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Evaluation of health laboratory ethical compliance among laboratory practitioners in Kinondoni District, Tanzania

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Abstract

Background Laboratory science rears a special pattern in medicine, which helps promote different biological phenomena, which will aid in the management of disease through analysis of samples and laboratory tests. Laboratory practitioners provide results that are used to make critical decisions. The aim of the study was to evaluate how health laboratory practitioners understand and comply with the laboratory ethical conduct as per ISO 15189:2012.

Methodology An exploratory study design that involved a qualitative approach for data collection. A total of 16 laboratory personnel who were purposively selected participated in the study. Primary data was collected through in-depth interview guided by semi-structured questions.These interviews were audio recorded, and the researcher verified the recordings for accuracy and completeness. Data saturation was reached after interviewing 14 laboratory practitioners. Additionally, non-participatory observation were conducted to complement the data. The audio recordings were transcribed into text, translated into English, and analyzed using a thematic analysis method with a deductive approach, guided by pre-determined themes. NVivo 12 software was used to facilitate the analysis.

Results Despite most of the laboratory practitioners claiming to be aware of and follow laboratory ethical conduct, there were several instances of misconduct that still exist in the laboratories, e.g, mislabeling and miscommunication with clients. study has brought about valuable knowledge on ethical conduct among laboratory practitioners, the importance of abiding by ethical standards while performing laboratory activities, and the impact of these on the results. Prior research suggests that ethical compliance should be reinforced through institutional policies, leadership commitment, and accountability frameworks rather than relying solely on self-regulation. Laboratories should prioritise embedding integrity as a core institutional value through structured ethical guidelines, leadership-driven ethical culture, and continuous professional education.

Conclusion There were still some incidences of information breaching that still happen to some of the laboratories. More frequent trainings were of concern along with the enhancing supportive supervision and accountability mechanisms to address ethical breaches through formalized corrective actions rather than informal reminders, integrate ethical guidelines into laboratory management systems, ensuring routine monitoring and enforcement rather than relying on self-regulation establish structured and mandatory ethical training programs with clear

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attendance or each laboratory staff to attend all ethical trainings with a call to the responsible Laboratory practitioners board, policies should enforce accountability by implementing appropriate penalties for practitioners who fail to comply with ethical standards.

Keywords Health laboratory, Ethical practice compliance, Consent, Health laboratory practitioners

Background

Laboratory science reveals a unique pattern in medicine that helps promote different biological phenomena, which will aid in disease management through the analysis of samples and laboratory tests. For such an importance of subject, there must be rules and principles of right conduct [1].

Various international and national guidelines and declarations have been involved with time to time and thus critically upgraded the practice of bioethics in the field of biomedical research. Compliance with these guidelines confirms the autonomy, dignity, and well-being of participants as well as the integrity and credibility of research and test results [2]. The organizations specially; the International of federation of clinical chemistry (IFCC), American Association of Clinical Chemistry (AACC) and International Organization for Standardization (ISO) have defined ethical recommendations for clinical laboratories. Code of Ethics for public servants (CEPS) in Tanzania suggest that all the area of medicine should fulfill the ethical standards and guidelines and the field of laboratory medicine is no exemption on compliance with the International Organization standards among the laboratory practitioners [3].

Laboratory scientists as Public Servants in Tanzania, for the sector to be efficient and secure its reputation, they shall behave and adhere to the laboratory Code of Ethics and conduct per ISO 15189:2012 which are maintenance of information Confidentiality, laboratory's competence, impartiality, judgment or operational integrity, appropriate procedures to ensure that staff treat human samples, tissues or remains according to relevant legal requirements. For the laboratory to pursuit of excellence in the service, loyalty, diligence, impartiality, integrity, accountability, respect of law, proper use and respect of official information [3] When discussing about medical laboratory system, the staff comes first, as they are the key players in the linkage between clients (Patients) and their care. Therefore, it is highly mandatory to avoid any ethical issues that would degrade the professionalism and expertise in the laboratory [4].

Methods

The study was an exploratory case study design involving a qualitative data collection approach. This design was selected to allow an in-depth exploration of views and understanding from health laboratory managers and health laboratory practitioners with experience with laboratory activities through semi-structured interviews conducted in health facilities. Second to describe the events and experience of the interview which were conducted by the researcher and those designated laboratory personnel to gain knowledge concerning the challenges and ethical concerns that influence the health laboratory practitioners to ethically comply while performing laboratory activities, where saturation was achieved with only 14 laboratory practitioners when data analysis and review indicated that the participants expressed no new themes or ideas.

Ethical consideration

Ethical clearance with Ref No. DA.282/298/01.C/1128 was obtained from Institutional Review Board (IRB) of Muhimbili University of Health and Allied Sciences (MUHAS) and the National Research Ethics Review Committee. In addition, permission to collect data was requested from the Regional Administrative Secretary of Dar Es Salaam region. This was presented to introduce the researchers to any other relevant authority. Kinondoni Municipal Executive Director, Municipal Medical Officer (MMO), and other relevant authorities were asked for permission to conduct the study in Kinondoni Municipal Council.

Participants were not given any reward in exchange for their participation instead, a written informed consent were administered to the laboratory managers and the laboratory practitioners that their involvement in the study was voluntary and gave power to withdraw any time without affecting relation with researchers and provide their views, as stated that the researcher was also an out sider laboratory expert from Muhimbili. The study's aims were stated in detail before written informed consent was requested and obtained from every study participant before commencement of the interview. Until the study was over, confidentiality was upheld to safeguard the subjects from harm since no names were mentioned, only the Identity numbers were used.

Sampling techniques

Purposive sampling technique was used to sample health laboratory facilities, whereby participants were selected and purposefully by their experience in health laboratory processes, to inform an understanding of the research problem [5]. Expert sampling was deployed as a type of purposive sampling technique that is particularly useful in exploratory qualitative research, helping

the researcher to glean knowledge in an area with high level of uncertainty from the participants who are laboratory expertise providing rich information thus suitable for detailed research fundamental to the quality of data gathered is reliability and competence of the informant must be ensured. Only 14 laboratory practitioners were deemed when saturation was achieved, where data analysis and review indicated that the participants expressed no new themes or ideas.

Data collection

Data was collected qualitatively through an in-depth interview with laboratory supervisors, managers, and practitioners in the selected health facilities, where open and closed-ended questions and topics were asked to the mentioned and responses were recorded in audio devices. Before full data collection, a small pilot study involving three laboratory practitioners was conducted at Amana Regional Referral Hospital in Tanzania. This Facility was selected for the pre-testing of the data collection tool because of its similar facility level, population density, and composition of potential respondents for the interviews to the health services at Mwananyamala Regional Referral Hospital in Tanzania. Minor adjustments were made to several interview questions for clarity. Furthermore, the attached interview guide and its English version are available in Supplementary File 1. Each in-depth interview averaged about 45 min. A non-participatory observation data collection method where by an observer is not entirely in touch with actions and events taking place [6] was used to observe laboratory practitioners' competence on conducting laboratory activities from pre analytical phase, analytical phase thus samples collection, testing and post analytical phase (report and interpretation of the findings). The researcher who collected data had an academic background in laboratory science, which made it easy to observe ethical compliance issues in terms of competence via applying an observation checklist and triangulating data, participants' views, and findings of the study. The attached observation checklist is available in Supplementary File 2.

The non-participatory method is used to understand a phenomenon by entering the community or social system involved, while staying separate from the observed activities. Furthermore, the researcher who collected data has a lab background. She was observing laboratory ethical compliance issues in terms of how patients were attended (registration), communication (customer care) analytical phase thus Lab rules abided while conducting procedures, SOPs, Guidelines compliance of the lab practitioner on proper utilization of personal protective equipment (PPE), Personal hygiene (Hand washing) and Technical skills.

An interview guide was used to collect qualitative data, whereas the guide included semi-structured interview questions on various thematic areas, such as confidentiality and laboratory procedures. The interview guide was developed from predetermined themes. During the data collection process, the first interview assists in refining the questions and was validated by the team, which comprised a laboratory expert and a qualitative research expert.

Some of the semi-structured questions framed are: '*How do you treat the residual specimen?*'

Data analysis

Descriptive statistics were used to analyse participants' demographic characteristics, including age and gender, at the designated laboratory in the health facility, where demographic information helped the researcher identify patterns and variations in experiences. Thematic analysis method was used to analyze the data [7] With a deductive approach where themes were pre-determined, the researcher could focus on a specific aspect of the information based on the research questions. The audio recorded interviews were transcribed verbatim into text, translated, and then analyzed using the thematic method of analyzing qualitative data using NVivo 12 software. Relevant information was identified. NVivo software allows researchers to organize, analyze, and visualize unstructured qualitative data like interviews, surveys and documents by enabling them to code, categorize, and query the data to identify patterns and insights within large datasets, essentially helping them manage and interpret qualitative research effectively.

Nvivo 12 software relevant information was identified, which involves the following steps [8];

First, Prior coding process, the principal researcher involves the qualitative research experts and the supervisors, share the scripts, reread the transcripts to familiarize themselves with the data which were then imported transcripts to NVivo 12 software to be coded and sorted where phrases, sentences, and paragraphs were organized in a meaningful way to form codes. The code book was developed, which contained identified coding categories and themes. Through the NVivo software, themes and sub-themes were generated, and the most common themes were reviewed to see if there were any contradictions among codes forming themes. Finally, the themes were defined by returning to the original transcripts to ensure that the information (themes) and named to be able to answer research questions and those not supported by data were eliminated.

Reliability was due to inter-coder agreement [9] among the researchers based on the quality of data gathered and validated by the team, reaching a consensus establishes the credibility of the qualitative findings.

Table 1 Themes and sub themes from the in-depth interviews

Sub-Themes	Themes
• Ethical training • Frequency of conducting ethical training • Application of knowledge gained from the training	Practitioner's Competence
• Awareness of laboratory misconduct • Common misconducts in the laboratory • Practice of laboratory activities ethically • Ensuring client agrees with the procedure to be undertaken • Treatment of residue specimen • Interactions with clients	Laboratory Procedures
• Ensuring confidentiality for the client's information • Record keeping system • Use of codes	Security

Trustworthiness of qualitative research

Several criteria were used to evaluate the trustworthiness of the qualitative data [10]. First, credibility was enhanced, where an in-depth interview was used to obtain information phenomenon and well recognized research methodology in preference to internal validity by establishing the confidence that the results are accurate, triangulation was done between data collected from different participants from health laboratory facilities, transferability in preference to external validity by ensuring the research findings apply to other program or study of similar context because of the detailed research methodology descriptions, selection criteria and the analysis being complemented by quotation from the participants interview which allow readers to judge the dependability of the analysis and support transferability of the findings, dependability thus in preference to reliability by detailed description of the methodology for the study to describe what was planned to enable other research to repeat in the future after the execution. If the inquiry occurs within the same context, coder, or participants, and confirmability, where triangulation was used for this study involving the data collection method via the in-depth interviewer guide (IDI guide), the study site and the participant to reduce researcher bias. Extending the confidence that other researchers could corroborate the results, detailed methodological description enabled determination of how far the data and concepts emerge may be accepted by the reader in preference to objectivity, examine the research process and the data analysis to ensure that the findings are consistent and could be repeated.

Results

Participant demographics

Summarize participants' socio-demographic characteristics from in-depth interviews, enhancing the identification of patterns, varied experiences, and the context of the participants' perspectives. The study had a total of 14 laboratory staff from Mwananyamala regional referral hospital and Magomeni hospital who were interviewed. An equal split between gender was maintained, with seven males and females. The majority were in the age range of 26 to 49 years, with an academic perspective, education levels being a diploma (8) and (6) bachelor degree level. A lot of the surveyed participants have a working experience of 2 years.

Qualitative themes

The study findings have been grouped into three main thematic areas: practitioners' competence, laboratory procedures and confidentiality, whereby the targeted participants will give their different views on the topics of discussions. Table 1 details the themes and sub-themes from the In-Depth Interviews.

Practitioners' competence

A total of 13 laboratory practitioners were observed through non-participatory observation as they conducted their laboratory activities within their respective laboratory facilities. The level of laboratory practitioners 'compliance on practitioners' competence practices observed how patients were attended from the pre analytical phase and language used where the was good customer care observed, in analytical phase as how the practitioners conduct laboratory procedures and how they abide the laboratory rules, SOPs and proper use of PPE and hand washing. Some of the laboratory practitioners like (*Lab Technologist 14*) seemed to ignore the laboratory rules by not complying to the bench-colored tapes by putting stuffs on red tape which indicates that the area is hazardous, improper disposal of wastes like gloves and in appropriate movement of practitioner from one room the other while wearing the gloves hence causes the contamination. Practitioners were observed to comply with hand washing soon after performing laboratory tests.

Moreover, the technical skills were observed in how laboratory practitioners follow the guidelines, such as (Lab Scientist 10) on results reporting, performing the quality control and machine maintenance (Lab Scientist 3) was observed performing weekly machine maintenance, and Laboratory ethical training attendance.

Laboratory staff interviewed confirmed that they had attended different training sessions regarding ethical procedures. However, it was challenging for them to resonate the training given if it was linked to the ISO 15,189: 2012 trainings. Some training sessions that laboratory staff received included customer care, mainly about how to attend to clients, informing clients about the sample required, the turnaround time, and confidentiality. Other trainings included training on waste management, quality management system, sample management, technical management, and Infection Prevention Control. A good

number of the staff interviewed also agreed that training sessions received had positive results regarding their competence as signified by the quotes below.

"Training on customer care focused on how to attend a client because we don't refer clients as patients. In addition to that, we were also taught how to explain to the client what kind of specimen is required and the turnaround time (Lab scientist 1).

"I am applying them very effectively because they help me to perform efficiently. I was unaware of some things but am now aware of them after the training. Now I have realised the importance of conducting quality control, machine validation" (Lab technologist 3).

Frequency of training

While majority confirmed to have received the trainings as on job training, a few mentioned to have received the trainings from external trainees/institutions occasionally claiming that the top management are the ones who are given such opportunities because of budget limits as heard from some of the respondents as it was bolded by one of the respondents. *"It depends. When you read the guideline, the training frequency is specified, but these trainings require financial resources, which sometimes is a challenge".* (*Lab scientist 3)*

Some of the interviewed laboratory staff showed low willingness to attend some trainings provided by admitting that sometimes they do not, mainly on-the-job trainings.

The on-job trainings happen every week, whereby each department is given a slot to talk about a topic such as customer care, confidentiality, and sample management, among many other topics of interest. Some laboratory staff confirmed that they have made it a habit to have daily reminders to all staff on the code of ethics before the start of work to ensure that everyone follows what is required of them. This initiative was driven by the presence of interns in the health facilities who need to learn the code of ethics to ensure that they avoid the common misconducts that may occur in the laboratory.

It was also learned that staff responsible for training in the facilities have been making some efforts, but not tailor-made sessions for laboratory staff. *"The health secretary usually orients us every Wednesday on work ethics and guidelines, though they are not specific to the laboratory technologist," said Lab Technologist 12.*

It was also noted that the lab staff don't usually attend the organized training sessions but only receive information through their fellow staff who attend. *"Usually, quality officers attend training often, and usually they share with us every week on Tuesday,"* said *Lab technologist 6.* This practice may be helpful to the staff, but not very convenient since knowledge passed may be lost or miscommunicated between the staff.

As quoted by one of the participants, orientation programs are also conducted for all new employees on enrolment. *"Training on waste management is conducted when there are new employees or interns." (Lab scientist 5)*

Application of knowledge gained from the training

Laboratory staff have acknowledged that the training received has proved vital in their daily laboratory practices as it gives them confidence in what they are doing, improving their efficiency and quality of service.

"The training helps to improve workers' performance. It also improves quality improvement indicators because you know what needs to be done at what time. Even turnaround time and quality improvement indicators are doing well" (Lab scientist 1).

Some interviewees also showed that there is and can be positive uptake among lab staff to receive and apply knowledge gained from training sessions to their sections, as illustrated by the quote below.

" If I'm trained about something, then I must practice it. For example, when I was trained about IPC, I went to my supervisor and told him that I was trained on this, and then I asked him to put me in a department where I can practice what I learned for at least a month to share the experience with others. So, when I learn something, I practice it too". (Lab technologist 6).

Lab technologist 3 added, "I am applying them effectively because they help me *perform efficiently. I was unaware of some things but am now aware of them after the training. Now I have realized the importance of conducting quality control, machine validation etc."*

Practices of a laboratory procedure

Understanding of laboratory misconduct

The interviewed health laboratory staff were noted to be fully aware of what laboratory misconduct means, what it is, and how it happens. They further explained that laboratory misconduct can be categorized into two groups as follows;

Ethical misconduct: This type of misconduct results from a person's inability to follow the rules of laboratory practices. Some of the common misconducts that falls under this category as mentioned by the interviewed laboratory staff include, corruption, alcoholism, lack of adherence to guidelines/SOP, discrimination, forgetting to label

sample, poor handing over of shift, miscommunication–not informing the client about waiting time for his/her lab test results, forgetting to label specimen, mislabeling and contamination of sample, as shown by the below quote.

> *"There is something called information to clients. For example, a patient has arrived but not informed directly how long she/he should wait for her lab test results. I consider this a misconduct because a patient may complain later that her/his results have been delayed, but were not informed how long it would take. There are also misconducts due to negligence, for instance, a person may forget to label a specimen, and things like that" (Lab scientist 2).*

Technical misconducts: these result from poor attention/focus/care given by a laboratory staff when performing a specific task, or lack of knowledge and technical skills by a lab staff when performing a particular task [11]. This category includes misconducts such as giving wrong information/results to the client, bad analysis, poor quality sample and false results, as mentioned by the interviewed laboratory staff, as illustrated below.

> *"Incorrect lab results can lead to wrong diagnoses and incorrect treatment. Some errors occur due to staff lacking awareness of specific procedures. When such errors happen, we record them in an occurrence book (Lab scientist 1).*

Common misconducts in the laboratory

The interviewed health laboratory staff acknowledged that some misconduct is happening in the laboratory where they are working. They explained that misconduct does not occur frequently because they usually have an internal meeting or session to remind each other of the laboratory code of ethics. The common misconducts that were mentioned include;

- Improper waste management- it's an unsuitable practice of discarding or disposing unwanted hazardous substances such as used gloves, which should be disposed in the yellow bin, human tissues, which should be disposed in the red bin, papers, disposed in the black bin and sharps like needles in the syringe waste box.
- Staff punctuality- Some staff members do not arrive on time or do not perform activities on time.
- Improper sample transportation- poor handling of laboratory samples as a pre-analytical pathway; thus, specimens collected in tubes or containers should be tightly sealed. Medi box should be used for transporting blood samples to avoid sample leakage and splits leading to harm.

It was noted that a lot of laboratory misconduct has been minimised with the introduction of a computerized laboratory system. This includes issues like wrong labelling and documentation. Though the computerized systems seem practical, they still have a downside as some of the laboratory staff are still new to the systems, affecting their turnaround time (TAT).

Besides what was discussed above, laboratory staff mentioned other aspects/scenarios that clients/patients consider to be misconducts, but they are not. This includes unintended delays that result from a long sample analysis time, as signified by the quotes below.

> *"You may find a person who has come for FBP, and a urine test wait longer than the one with malaria and Hb sample. So, the person who has come for FBP will complain about why his sample is taking too long, and he was supposed to be informed about the turnaround time before. Another person will complain why my sample is taking longer, while this person has taken a shorter time than mine, probably, he has given something" (Lab scientist 8).*

Ethical practices in the laboratory

The interviewed health laboratory staff acknowledged following all the ethical code of conduct for laboratories. They claimed to follow SOP and had a copy of it posted on the wall as a constant reminder to them [12]. Punctuality; the interviewed laboratory staff mentioned that they usually must report early at work to have more time to prepare for their tasks and avoid delays, when probed more about their experience on ethical practices, some key responses were gathered from the respondents as described below;

> *"I adhere to guidelines and rules at the workplace. If a client arrives, I attend to her accordingly, take the required sample and conduct a test, and then issue the results without making the client feel bad" (Lab Technologist 13).*

> *"After arriving, first of all, I make sure my working area is decontaminated and prepare my working tools. If I am in phlebotomy, then I proceed with my activity." (Lab technologist 9).*

Professional dressing and Personal Protective Equipment (PPE); most of the time, they ensure that they are well dressed and look presentable, including wearing laboratory coats, closed shoes and PPE when needed as directed in the laboratory code of conduct. Furthermore, they explained that there are times where some staff may forget to wear professional attire in the laboratory. Still, they will remind those staff to change and wear professional attire, as the quote below signifies.

"You are not supposed to enter the laboratory with open shoes or without wearing a coat, but sometimes a person enters with open shoes and without a laboratory coat knowingly" (Lab scientist 5).

Turnaround time (TAT); the interviewed laboratory staff mentioned that they are constantly working towards improving the turnaround time of the results. They always ensure the results are provided on time and avoid delays.

"On my side, I must do control before taking samples, I will ensure all my work equipment is in place, then I will take the samples from phlebology and start working on them to meet the TAT that is needed and giving correct results to patients" (Lab scientist 11).

Client consent - ensuring client agrees with the procedure to be undertaken

Client consent is among the critical aspects of laboratory practices, without consent, the laboratory staff are not able to do any test [13]. To get clients' consent, the interviewed laboratory staff mentioned the following key steps that they usually use.

Introduction: This involves both parties, the laboratory staff and the client. The laboratory staff would introduce him/herself and, in return, confirm the name and other information to ensure the patient is the right one sent by the doctor. The introduction will also set a friendly climate between the client and the laboratory staff. Procedure explanation: Here, the laboratory staff would explain the exact procedure he is going to do on the client. The explanation includes the type of sample the lab staff will take, where he/she will take it, how he/she will take it and how much he/she will take it. This will keep the client fully aware of what will happen next and help the client manage his/her expectations.

TAT explanation- In this step, the laboratory staff would inform the client on when they should expect their results, as illustrated by the quote below.

"When a client arrives first, I introduce myself and let her know that I am here to take certain samples that she has requested and their turnaround time. I ask you to be patient in case there will be any challenge. After that, I continue" (Lab scientist 2)

"When a client arrives, I tell her I will take a blood sample for this and that test. So, a client is aware of what is happening, so he is ready to cooperate and allow you to proceed with other procedures" (Lab scientist 5).

This indicates that the client will sit expecting the procedure to take a certain amount of time but not precisely. In addition to that, the Lab scientist 5 said.

You welcome her by mentioning her name to ensure that she is the one, and tell her that now I will take a blood sample, or we will test you for typhoid. I will also take your urine sample and see her reaction so you can proceed with other procedures." It was analyzed from the staff that there is no explicit mention of TAT for clients, even though the clients are informed about the procedure that they will undergo.

It was also noted from the interviewed laboratory staff that there is a difference in how to get consent from children versus adults.

Children's consent- According to the staff, this is asked for by their guardians' consent and cooperation. Then, the sample will be extracted from the child using a little force but under the guardian's care.

Adult consent- Most of the time, adults tend to cooperate with the laboratory staff, but on occasions where an adult has not given consent, then the laboratory staff would advise the person about why it is essential to give consent to take samples [13]. They will advise the unwilling client only after other clients on the queue have been attended.

"Maybe if it's a kid, kids tend to refuse, but an adult refusing to give a sample while they are already at the hospital, then they need help, they need more than advice. You cannot hold an adult to take a sample. A kid can refuse, and you can take the sample by a little force. The guardian must consent, but they are there with their kids. Unwilling adults will be told to wait until others have attended to them, and then they will be given some advice. (Lab scientist 8)

Treatment of residual specimen

Residual specimens are not thrown away instantly, as most of the interviewed laboratory staff mentioned. Depending on the hospital, residual specimens will be taken to the sample retention for about 2 to 7 days before being disposed permanently [2].

It was also analyzed that some samples are sometimes retained for other purposes, like educational learning and control. They also said they do not sell samples for individual or organizational gains. However, sometimes they would give another institution some samples for validation purposes or for control upon request, as seen in the below quotes:

"It depends on the sample type because not all are retained. For instance, we take a small amount of urine, and the remaining will be thrown away. The

same applies to stool. But other samples are retained for further investigation, for instance, the full blood picture, we retain them for two to three days, and then we throw them away." (Lab technologist 13).

"For instance, we keep malaria samples for a few days for learning purposes for students" (Lab technologist 11).

Interactions with clients

Interaction with clients is mainly limited at phlebotomy as mentioned by most of the interviewed laboratory staff. They tend to maintain a very friendly and respectful relationship with clients. They care about their clients because they have received customer care trainings but also, they know some of their clients have come from very far places. They do not engage in unethical conversations with their clients, and if their clients are inappropriate. They deal with them politely, as signified by the quote below.

"I interact with clients only when I have to meet with them. Most of the time, those working at a phlebotomy meet with many clients, so they interact with them primarily by welcoming them, getting the samples, comforting them and telling them to wait for the results. (Lab scientist 1)

It was also learned that there is usually a positive connection between the staff and their clients before any procedure. *"First, clients are our friends because they left their home and come here for my service. After arriving, I welcome him and tell him you have come for this and that. We have a good relationship, though some of them are not polite" (Lab technologist 6)*

As illustrated below, the positive interaction between the staff and their clients may be impacted by training sessions given to the staff as explained by some of the staff.

"We are trained on how to welcome clients, introduce ourselves, have a smiley face and be happy so that even if the patient is critically ill, they can still see you in a normal state" (Lab scientist 8).

Security/confidentiality

It was gathered that the laboratory staff interviewed understand the need to keep customers' information confidential as indicated in the ethical guidelines. They have also admitted having filled a non-disclosure agreement with the health facilities they are working with, and the document is saved in the staff files.

From the interviews it was learned that some staff some key practices are adhered to ensure that there is confidentiality between them and their customers like Restricting admission to the room by authorized person only-only authorized staff are allowed to access entry to rooms with equipment and samples Access to the documents is restricted to authorized person only-only authorized staff are allowed to enter rooms with clients' information such as results paper, files and admission by non-authorized is at a given time only.

"Everyone is fulfilling his/her duty, if a cleaning person enters the room is not supposed to touch any documents. She will clean it, and we (technical persons) can access the documents. Even a nurse is not supposed to touch any book, and in addition to that, a non-authorized person is not allowed to enter the room. The person responsible for cleaning has a specific time for entering and leaving the room, and just every time she wants." (Lab technologist 13)

Data is stored in the system and accessed by codes instead of real names. *Only a few authorized staff have access to the system to gain maximum information security*. Register books are locked and can't be accessed by unauthorised persons. From the interviewed staff, it was learned that access to results registers is also high, as shown below.

"There is a very high level of confidentiality whereby I am not even allowed to share the lab results with the customer or her relatives no matter how many times they ask for them" (Lab Scientist 1)

Furthermore, the laboratory staff interviewed opened up that there were challenges in the past in terms of documentation whereby you would give a customer his/her lab result on paper for him/her to take it to the doctor for interpretation. This led to a lot of information breaching because a customer had access to the results and would take a picture of the lab results and share with their friends or relatives before reaching the doctor's office. However, this has been highly resolved with the introduction of the digital platform for recording customers' information, as heard by one of the participants.

In the past, we filled out the results in a form and gave it to the client so that he/she could take them by himself/herself directly to the doctor. So, it is between you and the client. But now we use the system, and everyone can log in using his/her password. So currently, you and the doctor can access the results. On top of that, whenever you attend a client, the door must remain closed." (Lab technologist 7)

"For instance, I am working in the HIV unit after business hours, I don't just leave my register anywhere. we have a special place where we keep it locked and no one else can have access to it." (Lab scientist 11)

Discussion

The data has clearly shown that most of the laboratory staff have attended several ethical trainings, such as internal training (on-the-job training), which occurs more frequently than external training. However, the inconsistency in training schedules and lack of a structured training framework contribute to varying levels of participation. Some of the laboratory staff are proactive in attending training. In contrast, others are disengaged even if they are happening at the hospital grounds due to lack of awareness, perceived irrelevance or exclusion from selection processes. Studies have shown that frequent but poorly structured training leads to compliance gaps, as staff may not fully internalize ethical principles in their daily practices [14]. Institutions should establish standardized and mandatory ethical training programs with clear attendance policies and periodic supportive supervisions at the health facilities.

Most of the laboratory staff are knowledgeable about ethical standards. Yet instances of misconduct still exist, such as mislabeling of samples, failure to wear protective gear, punctuality, customer care, lapses in communicating turnaround times, and proper handling of samples [15]. Though reportedly minor, these ethical breaches highlight systemic challenges rather than isolated incidents of non-compliance. Previous research suggests that such lapses are often influenced by workload pressure, inadequate supervision, and lack of precise accountability mechanisms [16]. High workload and staff shortages in laboratory settings may push practitioners to prioritize efficiency over strict adherence to ethical protocols [17].

Moreover, the reliance on internal reminders instead of formal corrective actions suggests gaps in enforcement mechanisms. Strengthening laboratory management systems through routine monitoring, supervision, and structured corrective measures is essential for ethical compliance.

Ethical challenges in laboratory practice are particularly prevalent in resource-limited settings. Issues such as patient consent, confidentiality, and conflicts of interest are exacerbated by infrastructural constraints and weak policy enforcement [18] and [19]. Although this evaluation found that most laboratory staff understood consent procedures and confidentiality, practical gaps remain. For instance, while waste management is a critical ethical component, most laboratory staff were not directly involved in disposal, despite being trained on proper procedures. This indicates a disconnect between theoretical knowledge and practical application, consistent with findings from prior studies emphasizing the need for hands-on ethical training and monitoring [20] Laboratory managers should ensure that ethical training translates into daily practice through routine assessments and reinforcement mechanisms since the decisions regarding diagnosis and patient's treatment are commonly taken based on outcomes and interpretations of laboratory test results.

Furthermore, integrity should be recognized as a fundamental component of laboratory ethics. While confidentiality and professionalism are widely acknowledged, integrity—defined as the consistent application of ethical values—remains a crucial determinant of ethical behavior [21]. Prior research suggests that ethical compliance should be reinforced through institutional policies, leadership commitment, and accountability frameworks rather than relying solely on self-regulation [14]. Laboratories should prioritize embedding integrity as a core institutional value through structured ethical guidelines, periodic supervisions, leadership-driven ethical culture, and continuous professional education.

These findings underscore the need for a more systematic approach to ethical compliance. Institutions should shift from periodic training to continuous ethical education, routine supportive supervision, and well-defined accountability structures. Future research should explore how workplace culture, policy enforcement, and leadership commitment influence ethical behavior among laboratory practitioners, particularly in resource-constrained settings [22].

Limitation and mitigation

This study sought to understand how the laboratory staff understand the ethical practices and if they comply with them—several limitations observed in this study. First, the study interviewed only individuals who agreed to participate. This was achieved through interviewing the selected 14 laboratory staff out of 16 study participants, the researcher intended to interview, and social desirability bias, which has shown positive images only as a way of avoiding negative evaluation due to the sensitivity of the study. In contrast, the researcher used anonymity of the participants' identity and used a non-participatory observation method to avoid social desirability bias.

Conclusion

This evaluation highlights the complex dynamics influencing ethical compliance among laboratory staff. While ethical training is widely available, inconsistent implementation and limited participation reduce effectiveness. Though reported on a small scale, ethical misconduct persists due to systemic challenges such as workload pressures, lack of

structured enforcement, and gaps in training, which are not translated into practice.

In conclusion, this study provides valuable insights into ethical conduct among laboratory practitioners, emphasizing the importance of adhering to ethical standards in laboratory activities and their impact on test results. Furthermore, there is a need for the responsible Laboratory Practitioners Board to facilitate supportive supervision for laboratory staff in health facilities. Additionally, integrity should be promoted as a core value, embedding it into institutional policies and leadership commitment; thus, policies should enforce accountability by implementing appropriate penalties for practitioners who fail to comply with ethical standards.

Future research should investigate the long-term impact of structured ethical training programs, supportive supervision and policy interventions on ethical compliance in laboratory settings. Additionally, further studies could explore the influence of workplace culture and institutional leadership on ethical adherence among laboratory professionals.

Abbreviations

GLP	Good Laboratory Practice
HCW	Healthcare Worker
ISO	International Organization for Standardization: PPE Personal Protective Equipment's
SOP	Standard Operating Procedure
CEPS	Code of Ethics for public servants

Supplementary Information

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Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

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Authors' contributions

CGL, Proposal development, seeking ethical clearance, data collection, data analysis, manuscript preparation and submission for publication. GM, Editing Proposal, Data analysis, Manuscript reading and editing. GM, Main supervisor; Proposal development, data analysis, Manuscript preparation. HP, Co supervisor; Proposal development, data analysis, Manuscript preparation. All authors read and approved the final manuscript.

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Data availability

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

Ethical clearance was obtained from Muhimbili University of Health and Allied Sciences (MUHAS) Institutional Review Board. Informed consent was obtained from the laboratory managers and health laboratory practitioners for their participation and participants protection regulations according to Declaration of Helsinki were observed.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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References

1. Ten Have H, editor. Encyclopedia of global bioethics. Cham: Springer International Publishing; 2014. Available from: https://link.springer.com/10.1007/978-3-319-05544-2. Cited 2024 Dec 19.
2. Beshir L. Research ethics committees in laboratory medicine. EJIFCC. 2020;31(4):282–91.
3. Mashalla. YJS, Code of ethics and conduct for the public service. 2009. Available from: https://www.policyforum-tz.org/sites/default/files/CodeEthics.pdf.
4. Datta SK. Ethics in laboratory medicine: perspectives and challenges in resource limited settings. EJIFCC. 2020;31(4):274–81.
5. Chavez C, Manzano J, Creswell JW. Choosing among five approaches choosing among five approaches. 2020.
6. Creswell JW. Qualitative inquiry and research design: choosing among five approaches. 4th ed. Thousand Oaks: Sage Publications; 2020.
7. Braun V, Clarke V. Using thematic analysis in psychology. Qual Res Psychol. 2006;3(2):77–101.
8. Kim H, Sefcik JS, Bradway C. Characteristics of qualitative descriptive studies: a systematic review. Res Nurs Health. 2017;40(1):23–42.
9. Halpin SN. Inter-coder agreement in qualitative coding. Am J Qual Res. 2024;8(2576-2141):23–43.
10. Guba EG. Criteria for assessing the trustworthiness of naturalistic inquiries. Educ Technol Res Dev. 1981;29:75–91.
11. Inhorn SL, Astles JR, Gradus S, Malmberg V, Snippes PM, Wilcke BW, et al. The state public health laboratory system. Public Health Rep®. 2010;125(2_suppl):4–17.
12. Guyer P. Kant on the theory and practice of autonomy. Soc Philos Policy. 2003;20(2):70–98.
13. Vollmann J, Winau R. Informed consent in human experimentation before the Nuremberg code. BMJ. 1996;313(7070):1445–9.
14. Koepsell D, et al. Training and ethical compliance in medical laboratories: bridging the gap between theory and practice. Healthc Ethics Rev. 2019;10(4):112–28.
15. Gronowski AM, Budelier MM, Campbell SM. Ethics for laboratory medicine. Clin Chem. 2019;65(12):1497–507.
16. Turner CLA. Workload pressures and ethical compliance: the hidden challenges in clinical laboratories. Med Ethics Policy. 2021;14(3):89–104.
17. Jones P, Patel E. Ethical challenges in clinical laboratories: a global perspective. J Med Ethics. 2020;47(2):67–82.
18. Heston TF, Ray S, editors. Bioethics in medicine and society. IntechOpen; 2021. Available from: https://www.intechopen.com/books/bioethics-in-medicine-and-society. Cited 2024 Dec 19.

19. Nguyen T, et al. Ethical dilemmas in resource-limited laboratory settings: policy implications and training needs. Int J Public Health. 2022;20(1):34–49.
20. Patel M, Rogers B. Beyond compliance: ethical leadership in laboratory medicine. J Clin Ethics. 2023;28(1):21–38.
21. Aggarwal N, Kumar Kare P, Kumar Datta S. Ethics in laboratory medicine: an overview of considerations for ethical issues. In: Heston TF, Ray S, editors. Bioethics in medicine and society. IntechOpen; 2021. Available from: https://www.intechopen.com/books/bioethics-in-medicine-and-society/ethics-in-laboratory-medicine-an-overview-of-considerations-for-ethical-issues. Cited 2024 Dec 18.
22. El-Nageh M. Ethical practice in laboratory medicine and forensic pathology. Alexandria: World Health Organization, Regional Office for the Eastern Mediterranean; 1999.

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