Perspectives on the Growth of IR and Embolotherapy in Africa

Drs. Felister Wangari Maina and Ivan Rukundo describe the current state of interventional radiology in Kenya and Rwanda, procedures offered, and materials available and needed, as well as share their thoughts on barriers to uptake in daily practice and opportunities for growth and outreach.

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How did you come to choose interventional radiology (IR) as your specialty, and what were some of the highlights of your IR training?

Dr. Rukundo: I come from a background that encouraged me to follow a career in machines and technology, but as I grew up, I liked medicine more. During medical school, I discovered radiology as a specialty in medicine that merged the fields of tech and medicine into one. Later, I chose IR because I wanted to use imaging technologies to treat patients. My IR training was hugely characterized by the satisfaction in providing treatment and/or medical solutions that were otherwise impossible in a resource-limited setting.

Dr. Wangari: I came to learn about IR during my time as a radiology resident. However, the exposure at that time was quite limited and the cases were few. Later, during my early years as a radiologist, I again was exposed to IR at my workplace, when one of my colleagues invited me to observe some of the work that was going on. Here is where my interest in IR grew exponentially. I came to enjoy the daily interaction with patients. The number of interventions had grown quite significantly from the earlier years, and I came to realize just how broad the reach of IR could be and how we met patients at the late stages of disease, offering some hope in their management.

This drove the urge to further my knowledge in IR. I joined the first IR fellowship course at the University of Nairobi at Kenyatta National Hospital in 2020. IR training was challenging. One of the first things I came to realize, and surprisingly, was that IR is an entirely new science from what I already knew. There were so many new concepts to learn (eg, embolization) and anatomy to learn at even greater detail. Pathology of tumors was also more detailed, and interaction with other specialties became even more intensive. These challenges were also the highlights of my training; there

were always new things to learn and new procedures to participate in, and seeing improvement in our patients' clinical outcomes after our procedures was a constant encouragement.

Which interventional procedures are you currently performing most often? Which embolotherapy procedures does your hospital provide?

Dr. Rukundo: The most common procedures include biopsies, abscess drainages, biliary drainages, nephrostomies, and liver-directed therapies. We are doing a good number of conventional transarterial chemoembolization (TACE) procedures for hepatocellular carcinoma (HCC).

Dr. Wangari: The most common procedures I am performing are nonvascular interventions such as image-guided biopsies and drainages, biliary drainages and stenting, nephrostomies and stenting, and percutaneous sclerotherapies (eg, for regional and hepatic hemangiomas, cystic hygromas).

During the time our angio suite machine was operational, we performed many tumor embolizations including TACE for HCC, renal angiomyolipomas, presurgical embolization for head and neck tumors such as juvenile nasal angiofibromas, and embolization of arteriovenous malformations. We also perform many angioplasties for both peripheral artery disease and central venous stenosis.

Our hospital provides several embolotherapy procedures, including embolization with gelfoam (Pfizer, Inc.), polyvinyl alcohol (PVA) particles, Onyx (Medtronic), Embospheres (Merit Medical Systems, Inc.), and coils (mostly pushable coils). Some embolization materials are not provided by the hospital and require patients to buy them individually due to the expense (eg, Lipiodol [Guerbet LLC]).

How would you describe the current availability of materials for embolotherapy procedures, from embolic materials to catheters and sheaths, etc?

Dr. Wangari: Kenyatta National Hospital has more recently become very proactive in acquiring some of the consumables required for embolization, particularly the vascular catheters and sheaths. These items have local suppliers from the major brands supplying them and are therefore more cost-friendly to patients. Other important materials such as microcatheters and wires tend to be very expensive and out of range for most patients, with the average cost for the cheapest microcatheter ranging around $800 to $1,000 for a single microcatheter.

The prohibitive costs result in local changes in technique during embolization to either avoid use of a microcatheter during the procedure or limit use to only a single microcatheter (in cases where a patient can pay for one). If the microcatheter undergoes some degradation during the procedure, the interventional radiologist may have to modify the approach to embolization due to lack of another extra microcatheter.

Most embolics also tend to be quite expensive and out of reach for many patients, except for gelfoam and PVA particles. Gelfoam is generally available and tends to be used for many embolization procedures due to its affordability and relative safety profile, especially where more targeted/selective treatment is not possible (eg, where there is no microcatheter). Other embolics like EmboSpheres are available and may be considered to be relatively affordable per vial, but when a number of vials are required (eg, as is the case for many patients with large uterine fibroids), the cost of embolization increases and limits use in these patients. Onyx has limited availability locally and its use is impacted by its cost and the cost of the dimethyl sulfoxide–compatible catheters. Although Lipiodol is frequently needed, it has limited availability here and is extremely expensive. Tissue glue is not available despite its relative affordability; however, the need to use it with Lipiodol makes embolization with glue quite expensive.

Pushable coils are available but limited in terms of available sizes. The cost of each coil limits the number of coils one can use, therefore requiring adaptation when doing the procedure to ensure few coils are used. Detachable coils are available but expensive. Newer coils like fibered coils are largely unavailable due to cost implications, and plugs are also unavailable for similar reasons.

Dr. Rukundo: Availability of embolotherapy materials is still a huge challenge, one that I believe needs more active involvement by industry and local authorities and combined efforts from regional professional bodies.

What have been your initial experiences in spreading the word about your practice and its capabilities, both in your hospital and with referrers in the local community?

Dr. Wangari: IR is the new kid on the block and is therefore generating a lot of interest in terms of understanding what we offer, our capabilities, and what our role is in day-to-day practice. There is also pushback from some quarters that view IR as a replacement of some specialties. Uptake of IR procedures has also

been affected by the feeling that IR procedures are too expensive and not affordable to patients, resulting in patients and physicians turning to more invasive routes of management since they tend to be cheaper.

There is also reluctance to invest in IR consumables for many hospitals due to the cost implications in the budget vis-à-vis the limited use of the consumables, which is influenced by the patients' ability to pay.

Recently, through rigorous advocacy, we were able to have IR procedures included in the National Health Insurance Fund benefits for patients within the public health care system. This was no small feat. However, while this has been achieved, the disbursements are less than the proper cost of the procedures, which has negative implications on the long-term sustainability of providing these crucial services given that the cost of IR consumables may not be covered by these disbursements. The patients seen within the private health care system have to pay out of pocket for IR services if they have no private insurance coverage.

Dr. Rukundo: I participate in weekly tumor boards at my hospital, where I discuss the capabilities of IR and how my services can help patients. I have also made efforts to talk to referring physicians from other hospitals, explaining what IR can offer.

Have you begun any direct patient awareness or outreach work?

Dr. Wangari: I have begun patient awareness via my social media platforms (eg, LinkedIn, Facebook) because I realized many patients and even physicians are not aware of what IR offers. I have also done an article on the same in the hospital magazine and in a local newspaper.

Additionally, I did some outreach work in 2018 to 2019 in a county called Nakuru County. Nakuru is 3 hours away from Nairobi, where I am based. I visited the county/provincial hospital once a week and did basic nonvascular IR procedures, returning to Nairobi on the same day. Patients did not have to travel to Nairobi to get IR services, and the services came at a markedly reduced cost than those in Nairobi. My main challenges were the expensive nature of the consumables, fatigue, and lack of time to sustain the project.

Dr. Rukundo: I have not yet done open awareness campaigns with the community or with patients. However, I've mostly focused on increasing awareness with health care providers, especially physicians during morning rounds and continuing medical education events, to spread the word on what IR can offer since it's a very new practice in Rwanda. I have also slowly but intentionally spoke with different patients about what IR can offer.

Where do you see the biggest opportunities for the growth of your embolotherapy practice in the near future, and what hurdles must be overcome for these to become reality?

Dr. Wangari: There are big opportunities for embolotherapy in Kenya, particularly in interventional oncology. There is a rising burden of cancer in Kenya, and the majority of patients present in the late stages of disease, making curative treatment difficult. Embolization of tumors can help in controlling growth to downstage tumors, delivering chemotherapy, controlling bleeding from tumors, and performing presurgical embolization to render surgery safer.

Other opportunities for embolization are vascular tumors and malformations and trauma embolization. For this to become a reality for patients, several hurdles must be overcome, by:

- Increasing training of IR specialists in the country
- Increasing the number of public facilities offering IR services to make them more accessible
- More efforts to increase awareness among clinicians about the services offered in IR
- Zero rating of tax for medical equipment like ultrasounds and angiography machines, as well as the equipment used for the procedures
- Concessions in pricing from suppliers and manufacturers for developing/underdeveloped countries, as well as increasing the type of embolics available for use
- Inclusion of IR procedures in services that can be covered through medical insurance and reduced out-of-pocket expenditure for patients

Dr. Rukundo: There is an immense need and opportunity for growth in liver-directed therapies, fibroid embolization, and postpartum hemorrhage management. The supply chain, awareness of IR services, and continued training are the hurdles to overcome.

What opportunities for multispecialty collaboration do you envision as essential for your practice?

Dr. Rukundo: I work for two main referral hospitals in the country, and one of them has the only cancer center with radiation oncology services. I find this a great opportunity for multidisciplinary collaborations, mainly in the broad spectrum of oncology services that IR can offer but also in terms of collaborations with

surgery, urology, pediatrics, and gynecology, among others. IR is slowly and steadily becoming an integral part of patient care and multidisciplinary team collaborations in the two hospitals and especially in tumor boards.

Dr. Wangari: By virtue of the services we offer, IR must collaborate with multiple specialties to offer interventions to patients at their various points of need. Collaborations with all surgeons, physicians/internists, pediatricians, oncologists, and palliative care specialists are all essential to provide patients with seamless care.

How can related industry groups, medical societies, and individuals foster the growth of interventional training and access in East Africa?

Dr. Rukundo: There are already impressive efforts in East Africa from individuals and organizations to foster growth and training in IR; however, these efforts need to be combined as one voice, especially in advocacy of scarce equipment, increasing awareness, and generally tackling common challenges together.

Dr. Wangari: The growth of IR in terms of training can be fostered by creating sponsored opportunities for observerships, hands-on training, and conferences, which tend to be inaccessible to us or too expensive when factoring in the cost of registration, travel, and accommodations. Industry groups can sponsor proctors to visit and do in-house training with the additional benefit of hands-on training and skills transfer. Growth of IR can also be fostered through outreach outside of the traditional centers offering IR, thereby improving access to patients and educating clinicians on the types of IR services we can offer at the same time. Participation/inclusion of IR presentations in other multispecialty conferences will also improve reach to clinicians. ■

Disclosures
Dr. Rukundo: None.
Dr. Wangari: None.