

A Three-Year Retrospective Analysis of Restorative Dental Treatment Patterns in a Nigerian Tertiary Hospital: Patient Demographics, Modalities, and Management Challenges

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ABSTRACT

Objective: To analyze and evaluate the patient management patterns for restorative treatment procedures at the Restorative Dentistry Clinic of a tertiary hospital in Nigeria over a three-year period, focusing on patient demographics, treatment modalities, and associated challenges to improve clinical outcomes and resource utilization.

Materials and Methods: This study employed a retrospective design to analyze patient management patterns for restorative treatments at the Restorative Dentistry Clinic of the University of Medical Sciences Teaching Hospital, Ondo, Nigeria, from 2021 to 2023. Treatment records were reviewed, categorizing procedures as prosthodontics, endodontics, and operative dentistry. Data analysis utilized SPSS and other Microsoft software packages, with statistical significance set at $p < 0.05$.

Results: A total of 316 restorative dental procedures were performed at the University of Medical Sciences Teaching Hospital, Ondo, between 2021 and 2023. Males comprised nearly half of the patients. The highest treatment volume occurred in 2022 (54.4%), followed by a significant decline in 2023 (19.3%). Prosthodontics led in treatment frequency (41.1%), with removable partial dentures being the most common procedure (73.8%) while fixed prosthodontics accounted for a small proportion (3.1%). Operative dentistry (38%) and endodontics (20.9%) followed. Notably, 25.6% of patients only consulted but did not undergo any treatment while 9.49% of the patient population cited financial constraints as a barrier. A statistically significant relationship was observed between financial constraints and the likelihood of not receiving treatment (p -value < 0.001), highlighting the impact of cost on patient care.

Conclusion: This study revealed that age, gender, and socioeconomic factors influence restorative dental treatment needs. Younger patients predominantly sought care, while the elderly required more removable dentures. Treatment rates varied across departments, with Prosthodontics leading and Endodontics trailing. Financial constraints and material shortages significantly hindered treatment completion.

KEYWORDS: Patient management patterns, Restorative treatment procedures, Barriers to dental care, Prosthodontics, Endodontics

INTRODUCTION

Restorative Dentistry is the study, diagnosis and integrated management of diseases of the oral cavity, the teeth and supporting structures¹. It includes the rehabilitation of the teeth and the oral cavity to functional, psychological and aesthetic requirements of the individual patient, including the co-ordination of multi-professional working to achieve these objectives¹. It encompasses the dental specialties of Endodontics, Periodontics and Prosthodontics (fixed and removable). Restorative procedures support vital oral functions such as speaking, eating, smiling, and chewing by integrating therapeutic approaches from these disciplines.

Understanding patient management patterns in restorative dentistry is critical for optimizing clinical outcomes and ensuring efficient healthcare resource utilization. These patterns are influenced by various demographic and socioeconomic factors. Age is a significant determinant, with bimodal trends observed in the utilization of restorative procedures: one peak during adolescence and early adulthood and another in middle age, declining significantly thereafter². Gender also plays a role, as females are often more concerned with dental aesthetics and thus report for dental visits more frequently than male³. Socioeconomic status is equally influential; individuals with lower income and educational levels tend to exhibit poorer oral health outcomes, as demonstrated by Chavers et al. (2002)⁴.

Patients' demand pattern for dental services can also be influenced by several factors such as the payment methods available for services, namely, out of pocket expenses or the availability of health insurance; their perception about the type of dental services and the expertise of the attending dentist; information and understanding of the treatment options available as well as their exposure to the media⁵. Challenges in managing patients during restorative treatments include clinical complexities and patient-related factors such as fear and anxiety, which contribute to avoidance of dental care⁶. Non-adherence to treatment recommendations, unavailability of materials or expertise and the high cost of restorative procedures further exacerbate these challenges, particularly in resource-constrained settings like Nigeria⁷.

Restorative dental treatment is essential for addressing the high prevalence of dental caries, trauma, and other oral conditions in Nigeria. However, access to quality restorative care is often hindered by socioeconomic, cultural, and systemic barriers^{5,8}. Despite the importance of restorative treatments, there is limited data on the management patterns employed in tertiary hospitals, including patient demographics, types of procedures performed, and treatment outcomes. This gap in knowledge hampers efforts to evaluate and improve clinical practices, resource allocation, and patient care.

This study aims to review the management patterns for restorative treatment procedures over a three-year period at the restorative clinic of a tertiary hospital in Nigeria. By analyzing trends, challenges, and outcomes, this research will provide insights to guide policy development, improve clinical protocols, and enhance patient care practices. Additionally, the findings will contribute to the broader goal of advancing oral healthcare delivery in Nigeria, serving as a benchmark for future research in restorative dentistry.

MATERIALS AND METHODS

This descriptive and retrospective study was conducted among 316 patients who visited the Restorative Dentistry Clinic of University of Medical Sciences Teaching Hospital (UNIMEDTH), within the last 3 years, between the period of 2021-2023.

Ethical Approval

Ethical approval for this study was obtained from the **UNIMED Health Research Ethical Committee**, Ondo State, Nigeria. The study was reviewed and approved under the reference number **NHREC/TR/UNIMED-HREC-Ondo St/22/06/21**. All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Study Design: Descriptive and retrospective study

Study Location: University of Medical Sciences Teaching Hospital is a state-owned tertiary health facility located in Ondo town, Ondo state, Nigeria. It is a referral center for most inhabitants of Ondo state and its environments.

Sample size: 316 patients.

Study Procedure: This study utilized appointment, treatment, and fees records from the Restorative Clinic of the UNIMEDTHC from 2021 to 2023. The case notes of 316 patients who visited the Restorative Clinic during the study period were meticulously reviewed to gather information on treatment procedures provided. Two examiners were calibrated for data collection using thirty randomly selected dental

records from a period outside the study time-frame. Inter-examiner reliability was assessed with a kappa score of 0.91, while intra-examiner reliability scores were 0.92 and 0.88 for the two examiners, respectively. Dental records were extracted by dental record officers with permission from the medical records department. Ethical approval for the study was obtained from the UNIMED Health Research Ethical Committee, Ondo state, Nigeria. The study recorded the effective treatment patterns, including all procedures performed within the restorative clinic.

Statistical analysis

Data were entered into Microsoft Excel spreadsheets and statistically analyzed utilizing the Statistical Package for the Social Sciences (SPSS) version 25.0 software. The results obtained were summarized in tables and charts. Demographic characteristics and restorative procedures done were summarized using descriptive statistics like frequencies and percentages. Bivariate analysis was conducted using Pearson's chi-square test to explore associations between variables. A p-value of <0.05 was considered statistically significant.

RESULTS

Figure 1: Gender distribution of the patients who attended the restorative clinic.

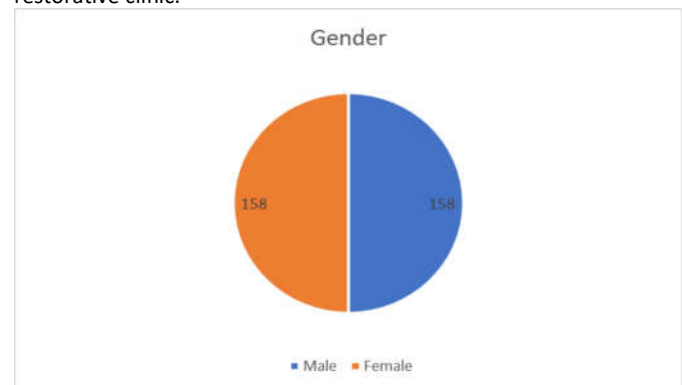


Figure 1 shows the an equal gender distribution of the patients who attended the restorative clinic.

Table 1: Distribution of Restorative Procedure according to Year.

Year	Frequency	Percent
2021	83	26.3
2022	172	54.4
2023	61	19.3
Total	316	100.0

Table no 1 shows the frequency distribution of restorative procedures over the 3-year period assessed. A total of 316 procedures were done. Most occurred in 2022 172(54.4%) and the least in 2023 61(19.3%).

Table 2 presents the frequency distribution of restorative procedures across the various fields or sub-units under restorative dentistry, with a total of 316 procedures recorded. The majority of procedures were prosthetic, accounting for 130 cases (41.1%), while endodontic procedures were the least common, comprising 66 cases (20.9%). Prosthetic Dentistry: Removable partial denture fabrication was the most frequently performed prosthetic procedure, representing 73.8% of all prosthetic cases. Other procedures included consultations with

no treatment done (16.2%), denture repairs (6.9%), and crown cementation (3.1%). Fixed prosthodontics accounted for 3.1% of total prosthetic procedure and 1.27% of total restorative procedure done. Endodontics: Consultations with no treatment done were the most common endodontic activity, comprising 47% of cases. Root canal therapy followed, accounting for 43.9% of endodontic procedures and 9.2% of the total restorative procedure done.

Table 2: Distribution of Dental Treatment Procedure done (N=316)

Category	Frequency	Percentage
Prosthodontic procedures (N=130, 41.1%)		
Fixed Prosthodontics	4	3.1
Denture repair	9	6.9
RPD fabrication	96	73.8
No treatment	21	16.2
Endodontic procedures (N=66, 20.9%)		
No treatment	31	47
Patient opted for extraction	5	7.6
Medication	1	1.5
Root canal therapy	29	43.9
Operative dentistry procedures (N=120, 38%)		
Amalgam restoration	6	5.3
Composite restoration	58	48.5
GIC restoration	25	20.5
No treatment	29	24.2
Patient opted for extraction	2	1.5

Operative Dentistry: Composite restoration was the most frequently performed procedure in operative dentistry, constituting 48.5% of cases. This was followed by consultations with no treatment done (24.2%), GIC restoration (20.5%), and amalgam restoration (5.3%). These findings highlight the distribution and trends in restorative procedures, with prosthetic treatments dominating overall, particularly removable partial dentures. The prominence of consultations with no treatment across sub-units may suggest underlying patient or systemic factors warranting further investigation.

Table 3: Cross-tabulation of Restorative Procedures and age

Category	AGE	
	<50	>50
Prosthodontic procedures (N=130, 41.1%)		
Crown cementation	4	0
Denture repair	2	7
RPD fabrication	22	74
No treatment	8	13
Endodontic procedures (N=66, 20.9%)		
No treatment	9	22
Patient opted for extraction	0	5
Medication	0	1
Root canal therapy	20	7
Operative dentistry procedures (N=120, 38%)		
Amalgam restoration	7	0
Composite restoration	46	18
GIC restoration	20	7
No treatment	13	19
Patient opted for extraction	0	2

Table 4: Cross-tabulation of financial constraint and the percentage of treatment undone.

Category	Frequency	Percentage
No Treatment Done	81	25.6%
Patient Not Financially Ready	30	9.49%

Of the total 316 patients, 81 (25.6%) had consultations with no treatment performed. Among these, financial constraints accounted for 9.49% of the total patient population, highlighting cost as a significant barrier to accessing restorative dental care.

This emphasizes the need for strategies to address affordability and accessibility in oral healthcare delivery, as financial limitations can hinder effective treatment and contribute to unmet dental needs.

Table 5: Relationship between financial constraint and the percentage of no treatment done.

	No treatment done	
	P-value	Chi-square (χ^2)
Financial constraint	<0.001*	316.000

χ^2 – Pearson's correlation score, * Statistically significant (p < 0.05)

Table 5 presents the association between financial constraint and the percentage of no treatment done. A statistically significant relationship was observed with a p-value of <0.001, indicating a strong correlation between financial constraint and the percentage of no treatment done.

DISCUSSION

Demographic Characteristics of Patients Undergoing Restorative Treatment

The study identified the demographics of patients undergoing restorative treatments, showing a balanced distribution between males and females, with a slight predominance of treatments performed on younger adults (26-35 years). This finding is consistent with the study by Guay et al. (2022)², which found that younger adults are more likely to seek dental restorative treatments due to increased awareness and aesthetic concerns.

A unique aspect of this study was revealed showing a substantial number of elderly patients (> 56 years) also sought restorative treatments, particularly in the Prosthetics Unit in the form of removable denture treatment. This aligns with the findings of a study conducted by Selmani et al. (2019)⁹, who showed that the need for prosthodontics treatment among the elderly is increasing, likely due to the relationship between edentulism, age, and elderly populations. This is further supported by Ehikhamenor et al. (2019)¹⁰, whose study found that patients (>50 years) have a higher demand for removable partial denture (RPD) use.

In contrast, studies done by Montini et al (2014)¹¹ have shown that in some regions, elderly patients are less likely to seek dental care due to financial constraints and lack of accessibility. The higher proportion of elderly patients in this study may indicate better access to dental care or a greater awareness of the importance of oral health among this demographic in our region.

The pattern in this study showed that fixed prosthodontic procedures were the least demanded procedures compared to other restorative procedures. It constituted 3.1% of total prosthetic procedures and 1.27% of the total restorative procedures demanded. This aligns with a similar Nigerian finding in which fixed prosthodontic procedure

accounted for 2.9% respectively⁵. This low demand for fixed prosthodontic procedures could be attributed to the high costs of fixed prostheses as well as inadequate knowledge of these types of treatment modalities on the part of the patients.

This study revealed a significant demand for endodontic procedures, with 20.9% of the study population expressing the need for such treatments. However, only 9.2% of these individuals actually underwent Root Canal Therapy (RCT). This observed demand is notably higher than that reported in a previous study conducted in southwestern Nigeria, where only 7.0% of the total patient population expressed a need for endodontic procedures⁵.

The study also demonstrated an age-related distribution of RCT procedures, with a higher prevalence among younger age groups. This finding aligns with previous research by Umanah et al. (2012)¹² and Agholor (2018)¹³, which also reported a higher proportion of RCT patients in younger age groups (<50 years). This is also consistent with findings by Menakaya and Loto (2022) who reported the demand for root canal treatment was more prevalent in those < 40 years of age¹⁴. This trend may be attributed to the higher prevalence of dental caries commonly observed among young adults. In addition, the observed demand pattern suggests a potential delay in seeking treatment for teeth with carious and pulpal involvement.

Furthermore, this study highlights a positive shift towards tooth preservation, as an increasing number of teeth that would previously have been extracted are now being treated endodontically. This positive development may be attributed to increased awareness, particularly among younger populations, and a shared desire among patients and dentists to preserve natural teeth.

Restorative Treatment Modalities and Techniques

The distribution of dental treatments varied across the three units, with prosthetics having the highest patient volume (41.1%), followed by operative dentistry (38.0%) and endodontics (20.9%). This finding contrasts with a study conducted in Lagos by Awotile et al. (2022), which reported operative procedures as the most demanded restorative service, accounting for 75% of all procedures⁵.

These contrasting findings may be attributed to several factors, including potential differences in socioeconomic conditions, dental awareness levels, and the availability of dental specialists. Lagos state, as a major metropolis, likely has a wealthier population with better access to dental care compared to Ondo state. This could lead to a higher demand for and utilization of operative dentistry services in Lagos, which focus on preventing and restoring teeth.

Prosthodontics : RPDs were the primary treatment in the Prosthetics Unit (73.8%). This aligns with findings by Oremosu et al. (2021)¹⁵ and Shrirao et al. (2013)¹⁶, who found that RPDs are often preferred due to cost-effectiveness, especially among patients with lower socioeconomic status. This suggests socioeconomic factors influence treatment choices across diverse populations.

Endodontic Unit: In the Endodontics Unit, root canal therapy (RCT) was the most prevalent procedure, comprising 43.1% of treatments. Notably, approximately half of the patients presenting to this unit opted for no treatment, while 7% chose extraction. This trend may be attributed to factors such as cost and perceived treatment complexity.

Mohamad and Alkeilani (2022) found that financial constraints often lead patients to opt for extractions over more costly RCT procedures¹⁷. Our study further supports this observation, with the

Endodontics Unit exhibiting the highest rate of "no treatment" decisions across all three units, suggesting potential financial barriers to accessing endodontic care.

Nigeria presently has very poor dental insurance coverage, and this may have been reflected in the low demand for expensive but necessary restorative treatment compared to cheaper dental services, whose costs can easily be borne out of pocket⁵.

Operative dentistry Unit: Composite restorations were the most frequent procedures in the General Restorative Unit, comprising 48.5% of all treatments, reflecting the growing preference for these materials due to their aesthetics, durability, and demonstrated long-term success¹⁸.

Financial Constraints and Treatment Completion

Our study found a significant association between financial constraints and the likelihood of completing dental treatments, with a Chi-Square test p-value of 0.000 indicating a strong statistical significance. Patients with financial constraints were less likely to complete their treatments. This finding is supported by the research of Gupta & Vujicic (2019), who demonstrated that financial barriers are a critical factor in the discontinuation of dental care¹⁹. Similarly, Zhou et al. (2017) identified financial constraints as a leading cause of unmet dental needs in many populations²⁰.

Availability of Materials and Equipment

The unavailability of materials and faulty equipment emerged as notable barriers to treatment completion. This observation is corroborated by the study of Kiwilu et al (2007), which identified material shortages and equipment malfunctions as common operational challenges in dental clinics, adversely affecting patient care²¹.

In addition, our study's findings align with Glick et al. (2016), which noted that inadequate supply chains and maintenance issues frequently disrupt dental services, particularly in lower-income regions²². Addressing these challenges is crucial for improving the quality and continuity of care.

CONCLUSION

This study has successfully identified the demographics and characteristics of patients undergoing restorative treatment, demonstrating the influence of factors such as age, gender, and socioeconomic status on the type of restorative procedures performed. Younger adults predominantly sought restorative care, while the elderly showed a higher demand for prosthetic treatments, particularly removable partial dentures.

The findings also highlighted the distribution of restorative treatments across the three units in UNIMEDTH, with the Prosthodontic Unit accounting for the highest treatment rate and the Endodontic Unit recording the lowest. The study identified significant barriers to care, including financial constraints and the unavailability of materials and equipment, which directly impacted patients' ability to complete restorative procedures. Addressing these challenges is essential to improving access and quality of care.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

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DATA AVAILABILITY STATEMENT: The data presented in this study are available on reasonable request from the corresponding author

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