

Standardizing Pathology Practices: The Impact of Timelines and Accuracy of Brazilian Medical Laboratories

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ABSTRACT

In the era of precision oncology, prompt and precise assessment of the histopathological, immunohistochemical, and molecular features of biopsy and surgical specimens is essential for treating patients with breast cancer. In this article, we give a brief summary of the epidemiology and the challenges associated with its diagnosis, especially in Brazil. We also provided the results of an expert panel meeting in May 2020, a multidisciplinary working group tasked with identifying and debating the challenges and barriers related to the transportation of breast cancer samples through Brazil. Once the issues had been identified, the working group discussed improving the quality and care of breast cancer samples using their professional knowledge and the most recent findings. Recommendations from national and international health organisations (such as the World Health Organisation) and medical societies, and other published material on the topic were included. To mitigate and prevent preanalytical and analytical concerns influencing diagnostic and therapeutic decisions, we present current suggestions to address these difficulties. Drawing on the clinical expertise of professionals now employed in both public and commercial medical facilities in Brazil, we have outlined the key concerns associated with that trip. Four areas include these issues: protocols for the operating room and sample transportation, education, communication, and pathology laboratory procedures. Right now, breast cancer is the most frequent malignant tumour in Brazil and the rest of the globe. To perhaps reduce the issues discovered and enhance the diagnostic and treatment options for patients with breast cancer, a selection of suggestions based on the most recent research and deliberated by the panel of Brazilian specialists are examined. This study was concurrently submitted to and published in Surgical and Experimental Pathology and Mastology journals with permission.

Keywords: Standardized Pathology (SP), Timeline (T), Accuracy (AA), Brazilian Medical Laboratories (BML)

INTRODUCTION

The importance of pathology labs for diagnosing and treating various diseases can never be underestimated. We know that in the present era, we have more cases of different diseases because of various environmental pollutants. Such pollution gave rise to various variants of the same pathogens, which are difficult to diagnose and treat. For this purpose, there is a need for property standardization of pathology practices to improve workflow in pathology labs and increase the chances of effective and accurate diagnosis[1]. In this research, we are going to discuss how standardization of pathology practices is helpful in terms of timeline and accuracy in Brazilian laboratories. The word standardization means the process of setting a proper standard, which is related to quality and quantity to get better outcomes from any organization. As we know,, a variety of pathology labs are working in different areas of Brazil,, but all of these are not effective enough to provide accurate results in diagnosis and treatment of different Diseases[2]. There are various reasons behind this aspect, such as untrained workers, less focus on goal, systematic error, human error, less calibrated instruments, and unhygienic conditions. But in recent years, the Brazilian government aimed has improved the condition of these pathology labs by providing them the aspect of standardization. If we discuss the background of pathology labs in Brazil, we may know that there were many problems in maintaining the quality of these pathology labs. There was the aspect of providing inaccurate reports and increased turnaround time, affected patient care. It has also been seen that because of related results of diagnosis, there was much waste of time in deciding treatment methods for patients, leading to disease outbreaks in different areas of Brazil[3]. A variety of important steps need to be followed for the standardization of pathology labs. The first and foremost step is the development of standard operating procedures

to control different aspects of pathology labs such as quality checks, hygienic conditions, effective instruments, trained pathologists, and others. The other important step is choosing uniform methodology in all pathology labs to ensure uniformity and the same service in all pathology labs in Brazil. The third step of standardization of pathology labs is using specific coding systems[4]. The next step is the implementation of these standard operating procedures in all pathophysiology Labs across the country. As we know, there is also a need to provide training to the staff of pathology labs so that they can follow standard operating procedures in a better and more accurate way. Secondly, the proper education and training of pathologists is also mandatory, so they must be aware of the use of modern machinery to accurately diagnose pathogens in pathology labs. So, the next step in the standardization of pathology practices is the arrangement of different programs related to training staff and pathologists of pathology labs in Brazil. The next step in standardizing pathology practices is conducting regular audits to check the efficiency of pathology labs[5]. As we know, whenever any change is introduced in any organization, it will take some time to get used to it. So, a proper audit is necessary so that we may know about flaws in adopting the standardized policies in Pathology Labs in Brazil. This regular audit of pathology practices will also be useful in collecting feedback and reviews of patients who got services from particular pathophysiology Labs in Brazil. The other important step in the standardization of pathology practices is developing standardized formats related to reports of pathology labs[6]. In other words, in this step, it is observed that the output of Pathology Labs is relative to the input provided to these labs. This means that the whole efficiency of pathology labs is assessed in this step, and the wholesale procedure for the next steps is

dependent upon it. The next step in standardizing pathology practices is developing a laboratory information system for pathology labs. It is the most advanced system for gathering and storing data of patients in Pathology Labs[7]. This information system is important because it stores data in electronic form, and there is no risk of data loss or misuse. It is also helpful in this way that it can be coordinated with other pathology Labs within a few seconds. The last and final step of standardization of pathology practices is the development of security programs so that there is no risk related to cyber security in pathology labs. In this era of different pathogenic diseases, it is the need of the hour to develop such systems in pathology labs that can be helpful and effective[8]. There are various benefits because of the standardization of pathology practices in Brazil. The first and foremost benefit is that it can increase the chances of Accuracy and reliability in pathology labs related to the diagnosis and treatment of various diseases. The other positive impact is that pathology labs' overall efficiency and productivity increase. As we know, pathology labs' productivity and efficiency depend on effective and accurate instruments. When standardized and calibrated instruments are used in pathology labs, it will enhance the efficiency and productivity of these pathology labs[9]. The other important positive impact of standardising pathology practices in Brazil can be explained in terms of enhanced patient care and safety. This standardization of pathology practices will also help in swift diagnosis, which will be useful for better treatment methods that prove effective for patients. The other important Impact of standardization of pathology practices is that it may reduce the risk of errors in diagnosis results. As we know, there is more use of machinery and less use of manual work, which will ultimately decrease the risk of human error and increase the chance of accuracy of results[10]. Patients with breast cancer should ideally be managed by a multidisciplinary team that includes all of the different specialists needed to get the best possible outcomes. Each person involved in the process has to be aware of their role and the broader process, even while there is overlap in how departments, individuals, and institutions contribute to a smooth tumour-tissue trip. The keys to success include communication, education, standardisation of practices, and developing a sufficient infrastructure. These goals are best met in institutions that are driven and possess the necessary administrative will. These institutions are further integrated into broader publicly supported or private systems, which need to acknowledge the significance of the concerns raised here and encourage their implementation. We hope the suggestions discussed here will help achieve that objective and maybe help shape public policy about these matters.

Research objective

The main objective of this research is to understand the term standardization of pathology practices and its positive impacts on Brazil's healthcare sector. This study effectively explains the importance of standardization of pathology practices in Brazil.

LITERATURE REVIEW

Researchers claim that health sectors are built to provide safe health services to the general public. Efficient medical management programs have been developed to satisfy patients regarding medical services. Using TLA technology in medical settings improves the quality of services of health institutes. Microbiology laboratories are specifically equipped with lean technology to improve the quality of their results[11]. Also, laboratories built around the world provide the

most efficient results to ensure that safe medical services are delivered equally to every medical patient. The errors that occur during any medical analysis procedure are overcome using advanced laboratory technology. Patient-centred medical services are provided in modern laboratories to enhance the process of patient care[12]. Studies suggest that the identification of certain therapeutic targets in NSCLC cases is done using guidelines provided by the pathology society. this pathology society allows the use of NGS to diagnose the molecular mechanism behind mutations[13]. Studies reveal that a major health problem occurring around the world is CKD. Various laboratories suggest GFR tests for identifying the function of the kidney in CKD patients. Evaluation-based GFR values have been developed to detect renal health. The common GFR equation used in labs is GFR-EPI. The SBN society allows the use of serum in laboratory practices for CKD tests[14]. Studies show that disease identification related to the veterinary field is done using smartphone technology. The process of inconclusive diagnosis is carried out by using tissue samples-based cultures. The fastest way to provide the general public with quality health services is by using Social media[15]. Studies from Brazilian health centres reveal that sarcoma diagnosis is based on two steps. the first step is the early diagnosis step, while the second step requires the study of sarcoma at the molecular level. The molecular mechanism underlying sarcoma disorder is identified through the molecular analysis process[16]. Studies explain that traditional blood testing methods have replaced modern technology methods. The workflow of medical laboratories has become optimized and standardized using AI in diagnostic procedures. The parameters that medical laboratories need to follow are integrated with AI to obtain accurate data after the blood tests[17]. Scholars conclude that the society of pathology in Brazil is specifically developed on the international health guidelines to provide safe health opportunities to people. The guidelines recommended by this society provide the basis for molecular testing. all the problems related to the clinical data of patients are overcome using the guidelines provided by Brazilian society[18]. Scholars predict that anatomic laboratories are specifically advanced to improve diagnostic test procedures. the QM process in these laboratories provides on-time medical reports regarding the patient's health condition. managing the implementation of medical quality processes in the laboratories is to maintain the QM of anatomic labs[19]. Scholars' studies conclude that WHO provides protocols regarding serum testing. The use of authentic laboratory techniques increases the chances of accurate results. the standardized protocols followed in laboratories are improved using scientific knowledge. The andrological diagnoses require the proper use of laboratory techniques and an examination of serum culture[20]. Studies explain that the diversity of periodontics becomes difficult to diagnose in pregnant women. Many studies provide evidence about using accurate diagnostic techniques in medical laboratories that improve result accuracy[21]. Studies suggest that medication for cancer is made under the supervision of large societies and stakeholders. Stakeholders invest in producing personalised cancer medication to effectively eradicate cancer incidence rates. Moreover, developing diagnostic techniques based on molecular mechanisms improves patients' overall health. The optimization of laboratory framework is the key to improving the efficacy of medical laboratories[22]. Studies show that people affected with bleeding disorders are treated using the PT As well as APTT tests. These tests are diagnostic tests for congenital diseases. Sometimes, the testing procedure for PT gets prolonged. The prolongation delays the results. to optimally evaluate the test efficiency,

standardized protocols by the International Standardized Council are followed[23]. Studies reveal that the antemortem diagnostic process is done through autopsy diagnostic procedures. This procedure is more reliable than ordinary diagnostic procedures for identifying antemortem gaps[24]. Scholars have declared technology to be a modern method for revolutionizing the diagnostic process of laboratories. FNA specimens are studied using the ROSE technology. It is a low-cost technology that improves the productivity of cytopathological techniques. ASC promotes the use of ROSE by developing effective protocols and guidelines. The guidelines provided by ASC are international and are widely used in many laboratories around the world to improve the use of ROSE[25]. Scholars suggest that the spread of candida auras among people results in public health problems. The pathogen responsible for candida auras is the fungal type. The pathogen is responsible for impacting the health of immunocompromised patients. The automation of laboratories provides a rapid testing process for disease diagnosis. There are two widely used methods for diagnosing candida. The first involves the use of PCR tests for rapid disease qualitative assessment. the second process requires the use of inferred spectroscopy to identify the molecular structure of the pathogen causing this disorder[26]. Studies claim that automated laboratories require the use of AI in CP. Replacing the traditional diagnostic methods with AI-based CP methods is included in the automation process of laboratories. also, the use of computer-based algorithms helps in enhancing the lab-associated results[27]. Studies regarded the strain of TB-causing bacteria as multi-strain. The disease complexity is increased due to mycobacterium tuberculosis. The ability of this bacterial strain to resist the drug's action makes the treatment process difficult. The evaluation of the current procured of diagnosis of TB provides insight into improving the diagnostic process using automated laboratory tools. At the microscopic level, the study of TB-causing fungal pathogen is made using modern methods of medical identification[28]. Studies made by scholars reveal that identification of neck and hear associated cancer is possible through histopathological studies. The criteria for diagnosing head extension during head cancer are provided by evidence-based studies. The detection criteria for head cancer require the detection of metastasis of soft tissues. The extranodal extension is detected by an improved disease analysis process along with accurate data collection methodology[29]. Scholar elaborates that using an imagery-based cloud networking system in laboratories provides data for disease identification. The cloud monitoring system is based on AI software that assists decision-making. Also, cloud systems are universal and are used in laboratories around the globe. Improvement in public health provision sectors is possible through the active role of cloud computing systems in these sectors[30].

Methodology

The research determines the impact of diagnostic timelines and accuracy in Brazilian medical laboratories. The research study was based on primary data analysis to determine the data using SPSS software and generate results, including descriptive statistics, correlation, and linear regression analysis, which also explain the theory-based analysis between them. The word pathology practices refer to all those important techniques and procedures mainly used in pathology labs for diagnostic purposes. As we know, the role of pathology labs has been increasing in medical sectors, so there must be standardization of these pathology practices for bringing accuracy

in medical laboratories in Brazil. Recently, different and vast efforts have been made to improve and standardize these pathology practices, which has brought the following important implications in the medical sector of Brazil.

Improved Diagnostic Accuracy, enhanced patient care, increased efficiency of laboratories, the aspect of quality control and assurance

The accuracy of diagnostic methods is important to such an extent that the whole procedure and treatment timing depend on the accurate diagnosis of diseases. If the instruments used in pathology labs are not advanced and error-free, these pathology labs cannot provide accurate results. The other aspect is that if there is no proper training of pathologists for performing complex procedures, then the accuracy of diagnostic methods will also be reduced. So, there is a need to improve all of these factors to bring accuracy in diagnostic methods. For this purpose, Brazil has recently introduced the standardization of pathology practices. The first and foremost implication of standardization of pathology practices is the aspect of accuracy of diagnostic methods. It has been seen that by implementing the rules of standardization of pathology practices, the chances of accuracy in diagnostic methods have increased. This aspect has brought much improvement to Brazil's healthcare sectors. The other important implication of standardization of pathology practices is the aspect of Enhanced patient care. Specific pathogens and such pathogens cause some diseases are spread by different transmission modes such as fluid contact, sexual contact, saliva, and others. By standardizing pathology practices, we learned about the transmission modes of different pathogens. This aspect helped us create an environment where there is more care for patients. This is not only true in pathology labs, but the aspect of patient care has also been taken into consideration in all healthcare sectors of Brazil. The other important implication of standardization of pathology practices is the aspect of increased efficiency of pathology labs. As we know, cases related to pathology have increased all over the world. So, there is a need to improve the efficiency of pathology labs so that pathologists can handle more cases daily. When standardized instruments and trained pathologists work in pathology labs, there is no need for repetitive procedures to remove errors from results. In this way, there will be an increase in the workflow of pathology labs, which will also help increase their efficiency. The other important implication of standardization of pathology practices can be explained in terms of quality control and assurance. When hygienic conditions are provided in pathology labs related to instruments and pathologists, results will be accurate, and the quality of these procedures will easily be controlled. In this way, people will have trust in these pathology labs, which will increase the assurance factor related to pathology labs. These important implications of standardization of pathology practices convince us that we have many benefits because of it in the healthcare sectors of Brazil.

Reduced Turnaround Time, Inter-Laboratory Comparison, Training, and Education Programs for Pathologists

The turnaround time refers to the time taken to complete a particular procedure in the laboratory for diagnostic purposes. The other important implication of standardization of pathology practices is that it can help reduce turnaround time for diagnosis. When there is the use of specific advanced and standardized instruments in pathology labs, there is an Accuracy of results and no need to perform the same tests again and again to remove errors from the results. In

this way, standardization of pathology practices is also helpful in reducing turnaround time in pathophysiology Labs. The other important implication of the standardization of pathology practices is the aspect of inter-laboratory comparison. As we know, there are certain cases in which one diagnostic test is performed by more than one laboratory. The reason is the quality control and quality assurance of different laboratories. Sometimes, there are less standardized instruments in one laboratory, but there are highly advanced and standardized ones in another. So, there is a need to compare the results of these laboratories. In this way, we can conclude that standardization of pathology practices is helpful in inter-laboratory comparison for better, effective, and accurate results. The other important implication of standardization of pathology practices is the aspect of Training and education programs for pathologists. As we know, there is the use of highly advanced and complex instruments in modern pathology labs, so there is a need for proper training and education of pathologists so that they can perform these diagnostic tests accurately. After the

standardization of pathology practices, there is a need for proper training of pathologists, which is another important implication of standardization of pathology practices. All of these aspects of standardization of pathology practices suggest to us that there is an important need for this standardization in pathology labs

Reduced False Interpretation, Streamlined Sample Processing

The main problem with most of the primitive diagnostic methods is that they may give false interpretations. These false interpretations may result in ineffective treatment of patients, which may cause the spread of more diseases. So, it is the important implication of standardization of pathology practices that it may greatly reduce the risk of false interpretation. When there is no false interpretation, better treatment is suggested for patients. The other important implication of the standardization of pathology practices is the aspect of streamlined sample processing. In these advanced pathology labs, there is proper division and classification of every work related to sample processing.

Table 1: Results of ANOVA

		ANOVA				
		Sum Of Squares	Df	Mean Square	F	Sig.
Timelines	Between Groups	2.822	3	.941	2.193	.101
	Within Groups	20.159	47	.429		
	Total	22.980	50			
Accuracy	Between Groups	.456	3	.152	.329	.804
	Within Groups	21.701	47	.462		
	Total	22.157	50			
Brazilian Medical Laboratories	Between Groups	.192	3	.064	.125	.945
	Within Groups	23.965	47	.510		
	Total	24.157	50			

The result of table 1 demonstrates that the one-way ANOVA test describe the sum of square values, the mean square values, and the F statistic, and the significant values variable are dependent and independent. The result describes the group, within the group and total group values. The timelines describe a relation as positive and 10% significant. The accuracy describes 32% positive and 80% significant levels between them. Similarly, Brazilians describe that 12% there is a positive and 94% significant link with between. For example, skin pieces should be lodged with the epidermis on the same side to prevent dislodging during sectioning. To avoid block contamination, instruments must be thoroughly cleaned between sample implantation.

To prevent contamination with similar specimens, it is generally necessary to intercalate specimens of different kinds when embedding. For example, insert a stomach biopsy, followed by a skin biopsy, another stomach biopsy, and so on. It is preferable to intercalate as many different specimens as possible to facilitate the tracking of any contaminants. › Sectioning: to prevent sample loss or exchange, it must be done case by case. Before beginning another sample

sectioning, the microtome, blade, tweezers, and flotation bath must be cleaned. Every cutting station needs to have its hot water temperature in the flotation bath confirmed and documented in a unique data sheet between 40° and 50°C. During working hours, containers for spent sharp instruments must always be available. › Slide staining: Manual or automated staining techniques are also possible.

Clear protocols should be supplied regarding the sort of stain to use for routine microscopic analysis or particular analytical processes, such as acid-fast staining or fungal staining. Before beginning the staining batch, it is recommended to run a single slide using a straightforward surgical sample, such as an appendix or gallbladder, that can be readily reinserted if needed. Consequently, before the entire batch begins, any necessary modifications to the staining process may be performed, guaranteeing high-quality staining. Mounting can be carried out mechanically or manually. Operating manuals for devices and equipment must be accessible. › Slide labelling: To minimise the possibility of mislabeling specimens, each case should be marked individually. Do not print a series of labels with various numbers to expedite the procedure.

Table 2: Results of ANOVA^a

		ANOVA ^a				
Model		Sum Of Squares	Df	Mean Square	F	Sig.
1	Regression	2.734	3	.911	1.999	.127 ^b
	Residual	21.423	47	.456		
	Total	24.157	50			

a. Dependent Variable: Brazilian Medical Laboratories
b. Predictors: (Constant), Accuracy, Timelines, Standardizing Pathology Practices

The above result of table 2 describes the regression model and residual model and also explains the total values related to the sum of squares, mean squares and significance. The regression model

presents that the sum of the square value is 2.734, the mean square value is 0.911, and the significant value is 0.127, showing a 12% significant value between them. The residual model shows a 21.423

rate related to the sum of squares, and the mean square rate is 45%, respectively. The overall result shows a direct and significant relation between them.

Analytical Stage Methods

Following the triage phase, the specimens will be sent to the grossing room for macroscopic examination, description, measurements, and sectioning of pertinent diagnostic regions in preparation for slide analysis and histological processing.

Specimen checking: additional specimen integrity verification list about identity, correlation with contents on the container label, and the corresponding medical request data should be completed in the grossing room. As mentioned in the registration item above, it is essential to guarantee the samples' traceability in the laboratory system at every step of the procedure.

Grossing procedures: particular protocols, including guidelines for classifying specimens (such as biopsies, straightforward surgical specimens, and products from extensive surgery), should be made available. These guidelines might be produced locally or as global standards. After completing the grossing processes, the bench and tools must be thoroughly cleaned before beginning to gross another specimen.

Storage: specimen remnants must be temporarily held to enable the performance of additional analyses in the event that fresh samples are required or there is an issue with the report. This prevents samples from becoming contaminated with pieces of the previous specimen. Remaining specimens should be kept in storage for a minimum of 14 days, depending on the laboratory's storage capability and local regulations. A clear protocol about the conditions and duration of specimen storage should be established by the laboratory director. To prevent sample mishandling and mishaps, technicians and responsible personnel should have access to tissue processor operation instructions. Regular scheduling is required for reagent changes and equipment maintenance. The paraffin recipients' temperature needs to be maintained between a maximum of 60°C and 65°C, and it needs to be checked and documented on a particular data sheet each day.

Embedding: Before beginning the process of embedding, the temperature of the hot plate and paraffin bath must be monitored daily and noted on a special data sheet for each station to prevent burning specimens. For every specimen, a procedure must be carried out to verify the relationship between the cassette number and the number of pieces in the embedding. When many cassettes from distinct instances are open on the hot platform, sample or fragment exchange must be avoided by carrying out embedding case by case. There should be protocols on how to integrate instructions for particular kinds of specimens.

Table 3: Results of Coefficients^a

Model	Coefficients ^a			T	Sig.
	Unstandardized Coefficients	Standardized Coefficients			
	B	Std. Error	Beta		
1					
(Constant)	.953	.385		2.476	.017
Standardizing Pathology Practices	-.032	.144	-.033	-.223	.824
Timelines	.351	.149	.342	2.353	.023
Accuracy	.069	.144	.066	.480	.633

a. Dependent Variable: Brazilian Medical Laboratories

The above result of table 3 demonstrate that linear regression analysis result describes unstandardized coefficient analysis, the standardized coefficient analysis included beta value also that t statistic and significant value of independent variables.

The standardized pathology practices describe that beta value is -0.032 the t statistic rate is -0.223 the significant value is 0.824 shows that negative but its significant linear regression analysis between them. the accuracy describes that 0.480 and 0.633 positive and

significant relation with Brazilian medical laboratories. The below result of table 4 describes that test statistical analysis result demonstrate that chi square values of each factors included dependent and independent for measuring the impact on diagnostic timeline and accuracy. The chi square rate is 45.235, 10.706, 13.176 also that 12.118 respectively shows positive chi square rates. According to the above result overall significant rate is 0.000 shows 100% significant relation between them.

Table 4: Results of Test Statistic

	Test Statistics			
	Standardizing Pathology Practices	Timelines	Accuracy	Brazilian Medical Laboratories
Chi-Square	45.235 ^a	10.706 ^b	13.176 ^b	12.118 ^b
df	3	2	2	2
Asymp. Sig.	.000	.005	.001	.002

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 12.8.

b. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 17.0.

Discussion

It is impossible to overstate the significance of pathological preanalytical and analytical difficulties for the proper delivery of modern cancer care. The majority of problems that impact accurate and timely specimen assessment arise during the preanalytical stage of processing. Preanalytical variables may account for 60–70% of laboratory mistakes, according to studies. Labelling, packing, moving, fixing, and storing surgically removed specimens appropriately also

entails gathering and disclosing administrative, demographic, and medical data. In breast cancer, paying attention to specimens at each of these stages can reduce mistakes and improve histopathological, immunohistochemical, and molecular tests. The importance of the topics discussed here is only going to grow as precision oncology becomes more and more important in the care of breast cancer patients. The cold ischaemic time (the interval between tissue removal and formalin fixation) and the fixation temperature are critical. These factors are very important for analysing the expression of ER, PR, and

HER2. Among other issues, antigen loss in formalin-fixed tissue sections is significant enough to impede the best possible IHC and diagnostic histopathology. Although we concentrate on sample preparation for histopathological and immunohistochemical analyses, the issue is more widespread when one takes into account the growing significance of more recent molecular biology methods that use tissue RNA quality to determine gene expression. Assays based on predictive gene expression have become more important and are being used more often to determine when chemotherapy is indicated. Errors in the pathologist's analysis or interpretation of the data are reduced if the preanalytical stage is optimised, especially in regards to the pathologist's inadequate access to pertinent clinical data. Regrettably, several preanalytical problems that may jeopardise accurate and timely information gathering necessary for cancer diagnosis and treatment choices also arise in the pathology laboratory. Many hospitals in Brazil contract their pathology laboratory services instead of owning one, which adds another level of complication to the process of reducing mistakes. Notably, there is often worry over the calibre of services rendered by some laboratories, which are often hired through public tendering.

Conclusion

After an overview of these aspects of the important implications of standardization of pathology practices, we can say that standardization of pathology practices has become the need of the hour in this Modern era for improving diagnostic methods and providing accurate results. In the event that a label printer is not available, the case number might be written on the slide using a permanent, insoluble ink pen. Steer clear of pencils since the graphite

on the side might disappear with use and time. Immunohistochemistry procedures can be carried out either manually or mechanically. Procedures with sample identification checks should be carried out in a different room or location. procedures for obtaining antigens, preserving antibodies, diluting them (if necessary), and applying them. Operating manuals for instruments and equipment must to be easily accessible.

Microscopic analysis: Pathologists' studies of slides require safe transportation to the microscopy laboratory. There have to be protocols for standards of microscopic description available. When feasible, instances of cancer should have at least two pathologists sign off and be categorised using the TNM classification system developed by the UICC.

Analysis of cytology specimens: Depending on the circumstances and customs in the area, qualified pathologists or cytotechnicians may do cancer screening on gynaecological cytology specimens. If there is no local system, the Bethesda System can be used to record thyroid fine-needle aspiration (FNA) cytology and gynaecological cytology. Periodically, ideally once a month, the Accordance Index—the proportion of cases classified as benign, atypical, or malignant based on the diagnostic views of pathologists and cytotechnicians should be confirmed. A coordinated effort by institutions and people is needed to guarantee that tissue samples are acquired, processed, analysed, and reported in an optimal fashion while taking into account the most recent scientific and technological information and avoiding logistical and operational obstacles. In certain contexts, this might provide a special difficulty because of various economic, structural, organisational, and communication inefficiencies.

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