Cancer Control in Africa 3

Treatment of cancer in sub-Saharan Africa

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Cancer is rapidly becoming a public health crisis in low-income and middle-income countries. In sub-Saharan Africa, patients often present with advanced disease. Little health-care infrastructure exists, and few personnel are available for the care of patients. Surgeons are often central to cancer care in the region, since they can be the only physician a patient sees for diagnosis, treatment (including chemotherapy), and palliative care. Poor access to surgical care is a major impediment to cancer care in sub-Saharan Africa. Additional obstacles include the cost of oncological care, poor infrastructure, and the scarcity of medical oncologists, pathologists, radiation oncologists, and other health-care workers who are needed for cancer care. We describe treatment options for patients with cancer in sub-Saharan Africa, with a focus on the role of surgery in relation to medical and radiation oncology, and argue that surgery must be included in public health efforts to improve cancer care in the region.

Introduction

Cancer care is rapidly becoming a public health priority in sub-Saharan Africa. Up to 70% of the predicted 24 million people that will be diagnosed with cancer annually by 2050 will reside in low-income and middle-income countries. Cancer incidence in these countries is rising because of lifestyle changes, increased life expectancy, and improved treatment of infectious diseases. Many countries in sub-Saharan Africa have health-care systems that are struggling to meet the increasing demand caused by the growing number of patients with cancer, since all the necessary components of cancer care are inadequate. Additionally, how to adapt care guidelines from high-income countries to countries in a region with fewer resources, fewer personnel, and in some cases different cancer biology, is unclear. Advances in prevention, detection, and treatment have not translated into success in sub-Saharan Africa. The overall case fatality from cancer (ratio of mortality to incidence) is estimated to be 75% in low-income countries, compared with 46% in high-income countries. Cancer mortality in sub-Saharan Africa is high because of poor infrastructure, insufficient numbers of health-care workers, advanced stage at presentation, reliance on traditional therapies, few treatment choices, and poor compliance.

Surgical oncology has a rich history in sub-Saharan Africa. In the 1950s, the Irish surgeon Denis Burkitt embarked on a “tumour safari” and described the clinical manifestations of cancer from west to east Africa. Despite being established early on as one of the core diagnostic and therapeutic cancer modalities, few data are available for the role of surgery in cancer care in sub-Saharan Africa. Surgeons are often responsible for all elements of care for patients with solid tumours, including prescription of chemotherapy and palliative care. Although surgery is now recognised as an essential component of public health efforts, poor access to specialist surgical care is a major obstacle for cancer care in the region. Additionally, as radiotherapy and chemotherapy are introduced in low-income and middle-income countries, more complex options for surgical oncology interventions emerge. Here, we gather the limited available data for the role of surgery in the treatment of the most common solid tumours in sub-Saharan Africa and discuss it in context with diagnostics and other treatments.

Diagnosis

Clinical assessment is an essential component of cancer diagnosis in sub-Saharan Africa, since advanced equipment is rarely available. Late presentation is commonplace in most countries in the region. However, clinical examination is not as accurate as staging with advanced imaging. Knowledge of regional differences in cancer burden can be useful for generating a differential diagnosis. In The Gambia, for example, 81% of patients with liver cancer present with abdominal pain, hepatomegaly, and weight loss. For cancers with a high prevalence, identification of such groups of associated symptoms by geographical region is important. Additionally, knowledge of local benign infectious masses is useful for accurate diagnosis.

In high-income countries, cancer staging usually consists of a combination of CT, PET, and MRI. Most low-income and middle-income countries still rely on clinical examination, chest radiography, and, where available, ultrasound. Despite these limitations, important data can still be obtained when a skilled practitioner does the investigation. Chest radiography is a valuable initial examination for diagnosis of lung metastases for many tumour types. Its value was shown in a study of 688 patients with new cancer diagnoses in Nigeria: 118 chest radiographs (17%) had signs consistent with metastasis. The most common tumour to cause lung metastasis was breast cancer (37–3% of patients).

Clinical examination with ultrasound is better than clinical examination alone for diagnosis of...
intra-abdominal pathology. In a retrospective chart review of 95 children with B-cell lymphoma in Cameroon, ultrasound enabled diagnosis of abdominal disease in 83% of patients, whereas physical examination alone identified disease in only 59% (p=0.004). Ultrasound is also useful for assessment of breast masses. In a study of 80 women in Uganda, ultrasound was useful in differentiation of cystic from solid masses (100% sensitivity and 100% specificity). The sensitivity and specificity for detection of breast carcinoma were 57.1% and 62.8%, respectively, and the negative predictive value was 99.5%. In the past decade, CT has become available in some major cities in sub-Saharan Africa, which is a big boost for the accurate staging of cancers. Unfortunately, this imaging procedure is quite expensive, the machines are difficult to maintain, and image quality can be poor. Because of the limitations of radiographic imaging, staging often has to be done with surgery. Diagnostic laparoscopy is a good option for surgical staging because of low morbidity, but it is not widely available in the region.

Pathological diagnosis of cancer is important for initiation of care, but is quite complex. Tissue has to be obtained, the specimen prepared, and the tests needed to make a diagnosis identified. A group of pathologists to reach consensus on difficult diagnoses, a tumour board, and a system of archiving tissue for future use are also needed. A major limitation to cancer care in sub-Saharan is the shortage of pathology workers and infrastructure. Most countries in the region have few pathologists, which means that there can be delays of several months to obtain pathological assessments. The shortage of personnel, which is caused partly by the emigration of trained technical workers, means there are inadequate numbers to maintain pathological equipment, reagents, and other consumables. Even the erratic power supply affects pathological assessment, since reagents are difficult to maintain without reliable refrigeration. Because of these limitations, fine-needle aspiration cytology is widely practised in many low-income and middle-income countries, because it is a fast, safe procedure that is fairly cost-effective. Unfortunately, the technique has the disadvantage of not yielding information on tissue architecture, so the invasiveness of a tumour or the expression of receptors in breast cancer, for example, cannot be determined.

Assessment of lymphadenopathy, a common presentation in sub-Saharan Africa, is a staging challenge, because of the high prevalence of tuberculosis, dental infections, respiratory tract infections, lymphomas, and HIV. In a retrospective study of 169 lymph-node biopsy samples taken from patients with lymphadenopathy of unknown cause in Nigeria, diagnoses were tuberculosis (38%), metastatic cancer (25%), non-specific lymphadenitis (17%), lymphoma (16%), and other causes (6%). Thus, lymphadenopathy has a wide differential diagnosis in the region.

**Treatment of solid tumours in sub-Saharan Africa**

**Prostate cancer**

Incidence of prostate cancer in Nigeria has in the past 10 years risen to as much as seven times that reported in the 1990s. During a 10-year period, 548 genitourinary malignancies were seen at the Korle-Bu Teaching Hospital in Accra, Ghana, with prostate cancer the most common (63.7%). In a study in Nigeria, 80 (88.9%) of 90 patients with prostate cancer had locally advanced or metastatic disease. No patients were identified by screening. After 3 years of follow-up, 16% of patients had died from the disease, which contrasts with the 99% 5-year survival for all stages of prostate cancer reported in the USA. Digital rectal examinations are often used to assess the prostate. Low access and high cost limit the use of prostate-specific antigen tests and transrectal ultrasound in sub-Saharan Africa. The limitations of digital rectal examination were shown in Nigeria, where the specificity of the technique compared with histological diagnosis was only 61.1%. One challenge is that the incidence of benign prostatic hypertrophy is high in the region, and the symptoms are similar to those of prostate cancer. Of 640 patients with prostatic problems seen at the Ahmadu Bello University Teaching Hospital, Zaria, Nigeria, between 1993 and 1998, 545 had benign prostatic hypertrophy and 95 had prostate cancer. In 10% of the pathological specimens that were predominantly benign prostatic hypertrophy, carcinoma was also present.

Treatment for prostate cancer in sub-Saharan Africa is limited by late presentation, advanced disease, and a scarcity of urologists, pathologists, radiotherapy options, and androgen-deprivation therapies. Because of these factors, subcapsular orchidectomy and diethylstilbestrol are the two most widely used treatments. Subcapsular orchidectomy—where culturally accepted—is the most widely used treatment for prostate cancer. When 30 Nigerian patients were treated with subcapsular orchidectomy, 28 (93%) showed reduced skeletal metastases and prostate tumour size, and improved urinary symptoms, which suggests that the procedure is an effective (and cost-effective) alternative to chemical castration.

Where the drugs are available, intermediate-risk patients are given goserelin or diethylstilbestrol concomitant with radiotherapy, followed by the same drugs in the adjuvant setting, with or without bicalutamide or flutamide intermittently or for 1 year. However, these therapies are too expensive to use for longer periods, especially in high-risk patients, for whom adjuvant treatment can last for 2–3 years. Patients with biochemical failure after radiotherapy or surgery are either observed or given hormonal therapy if disease is thought to be metastatic. Hormone-refractory cases are managed initially with antiandrogens and, as a last resort, the morbid and expensive chemotherapy combination of docetaxel and prednisolone.
Cervical cancer
Cervical cancer is the leading cause of cancer mortality in developing countries.¹⁹ Out of the 268 million women in Africa older than 15 years, roughly 80,000 cases of cervical cancer are diagnosed per year, and more than 50,000 of these women die from the disease. Mortality from cervical cancer is so high because of late presentation, and poor access to health care. The infrastructure and resources needed for cervical cancer prevention programs have been very difficult to secure in sub-Saharan Africa.

Women with cervical cancer can present either without symptoms (usually detected through screening) or with abnormal vaginal bleeding, offensive vaginal discharge, pelvic pain, dyspareunia, or symptoms related to a fistula or metastases. Women who are fortunate enough to access treatment for late-stage cervical cancer in Africa will most often be given radiotherapy. Poor access to radiotherapy plays a part in poor cervical cancer outcomes. Early-stage disease (IA to IB1), however, is treated surgically, with excellent 5-year survival in some series. Options for treatment include cone biopsy, trachelectomy, radical trachelectomy (with or without pelvic-lymph-node dissection), or simple or radical hysterectomy with pelvic-lymph-node dissection. Dependent on pathological staging and margins, adjuvant chemoradiation might be indicated. For tumors larger than 4 cm in diameter or with spread beyond the cervix, primary chemoradiation is recommended.²⁰

Historically, cervical cancer has been prevented with cervical cytology screening programs that also provide colposcopy for women with abnormal cytology results. Because of prohibitive costs, in the past 15 years alternatives have been investigated in large trials. The most tested approaches have been visual inspection with acetic acid and human papillomavirus (HPV) DNA testing. Visual inspection with acetic acid has shown promising sensitivity compared with cytology, but investigators of a meta-analysis of 26 studies in which the technique was used on asymptomatic women reported a sensitivity of 80% (range 79–82%) and a specificity of 92% (91–92%), with a positive predictive value of 10%.²¹ Overall, results for visual inspection with acetic acid were worse than those for HPV DNA tests.

One randomized trial assessed the safety and efficacy of screening women and treating those with positive tests with cryotherapy.²² 6555 women were tested by primary care nurses for high-risk HPV DNA and with visual inspection with acetic acid. The investigators reported that women in the HPV DNA test screen-and-treat group had a 3.7-fold reduction in the cumulative detection of cervical intraepithelial neoplasia of grade 2 or higher by 36 months, whereas visual inspection with acetic acid was associated with a 1.5-fold reduction. HPV DNA testing, however, remains laboratory-based, and tests are not currently affordable for use in developing countries. The ideal screening test would be a point-of-care test that could give an accurate, immediate result that would enable the screening visit to be linked to treatment of cervical cancer precursors.²³

Two vaccines against HPV infection are available. The bivalent vaccine targets HPV types 16 and 18 (which are associated with 70% of cervical cancers), and the quadrivalent vaccine also targets types 6 and 11 (which cause genital warts). Detected early, cervical cancer is amenable to surgical intervention, with excellent 5-year survival. However, the necessary surgical skills tend to be scarce in sub-Saharan Africa, and standard protocols are not available.

Breast cancer
Patients with breast cancer in sub-Saharan Africa tend to be premenopausal, multiparous, and have a history of protracted breastfeeding, compared with patients in high-income countries.²⁴ Delayed presentation is common, with one Nigerian study,²⁴ with data from 1996 to 2003, describing a mean delay of 11.2 months between the onset of symptoms and presentation. 39% of the 212 patients described in this study had fungating tumors (figure 1). Breast cancer is unique in that physical examination and basic radiological examinations might be sufficient to analyse suspicious breast masses. In a study in Benin City, Nigeria, fine-needle aspiration of 103 breast masses had a positive predictive value for malignancy of 100%; the false negative frequency was 2.6%.²⁵ These results are adequate to recommend fine-needle aspiration of breast masses to improve diagnostic accuracy.

Breast cancer is often treated with surgery in sub-Saharan Africa. Of 297 patients with breast cancer seen at a hospital in Uganda between 1996 and 2000, 77% presented with stage III or IV disease.²⁶ 75% of patients

Figure 1: A 48-year-old woman with an advanced, fungating breast cancer
underwent surgery, 76% had radiotherapy, 60% had hormone therapy, and 29% had chemotherapy. Surgery included modified radical mastectomy (58%), toilet mastectomy (35%), and lumpectomy (7%). 5-year overall survival was 56%. Inadequate surgical approaches can affect patient outcomes. In a cross-sectional study of 111 patients with breast cancer in Nigeria, 15-1% had lumpectomy with a local recurrence, 14-1% had a lumpectomy that was not sent to a pathology laboratory, 13-1% were not counselled about the seriousness of the breast lump, and 10-1% had a breast mass that was mistakenly incised as an abscess. Although mastectomy is the most widely used procedure for treatment of breast cancer in sub-Saharan Africa, it is not always culturally accepted. In a survey of married women in Nigeria who had undergone the procedure, 38-3% were divorced after 3 years.

Breast-conserving surgery is rare because of the poor availability of adjuvant radiotherapy, chemotherapy, and resources for sentinel lymph-node assessment.

Neoadjuvant therapy is now frequently used to treat patients with locally advanced breast cancer and patients whose scheduled surgery has been delayed. In a study in Nigeria, 32 women with stage III disease were given neoadjuvant doxorubicin, fluorouracil, and cyclophosphamide. Of the 28 patients who completed the treatment, 25 had a partial response, one had a complete response, and two had no response. The mean tumour size decreased from 13-5 cm to 7 cm. Overall, however, the frequencies of response and positive outcomes with neoadjuvant therapy in sub-Saharan Africa are not as good as those in high-income countries, possibly because of advanced stage at presentation. The absence of data from randomised trials means that the effectiveness of neoadjuvant chemotherapy in the region is unclear.

The pathological assessment of breast tumours in sub-Saharan Africa has implications for potential therapies. In a study of 507 patients from Nigeria and Senegal, low frequencies of oestrogen-receptor-positive (24%), progesterone-receptor-positive (20%), and HER2-positive (17%) statuses were reported—most patients had triple-negative disease. Tamoxifen is an effective anticancer agent that is more affordable than chemotherapies and can be used to treat hormone-responsive cancers. Many patients in sub-Saharan Africa are given tamoxifen without knowledge of receptor status. However, since access to tamoxifen is poor in many countries in the region, ovarian ablation is a surgical option in premenopausal women. The Breast Health Global Initiative includes oophorectomy in its recommendations for treatment of patients with some breast cancers (ranging from early to late stages) in settings without access to luteinising hormone-releasing hormone agonists.

**Gastrointestinal and abdominal cancers**

Liver and oesophageal cancers are both common in sub-Saharan Africa, but are rarely treated with surgery. Hepatocellular carcinoma is associated with hepatitis B and C, aflatoxin exposure, and alcohol-related cirrhosis. In one study from The Gambia, 16% of patients had tumour sizes and numbers that met Milan criteria, which suggests surgery as a possible treatment, but 50% of these patients had substantial cirrhosis, so were not eligible for surgery. That surgery is little used was also shown in a prospective study of 154 patients with hepatocellular carcinoma in Nigeria. 96% of the patients were treated only for symptoms; only one patient underwent surgery. Because of the dearth of treatment options, public health efforts are currently focused on hepatitis B vaccination to prevent hepatocellular carcinoma.

Oesophageal cancer also has a complex aetiology in sub-Saharan Africa, with risk factors including tobacco and alcohol use, *Helicobacter pylori* infection, HPV infection, and diet. Surgical resection is the optimum treatment for locoregional control and long-term survival in patients with localised oesophageal cancer who are candidates for surgery. Unfortunately, only 13% of patients with oesophageal cancer in sub-Saharan Africa are surgical candidates. Factors that affect patient outcomes include resection margin, lymph-node status, and the skill of the surgeon.

Patients with colorectal cancer in sub-Saharan Africa present at young ages, often when aged 40–60 years. The median age at diagnosis reported in a study from South Africa was 59 years, by contrast with the median age of 71 years reported in the USA. Patients present with symptoms of obstruction or haemorrhage (figure 2), since screening is rare. Surgery can have a crucial role, since it is often the only available treatment option because of the scarcity of adjunctive therapy and the need to alleviate symptoms. General physicians or surgeons do most surgeries, even though neither see patients with colorectal cancer very often. These physicians and surgeons are often not familiar with recommendations from high-income countries about adequate margins, lymphovascular clearance, and staging. However, adequate tumour ablation can be achieved, with reduced morbidity and disease-free survival similar to that in high-income countries in some centres.

Surgical treatment of rectal cancer is difficult, because of the scarcity of experience in sphincter-preserving surgery, the cost of stapling devices needed for sphincter preservation, and the lack of therapies that can downstage rectal tumours. In high-income countries, the proportion of patients who undergo abdominoperineal resection is now less than 25%. By contrast, most reports from sub-Saharan Africa still show that more than 40% of patients undergo such resection. This statistic is important, because stomas are often not socially accepted, and can even lead to increased rates of suicide. Transrectal ultrasound can help to improve staging to select candidates for sphincter preservation. In a study of 30 Nigerian patients, four of the 20 patients with fixed tumours on digital rectal examination did not
have full-thickness tumours on transrectal ultrasound. Expansion of the capacity for sphincter-preserving surgery at selected centres in sub-Saharan Africa is urgently needed, and surgeon-guided transrectal ultrasound can help to achieve this.

Chemotherapy for colon cancer in sub-Saharan Africa tends to consist of adjuvant or palliative fluorouracil or capecitabine, with or without oxaliplatin or irinotecan. Because of the absence of mobile continuous infusion pumps, where it is available and affordable, capecitabine has replaced fluorouracil. Treatment for locally advanced rectal cancer usually consists of concomitant bolus fluorouracil or capecitabine and radiotherapy as neo-adjuvant treatment, followed by adjuvant fluorouracil or capecitabine, with or without oxaliplatin or irinotecan, for six cycles.

Patients with gastric cancer in sub-Saharan Africa often present with the disease before age 55 years.50 Gastric cancer is associated with many environmental factors and infection with H pylori and Epstein-Barr virus. Most patients with H pylori infection do not develop cancer—H pylori prevalences of 55–92% have been reported in some countries, whereas gastric cancer affects only 2–3% of the population.51 The high prevalence of H pylori and resultant gastritis make endoscopies difficult to interpret. Investigators of a study in Nigeria reported that only 18 of 77 (23·4%) patients with suspicious gastric mucosal lesions had gastric cancer.52

Most patients with gastric cancer in sub-Saharan Africa present with gastric outlet obstruction, haematemesis, or perforation.51,52 The proportion of patients who undergo resection is variable, ranging from 13% to 67%.53–55 Morbidity and mortality after gastrectomy are high. Major complications, including anastomotic leak and haemorrhage, occur after as many as 30% of resections.56 Operative mortality is also high, ranging from 16% to 36%,54 the reasons for which include poor patient selection and little surgical experience. Resection or bypass surgeries are often the only possible palliative interventions, since endoluminal therapies are rarely available.

In the adjuvant setting, capecitabine or fluorouracil is combined with local radiotherapy, followed by adjuvant single-agent platinum or anthracycline, or a combination of a platinum and an anthracycline. Some centres have adopted the neoadjuvant chemotherapy protocol that is regarded as standard in high-income countries for patients who present with resectable gastric cancer—platinum and fluorouracil with or without an anthracycline for three cycles, followed by surgery. The same regimen is given adjuvantly for three more cycles, or as can be tolerated or afforded by the patient. Those who are not candidates for surgery are given fluorouracil or capecitabine alone, or concomitant with radiotherapy.

Chemotherapy

The use of chemotherapy in sub-Saharan Africa has progressed over many decades (panel). Traditionally, chemotherapies have been prescribed by surgeons, because the few oncologists in the region focused on haematological malignancies. Without coordination with oncologists, surgery as initial therapy, which is often indicated, is done by physicians without experience in cancer care, which results in residual disease or early recurrence. As multidisciplinary cancer management is adopted by many tertiary hospitals, this situation is beginning to change. However, delays in referral for adjuvant treatment remain a major issue. Such delays can be attributed to factors such as cultural beliefs that regard surgery as taboo, denial (especially after complete clinical response), physician ignorance, delays in final histopathological analysis, and financial constraints. Traditional healers often promise cure without the complications—eg, hair loss, erectile dysfunction, and infertility—that arise from the use of chemotherapy.

The major obstacle to delivery of appropriate cancer management worldwide is cost. Generic drugs, often from Asia, are widely used, because the cost of patented drugs is prohibitive. This situation can be problematic because of issues related to the bioequivalence and efficacy of some generic drugs compared with originals.57 Strong regulatory bodies to control the influx of substandard drugs do not exist in most countries in sub-Saharan Africa. Rich individuals can afford anticancer drugs, but most patients with cancer in the region cannot. Ironically, expensive targeted therapies are often available in places without basic anticancer treatments. For example, an access programme run by Novartis for imatinib, which is used to treat chronic lymphocytic leukaemia and gastrointestinal stromal tumours, is still available in some countries and has helped patients with these diseases.
Patient requirements.59,60 External beam radiotherapy is the most widely used form of radiation therapy, although rare, can be used to treat patients with cancers such as cervical cancer. Radiotherapy is indicated for many cancers in sub-Saharan Africa, including breast and cervical cancers.61 Investigators of one study estimated that 83% of patients with breast cancer should receive radiotherapy, but only 10·8% actually receive it.60 Availability of radiotherapy expands surgical options for cancers such as breast and rectal cancers and can improve outcomes of resection. Because of poor availability of radiotherapy in many countries in the region, alternative approaches have been investigated. Intraoperative breast radiotherapy, for example, can address the inadequate infrastructure and poor patient compliance with long treatment protocols. In a study in South Africa,62 39 women with early breast cancers were treated with 21 Gy intraoperative radiotherapy. After 7 years of follow-up, one patient (2·6%) had local recurrence, four (10·3%) had regional recurrences, and three (7·7%) had systemic relapses. The cost was $1300 per patient, compared with $9000 for standard external beam radiotherapy. More short-course options such as this need to be developed to optimise the use of the few resources available to most patients and health-care systems in the region.

Consideration of the complications of radiotherapy is important in discussion of its use in low-income and middle-income countries. In a report from Nigeria in which records from 331 patients treated with radiotherapy from 2000 to 2002 were examined, 105 patients (31·7%) received a higher dose than planned and 65 patients (19·6%) received a lower dose than planned.61 16 deaths (4·8%) were believed to be potentially related to the treatment. However, this situation is improving with support from the International Atomic Energy Agency, whose approach includes support for training and infrastructure and peer review by a quality assurance team.63

### Paediatric oncology

Paediatric oncology is not well developed in sub-Saharan Africa, partly because of the higher priority given to infectious diseases and malnutrition, and the poor health-care infrastructure. The available scientific literature from the region suggests that some specific cancers are especially prevalent in children: Burkitt’s lymphoma (50% of childhood cancers),64 nephroblastoma, retinoblastoma, non-Hodgkin and Hodgkin’s lymphomas, rhabdomyosarcoma, and Kaposi’s sarcoma.65

As with adults, children with cancers in sub-Saharan Africa often present with advanced-stage disease. Delay in presentation is often caused by cultural beliefs and misinformation, and patients are often seen first by traditional healers. Comorbidities such as malaria, HIV, tuberculosis, and malnutrition can limit treatment...
choices for patients with advanced disease. Most children with cancers in the region are unable to complete treatment because of poverty, which results in treatment failures.64

B-cell lymphoma is treated with intravenous cyclophosphamide-based cytoreductive chemotherapy. Clinical oncology trials can be done, as has been shown by a non-randomised, single-arm study68 that used the International Society of Paediatric Oncology 2001 protocol to treat nephroblastoma. This protocol used neoadjuvant vincristine and dactinomycin with nephrectomy for local tumours, and vincristine, dactinomycin, and doxorubicin for metastatic disease. 229 patients were registered to the protocol. After a mean follow-up of 3 years, 2-year disease-free survival was 86–6% in north African countries and 46–7% in sub-Saharan countries. 90% of patients are cured of the disease in high-income countries.

**HIV/AIDS**

Patients with AIDS in sub-Saharan Africa have increased risks for Kapoši’s sarcoma (30–90 times), lymphomas (five times), and cervical cancer (double the risk). Treatment of HIV-associated malignancies with chemotherapy in the absence of antiretroviral therapy often does not provide benefit.69 In resource-rich regions, incidence of cancer in HIV-infected people is several times higher than would be expected in age-matched and sex-matched individuals from the general population.69 Although similar data from sub-Saharan Africa are not available, the high prevalence of both HIV and cancer-causing infectious agents has led to a high prevalence of HIV in people with cancer.

Surgical skill is needed for the management of most HIV-associated malignancies in sub-Saharan Africa. The most common malignancy in the region is cervical cancer (an AIDS-defining malignancy),69 which is usually treated with hysterectomy, often together with radiotherapy. Similarly, the AIDS-defining non-Hodgkin lymphoma is increasingly common, even in the era of effective antiretroviral therapy, and needs surgical lymph-node excision to differentiate the cancer from other common lymphadenopathies.70

**Challenges**

The shortage of physicians and poor health-care infrastructure in sub-Saharan Africa has been well documented.7 The capacity to provide multimodal cancer care is limited by an insufficient number of health-care workers trained in oncology. That there are insufficient numbers of surgeons has been noted in many countries in the region.7 The disparity between the need for surgical care and the existing surgical infrastructure is exemplified by Sierra Leone, where 25% of the population have a surgical problem that needs assessment by a surgeon according to the results of a randomised cluster survey in 2012.7 yet in 2008 only ten surgeons worked at government hospitals in the country, to serve an overall population of more than 5 million people.7 Throughout sub-Saharan Africa, general surgical care is often provided by non-physician medical officers or general physicians. Many countries do not have even one trained oncologist or radiation oncologist. Similarly, severe shortages of oncology nurses, pharmacists, and laboratory personnel have a major effect on cancer care, particularly the safe administration of chemotherapy.

Several potential solutions have been proposed to address the shortage of health-care workers for cancer care. Subspecialty training in oncology for physicians outside of their native country is expensive and can result in the trainee choosing not to return home. Efforts to develop in-country oncology training are in progress in some countries, including Uganda, Ghana, Nigeria, and Kenya. Incentives, such as compensation and adequate equipment, are also needed to encourage physicians to pursue such training and to continue to practise in their home countries. Nursing education programmes that focus on teaching cancer-specific skills to senior nurses are a successful template for in-country training.76 Another potential approach is to reorganise care responsibilities, so that non-physician clinicians, along with community health workers and traditional healers, can manage patients with cancer as well.75,76

Almost without exception in sub-Saharan Africa, cancer clinics and hospitals are located in urban areas, which leaves the vast majority of the population without access to cancer care. Even cancer treatment facilities in urban areas often do not have the equipment and supplies needed for oncological care, such as pathology laboratories, CT scanners, surgical supplies, hoods for chemotherapy preparation, infusion pumps, and regular access to blood counts and chemistries. With the increasing recognition of cancer as an important global health issue, government agencies and non-governmental organisations are starting to fund the construction of either dedicated cancer facilities7 or improved models of cancer-care delivery that are integrated into existing health-care systems.78 However, at present, most countries in sub-Saharan Africa have either none or only one cancer centre.

Adherence to clinical-care guidelines has in some cases been shown to increase the quality of cancer care delivered in resource-rich regions, and might also provide a means to reduce health-care expenditures.79 Existing cancer-care guidelines, however, are not readily adaptable and have not been validated in resource-limited settings. As such, resource-appropriate guidelines for the management of cancer in sub-Saharan Africa are needed.80 Such guidelines for the screening, diagnosis, and management of breast cancer have been developed, and have the potential to increase the quality of care.41 Additionally, collaborative groups in the Middle East and north Africa have adapted guidelines from the US National Comprehensive Cancer Network to be locally
appropriate, in a process that could be used to develop similar guidelines for the sub-Saharan region. At present, national governments have begun to develop guidelines for the treatment of cervical cancer (Uganda and Zambia), oesophageal cancer (Uganda), and lymphoma (Kenya), but these guidelines have not been assessed for feasibility, efficacy, or cost.

Conclusions

Issues of cost, infrastructure, inadequate workforce, cultural barriers, and scarcity of data all limit cancer care in sub-Saharan Africa. There are basic standards of cancer care that even low-income countries can, but often do not, meet. Even with a massive influx of supplies and workers, cost would still probably be a major limiting factor for the maintenance of adequate cancer care. Universal coverage for cancer care could be the only mechanism by which patients with cancer in low-income and middle-income countries can obtain appropriate care. Advocacy for additional investment and lower costs for all elements of cancer care is desperately needed. Additionally, many important clinical questions that have arisen are only starting to be addressed. For example, why some cancers seem to be more aggressive in sub-Saharan Africa than elsewhere is unknown. Patterns of metastasis and resistance to chemotherapy have not been thoroughly studied in patients in the region, but retrospective evidence suggests that these are different from those in high-income countries. Surgery is an essential component of both public health and oncology care. Surgeons are often the first and only physicians to treat a patient with cancer in sub-Saharan Africa. The importance of oncology training must be stressed for the surgical workforce, because as chemotherapy and radiotherapy availability increase, these therapies will have profound effects on surgical treatment. Oncologists and surgeons must also intervene to influence the curricula of medical schools and training for other health-care professionals, to improve cancer care. More specialist centres for oncology care need to be created on the continent to help to train needed health-care workers and collaborate with international training institutions, to meet the needs of the rapidly growing numbers of patients with cancer.

Search strategy and selection criteria

References were identified through searches of PubMed, with the search terms “surgery”, “cancer”, “Africa”, “chemotherapy”, “radiation therapy”, “breast cancer”, “prostate cancer”, “cervical cancer”, “oesophageal cancer”, “gastric cancer”, “colorectal cancer”, and “liver cancer”, from January, 1980, to June, 2012. Only papers published in English were reviewed. The final reference list was generated on the basis of originality and relevance to the broad scope of this report.

Contributors

All authors were involved in the data collection and analysis and in the preparation and revision of the report. All authors apart from MH, FBA, and TPK were involved in the design and layout of the report. TPK was the main author, and all authors contributed at least one section.

Conflicts of interest

We declare that we have no conflicts of interest.

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References


Series


