competencies required for undergraduate and postgraduate life science laboratory courses (13).

The questionnaire was developed with reference to previously reported KAP-based and student laboratory-safety assessment approaches (Halatoko *et al.*, 2024)(6). The questionnaire was structured to address the three principal domains of biosafety: knowledge, attitude, and practice. Question formulation and response scaling were informed by previous studies assessing laboratory safety awareness and perceptions among university students (7).

2.6 Questionnaire structure

The questionnaire consisted of four sections. The first section collected demographic and academic information, including gender, academic programme, year of study, institution, and location. It also included questions regarding previous formal laboratory biosafety training and the frequency of biosafety briefings (14).

The second section assessed biosafety knowledge using 15 multiple-choice questions covering key laboratory safety concepts, including biosafety cabinets, biomedical waste segregation, biological spill management, gloves and personal protective equipment, disinfection, autoclave operation, aerosol hazards, containment, chemical hazards, and decontamination of biological waste. Each knowledge question had one designated correct response. The third section assessed attitudes toward biosafety using 10 statements rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The statements addressed hand hygiene, PPE use, biological waste management, laboratory organization, emergency preparedness, spill response, incorporation of

biosafety into experimental planning, incident reporting, continuing biosafety training, and adherence to safety procedures.

The fourth section assessed self-reported biosafety practices using 13 items rated on a five-point frequency scale from 1 (never) to 5 (always). The items covered hand hygiene, use of laboratory PPE, biosafety cabinet practices, waste segregation, glove replacement, avoidance of food and beverages in the laboratory, treatment of biological cultures before disposal, eye protection, and laboratory surface decontamination.

2.7 Data collection

The survey questionnaire was accessed by the participants through a Google form link, distributed online through Whatsapp to eligible students. Participation was voluntary, and respondents were required to provide informed consent before proceeding to the questionnaire. A total of 162 responses were recorded, with the respondents voluntarily agreeing to participate. Responses from the questionnaire were compiled into a spreadsheet for data organization and analysis. Confidentiality was maintained for all the collected data.

2.8 Data analysis

Knowledge responses were evaluated according to the correctness of each response, whereas attitude and practice responses were recorded according to their respective five-point scales. Descriptive analysis was used to summarize participant characteristics and responses across the knowledge, attitude, and practice domains through different statistical tests. The resulting KAP data were organized for comparison across relevant participant characteristics and biosafety-training exposure. The deemed significant value for p was used as $p < 0.05$ for all statistical tests.

Table 1: Classification of score for level of knowledge, attitude and practice

Level of KAP	Knowledge	Attitude	Practice
Good	12-15	38-50	42-55
Moderate	8-11	25-37	28-41
Poor	0-7	10-24	11-27

The levels of knowledge, attitude, and practice were categorized according to the percentage scores obtained by the participants. Scores of 75% or above were classified as good, scores ranging from 50% to 74% were considered moderate, and scores below 50% were categorized as poor.

3. Results

The collected responses were analyzed to assess the knowledge, attitudes, and self-reported practices related to laboratory biosafety among biotechnology and related life-science students. The results are presented in terms of demographic characteristics, biosafety training, knowledge, attitudes, practices, and associations between these domains.

3.1 Demographic and academic characteristics

The demographic and academic characteristics of the respondents are presented in Table 2. The majority of respondents were female (81.3%), while 18.1% were male and 0.6% preferred not to disclose their gender. Most respondents were enrolled in B.Sc. Biotechnology (73.1%), followed by M.Sc. Biotechnology (16.3%). Regarding year of study, second-year students constituted the largest group (45.6%), followed by third-year (30.0%), first-year (18.1%), and fourth/final-year students (6.3%).

Table 2: Demographic and academic characteristics of respondents

Characteristic	Percentage (%)
Gender	
Female	81.3
Male	18.1
Prefer not to say	0.6
Academic programme	
B.Sc. Biotechnology	73.1
M.Sc. Biotechnology	16.3
Allied Sciences/Other	10.0
B.Tech. Biotechnology	0.6
Year of study	
First year	18.1
Second year	45.6
Third year	30.0
Fourth/Final year	6.3

3.2 Biosafety training and briefing

As shown in Table 3, 69.4% of respondents reported having received formal biosafety training, whereas 30.6% had not. Regarding the frequency of biosafety briefings, 28.1% reported receiving briefings occasionally or before specific laboratory modules. Biosafety briefings were received every year or semester by 20.0% of respondents, while 26.3% reported receiving them only during the first year. A further 25.6% reported having no biosafety briefing.

Table 3: Biosafety training and briefing frequency

Training/ Briefing	Percentage (%)
Formal biosafety training	
Yes	69.4
No	30.6
Frequency of biosafety briefing	
Every year/semester	20.0
Only during first year	26.3
Occasionally /before specific laboratory modules	28.1
No biosafety briefing	25.6

3.3 Level of knowledge, attitude and practice of laboratory biosafety

In the study, a majority of respondents (N=114, 70.37%) showed good knowledge on laboratory biosafety and had a mean score of 12.49 ± 3.09 . The same was also found to be true for Attitude and Practice measures. A majority of respondents also exhibited a good attitude (N=119, 73.46%) and good practice (N=102, 62.96%) towards laboratory biosafety. They had a mean score of 40.33 ± 10.72 and 43.46 ± 10.43 respectively.

Table 4: Level and mean score of knowledge, attitude and practice on laboratory biosafety

Measure		Frequency (N)	Percentage (%)	Mean	Standard Deviation	Interpretation
Knowledge	Good	114	70.37	12.49	3.09	Good Knowledge
	Moderate	28	17.28			
	Poor	20	12.35			
Attitude	Good	119	73.46	40.33	10.72	Good Attitude
	Moderate	29	17.90			
	Poor	14	8.64			
Practice	Good	102	62.96	43.46	10.43	Good Practice
	Moderate	47	29.01			
	Poor	13	8.02			

**The highest frequency and percentage were in bold*

3.4 Laboratory biosafety knowledge

Knowledge was assessed using 15 questions covering biological safety cabinets, waste disposal, spill management, personal protective equipment, disinfection, autoclaving, aerosol hazards, containment, and other laboratory biosafety procedures. The percentage of respondents selecting the correct answer for each item is presented in Table 5.

Table 5: Knowledge of laboratory biosafety

Knowledge item	Percentage (%)
Purpose of a biological safety cabinet	91.3
Appropriate biohazard waste bin	71.3
Biological spill management	96.3
Appropriate laboratory gloves	85.6
Recommended alcohol concentration for hand sanitizer	85.0
Appropriate fire extinguisher	84.4
Standard autoclave conditions	88.1
Correct alcohol concentration	83.8
PPE for cryogenic materials	88.1
Aerosol hazard from sonication/centrifugation	68.8
Proper arrangement inside a biological safety cabinet	83.8
Disinfectant for liquid biological waste	75.6
Containment of genetically modified microorganisms	81.3
Hazards of ethidium bromide	83.1
Disposal of antibiotic-resistance marker cultures	83.1

Overall, respondents demonstrated high levels of correct responses for several basic biosafety concepts. The highest proportion of correct responses was observed for biological spill management (96.3%), followed by the purpose of the biological safety cabinet (91.3%). Correct responses were also high for autoclave conditions and

cryogenic protective equipment (88.1% each). The lowest correct response was observed for the identification of aerosol hazards associated with sonication or centrifugation (68.8%), followed by the appropriate biohazard waste bin (71.3%).

3.5 Attitudes toward laboratory biosafety

Attitudes toward laboratory biosafety were assessed using a five-point Likert scale. The proportion of respondents who selected either 'agree' or 'strongly agree' for each statement is shown in Table 6. Agreement levels ranged from 70.6% to 76.9% across the ten attitude statements, indicating generally favorable attitudes toward laboratory biosafety.

Table 6: Attitudes toward laboratory biosafety

Attitude item	Agree/Strongly agree (%)
Attitude statement 1	76.9
Attitude statement 2	75.6
Attitude statement 3	76.3
Attitude statement 4	70.6
Attitude statement 5	74.4
Attitude statement 6	71.9
Attitude statement 7	75.0
Attitude statement 8	73.1
Attitude statement 9	74.4
Attitude statement 10	76.9

3.6 Laboratory biosafety practices

Self-reported biosafety practices were assessed using 13 five-point Likert-scale items. Table 7 presents the percentage of respondents who reported performing each practice always or frequently.

Table 7. Self-reported laboratory biosafety practices

Practice item	Always/Frequently (%)
Handwashing after removing gloves/finishing laboratory work	73.1
Use of UV light in the laminar flow hood	58.8
Proper segregation of sharps	66.9
Changing compromised gloves	75.0
Avoiding eating/drinking in the laboratory	80.6
Treating liquid cultures before disposal	67.5
Wearing eye protection during splash/corrosive hazards	56.3
Handwashing after practical sessions	71.9
Wearing lab coats, eye protection and closed shoes	71.3
Proper disposal of contaminated biohazard waste	70.0
Maintaining clean-to-dirty workflow in the BSC	71.3
Changing gloves when compromised	71.9
Decontaminating laboratory benches	74.4

The highest reported adherence was observed for avoiding eating or drinking in the laboratory (80.6%), followed by changing compromised gloves (75.0%) and decontaminating laboratory benches (74.4%). The lowest levels of frequent or consistent practice were observed for wearing eye protection during activities involving splash or corrosive hazards (56.3%) and the use of UV light in the laminar flow hood (58.8%).

3.7 Association between knowledge, attitude and practice

Spearman's correlation analysis was performed to examine the relationships between knowledge, attitude, and practice scores (Table 8). A weak positive correlation was observed between knowledge and attitude ($\rho = 0.162$, $p = 0.041$). Knowledge also showed a moderate positive correlation with biosafety practice ($\rho = 0.322$, $p < 0.001$). The strongest association was observed between attitude and practice ($\rho = 0.615$, $p < 0.001$).

Table 8: Correlation between knowledge, attitude and practice scores

Variables	p-value
Knowledge – Attitude	0.041
Knowledge – Practice	<0.001
Attitude – Practice	<0.001

3.8 Association between biosafety training and KAP scores

Differences in KAP scores according to previous biosafety training are presented in Table 9. Respondents who had received biosafety training had a higher mean knowledge score than those who had not received training (12.93 ± 2.75 vs. 11.43 ± 3.55), and this difference was statistically significant ($p = 0.006$).

In contrast, no statistically significant differences were observed in attitude ($p = 0.804$) or practice scores ($p = 0.210$) according to training status.

Table 9: KAP scores according to biosafety training status

KAP domain	Training: Mean $\pm$ SD	No training: Mean $\pm$ SD	p-value
Knowledge	12.93 ± 2.75	11.43 ± 3.55	0.006
Attitude	40.50 ± 10.66	39.80 ± 11.05	0.804
Practice	52.36 ± 12.37	49.98 ± 12.51	0.210

3.9 KAP scores according to year of study

The KAP scores across different years of study are presented in Table 10. No statistically significant difference was observed in knowledge scores across academic years ($p = 0.183$). However, statistically significant differences were observed in both attitude and practice scores across years of study ($p < 0.001$ for both).

The mean attitude scores were highest among first-year respondents, while the mean practice scores were highest among fourth/final-year respondents, with first-year respondents also showing a comparatively high practice score.

Table 10: KAP scores according to year of study

Year of study	Knowledge mean	Attitude mean	Practice mean
First year	13.21	46.62	59.59
Second year	12.36	38.04	48.08
Third year	12.29	39.63	50.56
Fourth/Final year	12.00	41.40	59.60
Overall p-value	0.183	<0.001	<0.001

4. Discussion

The present study found that biotechnology students demonstrated relatively strong knowledge of laboratory biosafety, with a mean score of 12.47 out of 15. However, some gaps were observed in specific areas, particularly aerosol-related hazards and biological waste management. This indicates that students may be more familiar with routine safety procedures than with less frequently encountered hazards requiring specific technical knowledge. Similar variations have been reported internationally. A Malaysian study among health-science undergraduates found moderate biosafety knowledge despite good attitudes and practices (6). In contrast, a study among life-science students in India identified poor-to-moderate baseline knowledge of biosafety and waste management, demonstrating the need for structured education (16). Research among medical laboratory students in Uganda also highlighted gaps between theoretical knowledge and practical biosafety application, particularly during laboratory internships (17,18).

The relatively higher knowledge observed in the present study may be related to the participants' biotechnology background and regular exposure to biological laboratory procedures. Nevertheless, the remaining topic-specific gaps suggest that routine laboratory exposure alone may not ensure complete understanding of biosafety requirements.

Students demonstrated generally favourable attitudes towards laboratory biosafety and reported frequent adherence to several recommended practices. Routine behaviours such as avoiding food and drinks in the laboratory, changing compromised gloves, handwashing, wearing appropriate protective clothing, and bench decontamination were commonly reported.

Comparable findings have been observed in Malaysia, where students demonstrated good attitudes and practices despite moderate knowledge (18,6). Similarly, the Ugandan study found that students generally reported recommended biosafety practices, although gaps remained in particular procedures and attitudes. The authors emphasized the importance of practical training and standardized procedures rather than relying only on theoretical knowledge (4).

Some practices in the present study, particularly those involving UV use, treatment of liquid biological waste, and eye protection, showed greater variation. These differences may reflect the fact that some procedures are encountered less frequently during routine practical sessions. Therefore, positive attitudes should be reinforced through demonstrations, supervision, and repeated practical application.

A significant positive association was observed between knowledge and attitude, knowledge and practice, and attitude and practice. The strongest association was between attitude and practice, suggesting that students' perceptions of the importance of biosafety may contribute to the translation of knowledge into routine laboratory behaviour.

The Malaysian study similarly reported a positive relationship between attitude and practice, although its knowledge-attitude relationship was not significant (6). Differences between the studies may be related to variations in student populations, laboratory exposure, institutional safety culture, and questionnaire design.

The present findings therefore support an integrated approach to biosafety education. Knowledge is important, but it may not independently determine behaviour; students must also develop positive attitudes and opportunities to apply safety principles consistently in laboratory settings.

Biosafety training was significantly associated with higher knowledge scores in the present study, although no significant differences were observed in attitude or practice. This finding is supported by evidence from India, where a one-day biosafety and waste-management training programme among 81 life-science students significantly increased the mean knowledge score from 10.20 to 14.02 ($p < 0.001$) (16).

Similarly, a study conducted among 320 university students in Pakistan found a significant improvement in laboratory biosafety knowledge following interactive workshops, with overall understanding increasing substantially after training ($p < 0.001$) (19). These findings support the value of structured and interactive biosafety education.

The absence of a significant association between training and attitude or practice in the present study may be related to differences in the frequency, duration, recency, or practical content of training. A one-time briefing may improve knowledge without necessarily producing sustained behavioural change. The Ugandan study similarly emphasized practical application, standardized procedures, and laboratory simulations as important components of biosafety education (4). The academic year was significantly associated with attitude and practice but not knowledge. This may indicate that increasing laboratory exposure and practical experience influence safety attitudes and behaviour without necessarily producing major differences in factual knowledge. Therefore, biosafety education should be reinforced throughout the academic programme rather than being restricted to the first year.

A strength of this study is its specific focus on biotechnology students, who regularly work with biological materials. The study also assessed knowledge, attitudes, and practices together and examined their relationships with biosafety training and academic year.

However, the cross-sectional design prevents causal conclusions. The study also relied on self-reported practices, which may be affected by recall or social-desirability bias. Voluntary participation may have introduced selection bias, and the findings may not be directly generalizable to biotechnology students at other institutions. In addition, the training variable did not assess the duration, quality, recency, or practical content of previous training.

The findings highlight the importance of incorporating continuous biosafety education into biotechnology programmes. Training should extend beyond theoretical information and include practical demonstrations, scenario-based exercises, and reinforcement of procedures involving biological spills, aerosol-generating equipment, waste disposal, PPE, and emergency response.

The positive associations among knowledge, attitude, and practice suggest that biosafety education should address these components together. Overall, the study indicates that biotechnology students have a generally favourable foundation for laboratory biosafety, although specific knowledge and practice gaps remain.

5. Conclusion

The present study demonstrates that biotechnology and life-science students generally showed a favourable level of laboratory biosafety knowledge, attitudes, and self-reported practices. Most participants demonstrated good knowledge of basic biosafety principles, while positive attitudes toward laboratory safety and adherence to several routine safety practices were also observed.

However, specific gaps were identified, particularly in the recognition of aerosol hazards, appropriate biohazard waste disposal, eye protection, and certain laboratory decontamination practices. The significant positive

associations between knowledge, attitude, and practice suggest that these domains are interconnected, particularly the relationship between safety attitudes and reported practices.

The findings also indicate that previous biosafety training was significantly associated with higher knowledge scores, although it was not significantly associated with attitude or practice scores. This highlights the importance of continuous and practical biosafety education, including demonstrations, hands-on exercises, spill management, aerosol-risk awareness, PPE use, and appropriate biological waste disposal.

Overall, the study provides evidence that while students possess a good foundation in laboratory biosafety, regular practical training and reinforcement of safety procedures are needed to strengthen consistent laboratory safety behaviour and promote a stronger biosafety culture among biotechnology and life-science students.

6. Future scope

The findings of the present study provide several directions for future research in laboratory biosafety education among biotechnology and life-science students. The significant associations observed between knowledge, attitude, and practice, together with the higher knowledge scores among students with previous biosafety training ($p = 0.006$), support further investigation of structured educational interventions. However, the absence of a significant association between training and attitude or practice indicates that training exposure alone may not be sufficient to produce sustained behavioural change. Future studies should therefore examine the frequency, duration, recency, content, and practical intensity of biosafety training.

Longitudinal and quasi-experimental studies could evaluate changes in KAP before and after standardized biosafety interventions. Training programmes should incorporate hands-on demonstrations, laboratory simulations, spill-response exercises, aerosol-risk recognition, appropriate PPE selection, biological waste management, and decontamination procedures. Interactive and technology-assisted approaches may provide additional opportunities for reinforcement (20) demonstrated the feasibility of a digital WeChat-based approach for laboratory biosafety education among medical students.

The specific gaps identified in the present study, particularly aerosol-related hazards, eye protection, and biological waste management, warrant targeted assessment in future intervention studies. Direct observation or competency-based assessments should complement self-reported practice measures to reduce potential reporting and social-desirability bias. Future multicentre studies involving diverse biotechnology and life-science programmes could provide stronger evidence on institutional and academic factors influencing biosafety behaviour. In addition, longitudinal assessment of laboratory safety climate, supervision, and training quality may clarify how educational and organizational factors contribute to sustained safe laboratory behaviour. Such evidence could support the development of standardized, competency-based biosafety training frameworks and strengthen safety culture within academic laboratories.

Future studies should complement self-reported KAP assessment with direct evaluation of adherence to laboratory SOPs and competency-based biosafety assessments. Such an approach would help determine whether reported knowledge and practices correspond to actual laboratory behaviour, an issue also addressed in student-focused biosafety research by (17).

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