

Original Article

Pattern of Biochemical Tests in A New Suburban Nigerian Teaching Hospital

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**ABSTRACT**

The utilization of biochemical tests is well established and justified in modern medicine. This study highlights findings in the Chemical Pathology Department of a suburban teaching hospital in eastern Nigeria. Our study highlighted annual variation of patients visit, with more visit between the months of March and August. This implies more visits during the rainy season. In this area, the most frequently requested biochemical tests includes; creatine (18.3%), urea (18.2%), glucose (15.2%), and electrolytes (14.8%). Others include urinalysis (7.9%), total protein (3.4%), albumin (3.1%), aspartate amino transferase-AST (2.6%), alkaline amino transferase-ALT (2.5%), lipids (2.5%), alkaline phosphatase (1.8%), calcium (1.6%), and prostate specific antigen-PSA (1.2%). The hormone tests such as triiodothyronine(T<sup>3</sup>), thyroxine(T<sup>4</sup>), and thyroid stimulating hormone(TSH), luetinizing hormone(LH), follicle stimulating hormone(FSH), prolactin, progesterone, testosterone, and estradiol are not commonly requested (0.4% each).The tumor markers alpha-feto protein(AFP) and beta- human chorionic gonadotrophin (bHCG) are rarely requested. This study reflects the overall activity of Chemical Pathology laboratory, revealing the tests more frequently requested; and also showing the period of the year when patients visit is more. Considering the high cluster of patients visit, between March and August, it appears people in this area presents with health problems needing medical attention more in the rainy season.

**Keywords: Biochemical tests; chemical pathology; teaching hospital laboratory.**

**INTRODUCTION.**

The clinician's main task is to make reasoned decision about patient care, despite imperfect clinical information and uncertainties about clinical outcomes. While data elicited from the history and physical examination are often sufficient for making a diagnosis or as a guide to therapy, more information may be required. In these situations, clinicians often turn to diagnostic tests for help. The importance of biochemical tests in the management of diseases cannot be overemphasized. Clinical biochemical studies elucidate changes that occur in diseases in the chemical constituents of the body and biochemical mechanism of the body<sup>1</sup>. These changes may

either be a cause<sup>2-4</sup> or effect<sup>5-7</sup> of a disorder. Biochemical tests may also be utilized in the monitoring of disease patterns and prevalence in any given community. The pattern of diseases in this community is far from being known. This study shows in a way the prevalent diseases and a pattern of their occurrences in this community.

**METHOD AND SCOPE OF THE STUDY.**

The study was restricted to the chemical pathology laboratory of the Imo State University Teaching Hospital, Orlu-IMSUTH. The annual returns of biochemical investigations from the chemical pathology laboratory were obtained covering a

period of three years-2005-2007. The data was evaluated manually to derive; number of patients visit per month, work output per month, annual workload, and the percentage distribution of tests done in the department. The Imo State University Teaching Hospital transformed from a state general hospital into a teaching hospital in April, 2004. It was officially commissioned on Tuesday November 30, 2004; with total bed occupancy of three hundred and sixty beds. At that time, it was constrained by poor and inadequate equipment, facilities and staffing. As such, the chemical pathology laboratory could not do much investigation. By 2005, following the acquisition of basic laboratory equipment, the department could do basically all routine tests such as, blood glucose, urea, creatine, lipid profile, liver function test, uric acid, and calcium etc. Following subsequent acquisition of equipment, the scope of services in the department was further broadened to include such tests as tumor markers (prostate specific antigen-PSA, beta human chorionic gonadotrophin-bHCG, and alfa-feto protein-AFP), thyroid function test (T3,T4,TSH), fertility hormones LH, FSH, progesterone, estradiol, testosterone, prolactin. As at the time of this study, the chemical pathology laboratory of the hospital also have facilities for creatine kinase (CK-MB), lactate dehydrogenase (LDH), cortisol, and dehydroepiandrosterone DHEA.

## RESULT

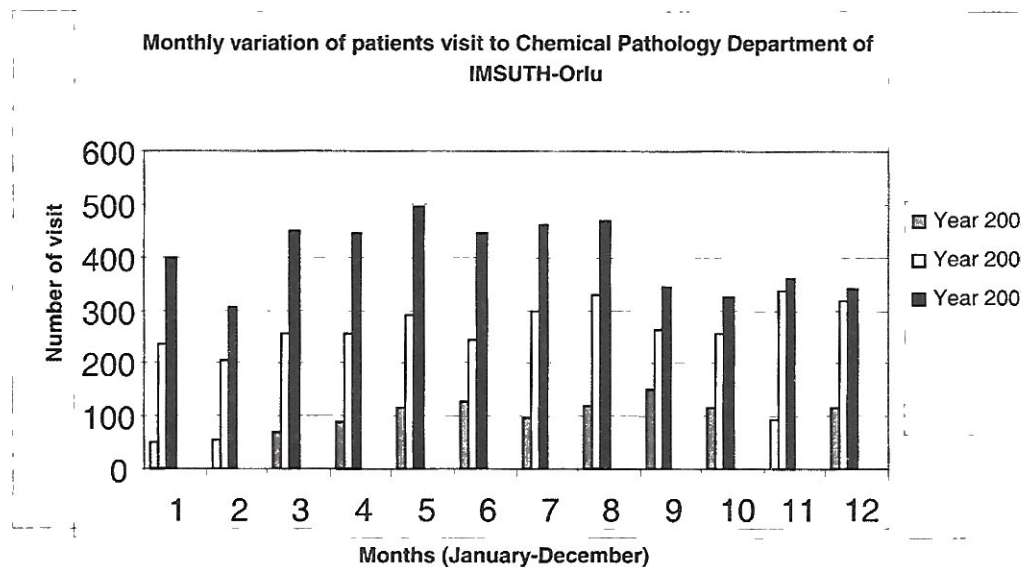
Figure 1 shows the monthly variation of patients visit to Chemical Pathology Department of Imo State University Teaching hospital, Orlu. This showed a steadily increasing patients visit between the year 2005 and 2007. The total patients visit in 2005 was 1,194 with average monthly and daily visits of 100 and 3 respectively.

In 2006, the total patients visit was 3,289, with average monthly and daily visits of 274 and 9 respectively. The total visit increased to 4,842 in 2007 with subsequent increases in the average monthly and daily visits of 404 and 14 respectively. The pattern of visits shows peak

patients visit between the months of March and August of each year. Figure 2 shows the monthly variation of work output (work load) in the Department. The work output varied proportionally with patients visit. Figure 3 shows the annual work output of the Chemical Pathology Department. Work output increased steadily from 4,869 per annum in 2005, to 8,617 per annum in 2006, and to 11,288 per annum in 2007. There was peak work output between March and August of each year studied. The results of this study indicate more patients visit during the rainy season. Also, there was increasing relevance of the hospital Chemical Pathology laboratory over the years studied, as evidenced by the increasing work output. Figure 4 shows the percentage distribution (frequency) of biochemical tests performed in Chemical Pathology laboratory of IMSUTH-Orlu.

The most frequently requested biochemical tests included; creatine (18.3%), urea (18.2%), glucose (15.2%), and electrolytes (14.8%). Others include urinalysis (7.9%), total protein (3.4%), albumin (3.1%), AST (2.6%), ALT (2.5%), lipids (2.5%), alkaline phosphatase (1.8%), calcium (1.6%), and PSA (1.2%). The hormone tests such as T<sup>3</sup>, T<sup>4</sup>, and TSH, luteinizing hormone, follicle stimulating hormone, prolactin, progesterone, testosterone, and estradiol were not commonly requested (0.4% each). The tumor markers alfa-feto protein and beta HCG were rarely requested (<0.1% each). The hormonal assays T<sup>3</sup>, T<sup>4</sup>, and TSH, luteinizing hormone, follicle stimulating hormone, prolactin, progesterone, testosterone, and estradiol, together with the tumor markers alfa-feto protein and beta HCG cumulatively make constituted about 3.2% of total tests done in the department. While as creatine, urea, glucose, and electrolyte were the most frequently requested tests. Electrolyte was requested as a profile comprising sodium, potassium, chloride, and bicarbonate. Similarly, lipid profile was requested as a profile comprising triglyceride, total cholesterol, high density cholesterol, low density cholesterol, and very low density cholesterol.

Figure 1



**DISCUSSION**

The result of this study shows more patients visit during the rainy season. The cause of this trend is not clearly identified in this study. However, it may be easily

adduced that, rainy season poses a lot of health challenge to the people. This period encourages the breeding of many vectors of disease transmission such as mosquito, housefly, sun fly, sand fly<sup>8-11</sup> etc.

Figure 2

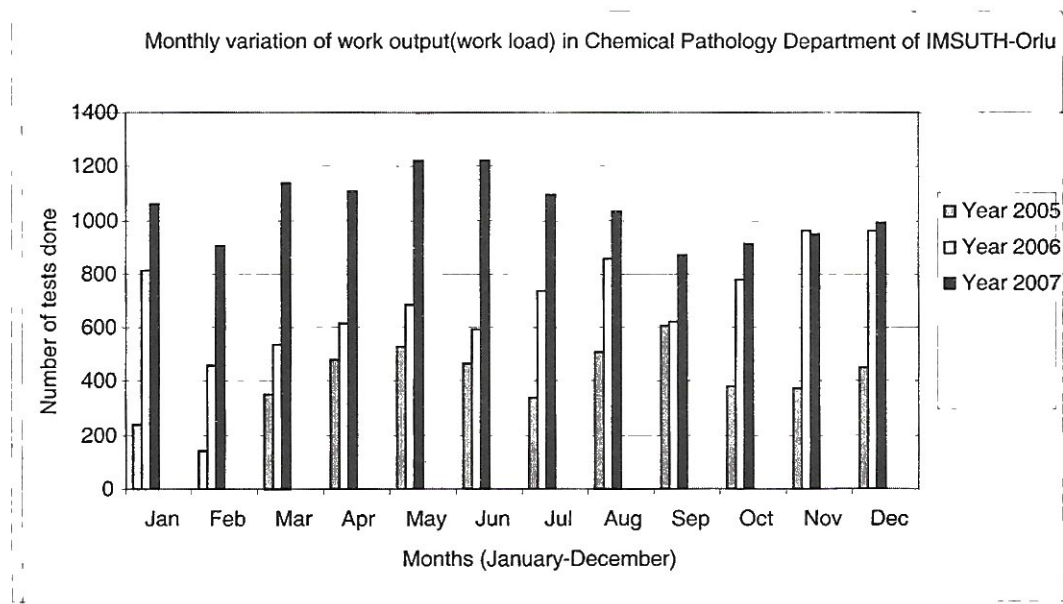


Figure 3

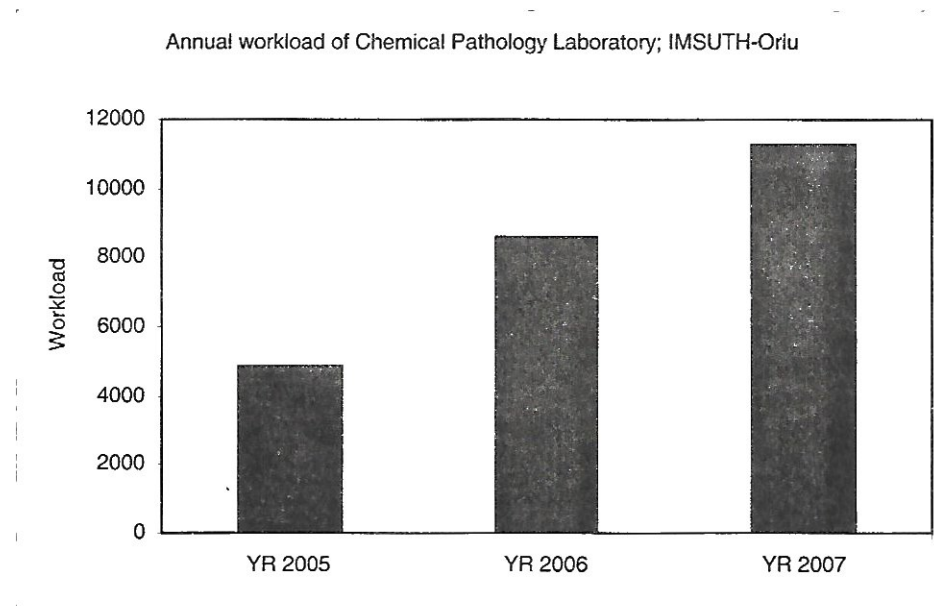
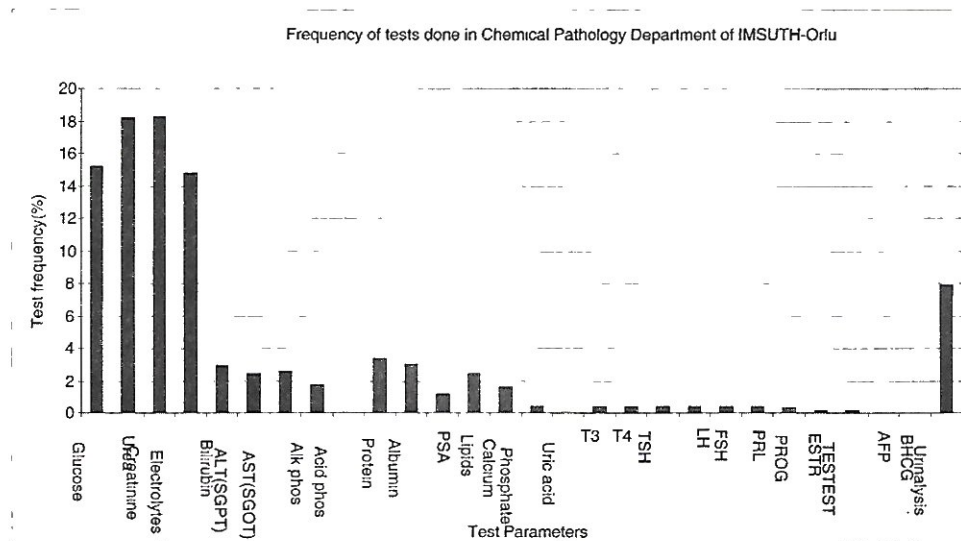


Figure 4



Also, the people may be easily overwhelmed by their high indulgence in farming activities which is at its peak during this period with most our patients drawn from this suburban community. This habit of overindulgence in farming activity with out commensurate attention to personal health needs predisposes the individual to infections, stress and stress related complications.

The work output of the laboratory observed a steady increase all through the period of this study. The hospital embarked on a number of awareness exercises that enhanced its services. Particularly,

the free surgery exercise during which some medical experts are invited from United States of America to assist in various kinds of surgical procedures. This is usually done in April and December of every year since inception of this initiative. It attracts a lot of people from within and outside the state, who on their own are unable to bear the cost of their surgical needs. The outcome of the surgeries is marked with high success rate, thus building-up confidence among the people, and there by increasing the hospital's acceptability and patronage. Often times too, the hospital permitted

free medical services to the people-especially children and antenatal women. These efforts highlight the importance of awareness campaign, and elaborate information strategy in the enhancement of services of a growing hospital<sup>12</sup>. The hospital also became more attractive among the general practitioners and primary health care physicians around its vicinity with patronage from outreach referrals also increasing.

Within this period of growth, the hospital acquired chemistry auto-analyzers and employed more laboratory personnel. This approach enhanced service delivery. This observation supports the simultaneous expansion of facility and manpower with increasing work load.

This prevents putting excess pressure on existing facility; to forestall breakdown. Services were also enhanced. In recent years, some fundamental changes in clinical medicine, including new trends in laboratory investigation have become evident. There is increased dependence on laboratory services. Consequently, the physician is faced with array of laboratory tests, some of which are newly developed and may entail substantial expenditure. Where as a rising trend in the dependence on biochemical tests is the feature of most industrialized societies,<sup>13-16, 17-19</sup> the reverse is the case in Nigeria.<sup>20</sup> Poverty is a feature of tests underutilization. The hospital is located in a suburban area with majority of patients belonging to medium or low social economic class. It is observed that when the cost of laboratory test is high, the patient tend to decline from doing the test. The high profile tests such as the hormonal assays and the tumor markers are relatively rarely done in this center. They are the most expensive tests, and consequently the least conducted. Undoubtedly, tests that incur substantial expenses on patients discourage elaborate biochemical testing essential for proper diagnosis. On the other hand, incentives from government and non-governmental agencies by way of discounted charges, and outright provision of free facilities encourage easy assess to health facilities, with a resultant enhancement of health status of the people.

Blood urea and creatine determination are clinically very useful in the assessment of renal function.<sup>21</sup> Urea and creatine top the list of frequently requested tests. This may not be unconnected with high prevalence of renal complications in this environment. Further studies however will be needed to show the extent of this discovery. Glucose determination is often performed in the evaluation of disorder of carbohydrate metabolism. High prevalence of diabetes mellitus accounts for high demand for glucose determination<sup>22-24</sup>. The relative high demand for electrolytes determination underscores the manifold role of electrolytes in human physiology. Thus, an abnormal electrolyte level is a frequent consequence of a variety of disorders.<sup>25-41</sup>

Considering the high cluster of patients visit between March and August, it appears people in this area get sick more in the rainy season. There should be more studies to uncover the underlying factors. This study also suggests more emphasis to be given to the facility for urea, creatine, glucose, and electrolytes tests in the planning of a Chemical Pathology laboratory. Also provision should be made for expansion of workload in terms of commensurate enhancement of manpower and facilities for effective sustenance of medical services. The finding from this study may be of value in the establishment of referral hospital with chemical pathology facility in locations similar to the one reported here.

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