






Review of radiation oncology emergencies in Lagos University Teaching Hospital, Nigeria



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Dates:

Received: 12 Dec. 2018

Accepted: 22 Apr. 2019

Published: 11 July 2019

How to cite this article:

Adegboyega BC, Sowunmi AC, Alabi AO, Ojifinni OO, Adenipekun AA. Review of radiation oncology emergencies in Lagos University Teaching Hospital, Nigeria. *S. Afr. j. oncol.* 2019;3(0), a66. <https://doi.org/10.4102/sajo.v3i0.66>

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Background: Radiation oncology emergencies (ROEs) are common in metastatic or locally advanced cancer accounting for a large proportion of radiotherapy indications in poor resource settings.

Aim: To review pattern, presentation and outcome of ROEs in Lagos University Teaching Hospital (LUTH) and compare with an earlier study in the northern part of the country for possible geographical variation.

Setting: A retrospective review of ROE record from 2008 to 2016 in LUTH.

Method: Demographic data, clinical presentation, treatment and outcomes were analysed using charts and frequency tables.

Results: Total of 458 cases of oncologic emergencies were reviewed. The mean age was 52.3 years with a male-to-female ratio of 1:2.2. The majority (85%) of the patients presented in stage IV, 10% stage III and 5% stage II diseases. Spinal cord compression was the commonest presentation seen in 53.9% of cases, brain metastases in 22.1% of patients and tumour haemorrhage in 22.5% of patients. Time from the onset of symptoms to treatment was between 24 and 48 h in 16.4%, > 48 h to 1 week in 64.4% and above 1 week in 19.2%. There was a complete or significant response in signs and symptoms in 77%, no improvement in 11% and 1.1% had disease progression.

Conclusion: This study showed a varied pattern of presentation in ROEs from what was obtained in northern Nigeria, with spinal cord compression being the commonest in south west Nigeria. Despite a delayed onset in treatment, radiation therapy is vital in oncology emergencies management. There is a need for accessible functional radiotherapy centres in Nigeria to combat the delays in commencing treatment.

Keywords: radiation; oncology; emergencies; pattern; outcome; Nigeria.

Introduction

An oncology emergency is an acute condition caused by cancer or its treatment, requiring rapid intervention to avoid death or severe permanent disability.¹ They are commonly seen in metastatic and locally advanced disease and can occur at any time during the course of a malignancy. Indications for emergency care in cancer patients include complications arising from advanced disease and side effects of the treatment, and the outcomes depend on early diagnosis and timely implementation of appropriate therapy.^{2,3}

Oncologic emergencies are managed with chemotherapy, radiotherapy or surgery.⁴ This palliative radiation therapy is vital in the management of many oncologic emergencies like malignant spinal cord compression (MSCC), raised intracranial pressure (ICP), superior vena cava obstruction (SVCO) and life-threatening tumour haemorrhage.³ It is aimed at relieving the clinical symptoms and improving the quality of life.⁵

Owing to the rising incidence of cancer globally there is also an expected increase in the incidence of oncology emergencies.⁶ In developing countries like Nigeria, our cultural beliefs, myths about cancer and poverty account for late presentation of cancer patients with/in emergencies; in addition, with a population of over 200 million, there are just about 70 radiation oncologists 15 hospitals in the 36 states of the country, fewer than 50 radiation therapists and fewer than 50 trained oncology nurses. The scarce treatment facilities and incessant breakdown lasting from weeks to several months or even years in some instances result in poor access to early treatment and also contributes to the poor prognosis and outcome.^{7,8} An earlier study

in the northern part of Nigeria showed tumour haemorrhage as the commonest oncology emergencies in those regions.⁹ This review will identify any variation in presentation and outcome in comparison with the earlier studies both locally and internationally.

Methodology

The study is a retrospective review of the records of eligible patients for the study, and the eligibility criteria were histologically confirmed cancer patients who completed prescribed emergency radiotherapy for palliative purpose in the Radiotherapy Department of Lagos University Teaching Hospital, Lagos, between January 2008 and December 2016. Five patients who could not complete their treatment because of complications of treatment like anaemia and renal failure or disease progression and death were excluded.

Lagos State is situated in the south west region of Nigeria (Appendix 1, Figure 1-A1²⁴) and it is one of the three states that have a linear accelerator machine for cancer treatment. The Linear Accelerator (LINAC) 6MV/15MV machine was used for external beam radiotherapy treatment.

The data were collected from the patient's case file and the radiotherapy treatment files. The information extracted included: demographic information like age and sex, site of primary disease, presenting complaints, duration of symptoms, stage at presentation, histological types, previous treatment and present treatment modalities; other details were the radiotherapy treatment field and dose received. Alongside the tele-therapy, supportive therapies to further improve their outcomes were also noted like analgesics for those with pains ranging from non-steroidal anti-inflammatory drugs (NSAIDS) to strong opioids following the World Health Organization (WHO) ladder.¹⁰ High-dose corticosteroids in those with spinal cord compression and raised ICP because of brain metastases.^{11,12}

Other modalities of treatments included site packing with or without adrenaline for bleeding cervical cancer and other bleeding superficial tumours. Parenteral or oral tranexamic acid and blood transfusion were also employed in haemorrhage management.^{12,13}

Follow-up record and response to treatment during treatment to 3 months after treatment were also retrieved. These include pain assessment, improvement in grade of motor power and relief of other symptoms. This however was subjective for which we use the presenting complaints and examination findings at presentation and at each follow-up visit from the treatment cards to determine the response to treatment.

The responses to treatment were graded based on the clinical features into the following.

- Complete response (CR): complete resolution or disappearance of signs and symptoms of the disease.

- Partial response (PR): this is greater than 50% reduction in signs and symptoms after radiotherapy treatment.
- No response (NR): this is reduction in signs and symptoms of less than 50%.
- Disease progression: worsening signs and symptoms despite radiotherapy treatment.
- The data obtained were analysed and categorical variables were expressed as percentages, frequencies, tables and charts.

Ethical considerations

Ethical approval was obtained to conduct the study from the Health Research and Ethics Committee of the Lagos University Teaching Hospital, Lagos, assigned reference number: ADM/DCST/HREC/111.

Results

A total of 458 patients who had emergency radiotherapy were included in this study, and this accounts for 20% of the total 2294 patients treated with radiotherapy during the study period.

The socio-demographic data of the study population are shown in Table 1. Ages of patients seen were between 7 and 83 years with the mean age of 52.3 years and peak age was the fourth decade in men and sixth decade in women. The sex distribution of the patients was 31% male and 69% female with a male-to-female ratio of 1:2.2.

The commonest primary cancer site was breast, accounting for 212 (46%) of cases, followed by prostate cancer in 96 patients (21%) cervical cancers in 80 patients (17%), head and neck cancers in 25 patients (5%), colorectal, soft tissue sarcomas lung and the other cancers made up the rest (see Figure 1).

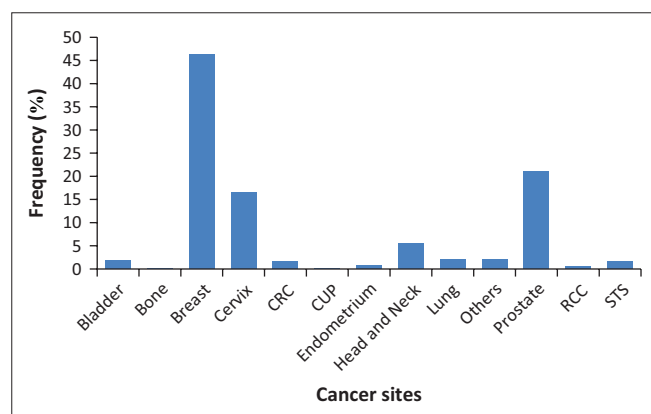
At presentation, 353 (77%) patients had prior treatments including surgery, chemotherapy, hormonal therapy or various combination therapies, and 105 (23%) of these patients had no prior treatments before presenting as emergencies. These treatment-naïve patients consisted of 58 cases of tumour haemorrhage, 15 patients with cord-compressions and 32 other emergencies.

TABLE 1a: Frequency table for the demography of radiation oncology emergencies.

| Age distribution | Male | | Female | |
|------------------|------------|----------------|------------|----------------|
| | Frequency | Percentage (%) | Frequency | Percentage (%) |
| 1-10 | 1 | 0.2 | 0 | 0.0 |
| 11-20 | 2 | 0.4 | 3 | 0.6 |
| 21-30 | 5 | 1.1 | 13 | 2.8 |
| 31-40 | 28 | 6.1 | 13 | 2.8 |
| 41-50 | 44 | 9.6 | 22 | 4.8 |
| 51-60 | 41 | 9.0 | 76 | 16.6 |
| 61-70 | 14 | 3.1 | 111 | 24.2 |
| 71-80 | 5 | 1.1 | 73 | 15.9 |
| 81-90 | 1 | 0.2 | 6 | 1.3 |
| Total | 142 | 30.8 | 316 | 69.2 |

TABLE 1b: Frequency table for the stage, indications, presentation and outcome of radiation oncology emergencies.

| Variable | Frequency | Percentage (%) |
|---|------------|----------------|
| Distribution of cancer stage | | |
| I | Nil | 0 |
| II | 45 | 5 |
| III | 22 | 10 |
| IV | 391 | 85 |
| Total | 458 | 100 |
| Indications for emergency radiotherapy | | |
| Myelocompression | 247 | 53.9 |
| Tumour haemorrhage | 103 | 22.5 |
| Brain metastases | 101 | 22.1 |
| Superior vena cava obstruction (SVCO) | 5 | 1.1 |
| Obstructive uropathy | 2 | 0.4 |
| Total | 458 | 100 |
| Time to presentation | | |
| 24–48 h | 75 | 16.4 |
| 48 h – 1 week | 295 | 64.4 |
| > 1 week | 88 | 19.2 |
| Total | 458 | 100 |
| Response to treatment | | |
| Complete or partial response (CP or PR) | 353 | 77 |
| No response | 52 | 11 |
| Disease progression | 5 | 1.1 |
| Unknown | 48 | 10 |
| Total | 458 | 100 |

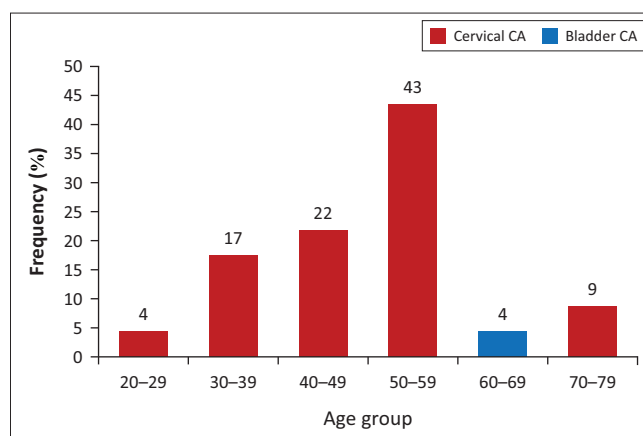


CRC, colorectal cancer; CUP, cancer of unknown primary; RCC, renal cell carcinoma; STS, soft tissue sarcoma.

FIGURE 1: Frequency distribution of cancer sites.

The commonest stage at presentation for radiotherapy in an oncology emergency was stage IV disease in 391 (85%) patients, 45 (10%) patients were stage III, 22 (5%) presented in stage II disease (see Table 1). The stage 2 cases were all female with cervical cancers and 1 bladder cancer (see Figure 2). The early stage cancers proceeded with definitive management of chemo-radiation or chemotherapy as the case required following the initial palliative radiotherapy.

In all, frank and impending cord compression was the commonest indication for emergency radiotherapy in our centre accounting for 53.9% of all cases seen; raised ICP was seen commonly in metastatic breast cancer, tumour haemorrhage secondary to cervical cancers. Less frequent indications for emergency radiotherapy were SVCO and obstructive uropathy. See Table 1.



CA., cancer.

FIGURE 2: Frequency distribution of stage II cases.

Time from the onset of symptoms to treatment was between 24 and 48 h in 75 patients (16.4%), > 48 h to 1 week in 295 (64.4%) patients and more than 1 week in 88 (19.2%) (Table 1). The majority (80%) of the earliest presentations were cases of tumour haemorrhage and some (13.3%) were raised ICP because of brain metastases, but most cases (53.4%) of impending or frank cord compression and raised ICP were as a result of brain metastases (38.6%) and presented after 1 week.

The commonest radiotherapy dose given in 75.6% of the total patients treated was 30 Grays (Gy) in 10 fractions, which was mostly because of spinal cord compression in 242 (52.8%) patients and raised ICP because of brain metastases in 98 (21.4%) patients. Some (11/2.4%) with spinal cord compression however received 20 Gy–25 Gy in 5–10 fractions, whereas patients with tumour haemorrhages received 15 Gy in 3 fractions.

There was CR or PR in 353 (77%) patients as evidenced by the cessation of symptoms like tumour haemorrhage or improvement in power or gait in those with spinal cord compression and significant pain control in those with impending spinal cord compression. There was NR in 52 (11%) of patients, mostly patients with brain metastases and MSCC, whereas 5 (1.1%) had disease progression or died because of renal failure in pelvic malignancies and brain metastases with raised ICP. The remaining 48 (10%) were either lost to follow-up or outcome unknown (see Table 1).

Discussion

Lagos state is the economic capital of Nigeria and it is situated in the south west region of the country. It is the most populous city in West Africa¹⁴ and also a major referral centre for radiotherapy in Nigeria, as it serves the south west, south south, south east and some parts of the northern part of the country.

Nigeria's health care system is faced with major challenges of inadequacies and poor funding making it inaccessible and subsequent poor outcome. With a rough estimate of less than

10% of patients with cancer on any health insurance, both government and private, less than 2% of the health insurance covers cancer management or radiotherapy. The efforts of the government are still very poor, although about 2 years ago some chemotherapy drugs were covered by health insurance but not the targeted therapy. And this insurance is accessible only by a low percentage of the population. The situation is even worse with cancer treatment where there is no one-stop cancer centre and only five LINAC and three Cobalt 60 machines in the country with only one functional LINAC and two Cobalt 60 machines during the period of this study (Appendix 1, Figure 2-A1).

The study results showed that oncologic emergencies are a common occurrence in our centre, as it is in most developing countries, and it is found that one in every five new patients will present with an emergency. This is higher than that found in the earlier study conducted in the northern part of the country by Adewuyi et al.⁹ who reported emergencies in one in nine patients. The rising incidence could be attributed to the increasing cancer incidence in the general population as reported by Ferlay et al.⁶ and Abdulkareem¹⁵ who also projected further increase in cancer incidence rate in Nigeria and worldwide. This late presentation in Nigerian patients compared with, as shown in the study by Christian et al.,¹⁶ those in Germany, Austria and Switzerland could be attributed to screening and early detection because of the advancement in management modalities and availability of funds or health insurance among other things. This is the case in developed countries as opposed to resource-poor countries like Nigeria.

The female preponderance confirmed breast cancer as the commonest cancer seen in the general population in Nigeria, and this is in accordance with previous studies by Ketiku¹⁷ and Abdulkareem¹⁵ which showed that cancer incidence is higher in females than in males.

The high rate of late presentation in 95% of cases as either metastatic or locally advanced disease is similar to the pattern of presentation in the northern part of the country found by Adewuyi et al.,⁹ in which about 80% of the patients had stages III and IV. An earlier study in our centre by Ajekigbe et al.⁷ and Durosinmi-Etti et al.⁸ also put the incidence of late presentation at about 80%. Fear of unknown, illiteracy, traditional and cultural beliefs were reasons proffered for late presentation; other reasons included poverty, denial, alternative medicine usage and inadequate facilities in the environment. When compared with studies in developed countries, this presents a gloomy picture of expected poor outcome.

Malignant spinal cord compression was the commonest indication for emergency radiotherapy followed by raised ICP from brain metastasis, although SVCO only contributed minimally. Earlier studies in the literature reported that the commonest indication for emergency radiotherapy is MSCC and closely followed by SVCO also due to higher incidence

of lung cancer in developed countries which is contrary to the pattern in this environment.^{2,3,10,18} However, the study findings are contrary to the earlier study conducted in the northern part of the country that showed the commonest indication for emergency radiotherapy to be tumour haemorrhage.⁹ This could be because of a higher incidence of cervical cancer in the northern part of the country, which could be as a result of early marriage, illiteracy and low socioeconomic status in that environment compared with the south-western part of Nigeria.⁹

Breast cancer accounted for 84% of the causes of raised ICP from brain metastasis, 10% from head and neck cancers, 4% brain metastasis from lung cancer and 3% from prostate cancer, and this is comparable to reported studies where lung cancer, breast cancer and melanoma were the commonest primary cancers to cause brain metastasis, and this further corroborates the pattern of cancer prevalence in our environment where breast cancer is the commonest malignancies seen in the general populace.^{15,17}

At presentation, 105 (23%) of the patients had no prior treatment while the rest had some forms of treatments like chemotherapy, hormonal therapy, surgery either as monotherapy or combination therapies. However, when compared with the study conducted in the northern part of the country by Adewuyi et al.,⁹ 64.3% of cases seen were not on any treatment. This wide variation between the North and South could be because of low socioeconomic status, paucity of treatment facilities in the North compared to the West, illiteracy and high incidence of tumour haemorrhage, especially bleeding cervical cancer being the commonest oncologic emergencies over there.⁹

According to the literature, the interval between the onsets of symptoms to definitive treatment is a major prognostic factor determining the outcome and effectiveness of the treatment.² Christian et al.¹⁶ reported the median time interval between the onset of treatment or presentation and commencement of radiotherapy as 2–36 h in a developed country setting. The pattern in our setting however is far from this, as in 64.4% of the patients' radiotherapy was not commenced until after 48 h to 1 week from the onset of symptom, in 19.2% treatment commenced after 1 week and only 16.4% were presented and treated within 24–48 h of the onset of symptoms. This is also similar to the study by Adewuyi et al.⁹ where 82% of the patients were treated 1 week after the onset of symptoms. Reasons for delay in presentation include our belief and myths, misconceptions about cancer, poverty and ignorance, although there is also delay in the commencement of treatment because of extremely few functional radiotherapy centres and frequent breakdowns.⁷

There is no ideal or fixed dose and fractionation for oncologic emergencies, but according to the literature, the total dose is tailored to the disease setting, life expectancy and performance status of the patients.^{4,5,20,21,22} The commonest radiotherapy dose schedule given in 75.6% of the total patients treated was

30 Gy in 10 fractions, whereas patients with spinal cord compression and brain metastases and those with tumour haemorrhage received 15 Gy in 3 fractions.

This study showed either CR or PR in symptoms (palliative measures) in 77% of patients, most especially in those with tumour haemorrhage and 60% of those with MSCC and some with MSCC following radiotherapy irrespective of the dose fractionation. The response was also improved by other supportive measures like steroids,^{11,12} analgesics¹⁰ and anti-haemorrhagic agents¹³ although the percentage contribution achieved was not specified by the records. This is along the findings by Patchell et al.,²² reporting the critical role played by radiation therapy in the treatment of MSCC.

The NRs in 11% of cases were mostly patients with raised ICP and some with MSCC. This result is far lesser than the result by Chargari et al.²³ that found that 70% of patients with brain metastasis had only short-term relief. The major difference could be because of late presentation of our patients compared with those in developed countries. Also five patients died during or shortly after treatment, essentially because of disease progression or complications like anaemia and renal failure.

As in a retrospective study some patients were lost to follow-up or had incomplete documentation. The findings too were not consistently documented in the case files, forcing the reviewer to adopt a common ground for data extraction. So we hope that our centres will develop a format or protocol for patient review to ensure uniformity and also electronic data management to ensure preservation of this information for future references.

Conclusion

Increasing cancer burden is a global challenge, with the majority of the patients in the low- and medium-income countries like Nigeria presenting with advanced or metastatic diseases with its attending oncologic emergencies, most commonly MSCC, tumour haemorrhage and brain metastases. The pattern of presentation varied between the northern and south-western part of Nigeria basically because of the commonest cancer in these regions. However there are similarities in the treatment and outcomes because of the common factors of late presentation, poverty and lack of cancer treatment facilities among others when compared with developing countries. Nevertheless, radiotherapy was still beneficiary in palliative management of oncologic emergencies, leading to improved quality of life and longer survival time especially with early treatment despite the advanced presentation and delayed treatment in cancer management in Nigeria contributing to the poor outcome.

Acknowledgements

Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

B.C.A. was responsible for concept, design, definition of intellectual content, literature research, clinical studies, data acquisition and analysis, manuscript preparation, manuscript editing, manuscript review and guarantor. A.C.S., A.O.A., O.O.O. and A.A.A. were responsible for the clinical studies, manuscript preparation, manuscript editing and manuscript review.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Data availability statement

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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Appendix starts on the next page →

Appendix 1



Source: Yusuf U. Map of the Six Geopolitical Zone in Nigeria showing total number of registered voters [homepage on the Internet]. c2018. Available from <https://umar-yusuf.blogspot.com/2018/09/map-of-six-geopolitical-zone-in-nigeria.html>

FIGURE 1-A1: Map of the six geopolitical zones in Nigeria.²⁴

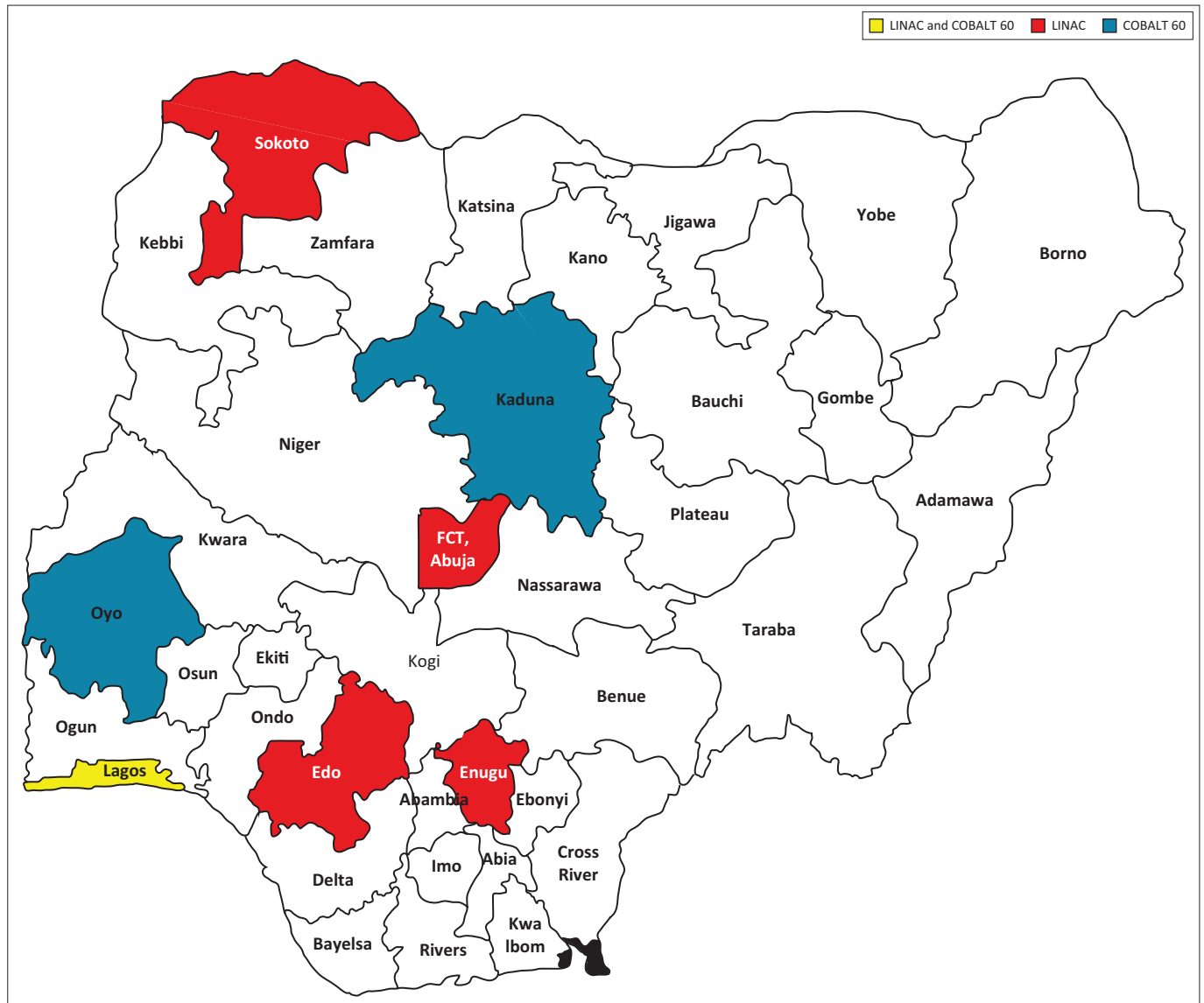


FIGURE 2-A1: Distribution of External Beam Radiotherapy machines in Nigeria.