

# Toward Optimization of Cancer Care in Sub-Saharan Africa: Development of National Comprehensive Cancer Network Harmonized Guidelines for Sub-Saharan Africa

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## abstract

**PURPOSE** Standard treatment guidelines improve patient outcomes, including disease-specific survival, in cancer care. The African Cancer Coalition was formed in 2016 to harmonize cancer treatment guidelines for sub-Saharan Africa.

**METHODS** The African Cancer Coalition collaborated with the National Comprehensive Cancer Network (NCCN) and the American Cancer Society to harmonize 46 cancer treatment guidelines for use in sub-Saharan Africa. Harmonization for each guideline was completed by a group of approximately 6-10 African cancer experts from a range of specialties and with representation across resource levels. Each working group was chaired by an African oncologist and included a member of the appropriate NCCN guidelines panel. Treatment recommendations from the parent guidelines were distinguished as options that are generally available and should be considered standard care in most of the region or as highly advanced options for which cost or other resources may limit widespread availability. Additional recommendations specific to sub-Saharan Africa were added.

**RESULTS** The NCCN Harmonized Guidelines for sub-Saharan Africa, available for download on the NCCN website and mobile application, provide flexible recommendations appropriate for the range of resources seen in African cancer programs, from private comprehensive cancer centers to resource-constrained public hospitals. IBM (Armonk, NY) has developed a digital interface—the Cancer Guidelines Navigator—that allows oncologists to access the treatment recommendations for the first five guidelines through an interactive web-based application.

**CONCLUSION** Harmonized guidelines that reflect the diversity of resource levels that characterize the current state of clinical care for cancer in Africa have the potential to fill a crucial gap in efforts to standardize and improve cancer care in Africa.

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## ASSOCIATED CONTENT

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## INTRODUCTION

In sub-Saharan Africa, there were an estimated 811,000 new occurrences and 527,000 deaths from cancer in 2018, and cancer incidence is expected to double by 2040 to more than 1.6 million cases annually as the population grows and ages.<sup>1</sup> Cancer in Africa is characterized by late stage at presentation, delayed diagnosis, limited access to treatment, and poor outcomes relative to other geographic regions.<sup>2</sup>

Standard treatment guidelines improve patient outcomes, including disease-specific survival, in cancer care.<sup>3,4</sup> They help practitioners keep up with rapidly evolving evidence, provide an independent measure of quality of care, and facilitate shared decision-making

in multidisciplinary care.<sup>5,6</sup> Up-to-date, comprehensive national treatment guidelines did not exist previously for any country in sub-Saharan Africa. The variability of cancer practice within and across countries limited opportunities for training and research collaborations as well as product forecasting and procurement planning.

There are 32 cancers with at least 1,000 annual incident cases in the WHO African region.<sup>1</sup> Cancer care is developing rapidly, and guidelines must be reviewed and updated frequently. However, the development of cancer treatment guidelines is resource intensive. Few countries within the subregion have an adequate number of specialist oncologists to develop and maintain high-quality national guidelines. In the

## CONTEXT

### Key Objective

How should international cancer treatment guidance be adjusted to be useful and appropriate for African treatment programs?

This article describes an effort by > 100 African oncologists to develop regional treatment guidelines that provide high-quality treatment that is practical for the African setting.

### Knowledge Generated

Harmonized cancer treatment guidelines for sub-Saharan Africa provide an opportunity to improve the quality of cancer care, tailor care to the unique settings of African cancer centers, and create an environment for increased collaboration around research and training. The coalition that was formed to harmonize guidelines created a structure that can be used to launch additional regional efforts to improve cancer care.

### Relevance

Harmonized guidelines have the potential to standardize care delivery. They aim to address different resource settings to enhance best practice irrespective of resources. Implementation and evaluation of these guidelines have the potential to improve care.

absence of national standards, oncologists may adopt treatment plans that are not protocol based or rely on guidelines developed for other countries, which may include regimens or treatment modalities that are not available or appropriate for cancer care in sub-Saharan Africa and which may not adequately address different cultural conditions or comorbidities, such as HIV/AIDS. To address these challenges, there was a need to develop standard cancer treatment guidelines that accommodate the unique environments and various levels of resource stratification available in developing economies, like those in sub-Saharan Africa.

Under the leadership of Isaac Adewole, PhD, former Health Minister of Nigeria, and Jackson Orem, MD, director of the Uganda Cancer Institute, the African Cancer Coalition was established in 2016 with the purpose of improving the quality of cancer treatment by establishing a regional collaboration to develop comprehensive standard cancer treatment guidelines that are tailored for use in sub-Saharan Africa. This paper describes the process, challenges, and outcomes of the effort to harmonize and adapt the NCCN guidelines on cancer treatment and protocol for use in sub-Saharan Africa.

## METHODS

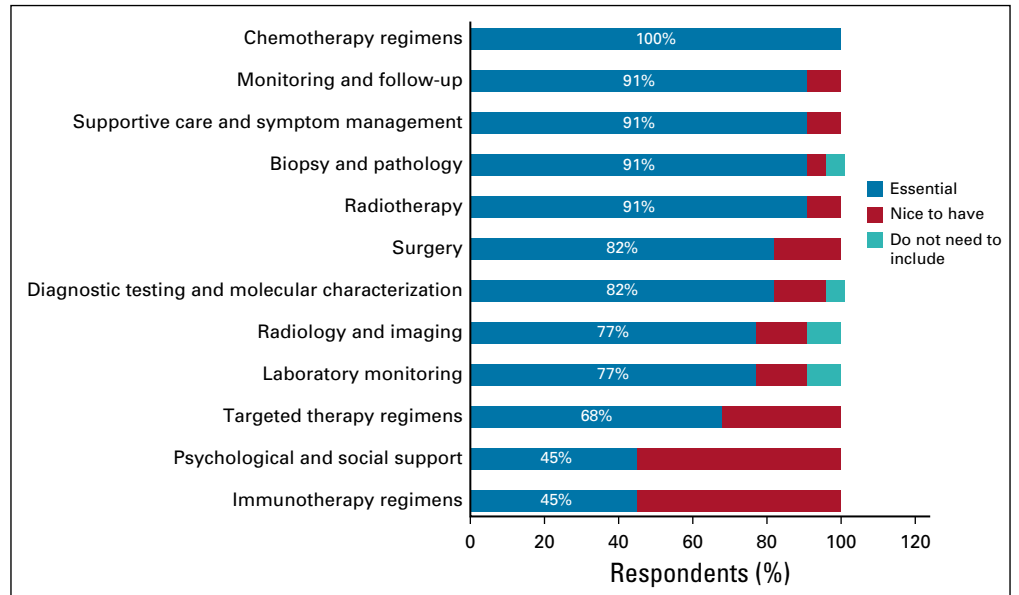
An initial survey was conducted among a convenience sample of 26 oncologists in 10 African countries (Botswana, Burundi, Ethiopia, Ghana, Kenya, Malawi, Nigeria, Rwanda, Tanzania, and Uganda) to identify priorities for resource-specific guidelines. Guidelines produced by the NCCN were the most commonly used (54% of respondents), and African oncologists' needs and preferences aligned well with these guidelines. Sixty-five percent of respondents reported that they treat > 10 types of cancer, which suggested a need for accessible guidelines that provide clear, at-a-glance recommendations. A majority of respondents preferred to have guidelines that were in a digital format available on a tablet

computer or mobile phone (62%) and that could provide quick access to specific management recommendations without having to sort through a lot of background literature (68%). When asked to rank features of guidelines, 91% ranked as "very important" the need for clear and simple pathways that identify optimal treatment protocols and regimens.

When asked which components they considered essential, > 90% identified biopsy and pathology, chemotherapy regimens, radiotherapy, supportive care and symptom management, and monitoring and follow-up as essential elements for the guidelines (Fig 1). Their answers indicated a desire for comprehensive, multidisciplinary guidelines and suggested that NCCN guidelines could be chosen as the basis for harmonization.

Countries targeted for participation in the African Cancer Coalition were the eight English-speaking, low or lower-middle-income countries with at least five clinical oncologists (Ethiopia, Ghana, Kenya, Nigeria, Tanzania, Uganda, Zambia, and Zimbabwe).<sup>7</sup> Four countries that had < five clinical oncologists and/or imminent plans to scale-up cancer treatment (Burundi, Democratic Republic of Congo, Malawi, and Rwanda) requested to join the Coalition and were also included. Health ministries were chosen as the main coordinating partner in each country, because they were the bodies tasked with developing national guidelines and were best placed to identify leading cancer treatment experts in their country. There are few cancer professional societies in sub-Saharan Africa, and none of them had undertaken the development of cancer treatment guidelines. Although some cancer treatment was available in private sector facilities, comprehensive cancer treatment (including surgery, radiotherapy, and chemotherapy) was only available in national teaching and referral hospitals in most African countries. For the first meeting of the Coalition, communications were sent to the health ministries, inviting them to nominate one or two oncologists and a health

**FIG 1.** Survey of essential guideline components (n = 26). Survey respondents were 26 cancer experts from 10 African countries (in April 2017).



ministry representative for participation. For subsequent meetings, existing Coalition members were invited to refer colleagues, including those in the private sector, whose specialties lined up with the guidelines being harmonized. The organizers made efforts to ensure that the working groups included surgical, medical, hematology, and radiation oncologists; pathologists; and palliative care, pain, and nuclear medicine specialists in each working group, as appropriate, and to ensure that the working groups included representation across resource levels.

Guideline panel members from the African Cancer Coalition and NCCN volunteered their time to participate in the harmonization meetings and did not receive any compensation for their participation. Costs for travel and accommodation for the panel meetings was paid for by the American Cancer Society and NCCN. No funding for the project was provided by industry. NCCN followed standard conflict of interest policies in the development of their guidelines.

Online surveys were used each year for Coalition members to rank their priorities for guidelines to be harmonized. Coalition meetings were held twice per year and consisted of a working group of approximately 6-10 members for each guideline chaired by an African oncologist. The working group also included a member of the NCCN guidelines panel to provide technical input and clarification in relation to the parent guideline. Over the course of 3 days, working groups went page by page through the guideline to harmonize recommendations. Decisions were made by group consensus.

### Challenges

One of the key challenges was the heterogeneity of resource availability in sub-Saharan Africa. Some Coalition members work in very highly resourced, private

comprehensive cancer centers, whereas others work in more resource-constrained public hospitals. Resource availability is dynamic, often changing from day to day or patient to patient—for example, because of machine breakdown, exhausting the supply of a medicine, or patients' ability to pay.

A second challenge faced by Coalition members was how to balance a collective aspiration for a high standard of care with the urgent need to expand access to effective treatment in settings where those standards are not yet achievable. On one hand, establishment of standards that exceed current capacity may result in withholding or delaying treatment. On the other, lowering the standards to match current capacity disincentivizes capacity building and was deemed ethically unacceptable by Coalition members.

Coalition members wrestled with the desire to create clear, simple guidelines that point oncologists to optimal treatment without eliminating acceptable options. Standards of care were based on best-reported achievable outcomes, but issues of cost, local infrastructure, patient values and cultural beliefs, regulatory environment, medical education, and training were considerations that may affect treatment selection. African oncologists are skilled at improving appropriate care in the context of myriad challenges. Coalition members felt that guidelines should identify optimal care pathways but not unduly limit the delivery of acceptable, effective care, even when more advanced, sophisticated, or costly care is not possible or practical.

### RESULTS

The Coalition developed the NCCN Harmonized Guidelines for sub-Saharan Africa as resource-integrated guidelines that include recommendations across resource levels.

**TABLE 1.** Institutional Affiliations of Guidelines Authors

| Country and Affiliation  |
|--|
| Botswana   |
| Ministry of Health   |
| Princess Marina Hospital                                       |
| Burundi  |
| Kamenge University Hospital                                    |
| Democratic Republic of the Congo                               |
| Biamba Marie Mutombo Hospital                                  |
| University Hospitals of Kinshasa                               |
| Ethiopia   |
| Federal Ministry of Health                                     |
| Jimma University Hospital                                      |
| St Paul Millennium Medical College                             |
| Tikur Anbessa Specialized Hospital                             |
| Ghana  |
| Komfo Anokye Teaching Hospital                                 |
| Korle Bu Teaching Hospital                                     |
| Ministry of Health   |
| Kenya  |
| Aga Khan University Hospital                                   |
| Kenyatta National Hospital                                     |
| Ministry of Health   |
| National Cancer Institute of Kenya                             |
| University of Nairobi  |
| Malawi   |
| Kamuzu Central Hospital  |
| Queen Elizabeth Central Hospital                               |
| University of Malawi, College of Medicine                      |
| Nigeria  |
| Federal Ministry of Health                                     |
| Lagoon Hospital, Lagos   |
| National Hospital Abuja  |
| Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife |
| University College Hospital, Ibadan                            |
| University of Ilorin Teaching Hospital                         |
| Rwanda   |
| Butaro Cancer Center of Excellence                             |
| Federal Ministry of Health                                     |
| Kigali University Teaching Hospital                            |
| King Faisal Hospital, Kigali                                   |
| Rwanda Military Hospital                                       |
| Tanzania   |
| Bugando Medical Centre   |
| Kilimanjaro Christian Medical Centre                           |
| Muhimbili National Hospital                                    |
| Ocean Road Cancer Institute                                    |

(Continued in next column)

**TABLE 1.** Institutional Affiliations of Guidelines Authors (Continued)

| Country and Affiliation             |
|-------------------------------------|
| Uganda                              |
| African Palliative Care Association |
| Uganda Cancer Institute             |
| Zambia                              |
| Cancer Diseases Hospital            |
| Ministry of Health                  |
| Zimbabwe                            |
| Ministry of Health                  |
| Mpilo Central Hospital              |
| Parirenyatwa Group of Hospitals     |

Reflecting the tension between what should be done and what can be done, the Coalition opted not to remove advanced or high-cost recommendations but rather to keep them in and use color-coding to indicate that they may not be widely available and may not be included in a package of minimum standards for cancer care developed by African health ministries. When multiple options were acceptable, the Coalition opted to include all of them, to maximize the tools and options available to African oncologists; in some cases, though, they rearranged the options to indicate an order of preference.

The color-coded framework includes the following recommendations:

1. Recommendations in black, which refer to generally available services, such as standard chemotherapy and radiotherapy, that can be considered reasonable standard of care not only in sub-Saharan Africa but in the world over and would be included in a package of minimum standards for comprehensive cancer care. Good outcomes can be achieved with standard services, and care should not be withheld or delayed when it is available.
2. Recommendations in gray refer to highly advanced or optimal care recommendations that may be costly, technically challenging, and/or less impactful on oncologic outcomes, such as immunotherapy or positron emission tomography/computed tomography. These recommendations can be followed if resources allow, but treatment should not be delayed or withheld if these options are not available.
3. Recommendations in blue refer to regional options that have been added for sub-Saharan Africa. Additions were made to provide additional options to be used when resource availability precludes general standard of care; , address issues specific to cancer in the region such as comorbidities like HIV; or add options that may be more practical for the clinical or cultural setting. These options include items like the addition of x-ray and ultrasound as

**TABLE 2.** NCCN Harmonized Guidelines for sub-Saharan Africa Completed Through 2019

| XXXX   |
|--|
| Treatment of cancer by site  |
| Acute lymphoblastic leukemia (adult and AYA)                         |
| Acute lymphoblastic leukemia (pediatric and AYA)                     |
| Acute myeloid leukemia   |
| Anal carcinoma   |
| Bladder cancer <sup>a</sup>  |
| Bone cancer  |
| Breast cancer <sup>a</sup>   |
| CNS cancers  |
| Cervical cancer <sup>a</sup>   |
| Chronic lymphocytic leukemia/small lymphocytic lymphoma <sup>a</sup> |
| Chronic myeloid leukemia   |
| Colon cancer <sup>a</sup>  |
| Esophageal and esophagogastric junction cancers                      |
| Gastric cancer   |
| Gestational trophoblastic neoplasia                                  |
| Head and neck cancers <sup>a</sup>                                   |
| Hepatobiliary cancers  |
| Hodgkin lymphoma   |
| Kaposi sarcoma <sup>a</sup>  |
| Kidney cancer <sup>a</sup>   |
| Malignant pleural mesothelioma                                       |
| Neuroendocrine and adrenal tumors                                    |
| Non-Hodgkin lymphomas; B-cell lymphomas <sup>a</sup>                 |
| Non-small-cell lung cancer   |
| Occult primary (cancer of unknown primary)                           |
| Ovarian cancer   |
| Pancreatic adenocarcinoma  |
| Penile cancer  |
| Prostate cancer <sup>a</sup>   |
| Rectal cancer <sup>a</sup>   |
| Small-cell lung cancer   |
| Soft-tissue sarcoma  |
| Testicular cancer  |
| Thymomas and thymic carcinomas                                       |
| Thyroid carcinoma  |
| Uterine neoplasms  |
| Vulvar cancer  |
| Detection, prevention, and risk reduction                            |
| Colorectal cancer screening  |
| Prostate cancer early detection                                      |

(Continued in next column)

**TABLE 2.** NCCN Harmonized Guidelines for sub-Saharan Africa Completed Through 2019 (Continued)

| XXXX                                |
|-------------------------------------|
| Supportive care                     |
| Adult cancer pain <sup>a</sup>      |
| Antiemesis <sup>a</sup>             |
| Myeloid growth factors <sup>a</sup> |
| Palliative care <sup>a</sup>        |
| Survivorship                        |
| Smoking cessation                   |
| Specific populations                |
| Adolescent and young adult oncology |

Abbreviations: AYA, adolescent and young adult; NCCN, National Comprehensive Cancer Network.

<sup>a</sup>Indicates guidelines that have been reviewed and updated since their first release.

imaging options or the use of neoadjuvant chemotherapy when definitive chemoradiotherapy is not available.

Whenever possible, recommendations were based on published evidence in sub-Saharan Africa. When local evidence was lacking, the Coalition members relied on evidence from other regions. When evidence was limited, they relied upon the consensus opinion of the experts in the working group. Each guideline is reviewed and updated every 2 years, but updates also may be triggered by a notable change to clinical practice within the subregion.

To date, 110 cancer experts from 34 institutions and 13 countries in sub-Saharan Africa have participated as guideline authors. Additionally, 11 policymakers from eight countries participated in working groups, focusing on uptake and integration of the guidelines into national policies (Table 1). Forty-six guidelines have been harmonized at write-up, and 10 have been reviewed and updated since their first release (Table 2). These guidelines cover > 86% of the incident cancers in the region, according to Globocan model estimates.<sup>1</sup> Among the cancer types with an incidence of > 600 occurrences per year in sub-Saharan Africa, these guidelines cover 95% of incident cancers.

The guidelines have been endorsed by the governments of Nigeria, Ethiopia, and Malawi as well as cancer institutes in Tanzania (Ocean Road Cancer Institute), Uganda (Uganda Cancer Institute), and Zambia (Cancer Diseases Hospital). Together, these countries represent approximately 36% of cancer incidences in the region and 43% of the population of sub-Saharan Africa. As of mid-May 2020, there were more than 12,200 downloads of the NCCN Harmonized Guidelines from the NCCN website.



African Cancer Coalition members include many of the leaders and members of national and regional professional oncology societies, such as the African Organization for Research and Training in Cancer. Throughout the development of the guidelines, they used regional and national meetings to share the guidelines and invite participation and feedback from other oncologists.

### Partners

The African Cancer Coalition worked in partnership with NCCN, the American Cancer Society, IBM, and the Clinton Health Access Initiative. NCCN provided experts and parent guidelines for harmonization, produced the harmonized guidelines, and published the harmonized guidelines on their online platforms. Users who register on the website ([www.nccn.org/harmonized](http://www.nccn.org/harmonized)) can download the guidelines for free and receive e-mail alerts when revisions are posted. The guidelines are also available on the NCCN guidelines application for mobile devices. IBM (Armonk, NY) has developed a digital interface—the Cancer Guidelines Navigator—that allows oncologists to access patient-specific treatment recommendations for five harmonized guidelines (breast cancer, cervical cancer, Kaposi sarcoma, prostate cancer, and non-Hodgkin lymphomas: B-cell lymphomas) through an interactive web-based application (available at [www.alliedagainstcancer.org](http://www.alliedagainstcancer.org)). The Navigator allows oncologists to input characteristics of a particular patient and then review the recommended treatments from the harmonized guidelines. The tool also provides more detailed supplemental information, such as prescribing information, supportive care recommendations, drug information, and relevant literature. The American Cancer Society provided support and coordination for the project. The Clinton Health Access Initiative works with Coalition members to network to regional efforts focused on improving

medicines procurement. In 2019, the partnership was formalized as a new alliance—Allied Against Cancer—with the objective of continuing the collaboration to improve access to cancer treatment in sub-Saharan Africa.

### Benefits and Impact

This process of harmonization has provided a vehicle that not only benefits oncologists in the region but also has the potential to impact the global community. For instance, the supportive care guidelines have taken into account the sociocultural context of the patients. Considerations such as recognition of stigma are novel additions to the harmonized guidelines that would enhance the global approach to some of these concerns. The harmonized guidelines are intended for regional use, but many countries may face similar challenges in access and management of cancer. There is the potential for collaborative adaptation of these guidelines to different health ecosystems that may have similar concerns. In conclusion, our experience indicates that it is feasible to create clinical guidance reflecting the diversity of resource levels that characterize the current state of clinical care for cancer in Africa. Such guidelines have a potential to fill a crucial gap in efforts to standardize and improve cancer care in Africa. They can also promote greater technical collaboration within the region and with the global oncology community, reduce duplication of efforts from country to country, and provide a roadmap to upgrade cancer care to the highest global standard.

Data to inform specific recommendations for the sub-Saharan African setting are very limited, and additional studies are needed. Additional studies are needed to measure uptake of the guidelines and their impact on oncology care in the region.

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- <sup>5</sup>Lagoon Hospital, Lagos, Nigeria
- <sup>6</sup>University of Ilorin Teaching Hospital, Ilorin, Nigeria
- <sup>7</sup>Kenyatta National Hospital, Nairobi, Kenya
- <sup>8</sup>Ocean Road Cancer Institute, Salaam, Tanzania
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Presented at The African Organisation for Research and Training in Cancer (AORTIC) Conference, Kigali, Rwanda, November 7-10, 2017;

and the AORTIC Conference, Maputo, Mozambique, November 5-8, 2019.

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**Conception and design:** All authors  
**Collection and assembly of data:** Miriam Mutebi, Robert Carlson  
**Data analysis and interpretation:** Robert Carlson  
**Manuscript writing:** All authors  
**Final approval of manuscript:** All authors  
**Accountable for all aspects of the work:** All authors

### AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

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Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians ([Open Payments](#)).

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**Employment:** Flatiron Health (I)

**Patents, Royalties, Other Intellectual Property:** Patents relating to inventions as employee of National Comprehensive Cancer Network

(NCCN). Recipient question below is ambiguous. I hold the patents (institutions cannot), all proceeds (none at current time) from patents go to NCCN. (Inst)

**Other Relationship:** National Comprehensive Cancer Network

No other potential conflicts of interest were reported.

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