Original Article

Turn-around Time of Histopathological Surgical Biopsies and Delivery of Medical Services: A Patient Perceptive Perspective using the Servqual Tool

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ABSTRACT

Pathology service in developing countries is characterized by system delays: obtaining, processing, and reporting the result of biopsied samples, with consequent delay in instituting appropriate treatment. The broad objective of this study is to determine the impact of service delivery on the turn-around time of histopathological surgical biopsies in the Jos University Teaching Hospital. Specifically, the study investigated the impact of reliability, assurance, tangibility, empathy and responsiveness on the turn-around time of the laboratory. To meet these objectives, a questionnaire was developed and distributed to 308 patients that sought the service of the Histopathology laboratory department in the hospital. The research revealed a turn-around time of 3 days to 30 days with a mean of 12.83+3.14 days. The research established positive influence of tangibility and reliability (two of the five dimensions of service delivery) on turn-around time. The research also revealed that the remaining three dimensions of service delivery (assurance, empathy, and responsiveness) had no significant impact on turn-around time. This study has shown that the SERVQUAL tool of service delivery can be used in assessing turn-around time in the histopathological laboratory. This is novel as to the best of our knowledge this tool has never been employed in this regard. Furthermore, it brings to the fore the importance of tangibles and reliability as two important service delivery dimensions that have significant impact on the turn-around time of surgical laboratories.

Keywords: Turn-Around Time, Surgical, Biopsies, Servqual Tool.

INTRODUCTION

Globally, there is a growing need of increasing the quality and productivity of healthcare services delivery.¹ To guarantee the heath of the populace, an efficient service delivery system is important. Sometimes

that little unexpected extra can come in different shapes and forms such as a smile, a positive remark, random acts of kindness or the additional effort by a service professional going the extra mile.²An excellent service delivery system generates repeat business, enhances business reputation, combats higher prices, provides

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competitive advantage, and improves employee morale.³ Service providers who wish to remain in business strive to create, package, and deliver services to their customers to satisfy them, in order to engender confidence and loyalty of the client, towards increase and continuous patronage, and hence profitability and sustenance of the venture.^{4,5}

One of the important components of the health delivery system is the laboratory. Laboratory analysis of samples plays a vital role in health care and in the provision of quality service delivery.⁶ The speed with which laboratory results are reported impacts the institution as well as the patient, and contributes to the quality of the services the system provides.⁷Timelines is an essential ingredient in the laboratory and hence brings to the fore the phenomenon of "turn-around time" (TAT). "Laboratory TAT is measured from the time the laboratory receives the specimen to the time the final report is authorized. It is a key monitor for the overall function of the laboratory service, and is considered a critical element of quality because of the impact it has on clinical management of patients".⁸

Histopathology is a rapidly evolving specialty and is being considered as one of the cornerstone of modern medical sciences.⁹Almost every allied branch of medicine and surgery is somehow dependent upon a histopathology input for establishing a definitive diagnosis.⁹ To this end, failure to deliver accurate histopathological results in good time expectedly would have far reaching negative consequences on the health of an individual patient, and the society at large.

The developing world is arguably characterized by backwardness or rudimentary political, social, and economic systems.¹⁰ The health system is not immune to this as the worst health indices across the globe is domicile in these countries.¹¹ This has resulted in a staggering phenomenon of medical tourism in Nigeria, as citizens readily travel abroad to seek health care.¹² Indeed Nigeria and other low- and middle-income countries (LMICs), have little or no pathology services, hence patients are often treated without investigation results from the laboratory.¹³ When pathology is available in these countries, system delays often occur in obtaining and

processing a biopsy sample, and reporting the results, which consequently delay the starting of treatment.¹⁴ Furthermore, in developing countries, the need to utilize turn-around time towards the improvement of medical services has not been elucidated or utilized.¹⁵It is therefore imperative to examine the effect of service delivery on turn-around time at the histopathology laboratory of the

Objectives

Jos University Teaching Hospital.

The broad objective of this research study is to determine the impact of service delivery on the turn-around time of histopathological surgical biopsies in Nigerian public Health sector with reference to the Jos University Teaching Hospital. Specifically, the objectives of this research study are:

- 1. To investigate the impact of reliability on the turn-around time of the laboratory.
- 2. To examine the impact of assurance on the turnaround time of the laboratory.
- 3. To determine the impact of tangibility on the turn-around time of the laboratory.
- 4. To investigate the impact of empathy on the turnaround time of the laboratory.
- 5. To examine the impact of responsiveness on the turn-around time of the laborato

Hypothesis

The research study has the following hypothesis:

 H_{01} : Reliability has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

 H_{02} : Assurance has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

 H_{03} : Tangibility has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

 H_{04} : Empathy has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

H₀₅: Responsiveness has no significant impact on

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the turn-around time at the histopathology department of the Jos University Hospital.

MATERIALS AND METHODS

The explanatory cross sectional sample survey research design was used in this study. The causal explanations on the relatedness of service delivery (Tangibility, Reliability, Responsiveness, Assurance, and Empathy) and turnaround time were advanced in this study using this design.

The research population in this study consisted of all patients accessing histopathological services on surgical tissue biopsies at the Histopathology Department of the Jos University Teaching Hospital (J.U.T.H). The common characteristic of this population is therefore the services they enjoy from the pathology laboratory at J. U. T. H.

The clients of the histopathology department get a "one off" service from the facility, implying that once they submit a sample and get a result/report, that end the encounter with the laboratory, as there is no future/followup visit. This is in contrast to clinical departments whose patients continue to receive services on follow-up basis resulting in accumulation of clients in their thousands. In 2018, the most recent preceding year, the record of the Department showed that 1530 patients submitted samples for analyses in the laboratory. As such 1530 was used in this as study the study population.

The research population in this study is small, or moderate. For such a population, the standard formula has been advocated for calculating the sample size.¹⁶

The standard formula for calculating sample size is expressed thus:



Where,

N = population size = 1530z = z-score = 1.96 at 95% confidence level e = margin of error = 5% (0.05)p = standard of deviation = 50% (0.5)

Therefore,

Sample Size = $(1.96)^2 \times 0.5(0.5)/(0.05)^2$

 $1+[(1.96)^{2}x0.5(0.5)/(0.05)^{2}x1530]$

=384.16/1.25 =307.33

This number was approximated to 308.

This study employed the consecutive sampling (total enumerative sampling) technique.¹⁷ The tool for obtaining data in this research was the questionnaire. It was a quantitative, close ended, scaled questionnaire.¹⁸

The original SERVQUAL instrument created by Parasuraman *et al* in 1985 with its 5 dimensions of service delivery and 22 questions thereof was adopted with some modifications. The perception of the patient as regards these dimensions (Tangibles, Reliability, Responsiveness Assurance, and Empathy) was measured. In this tool, these five dimensions were resolved into 22 questions. Of the 22 questions in the original SERVQUAL document, 9 were negative, and were all converted to positive statements in the modified questionnaire used in this study (Figure 1). This was done to achieve uniformity and clarity.

Each question is answered with a scale of consonance from 1-5, corresponding to the degree of agreement in response to the statement in the question in incremental fashion. Therefore, "1" represents the lowest degree of agreement and "5" the highest level of affirmation. This scale was adopted from the five-point Linkert Scale.¹⁹

The questionnaire was also modified to include turnaround time, and it was similarly scaled from 1 to 5. The questionnaire was administered to respondents with the help of 2 research assistants stationed at the reception of

the Histopathology Department of J.U.T.H., where final collection of histology reports on surgical biopsies are done. These assistant were trained in an all encompassing manner on the most appropriate way to administer the questionnaire thereby obtaining data in conformity with the aims and objective of the study.

The respondents were the patients' relatives who stood in for the patients. This is because they were the persons who almost always submit histology samples to the histopathology laboratory and receive the result in the stead of the patients who are usually sick to do so, and are also recuperating from the invasive surgical procedure done on them to obtain the biopsy (sample).

After obtaining the data using the questionnaire, the information was subjected to field and central editing. Afterwards it was coded in the Statistical Package for Social Sciences version 19.0. The result was presented in pie charts and frequency tables.

The multiple regression analyses was used to test the five hypothesis of the study.

The research used the model below:

 $TAT = \beta_0 + \beta_1 T_1 + \beta_2 R_2 + \beta_3 R P_3 + \beta_4 A_4 + \beta_5 E_5 + \varepsilon_i$

Where:

TAT=Turn-Around Time T=Tangibles R=Reliability RP=Responsiveness A=Assurance E=Empathy ϵ_i =Error term

RESULTS

Three hundred and ten (310) questionnaires were administered to patients accessing histopathological services on surgical tissue biopsies at the Histopathology Department of the Jos University Teaching Hospital (J.U.T.H). Three hundred and eight (308) were correctly filled and returned, thereby representing 99.4% return rate. The Social Science Statistical Software (SPSS) version 9.0 was used to analyze the data obtained via the questionnaires. The data was coded and cleaned up. The Multiple Regression Analysis was used to test the hypothesis of the study.

The demographic distribution of the 308 respondents is summarized below.

They showed a slight female preponderance: 162(52.59%) females and 146(47.40%). Of these, 5.8%, 63.1%, 27.60%, and 3.25% were respectively up to or below the age of 20years, between 21 to 40years, between 41 to 60 years, and 60years and above.

About their marital status: 0.97% were divorced; 47.07% were currently married; 42.86% were single; and 9.41% were widowed.

Finally, educationally, the highest qualification of respondents was: 3.90%, First School Leaving Certificate; 20.45% National Diploma (ND), or Ordinary National Diploma (OND); 45.13, Higher National Diploma (HND), or First University degree (BSc/BA); 10.71, Masters Degree (MSc); and 1.30%, Doctorate degree (PhD).

The age range of the population was 7years to78years, with a median age of 43 years, mean age of 36.68+11.23, and modal age of 29 years.

The time taking for patient to receive their results from date of submission is presented in table 1.

Subjecting this to measures of central tendency, the turn-

Table 1. Turn Around Time frequency table in days.

How many days did it take to get your result	Frequency	Percent
3	3	0.97%
7	39	12.62%
10	24	7.77%
12	3	0.97%
13	3	0.97%
14	230	74.76%
15	3	0.97%
30	3	0.97%
Total	308	100.00%

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around time of the laboratory ranges between 3days to 30days, with a mean of 12.83+3.14 days, median of 14days, and mode of 14 days.

On the response of participants in the study to the questionnaire with respect to "Reliability", 55.9%, 59.8%, 54.9%, 60% and 67.9% agreed or strongly agreed, respectively on the 1^{st} , 2^{nd} , 3^{rd} , 4^{th} and 5^{th} statement/questions, thereby constituting a majority in each case.

On the response of participants with respect to "Assurance" 59.8%, 59.8% and 56.9%, agreed or strongly agreed respectively with the 1^{st} , 2^{nd} and 3rd statement thereby constituting a majority in these cases. On the 4^{th} statement, 44.1% were neutral constituting a majority in this case.

On the response of participants with respect to "Tangible" 43.1%, 52.0%, 85.3%, and 57.9% agreed or strongly agreed, with the 1^{st} , 2^{nd} , 3^{rd} and 4^{th} statement thereby constituting a majority in each case.

On the response of participants with respect to "Empathy" 57.8%, 43.1%, 61.3%, 64.1% and 62.2% agreed or strongly agreed with the 1^{st} , 2^{nd} 3^{rd} , 4^{th} and 5^{th} statement thereby comprising the majority.

On The response of participants with respect to "Responsiveness", 61.1%, 59.7% and 54.3% agreed or strongly agreed with the 1st, 3rd and 4th statement respectively thereby constituting a majority in these cases. Combined, 20.5% agreed or strongly agreed with the second statement thereby comprising the minority.

Data analyses

The multiple regression analyses was used to test the research hypothesis. Furthermore, the research model was employed.

The following research hypotheses were tested:

 H_{01} : Reliability has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

 H_{02} : Assurance has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

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 H_{03} : Tangibility has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

- H_{04} : Empathy has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.
- H_{05} : Responsiveness has no significant impact on the turn-around time at the histopathology department of the Jos University Hospital.

Multiple regression analyses was used in testing the hypothesis and the results presented in table 2 and summarized below:

Table 2: Structu	ral Path Summary\					
HYPOTHESIS	RELATIONSHIP	BETA	STD ERR	T STAT	PVALUE	DECISION
HI	RELIABILITY \neq TAT	.189	3.152	.724	.607	Not Supported
H2	ASSURANCE \neq TAT	.388	2.943	4.391	.003	Supported
H3	TANGIBILITY \neq TAT	.149	3.158	.563	.690	Not Supported
H4	EMPATHY ≠ TAT	.250	3.107	1.310	.026	Supported
H5	RESPONSIVENESS \neq TAT	.394	.098	8.966	.006	Supported
	$r^2 = 0.34$	N=308	Regression=22			

The table above showed that the pValue of H1 is 0.607 which is greater than $\alpha = 0.05$, thus the null hypothesis is rejected that reliability has no significant impact on the turn-around time of results submitted to the Histopathology lab of the Jos University Teaching Hospital. The difference is statistically significant as it implies or not, this implies that the alternative hypothesis is correct as TAT is almost always 14 days therefore reliability is ensured.

A test of H2 reveals a p Value of .003, which is less than $\alpha = 0.05$. This implies that it is insignificant as regardless of whatever assurances are given or not given the TAT almost remains constantly at 14 days. That means that assurance plays no part in the TAT. The null hypothesis is supported.

An analysis of the structural path summary of H3 reveals a pValue of .690 which is greater than $\alpha = 0.05$. This means that the patient's perception of the tangible assets of the lab colors their perception of what they perceive the lab to be capable of. The difference is statistically significant. Therefore, the null hypothesis that Tangibility is not equal to TAT is rejected.

A further analysis of H4 shows that the pValue of the hypothesis to be .026 which is below $\alpha = 0.05$. This is statistically insignificant. What it implies is that empathy has no part in the TAT of the lab, there for the null hypothesis is supported.

The table also shows that H5 with a pValue of 0.006, supports the hypothesis that responsiveness plays no part on the TAT of the lab. This is supported by the fact that the pValue is statistically insignificant to $\alpha = 0.05$. Therefore, the alternate hypothesis is rejected.

This equation model then shows us that turn-around time TAT = .189 (reliability) + .149 (tangibility) + .388 (assurance) + .250 (empathy) + .394 (responsiveness). This means that an increase by 1% in reliability will increase turn-around time by 0.189 %, while assurance, tangibility, empathy and responsiveness will be fixed, a 1% increase in assurance will lead to an increase of 0.388% in turn-around time while reliability, tangibility, empathy and responsiveness are fixed, an increase of 1% in tangibility will lead to an increase of 1% in turn-around time while reliability, assurance, empathy and responsiveness are fixed, an increase of 1% in turn-around time while reliability, assurance, empathy and

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responsiveness will remain constant, a change of 1% in empathy will lead to an increase of .250% in turn-around time while, reliability, tangibility, assurance and responsiveness are fixed and a 1% increase in responsiveness will lead to an increase of .394% in turnaround time while reliability, assurance, tangibility and empathy will remain fixed.

The model summary revealed that $r^2 = 0.34$. This means that there is a 34% variance in reliability, tangibility, assurance, empathy and responsiveness.

DISCUSSION

This research study sought to establish the relationship of turn-around time of histopathological surgical biopsies and delivery of medical services in Nigerian public Health sector with reference to the Jos University Teaching Hospital. The discussion that follows is in tandem with the research question, objectives and hypothesis.

The research revealed a range of 3days to 30days for turnaround. This range is similar to the 2-27days reported in a teaching hospital in Barcelona Spain,²⁰ but lower than the 3-59 days reported by in a similar setting at Eldoret, Kenya.²¹

The mean turn-around time of 12.83+3.14 days in this study was higher than the 6.24+3.16 days in the study alluded to earlier at Barcelona Spain,²⁰but lower than the 16.2+10.20 days at Eldoret, Kenya.²⁵This better turn-around time in Spain, than our study and that in Kenya, mirrors the gap in advancement in health (an unarguable or developmental indicators) between developed and developing countries. The turn-around time in this study also was longer than the standard recommended by of the College of American Pathologist that 90% routine biopsies be signed out within 2days.²²

On the first research hypothesis, which corresponds with the first research question, the research showed that reliability has significant impact on turn-around time. This means that reliability positively influence the turn-around time in the laboratory. It was found that the laboratory: promised and met the time-frame for availability of results; was sympathetic, reliable, and kept accurate

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records. The laboratory therefore exhibited reliability since it kept to its words. A study in China which inter-alia aimed at investigating the state of the art of intralaboratory turnaround time (intra-TAT) concluded that laboratories in the country were aware of intra-TAT control and were making frantic efforts to reach the target.²³ They furthermore stated that there is still room for improvement. Improvement in this regard can be achieved when the laboratory and its' staff thereof seek to beat targets. As such the Histopathology Laboratory of JUTH should not only aim to meet the date promised patients, but also strive at beating this date to achieve a much improved turn-around time comparable to its counterparts in developed climes.

It has been documented that although most laboratory services are directed in achieving rapid and reliable report at a reasonable cost, most laboratories put undue stress on only reliability, where as customers give more concern on how soon (TAT) a report would be made available to them.²⁴As such reliability, as in this study, should be tailored in a manner to positively impact the turn-around time in the surgical pathology laboratory.

On the second hypothesis, which corresponds to the second research question, the research revealed that assurance has no significant impact on turn-around time. It was found that the laboratory staff were polite, and patients felt safe transacting with them and trust them. Despite this, this did not impact the turn-around time positively on the turn-around time. Gregory reported that polite treatment of patients by staff of pathology laboratories is reassuring, and has far reaching beneficial effects in service delivery.²⁵

On the third hypothesis, which corresponds with the third research question, the research showed that tangibility has significant impact on turn-around time. It implies that tangibility positively impacts turn-around time in the laboratory. Expectedly, up to date equipment in the laboratory would mean work would likely be completed in good time, and an environment with physical appearance consistent with services provided would likely do same. This finding is consistent with reports by Westbrook *et al.*²⁶ and Angeletti *et al.*²⁷ who respectively

concluded in their studies that computerization, and automation, which are important components of modern laboratory equipments/tangibles, have a significant impact in improving turn-around time in medical laboratories. Also it has been documented that the easiest way to reduce turn-around time is to acquire and provide the laboratory with high standard equipments.²⁴ David Hoyle²⁸asserted that "there are many measurements that cannot be made using physical equipment". Other qualities in this regard which depends wholly on the competence of the person providing services, legal services (medical services) that should be measured include empathy, responsiveness, courtesy, trust, and

discussed. On the fourth hypothesis, which corresponds with the fourth research question, the research showed that empathy has no significant impact on turn-around time. It was found that: the employees see it reasonable for patients to expect them to have their best interest at heart; the lab see it necessary to operate at hours convenient for all patients; the lab gives each patient individual attention; the lab employees give each patient individual attention, and; the lab employees fully understand the needs of the patients. But all these did not significantly impact the turnaround positively. Indeed, the activities in the laboratory go through a series of processes that are each accomplished within narrow limits of time frame.²⁹ These steps must be carefully carried out to ensure a quality result. Therefore it goes beyond empathy to improve the turn-around time in some services like that in the laboratory, which is regimented in an organized setting.

appearance.²⁸ Empathy and responsiveness are the crux of

the last two hypotheses in this study and are further

On the fifth hypothesis, which corresponds with the fifth research question, the research showed that responsiveness has no significant impact on turn-around time. It was found that: the employees see it reasonable for patients to expect prompt service; employees were not too busy to attend promptly to patient request; employees are willing to help patients and; the lab tells patients when services will be performed. But all these did not

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significantly impact positively on the turn-around time. It has been documented that diagnostic responsiveness is indicative of laboratory turn-around time.³⁰ Our study however is at variance with this as these two variables show no significant relatedness. As stated earlier, this might not be unconnected to the regimented nature of the laboratory work process-Standard Operating Procedure-that must be abide by to guarantee quality results in organized settings.

This research established a positive influence of tangibility and reliability (two of the five dimensions of service delivery) on turn-around time at the Histopathology Department of the Jos University Teaching Hospital. Tangibility indicators included: up-todate equipment laboratory equipments; visually appealing physical facilities; neatly and well-dressed employees; and the appearance of the physical facilities being consistent with the type of service rendered by the laboratory. In the same vein, reliability pointers were: meeting the promised time-frames for response by the laboratory; provision of services at the time promised; a sympathetic, reassuring and dependable laboratory; ability to keep accurate records.

The research also revealed that the remaining three dimensions of service delivery (assurance, empathy, and responsiveness) had no significant impact on turn-around time. Although these three dimensions were examined and found to score above average (same as the other twotangibility and reliability), they had no significant influence on timeliness.

Therefore, it is here-in inferred that a histopathological laboratories in an attempt to improve turn-around time, should pay attention in improving tangibility and reliability above the current satisfactory level, while it maintain a standard of other service delivery dimensions (assurance, empathy, and responsiveness). Indeed the laboratory can only promise and meet its' promise (reliability) of a faster turn-around time based on how much it is equipped (tangible), in a background of a satisfactory assurance, empathy, and responsiveness of its' employee. a comprehensive work on the inter-relatedness of service dimension on turn-around time, especially as it regards histopathological surgical biopsies. Researchers should focus the search light on this emerging field in Plateau State, Nigeria, and on a global scale to lay the platform for the generalization of the findings of research in this regard. This study has shown that the SERVQUAL tool of service delivery can be used in assessing turn-around time in the histopathological laboratory. This is novel as to the best of our knowledge this tool has never been employed in this regard. Furthermore, it brings to the fore the importance of tangibles and reliability as two important service delivery dimensions that have significant impact on the turnaround time of surgical biopsies in histopathological laboratories.

Finally we recommend s follows; firstly, the histopathology laboratory in Nigeria should try to meet up with a shorter turn-around time on surgical biopsies as with their counterparts in developed climes. This can be done by improving reliability and tangibility. This would help to guarantee optimal patient care. Secondly, the histopathological laboratories in Nigeria should work towards up-to-date laboratory equipments; visually appealing physical facilities; neatly and well-dressed employees; and making the appearance of the physical facilities consistent with the type of service rendered. Tangibility would be improved in this regard in order towards a better turn-around. Thirdly, the histopathological laboratories in Nigeria should work towards meeting the promised time-frames for response by the laboratory; provision of services at the time promised; a sympathetic, reassuring and dependable laboratory; ability to keep accurate records. This would improve reliability towards a better turn-around time. And lastly, other dimensions of service delivery (assurance, empathy, and responsiveness) that did not have significant impact on turn-around time should be maintained at a satisfactory level in Nigeria histopathological laboratories.

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Globally, to the best of our knowledge, there has not been

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