Clinicians' Compliance with Requirements on Surgical Pathology Laboratory Request Forms

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Abstract

Background: Early and accurate diagnosis has a major impact on outcome of diseases. Prompt delivery by the laboratory on requests sent by clinicians is fundamental to this. For useful laboratory outcomes, clinicians should provide comprehensive information, as required in laboratory request forms. The aim of this study was to analyze how well clinicians complete laboratory request forms. **Methods:** This is a retrospective descriptive study from January 1 to December 31, 2017. Laboratory request forms submitted with laboratory requests were retrieved and reviewed for completeness of required information. **Results:** An error prevalence of 12.2% was observed from the analyzed requests, and the average number of errors per request was 1.7. Surgical specialties contributed by far the most errors (t=-7.571; p=0.0000), and biodata information was the group that was mostly omitted from laboratory forms. **Conclusion:** This study revealed that clinicians submit requests with various irregularities, including suboptimal information, to the histopathology laboratory of our hospital. Regular interaction between clinicians and pathologists is needed in order to enlighten clinicians on the importance of providing necessary information regarding their requests to the laboratory.

Keywords: Laboratory request forms, Accurate diagnosis, Clinicians, Pathologist, Histopathology, Laboratory form errors, Nigeria

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Introduction

Early and accurate diagnosis has a major impact on disease outcomes. Prompt delivery by the laboratory on requests sent by clinicians is fundamental to this. Over time, the laboratory has become a major contributor to disease diagnosis and patient management. Some researchers have reported that pathologists' outputs were relied upon for clinical decisions in 29–98% of patients attending their hospital and that the variation is according to the care area where medical services were rendered to patients namely outpatient care, emergency department and inpatient care (1). For useful laboratory outcomes, coherent, adequate, and timely

communication must flow between the clinician and the pathologist. The laboratory request form is the main methods by which clinicians communicate patient's clinical information to the pathologist. The pre-analytic phase of specimen handling, which includes filling of laboratory request forms, is believed to be the most critical phase and also the phase most prone to error (2, 3).

Laboratory requests received in histopathology are mostly from surgical specialties, but other clinicians, namely dermatologists, nephrologists, gastroenterologists, and family physicians, also send requests. Added to other factors, progressively sophisticated surgical techniques are leading to an increase in the number of specimens sent for histopathological analysis and therefore increased workload for pathologists (4, 5). An increase in workload complicated by irregularities in laboratory request forms can lead to frustration for pathologists and leads to the possibility of diagnostic errors. Clinicians contribute to laboratory errors mostly through inappropriate laboratory requests and absent, incomplete, or erroneous clinical information in laboratory request forms, among others (6). These failures lead to prolonged turnaround time (TAT) with possible inability of the pathologist to make a diagnosis or the pathologist arriving at an incorrect diagnosis. This is possible because the delays may result in degradation of the specimen provided for laboratory analysis. This could result in an unnecessary treatment (eg, biopsies for a patient or further but unnecessary testing outcomes), which may cast doubt on the healthcare delivery system as a whole(7).

To mitigate these avoidable errors and their attendant consequences, continued frank communication between the pathologist and the clinician is needed. Such communication can be improved if the areas of clinician errors are known by the pathologist. The aim of this study was to analyze how well clinicians complete laboratory request forms that they send with specimens for histopathological analysis in order to achieve better laboratory outcomes and therefore enhance clinical care of patients.

Materials and methods

This is a retrospective descriptive study from January 1 to December 31, 2017. It was carried out in the histopathology laboratory of a university teaching hospital. The laboratory receives specimens from the hospital and other hospitals in the city of Enugu and surrounding areas. Specimens are received from surgical specialties and non-surgical specialties, namely dermatology, gastroenterology, nephrology, and family medicine, and from general practitioners as well. Requests from hospitals other than ours were excluded from the study because those hospitals may be using a different request form and thus may not have known the nature and/or extent of information required by the laboratory. Ethical approval for this work was obtained from the ethics committee of the hospital.

Histopathology (surgical pathology) request forms were retrieved from the laboratory archives, and appropriate data was extracted from them into a proforma created for the purpose. Variables extracted included patient's demographic data (age, sex, occupation, and address), patient's hospital number, nature/source of specimen, clinical details, clinical/provisional diagnosis, date of surgery, requesting specialty/unit/ward, and clinician's name. For ease of analysis, these parameters were grouped into four, namely: laboratory form integrity, clinician information, clinical information, and patient information. Data retrieved were analyzed using SPSS version 21 (IBM Corp., Armonk, NY, USA). A p-value<0.05 was considered significant.

Results

A total of 979 surgical pathology requests were received in the histopathology laboratory in the study period, of which 913 were included in the study. Of these, 898 (88.4%) came from surgical specialties, whereas 15(1.6%) were from non-surgical specialties. As shown in Figure 1, general surgery, gynecology, and urology requests were subspecialties that contributed the most, whereas neurosurgery contributed the least. Of an expected total of 12,782 parameters from 913 requests studied (at 14 parameters per request), 1,561 (12.2%) errors were recorded, with an overall average of 1.7 errors per request (Table 1). The most frequent error was

omission of patient's occupation, followed by omission of age and address. The least occurring error was non-submission of laboratory request forms.

Table 1. Frequency distribution of observed errors in laboratory request form (No. of requests, N= 913; total errors, n= 1561)

Error group	Error type/Missing parameter	Frequency (%) [n = 1561]	Error rate (%) [N = 913]	No. of parameters /group of errors	Mean Error/ group of errors	Std. Deviation	Std. Error	t-value (P-value)
Laboratory form integrity	No lab. form	7 (0.4)	0.8	2	11.00	5.657	4.000	.966 (.466)
	Incorrect lab form	15 (0.9)	1.6					
Clinician information	Consultant's name	56 (3.6)	6.1	2	48.50	10.607	7.500	
	Department/unit/ward	41 (2.6)	4.5					
Specimen information	Nature of specimen	83 (5.3)	9.1	5	39.20	25.936	11.599	
	No clinical information	22 (1.4)	2.4					
	Incomplete clinical information	39 (2.5)	4.3					
	Clinical diagnosis	34 (2.2)	3.7					
	Surgery/procedure date	18 (1.2)	2.0					
Patient Information	Age	136 (8.7)	14.9	5	249.20	357.615	159.30	
	Sex	29 (1.9)	3.2					
	Hospital number	68 (4.4)	7.4					
	Occupation	884 (56.6)	96.8					
	Address	129 (8.3)	14.1					
Total		1561 (100)		14	111.50	225.912	60.378	

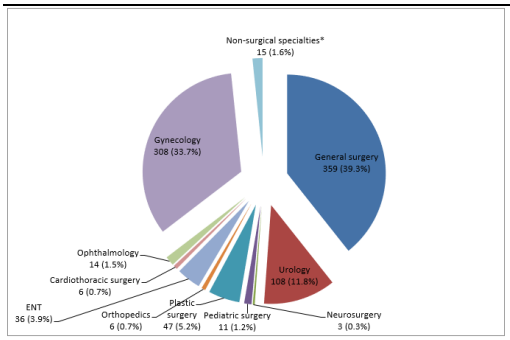

Figure 1. Number of specimens received per (sub) specialty. *Gastroenterology, dermatology, nephrology, and others.

Analysis showed that the association between frequency of error and type of error is not statistically significant (t=0.966; p=0.466). Distribution of observed errors according (sub)specialties is shown on Table 2. General surgery has the most errors, followed by gynecology and urology. The number of mean error per request per department ranges from 1.5 (urology) to 2.9 (non-surgical specialties). The mean error per request for all specialties is 1.7±0.7 standard deviation. The t-test (t=□7.571; p=.0000; 95% confidence interval of the difference of mean, □1.1429 to □0.6171) showed a significant association between specialty type (grouped into surgical and non-surgical) and frequency of individual laboratory request form errors. Similarly, as shown in Table 3, there is significant association between specialty (grouped into surgical and non-surgical) and error groups (□2=45.371; p=0.0000).

Discussion

Each item required in a histopathology request form serves a purpose. For instance, patient's demographic information helps to link a patient to both the present tissue and that already existing in the laboratory, if there is any, and is also useful for building epidemiological data (8). Stating the nature of specimen ensures that the pathologist is indeed processing the specimen intended by the surgeon while the identity of the clinician helps to secure a communication link between the requesting clinician and the pathologist, should there be need for that. Even with all these benefits, studies have shown that clinicians often provide less than optimal information in the laboratory request form they send to the laboratory (9,10).

Table 2. Distribution of observed errors according to specialties (number of requests, N = 913; total recorded errors, n= 1561)

Specialty	Surgical										TS	NS	*t-value; (p-value)*
	Surgical subspecialty												
Error type/Missing parameter	GS	U	NS	PS	O	ENT	OPS	PDS	CTS	G			
Lab form not submitted	1	-	-	1	-	-	1	1	-	2	6	1	-7.571; (0.000)
Inappropriate lab form	3	1	1	-	-	2	-	-	1	3	11	4	
Consultant's name	24	-	-	-	1	-	2	1	-	24	52	4	
Department/unit/ward	14	6	-	4	2	2	-	2	1	9	40	1	
Nature of specimen	29	3	-	2	-	3	2	2	2	37	80	3	
No clinical information	9	-	-	-	2	4	-	-	1	3	19	3	
Incomplete clinical information	8	4	1	3	3	3	1	2	1	11	37	2	
Clinical diagnosis	21	-	1	1	-	1	1	-	-	6	31	3	
Date of procedure	4	1	-	3	-	2	-	1	-	7	18	-	
Patient information													
Age	59	16	-	5	2	6	-	-	1	44	133	3	
Sex	6	11	1	-	1	3	1	2	-	3	28	1	
Hospital number	27	4	-	6	3	5	2	3	-	15	65	3	
Occupation	352	103	3	45	12	36	6	5	6	304	872	12	
Address	42	12	-	11	3	7	-	4	1	46	126	3	
Total	599	161	7	81	29	74	16	23	14	514	1518	43	
Error frequency (%)	38.4	10.3	0.5	5.2	1.9	4.7	1.0	1.5	0.9	32.9	97.3	2.8	
Mean error	1.7	1.5	2.3	1.7	2.1	2.1	2.7	2.1	2.3	1.7	2.02	2.9	

GS: general surgery, U: Urology, NS: neurosurgery, PS: plastic surgery, O: ophthalmology, ENT: Ear, Nose and Throat, OPS: orthopedic surgery, PDS: paediatric surgery, CTS: Cardiothoracic Surgery, G: gynaecology, TS: Total Surgical, NS: Non-surgical

In this study, a significantly higher proportion of requests for surgical pathology tests (98.4%) came from surgical specialties than that from non-surgical specialties (1.6%). This is comparable to a study from Benin, Nigeria, which reported 83.3% from surgical specialties, albeit that for non-surgical specialties was 16.7% (11). The very low incidence of request from the non-surgical specialties in our center suggests that these specialties may not be performing procedures that yield tissues for histopathological studies.

The finding of 0.8% absent laboratory request forms in this study is less than that reported in a study from Portugal (1.6%) (12). A total of 894 (98.7%) of received request forms had at least one parameter omitted, whereas only 12 (1.3%) had all parameters supplied. This is similar to the findings of Yacouba et al. (95.8%) (13), Akinfenwa and Solomon (97%)(3) and Oyelekan et al.(99.8%)(14). Similarly, Osegbe et al. (15) and Toshniwal et al. (16), following their interventional study, both reported high error rates; however, they reported lower error rates pre- and post-interventions, respectively. By far, the most errors in the requests, 1518 (97.2%), were from the surgical specialty, whereas 43(2.8%) came from non-surgical specialties. This is similar to the finding by Burton and Stephenson (8).

Table 3. Analysis of laboratory error class according specialty

Error Group	Surgical	Non-surgical	Total
	n (%)	n (%)	n (%)
Lab Form integrity	17 (1.1)	5 (11.6)	22 (1.4)
Clinician information	92 (6.1)	5 (11.6)	97 (6.2)
Specimen information	185 (12.2)	11 (25.6)	196 (12.6)
Patient information	1224 (80.6)	22 (51.2)	1246 (79.8)
Total	1518 (100)	43 (100)	1561(100)

Chi-square 45.371, p-value 0.000

Cumulatively, patients' biodata information was the most omitted in this study (79.9%), similar to that reported in another study (66.2%) (11) but contrasts that of another study, which reported nature of specimen and clinical information as the most omitted information (12). Furthermore, in this study, patient's occupation was the least provided information, in contrast with findings by other workers (11,14), whereas patient's name (100%), date of surgery/sample collection (98%), and sex (96.8%) were the most supplied information. Alagoa and Udoye (17) reported name (100%) and sex (97%), whereas Oyelekan et al. (14) reported sex(97.8%), clinician's information (95.3%), and unit/specialty making request (95.1%) as the most supplied information. Analysis had shown a significant relationship between individual errors and error group and specialty. There is need for another study to determine the reason for this relationship. However, prompt and optimal provision of information on laboratory form as well as the specimen container can help to clear any confusion that may arise where there is a discrepancy between the two instruments.

In this study, patient's sex was not included in 3.2% of submitted requests. This is similar to reports by Oyelekan et al. (2.2%) (14) and Alagoa and Udoye(3%)(17), but lower than that reported from Ghana by Olayemi and Asiamah-Broni (32.7%)(18). Furthermore, patient's age was omitted in 14.9% in this study, which is comparable to the rates reported by Alagoa and Udoye(11.5%)(17), Akinfenwa and Solomon (25%)(3), and Olayemi and Asiamah-Broni(25%)(18), but far lower than 57.9% reported by Oyelekan et al.(14). In most of the forms omitting age, "Ad" (for adult) was entered for age. This may be due to an erroneous assumption that adulthood is an all-defining demographic. Furthermore, the observed rate of absence of age in this study may be due to actual lack of the information, given the poor practices of birth registration in our setting (19). With this reality at the background, locally trained doctors are usually taught to estimate a patient's age when necessary, by exploring the history of possible landmark events that happened about their birth period and/or early childhood. Omission of sex and age from a laboratory request may significantly affect the interpretation of laboratory results, and therefore clinical management of the patient, since most measured parameters vary with these two biographic characteristics.

Address and occupation are biographical information that can give clue about the environment where one lived and/or works, their economic circumstances, and lifestyle, and therefore, they can help mirror the epidemiology of diseases according to social status. Patient's address and occupation were omitted 14.1% and 96.6% of the times, respectively, in this study. The rate for address is lower than that found in a study in Ghana (18); meanwhile, Oyelekan et al. (14) reported the absence of space for address in their laboratory request form. Furthermore, reviewed literature did not have any report on patient's occupation for comparison. The patient's name was supplied in all request forms in this study, as in other studies (8,17,18). This may be because it comes naturally for clinicians to ask for the name of the patient.

In this study, clinical information was absent in 2.4% of cases and incomplete in 4.3%. This is similar to reports from another study (20) but lower than that of other studies (1–3, 11, 12, 14, 17, 18). Clinical diagnosis was absent in 3.7% of request forms analyzed, a finding that is lower than that reported by other studies (1,11,17). Adequate clinical details can guide the pathologist in interpreting laboratory results, in making additional comments where necessary, and in deciding which tests to order further, all of which affect patient management and deployment of limited resources (8). The nature of specimen was not supplied in 9.1% of requests, which is comparable to the rate (11.0%) reported by Alagoa and Ugoye (17) from Bayelsa state, Nigeria, but less than that reported by others (3,14).

The name of the attending clinician was not supplied in 6.1% of cases, which compares with 4.7% reported by Oyelekan et al. (14). However, it is much higher than that reported by Roque et al. (2.2%) (12)

but lower than 77%, 15.5% and 44.6% reported by Sharif et al. (2), Alagoa and Udoye (17) and Olayemi and Asiamah-Broni (18) respectively. Similar to the laboratory form of Niger Delta University Teaching Hospital, Okolobiri, Nigeria (17), our histopathology laboratory form does not have space for the clinician's telephone number. Having the clinician's identity and contact information on the laboratory form can expedite further communication between the clinician and the pathologist, when necessary, with the potential of preventing possible prolongation of TAT. This will be difficult, if not impossible, if the clinician's identity/contact information is not supplied. The source of request (department/unit/ward) was not supplied in 4.5% of cases, which is comparable to other reports (1,14) but lower than that reported by Alagoa and Udoye (9.6%) (17). The date of surgery/specimen collection was omitted in 2.0% of the requests. This is lower than the rates reported in other works namely 21.5%(17) and 37.3%(18).

One of the behavioral challenges of medical practice is that practitioners submit laboratory requests with irregularities in the face of glaring evidence of the deleterious effects of such errors to patient management. This research did not explore the reasons for this behavior among clinicians in this center, but we propose that it should be a subject of research. According to Chismar et al. (21), 32% of the clinicians they studied believed that including clinical information on request forms could bias the pathologist, whereas 34% believed that the pathologist should be able to reach a diagnosis without knowing the clinical information. Generally, irregularities in laboratory requests are known to increase TAT to varying degrees (3,12,16). Prolonged TAT has a number of implications for patient management, which can also be far reaching. Another implication of prolonged TAT is the possibility of degradation of specimen, especially if it is not placed in the appropriate preservative ab initio, which may affect diagnosis. Other consequences include delayed or inappropriate treatment, increased cost for patients, and prolonged hospital stay. In conditions such as cancer, the delay may lead to possible worsening of prognosis. Pathologists have been faced with the dilemma of a tradeoff between promptness of result and having to insist on clinicians to submit only requests without irregularity. In 1996, Nakhleh and Zarbo (9) reported a case return rate of 2.0% in their center, whereas, in 2015, Roque et al. reported a case return rate of 24.4% (12). Laboratories handle errors by creating and deploying error reporting system (22), and this is usually a requirement for histopathology laboratories (23). Retention of requests with irregularities by a laboratory is believed to be good practice because it can prevent specimen loss or degradation before handling in the laboratory (12). It is a standard protocol in our center to retain specimens with irregularities pending rectification of identified errors where possible.

There are some limitations to this work. On some occasions, a patient's relative may be the one to send specimens to the laboratory. Not knowing the importance of the request form, they may mishandle it, possibly damaging or obliterating hitherto provided information. Furthermore, since this study focused on histopathology requests, its findings cannot be extrapolated as attitude of physicians in our center to the request form for other clinical laboratories. In addition, being a retrospective study that involved papers in storage, the integrity of the request forms may have been affected by the archiving system and some may be lost. Lastly, being quantitative research, this work could not explore the reasons why clinicians send specimens to the laboratory with poorly completed laboratory request forms. Qualitative research is therefore necessary to gain insight into this behavior and to determine the means to correct it.

Conclusion

This study revealed that clinicians in our center do not complete histopathology laboratory forms properly. This means that pathologists in our center receive incomplete information about specimens they receive for histopathological analysis. This can

potentially affect the quality of their output and, consequently, patient care. There is a need to continually educate clinicians on the importance of sending properly completed laboratory request forms with their laboratory requests. Regular interdepartmental meetings between pathologists and other clinicians and continuous medical education programs can be useful for this. Furthermore, our hospital should consider adopting an electronic requisitioning method in which all information fields are compulsory. To inculcate the culture early enough, medical students and house officers should be deliberately exposed to proper laboratory practice including making junior doctors rotate through pathology during the internship period. Finally, an error-reporting system should be created in order to cater to the important role of sending feedback to clinicians when errors are identified with their requests.

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