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Audit of Selected Treatment Charts Review in A Mid-Income Radiotherapy Facility

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ABSTRACT

In cancer management, where precision and consistency are critical, systematic treatment chart review, a key player in quality assurance, contributes significantly to maintaining treatment integrity and patient safety. This study aimed to analyze treatment chart review of some patients, managed with external beam radiotherapy at MEDSERVE-LUTH cancer centre, Lagos between January – August, 2025. Relevant data were extracted from 100 patients' treatment records and descriptive statistics were used for analysis. In all, the predominant site of treatment was pelvis (50%) followed by the breast (30%) and the treatment intent comprised both curative and palliative. The fractionation regimen ranged from conventional 2 Gy, to hypo-hypofractionation (>2Gy) and single fraction of very high dose. The treatment planning techniques comprised 3D CRT, IMRT and VMAT. The prevalence gender was female patients (57% Vs 43%) and the median age of all patients was between 51 – 60 years. In all, 85% of the planned treatment were delivered within the stipulated period, while 15% did not due to patients' specific factors, because there was no record of machine break down to warrant treatment interruption. This study validated the compliance of the centre with standard (patient-centred) radiotherapy practices obtainable in developed countries. Routine treatment charts review should be encouraged in all radiotherapy centres in Nigeria to ensure that patients, who miss scheduled treatments are promptly contacted to ascertain reasons for their absence. Supportive measure can then be implemented where necessary. This approach will significantly reduce patient-related treatment interruption.

Keywords

Patient-Centred Radiotherapy, Patient Safety, Quality Assurance, Standard of Care, Treatment Chart Review.

Introduction

Cancer is a disease in which some of the body's cells proliferate uncontrollably and spread to other parts of the body and is one of the leading causes of death globally [1,2]. Nigeria is grappling with growing cancer burden, the most prevalent being cancer of the breast, prostate, cervical, and colorectal. They show wide variation in their age-standardized incidence rates, underscoring the urgency of effective interventions [3]. In 2024, breast cancer accounted for an incidence rate of 51.5 per 100,000, while prostate cancer remained the leading cause of cancer-related deaths, with a mortality rate of 27.9 per 100,000. With a population exceeding 200 million, Nigeria's demographic structure significantly influences patterns of cancer incidence, outcomes, and survival [4]. Challenges such as limited access to modern radiotherapy facilities, equipment shortages, treatment delays, treatment interruptions, gap in surveillance and geographical inequities significantly affect patient outcomes, limits the design of evidence-based cancer control strategies and constrains effective policy development [5].

Advances in treatment planning, delivery, and verification have improved dose conformity and reduced normal tissue toxicity,

yet the complexity of modern radiotherapy necessitates rigorous Quality Assurance (QA) systems to ensure safe and effective care [6]. A comprehensive QA framework includes not only machine and dosimetric verification but also clinical process, among which treatment chart review is an essential component [7].

Audit of treatment chart review is a systematic review of patients' radiotherapy records to assess accuracy, completeness, and compliance with departmental or international standard of care. It serves as a Continuous Quality Improvement (CQI) tool to identify documentation errors, verify adherence to prescription parameters, and enhance communication among multidisciplinary team [8]. Treatment chart audits also ensure that any deviation in prescribed dose, number of fractions, or treatment intent are promptly detected and corrected before they can impact patient outcomes [6]. Radiotherapy depends on meticulous documentations and verifications to achieve optimal tumor control while minimizing toxicity, making chart audits crucial for safety and quality improvement [9].

A radiotherapy treatment chart typically contains patient's demographic information, diagnosis, staging of the disease, simulation notes, planning parameters, dosimetric calculations, daily treatment records, verification imaging, and follow-up documentation [10]. Reviewing these elements help confirm that the prescribed dose matches the delivered dose, that treatment sites are correctly targeted, and that documentation is complete [6].

Chart review is generally carried out in two stages: prospective review, which occurs before treatment initiation to verify prescriptions and plans, while retrospective review, conducted during or after therapy is meant to evaluate execution, treatment gaps, and toxicities [11].

Ultimately, chart review in radiotherapy is more than a procedural requirement, it is a patient safety initiative. This study performed systematic assessment of treatment charts review of some patients living with cancer, who were managed with advanced treatment techniques of external beam radiotherapy at MEDSERVE-LUTH cancer centre, Idi-Araba Lagos State, Nigeria.

Materials and Method

This retrospective study was designed to evaluate radiotherapy treatment records of cancer patients managed at MEDSERVE-LUTH Cancer Centre, Idi-Araba Lagos, Southwestern Nigeria. The review covered records of patients managed with external beam radiotherapy (EBRT) using Varian Linear Accelerator Units (Vital Beam and HALCYON) from January-August 2025. The institutional ethical review approval was obtained prior to data collection, ensuring compliance with patient confidentiality and ethical research standards [6].

One hundred (100) patients with average age of 57 years and histologically confirmed cancer were considered. Patient records were obtained from electronic medical records. Information collected includes: Patient demographics, Diagnosis and stage of disease, Treatment intent and modalities, prescribed dose and number of fractions, beam energy used, treatment planning technique, relevant documentation completeness (simulation, verification, and delivery records), treatment completion status, treatment time intervals (timelines; start of treatment & end of treatment), treatment interruption and reason, etc. Data were entered into a structured data extraction form designed for this study to ensure uniformity. Data were analyzed with Microsoft Excel 2016 using descriptive statistics. Frequencies, means, and percentages were computed to summarize categorical and continuous variables.

Results

The demographic data of all the patients considered in this study are presented in Table 1. The prevalent age group was between 61 and 70 years and there are more females than male patient. The various treatment sites are presented in Table 2, with Pelvis being the predominant sites of treatment among all the patients. The classification of cancer based on staging among these patients are presented in Table 3 with stage IV being the highest stage of the disease presentation. The overall treatment characteristics (input and outcome) with external beam radiotherapy management of these patients are presented in Table 4. Majority of the patients were managed with curative intent; the most planning technique employed for their treatment planning is Intensity Modulated Radiation Therapy (IMRT) and patients, who completed their treatment within the stipulated period, out numbered those who did not. The treatment regimen in terms of overall prescription dose and fractionation with respect to various cancer type and treatment intent, are presented in Table 5.

Table 1: Age and Gender Distribution among Selected Patients.

Age group	Number of Patient
20-30	3
31-40	9
41-50	20
51-60	25
61-70	28
71-80	14
81-90	1
Total	**100**
Gender	
Male	43
Female	57
Total	**100**

Table 2: Patients' Treatment Site.

Treatment Site	Number of Patient
Pelvis	50
Breast	30
Head & Neck	15
Abdomen	1
Extremities	2
Skin	2
Total	100

Table 3: Distributions of Diseases according to Staging.

Staging of the Disease	Number of Patient
Stage 0 (Carcinoma in-situ)	4
Stage I	11
Stage II	16
Stage III	32
Stage IV	37
Total	**100**

Table 4: External Beam Treatment Characteristics.

Parameters Considered	Classification	Number of Patient
Treatment Intention	Curative Palliative Radical	66 18 16
Treatment Planning Techniques	3D CRT IMRT VMAT	18 76 6
Completion of Treatment within the Scheduled Days	Completed Not Completed	83 17

Table 5: Radiation Dose Prescription for Different Cancer Management.

Dose per fraction, Gy	Number of fraction	Total Dose, Gy	Types of Cases
1.8 – 2.0 (Curative Intent, Conventional)	25 – 33	45 - 66	Breast, Pelvis and Head & Neck
2.66 – 2.80 (Curative Intent, Hypo-fractionation)	15 – 16	42 - 43	Breast
3.0 (Palliative Intent)	10 – 20	30 - 60	Whole Brain, Prostate (SIB)
4.0 (Palliative Intent)	5	20	Bone metastases
7 – 8 (Palliative Intent)	1	7 - 8	Metastatic lesions (Single fraction)
3.0 Curative Intent)	24	72	Prostate (Dose escalation Technique)

Discussion

The demographic analysis of the study population revealed a clear gender imbalance, with a predominance of female patients (57%) compared to male patients (43%). This disparity is largely attributable to the high incidence of female-specific cancers such as breast and cervical malignancies, which represented a significant proportion of cases within the study cohort. Conversely, male-specific cancers such as prostate carcinoma were fewer, resulting in overall smaller male representation.

In terms of age distribution, the female group demonstrated a wider spread in age at presentation. The youngest female patient was 17 years compared to 26 years for males, while the oldest female reached 82 years, slightly older than the oldest male at 78 years. This translated into a broader age range for females (65 years) than for males (52 years). These findings suggest that female patients not only presented earlier but also at much older ages, underscoring the broad spectrum of oncological disease across different stages of life in women [12].

The median age for females was 57 years, notably lower than the male median age of 64 years. This indicates that women in this cohort were more likely to present with cancer at younger ages compared to their male counterparts. This trend is consistent with the epidemiology of breast and cervical cancers, which often present earlier in life relative to prostate or bladder cancers that are more common in men and typically diagnosed at older ages [13].

Taken together, the results demonstrate that the study population was female-dominated, with women presenting both at younger and older extremes, and with a median age nearly a decade lower than that of males. These findings highlight the importance of gender-specific cancer screening and treatment strategies, especially in low- and middle-income settings where cervical and breast cancers continue to contribute significantly to the overall cancer burden [14]. The predominated cancer stage was IV, followed by stage III and II across all the treated cases within the period. This showed that most of the patients living with cancer usually present at Radiotherapy clinic at the late stage of the disease, where curative intent is usually very hard to achieve [15-18]. However, MEDSERVE-LUTH cancer centre was able to manage 66% of these patients for curative, 16% for radical and only 18% for palliative. This was made possible by the cohorts of professionals, state-of -the -art treatment facilities and advanced treatment planning techniques (IMRT & VMAT) deployed at the centre for cancer management.

The analysis of radiotherapy treatment planning techniques demonstrated a striking dominance of intensity-modulated radiotherapy (IMRT) within the study population as it accounted for 94% of all cases. This reflected the widespread adoption of IMRT as the primary technique in contemporary radiotherapy, given its proven ability to deliver highly conformal dose distributions, optimize target coverage, and spare adjacent organs at risk (OARs) [19]. In addition, given the complexity of cases seen in the country and in this centre in particular, IMRT has proven to be a valuable treatment technique, enabling improved target coverage while better sparing organs at risk. The overwhelming reliance on IMRT also highlights institutional preference and availability of resources, particularly in centers where advanced planning systems and linear accelerators are routinely accessible [20]. Volumetric modulated arc therapy (VMAT) was used in 5 patients (6%), representing the second most common technique. Although VMAT is recognized for its efficiency in reducing treatment delivery times while maintaining dose conformity comparable to IMRT [19] but its optimization process is very slow when compared with that of IMRT. The relatively low utilization of VMAT for treatment planning of patients by the centre may be due to avoidance of long waiting time [20] for huge number of patients, that need to undergo treatment planning before treatment and hence, their treatment planning preference for IMRT. The dose fractionation regimens observed in these cohorts of patients include common radical courses of treatment (conventional fractionation), hypo-fractionation, the adopted modern breast schedules, meant for treating more patients living with breast cancer in a centre

with limited treatment facilities and of course, high dose-escalated protocols. These reflected the flexibility of the centre in deploying international standards of patient-specific care for improved treatment outcomes and better quality of life of patient.

Conclusion

This study showed that majority of cancer patients managed at MEDSERVE-LUTH cancer centre received care that was well aligned with international standards and institutional protocols. The overall quality of documentation was commendable, reflecting the centre's strong commitment to quality assurance and patient safety.

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