Cases in Global Health delivery: Voluntary Medical Male Circumcision in Nyanza Province, Kenya

Julie Rosenberg, Claire Cole, Maria May and Rebecca Weintraub

From 2008 to 2012, Dr. Nicholas Muraguri, head of Kenya’s National AIDS and Sexually Transmitted Infections Control Programme, had been working hard to promote male circumcision in Kenya. As part of the national HIV/AIDS strategic plan, Kenya’s goal had been to circumcise 80% of consenting uncircumcised men aged 15–49 by July 2013. Officials believed performing these 860,000 circumcisions could avert an estimated 900,000 infections over 20 years. Nyanza province, which had the highest HIV prevalence and lowest male circumcision prevalence in the country, was one of four targeted provinces and was expected to perform 426,500 circumcisions.

Over 395,500 men and boys, most of whom were from Nyanza, had been circumcised by mid-2012. Campaign implementers in Nyanza offered ongoing circumcision services in various delivery settings as well as an annual intensive 30-day Rapid Results Initiative (RRI), each of which resulted in over 30,000 circumcisions. Nyanza had increased the total percent of men circumcised by 18%. As national scale-up progressed, the country looked at Nyanza. One implementing director in Nairobi commented, “We borrowed lessons learned in Nyanza...however, we also recognize that each place is unique and requires different approaches to service delivery.”

Overview of the Republic of Kenya

The Republic of Kenya is composed of eight provinces, and is located in Eastern Africa (see Exhibit 1 for map). In 2012, 76% of Kenyans lived in rural areas, and approximately 43% of all Kenyans lived below the national poverty line (see Exhibit 2 showing basic socioeconomic and demographic indicators). Of over 70 ethnic groups in Kenya, the Kikuyu (22%), the Luhya (14%), and the Luo (13%) were the largest. The majority of Kenyans were Christian. In December 2007, Mwai Kibaki was elected President for a second term after defeating Raila Odinga in a highly controversial election. Amid allegations of corruption, riots across the country led to deaths and over 600,000 internally displaced persons. In 2008 the United Nations Secretary Kofi Annan mediated a power-sharing agreement. Kibaki served as president and Odinga as prime minister—a newly created position.

Health in Kenya and Nyanza Province

In 2006, HIV/AIDS was the third leading cause of death in Kenya (see Exhibit 3 for table of key indicators). Among health facilities, 41% were public, 43% were private for-profit, and 14% were nonprofit (see Exhibit 4 for number of facilities). Acute and chronic disease management was free, though the government recognized that the public health infrastructure often fell short of its mandate without external assistance.
In Nyanza, the majority of public hospitals were understaffed and underequipped given the province’s more than 5 million people, including 1·2 million males aged 15–49. As in the rest of the country, most people, including the poor, accessed the private sector. Many traveled an average of five kilometers for health care, primarily by foot. The majority of Nyanza’s population identified as Luo and lived in 16 of Nyanza’s 34 diverse districts.

**Male Circumcision in Kenya**

The majority of adult males in Kenya were circumcised in 2012, with a national prevalence of 91·2% (see Exhibit 5 for circumcision prevalence by province). Long before medical benefits were known, most ethnic groups in Kenya practiced male circumcision as a rite of passage. Traditional, non-professionally trained circumcision providers performed 10% of all circumcisions in 2008 and had a higher rate of adverse events than those performed by the health system. Many Kenyans, including those from non-circumcising groups, sought male circumcision from the health system. Prior to 2008, the cost of medical circumcision—USD 6–12—was prohibitive for many.

Non-circumcising groups faced stigma and included the Turkana, the Luo, and the Teso. Most of Kenya’s powerful political leaders came from circumcising ethnic groups, and circumcision status was often made public during elections. Nyanza Province had the country’s lowest circumcision prevalence, at 46·7% overall in 2007, with some primarily Luo districts at 17%.

**HIV/AIDS in Kenya**

The first official case of HIV/AIDS was reported in Kenya in 1984. By 2008, almost 7% of Kenyans aged 15–64 (1·4 million Kenyans) were HIV positive. Kenyan women were more likely to be infected with HIV (8·4%) than men (5·4%) (see Exhibit 6 for HIV prevalence by age). Transmission occurred most frequently through vaginal intercourse between casual heterosexual partners (accounting for 41% of cases; see Exhibit 7 for incident HIV infections by mode of transmission) in 2009. At that time, about 45% of married, HIV-positive individuals had a partner who was not infected. Prevalence ranged regionally from less than 1% in Northeastern province to almost 15% in Nyanza. There, 2003 reports showed HIV prevalence at about 25% in Luo women and 18% in Luo men.

The Kenyan government’s initial response to HIV/AIDS, starting in 1986, aimed to prevent HIV through educational campaigns. In 2004 Kenya received USD 92·5 million from the US President’s Emergency Plan for AIDS Relief (PEPFAR) for service delivery and technical support. The following year, with a budget of USD 2·39 billion, the government declared a “total war on AIDS.” A new plan prioritized targeted interventions for vulnerable populations and called for greater grassroots-level involvement. By 2007, there was new but limited funding from PEPFAR to support male circumcision.

**Voluntary Medical Male Circumcision for HIV Prevention**

The first suggestion that male circumcision had a protective effect against HIV was in 1986. In 2000, a cohort study in Rakai, Uganda, confirmed this for men. In 2006, data from a randomized control trial involving 18–24 year old males in Orange Farm, South Africa showed a statistically significant 60% reduction in risk of female-to-male transmission among those circumcised. Interim data from two other trials also showed over 50% protective effect that year.

In February 2007 the final results of the trials were published in The Lancet, and within a month the World Health Organization (WHO) and the Joint United Nations
UNAIDS recommended targeting men aged 12–30, another study found targeting men older than 30 might initially be the most cost-effective. 16

The Kenyan government convened the first official male circumcision stakeholder meeting in September 2006, aiming to rapidly scale up existing male circumcision services. 8,29 In October 2009, the government formally released the Kenya National Strategy for Voluntary Medical Male Circumcision. The aim was to increase the proportion of men ages 15–49 years who were circumcised in Kenya from 84% to 94% by 2013. 15 The campaign prioritized provinces where circumcision rates were low and HIV rates were high, including Nyanza, Western, Rift Valley, and Nairobi. 15

The following month, the third Kenyan National AIDS Strategic Plan 2009–2013 was released. It aimed to reduce the incidence of HIV infection by 50% and AIDS-related deaths by 25%. Of the USD 3.56 billion budgeted for the plan, about 19.5% was allocated to prevention. 33 A large proportion (60.7%) of total government health spending was going to HIV/AIDS-related costs, 34 so the plan aimed to ensure investments paid off. The plan stated, “The most cost-effective intervention, at about USD 225 per case averted, is that of VMMC for men in rural Nyanza aged 25 to 49 years.” 35, 15 All interventions were expected to cost less than USD 4000 per infection averted. 33 The VMMC program comprised 1.6% of total AIDS funding in the 2009–2013 strategic plan. 33 Kenya would be the first country in sub-Saharan Africa to roll out a national male circumcision program for HIV prevention.

Voluntary Medical Male Circumcision in Kenya
Ministry of Health (MOH) leadership reached out to Luo community leaders to discuss the plan, and community engagement began in April 2007: Dr. Nicholas Muraguri, director of health promotion at the time, explained, “We took a very aggressive publicity approach. We wanted the message to be clear…that [male circumcision] was a medical intervention, not a cultural expectation.” In the fall of 2007, the MOH named the National AIDS Control Council responsible for the national circumcision agenda and created the National Male Circumcision Task Force to ensure that male circumcision efforts aligned with national health system strengthening goals; that messaging regarding the 60% protective effect of VMMC was consistent; and to oversee training, monitoring and evaluation, development of program tools, and quality control. 9

Muraguri became head of Kenya’s National AIDS and Sexually Transmitted Infections Control Programme in July 2008 and prioritized the VMMC campaign. “It was the first thing we had that was going to be cost-effective [and] give us returns in a short time,” he said. Prime Minister Raila Odinga, a Luo and Nyanza native, promoted male circumcision as well.

Many saw an opportunity to increase service utilization. Muraguri explained: “We know women...have a lot of

Programme on AIDS (UNAIDS) issued guidance endorsing male circumcision accompanied by HIV counseling and testing, sexually transmitted disease treatment, safe sex promotion, and condom provision for HIV prevention. They advised countries with heterosexually driven, generalized HIV epidemics and low male circumcision rates to “scale up with urgency.” 6 While
contact with the health system. But for men, the opportunities are rare. We see [VMMC] as an opportunity to address that gap.36 The national program launched officially in November 2008.1 “Speed matters,” Muraguri said, “It was an emergency...and the ‘building blocks’...had been assembled.”

External Support for Male Circumcision

The total cost for the VMMC campaign over five years was estimated at USD 76.5 million (see Exhibit 8 for estimated program costs); around USD 7.3 million would go toward infrastructure, primarily in public facilities. The setup costs for each delivery site were estimated to be USD 12,000. Assuming no more than a 5% adverse event rate, USD 33.2 million was budgeted for complications. Cost per client was expected to decline over time, from USD 143 to USD 65; consumables were USD 15 per procedure in private sites and USD 22.50 in government facilities.

PEPFAR, the male circumcision implementation funder, channeled money to 11 sub-grantees and US agencies in Kenya through USAID and the CDC. In line with its mission to support long-term and equitable growth, including strengthening the health system, USAID incorporated VMMC into its large umbrella program called AIDS, Population, and Health Integrated Assistance (APHIA) II in Nyanza. Four public sector organizations trained providers and paid for locum services. By contrast, the CDC funded four direct grantees beyond direct implementation support, the Bill & Melinda Gates Foundation funded a five-year USD 18.5 million grant to launch a Male Circumcision Consortium in Kenya in 2008 composed of private, research, and academic institutions to support the government in developing a national strategy; expand research, training, health facility capacity, and monitoring; address misunderstandings about male circumcision; conduct its own research, and bring partners together to mobilize resources and work in sync with the MOH. “It’s like the Male Circumcision Consortium is the champion, the catalyst,” one stakeholder explained.39

Male Circumcision in Nyanza Province

A provincial body—the Provincial Male Circumcision Task Force for Nyanza—coordinated delivery efforts in Nyanza. The Provincial Task Force posted implementers’ data at each meeting and encouraged sharing of resources. Some implementers felt they had an unfair disadvantage, depending on how many eligible men were in their assigned district. “It was the fight for the foreskin, to get as many...as possible,” one campaign leader said.

Though Task Force meetings could be tense due to competition among implementers, implementers ultimately represented their work as a joint effort. As one communications officer shared, “We don’t attribute leadership to any specific partner, but to the government.”40

Implementation Efforts

Training

Teams consisting of a surgeon, a surgical assistant, an infection control officer, and a counselor received training in implementing an adapted version of the WHO/Jhpeigo training curriculum in collaboration with the university that had spearheaded the Kenyan clinical trial (see Footnote B for full training guide).41 The training involved two to three days of classroom instruction followed by six to eight days of practicum in which each trainee observed two circumcisions, assisted with one, performed one with the trainer, and then performed 20 under supervision.40, 38 The total cost for training was about USD 6500 per team.42

Many sites deployed a “train-the-trainers” model, and a refresher training was offered as needed.

On average, a newly trained provider could complete one circumcision in 25–45 minutes. With more experience, providers’ speed increased and risk of adverse events (most commonly, pain and swelling after the procedure41) decreased. After performing 100 or more procedures, some VMMC surgeons completed the procedure in 10–15 minutes.43

Newly trained providers were less likely to provide circumcisions in general. “People had too many doubts in their heads,” Muraguri explained. “They weren’t implementing or motivated.”44 VMMC program leaders observed that coaching and mentorship increased the confidence of those new to the procedure. Training was subsequently done on-site.

Care Package

Implementers began offering services in Nyanza in September 2008, prior to the national launch. When a client presented for circumcision, a counselor ensured

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Injecting drug users (IDUs)</td>
<td>0.28</td>
<td>4.84</td>
<td>0</td>
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<td>Partners of IDUs</td>
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<td>0.2</td>
<td>0.01</td>
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<td>Sex workers (SW)</td>
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<td>SW clients</td>
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<td>10.48</td>
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<td>4.07</td>
<td>4.7</td>
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<td>Partners of SW clients</td>
<td>1.81</td>
<td>1.1</td>
<td>1.81</td>
<td>2.6</td>
<td>1.68</td>
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<td>Men who have sex with men (MSM)</td>
<td>0.61</td>
<td>4.49</td>
<td>0.99</td>
<td>3.6</td>
<td>2.89</td>
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<td>Female partners of MSM</td>
<td>0.1</td>
<td>0.64</td>
<td>0.05</td>
<td>0.5</td>
<td>0.5</td>
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<td>Multiple partnerships (MMP)</td>
<td>23.73</td>
<td>18.31</td>
<td>35.96</td>
<td>13.4</td>
<td>31.04</td>
</tr>
<tr>
<td>Partners’ MP (PMP)</td>
<td>21.76</td>
<td>27.74</td>
<td>37.03</td>
<td>20.8</td>
<td>27.45</td>
</tr>
<tr>
<td>Mutually monogamous heterosexual sex</td>
<td>42.89</td>
<td>30.14</td>
<td>21.19</td>
<td>49.8</td>
<td>35.15</td>
</tr>
<tr>
<td>Medical injections</td>
<td>0.06</td>
<td>0.55</td>
<td>0.17</td>
<td>0.01</td>
<td>0.04</td>
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<tr>
<td>Blood transfusions</td>
<td>0</td>
<td>0.24</td>
<td>0.02</td>
<td>0.02</td>
<td>0</td>
</tr>
</tbody>
</table>

Bold text indicated sexual transmission (61, 78–81).

Exhibit 7: Incident HIV Infections by Mode of Transmission in Five sub-Saharan Africa Countries

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#### Exhibit 8: VMMC Estimated Program Costs, 2009–2013

<table>
<thead>
<tr>
<th>I. Through Mobile Teams</th>
<th>Annual cost year 2</th>
<th>Total cost years 3–4</th>
<th>4-year cost</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal</strong></td>
<td>Target numbers of AMCs</td>
<td>160 000</td>
<td>408 000</td>
</tr>
<tr>
<td></td>
<td>Human resources</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of teams needed</td>
<td>80</td>
<td>102</td>
</tr>
<tr>
<td></td>
<td>Breakdown</td>
<td>Cost</td>
<td>Cost</td>
</tr>
<tr>
<td></td>
<td>1. Salary &amp; benefits</td>
<td>Mobile team</td>
<td>3 280 000</td>
</tr>
<tr>
<td></td>
<td>2. Surgery</td>
<td>Equipment &amp; infrastructure</td>
<td>480 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Consumables @ $15/MC</td>
<td>2 400 000</td>
</tr>
<tr>
<td></td>
<td>3. Training costs</td>
<td>US $6500 per team</td>
<td>130 000</td>
</tr>
<tr>
<td></td>
<td>4. Rural outreach</td>
<td>Vehicle @ US $30 000</td>
<td>600 000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Petrol &amp; maintenance</td>
<td>80 000</td>
</tr>
<tr>
<td></td>
<td>5. Complications</td>
<td>Adverse events (5% default)</td>
<td>200 000</td>
</tr>
<tr>
<td><strong>Total Direct Costs (1–4)</strong></td>
<td></td>
<td>7 890 000</td>
<td>18 467 000</td>
</tr>
</tbody>
</table>

| II. Through Support to Public Health Facilities | | | |
| Goal | Target numbers of AMCs | 40 000 | 102 000 | 172 000 |
| Facilities upgraded | Hospitals | 44 | - | - |
| | Health centers | 96 | - | - |
| | Total Facilities | - | - | - |
| | Human resources | Two teams per facility for 140 facilities | 280 | 0 | 560 |
| Breakdown | 1. Incentives | $10 per circumcision | 400 000 | 1 020 000 | 1 720 000 |
| | 2. Surgery | Equipment & Infrastructure | 3 360 000 | - | 6 720 000 |
| | | Consumables @ $22/5/MC | 900 000 | 2 295 000 | 4 972 500 |
| | 3. Training costs | US $6500 per team | 1 820 000 | - | 3 640 000 |
| | 4. Complications | Adverse events (5% default) | 50 500 | 127 500 | 215 000 |
| **Total Direct Costs (1–4)** | | 6 520 000 | 3 442 500 | 16 165 000 |

| III. Other costs | Monitoring & evaluation (7.5%) | 1 395 484 | 2 120 274 | 4 881 484 |
|                 | Warehousing & distribution (7.5%) | 1 395 484 | 2 120 274 | 4 881 484 |
|                 | Communication campaign (10%) | 1 860 645 | 2 827 032 | 6 508 645 |
|                 | General administration (15%) | 2 790 968 | 4 240 548 | 9 762 968 |

| IV. Overall | Overall goal | Target numbers of AMC | 200 000 | 510 000 | 860 000 |
|             | Human resources | Overall number of teams | 360 | 662 | 662 |
|             | Overall program costs | 21 862 581 | 32 217 629 | 76 475 819 |
|             | Overall cost per client (national) | 109 | 65 | 89 |

Kenyan policy had originally restricted surgery to medical officers. When the Male Circumcision Consortium found that task-sharing would increase the number of facilities capable of participating in VMMC from 12% to 85%, the government allowed nurses to perform VMMC, starting in June 2009.1, 42

USAID-Funded Delivery
APHIA-II Nyanza worked in its assigned districts starting in November 2008 to train public providers to provide circumcisions, however none of the 81 facilities in two key districts was prepared to offer VMMC (see Exhibit 11 for assessment criteria).42 Eight of the 59 public hospitals were able to participate (see Exhibit 12 for facilities meeting criteria).43 All 140 facilities were renovated by 2010.

At capacity, district hospital sites could theoretically support 10–20 procedures per day. In practice, many public providers prioritized contractual responsibilities and acute medical care, which did not include VMMC. “If you have a convulsing child and a person waiting for [VMMC], then the [VMMC] client must wait”, explained one implementer.38 Public providers had a much higher rate of adverse events than those working for CDC-funded projects.41,43

In addition to the 9 health facilities, public providers also provided VMMC in 11 outreach settings, which saw much greater demand for VMMC. At one site, the team provided 343 circumcisions in one three-week period. Regular outreach was not possible due to workforce shortage, however. Public-sector staff working through APHIA-II performed about 12% of VMMCs in Nyanza. The average cost per USAID-funded VMMC procedure was USD 38·62.44

CDC-Funded Delivery
CDC-funded implementers were free to set up sites anywhere.1 Surgical teams were each expected to provide 12 or more circumcisions per day, and implementers frequently worked late performing circumcisions or holding after-hours meetings to maximize daylight procedure time. At capacity, district hospital sites could theoretically support 10–20 procedures per day. In practice, many public providers prioritized contractual responsibilities and acute medical care, which did not include VMMC. “If you have a convulsing child and a person waiting for [VMMC], then the [VMMC] client must wait”, explained one implementer.38 Public providers had a much higher rate of adverse events than those working for CDC-funded projects.41,43

Mobile services were the most expensive service delivery model to set up. Established in hard-to-reach places, implementers transported staff, tents, water, and generators to the sites. When distance or weather required, they increased staff compensation to account for onsite camping. Mobile sites’ counseling was sometimes done under nearby trees. A 100-square-foot tent with one surgical table could be the operating theater. One officer commented, “When it rains, the tent floods. When it’s sunny, the tent is hot. If it’s dry, the dust . . . drifts through. But we work with all of this.” A single mobile team with a regular Friday scheduled provided as many as 18 circumcisions per day and maintained an 80% follow-up rate. CDC implementers performed 88% of all procedures in Nyanza.4 The average cost of CDC-funded procedures was USD 44·24.44

Exhibit 9: WHO-Recommended Male Circumcision Equipment and Supplies
“Pre-packs” or “consumables” contained:
- two sizes of latex gloves
- plain and petroleum jelly impregnated gauze
- one scalpel knife handle and two blades
- one 10-milliliter syringe
- one 18- or 21-gauge needle
- chromic gut or vicryl 3-0 and 4-0 sutures with a three-eighths circle reverse
- cutting needle

Surgical packages (reusable) included:
- fine-toothed dissecting forceps
- two straight and two curved artery forceps
- curved Metzenbaum’s scissors
- stitch scissors
- Mayo’s needle holder
- sponge-holding forceps

Other supplies kept on site included:
- surgical masks
- aprons
- lidocaine anesthetic solution
- povidone iodine
- 80 cm × 80 cm “o” drapes with 5 cm holes
- sterile marking pens to mark the line of incision
- emergency medications for anaphylactic reactions
- sterile drapes
- gallipots for antiseptic solution
- instrument trays


Exhibit 10: Mobile Service Delivery Model Images
Group counseling on male circumcision (A). Mobile circumcision counseling site (B). Circumcision being conducted in tented delivery site (C). Source: Nyanza Reproductive Health Society.
Monitoring and Evaluation

Implementers reported data electronically. PEPFAR primarily evaluated implementers on the number of circumcisions performed. By the end of 2009, the MOH adopted VMMC indicators for inclusion in its health and management information system. Providers completed an intake form for each client, with CDC and the APHIA-II sites aggregating their data separately. In 2010, providers called for greater standardization of data.

The Male Circumcision Consortium worked to assess how to improve efforts in Kenya. One analysis found only 38% of sites were equipped for VCT, which could take up to 45 minutes, required a private space, and counselor training. The surgery was taking only 8–45% of total provider time. Provider-initiated counseling and testing did not require additional space or staff. The Male Circumcision Consortium’s recommendation to switch from VTC to provider-initiated counseling and testing increased testing rates to 60% and eventually to 93.6%. Counseling and testing sessions dropped to less than 20 minutes. The Male Circumcision Consortium supported research that found after VMMC, most men either did not alter their sexual behaviors. Most described being able to perform more rounds of sex, easier condom use, and fewer cuts on the penis during sex.

The Rapid Results Initiative

National success hinged on Nyanza’s goal to provide 76,500 circumcisions in the first year, 100,000 in the second, and 125,000 in each of the final two years (see Exhibit 13 for VMMC targets over four years). The model predicted that 80% coverage could reduce HIV prevalence in Nyanza by 45–67%, dropping male prevalence from 17% to 10%. USAID estimated that reaching 60% of the target population by 2014 could avert 47,000 infections by 2025, saving USD 247 million in HIV care and treatment costs. Programming would use a “high-quality, high-volume” approach. The strategy codified many ongoing activities from Nyanza.

In 2009 when the RRIs began, 50,526 circumcisions had been performed (see Exhibit 14 for circumcision performed over time), each costing an average of USD 86. Two Nyanza implementers suggested a province-wide campaign, modeled after previous Kenyan immunization campaigns, to reach targets. The implementers agreed to pool resources to increase efficiency and reduce costs. The Provincial Task Force oversaw district committees and provided technical oversight, as well as a supervision team with experts on logistics, data management, and waste disposal. All 110 implementing teams used a checklist adapted from the WHO quality-assurance toolkit and aimed to serve 12 clients per day for a total of 30,000 eligible boys and men within 30 working days. RRI’s were held during school holidays, when many return home, and promoted with public outreach.

NGO personnel worked with MOH and locum staff to train public hospital staff and leverage human resources from different agencies. Experienced providers partnered with less-experienced providers and served as team leaders to ensure quality.

Initially, two- to three-day supplies of pre-packed reusable surgical kits were distributed to sites a week before the RRI; each partner tracked supplies, allowing districts to forecast needs daily. Since only reusable surgical packs were distributed, basic decontamination was done on site.

The Male Circumcision Consortium supported research that found after VMMC, most men either did not alter their sexual behaviors.
and instruments were brought to district autoclaves for sterilization. Unpredicted variation in demand could lead to complex supply and waste management problems despite several vehicles helping with staff and supply distribution. Counseling and screening clients on the eve of surgery and group counseling in high-volume sites increased efficiency during the RRIs.

Over time, RRI implementers began to use two operating tables per team to reduce time between surgeries, used prepackaged supply kits, and delegate tasks to different level providers. In high-volume areas, some clients received counseling the day before surgery so surgeons could start working first thing in the morning. Intentional mobilization and advocacy efforts targeted men 15 and older, particularly those 18–49. In order to increase access, implementers also opened after hours “moonlight” services—sometimes as late as 3 a.m.—at 20 locations. RRIs began to surpass their goals at times by excesses of more than 30%.

Impact

Over the course of the Nyanza implementers’ RRIs, an average of 33,000 circumcisions were performed per 30 days at USD 39 per procedure (see Exhibit 15 for circumcisions per month over time). After the first RRI, the complication rate was under 2%, and most complications resolved completely. Forty-five percent of clients were below age 15 and only 39% consented to on-site HIV counseling and testing, a lower percentage than that seen during routine service delivery. Of those tested on site, 2.8% were HIV positive, and 79% (236) of those with HIV opted for circumcision. The follow-up was 23%. Another challenge included appropriately combining public and private implementers into surgical teams. In subsequent RRIs, clients within the target age range comprised the majority of those served, as did those opting for HIV testing and counseling. Still, less than half of clients returned for follow-up. The cost per procedure decreased by 43%, from USD 48 during regular program implementation to as low as USD 27 during one RRI. Matching client flow with deployment of staff remained a challenge throughout the campaign.

Next Steps

Between 2008 and 2012, the program went from performing 8000 circumcisions annually to around 150,000. About 80% of all circumcisions were performed in Nyanza. The percent of men circumcised in Nyanza increased from 48.2% to 66.3%. Allowing nurses to perform VMMC was critical to the success of the campaign.

Many approached Muraguri to request his guidance for their programs. While he was glad to support them, he also wondered how Kenya could adapt lessons from VMMC to other diseases. What could they learn from the VMMC campaign’s success? Were there other surgical procedures that could be performed successfully by mid-level providers? How could the campaign promoting VMMC also increase surgical capacity?

Acknowledgments

Julie Rosenberg, Claire Cole, Maria May, and Rebecca Weintraub prepared this case with assistance from Abby Campbell for the Lancet Commission on Global Surgery. It is not intended to illustrate either effective or ineffective health care delivery practice. Case development support was provided in part by The Bill and Melinda Gates Foundation, The Abundance Foundation, and The Harvard Medical School Department of Global Health and Social Medicine. A full length version of this case is available through Harvard Business Publishing or GHDonline.org/cases. © 2015 The President and Fellows of Harvard College. This case is licensed Creative Commons Attribution-NonCommercial-NoDerivs 3.0 Unported. Visit the Global Health Delivery online communities, GHDonline.org, and join thousands of health care implementers and experts from around the globe in discussion and learning. Case development support was provided in part by The Bill and Melinda Gates Foundation, The Abundance Foundation, The Harvard Medical School Department of Global Health and Social Medicine and the Global Health Delivery Project at Harvard University.
Male circumcision was believed to be effective in aiding HIV prevention because it removed tissue most susceptible to HIV. The inner mucosal surface of the human foreskin present in uncircumcised men had a high density of HIV target cells. During intercourse, this mucosal surface was exposed to vaginal fluid that could contain HIV, providing an environment conducive to HIV transmission.

See Manual for Male Circumcision under Local Anaesthesia (http://www.who.int/hiv/pub/malecircumcision/who_msc_local_anaesthesia.pdf)

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Medical Circumcision of Adults

Three methods were recommended for adult and adolescent male circumcision for HIV prevention: the forceps-guided, the dorsal slit, and the sleeve resection method. Advantages and disadvantages are summarized in the table below. Though the sleeve resection method was regarded as having the most ideal result, it required the highest level of surgical skill. The dorsal slit was the most widely used procedure by trained surgeons worldwide, but ran the risk of uneven foreskin removal, as there was no guide to ensure a uniform incision since the provider cut free-hand around the circumference of the penis. Finally, the forceps-guided method, the simplest method, was regarded as ideally suited to most resource-limited clinical settings. It was the simplest to teach and perform, and was the method used in Kenya’s VMMC campaign. All recommended adult and adolescent circumcision procedures require knowledge of penile anatomy, training in draping and skin preparation, anesthesia administration, haemostasis, and suturing. Each technique removes a uniform amount of the foreskin sufficient to expose the glans whether the penis is erect or flaccid.

### Advantages and Disadvantages of Adult Male Circumcision Methods

<table>
<thead>
<tr>
<th>Method</th>
<th>Advantages</th>
<th>Disadvantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsal Slit</td>
<td>A surgical assistant is helpful but not required</td>
<td>Requires more surgical skill than forceps-guided method</td>
</tr>
<tr>
<td></td>
<td>Widely used by surgeons throughout the world</td>
<td>Small risk of asymmetric result</td>
</tr>
<tr>
<td>Forceps Guided</td>
<td>Can be learned by surgeons/surgical assistants who are relatively new to surgery</td>
<td>Cosmetic effect may be less satisfactory</td>
</tr>
<tr>
<td></td>
<td>Ideal for use in a clinic with limited resources</td>
<td>Leaves 0.5–1.0 cm of mucosal skin proximal to corona</td>
</tr>
<tr>
<td>Sleeve Recession</td>
<td>Better cosmetic results than other two techniques</td>
<td>Requires highest level of surgical skill</td>
</tr>
<tr>
<td></td>
<td>Can be done without a surgical assistant</td>
<td>Better suited to hospital rather than clinic setting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Requires an assistant</td>
</tr>
<tr>
<td></td>
<td></td>
<td>More room for surgical error</td>
</tr>
</tbody>
</table>

### The Forceps-Guided Method

To perform a forceps-guided circumcision, surgeons sterilize the skin with iodine and drape the body so that only the penis is exposed. After administering injected anesthesia, surgeons pull back the foreskin to separate any adhesions between the foreskin and the glans. Then, surgeons pull the foreskin forward to mark the point at which the foreskin meets the glans as the line of incision. Surgeons clamp the foreskin, evenly holding the foreskin just past the glans. Surgeons use their fingertips to ensure the glans had not been caught in the forceps and was still located before the line of incision. Then, using a scalpel, surgeons cut along the exterior line of the forceps, removing the foreskin. The surgeon retracts the skin on the shaft of the penis to tie off blood vessels as necessary. Surgeons place at least six sutures, then check for any remaining bleeding and dress the wound.
### Appendix B
#### Useful Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APHIA</td>
<td>AIDS, Population, and Health Integrated Assistance</td>
</tr>
<tr>
<td>CDC</td>
<td>US Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>Gates Foundation</td>
<td>The Bill &amp; Melinda Gates Foundation</td>
</tr>
<tr>
<td>PEPFAR</td>
<td>US President's Emergency Fund for HIV and AIDS Relief</td>
</tr>
<tr>
<td>PMTCT</td>
<td>prevention of mother-to-child transmission</td>
</tr>
<tr>
<td>UNAIDS</td>
<td>The Joint United Nations Programme on AIDS</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
</tr>
<tr>
<td>USD</td>
<td>United States’ dollar</td>
</tr>
<tr>
<td>VCT</td>
<td>voluntary counseling and testing</td>
</tr>
<tr>
<td>VMMC</td>
<td>voluntary medical male circumcision</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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