

What Is the Impact of the Ebola Virus Disease Outbreak on Cancer Management in Guinea?

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PURPOSE To assess the impact of the Ebola virus disease outbreak (EVDO) on cancer management at the surgical oncology unit of Donka National Hospital.

METHODS This was a retrospective and comparative analysis of cancer consultation and care data before (2012-2013), during (2014-2015), and after (2016-2017) the EVDO. The number of cancer occurrences, referral mode, origin, main activities (consultations, surgery, chemotherapy), and access of radiotherapy were analyzed. The Mann-Whitney *U* test with independent samples used was considered as significant if *P* was $\leq .05$.

RESULTS From 2012 to 2017, 4,977 patients were admitted, including 2,254 with cancer. The variations observed were a decrease in consultations by 2.3% during the EVDO versus an increase by 46.9% after the outbreak ($P < .001$). We found decreases of 0.7% and 12.5% during and increases of 253.8% and 15.4% after the EVDO from level 1 and 2 and from level 3 health facilities, respectively ($P < .001$). A total of 251 surgeries were performed, and 1,463 received chemotherapy. There was 5.2% more chemotherapy use during and 33.7% more after the EVDO ($P < .001$). The number of surgeries increased by 35.8% and decreased by 40.0% during and after the EVDO, respectively ($P < .001$). We evacuated 36 patients for radiotherapy, which reflected a decrease of 42.1% and 45.5% during and after the EVDO ($P < .001$).

CONCLUSION Cancer management slowed down during the EVDO. This change requires organization of the fight against cancer through the institutionalization and decentralization of its management.

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INTRODUCTION

The 2014-2015 Ebola virus disease outbreak (EVDO) affected for the first time and simultaneously several previously free countries in West Africa and rapidly generated more cases than all previous outbreaks.¹ It is reported to have started in southeastern Guinea in December 2013, before spreading to Liberia and Sierra Leone and, to a lesser extent, to Nigeria, Senegal, Mali, and sporadically outside Africa. In Guinea, this outbreak has reached 3,814 people, including 2,554 deaths.²

One of the consequences of this outbreak was the collapse of an already very fragile health system, and the care provided for patients without Ebola was sharply reduced. Antenatal visits decreased by 10% nationally, and skilled births attendance decreased by 29%.³ In N'Zerekore and Conakry, the number of women giving birth in a health facility decreased by 87% between October to December 2013 and July to September 2014. At the same time and in the same region, the contraceptive prevalence rate had declined by almost 70%.⁴

Before the EVDO, cancer care was characterized by the absence of a national cancer care strategy, an insufficient technical platform, and the absence of subsidies on anticancer drugs. The national strategic plan for the response to noncommunicable disease in 2011-2015, which included cancer, could not be implemented because of a lack of funding during the outbreak period.⁵ In Guinea, there is only one cancer unit, in Donka National Hospital (DNH), where the Ebola treatment center was located.

Although use of reproductive and primary health care, which are heavily funded, have declined, cancer, which is unsubsidized, must also have been affected during the outbreak in our country. The objective of this study was to assess the impact of EVDO on cancer management at the surgical oncology unit (SOU) of DNH.

METHODS

Study Setting

The health system in Guinea is based on a 3-level referral mode from the health facilities: level 1 (health post

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CONTEXT

Key Objective

To discuss the impact of a highly contagious viral outbreak on cancer management in a low-resource country.

Knowledge Generated

The variations observed were a decrease in consultations by 2.3% during the Ebola virus outbreak and an increase of 46.9% after the outbreak ($P < .001$). We found decreases of 0.7% versus 10.9% during and increases of 253.8% versus 15.4% after the EVDO for levels 1 and 2 versus level 3, respectively, from health facilities ($P < .001$).

Relevance

The slowdown in the treatment of patients with cancer during the Ebola outbreak can be addressed by increasing public awareness and implementing an efficient referral system consistent with the national cancer strategy.

and health center), level 2 (municipal medical center, prefectural and regional hospitals, private clinics), and level 3 (national hospital or university hospital center). The only country SOU was located on the fifth floor of the main building of DNH, where the Ebola treatment center could be seen.

Study Design

This was a retrospective, descriptive, and comparative analysis of the use of cancer management in the SOU. From the first declaration in January 2014 to the end of the outbreak in December 2015 by the Ministry of Health, the epidemic had lasted, we estimated, for 2 years. For this reason, we decided to compare 2 years before (2012-2013), during (2014-2015), and after (2016-2017) the EVDO.

Data Management

The number of consultations (reception and examination of any patient for suspected cancer) and cancer occurrences (malignant histologically and/or cytologically verified), the mode of referral (self-referral or referred by health facilities), the origin of patients (the administrative region where the patient stayed at least 6 months before the first symptom), and the cancer care given (specific treatment, including surgery, chemotherapy, radiotherapy, and others) were collected. All missing data were excluded from the analysis.

Statistical Plan

The data were analyzed on the statistical package for the social sciences software (version 21.0 for Windows; SPSS, Chicago, IL). Data were compared over the 3 periods before, during, and after the outbreak. The Mann-Whitney U test was used for the comparison and was significant if the P value was $\leq .05$.

RESULTS

Patients and Cancer Occurrences

From January 1, 2012, to December 31, 2017, 4,977 patients were seen. The number of patients seen in consultation was 1,459 (29.3%) before Ebola, 1,425 (28.6%) during Ebola, and 2,093 (42.1%) after Ebola. The variations observed were a decrease in consultations by 2.3% during

the EVDO versus an increase by 46.9% after the outbreak ($P < .001$). Of the 4,977 patients, 2,254 (45.3%) had cancer, and the remaining 2,723 (54.7%) had benign tumors or other diseases. There were 587 cancer occurrences (26.0%) before, 605 (27.0%) during, and 1,062 (47.0%) after EVDO (Fig 1). Overall, 907 patients (40.2%) were men, and 1,347 (59.8%) were women; the mean age was 45.7 years (standard deviation, ± 18.6 years). Children (≤ 15 years old) represented 133 patients (5.9%).

The top 5 cancers in all patients were breast ($n = 512$; 22.7%), liver ($n = 320$; 14.2%), cervix ($n = 218$; 9.7%), soft tissues ($n = 130$; 5.8%), and skin ($n = 118$; 5.2%). Table 1 presents the variation observed in the top 5 cancers in all patients, in men and women, and in adults and children before, during, and after the EVDO at SOU of DNH. Among these top 5 cancers, only breast cancer showed a constant increase; all others experienced a decrease during the outbreak period ($P < .001$). For skin cancers, we found an increase of 71.4% during and a decrease of 12.5% after the outbreak ($P < 0.001$). Lung cancers were steadily increasing during and after the outbreak in men ($P < 0.001$).

The top 5 childhood cancers were retinoblastoma ($n = 45$; 33.8%), soft tissue sarcomas ($n = 18$; 13.5%), bone ($n = 17$; 12.8%), lymphomas ($n = 14$; 10.5%), and liver ($n = 6$; 4.5%) cancers. Among these, an increase of 170.0% and a decrease of 70.4% in retinoblastoma were found respectively during and after the outbreak ($P = .004$).

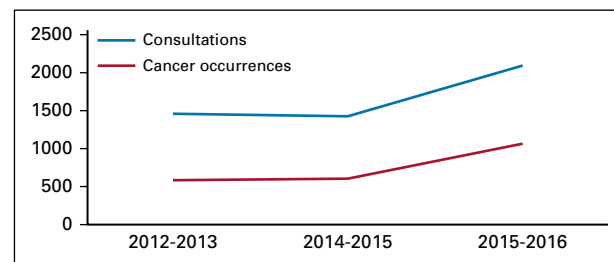


FIG 1. Trends of consultations and cancer cases before (2012-2013), during (2014-2015), and after Ebola virus disease outbreak at the surgical oncology unit of Donka National Hospital.

TABLE 1. Variation Observed in the Top 5 Cancers in All Patients Before, During, and After the Ebola Virus Disease Outbreak at the Surgical Oncology Unit of Donka National Hospital

Top 5 Cancers by Patient Group	Total No.	No. Before Ebola	% Observed Variation [[n ₁ - n ₀]/n ₀] × 100	No. During Ebola	% Observed Variation [[n ₂ - n ₁]/n ₁] × 100	No. After Ebola	P
All patients							
Breast	512	138	+19.6	165	+26.7	209	< .001
Liver	320	81	-21.0	64	+173.0	175	< .001
Cervix uteri	218	50	-28.0	36	+267.0	132	< .001
Soft parts sarcoma	130	45	-31.1	31	+74.2	54	< .001
Skin	118	28	+71.4	48	-12.5	42	< .001
Men							
Liver	255	63	-11.11	56	+142.9	136	< .001
Soft tissues sarcomas	71	26	-38.5	16	+81.3	29	< .001
Lymphomas	71	17	-29.4	12	+250.0	42	.002
Skin	57	16	+37.5	22	-13.6	19	< .001
Lung	51	12	+50.0	18	+16.7	21	< .001
Women							
Breast	495	136	+16.9	159	+25.8	200	< .001
Cervix uteri	218	50	-28.0	36	+266.7	132	< .001
Liver	65	18	-55.6	8	+387.5	39	.014
Skin	61	12	+116.7	26	-11.5	23	< .001
Soft tissues sarcomas	59	19	-21.1	15	+66.7	25	< .001
Adult							
Breast	510	138	+18.8	164	+26.8	208	< .001
Liver	314	78	-21.8	61	+186.9	175	< .001
Cervix uteri	217	50	-28.0	36	+263.9	131	< .001
Skin	113	26	+73.1	45	-6.7	42	< .001
Soft tissues sarcomas	112	39	-30.8	27	+70.4	46	< .001
Children							
Retinoblastoma	45	10	+170.0	27	-70.4	8	.004
Soft tissues sarcomas	18	6	-33.3	4	+100.0	8	.002
Bone	17	8	-25.0	6	-50.0	3	.002
Lymphomas	14	2	+100.0	4	+100.0	8	.020
Liver	6	3	+0.0	3	-100.0	0	NS

Abbreviations: n₀, number before Ebola; n₁, number during Ebola; n₂, number after Ebola; NS, not significant.

Referral Mode

Patients were referred from level 1 and 2 facilities in 721 patient cases (32.0%), from level 3 facilities in 832 (36.9%), and by self-referral in 701 (31.1%) patient cases. We found decreases of 0.7% versus 10.9% during and increases of 253.8% versus 15.3% after the EVDO from levels 1 and 2 versus level 3 health facilities, respectively ($P < .001$; Table 2).

Geographic Origin

As for the geographic origin of the patients, 1,030 (45.7%) came from the Conakry region, and 1,187 (52.7%) came from other parts of the country. There was a decrease from

31.6%-7.9% of patients from the administrative regions of Mamou, Faranah, Labe, and N'Zerekore, whereas an increase of 6.0%-28.0% of patients was found from Conakry, Boké, Kankan, and Kindia ($P < .001$; Table 2).

Cancer Care

From 2012 to 2017, 251 surgeries were performed and 1,463 chemotherapies were administered in our unit. There was 5.2% more chemotherapy during and 33.7% more chemotherapy after the outbreak ($P < .001$). The number of surgeries increased by 35.8% during the outbreak compared with a decrease of 40.0% after the outbreak ($P < .001$). We evacuated 36 patients for

TABLE 2. Variations Observed in the Referral Mode, Origin of Patients, and Cancer Care Before, During, and After the Ebola Virus Disease Outbreak at the Surgical Oncology Unit of Donka National Hospital

Variable	Total No.	No. Before Ebola	% Observed Variation [[n ₁ - n ₀]/n ₀] × 100	No. During Ebola	% Observed Variation [[n ₂ - n ₁]/n ₁] × 100	No. After Ebola	P
Referral mode							
Level 1 and 2 facilities	721	131	-0.7	130	+253.8	460	< .001
Level 3 facilities	832	285	-10.9	254	+15.3	293	< .001
Self-referral	701	171	+29.2	221	+39.8	309	< .001
Origin of patients							
Conakry	1,030	261	+ 6.1	277	+77.6	492	< .001
Kindia	345	77	+26.0	97	+76.3	171	< .001
Kankan	172	43	+28.0	55	+34.5	74	< .001
Boke	171	41	+14.6	47	+76.6	83	< .001
Mamou	135	38	-7.9	35	+77.1	62	< .001
N'Zerekore	123	38	-31.6	26	+126.9	59	< .001
Labe	124	43	-27.9	31	+61.3	50	< .001
Faranah	117	36	-16.7	30	+70.0	51	< .001
Others countries	33	8	-37.5	5	+300.0	20	.002
Missing	4	2	—	2	-100	0	NS
Cancer care							
Surgery	251	81	+35.8	110	-40.0	66	< .001
Chemotherapy	1,463	423	+5.2	445	+33.7	595	< .001
Radiotherapy	36	19	-42.1	11	-45.5	6	.002

Abbreviations: n₀, number before Ebola; n₁, number during Ebola; n₂, number after Ebola; NS, not significant.

radiotherapy from 2012-2017, and the access to this treatment decreased by 42.1% and 45.5% during and after the EVDO, respectively ($P < .001$; Table 2).

DISCUSSION

This retrospective study assessed trends in the number of cancer occurrences and the impact of the EVDO on cancer management at the SOU of DNH. During the outbreak, no health workers or patients were affected by the Ebola disease. However, the clinical implications could be the risk of infection, low attendance, delayed diagnosis, and treatment of patients with cancer.

In this study, only 45.3% of the patients had cancer. This reflects the insufficient referral system; patients are self-referred or are referred by health professionals at different levels of the health facilities. Although a previous study had shown that more patients with cancer were being referred by health professionals than by self-referral,⁶ health professionals should be trained to refer only those patients with cancer to the care center.

The EVDO occurred in Guinea when the increase in consultations and the number of cancer occurrences were constant in our unit.⁷ The impact was a decrease of 2.3% in consultations during the outbreak compared with an increase of 46.6% after the outbreak. The national cancer

plan was expected to implement the early detection of cancers in the primary health care system from 2011-2015.⁵ The decrease in the number of cancer occurrences would be due to the negative perception of the EVDO, fear, the public's crisis of confidence in the health system, and the discontinuation in 2014 of the implementation of early cancer detection in the primary health care system. Similar findings were found in the dermatology department of DNH, where consultations and hospitalizations decreased by 42.6% and 36.2%, respectively, during the outbreak.⁸

In this study, breast, liver, and cervical cancers represented the top 3 cancers. In the general Guinean population, the cancer occurrences are estimated at 7,274, of which cervix uteri (24.9%), liver (21.7%), and breast (8.3%) cancers represent the first, second, and fourth cancers, respectively.⁹ Conversely, soft tissue sarcomas and skin cancers, which represented the fourth and fifth cancers in our study, are uncommon in the general population.¹⁰ Breast cancer is the only one among the top 5 cancer with an observed increase during and after the EVDO. This could be related to the high incidence of breast cancer (26%) in our unit, which is the reference center for this cancer.⁶ As the fifth most common cancer in men, lung cancer has also kept a steady increase during and after the EVDO. This is believed to be related to the higher exposure

of men to tobacco. The increase of skin cancers during the outbreak is related to a campaign of skin cancer screening among albinos in 2014 with nongovernmental organizations. The high incidence of retinoblastoma in children is like that in the general population.¹⁰ The decrease in the number of cancer occurrences in children after the outbreak is believed to be due to the implementation of a pediatric oncology unit in 2016 at DNH.

The number of patients referred from the health facilities at different levels of the health system declined during the outbreak. These facilities were themselves less frequented because of a lack of confidence between the population and the health system. Before the outbreak, the level of preparedness for cancer management was not enough because of a lack of infrastructure, access to care, and public awareness. Better organization of the service and increased awareness are needed to bring patients to the hospital. Investment in terms of training of human resources, infrastructure, and equipment (eg, radiotherapy) was also required.

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The mobility of populations for health reasons decreased considerably during this period of the outbreak. The number of patients from Conakry and surrounding areas (Boke and Kindia) and those from Kankan (without an outbreak) were increasing. The other regions, with (N'Zerekore, Faranah) or without (Mamou, Labe) outbreak, were less likely to use the services of our unit.

Regarding cancer care, surgery rates increased during and decreased after the outbreak. The post-outbreak decrease was related to multiple academic trips of the only surgical oncologist who lives in the country. Despite the lack of funding, chemotherapy continued to increase during and after the EVDO. Because the borders with Senegal closed, the access to radiotherapy declined even after the outbreak. This poses the problem of access to radiotherapy in sub-Saharan Africa.¹¹

In conclusion, cancer management has slowed down during the EVDO. Raising public awareness and implementing an efficient referral system in line with the national cancer strategy allows adaptation to the outbreak environment.

AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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