Obstetric fistula: Where we currently stand

Guest Editors: Andrew Browning, Shershah Syed, and Rachel Pope

IJGO Supplement Editor: Ashraf Nabhan
EDITORIAL BOARD

Editor: R.M. Adanu (Ghana)
Editors Emeritus: T.R.B. Johnson (USA)
J.J. Sciarra (USA)

Regional Representatives:
Africa - Middle East: C. Chibwesha (South Africa)
Asia: P.P. Fogarty (Malaysia)
Europe: M. Geary (Ireland)
Latin America: J.G. Cecatti (Brazil)
North America: E. Stringer (USA)

Public Health Obstetric Consultant: E. Stringer (USA)
Systematic Reviews Editor: A. Nabhan (Egypt)
Ethical and Legal Issues in Reproductive Health: B. Dickens (Canada)
R. Cook (Canada)
C. Ngwena (South Africa)

Contemporary Issues in Women's Health: M. Geary (Ireland)
E. Stringer (USA)
C. Chibwesha (South Africa)

FIGO Cancer Staging: S. Kehoe (UK)
Statistical Consultant: A. Vahratian (USA)
Advisors: V. Boama (Qatar)
V. Guinto (Philippines)
C. Sosa (Uruguay)

Managing Editor: A. Goggins (UK)
Manuscript Editor: S. Maprayil (UK)
Editorial & Communications Assistant: F. Harris (UK)

Editorial Office: FIGO Secretariat, FIGO House
Suite 3 - Waterloo Court,
10 Theed Street,
London, SE1 8ST, UK
Tel: +44 20 7928 1166
Fax: +44 20 7928 7099
E-mail: ijgo@figo.org
SUMMARY OF AUTHOR GUIDELINES

(Full guidelines are available online at http://obgyn.onlinelibrary.wiley.com/hub/journal/10.1002/(ISSN)1879-3479/about/author-guidelines.html)

INTRODUCTION

Only original manuscripts that are submitted exclusively to IJGO will be considered for publication. The requirements of IJGO are in accordance with the "Uniform Requirements for Manuscripts Submitted to Biomedical Journals" published by the International Committee of Medical Journal Editors (ICMJE). Editorial processes will adhere to the Committee of Publication Ethics guidelines.

SUBMISSION

IJGO will consider for publication unsolicited submissions of the following: Clinical Articles; Review Articles; and Brief Communications (including Case Reports). All manuscripts should be prepared according to the author guidelines available online. Manuscripts are submitted to the journal via the online service Editorial Manager (www.editorialmanager.com/IJG). Authors must first register for an account on Editorial Manager, ensuring that the details provided for the corresponding author are up-to-date so that all manuscript status notifications are successfully received. Authors can check the status of their manuscript during the review process by logging into Editorial Manager. Queries relating to the submission process or to journal procedures can be directed to the editorial office at ijgo@figo.org.

JOURNAL REQUIREMENTS

Studies of patients, patient records, or volunteers require Ethics Committee approval and informed consent. In compliance with ICMJE requirements, all clinical trials must be prospectively registered in a public trials registry. Purely observational studies (those in which the assignment of the medical intervention is not at the discretion of the investigator) will not require registration. Authors wishing to use material that has already been published must first obtain the permission of the copyright holder(s). Authors will be expected to provide the relevant documentation on request.

LAYOUT OF MANUSCRIPTS

Please refer to the online instructions for full details on how to structure your manuscript. All submissions must be accompanied by a cover letter addressed to the Editor. The first page of the manuscript should contain the following: (1) title; (2) full names of authors; (3) affiliations of authors; (4) full contact details of the corresponding author; (5) a list of up to 8 keywords for indexing and retrieval; (6) a brief synopsis.

Clinical Articles and Review Articles require an abstract of 200 words or fewer; Brief Communications do not require an abstract. Full length articles should be structured with the following headings: Introduction; Materials and methods; Results; Discussion; Author contributions; Acknowledgments; Conflicts of interest; and References. Brief Communications do not require headings for the main text, but should include the following sections: Author contributions; Acknowledgments; Conflicts of interest; and References. Tables, figures, and supporting information may also be submitted.

MANUSCRIPT CONTENTS

Where appropriate, statements on clinical trial registration, Ethics Committee approval, and informed consent should be included in the manuscript. Details of any statistical analysis conducted should be given in the methods. In line with ICMJE standards, author contributions must be listed and a conflicts of interest statement be made. References should be presented as per the journal’s style. The editors reserve the right to make any necessary editorial changes.

LICENSING

On acceptance, authors have the option of publishing their manuscript under the terms of the journal’s standard copyright transfer agreement, or under open access terms made available via Wiley OnlineOpen.
Obstetric fistula: Where we currently stand

Guest Editors: Andrew Browning, Shershah Syed, and Rachel Pope

IJGO Supplement Editor: Ashraf Nabhan

Publication of this Supplement was funded by the Texas Children's Hospital
EDITORIAL

A. Browning, S. Syed
UK, Tanzania, Pakistan
Where we currently stand on obstetric fistula treatment and prevention
Treatment and prevention of obstetric fistula have seen gains over the last 20 years. There is room to improve surgical cure rates and to prevent them.

COMMENTARIES

E. Anastasi, B. Asiamah, G. Lal
USA
Leaving no one behind: Is the achievement of the Sustainable Development Goals possible without securing the dignity, rights, and well-being of those who are "invisible"?
From a rights perspective, ending fistula is critical to achieving the SDGs, as called for by the UN Member States and Campaign to End Fistula.

A. Rane, A. Browning, P. Majinge, R. Pope
Australia, UK, Tanzania, USA
Challenges in the field of obstetric fistula
A call to action on the greatest needs for ending obstetric fistula.

SUPPLEMENT ARTICLES

G. Slinger, L. Trautvetter
UK
Addressing the fistula treatment gap and rising to the 2030 challenge
FIGO's methodological training approach is making vital contributions to closing the global fistula treatment gap and calls for more action and resources to end fistula by 2030.

Ghana
Knowledge of obstetric fistula among prenatal clinic attendees and midwives in Mfantsiman municipality, Ghana
Educating prenatal attendees and organizing regular refresher courses on obstetric fistula for midwives should be a priority in Mfantsiman municipality.

R. Pope, M. Beddow
USA
A review of surgical procedures to repair obstetric fistula
This summary of surgical techniques and procedures in obstetric fistula repair demonstrates the need for more evidence and innovation.

R. Maroyi, L. Keyser, L. Hosterman, A. Notia, D. Mukwege
Democratic Republic of Congo, USA
The mobile surgical outreach program for management of patients with genital fistula in the Democratic Republic of Congo
Panzi Hospital's mobile surgical outreach program provides fistula care to women in their communities and represents a scalable model for treatment and prevention of fistula.

N. Tasnim, K. Bangash, O. Amin, S. Luqman, H. Hina
Pakistan
Rising trends in iatrogenic urogenital fistula: A new challenge
A rising yearly trend in iatrogenic fistula was observed over a 12-year period in Pakistan.
A retrospective review to identify criteria for incorporating the Singapore flap and gracilis muscle flap into obstetric fistula repair

Based on our retrospective review, we suggest criteria for using the Singapore and gracilis muscle flaps in complex obstetric fistula repair.

Rehabilitation and reintegration programming adjunct to female genital fistula surgery: A systematic scoping review

Holistic adjunct reintegration programming accompanying female genital fistula surgery is recommended; however, efforts to develop robust evidence on best reintegration practices are necessary.
Where we currently stand on obstetric fistula treatment and prevention

Andrew Browning1,2,* | Shershah Syed3

1Fistula and Genital Trauma Committee, FIGO (International Federation of Gynecology and Obstetrics), London, UK
2Maternity Africa, Arusha, Tanzania
3International Society of Fistula Surgeons, Pakistan Medical Association, Karachi, Pakistan

*Correspondence
Andrew Browning, PO Box 16464, Arusha, Tanzania.
Email: andrew_browning@hotmail.com

Over the last two decades, obstetric fistula has rightly gained some prominence as a public health issue. It has been a rocky road, with each step along the path bringing positives and negatives: one step forward, two steps back. Thankfully the end result has been overwhelmingly positive.

The increased awareness of obstetric fistula first led to an increase in the availability of funds to help women with the condition, which in turn led to more people performing fistula surgery. All good. However, a small group of people took, and still take, advantage of the funds and perform surgery without adequate training, leading to unnecessary breakdowns and complications, which ultimately increases the suffering of these women, rather than decreases it. In response, FIGO (the International Federation of Gynecology and Obstetrics) founded a standardized global fistula training program that enables many surgeons to be trained in the latest techniques and thousands of women with obstetric fistula to access quality surgery.

The surgical community has looked more closely at the outcomes of fistula repair and exciting new techniques have been developed to improve continence rates with a closed fistula and ways to improve sexual health. Twenty years ago, ongoing incontinence rates despite fistula closure were often overlooked and categorized as too difficult to rectify. We are now getting many more of these most severely injured women fully continent thanks to some exciting developments, but there is still much room for improvement. Likewise, novel techniques of vaginal reconstruction have also enabled women to resume a sexual life.

The Millennium Development Goals sought to decrease maternal death and disability. Although we’ve seen a two-thirds reduction in maternal deaths in Africa and Southeast Asia—the areas where obstetric fistulae occur in greatest numbers—more needs to be done. We hope that the Sustainable Development Goals will continue to make improvements to maternal health and indirectly to obstetric fistula.

In December 2018, the UN General Assembly made a call to end fistula by 2030, eliminating obstetric fistula within a decade. Soon after the announcement an initial planning meeting was held with members of the International Society of Obstetric Fistula Surgeons (ISOFS) and the plans to achieve this continue to evolve. This is indeed a noble and ambitious task and we hope that it will propel positive action; however, action needs to be directed. All too often we have seen wealthy donors wanting to help by giving expensive equipment that has wasted millions of dollars investing in high-tech ideas when the problems and solutions are far more basic. The overwhelming and daily frustrations such as having water, gloves, medicines, and sutures available in hospitals, and educating communities on women delivering in a hospital, either at no cost or greatly subsidized, need to be funded first. These basics are what eradicated fistula from high-resource countries over 100 years ago, not expensive, complicated systems and technologies that are being unsuccessfully transplanted to resource-poor settings.

Thankfully some action has been directed, such as the roll-out of more access to maternal health services. However, with the race to catch up on these basic health needs, standards of training and practice have been compromised. For instance, up to 25% of fistulae seen in some series around the world have been caused by a doctor—the patient has done the right thing, she and her family have got to the hospital in time for the delivery and a cesarean has been performed,
only for the cesarean to have caused the fistula, not a long obstructed labor. Equally, we are seeing many more fistulae occurring from hysterectomies for benign conditions such as menorrhagia and fibroids.

This Supplement is a joint effort by the FIGO Committee for Fistula and Genital Trauma and ISOFS. It contains commentaries by Anastasi et al. and Rane et al. that consider where we are and what it will take to end obstetric fistula. Other articles review raising awareness in the community (Maroyi et al., Azanu et al.), training in fistula surgery (Slinger and Trautvetter), the growing problem of iatrogenic fistula (Tasnim et al.), surgical updates on new techniques and the revival of some old ones (Pope and Beddow, Pope et al.), and a review of rehabilitation programs acting jointly with fistula surgery (El Ayadi et al.).

It is exciting to think that the progress we are making in the treatment of women with obstetric fistula might be redundant by 2030. In reality though, our surgical techniques will be used for and improved upon a little while longer, but the hope is that we might be proved wrong. To fully eradicate obstetric fistula, millions more women need rapid access to obstetric care; in addition, health workers must be trained and equipped to operate safely to prevent iatrogenic fistula.

**ACKNOWLEDGMENTS**

Publication of this Supplement was funded by the Texas Children’s Hospital.

**CONFLICTS OF INTEREST**

The authors have no conflicts of interest.

**REFERENCES**


Leaving no one behind: Is the achievement of the Sustainable Development Goals possible without securing the dignity, rights, and well-being of those who are “invisible”?

Erin Anastasi*  |  Bridget Asiamah  |  Geeta Lal

Abstract
The persistence of obstetric fistula—a devastating childbirth injury occurring largely among poor, marginalized women and girls—constitutes a human rights violation and a public health crisis. The Sustainable Development Goals (SDGs) aim to “leave no one behind.” Failing to eliminate fistula jeopardizes attainment of several of the SDGs.

Member States of the United Nations adopted a UN Resolution on ending fistula in 2018, calling for an end to fistula within a decade. Building upon recommendations of the UN Secretary General’s 2018 Report on Obstetric Fistula, the Resolution calls for significantly increased commitments and investments to end fistula. Crucial interventions for eliminating fistula include high-quality, equitable, accessible health systems; implementing costed national strategies for eliminating fistula; integrating fistula into national plans to achieve the SDGs; strengthening national fistula task forces; and significantly increased, sustained financial support. Fistula elimination necessitates protecting women’s/girls’ human rights and addressing social determinants that affect women’s/girls’ ability to “survive, thrive and transform,” including social and economic inequities; gender-based violence; child marriage and early childbearing; and access to education. Enhanced awareness-raising and advocacy; improved research, data, monitoring and evaluation; holistic social reintegration and survivor empowerment; and community engagement are additional key strategies for realizing this ambitious goal.

KEYWORDS
Obstetric fistula; Sustainable Development Goals; United Nations resolution on obstetric fistula

1  |  A QUESTION OF RIGHTS

According to United Nations (UN) Resolution A/HRC/RES/39/10: “Preventable maternal mortality and morbidity and human rights in humanitarian settings,” adopted at the 39th session of the Human Rights Council in September, 2018 “…Violations of the right of everyone to the enjoyment of the highest attainable standard of physical and mental health… can cause high levels of maternal morbidity, including obstetric fistula, leading to ill health and death for women and girls of childbearing age in many regions of the world, and particularly in humanitarian settings…” Therefore, “…a dramatic and sustainable scaling up of quality treatment and healthcare services, including high-quality emergency obstetric services and also of the number of trained, competent fistula surgeons and midwives, is needed to
significantly reduce maternal and newborn mortality and to eradicate obstetric fistula.”

This year’s (2019) theme for the International Day to End Obstetric Fistula, “Fistula is a human rights violation—end it now!” is a call to action to end this global social injustice and health and human rights tragedy. The very existence of fistula is a serious violation of human rights and an affront to the right of all persons to hope, healing, and dignity. Fistula survivors are living reminders of health systems’ failure and a tragic sign of inequity. All too often, however, they are “invisible”—hidden away and forgotten.

2 | LEAVING NO ONE BEHIND

The 2030 Agenda for Sustainable Development/Sustainable Development Goals (SDGs) represents a unique opportunity to promote human rights, equality, and well-being for all. This bold, visionary global agenda aims to “leave no one behind” and “reach the furthest behind first,” with a view toward eliminating all forms of extreme human suffering. Women and girls with obstetric fistula are surely among the furthest left behind. They have needlessly suffered some of the worst human misery imaginable. Eliminating fistula is a key element of “leaving no one behind” and the world risks failing to achieve the SDGs, especially Goals 1 (poverty); 3 (health); 4 (education); 5 (gender equality); and 10 (inequalities), if there are still women and girls left in the world suffering from fistula who are being neglected. Therefore, the UN has called on the global community to eliminate this tragic, yet preventable and largely treatable condition.

As evidence suggests, policies and programs often fail to reach the poorest and most vulnerable women and girls. These marginalized groups tend to remain invisible to policymakers, healthcare providers, and society in general. By failing to understand and address the multi-dimensional barriers and deeply ingrained structural violence faced by these poorest, most at-risk groups, we risk perpetuating “invisibility, inferiority, and powerlessness,” and failing to achieve “the world we want,” as enshrined in the vision of the SDGs.

3 | THE UN CALL TO END FISTULA WITHIN A DECADE

Although significant progress has been made in efforts to end fistula, including increased political awareness; initiatives at the global, regional, and country levels; strengthened partnerships and coordination mechanisms for fistula and maternal and neonatal health; and increasing country ownership and leadership, significant challenges remain. A new UN Resolution on fistula was adopted by Member States in December 2018. Building upon the recommendations of the UN Secretary General’s 2018 Report on Fistula, the Resolution has called for significantly increased commitments and investments to end fistula “within a decade.” This represents a major and urgent shift from the 2016 UN vision of ending fistula within a generation. Both the report and the resolution link the call to end fistula with the achievement of the SDGs; integrating fistula with global efforts to achieve universal access to emergency/essential surgery; addressing root causes of fistula; and calling for UNFPA/Campaign to End Fistula, together with member states and key strategic partners, to lead the development of a new global road map to end fistula within a generation.

The UN Resolution further calls on every fistula-affected nation to develop an inclusive, time-bound national strategy and action plan to end fistula by 2030, and establish a national ministry of health/government-led task force on fistula to bring together all key stakeholders to develop and implement this critical strategy and action plan. This is an essential component of an overall strategy to ensure universal health coverage (including access to quality sexual and reproductive health and rights) and achieve the SDGs. Key to this achievement is for governments to increase national budgets and harness domestic resources to address fistula through a multisectoral approach. In addition, the global community needs to urgently and dramatically intensify financial and technical support to nations with the greatest need.

4 | WHAT MUST BE DONE?

To end fistula, we must ensure universal access to quality sexual and reproductive health services and comprehensive health care including fistula treatment. Crucial interventions that will contribute to eliminating fistula and to making the “invisible” women and girls affected by fistula, visible, include:

- Strengthening health systems
- Implementing and monitoring costed national strategies for eliminating fistula
- Integrating fistula into national SDGs implementation plans and operational processes to achieve the SDGs
- Strengthening national task forces for fistula
- Securing significantly increased, predictable, sustained, and adequate financial support (ensuring that a higher proportion of resources reach young women and girls)
- Strengthening awareness-raising and advocacy
- Improving research and data
- Holistic social reintegration and follow-up and empowerment for survivors (including engaging them as advocates, enhancing their voices and leadership)
- Increased focus on social determinants that affect the well-being of women and girls, including eliminating gender-based social and economic inequities; preventing child marriage and early childbearing; promoting education and broader human rights
- Fostering community participation in finding solutions, including through the active involvement of men as well as seeking the help of fistula survivors as advocates
- Monitoring and evaluation of programs to end fistula.

To end fistula within a decade, every new case of fistula should be prevented and every woman or girl suffering from fistula should receive
the treatment, follow-up, social reintegration, and rehabilitation support she needs. Prevention is the "best medicine" and is key to ending fistula. The same interventions that prevent fistula could also save many of the women and babies who die or are stillborn each year due to complications of pregnancy or childbirth. Women with fistula most often suffer the "double tragedy" of losing their babies, who are stillborn or die soon after birth.6

Healthy women mean healthier infants, children, families, communities, and societies. Yet, millions of women and girls still cannot access sexual and reproductive health information and services and exercise their rights. The UNFPA is the leading UN agency for sexual, reproductive, maternal, newborn, and adolescent health, galvanizing global commitment to end unmet need for family planning, end preventable maternal deaths, and end gender-based violence and harmful practices against women and girls. UNFPA has launched a strategy to promote and protect maternal/newborn survival and well-being, including ending fistula. This strategy includes: family planning to prevent unintended pregnancies and enable women to space their pregnancies in a healthy manner; quality, skilled, accessible, and culturally appropriate care for all women during pregnancy, delivery, and the postnatal period (including through its global midwifery program, which is active in over 120 countries); and equitable access to high-quality, timely, emergency obstetric and newborn care for those who need it.

UNFPA has helped transform thousands of lives by supporting more than 105 000 surgeries to repair fistula. And Campaign to End Fistula partners have supported thousands more. Yet, despite remarkable progress since the Campaign's launch in 2003, we remain far from the goal of preventing every single case of fistula from occurring in the first place and from reaching, treating, and supporting the countless hundreds of thousands of women and girls around the world who are already suffering from fistula and who continue to wait in agony and suffer in silence. Tragically, at the current rate of progress, many women and girls may die without ever being treated.

5 | TO SUCCEED OR NOT TO SUCCEED: THE CHOICE IS OURS

As highlighted in the Lancet article "High-quality health systems in the Sustainable Development Goals era: time for a revolution," high-quality health care for all is achievable and a sensible investment, but the political will to make it happen is essential.7 If health systems delivered high-quality care to all those in need, it is estimated that over 8 million lives could be saved each year in low- and middle-income countries. Yet, sadly, people continue to receive poor-quality care, and the situation is worst among the poorest and most vulnerable.

While obstetric fistula typically affects the poorest and most marginalized women and girls around the world, these women and girls are not powerless. They are strong, resourceful, and resilient. They just need to be given a chance… a chance to have their human right to health, dignity, and bodily integrity respected. A chance for an education and a decent livelihood. A chance to benefit from high-quality, life-saving health care, and social protection when they need it. As in the case of Ms Fiona Kevin Nalubwama, a fistula survivor from Uganda who (with support from the UNFPA/Campaign to End Fistula and Operation Fistula), after years of struggling with poverty, indignity, and near despair, recently enrolled in a school to become a midwife. This is what the SDGs are all about.

The world is at a critical crossroad in the struggle to achieve equality, dignity, and social justice for all. Those who yield power (politically, financially) hold within their hands the ability to make a difference and to heal and rectify centuries of discrimination against the poor and vulnerable. The time is now.8

AUTHOR CONTRIBUTIONS

EA conceived the article and prepared the first draft. BA contributed to writing key sections of the manuscript and GL added key inputs and revised the draft. All authors revised and approved the final manuscript.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES


Challenges in the field of obstetric fistula

Ajay Rane1,*  |  Andrew Browning2,3  |  Peter Majinge4  |  Rachel Pope5

1James Cook University, Townsville, Qld, Australia
2FIGO (International Federation of Gynecology and Obstetrics), FIGO Fistula and Genital Trauma Committee, London, UK
3Maternity Africa, Arusha, Tanzania
4Comprehensive Community Based Rehabilitation in Tanzania (CCBRT), Dar es Salaam, Tanzania
5Division of Global Women’s Health, Department of Obstetrics and Gynecology, Baylor College of Medicine, Houston, TX, USA

*Correspondence
Ajay Rane, 1 James Cook Dr, Douglas Qld 4814, Australia.
Email: ajayarane@jcu.edu.au

Abstract
Thirteen years after the last supplement on obstetric fistula, the authors challenge the progress achieved. Citing the ongoing need for a standardized classification system, uniform surgical training and certification, evaluation, follow-up, and research, we emphasize the need for improved communication and coordination between government and nongovernment entities invested in ending obstetric fistula. Struck by the call by the United Nations to end obstetric fistula by 2030, we stress the need for increased and targeted funding of programs that are of the highest quality and impact.

KEYWORDS
End fistula; Obstetric fistula; UNFPA; Vesicovaginal fistula

1 | BACKGROUND

The authors reviewed the 2007 FIGO Supplement on the prevention and treatment of obstetric fistula and found it provocative reading. Thirteen years on, the list of “achievements” could be pages long; however, in reality, have we made any progress? Are we asking the difficult questions that we should be asking? Many of the needs addressed in the 2007 Supplement remain current issues in our field. These needs include a standardized classification system, uniform training and certification of surgeons, evaluation and follow-up of outcomes, setting of research protocols, and the uniform setting of communication links.

Despite the many organizations and institutions working in the field of obstetric fistula, there is little collaboration and coordination of efforts. Leadership is needed to make greater strides to end obstetric fistula. Furthermore, the United Nations has set a goal to end obstetric fistula by 2030. The risks of such an ambitious goal are that it might encourage haste, unwarranted risk-taking, inaccurate data, and pressure on countries and organizations to achieve a goal on “paper” that does not reflect reality. However, the advantage of such a lofty goal is that more attention is focused on the issue, intensifying resourcing and creating an opportunity to standardize the approach to ending fistula. This article provides an outline of where efforts need to be strengthened and where funding needs to correlate.

2 | A STANDARDIZED CLASSIFICATION SYSTEM

A common language is needed for surgeons and health facilities to communicate surgical techniques and procedures for women with obstetric fistula. Standardized terminology is also needed to understand research conducted at diverse settings and to compare outcomes. This is a basic surgical tenet that is used in complex medical conditions such as gynecologic cancers and endometriosis. Obstetric fistula is a similarly complex, heterogeneous condition that language is needed to convey both the injury, as seen by any surgeon, and the repair that is required. Both FIGO and the...
International Society of Fistula Surgeons (ISOFS) are governing bodies that could assist in creating a uniform classification system. To begin the conversation on ending obstetric fistula, we need to speak the same language.

3 | UNIFORM TRAINING AND CERTIFICATION

Some years back the term "fistula tourism" was coined. The concept and problems surrounding it still exist. Tourism happens when well-meaning—but sometimes misguided—surgeons come from nonfistula-affected countries to perform and teach fistula surgery in areas that are affected by obstetric fistula. They rapidly realize that, without adequate training and experience in the field, they are out of their depth and the local surgeons are too polite to say so. We have seen and heard of camps where visiting surgeons have come at great expense—promoting their good work back in their own countries—only to leave every woman they operate on still leaking; patients and hospital staff are left dismayed and the chance of the patient being cured is all the more remote owing to the failed operation. Worse still, there have been circumstances where the visiting teams have disrupted the national fistula programs to suit their own needs. Rogue camps and surgeons can cause more harm than good. When camps are set up in facilities not accustomed to providing care for fistula patients, the preoperative, intraoperative, and postoperative care is suboptimal. Fistula centers and experienced surgeons should be leading fistula repairs in facilities that are best equipped to offer care for this special patient population.

Additionally, in many countries there are local surgeons offering fistula repair who have not had adequate training. In some of the worst scenarios they charge women exorbitant costs to have surgery that is often unsuccessful. It is imperative that each country’s ministry of health monitors the provision of fistula repairs to protect the rights of women with obstetric fistulae. Through FIGO and the Baylor College of Medicine/Texas Children’s Hospital, training programs exist for surgeons and nonphysician clinicians in settings where there are no surgeons available. It would be prudent for each country’s ministry of health to work with these entities to standardize training and certification for those offering surgical repair to women with obstetric fistula. Moreover, the multiple funding entities involved in the obstetric fistula arena should coordinate with ministries of health to fund only those individuals who are certified. Women with obstetric fistulae have been through enough trauma and should not be traumatized further by inexperienced and unskilled surgeons.

4 | EVALUATION, FOLLOW-UP, AND RESEARCH

Much of the research on obstetric fistula surrounds the lived experience and very little is robust research on surgical procedures. One of the biggest issues in our field is residual urethral incontinence—affecting approximately 33% of women with healed fistulae. The pathology is very different from women who have incontinence without history of fistula and limited research has taken place to help understand it. There have been incremental developments in preventing and treating the problem, and thus, the myriad approaches that have been developed to treat it make it clear that we still do not have the answer.

Women with obstetric fistulae have experienced a lack of access to the most basic of medical technologies: monitoring of labor and cesarean delivery. This injustice should not translate to a lack of access to innovation. There are biological and tissue engineering innovations in high-resource settings that could enhance the quality of life for women with fistulae, especially in the area of urethral incontinence. However, as various techniques are developed, adequate follow-up is needed to evaluate the long-term outcomes. Without uniform evaluation and follow-up of patients, including core outcomes, it is impossible to know whether we are making progress in any area.

Evidence suggests that in many countries there is an alarming increase in iatrogenic fistula patients. Reasons for this are multiple and more research is needed. It is likely that improved surgical training and skill-building are also needed. If this area is not addressed, it will only stymie the efforts to end fistula.

5 | COMMUNICATION

Communication between governments and nongovernment entities invested in ending fistula is needed to train clinicians to prevent fistulae and repair those that have already occurred, generate evidence based on surgical techniques, and fuel innovations to improve the quality of life of women living with fistulae.

With the goal to end obstetric fistula by 2030, targeted and adequate funding is needed. In much of the international development community, the issue of "sustainability" is discussed. However, if obstetric fistula is a problem to be eradicated, our efforts do not need to be "sustainable," but rather impactful and long-standing. To repair the backlog of cases in a successful way, we need to fund the trained and certified surgeons so that the majority of cases are healed at the first attempt. Funding is needed to train additional surgeons to a standardized skill level so that more women can access high-quality surgery. Follow-up and evaluation will keep all entities on the right track. To prevent new cases, maternal health systems need ongoing support to bring basic obstetric care to all women.

Communication is needed to coordinate the various organizations and ministries of health to perform optimally. We have 10 years to reach the goal of ending obstetric fistula by 2030. Are we willing to do it?
AUTHOR CONTRIBUTIONS

AR, AB, and RP conceived the concept for the manuscript. All authors contributed to drafting, editing, and finalizing the manuscript.

ACKNOWLEDGMENTS

The authors would like to thank FIGO, ISOFS, and Baylor College of Medicine/Texas Children’s Hospital for support. Thanks also to Ms Gillian Slinger for inspiring and advising on some of the content of this manuscript.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

Addressing the fistula treatment gap and rising to the 2030 challenge

Gillian Slinger* | Lilli Trautvetter

Abstract
Obstetric fistula is a neglected public health and human rights issue. It occurs almost exclusively in low-resource regions, resulting in permanent urinary and/or fecal incontinence. Although the exact prevalence remains unknown, it starkly outweighs the limited pool of skilled fistula surgeons needed to repair this childbirth injury. Several global movements have, however, enabled the international community to make major strides in recent decades. FIGO’s Fistula Surgery Training Initiative, launched in 2012, has made significant gains in building the capacity of local fistula surgeons to steadily close the fistula treatment gap. Training and education are delivered via FIGO and partners’ Global Competency-based Fistula Surgery Training Manual and tailored toward the needs and skill level of each trainee surgeon (FIGO Fellow). There are currently 62 Fellows from 22 fistula-affected countries on the training program, who have collectively performed over 10,000 surgical repairs. The initiative also contributes to the UN’s Sustainable Development Goals (1, 3, 5, 8, 10, and 17). The UN’s ambitious target to end fistula by 2030 will be unobtainable unless sufficient resources are mobilized and affected countries are empowered to develop their own sustainable eradication plans, including access to safe delivery and emergency obstetric services.

KEYWORDS
Capacity building; FIGO; Fistula; Holistic care; Obstetric fistula; Surgery; Sustainable Development Goals (SDGs); Training

1 | INTRODUCTION

Obstetric fistula, caused by unrelieved obstructed labor, results in a hole between the vagina and the bladder and/or rectum. The condition leads to chronic incontinence and continues to be a serious public health concern in sub-Saharan Africa and Asia. Fistulae occur in contexts with a high maternal mortality ratio where expectant mothers do not have access to emergency obstetric care and other essential maternal/reproductive health services. The condition causes severe psychosocial, physical, and economic distress and has been classed as a violation of internationally recognized human rights. It is estimated that around two million women and girls in 60 under-resourced countries currently live with a fistula and that between 50,000 and 100,000 new cases develop each year. The main curative treatment remains corrective surgery; however, due to a global shortage of fistula surgeons, current treatment rates indicate that only one woman in 50 receives a fistula repair.

Key global movements to help eradicate obstetric fistula include UNFPA’s Campaign to End Fistula (2003); the International Society of Obstetric Fistula Surgeons (ISOFS, 2008); the Global Fistula Map established by Direct Relief, Fistula Foundation, and UNFPA; and the UN’s International Day to End Obstetric Fistula (2013), which is observed on...
May 23 each year. While these efforts have been invaluable in putting obstetric fistula on the global health agenda, a systematic and standardized training approach was still required to train the next generation of competent fistula surgeons and to meet the treatment gap. FIGO (the International Federation of Gynecology and Obstetrics), together with partners identified this need and decided to act.

2 | BACKGROUND

The two long-standing factors impeding fistula treatment work were the absence of a widely agreed curriculum for fistula surgeons, and a coordinated international training program for fistula surgeons. To overcome these two obstacles, FIGO convened leading authorities from the fistula world (including expert surgeons and international agencies) to address the global treatment gap with a two-tiered approach: education and training.

- In 2011, after numerous stakeholder meetings, releasing the world's first standardized curriculum—FIGO and partners' Global Competency-based Fistula Surgery Training Manual—to train fistula surgeons.\(^9\)
- In 2012, launching the Fistula Surgery Training Initiative\(^10\)—an ambitious multyear program with the aim of training more fistula surgeons (using the Competency-Based Manual) to considerably increase the number of skilled fistula surgeons in affected countries so that significantly more women receive treatment.

After introducing the new Training Manual in workshops to more than 50 fistula surgeons and trainers in Africa and Asia, five busy, well-functioning fistula treatment facilities were identified as FIGO Training Centers in Ethiopia, Tanzania, Kenya, and Nigeria (two centers). Then, following strict selection criteria (Box 1), in collaboration with ministries of health, hospital management teams, and multiple partners, FIGO started to recruit local fistula surgeon trainees (Fellows) on to the program, focusing exclusively on building national capacity to boost fistula treatment work in high-burden countries.

Using the Training Manual, a Fellow’s skills in fistula surgery (and care of affected women) are methodically developed over time and through three ascending levels of competency: standard, advanced, and expert. This takes place with a series of training placements in the identified training centers, as well as coaching visits from a FIGO Trainer in Fellows’ home environments. This process complements Fellows’ existing clinical roles, while aiming to cause minimal disruption to their existing work and hospital schedules.

As Fellows come from various medical disciplines, including obstetrics and gynecology, urology, and general surgery, they have widely differing professional responsibilities, of which fistula treatment is just one component. A flexible training approach is therefore essential and can be tailored to meet the needs of each trainee, allowing additional study or placements away from usual work settings without the Fellow losing their place on the training program. This supplied training system accommodates Fellows’ career progression while ensuring their continued development as a fistula surgeon, thereby optimizing investment in the initiative and—directly in line with the aim of the program—ensuring fistula treatment is provided for substantially more women in the long term.

As the project has grown, two objectives have been developed that correspond to both short- and long-term goals:

1. Short-term objective
   To strengthen fistula treatment capacity in each affected country by developing an appropriate pool of trained, competent fistula surgeons who can accelerate efforts to address the fistula treatment gap and thereby treat significantly more women in that country.

2. Long-term objective
   To develop a group of Fellows to Trainer level—to reinforce the pool of FIGO trainers—to scale up global treatment efforts by helping to train more fistula surgeons (and holistic care teams) in their own country and internationally.

3 | ACHIEVEMENTS

Great progress has been made since the initiative began, with some notable achievements listed below:

- 62 Fellows recruited from 22 high-burden countries (Table 1 and Fig. 1).
- Collectively the Fellows have performed more than 10,000 fistula surgeries to date, with a success rate of 84%.
- Tailored coaching visits provided to over 30 Fellows, helping them to refine their skills.
- Certification mechanism set up, in line with the Training Manual, through which more than 50 Fellows have attained the standard level of competency in fistula surgery (of whom many are now working toward the advanced level); 13 Fellows have attained the advanced level of competency in fistula surgery (of whom several are now working toward the expert level).
- 9 multidisciplinary healthcare teams admitted for training in holistic care of fistula patients.
- 50 high-quality fistula instrument sets and more than 30 surgical head torches supplied to Fellows via the pioneering FIGO-Medical Aid International Equipment Alliance.\(^11\)
- Comprehensive Kaizen e-Portfolio monitoring and evaluation system\(^12\) established to track Fellows’ progress and program impact. This allows Fellows and trainers to submit information directly, including training assessment forms, and quarterly data containing Fellows’ repair numbers and surgical outcomes. This method also creates robust feedback loops, helping the project team to make data-driven decisions and to consistently weave in lessons learned.
- Expert Advisory Group (EAG) created, comprised of the project team and FIGO trainers, to provide consensus and expert guidance to the evolving program, which has grown significantly in recent years both in terms of size and complexity.
- Substantial increase in requests being received from sponsors, including national and international nongovernmental organizations and UN entities, to train more Fellows and care teams.
- Vast network of collaborating partners developed and being coordinated, including fistula treatment facilities, training centers, authorities, and patient recruitment teams in Africa and Asia.
Box 1 | Selection criteria for FIGO Fellows.

- Must be a qualified physician with a minimum of 3 years’ surgical experience
- Must originate from and be in full-time clinical work in a fistula-affected country
- Must have a proven track record and strong commitment to caring for women with fistula
- Must be available to undergo 6 weeks of initial training then subsequent coaching
- Assurance must be provided by the Ministry of Health and hospital management that the Fellow will be able to continue providing fistula treatment after the initial training placement on return to their home country
- Must be committed to the care of women who have incurred obstetric fistula and to upholding women’s basic rights to privacy, dignity, safety, and self-determination
- Must be prepared to apply, immediately and on a long-term basis, the skills gained during training placements/coaching sessions and upon returning to their home environment
- Robust references must be provided directly to FIGO by recognized fistula surgeon(s)

Note: The selection decision is taken jointly by the FIGO team with the appointed training center

4 | MEETING THE SUSTAINABLE DEVELOPMENT GOALS AND THE 10-YEAR COUNTDOWN

Since the launch of the UN’s Sustainable Development Goals (SDGs) in 2015,13 FIGO’s Fistula Surgery Training Initiative has been making crucial contributions to the Global Development Agenda 2030. While the program supports the advancement of women’s sexual and reproductive health, rights, and prosperity in some of the most underserved and marginalized communities, contributions are particularly relevant to SDG 3 (good health and well-being pertaining to women’s sexual and reproductive health and rights, as well as newborn, child, and adolescent health) and SDG 5 (gender equality). Furthermore, as the Initiative is providing life-changing care and enhanced life opportunities for some of the poorest, most disadvantaged women on the planet, it also plays a role in achieving SDG 1 (no poverty), SDG 8 (decent work and economic growth), SDG 10 (reduced inequalities), and SDG 17 (partnerships).

At the end of 2018, the UN challenged its member states to end obstetric fistula by 2030.14 Without question, even though the global eradication of obstetric fistula is long overdue, achieving this goal within a decade is extremely ambitious, particularly with the current infrastructure, and limited human as well as financial resources.

It has long been known that the key to eradicating obstetric fistula is to change the multiple systems currently failing so many women. To do this, each fistula-affected country should develop its own eradication strategy that is costed, well-resourced, time-bound, and built into a framework supporting gender equality and the socioeconomic development of women and girls.

Furthermore, it is necessary that the implementation of such strategies takes place at a national, regional, and local level, for which governmental support and leadership are mandatory to ensure sustained success. Any such strategies are to be carefully monitored and will ideally encompass awareness raising, prevention of (first and subsequent) obstetric fistula, availability of treatment services, and collaborative partnerships.

Integrated into a human rights-based approach, awareness raising and prevention of obstetric fistula would preferably start at a preadolescent age so that girls, women, and men are empowered to make informed decisions. Moreover, affordable, accessible, and safe emergency obstetric services are required so that expectant mothers do have a choice and can prepare accordingly.13,14

Fistula treatment networks and referral systems also need to expand so that even patients in the most remote locations have the chance of a surgical repair by a trained, competent fistula surgeon. In addition, countries with decades of experience and dedicated specialist fistula task forces should be encouraged to share their rich expertise with those that are further behind, to avoid delaying progress.

TABLE 1 | Country of origin of FIGO Fellows currently on the training program (October 2019)

<table>
<thead>
<tr>
<th>Country</th>
<th>Number of Fellows</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Afghanistan</td>
<td>2</td>
</tr>
<tr>
<td>2. Angola</td>
<td>1</td>
</tr>
<tr>
<td>3. Bangladesh</td>
<td>3</td>
</tr>
<tr>
<td>4. Burundi</td>
<td>1</td>
</tr>
<tr>
<td>5. Chad</td>
<td>2</td>
</tr>
<tr>
<td>6. Democratic Republic of Congo</td>
<td>4</td>
</tr>
<tr>
<td>7. Gambia</td>
<td>2</td>
</tr>
<tr>
<td>8. Ghana</td>
<td>4</td>
</tr>
<tr>
<td>9. Kenya</td>
<td>6</td>
</tr>
<tr>
<td>10. Madagascar</td>
<td>1</td>
</tr>
<tr>
<td>11. Nepal</td>
<td>4</td>
</tr>
<tr>
<td>12. Nigeria</td>
<td>13</td>
</tr>
<tr>
<td>13. Pakistan</td>
<td>1</td>
</tr>
<tr>
<td>14. Rwanda</td>
<td>3</td>
</tr>
<tr>
<td>15. Somalia</td>
<td>2</td>
</tr>
<tr>
<td>16. Somaliland</td>
<td>1</td>
</tr>
<tr>
<td>17. Sudan</td>
<td>1</td>
</tr>
<tr>
<td>18. South Sudan</td>
<td>1</td>
</tr>
<tr>
<td>19. Tanzania</td>
<td>2</td>
</tr>
<tr>
<td>20. Uganda</td>
<td>2</td>
</tr>
<tr>
<td>21. Yemen</td>
<td>2</td>
</tr>
<tr>
<td>22. Zambia</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>62</td>
</tr>
</tbody>
</table>

| TABLE 1 | Country of origin of FIGO Fellows currently on the training program (October 2019) | Number of Fellows |
|---------|------------------|
| 1. Afghanistan | 2 |
| 2. Angola | 1 |
| 3. Bangladesh | 3 |
| 4. Burundi | 1 |
| 5. Chad | 2 |
| 6. Democratic Republic of Congo | 4 |
| 7. Gambia | 2 |
| 8. Ghana | 4 |
| 9. Kenya | 6 |
| 10. Madagascar | 1 |
| 11. Nepal | 4 |
| 12. Nigeria | 13 |
| 13. Pakistan | 1 |
| 14. Rwanda | 3 |
| 15. Somalia | 2 |
| 16. Somaliland | 1 |
| 17. Sudan | 1 |
| 18. South Sudan | 1 |
| 19. Tanzania | 2 |
| 20. Uganda | 2 |
| 21. Yemen | 2 |
| 22. Zambia | 4 |
| Total | 62 |
FIGURE 1 Global reach of the FIGO fistula surgery training initiative.
The Fistula Treatment Chain must be reliably funded, functioning, and coordinated.

**Figure 2** The Fistula Treatment Chain.
5 | LESSONS LEARNED AND FUTURE PRIORITIES

Training more fistula surgeons—and multidisciplinary health teams—is crucial to helping women with fistulae, but it must be part of a system-wide approach, “the fistula treatment chain” (G. Slinger, oral communication, December 2018), with the involvement of local authorities and multiple partners to ensure quality care is available and accessible for affected women. Furthermore, the vital training component (of fistula surgeons and holistic care teams) is an essential link in the treatment chain. But to make certain that more affected women receive treatment in a sustainable manner, all links in the chain must be reliably funded, functioning, and coordinated. Experience repeatedly shows, through collaborative efforts, that such mechanisms make the best use of limited resources and bring in high patient numbers, yet it only needs one link in the fragile chain to fail (e.g. through lack of funding) and the whole system breaks down (Fig. 2).

Developing competencies in fistula surgery requires appropriate time and funding. This is not a single training event, but an ongoing process to build skills gradually, while allowing for changes in Fellows’ circumstances and making every effort to integrate fistula treatment activities into local health programs. While striving to close the fistula treatment gap, Fellows are encouraged to do more fistula repairs with supportive measures. But they are never pressurized to increase their repair numbers “at any price,” as this could potentially compromise patient safety, disrupt local health schedules, and lead to data distortions.

Evidence shows that combined efforts of diverse surgical disciplines and broader training methods can certainly enhance fistula repair work. However, because of the complexity of fistula surgery, and the long-standing neglect of women with the condition—making them one of the hardest to reach, most vulnerable groups—it is essential to maintain a focused fistula community and a focused training program, such as the FIGO Fistula Surgery Training Initiative, to prevent lapses in progress and to close the global treatment gap.

In direct collaboration with partners at all levels, and with ongoing support from the EAG, in the next phase, the training program aims to:

- Admit new Fellows/health teams from neglected countries.
- Provide ongoing training/coaching for existing Fellows to help them attain advanced and expert levels, then to become FIGO trainers with the ability to train many others and to adopt the FIGO and partners’ training curriculum (as appropriate) in their country and region.
- Identify additional training centers in francophone Africa and Asia.
- Convene surgical workshops for Fellows and trainers.
- Continue refining and supplying specialized fistula equipment to Fellows, as well as making the materials available at reduced rates to the broader fistula community through the FIGO–Medical Aid International Equipment Alliance.
- Strengthen the fistula treatment chain in collaboration with partners.
- Identify research gaps to reinforce the evidence base for all issues relating to fistula.

6 | CONCLUSION

Expanding the limited pool of fistula surgeons to provide life-transforming fistula repairs to women in some of the world’s most neglected contexts, FIGO’s Fistula Surgery Training Initiative is clearly demonstrating the effectiveness of its two-tiered approach through education and training. With the indispensable support of the dedicated FIGO Fellows, trainers, and EAG, plus an extensive network of collaborating partners, the program is rising to the challenge and making a significant contribution to bridging the fistula treatment gap, and to the Global Development Agenda 2030.

Although progress has undeniably been made in the last 20 years to bring attention to obstetric fistula, the fistula community has a daunting decade ahead if the SDG target to end fistula by 2030 is to be met. With the current set-up, and woefully insufficient funding across the sector, this is a monumental challenge and bold steps are required to move nearer this goal. FIGO calls to action governments to take decisive measures by developing fistula elimination plans, mobilizing resources, and addressing the underlying drivers perpetuating social, economic, and gender disparities leading to obstetric fistula. Although the 2030 target appears far from achievable, it nevertheless represents a unique opportunity that should be embraced and not ignored, so that those women who are currently furthest behind are not failed.

More information about the program and the Fistula Surgery Training Initiative Newsletter are available at: https://www.figo.org/fistula.

AUTHOR CONTRIBUTIONS
GS and LT contributed equally to the conception and design of the article. Both authors drafted the work, revised it critically for intellectual content, and provided final approval of the submitted manuscript.

CONFLICTS OF INTEREST
The authors have no conflicts of interest.

REFERENCES
Knowledge of obstetric fistula among prenatal clinic attendees and midwives in Mfantsiman municipality, Ghana


1School of Medicine, University of Health and Allied Sciences, Ho, Ghana  
2School of Public Health, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana  
3Department of Obstetrics and Gynecology, Komfo Anokye Teaching Hospital, Kumasi, Ghana  
4School of Medical Sciences, University of Cape Coast, Cape Coast, Ghana  
5School of Medicine and Dentistry, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

*Correspondence
Wisdom K. Azanu, Department of Obstetrics and Gynecology, University of Health and Allied Sciences, Ho, Volta Region, Ghana. Email: wisdomazanu@gmail.com; wazanu@uhas.edu.gh

Abstract

Objective: To determine obstetric fistula knowledge among prenatal attendees and midwives in Mfantsiman municipality, Ghana.

Methods: An analytical cross-sectional study was conducted among prenatal clinic attendees and midwives in Mfantsiman municipality from March to April, 2016. Women were selected by systematic sampling and consenting midwives were recruited. Respondents were interviewed using a pretested structured questionnaire. Data were analyzed using the $\chi^2$ test and Poisson regression with a robust error variance to generate relative risks (RRs) with 95% confidence intervals (CIs). $P<0.05$ was considered statistically significant.

Results: Altogether, 393 prenatal attendees and 45 midwives were studied. Mean age of attendees was 28.1 ± 7.1 years. About 29% of prenatal attendees knew of, 37.2% had poor knowledge of, and 56.6% had some misconceptions about obstetric fistula. Women who had attained some level of education (P trend=0.001), were employed (adjusted RR 4.92; 95% CI, 1.98–12.21), or had given birth before (P trend=0.01) were more likely to have heard of obstetric fistula. All midwives knew of obstetric fistula and its preventive measures; however, up to 73.3% had some misconceptions about it.

Conclusion: Educating prenatal attendees and organizing regular refresher courses on obstetric fistula for midwives should be a priority in the municipality.

KEYWORDS
Midwives; Obstetric fistula; Obstructed labor; Prenatal attendees; Prolonged labor; Supervised delivery

1 | INTRODUCTION

Obstetric fistula is a complication that arises from prolonged and obstructed labor without prompt medical care.1 It puts considerable strain on the health of affected women as a result of associated fecal and/or urinary incontinence. Obstetric fistula is largely confined to low-resource countries owing to inadequate utilization of health services and a nonavailability of maternity services.2,3 At a fistula hospital in Ethiopia, over 90% of fistula cases occurred after prolonged (duration of labor more than 1 day) or obstructed labor; the stillbirth rate was also over 90%.4 The World Health Organization (WHO), estimates that between 50 000 and 100 000 women develop obstetric fistula each year and over 2 million women currently live with the condition. An incidence rate as high as 10 per 1000 births has been reported in sub-Saharan Africa.5

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2020 The Authors. International Journal of Gynecology & Obstetrics published by John Wiley & Sons Ltd on behalf of International Federation of Gynecology and Obstetrics
Africa. A recent survey estimated the annual incidence of obstetric fistula in Ghana to be 1.6–1.8 per 1000 deliveries, with the Central Region having one of the highest incidence rates. These are largely deemed to be underestimates, as most cases go unreported owing to the associated stigma.

Access to a skilled birth attendant at delivery and emergency obstetric care are critical for preventing obstetric fistula. Although prenatal clinic attendance is very high in Ghana (97% for at least one visit), the number of deliveries conducted by skilled birth attendants is much lower (74%). Up to 30% of deliveries in the Central Region (where the study was conducted) take place outside a health facility despite high prenatal care attendance rates. Supervised delivery rates could be improved if expectant mothers understood the complications associated with prolonged and obstructed labor, including fistula. There are limited data on knowledge of obstetric fistula among prenatal clinic attendees and healthcare providers in communities in Ghana where the condition is prevalent, such as Mfantsiman municipality. This municipality has the highest prevalence of obstetric fistula cases in the Central Region. The aim of the present study was to assess knowledge of obstetric fistula among prenatal clinic attendees and midwives in Mfantsiman municipality.

2 | MATERIALS AND METHODS

An analytical cross-sectional study was conducted among prenatal clinic attendees and midwives at the two main hospitals (District and Mercy Women’s Hospital) and all five health centers in Mfantsiman municipality, Ghana, from March 15 to April 30, 2016.

Mfantsiman municipality is located on the Atlantic coast of the Central Region, comprising around 300 km². Its administrative capital is Saltpond. The municipality has a total population of 144,332, of which 55% is female; approximately 50% (39,402) of the female population is of reproductive age (15–49 years). Nearly two-thirds (65%) of the population live in urban localities and the remaining 35% live in rural areas.

The primary level of care in Ghana has three sublevels: community, health center, and district hospital. The district hospital is the first referral point and handles many more patients than the two other sublevels. The municipality has five subdistricts, each of which has a health center. The two main hospitals in the municipality are the District Hospital at Saltpond and Mercy Women's Hospital at Mankessim. The latter has a fistula center. There were 33 regular midwives with 12 additional rotation midwives (national service personnel) in the municipality at the time of study, making a total of 45 midwives.

All prenatal clinic attendees and midwives in the municipality within the study period were eligible for inclusion in the study. Expectant mothers or midwives who declined consent to participate were excluded. Prenatal attendees with obstetric complications were also excluded.

The study was approved by the Committee on Human Research, Publication, and Ethics (CHRPE) of Kwame Nkrumah University of Science and Technology. Participation in the study was entirely voluntary and informed consent was obtained from each woman. For minors (girls under 18 years of age), informed consent and assent were obtained from the parent/guardian and the woman, respectively.

2.1 | Sample size estimation

An estimated sample size of 390 had adequate power of 80% to detect knowledge of obstetric fistula among prenatal clinic attendees in the municipality, assuming the proportion of attendees with knowledge of obstetric fistula in the municipality was similar to the 36% reported in Burkina Faso. The number of women recruited from each facility was calculated in proportion to the reported prenatal care attendance for the first half of 2015. All 45 midwives in the municipality were invited to participate in the study.

2.2 | Sampling and procedure for data collection

Eligible women were selected by systematic sampling using the prenatal clinic attendance list for each day as the sampling frame. The sampling interval (x) for each day was obtained by dividing the number of attendees to be recruited that day by the total number (N) of eligible attendees at the clinic that day. The first case (y) was selected by simple random sampling through ballot. The rest of the participants were then obtained by y + x, y + 2x, y + 3x, etc. Where a selected woman was not available at the time of the interview or declined consent, the next eligible woman on the attendance list for that day was selected.

Eligible women were approached individually by a member of the research team who explained the purposes and benefits of the study and obtained informed consent. Consenting attendees and midwives were interviewed individually and data collected on their sociodemographic and reproductive characteristics, and knowledge of obstetric fistula using a pretested structured questionnaire.

Knowledge of obstetric fistula was assessed by evaluating responses to 11 questions on fistula including the causes, risk factors, and prevention of obstetric fistula. Each correct answer was assigned a score of +1 while each incorrect or undecided (“don’t know”) response attracted a score of 0. The scores for each woman were summed and categorized.

2.3 | Data analysis

Data were double entered into Epi Info version 7.1.1.14 (CDC, Atlanta, GA, USA) and exported to Stata version 12.0 (Stata Corp, College Station, TX, USA) for analysis. The knowledge scores for each woman were categorized as follows: 0–3 (low); 4–6 (average); and 7–11 (high). Women with low scores were considered to have poor knowledge while those with average or high scores were considered to have good knowledge of obstetric fistula. Data were summarized using descriptive statistics and charts. Categorical variables were compared using the χ² or Fisher exact test as appropriate. Factors associated with awareness of obstetric fistula among prenatal clinic attendees were assessed by calculating crude and adjusted relative
risks (RRs) with corresponding 95% confidence intervals (CIs) using univariate and multivariate Poisson regression with a robust error variance. P < 0.05 was considered statistically significant.

3 | RESULTS

A total of 393 prenatal clinic attendees and all 45 midwives in the municipality were recruited into the study. The midwives were of different categories, comprising 12 rotation midwives, 26 staff midwives, two senior staff midwives, and five midwifery officers. The mean age of the clinic attendees was 28.1 ± 7.1 years (range, 15–48 years). Nearly half (n = 304) were married/cohabiting or employed (n = 314). Median parity (n=189, 48%) was in their 20s and about 11% (n=44) were over 30. Nearly half (n=189, 48%) were in their 20s and about 11% (n=44) were over 30. Median parity (n=189, 48%) was in their 20s and about 11% (n=44) were over 30.

TABLE 1 Sociodemographic characteristics and type of health facility attended by women attending prenatal care clinics in Mfantsiman municipality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>No. (%) (n=393)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td></td>
</tr>
<tr>
<td>15–19</td>
<td>44 (11.2)</td>
</tr>
<tr>
<td>20–29</td>
<td>189 (48.1)</td>
</tr>
<tr>
<td>≥30</td>
<td>160 (40.7)</td>
</tr>
<tr>
<td>Educational levela</td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>32 (8.2)</td>
</tr>
<tr>
<td>Basic education</td>
<td>252 (64.3)</td>
</tr>
<tr>
<td>Secondary and higher education</td>
<td>108 (27.5)</td>
</tr>
<tr>
<td>Marital statusa</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>88 (22.4)</td>
</tr>
<tr>
<td>Married/cohabiting</td>
<td>304 (77.6)</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>79 (20.1)</td>
</tr>
<tr>
<td>Semiskilled</td>
<td>272 (69.2)</td>
</tr>
<tr>
<td>Skilled</td>
<td>42 (10.7)</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>77 (19.6)</td>
</tr>
<tr>
<td>1</td>
<td>120 (30.5)</td>
</tr>
<tr>
<td>≥2</td>
<td>196 (49.9)</td>
</tr>
<tr>
<td>Type of facility</td>
<td></td>
</tr>
<tr>
<td>Health center</td>
<td>153 (38.9)</td>
</tr>
<tr>
<td>Hospital</td>
<td>240 (61.1)</td>
</tr>
</tbody>
</table>

a Missing data from one (0.3%) attendee.
TABLE 2 Factors associated with awareness of obstetric fistula among women attending prenatal care clinics in Mfantsiman municipality.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Awareness of obstetric fistula (n=113)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. (%)</td>
<td>Crude RR (95% CI)</td>
</tr>
<tr>
<td>Age, y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–19</td>
<td>6 (13.6)</td>
<td>1</td>
</tr>
<tr>
<td>20–29</td>
<td>53 (28.0)</td>
<td>2.06 (0.94–4.48)</td>
</tr>
<tr>
<td>≥30</td>
<td>54 (33.8)</td>
<td>2.48 (1.14–5.38)</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No formal education</td>
<td>6 (18.8)</td>
<td>1</td>
</tr>
<tr>
<td>Basic education</td>
<td>50 (19.8)</td>
<td>1.06 (0.49–2.27)</td>
</tr>
<tr>
<td>Secondary and higher education</td>
<td>57 (52.8)</td>
<td>2.81 (1.34–5.92)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>12 (13.6)</td>
<td>2.44 (1.45–4.22)</td>
</tr>
<tr>
<td>Married/cohabiting</td>
<td>101 (33.2)</td>
<td>1</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>6 (7.6)</td>
<td>3.63 (1.64–8.03)</td>
</tr>
<tr>
<td>Semiskilled</td>
<td>75 (27.6)</td>
<td>10.0 (4.56–22.07)</td>
</tr>
<tr>
<td>Skilled</td>
<td>32 (26.2)</td>
<td>1.86 (1.13–3.09)</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>14 (18.2)</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>31 (25.8)</td>
<td>1.42 (0.81–2.50)</td>
</tr>
<tr>
<td>≥2</td>
<td>68 (34.7)</td>
<td>1.91 (1.14–3.18)</td>
</tr>
<tr>
<td>Type of facility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health center</td>
<td>40 (26.1)</td>
<td>1</td>
</tr>
<tr>
<td>Hospital</td>
<td>73 (30.4)</td>
<td>1.16 (0.84–1.62)</td>
</tr>
</tbody>
</table>

4 | DISCUSSION

Less than one-third of prenatal care clinic attendees had heard of obstetric fistula, nearly 40% of whom had poor knowledge and over half had misconceptions about its risk factors. Significant factors associated with being aware of the condition were educational background, occupation, and parity. Poor knowledge was associated with lower educational level, being single, unemployed, or receiving prenatal care in a hospital. Although most midwives were knowledgeable of the risk factors for obstetric fistula, up to three-quarters associated some basic reproductive health services with its occurrence.

The less than 30% rate of awareness in this study is comparable to the low rates reported in most countries in sub-Saharan Africa. However, it is lower than the 45% awareness rate reported in Northern Ghana, and 44%–61% in other parts of Africa. The higher awareness rate observed in some of the previous studies may be attributed to prior educational campaigns on obstetric fistula and conducting the study among fistula patients or participants with prior exposure to information on the condition. For example, in Northern Ghana where fistula is relatively common, more educational campaigns are directed toward these populations. These may have accounted for the higher level of awareness of obstetric fistula in Northern Ghana.

Less than half of the women who had heard of fistula in our study obtained their information from the health facility or healthcare provider, suggesting that discussions on fistula may not have been an integral component of prenatal care in most facilities in the municipality. It is also conceivable that information on fistula provided by healthcare providers may not have been very accurate as the majority of these providers had some misconceptions about the condition. Owing to the much smaller number of patients seeking care at health centers, they tend to have better health provider–patient contacts and interactions. This probably explains why expectant mothers who received care in the health centers had better knowledge of obstetric fistula compared with their counterparts in the hospitals.

Knowledge of the causes and risks factors for obstetric fistula among women who had heard of the condition could generally be described as low. These findings are consistent with those of a recent nationwide survey in which obstetric fistula was commonly attributed to adultery, sorcery, evil spirits, or bad luck. Similar findings have been reported across Africa. These misconceptions have implications for the uptake of reproductive health services, which is worrisome. For instance, should some of these women develop obstetric fistula, they may not seek treatment from the hospitals, but rather go to so-called spiritual healing centers. More than half of the women associated obstetric fistula with reproductive tract conditions and services, which
TABLE 3  Sociodemographic characteristics and poor knowledge and misconceptions among women attending prenatal care clinics who had heard of obstetric fistula (n=106).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Poor knowledge (n=42)</th>
<th>Misconceptions (n=64)</th>
<th>P value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, y</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15–19</td>
<td>3 (50.0)</td>
<td>5 (71.4)</td>
<td>0.64</td>
<td>0.51</td>
</tr>
<tr>
<td>20–29</td>
<td>21 (39.6)</td>
<td>34 (64.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥30</td>
<td>18 (33.3)</td>
<td>25 (47.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Educational level</strong></td>
<td></td>
<td></td>
<td>0.03</td>
<td>0.69</td>
</tr>
<tr>
<td>No formal education</td>
<td>4 (66.7)</td>
<td>3 (42.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic education</td>
<td>23 (46.0)</td>
<td>30 (55.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary and higher</td>
<td>15 (26.3)</td>
<td>31 (59.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
<td>0.004</td>
<td>0.46</td>
</tr>
<tr>
<td>Single</td>
<td>9 (75.0)</td>
<td>8 (66.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/cohabiting</td>
<td>33 (32.7)</td>
<td>56 (55.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Occupation</strong></td>
<td></td>
<td></td>
<td>0.01</td>
<td>0.38</td>
</tr>
<tr>
<td>Unemployed</td>
<td>4 (66.7)</td>
<td>4 (57.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Semiskilled</td>
<td>33 (40.0)</td>
<td>41 (52.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skilled</td>
<td>5 (15.6)</td>
<td>19 (67.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Parity</strong></td>
<td></td>
<td></td>
<td>0.14</td>
<td>0.36</td>
</tr>
<tr>
<td>0</td>
<td>4 (28.6)</td>
<td>9 (75.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>16 (51.6)</td>
<td>19 (57.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≥2</td>
<td>22 (32.4)</td>
<td>36 (52.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type of facility</strong></td>
<td></td>
<td></td>
<td>0.05</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Health center</td>
<td>10 (25.0)</td>
<td>11 (24.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospital</td>
<td>32 (43.8)</td>
<td>53 (77.9)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The study has some limitations. It was conducted in an area with a fistula center, therefore awareness of obstetric fistula in this population is likely to be relatively higher and should not be extrapolated to the general population. In addition, women who did not attend prenatal care were excluded. Therefore, the findings of this hospital-based study cannot be generalized to the entire population of pregnant women in the municipality. Finally, the number of midwives in the municipality was relatively small making it difficult to compare levels of knowledge of obstetric fistula across the different categories.

In conclusion, awareness of obstetric fistula among prenatal care clinic attendees in this municipality with a fistula center is relatively low and most attendees had some misconceptions regarding the condition’s risk factors. Although midwives generally had good knowledge, some had misconceptions, indicating a gap between midwives’ knowledge and perception. Therefore, there is an urgent need to educate women more regularly on obstetric fistula during prenatal care. Regular refresher courses on obstetric fistula should also be organized for midwives to update their knowledge and help dispel some of their misconceptions.

AUTHORS CONTRIBUTIONS

WKA, ETD, EKA, AAO, and HSOA conceived and designed the study. WKA collected the data. WKA and ETD analyzed the data. All authors read and approved the final manuscript.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES


A review of surgical procedures to repair obstetric fistula

Rachel Pope* | Meghan Beddow

Division of Global Women's Health, Department of Obstetrics and Gynecology, Baylor College of Medicine, Houston, TX, USA

*Correspondence
Rachel Pope, Division of Global Women's Health, Department of Obstetrics and Gynecology, Baylor College of Medicine, Houston, TX, USA.
Email: Rachel.pope@bcm.edu

1 | INTRODUCTION

Although obstetric fistula affects an estimated 2 million women worldwide, the oldest compendium of published surgical research is astoundingly sparse. The oldest evidence of the condition was found in a mummy dating back to 2050 BC. Written accounts of obstetric fistula have been described, including a 10th-century description by Ibn Sina, who related it to perineal injuries. More detailed descriptions of obstetric fistula were recorded in 1597; however, no further mention was made until the next century, when surgeons throughout Europe and the USA competed to devise methods of surgical repair, albeit with limited and rare success.

In 1663, van Roonhuyse of Amsterdam described his technique of denuding the tissues and using suture to close the defect. In 1752, Fatio of Switzerland reported using sharpened quills to reapproximate tissue. A "tension-free repair" was first hinted at in 1834, when French surgeon de Lamballe described his steps to reduce the strain on the sutures by making wide lateral incisions on the vagina. The cure for a vesicovaginal fistula was described as the "rarest of occurrences" by Deiffenbach in 1845.

Although ethically reprehensible, J. Marion Sims published a successful closure rate of 73% by denuding the edges of the fistula to the bladder mucosa, suturing the fistula closed with silver wire and clamps, and decompressing the bladder with a catheter. Sims' pupil, Thomas Emmet, published their work in 1868, making one of the first substantive contributions to the medical literature regarding fistula surgery.

Nearly a century and a half later (2020) we continue to function in a field without robust surgical writing and evidence. Many gaps in our practice are due to the unique challenges associated with conducting the studies and work necessary in the settings and populations affected by obstetric fistula. Kelly and Winter advocate for more clustered randomized controlled trials on obstetric fistula, specifically its treatment; however, they do acknowledge the difficulties in randomization. In addition, iatrogenic fistula seems to be on the rise in many countries where obstetric fistula is prevalent, leading to a need for more research into the prevention and treatment of these injuries as well. The aim of the present article is to review the most relevant current literature on surgical aspects of obstetric fistula, including a delineation of what is still unknown, highlighting the need for further investigations to contribute to refinement of our surgical practice.

2 | CLASSIFICATION AND OUTCOMES

Using a uniform language to describe a condition enables sharing of medical knowledge and description of a procedure. Frążyngier et al. examined prognostic values of classification systems for surgical closure of genitourinary fistula and found them to be "poor to fair." Goh's classification system predicts the risk of failure in fistula patients with scar and circumferential defects. It also demonstrates that fistulae near the external urethral orifice (EUO) are more likely to result in residual incontinence. Waaldijk's classification is based on the effect on the urethral closing mechanism, followed by size, representing increasingly...
difficult surgical technique from type I to III.8 There are various other classification schemes in existence, with unknown prevalence of use.9

Designation of one universal classification would assist the comparison of research and clinical outcomes across a variety of settings.

Published rates of successful surgical closure of obstetric fistula are high (80%–97%).10–12 In a series of 384 patients, Ouedraogo et al.10 reported success rates of 92% for “easy” cases, 68% for “intermediate” cases, and 57% for those deemed “difficult.” Repair outcomes have been associated with the duration of the fistula before surgery, fistula size, bladder size, circumferential fistula or those with urethral involvement, HIV status, and moderate to severe vaginal scarring.11–13

3 | BLADDER DECOMPRESSION AND TIMING OF CLOSURE

Although specific criteria are lacking, use of a catheter is recommended prior to surgical intervention: in early recognition (less than 1 month following development) to allow for spontaneous vesicovaginal fistula (VVF) healing, or in an individual at high risk for developing VVF after prolonged obstructed labor. Tayler-Smith et al.14 and Waaldijk15 reported healing rates of 11% and 15%, respectively, in small, early VVF with prolonged catheterization (6 weeks).

Traditionally, surgeons have waited 3 months after a vaginal delivery to operate, allowing time for spontaneous closure and for granulation tissue to disappear. However, both Waaldijk16 and Raassen et al.17 documented success with immediate operation on “fresh fistulae” rather than waiting. The closure rates in their samples were 95.2% (n=1633) and 93% (n=91), respectively, at first attempt. Waaldijk15 also discussed immediate surgery after a period of catheterization. The catheter remains until the fistula edge is no longer necrotic, at which time the fistula is repaired. Closure rates of 91.8% (n=156) using this timing for repair are also encouraging.

The management of iatrogenic fistula is debatable. Lo et al.18 report that iatrogenic fistulae are less likely to close spontaneously with bladder decompression, owing to location and size, and advise early transabdominal closure of this type. A recent meta-analysis on iatrogenic VVF demonstrated that 8% of patients treated with bladder decompression experienced spontaneous closure.19 The same meta-analysis noted a 93% success rate for vaginal closure, while avoiding the morbidity of an abdominal approach. For juxtacervical fistula, Chigbu et al.20 found that there was no difference in outcomes between the abdominal route versus the vaginal route. More information is needed to discern which fistula types and factors would lend to healing with catheterization versus surgery. Operating sooner rather than later has the great potential for reducing stigma and social isolation for women with obstetric fistula.

4 | SURGICAL TECHNIQUE

Surgical technique is described in multiple textbooks; however, scientific evidence behind technique is lacking. The vaginal approach to repair an obstetric fistula is generally described and preferred by most surgeons.21,22 The suture material selected and number of layers used for closure have not been studied in a systematic way; however, retrospective data demonstrate no superiority using two layers when controlled for bladder size.23

For circumferential fistula, experienced surgeons stress the importance of circumferential anastomosis.24 Urethral fistula and residual fistula were commonly repaired using the Martius graft. However, two retrospective reviews demonstrated no difference in fistula closure using the graft, but an increase in urethral incontinence.25,26 Therefore, this procedure should no longer be commonplace in obstetric fistula surgery.

More recently, fasciocutaneous and muscle flaps have been used for vaginal reconstruction and to provide a better chance of continence.27,28 As described by Pope et al.,27 the blood supply and innervation are maintained in the fasciocutaneous flap (Singapore flaps); this technique is reproducible in low-resource settings, with a relatively short operative time and no need for postoperative molds since it is a true flap, not a graft. However, as a more extensive surgery, patient selection is necessary.

Browning et al.28 described success with the Singapore skin flap used prophylactically with Goh type 4cii fistulae: 46% of women were dry compared with an expected 19%. In a series of women with leakage following previous fistula closure—some of whom had had multiple prior surgeries and significantly distorted anatomy—the Singapore flap provided 71% dryness compared with an expected 26%.28

The gracilis muscle flap may be used to augment fistula repair and is now being studied for efficacy in the setting of obstetric fistula. In a study of patients with complex fistulae (i.e. residual and recurrent fistulae, short urethras, small bladders, significant fibrosis, and thin bladder muscularis, all of whom were likely to fail standard fistula repair), 95% of patients were dry immediately following repair using the gracilis muscle flap.29 Preliminary follow-up results show increased continence in patients who received both a Singapore and gracilis flap at time of repair.

The first attempt is still widely considered to be the best chance for success, likely due to tissue and healing factors, which supports the idea of centralization of care in centers of excellence, especially for complex cases.11 Women who experience failure of the first repair likely have more complex fistulae, making the first repair less successful and each successive repair more difficult. If a patient requires a repeat procedure it is often performed in the same fashion as the first attempt. However, limited evidence indicates that incorporating a gracilis muscle flap may lead to improved outcomes.29 Other innovations for complex fistulae are needed.

5 | POSTOPERATIVE CATHETERIZATION

Traditionally, a Foley catheter is maintained in place after fistula repair to allow proper tissue healing without tension from bladder distention. The necessary length of catheterization time is debated, and three studies have been published on this. Barone et al.30...
conducted a randomized controlled trial of 7 versus 14 days for postoperative catheter duration. While no inferiority was determined, this study excluded “not simple cases,” yet included those with previous repairs, which are known to have worse outcomes. Nardos et al.\textsuperscript{31} described 212 patients who had a Foley catheter in place for 10, 12, and 14 days in a study from Ethiopia. The more complicated the fistula, the longer the Foley catheter remained. As breakdown rates for those with catheters in place for 10 days was 1.5%, the authors concluded that this may be sufficient time for simple fistulae. The group catheterized for 12 days had no breakdowns. The authors went on to prospectively randomize patients to 10 and 14 days of catheter duration, excluding circumferential fistula and residual fistula after previous failed repair.\textsuperscript{32} There was no significant difference in repair success, demonstrating the lack of inferiority of 10 days catheterization for fistula repairs that are not repeat surgeries or circumferential.

6 | URETERIC STENTS

Intraoperative ureteral stent placement is a common procedure among fistula surgeons; however, there is no consensus on the length of time that the stent should remain in situ following the procedure. There must be a balance between the prevention of obstruction/occlusion of the ureters and the risk of pyelonephritis caused by this foreign body. As the morbidity of pyelonephritis may lead to immediate poor outcomes (i.e. sepsis, acute kidney injury) and in the long term to chronic renal insufficiency and hypertension, this is an area of study that is worth exploring further.

7 | RECTOVAGINAL FISTULA

Rectovaginal fistula (RVF) is also considered obstetric fistula; it is often present concomitantly with VVF and likely represents worse or longer obstructed labor. A true RVF must be differentiated from a chronic fourth-degree perineal laceration, for which many women will present with similar symptoms. There is little published information on the surgical techniques and outcomes of RVF alone or in the presence of VVF, although there is more literature from high-resource countries on overall management. In a retrospective study of patients in Ethiopia, Browning and Whiteside\textsuperscript{35} described successful closure with a flap-splitting technique, avoiding the use of diverting colostomies or grafts.

8 | ACHIEVING “CURED” STATUS

No standardized definition of “cured” has been established. While this is often considered the same as “dry,” we know that even when a fistula is closed completely, a woman may experience urinary incontinence from intrinsic sphincter deficiency, stress incontinence, or leaking from a variety of other causes.

Browning\textsuperscript{34} found that urethral involvement resulted in an odds ratio (OR) of 8.4 (95% CI, 3.9–17.9) for ongoing incontinence. Other factors leading to ongoing incontinence include a small bladder following repair (<5 cm depth from external urethral orifice; OR 4.1; 95% CI, 1.2–13.8), vaginal scarring (OR 2.4; 95% CI, 1.5–4.0), and larger fistula size—with each centimeter increase in diameter of fistula size, there was an increased OR of 1.3 (95% CI, 1.16–1.56) for ongoing incontinence. There was no association between ongoing incontinence and the length of time elapsed since the delivery that caused the fistula.

While many centers do not examine patients postoperatively at all, a 1-hour pad weight test may be useful in determining true “cure,” as the source of the leakage often does not matter to the patient. However, a dye test and pad weight can differentiate between a leaking fistula and urethral leakage and therefore inform patient management.

Kopp et al.\textsuperscript{35} examined 346 women after fistula repair to determine a significant pad weight for incontinence. They determined that a 1-hour pad weight after catheter removal of less 1.5 g had a positive predictive value of 94% (95% CI, 90.0–96.9) in predicting ongoing incontinence.

9 | ANTI-INCONTINENCE PROCEDURES

Anti-incontinence procedures after fistula repair have not been shown to greatly improve continence status. The most common techniques include autologous fascia slings (i.e. fascia lata and rectus fascia), vaginal pubococcygeal slings, and synthetic slings. The rate of erosion with synthetic slings is unacceptably high, and while autologous fascia slings may help some women, they are also at risk of erosion.\textsuperscript{36,37} Browning\textsuperscript{38} described a prophylactic fibromuscular sling (pubococcygeal sling) used to treat patients with Goh 3 and 4 fistulae (involving the urethra) and larger than 1 cm; there was a decrease in urethral incontinence from 55% (n=44) in patients without the sling to 39% (n=272) in patients with it.

Pope et al.\textsuperscript{39} published a randomized controlled trial comparing prophylactic rectus fascia slings with pubococcygeal slings for individuals at highest risk for residual stress incontinence. Results for rectus fascia slings were promising, although long-term follow-up was a challenge, resulting in no difference between the slings. An autologous sling that maintains its vascular supply could potentially improve upon these outcomes.

Both periurethral and autologous fat bulking have been explored for women with urethral incontinence after obstetric fistula repair; however, the results are limited to 2 weeks after the procedure.\textsuperscript{40,41} Urethral plugs have been used widely as an alternative therapy to additional surgery.\textsuperscript{42} Plugs have been found to help 75.7% of women leaking urine from the urethra after successful fistula repair;\textsuperscript{42}, however, the manufacturer of the most commonly used urethral plug has ceased production, resulting in many women without further access to this modality.

10 | VAGINAL RECONSTRUCTION

Vaginal reconstruction is also likely to be necessary to achieve “cure” from the symptoms of obstetric fistula. Wall et al.\textsuperscript{43} estimated that
approximately 30% of fistula patients require vaginoplasty at the same time as surgery owing to lack of adequate healthy vaginal tissue or distorted anatomy from the amount of scarring that has taken place. A recent study found that about one-third of patients felt that intercourse returned to its pre-fistula state after surgical repair.44 In this cohort, 12% (n=14) experienced de novo sexual dysfunction, half of whom attributed this to pain and half to ongoing incontinence during intercourse. A fistula of more than 3 cm in diameter and a decreased vaginal caliber were associated with sexual dysfunction postoperatively. Only one paper thus far has documented reconstructive techniques.27

11 | URINARY DIVERSION FOR IRREPARABLE FISTULA

The ethics surrounding urinary diversion have been debated owing to a series of unknown variables surrounding follow-up and long-term outcomes—significant morbidity and mortality can result from these procedures. The outcome of an international symposium on the topic suggested that only expert fistula surgeons are qualified to deem a woman irreparable by traditional standards, and the procedure should only be offered if appropriate long-term medical follow-up is possible.45

12 | CONCLUSION

The repair of obstetric fistula, though studied for hundreds of years, is a subset of surgical expertise that lacks evidence-based guidance. Obstetric fistulae are a heterogeneous group, with a variety of surgical approaches and outcomes yet to be described. Many experiences of expert surgeons are not submitted for publication, therefore limiting accessibility. An effort must be made to share best practices among the surgeons who care for these women to advance our field and offer the procedures with the best possible outcomes. Continued commitment to sharing ideas, innovations, and experiences will help to move our field forward and provide the highest quality care to some of the most vulnerable women in the world—those living with obstetric fistula.

AUTHOR CONTRIBUTIONS

RP conceived the article’s concept. RP and MB drafted and edited the manuscript.

ACKNOWLEDGMENTS

We thank the Baylor College of Medicine/Texas Children’s Hospital for their overall support of our work.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

The mobile surgical outreach program for management of patients with genital fistula in the Democratic Republic of Congo

Raha Maroyi1,2,* | Laura Keyser3 | Lauren Hosterman3 | Amisi Notia1 | Denis Mukwege1,2

1Department of Urogynecology, Panzi General Referral Hospital, Bukavu, Democratic Republic of Congo
2Faculty of Medicine, Evangelical University in Africa, Bukavu, Democratic Republic of Congo
3Mama, LLC, Canton, MA, USA

*Correspondence
Raha Maroyi, Mushununu, Panzi, Bukavu, Democratic Republic of Congo.
Email: ken.raha01@gmail.com

Abstract
Objective: To describe components of the mobile surgical outreach (MSO) program as a model of care delivery for women with genital fistula; present program results; and discuss operational strengths and challenges.

Methods: A retrospective observational study of routinely collected health data from women treated via the MSO program (2013–2018). The program was developed at Panzi Hospital in the Democratic Republic of Congo to meet the needs of women with fistula living in remote provinces, where travel is prohibited. It includes healthcare delivery, medico-surgical training, and community sensitization components.

Results: The MSO team cared for 1517 women at 41 clinic sites across 18 provinces over the study period. Average age at presentation was 31 years (range, 1–81 years). Most women (n=1359, 89.6%) presented with vesicovaginal fistula. Most surgeries were successful, and few women reported residual incontinence postoperatively. Local teams were receptive and engaged in clinical skills training and public health education efforts.

Conclusion: The MSO program addresses the backlog of patients awaiting fistula surgery and provides a template for a national strategic plan to treat and ultimately end fistula in DRC. It offers a patient-centered approach that brings medico-surgical care and psychosocial support to women with fistula in their own communities.

KEYWORDS
Community outreach; Democratic Republic of Congo; Genital fistula; Mobile surgical outreach; Surgical training

1 | INTRODUCTION

Female genital fistula is often a direct result of inadequate obstetric health services for women with obstructed labor; congenital, iatrogenic, and genital trauma represent other less frequent causes.1–3 Women with fistula suffer physical, socioeconomic, and psychological consequences and experience a high level of disability, which further limits their access to adequate health services and skilled surgical care.4–6 The Democratic Republic of Congo (DRC) is a country characterized by weak maternal health indicators; the World Bank reports a fertility rate of 6 births per woman and a maternal mortality ratio of 550 per 100 000 live births.7 Additionally, the vast size of the DRC, ongoing insecurity, extreme poverty, and poor infrastructure further compound barriers to health care.8 Despite efforts to improve...
obstetric care, many women lack access to sufficient perinatal care and suffer complications from childbirth, including genital fistula.\(^7\)

It is difficult to estimate the incidence and prevalence of fistula in DRC as the majority of the country's 77 million people live in rural areas that are difficult to reach and significantly underdeveloped.\(^9\) Political instability, conflict, and inadequate investment in health infrastructure further contribute to this lack of data. In 2018, the DRC's Ministry of Health reported 42,000 women with genital fistula are awaiting surgical care.\(^10\) However, a national strategic policy for fistula prevention and treatment does not exist to address this significant burden.\(^3\) As a result, women with fistula often suffer for years with the associated primary and secondary health consequences while waiting for surgical care.\(^5,11\)

The Panzi General Reference Hospital in eastern DRC was established in 1999 as a tertiary care facility with specialization in obstetrics and gynecology. Since its inception, thousands of women have received surgical care for repair of gynecologic injuries, including fistula.\(^12\) In 2011, Panzi Hospital developed a surgical outreach program after receiving two women who had walked over 1000 km to receive care. Recognizing geographical barriers and persistent insecurity in much of the country, hospital staff worked to create mobile surgical teams to bring skilled health services to patients living in remote areas, so that other women might avoid making such an arduous and potentially life-threatening journey to reach the hospital.

The objectives of the present paper are to describe the components of the Panzi Hospital mobile surgical outreach (MSO) program as a model of care delivery for women with fistula; to present data highlighting the program's scope and clinical impact; and to discuss operational strengths and challenges to program sustainability and expansion.

2 | MATERIALS AND METHODS

This paper provides a retrospective descriptive study of programmatic information across MSO sites. The Ministry of Health and South Kivu Province Ethics Committee approved this program and publication of its description and results.

2.1 | A model for healthcare delivery for women with fistula

The Panzi Hospital MSO program organizes mobile teams, each consisting of two surgeons, one surgical assistant, one nurse, and one anesthetist. Outreach trips occur annually or biannually for most sites, depending on the volume of cases and available resources. Site selection occurs in a two-step process: (1) identification of accessible hospitals in strategic locations; and (2) initial visit and site readiness assessment.

2.1.1 | Site selection and site readiness

Sites may be identified by Panzi Hospital staff by first considering regional health zones and then surveying general hospitals within each zone to determine the volume of fistula cases in that region, as well as whether the local hospital meets the necessary minimum requirements for site selection (Box 1). Alternatively, sites may contact Panzi Hospital to request the MSO team given the number of fistula cases presenting in a particular area. This may be initiated by the general hospital in the region or by community organizations, such as churches, civil society agencies, or women's networks, who express the need for fistula services. Once a site has been identified, a contractual agreement is signed, which commits the MSO team to provide skilled surgical care, including consultation, surgical supplies, medications, and a 3-month postoperative follow-up visit. Panzi Hospital also provides transportation and hygiene kits for each patient. The local reference hospital agrees to participate in community sensitization efforts, to support patient care, and to provide space, including operating theater and beds for women to recover for 2–4 weeks postoperatively.

<table>
<thead>
<tr>
<th>Box 1 Minimum necessary requirements for site selection.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Surgical capacity</strong></td>
</tr>
<tr>
<td>• Adequate light source</td>
</tr>
<tr>
<td>• Adaptable operating table allowing for patient positioning</td>
</tr>
<tr>
<td>• Power generator</td>
</tr>
<tr>
<td>• Sterilization equipment for surgical materials</td>
</tr>
<tr>
<td>• Stock of saline solution for IV fluids</td>
</tr>
<tr>
<td><strong>Patient monitoring</strong></td>
</tr>
<tr>
<td>• Minimum 1 each (doctor, nurse) to assist in operating theater and participate in skills training</td>
</tr>
<tr>
<td>• Minimum 2 nurses dedicated to postoperative monitoring (day/night shifts)</td>
</tr>
<tr>
<td>• One nurse dedicated to translating patient medical histories</td>
</tr>
<tr>
<td>• Capacity to hold 50 patients (beds)</td>
</tr>
<tr>
<td><strong>Local emergency committee</strong></td>
</tr>
<tr>
<td>Consists of the following members with well-defined roles:</td>
</tr>
<tr>
<td>• Medical Director: oversees operating theater conditions, manages physician staff</td>
</tr>
<tr>
<td>• Nursing Director: responsible for pre- and postoperative nursing activities and scheduling</td>
</tr>
<tr>
<td>• Local religious leader and community representative: relay important information to patients, their families, and the community related to outreach activities; responsible for organizing patient meals</td>
</tr>
<tr>
<td><strong>Laboratory</strong></td>
</tr>
<tr>
<td>• Capacity for blood draw and testing</td>
</tr>
<tr>
<td>• Blood storage</td>
</tr>
</tbody>
</table>
In advance of the MSO team’s arrival, Panzi Hospital sends 1–2 staff to evaluate hospital conditions, including the operating theater and inpatient capacity. This small team also begins a 2–3-week community sensitization campaign to identify women with fistula and to educate the public about the health services and surgical care provided by the MSO team. This is done collaboratively with the local ministry of health and community leaders. In an effort to reach women living in remote villages, messages are delivered via radio broadcasts, in churches, markets, and other community forums, informing women of the date and location for consultation with the MSO team.

The MSO program includes three key aspects: (1) medico-surgical care; (2) training of local healthcare teams; and (3) community outreach.

2.1.1.1 | Medico-surgical care

Each woman with fistula receives medico-surgical care and psychological treatment with the goal of restoring mental and physical well-being and re-establishing her role and participation in society. On arrival at the hospital, all women undergo a medical examination by a physician from Panzi Hospital. Fistula diagnosis is confirmed with pelvic examination and a methylene blue dye test. The MSO team utilizes the Panzi score to categorize severity of cases. Simple fistula cases (score of 0) are scheduled for surgery; complex cases (score 1, 2, or 3) or those with co-morbidities, such as malnutrition, HIV, or active infection are referred to Panzi Hospital for treatment. Counseling is provided by the physician during the initial consultation, and further supported by trusted community leaders as needed.

Patient consultations are ongoing as patients arrive and include the evaluation and preoperative anesthetic assessment. Conservative management is offered as appropriate. Surgeries are then scheduled each day thereafter for a period of 14–21 days, depending on case volume. Up to 10 surgeries may be performed each day, though on average, the team performs 6–7 surgeries per day for the duration of their visit. Postoperative nursing care is initiated by a member of the MSO team, who works with local nursing staff to ensure each woman is monitored appropriately for complications.

Prior to discharge, each patient receives outpatient counseling regarding sexual activity guidelines, contraception, and future pregnancies. She also receives a summary card of the care received (i.e., fistula type, surgical route, complications, medications, pertinent medical history). This facilitates monitoring of patients at the 3-month postoperative appointment.

2.1.1.2 | Training of local healthcare teams

In an effort toward sustainability, the MSO program involves training of local staff at each site. Initially, the local healthcare teams were brought to Panzi Hospital for training at two separate 3-month intervals, spaced 3 months apart. In 2016, this approach was modified to better identify local healthcare staff with keen interest and the commitment to learning required for program success and sustainability. The MSO team now provides on-site training to the local teams over a period of 2–4 weeks, during outreach visits, while simultaneously providing medico-surgical care to women with fistula. The local teams then complete training at Panzi Hospital for a period of 3 months. This visit is typically scheduled within 3 months after completion of the outreach visit.

The local teams include doctors, laboratory technicians, nurses, midwives, and nurse anesthetists. Training includes prevention of fistula and pre- and postoperative care for women undergoing fistula repair. The local surgeon is trained in the repair of simple fistula cases and vaginal prolapse surgery, when resources are available. Training of nurse anesthetists has also become a key component of training, increasing local capacity to provide emergency obstetric services, including safe cesarean deliveries, thus contributing to fistula prevention efforts.

Such training efforts aim to build local capacity to identify and treat women with fistula, as well as those with pelvic organ prolapse, and to encourage referral of complex cases appropriately to Panzi Hospital.

2.1.1.3 | Community outreach

Community outreach begins during the site selection process, as outlined above, and continues during the MSO visit. The Panzi Hospital team works alongside local hospital staff to ensure that each patient is educated about her condition and course of treatment. She can also discuss concerns related to her physical and mental health and psychosocial and economic circumstances. Family members are invited to attend educational sessions at the hospital to improve their understanding of causes, treatment, and prevention of fistula.

After the initial MSO visit, community engagement and sensitization responsibilities are transferred from Panzi Hospital to the community. Women who have received treatment from the MSO team often become living testimonials, educating their communities and dispelling myths that fistula is a result of sorcery or witchcraft. The local health ministry, church, and civil society leaders also continue to raise awareness about prevention and treatment of fistula, and the local partner hospital continues to keep a roster of new cases, communicating with Panzi Hospital the volume of cases.

3 | RESULTS

Records from 2013 to 2018 were available for review. Data available by site varies due to challenges with documentation and data storage, and some information was missing or inconsistent. Efforts were made to reconcile patient information by crosschecking Panzi Hospital and partner site records and addressing discrepancies with local health staff when possible. Results presented here provide a summary of patient characteristics and surgical outcomes.

From 2013 to 2018, the MSO team provided care for 1517 women at 41 clinic sites across 18 provinces. Table 1 presents annual number of cases and patient demographic information. Average age at presentation was 31 years (range, 1–81 years); younger patients (<10 years) largely represent congenital cases or, less frequently, instances of sexualized violence. Most women had little to no formal education and worked as farmers. Table 2 reports clinical characteristics, etiology and type of fistula, and surgical outcomes. Gynecologic and obstetric history were obtained through patient interviews, and thus recall bias
and low health literacy may influence responses. Median age at first delivery was 18 years. Approximately 25% of women indicated a subsequent pregnancy after fistula had developed. Most women reported having had at least one previous surgery. Similarly, most women reported understanding fistula as a health problem often related to pregnancy and delivery.

In addition to incontinence, associated symptoms were also reported. Forty-six percent of women presented with genital irritation due to chronic urine exposure, and 38% complained of sexual pain. The incidence of foot drop reported across sites was high (31.5%). It is the impression of the MSO team that foot drop was not always determined by clinical examination, and patient reports of difficulty walking or lower extremity fatigue may confound this number.

Most women (n=1359, 89.6%) presented with vesicovaginal fistula. Most surgeries successfully closed the fistula, and few women reported residual incontinence, although this was often assessed early postoperatively and may not accurately reflect outcomes at 3 months and beyond. Feedback from patients and local staff has been positive. In addition, Panzi Hospital has built capacity to send four surgical teams on outreach trips at one time.

### TABLE 1

<table>
<thead>
<tr>
<th>Year treated</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>35 (2.3)</td>
</tr>
<tr>
<td>2014</td>
<td>272 (18.1)</td>
</tr>
<tr>
<td>2015</td>
<td>208 (13.8)</td>
</tr>
<tr>
<td>2016</td>
<td>367 (24.4)</td>
</tr>
<tr>
<td>2017</td>
<td>222 (14.8)</td>
</tr>
<tr>
<td>2018</td>
<td>399 (26.5)</td>
</tr>
<tr>
<td>Average treated per year</td>
<td>251</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Married</td>
<td>930 (66.0)</td>
</tr>
<tr>
<td>Single</td>
<td>77 (5.5)</td>
</tr>
<tr>
<td>Divorced/separated</td>
<td>282 (20.0)</td>
</tr>
<tr>
<td>Widowed</td>
<td>120 (8.5)</td>
</tr>
<tr>
<td>Average age</td>
<td>31.2</td>
</tr>
<tr>
<td>Median age</td>
<td>31</td>
</tr>
<tr>
<td>Range</td>
<td>1–81</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education level</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>617 (43.1)</td>
</tr>
<tr>
<td>Some primary</td>
<td>515 (36.0)</td>
</tr>
<tr>
<td>Primary completed</td>
<td>95 (6.6)</td>
</tr>
<tr>
<td>Some secondary</td>
<td>166 (11.6)</td>
</tr>
<tr>
<td>Secondary or above</td>
<td>38 (2.7)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Profession</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer</td>
<td>1015 (72.1)</td>
</tr>
<tr>
<td>Homemaker</td>
<td>260 (18.5)</td>
</tr>
<tr>
<td>Teacher</td>
<td>15 (1.1)</td>
</tr>
<tr>
<td>Commerce</td>
<td>46 (3.3)</td>
</tr>
<tr>
<td>Other</td>
<td>71 (5.0)</td>
</tr>
</tbody>
</table>

### TABLE 2

<table>
<thead>
<tr>
<th>Type of fistula and surgical outcomes.</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gynecological and obstetric history</td>
<td></td>
</tr>
<tr>
<td>Age at first delivery, y</td>
<td>n=1214</td>
</tr>
<tr>
<td>Average</td>
<td>16.3</td>
</tr>
<tr>
<td>Median</td>
<td>18</td>
</tr>
<tr>
<td>Range</td>
<td>0–45</td>
</tr>
<tr>
<td>Reported previous operation (n=1339)</td>
<td>774 (57.8)</td>
</tr>
<tr>
<td>No. of previous operations</td>
<td>n=774</td>
</tr>
<tr>
<td>Average</td>
<td>1.6</td>
</tr>
<tr>
<td>Median</td>
<td>1</td>
</tr>
<tr>
<td>Range</td>
<td>1–9</td>
</tr>
<tr>
<td>Pregnancy after fistula developed (n=1362)</td>
<td>362 (26.6)</td>
</tr>
<tr>
<td>Reported history of rape (n=1517)</td>
<td>8 (0.5)</td>
</tr>
<tr>
<td>Current gynecologic health status</td>
<td></td>
</tr>
<tr>
<td>Understands fistula as a health problem (n=1389)</td>
<td>938 (67.5)</td>
</tr>
<tr>
<td>Etiology of fistula</td>
<td>n=1517</td>
</tr>
<tr>
<td>Obstetric</td>
<td>1116 (73.6)</td>
</tr>
<tr>
<td>Iatrogenic</td>
<td>370 (24.4)</td>
</tr>
<tr>
<td>Congenital</td>
<td>23 (1.5)</td>
</tr>
<tr>
<td>Associated symptoms</td>
<td>n=1517</td>
</tr>
<tr>
<td>Genital irritation</td>
<td>701 (46.2)</td>
</tr>
<tr>
<td>Sexual pain</td>
<td>539 (38.3)</td>
</tr>
<tr>
<td>Vaginal bleeding</td>
<td>161 (11.2)</td>
</tr>
<tr>
<td>Foot drop</td>
<td>287 (19.9)</td>
</tr>
<tr>
<td>Type of fistula</td>
<td>n=1517</td>
</tr>
<tr>
<td>Vesicovaginal fistula</td>
<td>1359 (89.6)</td>
</tr>
<tr>
<td>Rectovaginal fistula</td>
<td>149 (9.8)</td>
</tr>
<tr>
<td>Both</td>
<td>39 (2.5)</td>
</tr>
<tr>
<td>Surgical outcome</td>
<td>n=1413</td>
</tr>
<tr>
<td>Closed fistula</td>
<td>1309 (92.6)</td>
</tr>
<tr>
<td>Residual incontinence</td>
<td>30 (2.1)</td>
</tr>
<tr>
<td>Failed, open fistula</td>
<td>75 (5.3)</td>
</tr>
</tbody>
</table>

### 4 | DISCUSSION

The Panzi Hospital MSO program has reached women with fistula residing in 18 of the 26 provinces in DRC. While data collection and long-term follow up remain challenging, program results across 5 years indicate positive surgical outcomes and successful community sensitization campaigns. The program, developed to address many of the barriers to health care faced by women living in DRC, has evolved since its inception, as both areas of strength and opportunities for improvement of care delivery were identified. Box 2 summarizes the
Box 2 Strengths, lessons learned, and challenges of the mobile surgical outreach program.

Strengths and lessons learned during program implementation

Stakeholder involvement
- Panzi Hospital and local health workers, patients and their families, community leaders engaged in program development and implementation
Quality care
- Women report improvement in physical and mental health, are able to return to meaningful family and community life
Health systems strengthening
- Identification of dedicated health staff and training of local providers at affiliate sites improves capacity for comprehensive obstetrics/gynecologic care, including prevention and treatment of fistula
- Specific targeting and uptraining of nursing staff, including nurse anesthetists is essential for program success and sustainability

Challenges and areas for improvement for future programming

Resource limitations
- Limited and case-specific funding for fistula repair only (i.e. no resources for prolapse, other types of UI, fertility, general gynecologic care)
- Lack of family planning resources at local sites
- Inadequate health workforce, few or no physiotherapists, psychologists, other nonphysician health workers to ensure comprehensive, quality care
- No resources for socioeconomic reintegration for women with fistula available at outreach sites
- Limited funds for transportation of complex cases to Panzi Hospital

Poverty-related challenges
- Poor health literacy of communities
- Limited health-seeking behavior
- Loss to follow-up/missed appointments at 3-months postoperatively

Political challenges
- Absence of a national support policy for prevention and treatment and for long-term monitoring of women with fistula

Strengths and challenges of the MSO program, highlighting areas in need of further development and resource allocation.

While the MSO program presents numerous successes, certain challenges remain—most notably that of resource limitations, including inconsistent funding, lack of trained healthcare providers, and an inadequate medical supply chain. The MSO team cites an ongoing dilemma: providers frequently diagnose other important gynecologic conditions (i.e. pelvic organ prolapse, urinary incontinence), yet lack the resources to provide treatment for these conditions owing to mandated funding for fistula only. While support for fistula surgery is essential, the need for comprehensive obstetric and gynecologic care for Congolese women remains. Similarly, family planning methods are not readily available for women who have undergone surgical repair, which may complicate postoperative healing.

The MSO program demonstrates to women and their communities that fistula is both preventable and curable and dispels local perceptions that it is a result of sorcery, witchcraft, or a curse. By bringing quality health services to remote villages and subsequently training local healthcare workers, the MSO program addresses health inequalities related to poverty, rural living, and access to skilled providers. For these reasons, we believe this program represents a model of care that may be implemented on a national level to definitively address the severe burden of this condition on women, their families, and communities.

The MSO model aims to build capacity to address fistula by improving accessibility to skilled medico-surgical care and enhancing community awareness. Training efforts serve to improve skills of local providers, strengthen the health workforce, and offer scalable, sustainable solutions to prevention and treatment efforts. Future work will emphasize outcomes research related to patient care delivery, training, and capacity building.

AUTHOR CONTRIBUTIONS
RM, LK, AN, and DM conceptualized the paper and wrote the original draft. RM, LK, LH, and DM developed the methodology. All authors reviewed and edited the final manuscript.

ACKNOWLEDGMENTS
We would like to acknowledge Panzi Hospital’s fistula team, as well as the local teams at each partner site for their time and dedication to providing high-quality patient care and continued commitment to program development.
CONFLICTS OF INTEREST

The authors have no conflicts of interest.

REFERENCES

Rising trends in iatrogenic urogenital fistula: A new challenge

Nasira Tasnim | Kauser Bangash | Ooreekha Amin* | Sobia Luqman | Hadia Hina

Department of Maternal and Child Health, Pakistan Institute of Medical Sciences, Islamabad, Pakistan

*Correspondence
Ooreekha Amin, Department of Maternal and Child Health, Pakistan Institute of Medical Sciences, Islamabad, Pakistan. Email: ooreekha@gmail.com

Abstract

Objective: To analyze trends in iatrogenic urogenital fistula among patients admitted for fistula repair at the Pakistan Institute of Medical Sciences, Islamabad.

Methods: In this longitudinal study, all patients who presented for fistula repair between 2006 and 2018 were included in the study. Patient data were collected on age, parity, and type and etiology of fistula, which was classified as ischemic or iatrogenic.

Results: Of 634 fistula patients, 371 (58.5%) had iatrogenic fistula, while 263 (41.5%) patients developed ischemic fistula due to obstructed labor. Mean age of patients was 31.6 years. Yearly trends showed an increase in iatrogenic fistula from 43.2% in 2006–2008 to 71.4% in 2017–2018. The major etiological contributor to iatrogenic fistula was hysterectomy (52.5%), followed by cesarean hysterectomy (26.4%), and cesarean delivery (19.9%).

Conclusion: A rising trend in iatrogenic fistula was observed. This emphasizes the need for optimization of surgical approaches and surgical skills. Moreover, gynecologic surgeries should be restricted to authorized gynecologic surgeons.

KEYWORDS
Iatrogenic fistula; Obstetric fistula; Pakistan; Trends

1 | INTRODUCTION

Urogenital fistula is a distressing and socially debilitating health condition for women. It is estimated that approximately 30,000–130,000 new cases occur annually worldwide. In Pakistan, an estimated 3500 cases of obstetric fistula occur every year. Furthermore, the prevalence of urogenital fistula in women of reproductive age has been reported as 1.60 per 1000 women in South Asia. Determining an accurate prevalence of fistula is still difficult owing to inadequate reporting and lack of disclosure of the condition by those affected.

It has been reported that low-resource countries have a higher incidence of obstetric ischemic fistula compared with high-resource nations. However, contrary to the previous trend, a significant shift has been observed regarding the etiology of female urogenital fistula. Recent studies have shown a growing incidence of iatrogenic fistula. Trends observed in various studies conducted over a period of 13 years in Pakistan show a significant increase in iatrogenic fistula.

The incidence of ischemic fistula in Pakistan declined from 70%–80% in 2004–2005 to 45%–56% in 2015–2016. This changing trend could be attributed to improvement in maternal skills and referral systems over time. As reported by the joint UNICEF/WHO database, in Pakistan, 38.8% of deliveries were carried out by skilled birth attendants (doctor, nurse, midwife, lady health worker) in 2006–2007, while in 2017–2018, 69% were attended by skilled birth attendants. However, the increasing rate of obstetric interventions and gynecologic pelvic surgeries performed by personnel lacking the appropriate skills may be the cause of the rising rate of iatrogenic fistula.

This is an open access article under the terms of the Creative Commons Attribution License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2020 The Authors. International Journal of Gynecology & Obstetrics published by John Wiley & Sons Ltd on behalf of International Federation of Gynecology and Obstetrics
Although a significant decrease in obstetric ischemic fistula has been observed, the remaining obstetric fistula cases reflect poor access to and inadequate obstetric services in remote areas. On the contrary, iatrogenic fistula reflects suboptimal surgical techniques that could be prevented through optimization and refinement of surgical skills.

Previous studies in Pakistan were conducted in different settings and in different years. The aim of the present study was to analyze the changing trends in the frequency of iatrogenic fistula injuries among patients admitted for fistula repair at a single regional fistula center, the Pakistan Institute of Medical Sciences (PIMS) Islamabad, based on almost 12 years of audit data.

2 | MATERIALS AND METHODS

This longitudinal study of prospectively collected data was conducted at the regional fistula center of the Pakistan Institute of Medical Sciences, Islamabad. The study included all patients diagnosed with urogenital fistula who underwent surgical repair between November 2006 and June 2018. Patient data were collected on age, parity, and type and etiology of fistula.

All patients underwent examination under anesthesia and intravenous urography to localize and classify the type of fistula. Urogenital fistula was classified as iatrogenic if the fistula developed after pelvic surgery (hysterectomy for nonobstetric causes), cesarean delivery, or cesarean hysterectomy. Ischemic fistula was classified as all low-level fistulae (vesicovaginal, urethral; procuring necrotic tissue) that developed after obstructed labor of more than 24 hours followed by vaginal/instrumental delivery or cesarean delivery.

Ethical approval was obtained from the Pakistan Institute of Medical Sciences institutional review board. The study was discussed with recruited patients and informed consent was provided.

3 | RESULTS

A total of 634 patients underwent urogenital fistula repair over the study period and were included. The mean age of patients was 31.6 ± 10.26 years (range, 15–70 years). Of the total, 371 (58.5%) were classified as iatrogenic fistula, whereas 263 (41.5%) were ischemic fistula. Among those with iatrogenic fistula, 195 (52.5%) patients developed fistula after hysterectomy performed for nonobstetric causes, 98 (26.4%) after cesarean hysterectomy, 74 (19.9%) after cesarean delivery (for obstetric reasons other than obstructed labor), and 4 (1.1%) after dilation and curettage. For patients with ischemic fistula, the causes were associated with obstructed vaginal delivery in 144 (54.7%), cesarean delivery in 99 (37.6%), and instrumental delivery in 20 (7.6%) patients (Table 1).

A rising trend in iatrogenic fistula was found over the study period (2006–2018) from 43.5% to 71.4%. A decreasing trend in ischemic fistula, from 56.5% to 28.6%, was also observed (Fig. 1).

**TABLE 1**  Occurrence and cause of iatrogenic and ischemic fistula among study participants (n=634), 2006–2018.

<table>
<thead>
<tr>
<th>Fistula type and cause</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iatrogenic fistula (n=371)</td>
<td></td>
</tr>
<tr>
<td>Hysterectomy (nonobstetric)</td>
<td>195 (52.5)</td>
</tr>
<tr>
<td>Cesarean hysterectomy</td>
<td>98 (26.4)</td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>74 (19.9)</td>
</tr>
<tr>
<td>Dilation and curettage</td>
<td>4 (1.1)</td>
</tr>
<tr>
<td>Ischemic fistula (n=263)</td>
<td></td>
</tr>
<tr>
<td>Vaginal delivery</td>
<td>144 (54.7)</td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>99 (37.6)</td>
</tr>
<tr>
<td>Instrumental delivery</td>
<td>20 (7.6)</td>
</tr>
</tbody>
</table>

**FIGURE 1**  Trends in iatrogenic and ischemic fistula, 2006–2018.
In terms of yearly trend, hysterectomy was the major etiological contributor to iatrogenic fistula, followed by cesarean delivery (Fig. 2). However, cesarean delivery as the cause of fistula showed a continuous rising trend over the years. Furthermore, curettage of the uterine cavity was found to be a minor contributor to iatrogenic fistula. A declining trend in ischemic fistula developing after obstructed vaginal delivery was observed (Fig. 3).

4 | DISCUSSION

In the past, the causes of urogenital fistula in low-resource countries have not been linked to iatrogenic origins. However, cases of iatrogenic fistula appear to be increasing in recent years. A retrospective study conducted in 11 countries, mostly in Africa, between 1994 and 2012 reported that 13.2% of urogenital fistula cases were caused by iatrogenic errors. A study from Ethiopia (2011–2015) reported that among 2500 fistula cases, 24.6% were attributed to surgical cause, particularly cesarean delivery and hysterectomy. An Indian study conducted from 2007 to 2013 reported that 39% of genitourinary fistulae were iatrogenic. A further study, conducted from 2011 to 2015 in India, reported that 65% of fistula cases were iatrogenic. Similarly, urogenital fistula studies conducted in Pakistan over various years have shown a gradual rising trend in iatrogenic fistula. One study conducted in 2005 reported that 75% of fistulae were caused by obstructed labor compared with 28.6% that were iatrogenic. Finally, a 2015 study reported that 53.6% of fistula cases were caused by obstructed labor versus 39% that had iatrogenic causes.

These previous studies were conducted in different settings over different time periods. Over almost 12 years in the present study, the rate of iatrogenic to ischemic fistula was 58.5% versus 41.5%, respectively. Grossly, this does not highlight the alarming advancing rate of iatrogenic fistula. Thus, we wanted to determine the yearly etiological trends in urogenital fistula at a single center over several years. Our study found a rising trend in iatrogenic fistula: 43.5% (2006–08), 51.0% (2009–10), 57.8% (2011–12), 61.1% (2013–14), 68.4% (2015–16), 71.4% (2017–18). This overlooked rising trend in iatrogenic fistula is emerging as a new challenge to the health sector, particularly in low-income countries.


The gradual rise in iatrogenic fistula is a warning sign about the quality of health care and training systems. Although surgical training offers a possible solution, health personnel may not have gained adequate practical experience to deal with complicated deliveries and surgical procedures. Therefore, there is a need for advanced training for improved decision-making and surgical skills in both obstetric and gynecologic management, especially for safe cesarean delivery and hysterecomy. Furthermore, despite the declining trend in fistula development, measures must also be taken to further improve health services in access-restricted areas. These measures will ultimately lead to a better healthcare system and decrease the rate of fistula development.

In conclusion, the present study observed a rising trend in iatrogenic fistula over almost 12 years at a single center in Islamabad, Pakistan. These recent increasing trends in iatrogenic urogenital fistula emphasize the importance of improving safety standards for surgical techniques, both obstetric and gynecologic.

REFERENCES


AUTHOR CONTRIBUTIONS

NT designed and directed the project and drafted the manuscript. KB directed the project and carried out data collection. QA performed data analysis and interpretation and drafted and critically revised the manuscript. SL and HH conducted data collection.

ACKNOWLEDGMENTS

We thank the Fistula Foundation, UNFPA, Pakistan National Forum on Women’s Health, and the Islamic Development Bank for supporting the fistula project in Pakistan.

CONFLICTS OF INTEREST

The authors have no conflicts of interest.
A retrospective review to identify criteria for incorporating the Singapore flap and gracilis muscle flap into obstetric fistula repair

Rachel Pope1,* | Pierce C. Hollier2 | Rodger H. Brown3 | Chisomo Chalamanda4 | Larry H. Hollier Jr5 | Jeffrey Wilkinson1

1Division of Global Women’s Health, Department of Obstetrics and Gynecology, Baylor College of Medicine, Houston, TX, USA
2School of Medicine, Duke University, Durham, NC, USA
3Division of Plastic Surgery, Department of General Surgery, Houston Methodist, Houston, TX, USA
4Freedom from Fistula, Fistula Care Centre, Lilongwe, Malawi
5Division of Plastic Surgery, Baylor College of Medicine, Houston, TX, USA

*Correspondence
Rachel Pope, Division of Global Women’s Health, Department of Obstetrics and Gynecology, Baylor College of Medicine, Houston, TX, USA.
Email: Rachel.pope@bcm.edu

Abstract

Objective: To identify criteria to guide surgeons regarding indications for use of the Singapore and gracilis muscle flaps in obstetric fistula repair.

Methods: This is a retrospective case series. Obstetric fistula surgeons in Lilongwe, Malawi, have been incorporating plastic surgery techniques with the Singapore and gracilis muscle flaps since collaborating with plastic surgeons in 2016. We describe the surgical outcomes of procedures utilizing each flap individually and those using both.

Results: Between February 2016 and June 2019, 69 patients received a flap at the time of obstetric fistula repair at the Fistula Care Center in Lilongwe, Malawi. A total of 32 (46.4%) received a Singapore flap, 20 (29.0%) received a gracilis flap, and 17 (24.6%) received both types of flap.

Conclusion: Based on our outcomes, we note the possible advantage of incorporating the gracilis flap even when it is thought that the Singapore flap is sufficient. However, more data are needed.

KEYWORDS
Fistula repair; Global women’s health; Gracilis muscle; Obstetric fistula; Singapore flap; Surgical collaboration; Vesicovaginal fistula

1 INTRODUCTION

Since 2016, surgeons at the Fistula Care Centre (FCC) in Lilongwe, Malawi, have been incorporating Singapore fasciocutaneous flaps and gracilis muscle flaps for complex obstetric fistula repairs. This development arose from a collaboration with plastic surgeons out of the need for additional techniques for complex repairs. Since then, we have performed approaching 70 fistula repairs incorporating one or both flaps. We have been encouraged by the outcomes as these are the most complex fistulae to repair—quoted to have as low as a 52% success rate.1

We have since held two workshops at the FCC along with a plastic surgeon (RB), during which we taught other fistula surgeons the flap techniques (Figs 1–4). For surgical techniques on flap creation, please see our papers on the Singapore flap for vaginal reconstruction and the gracilis muscle flap for complex repairs.2,3 From the second larger workshop we found that indications for use of the flaps are subjective. Therefore, the aim of the present study was to review our outcomes to date and attempt to determine criteria to guide others in the use of these flaps.
2 | MATERIALS AND METHODS

This is a retrospective review of all obstetric fistula repairs that used a Singapore flap, gracilis muscle flap, or both. Cases using a flap for vaginal reconstruction without the presence of a fistula were not included in this review. This is part of a larger study on the outcomes of obstetric fistula repair at our center, which has been approved by the Malawian National Health Sciences Research Committee and the Baylor College of Medicine Institutional Review Board. All cases in which a flap was incorporated into the obstetric fistula repair were included in the cohort. Trained research assistants double-entered and compared the data using RedCap (Research Electronic Data Capture, Vanderbilt University, Nashville, TN, USA) and a physician cleaned all data.

The variables we examined included patient age, fistula duration, Goh classification of the fistula injury, number of previous repairs, type of physical characteristics of the injury, outcomes of the repair, and operative or postoperative complications. At our center, we conduct a dye test at the time of catheter removal. If the dye test is positive but there is no obvious breakdown of the fistula repair and the Foley catheter is still draining urine, we keep the catheter in place for one additional week. If the subsequent dye test remains positive, or if at the first dye test the repair has grossly broken down and the Foley catheter is not draining urine, we consider this a failed repair. For patients with successful closure of the fistula, a 1-hour pad weight test is done to quantify the amount of urethral leakage; this is because many women with a complex fistula experience some degree of urethral leakage postoperatively despite a healed fistula.

3 | RESULTS

A total of 69 patients received a flap or combination of flaps during fistula repair at the Fistula Care Center in Lilongwe, Malawi between February 2016 and June 2019. In all, 32 (46.4%) women received a Singapore flap, 20 (29.0%) received a gracilis flap, and 17 (24.6%) received both types of flap. Table 1 outlines the variables of interest in forming criteria to guide employment of each flap.

3.1 | Singapore flap

The mean age of the women who received a Singapore flap was 27.2 ± 9.0 years; these women had lived with a fistula for an average of approximately 3 years. About half had a spontaneous vaginal delivery. Fistula injuries incurred based on the Goh classification were primarily type 3 and 4 (indicating maximum involvement of the urethra), mostly larger than 3 cm in diameter, and were type
iii indicating significant scarring, previous repair, or were circumferential in nature. Ten (31%) women had undergone a previous repair. Average urethral length was 1.88 ± 0.76 cm, bladder length 7.20 ± 1.59 cm, and vaginal length 6.17 ± 1.90 cm. Scarring was considered moderate to severe in most cases. Dye tests were negative in 22 (68.8%) women. Nine (32.1%) women did not leak urine from the urethra on the cough test, indicating complete “dryness.” This was measured objectively using a 1-hour pad weight test. Mean pad weight was 26.5 ± 21.2 g. Thirteen (40.6%) women experienced a postoperative complication, which was primarily minor wound breakdown from the donor site.

3.2 | Gracilis flap

A gracilis flap was used during fistula repair in 20 women. Average age was 42.4 ± 17.7 years. Many had lived with a fistula for several years: 10.4 ± 10.2 years on average. Eleven (57.8%) women had undergone cesarean delivery at the delivery that led to an obstetric fistula. Most women (85%) had a Goh type 3 or 4 injury indicating maximum involvement of the urethra. Half were large fistulae greater than 3 cm, and 90% were type iii due to scarring, previous repair, or were circumferential in nature. Ten (50.0%) women had undergone a previous repair attempt. Mean urethral length was 1.55 ± 0.72 cm, bladder length 6.35 ± 1.97 cm, and vaginal length 7.18 ± 0.89 cm.

Most had a moderate degree of scarring (n=11; 64.7%), but few had severe scarring or an obliterated vagina. Eighteen (90.0%) women healed successfully and six (30.0%) were completely dry with no urethral leakage. Average pad weight was 21.5 ± 29.3 g. Seven (35.0%) women had a postoperative complication, mostly urinary tract infections (n=6), and one blocked catheter (n=1).

3.3 | Both flaps

Seventeen (24.6%) women had both types of flaps at the time of fistula repair. Average age of the women was 35.2 ± 14.9 years, and they had spent an average of 8.2 ± 6.4 years with a fistula. Nine (56.3%) women had undergone cesarean delivery at the time of the fistula injury. Most were Goh type 3 and 4, greater than 3 cm in diameter, and 94.1% (n=16) were classified as type iii, due to scarring, previous repair, or were circumferential in nature. Six (35.3%) women had had a previous repair attempt. Average urethral length was 1.41 ± 0.82 cm, bladder length 6.13 ± 1.77 cm, and vaginal length 5.56 ± 2.34 cm. Most women had moderate to severe scarring. Only 10 (58.8%) of these cases had a negative dye test initially and 3 (23.1%) were completely dry with no urethral leakage. However, two patients returned for follow-up with a negative dye test, increasing the success rate to 70.6% (n=12). Average pad weight was 21.1 ± 18.6 g. Eight (47.1%) patients had a postoperative complication, mostly due to minor wound breakdowns.
The literature reveals that, overall, outcomes for cases including flaps are better than for complex fistula repairs without flaps. Singapore flaps are employed in cases of moderate to severe scarring where there is a compromise of vaginal length, likely due to a large fistula. Gracilis flaps are employed when there has been a previous repair attempt, the fistula injury is severe, but vaginal reconstruction is not required.

<table>
<thead>
<tr>
<th>TABLE 1 Characteristics of fistula repair case (n=69) based on flap type. a</th>
</tr>
</thead>
<tbody>
<tr>
<td>Characteristics</td>
</tr>
<tr>
<td>Age, y</td>
</tr>
<tr>
<td>Duration of fistula, y</td>
</tr>
<tr>
<td>Mode of delivery</td>
</tr>
<tr>
<td>Spontaneous vaginal</td>
</tr>
<tr>
<td>Cesarean</td>
</tr>
<tr>
<td>Type of initial injury (Goh classification)</td>
</tr>
<tr>
<td>Proximity to the urethra</td>
</tr>
<tr>
<td>Type 1</td>
</tr>
<tr>
<td>Type 2</td>
</tr>
<tr>
<td>Type 3</td>
</tr>
<tr>
<td>Type 4</td>
</tr>
<tr>
<td>Size</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>Scar tissue</td>
</tr>
<tr>
<td>i</td>
</tr>
<tr>
<td>ii</td>
</tr>
<tr>
<td>iii</td>
</tr>
<tr>
<td>History of a previous surgical attempt</td>
</tr>
<tr>
<td>Urethral length, cm</td>
</tr>
<tr>
<td>Bladder length, cm</td>
</tr>
<tr>
<td>Vaginal length, cm</td>
</tr>
<tr>
<td>Degree of vaginal scarring</td>
</tr>
<tr>
<td>None</td>
</tr>
<tr>
<td>Minimal</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Severe</td>
</tr>
<tr>
<td>Obliterated</td>
</tr>
<tr>
<td>(n=27; 1=N/A)</td>
</tr>
<tr>
<td>Dye test negative</td>
</tr>
<tr>
<td>Cough test negative</td>
</tr>
<tr>
<td>(n=28)</td>
</tr>
<tr>
<td>Pad weight, g</td>
</tr>
<tr>
<td>Number of days of catheterization</td>
</tr>
<tr>
<td>Postoperative complication</td>
</tr>
</tbody>
</table>

*Values are given as number (percentage) and mean ± SD unless otherwise indicated.*
Both flaps are employed when the injury is severe and vaginal reconstruction is required owing to a short length or severe scarring.

Incorporating a gracilis flap even in instances where the Singapore flap is felt to be sufficient is likely warranted given our lowest success rate for continence when using the Singapore flap alone. Although the Singapore flap carries a vascular supply, it is less robust than that of the gracilis muscle and is technically easier to compromise. Improving blood supply in compromised areas is paramount in any reconstructive procedure. Augmentation of the Singapore flap with the vascularity of the gracilis is beneficial to suture line healing and minimizing contraction. This is most poignantly demonstrated in two patients who had both a Singapore flap and a gracilis flap, who were discharged initially with a failed repair but returned to the center healed.

Our incontinence outcomes with the Singapore flap are lower than with the gracilis flap, suggesting again that perhaps the gracilis flap should be used more often in repairing large fistulae even when it seems that the Singapore flap is adequate. We have found that the Singapore flap greatly improves quality of life for women who need vaginal reconstruction. However, in the case of large complex fistulae, it may not be enough.

All cases involved a short urethra. A suboptimal number of patients had no urethral leakage, indicating that more efforts are needed to develop anti-incontinence techniques. This has been found in the literature for complex fistulae, namely Goh types 3 and 4 and represents the perpetual continence gap.\(^2\) Of note, the highest success rate was for women who had the gracilis flap alone (90%, \(n=18\)). However, this does not necessarily mean that a gracilis flap and a Singapore flap together are not recommended, as these cases may be considered “the worst of the worst.” The cases in which both flaps were employed were, on average, the most severe types according to the Goh classification. They also had, on average, the shortest urethras and the shortest vaginal lengths. This is consistent with the use of the Singapore flap when vaginal reconstruction is required along with a complex fistula injury.

Browning et al.\(^6\) describe the Singapore flap as a solution to prevent urethral incontinence by preventing contraction of tissue that would draw the urethra open. Unfortunately, many women in this cohort still experienced urethral incontinence with the Singapore flap and average pad weights were still high for this high-risk group.

The strengths of the present study are the large number of complex cases and the ability to follow outcomes because we were operating in a national referral center for women with obstetric fistulae. The major limitation is the retrospective nature of these data and the small sample size. However, it is exceedingly difficult to randomize cases with such heterogeneity of injury and these are relatively new techniques for use in obstetric-related fistula repairs. Future prospective studies, however, could use our suggested criteria in following outcomes.

In summary, we suggest the Singapore flap be used for vaginal reconstruction when large fistula injury has caused vaginal length shortening and/or severe tissue loss. We suggest the gracilis flap alone in cases of complex injury and previously failed repair attempts without vaginal tissue compromise. Finally, both flaps should be used when all of these variables are present, and perhaps more often in order to gain improved closure rates in all cases. We next plan to follow the quality of life and long-term outcomes including pad weights and urethral leakage to understand the changes over time. Ongoing work to decrease urethral leakage is still necessary to improve the impact of surgical repair on overall continence.

**AUTHOR CONTRIBUTIONS**

RP came up with the concept and initiated this study, drafted the manuscript and finalized edits. PC collected data and edited the manuscript. RP, RB, CC, LH, and JW contributed to the manuscript editing and surgical procedures performed in the study.

**ACKNOWLEDGMENTS**

The authors thank the Baylor College of Medicine/Texas Children’s Hospital for their overall support and Freedom from Fistula for the management and support of the Fistula Care Center.

**CONFLICTS OF INTEREST**

The authors have no conflicts of interest.

**REFERENCES**

Supplement Article

Rehabilitation and reintegration programming adjunct to female genital fistula surgery: A systematic scoping review

Alison M. El Ayadi1,* | Caitlyn E. Painter1,2 | Alexandre Delamou3 | Jill Barr-Walker1,4 | Abner Korn1 | Susan Obore5 | Josaphat Byamugisha6 | Justus K. Barageine6,7

1Department of Obstetrics, Gynecology and Reproductive Sciences, University of California San Francisco, San Francisco, CA, USA
2Department of Obstetrics and Gynecology, Urogynecology Division, Kaiser Permanente, Oakland, CA, USA
3Department of Public Health, Gamal Abdel Nasser University, Conakry, Guinea
4ZSF Library, University of California San Francisco, San Francisco, CA, USA
5Department of Obstetrics and Gynecology, Mulago National Referral and Teaching Hospital, Kampala, Uganda
6Department of Obstetrics and Gynecology, Makerere University College of Health Sciences, Kampala, Uganda
7Department of Maternal and Child Health, Uganda Christian University, Mukono, Uganda

*Correspondence
Alison M. El Ayadi, Bixby Center for Global Reproductive Health, Department of Obstetrics, Gynecology and Reproductive Sciences, University of California, San Francisco, CA, USA.
Email: alison.elayadi@ucsf.edu

Funding Information
Eunice Kennedy Shriver National Institute of Child Health and Human Development

Abstract

Background: Female genital fistula is associated with significant physical, psychological, and economic consequences; however, a knowledge and practice gap exists around services adjunct to fistula surgery.

Objectives: To examine rehabilitation and reintegration services provided adjunct to genital fistula surgery, map existing programming and outcomes, and identify areas for additional research.

Search strategy: We searched the published and grey literature from January 2000 to June 2019. Two reviewers screened articles and extracted data using standardized methods.

Selection criteria: Research and programmatic articles describing service provision in addition to female genital fistula surgery were included.

Data collection and analysis: Of 3047 published articles and 2623 unpublished documents identified, 26 and 55, respectively, were analyzed.

Main results: Programming identified included combinations of health education, physical therapy, social support, psychosocial counseling, and economic empowerment, largely in sub-Saharan Africa. Improvements were noted in physical and psychosocial health.

Conclusions: Existing literature supports holistic fistula care through adjunct reintegration programming. Improving the evidence base requires implementing robust study designs, increasing reporting detail, and standardizing outcomes across studies. Increased financing for holistic fistula care is critical for developing and supporting programming to ensure positive outcomes.

Keywords
Female genital fistula; Fistula surgery; Rehabilitation; Reintegration; Scoping review; Supportive care

1 | Introduction

Female genital fistula is a debilitating traumatic injury affecting up to 2 million women, mostly in sub-Saharan Africa. Annual global incidence may reach 100,000. Primary etiologies include pressure necrosis from prolonged and neglected obstructed labor combined with delay in accessing comprehensive emergency obstetric care, iatrogenic causes (i.e. during cesarean delivery or hysterectomy), and trauma. Prolonged obstructed labor is most prevalent; however, an increasing proportion of genital fistula is iatrogenic. Women with fistulae experience uncontrollable leakage of urine and/or feces, resulting in genital sores and infection. In addition...
to pain and general weakness, women may experience nerve damage, uterine cervix injuries, and pelvic bone trauma that present as secondary infertility and gait disorders. Most babies involved in fistula-causing deliveries do not survive. Women with fistula are stigmatized, restricted in social and economic participation, and report high psychiatric morbidity including depression, which may persist even after surgical repair.

Access to genital fistula surgery has improved in sub-Saharan Africa and many women experience improvements in physical and mental health following fistula repair alone; however, numerous women face continued physical and psychological challenges to resuming prior roles or adjusting to new circumstances. They may require further medical care depending on injury severity and surgical outcomes, and medical support for subsequent pregnancies and births. Longitudinal studies from sub-Saharan Africa have identified concerning adversity following fistula surgery, including fistula recurrence, persistent fistula-related symptoms, subsequent fertility challenges, and adverse perinatal outcomes. In Guinea, 16% experienced fistula recurrence by 24 months. In Uganda, by 12 months following repair, one-third had persistent urinary incontinence, 17% weakness, and 9% general pain. In Malawi, only one-fifth of women with reproductive potential became pregnant in the year following surgery. Experience of persistent physical adversity correlates with substantially lower psychosocial health. Such factors limit women's ability to resume previous roles despite successful surgery, particularly in conjunction with economic hardship, resulting in additional reintegration needs.

A knowledge and practice gap exists around women's postsurgical reintegration programming. Preliminary evidence supports short-term facility-based psychological intervention. Physical therapy has also been recommended, as has improvement of economic independence. Research synthesis on the reintegration process, evaluation, and service provision is important for developing evidence-based service prioritization to meet the health needs of women recovering from genital fistula. Thus, the objective of this scoping review was to examine the range of rehabilitation and reintegration services provided as adjunct to genital fistula surgery, map the existing programming and outcomes, and identify areas where additional research is necessary.

2 | MATERIALS AND METHODS

Four research questions were specified to meet these objectives:

1. What rehabilitation and reintegration services are provided as adjunct to genital fistula surgery for women with obstetric, iatrogenic, or traumatic fistula?
2. What are the components of each rehabilitation and reintegration intervention, and how are they delivered?
3. What is the impact of each rehabilitation and reintegration intervention on women's physical, psychosocial, and economic status?
4. What are the study authors' recommendations for rehabilitation and reintegration interventions and intervention delivery?

Our scoping review methodology followed Arsey and O'Malley and Levac et al. frameworks and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA-ScR) guidelines. The full protocol for this review is published in detail elsewhere and summarized herein.

We searched the published and unpublished ("grey") literature to broadly capture reintegration programming data. The search strategy was developed collaboratively with a medical librarian (JBW) with training and experience in systematic reviews using an iterative process including term harvesting, text and MeSH term extraction, and testing. The final search strategy was peer reviewed by a second librarian following Peer Review of Electronic Search Strategies guidelines. We searched reference lists of included articles and contacted authors for additional detail.

The published literature search strategy combined two main concepts: obstetric fistula and social reintegration, using Boolean logic. Our search was implemented on September 27, 2018 and updated on July 8, 2019 in PubMed (1966–), Embase (1947–), Popline (1970–), PsycINFO (ProQuest, 1887–), Web of Science (1900–), Sociological Abstracts and Social Services Abstracts (ProQuest, 1963– and 1980–, searched together), and African Journals Online (2004–) databases. The search strategy is available as supporting information Table S1. No language limits were used; however, we included only articles published from 2000 onward.

The grey literature search employed targeted Google (Google LLC, Mountain View, CA, USA) searches directly from organizational websites identified by UNFPA's Campaign to End Fistula (supporting information Data S1), and personal queries with other known clinical or social service organizations, implemented on June 16, 2019. The final search strategy was fistula and reintegration or rehabilitation or program or service, and was operationalized through Google Custom Search JSON API that imposed a 100-result limit per website. We also searched available abstract books from the various conferences of three organizations: The International Society of Obstetric Fistula Surgeons (ISOFs); The Global Maternal Newborn Health Conference; and Women Deliver.

Titles and abstracts of published articles were independently screened by two reviewers (AE and CP) followed by full-text screening and data extraction. A third reviewer (AD) was available to resolve discrepancies; however, none arose. In accordance with established scoping review frameworks, critical appraisal of study quality was not performed. Inclusion and exclusion criteria are detailed in Table 1. Data from eligible studies were systematically extracted (Table 2). Where articles were eligible but lacked detail, data were summarized narratively. Unpublished studies and reports were screened by one of four reviewers (AE, CP, RB, LL); results are reported following a simplified PRISMA sequence in narrative format.

3 | RESULTS

3.1 | Published articles and program reports

Our database search identified 3242 articles. Excluding duplicates, 2197 articles were screened; 25 were found eligible and one related article was identified during web searching of article PDFs. The
modified PRISMA flow diagram for selection of available studies is given as Figure 1. Twenty-six articles were analyzed. Among these, 11 articles representing seven different studies or programs were considered “primary,” including a meaningful level of detail on program components and outcomes, and are presented in the data extraction table (Table 2). Fifteen articles representing 10 different studies or programs were considered “supplementary,” meeting the eligibility criteria but lacking detail, and are summarized within a separate narrative section. Results from the same study or program are presented together in table and narrative. One program had one primary and one supplementary article; both are described within the primary results.

### 3.2 | Primary articles

Primary studies or programs identified were from Benin, Democratic Republic of the Congo (DRC), Eritrea, Guinea, Kenya, South Sudan, and Tanzania. Various intervention component combinations were employed, including health education (n=4), physiotherapy (n=1), psychosocial counseling (n=3), social support (n=2), and economic empowerment (n=1).

#### 3.2.1 | Rehabilitation and reintegration intervention components and delivery

Two studies tested a combined health education and physiotherapy program. In Benin, Castillo et al. employed physiotherapist-led didactic sessions to assist women in activity modification including perineal contractions, abdominal hypopressive exercise, and behavioral instruction. In DRC, Keyser et al. sought to increase pelvic floor strength and prevent postsurgical complications through physical therapy starting 14 days after surgery. Three studies investigated combined health education and psychosocial counseling programs. In Eritrea, Johnson et al. tested individual counseling sessions addressing fistula, general health, and nutrition knowledge; postoperative condition-specific management and recovery expectations; and explored women’s postrepair life and health goals. Compared to preassessment, fistula knowledge, self-esteem, and behavioral intentions after surgery significantly increased. In South Sudan, Ojengbede et al. determined the impact of an interpersonal therapy session before surgery. From presurgery to hospital discharge, depression, self-esteem, and suicidal ideation decreased significantly. In Tanzania, Watt et al. tested a 2-week individual cognitive behavioral therapy intervention on mental health. Improvements in depression, anxiety, post-traumatic stress disorder (PTSD), and self-esteem from baseline to follow-up were not significantly different by intervention group, but feasibility and intervention satisfaction were high.

One report, by Pollaczek et al. from Kenya, described an intervention comprising psychosocial counseling, social support, and economic empowerment. Individual counseling was followed by community-based peer support group linkage for social support and economic empowerment through income-generating activities. Most participants reported improvements in emotional well-being and fistula-related knowledge, and high intervention satisfaction; however, economic gains were modest.

One report described an intervention combining health education and social support. In Guinea, women lived in a supportive group home or host family while recovering from surgery, and received health education sessions and public speaking and interpersonal communication training. The program sought to facilitate women’s transition to family life while ensuring postoperative care access and prepared them as community educators. No outcome data were provided; however, anecdotaly, participants experienced increased confidence, self-esteem, and emotional health.

#### 3.2.2 | Outcomes of reintegration programming by program components

##### 3.2.2.1 | Health education and physiotherapy

Outcomes from two interventions combining health education and physiotherapy were not directly comparable. At hospital discharge, Castillo et al. identified higher repair success among intervention participants (69.9% vs 57.6%) and persistent incontinence was significantly lower in the intervention group among women with closed fistula. Keyser et al. also reported a decrease in stress incontinence. Castillo et al. reported improved quality of life by 12 months among women with closed fistula. Keyser et al. reported short-term increases in pelvic floor muscle strength, contraction endurance, contraction repetitions, and fast contractions.

##### 3.2.2.2 | Health education and psychosocial counseling

Outcomes from combined health education and psychosocial counseling interventions included self-esteem (n=3) and depression (n=2). All three studies identified significant improvements in self-esteem; in the only controlled study, no differential self-esteem increase was found between intervention and control groups. Significant decreases in depression were identified by Johnson et al. and Watt et al. again, intervention differences were not significant. Other outcomes included increased fistula knowledge and healthy behavioral intentions, and significant reductions in severe suicidal ideation, anxiety, and PTSD symptoms. No difference between intervention and control groups was found for anxiety and PTSD symptom reduction.
3.2.2.3 | Health education and social support
One intervention combined health education with social support\textsuperscript{26,37}; anecdotally, women experienced increased confidence, self-esteem, and emotional health.

3.2.2.4. Psychosocial counseling, social support, and economic empowerment
Outcomes of the combined psychosocial counseling, social support, and economic empowerment intervention suggested that women’s emotional well-being and fistula knowledge improved significantly with intervention participation.\textsuperscript{45} Economic status had modest gains, with most women reporting that their economic status had been helped somewhat by participating in the program (64%).\textsuperscript{45}

3.2.2.5 | Outcomes by fistula etiology
Outcomes of reintegration programming were not reported by etiology of genital fistula.

3.2.3 | Authors’ recommendations
The authors’ recommendations from primary articles supported holistic programming at genital fistula surgery and extending to community, despite most study outcomes measured at short term. Most articles recommended increasing women’s access to incorporated intervention components given formal or anecdotal findings. Psychosocial counseling for women\textsuperscript{36} and family members,\textsuperscript{25} access to family planning methods,\textsuperscript{25} and income-generating activities\textsuperscript{34} were recommended.

Recommendations for intervention design and implementation were discussed. Watt et al.\textsuperscript{44} reported factors critical to the feasibility and acceptability of their intervention included a formative research phase to contextually adapt and revise intervention design, ensuring that the intervention integrated easily into clinical flow. Additionally, task-shifting to nurse-level facilitators improved pilot intervention feasibility, and was anticipated to improve adoption.\textsuperscript{44} Challenges to program implementation largely focused on sustainability factors such as continuing support and education in intervention modality (i.e. physical therapy),\textsuperscript{41} challenges to long-term follow-up,\textsuperscript{41} high staff turnover,\textsuperscript{41} and funding.\textsuperscript{36,41}

3.3 | Supplementary articles
Fifteen additional articles representing 10 studies or programs were eligible but limited in information; most were conference abstracts. Bangser and Haile-Mariam\textsuperscript{46} reported on the effectiveness of the USAID Ethiopia program, which included transport home, follow-up, and cash or in-kind support, and was valued by stakeholders. Donnelly et al.\textsuperscript{47} reported qualitative experiences of such programming: women received food, clothing, stipend (some), contraceptive counseling, and education on postrepair pregnancy care needs. Benski et al.\textsuperscript{38} reviewed a multidisciplinary strategy for fistula management in Benin on physical and social outcomes; however, the intervention was not described. El Ayadi et al.\textsuperscript{49} explored adjunct service receipt and reintegration score in Uganda; no intervention details were captured. Hagos and Abebe\textsuperscript{50} reported on an Ethiopian model including provision of sanitary materials, training in life skills and income-generating activities, linkages with women’s associations, and education to support fistula identification and referral. Jarvis et al.\textsuperscript{27} described skills training provided to northern Ghanaian women; anecdotally, trainings were beneficial, but some felt the skills taught were inappropriate for the market, personal physical circumstances, or otherwise insufficient to change economic status. Mohammad\textsuperscript{51} described a residential Nigerian program designed to improve health and socioeconomic status; however, no intervention description or outcomes were reported. In Tanzania, Mselle et al.\textsuperscript{52} described patient participation in a society for disabled individuals that provided health insurance, paid medical bills, and supported income-generating activities. Parameshwar et al.\textsuperscript{53,54} evaluated postoperative recovery in a Ugandan fistula camp using a group-based model of postoperative care that integrated physical and psychosocial healing. The intervention was not described, but findings suggested support and helpfulness were increased among recipients. Finally, Shittu et al.\textsuperscript{55} described all Nigerian fistula hospitals as capable of rehabilitation/reintegration services including elementary education, skills acquisition, and counseling.

3.4 | Unpublished articles and program reports
3.4.1 | Internet
Our grey literature search resulted in 2623 eligible links across 123 websites; 1805 functioning and downloadable in PDF or html format were screened, and 55 were analyzed. The level of detail was variable, with most broadly summarizing activities, and some programming reported by multiple partners. Where organizations provided services across multiple locations, it was difficult to discern site-specific programming. Reintegration programming identified primarily included health education, psychosocial counseling, and skills development or business education for economic empowerment. Some included patient advocacy. Fewer discussed physical rehabilitation or contraceptive counseling. Most programming directly targeted women; although some extended counseling to families/partners or built community awareness and resources for support and stigma reduction. Findings lacked outcome data, with few documents presenting participant comments. Finally, programming dates were difficult to establish.

Multicomponent reintegration programming where adequate detail was provided is summarized in Table 3. Materials from UNFPA and EngenderHealth evidenced broad partnerships. UNFPA documents emphasized reintegration programming, specified as psychosocial and socioeconomic support, as a pillar of the Campaign, and facility-based reintegration programs are tracked. Findings highlighted programming across multiple countries (Burkina Faso, Central African Republic, Chad, Ghana, Guinea, Kenya, Liberia, Madagascar, Niger, Nigeria, Republic of Congo, Sierra Leone, Sudan, Tanzania, and Zambia; also highlighted were early steps to developing programming in Eritrea and Ghana) including combinations of health education,
<table>
<thead>
<tr>
<th>Study (author/ year)</th>
<th>Article type</th>
<th>Study objective</th>
<th>Country</th>
<th>Study design</th>
<th>Study dates</th>
<th>Participants</th>
</tr>
</thead>
</table>
### Summary of components: Health education and psychotherapy

**Location:** Fistula repair camp  
**Implementer:** Physiotherapists, nurses (follow-up)  
**Duration:** Preoperative through 14 d postsurgery  
**Mechanism:** Maintain low abdominal pressure through activity modification  
**Structure:** Preoperative: 2–3 physiotherapist-led didactic sessions to learn techniques to reduce abdominal pressure during daily activities including perineal contractions, hypopressive exercises, and behavioral instruction. Postoperative: Further physiotherapy sessions. Activity prohibitions for 3 mo: sitting up from back lie, twisting body, bending at abdomen, lifting with bend in back, sexual intercourse. Socially isolated women offered vocational training and/or microcredit (no additional detail). Follow-up at 3, 6, and 12 mo (unclear if any additional instruction offered).  
**Comparison:** Standard of care (no follow-up)

### Study outcomes and measures

<table>
<thead>
<tr>
<th>Study outcomes</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 d: Repair success (fistula repaired with or without incontinence vs failed repair or urinary diversion)</td>
<td>Repair success (14 d): Repair success was significantly higher in intervention group (68.8% vs 57.6%; OR 2.72, 95% CI, 1.30–5.93, P=0.005). Number of prior surgeries also significant predictor of surgical repair success. Among women with closed fistula, urinary stress incontinence was lower in intervention group (52.6% vs 22.1%, P&lt;0.001)</td>
</tr>
<tr>
<td>1 yr: Quality of life (QOL; Ditrovie scale, range 10–50)</td>
<td>Quality of life (1 yr); Mean QOL at surgery through 1 yr decreased from 36.3 to 13.0 among women with successful surgery and no USI, from 34.3 to 17.0 among women with successful surgery and USI, and from 38.7 to 29.4 among women with failed repair (including 10.3% who had achieved repair by 1 yr)</td>
</tr>
</tbody>
</table>

### Recommendations (authors’ recommendations based on findings/experiences)

A formal counseling program can have significant positive short-term impact on fistula patients through increasing knowledge about fistula and improving self-esteem. Counseling programs should include family members and provide information on and access to family planning methods.
### TABLE 2  (Continued)

<table>
<thead>
<tr>
<th>Study (author/year)</th>
<th>Article type</th>
<th>Study objective</th>
<th>Country</th>
<th>Study design</th>
<th>Study dates</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keyser et al. 40</td>
<td>Empirical research</td>
<td>To describe components of a physical therapy for women with fistula and report on outcomes</td>
<td>Democratic Republic of Congo</td>
<td>Quasi-experimental (pre/post)</td>
<td>May 2010–April 2012</td>
<td>205 total, 142 with discharge evaluation</td>
</tr>
<tr>
<td>Keyser et al. 41</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ojengbede et al. 24</td>
<td>Empirical research</td>
<td>To determine the impact of group psychological therapy on the mental health of obstetric fistula patients</td>
<td>South Sudan</td>
<td>Quasi-experimental (pre/post)</td>
<td>Oct.–Nov. 2008</td>
<td>60 women</td>
</tr>
</tbody>
</table>
### Intervention description (summary, location, duration, mechanism, structure, comparison)

<table>
<thead>
<tr>
<th>Summary of components: Health education and physical therapy</th>
<th>Study outcomes and measures</th>
<th>Results</th>
<th>Recommendations (authors’ recommendations based on findings/experiences)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location: Health facility</td>
<td>Pelvic floor muscle strength (range 0–5), contraction endurance (contraction time), contraction repetitions, fast contractions, level of continence (self-report, Addis Ababa Fistula Hospital Incontinence Scale; range 1–5).</td>
<td>Pelvic floor muscle strength: mean 2.45 postop to 2.54 at discharge, with 17.6% improving in grade</td>
<td>Preliminary results suggest that integrated physical therapy for women undergoing fistula repair is feasible and may be an important adjunct treatment given observed improvements in pelvic floor functional capacity with limited exposure to physical therapy. Challenges to implementation included need for more support and continuing education in pelvic floor physical therapy, difficulty in following patients long term, high staff turnover, and limited funding for program continuation</td>
</tr>
<tr>
<td>Implementer: Physical therapists and nurses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Duration: 7–14 d of physical therapy, average of 9.45 sessions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanism: Educating clients about fistula and prevention, building their self-esteem and helping to prepare them for social reintegration will increase awareness about women’s bodies, prevent postsurgical complications, and contribute to fistula prevention</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure: Physical therapy sessions started at day 14 postoperatively</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison: Postsurgery compared with hospital discharge</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Summary of components: Health education and psycho-social counseling

<table>
<thead>
<tr>
<th>Location: Fistula camp</th>
<th>Depresssion, self-esteem, and suicidal ideation</th>
<th>Depression: Depression significantly decreased from 71.7% to 43.4%</th>
<th>Given the systematic reductions in all mental health measures after group psychological therapy, psychological counseling is recommended as an adjunct to surgical repair. Group psychotherapy offers the opportunity for individuals to share experience and coping strategies and is cost-efficient in countries with limited human resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implementer: Trained nurse psychologist or clinical counselor</td>
<td>Self-esteem: Very low self-esteem significantly decreased from 65.0% to 18.3%</td>
<td>Suicidal ideation: Severe suicidal ideation significantly decreased from 15% to 0%, and no suicidal ideation significantly increased from 43.3% to 73.3%</td>
<td></td>
</tr>
<tr>
<td>Duration: 1 session</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanism: Group interpersonal therapy among patients with similar mental health conditions helps patients to understand their health problems through sharing of information, experiences, and coping strategies</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Structure: Group sessions had 9–12 participants and lasted 45–60 min. Discussion topics included the cause of their health challenge, initial reaction of their family members and community to incontinence, how they have been able to live and interact with their community, and the emotional impact. Counselors guided participants to think of ways to solve problems. Sessions concluded with fistula education and dispelling myths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison: Presurgery compared with hospital discharge (14–21 d postoperative)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study (author/year)</td>
<td>Article type</td>
<td>Study objective</td>
<td>Country</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------</td>
<td>-----------------</td>
<td>---------</td>
</tr>
<tr>
<td>Pollaczek et al. (2017)</td>
<td>Program report</td>
<td>To describe holistic fistula outreach, treatment and reintegration program content</td>
<td>Kenya</td>
</tr>
<tr>
<td>Trombley and McKay (2010) Program also reported on in Diallo (2009)</td>
<td>Program report</td>
<td>To describe fistula-related programming in Guinea funded by USAID</td>
<td>Guinea</td>
</tr>
</tbody>
</table>
### Summary of components: Psychosocial counseling, social support, and economic empowerment

**Location:** Hospital and community  
**Implementer:** Psychologists/social workers (counseling) and community representatives  
**Duration:** Not specified.

**Mechanism:** Economic empowerment will help women resume activities in community life and have greater agency and access to resources through: (1) challenging ideologies that justify social inequality; (2) changing prevailing patterns of access over resources; and (3) transforming institutions and structures that reinforce and sustain existing power structures.

**Structure:** Three-pronged approach: (1) outreach/identification of women with fistula and referral to care; (2) surgical repair and psychosocial counseling; and (3) reintegration assistance. At repair hospitalization, women undergo 2–3 individual or group psychosocial counseling to help women work through anxieties. Women are then escorted home by program staff and linked to peer support groups. Groups provide psychosocial support, teach income generating skills and women participate in group-led income generation activities. Group participation increases access to bank accounts and microloans. Women and their families are enrolled in the Kenya National Hospital Insurance Fund.

**Comparison:** None

<table>
<thead>
<tr>
<th>Intervention description (summary, location, duration, mechanism, structure, comparison)</th>
<th>Study outcomes and measures</th>
<th>Results</th>
<th>Recommendations (authors’ recommendations based on findings/experiences)</th>
</tr>
</thead>
</table>
| Emotional well-being, fistula knowledge, and economic status | Well-being: 90% reported support groups helped them a lot to make new friends, communicate with family members, and feel happy in lives  
Fistula cause: 85% indicated support groups helped them a lot to understand causes of fistula. Women in FGDs were able to articulate fistula causes and how to prevent recurrence after repair  
Economic status: 9% reported that they had been helped a lot with their basic needs, 64% said helped somewhat, and 23% said helped not very much. FGD participants reported success in developing income generating projects, getting larger loans out from the bank and respect in the community |  
Fistula survivors trained to serve as community-based representatives can effectively improve community awareness, increase identification of women with fistula and refer to surgical and psychological treatment, and provide meaningful reintegration assistance. A holistic integrated model of outreach, treatment, and reintegration can have a large impact on women’s lives, physically and emotionally. In time, it may also help women financially. Such a group model may be most effective in areas where fistula is concentrated. |

### Summary of components: Health education and social support

**Location:** Community  
**Implementer:** Waiting home coordinator, host families  
**Duration:** Not specified.

**Mechanism:** Social immersion in nonjudgmental environments supports women’s recovery and reintegration. Health education and communication skills will help women become agents of change in their communities.

**Structure:** Women stay in a waiting home for 2 wk prior to their surgery for testing and intake processes, and return to this waiting home after hospital discharge (14 d after surgery) until they have recovered. The coordinator supports patient morale and helps to create a sense of community at the waiting home. At the waiting home, women receive health education, orientation to publicly speaking, and interpersonal communication training. For women who have a longer recovery period or who would have difficulty returning for a 3-mo postoperative check-up, a host family initiative has been developed. Staying with a host family helps facilitate the transition between the waiting home and return to home villages, as women are able to participate in normal family activities to the extent to which they are comfortable.

**Comparison:** None

| Participant engagement in community educational sessions | Participant community engagement:  
53% of women who stayed at the waiting home had conducted at least 1 awareness session in communities  
Diallo: anecdotally, women experienced increased confidence, self-esteem, and emotional health | Waiting home model provides physical and social support to women. Greater attention is needed to address the psychosocial needs of patients and improve knowledge of host families. Other skills-building or income-generation activities would further facilitate patients’ reintegration; however, no funding is currently available for this |
psychosocial counseling, and income-generating activity training, literacy, and business skills. However, programming is generally lacking, with few women benefitting where programming is available, and best practices in social reintegration are needed. EngenderHealth findings emphasized vocational training, physical rehabilitation, counseling and emotional support, and stigma reduction. Country-focused needs assessments and other documents highlighted variability in available programming ranging from none (DRC), to some vocational training (Mali, Nigeria), some startup funding (Chad), some counseling (Niger), and some multicomponent programming (Guinea and Sierra Leone). Recommendations included development of holistic programming including social support, counseling, health education, and a focus on patient-centered care models.

### 3.4.2 Conference abstracts

Abstracts from five of seven ISOFs Conferences were accessible (Kenya 2009, Senegal 2010, Uganda 2014, Nigeria 2016, and Nepal 2018). Of 380 abstracts reviewed, 13 met inclusion criteria and were analyzed. Eligible abstracts described counseling, education, economic empowerment activities, and social support. Three abstracts reported on the Association for the Rehabilitation and Re-orientation of

**TABLE 2 (Continued)**

<table>
<thead>
<tr>
<th>Study (author/year)</th>
<th>Article type</th>
<th>Study objective</th>
<th>Country</th>
<th>Study design</th>
<th>Study dates</th>
<th>Participants</th>
</tr>
</thead>
</table>

Abbreviations: VVF, vesico-vaginal fistula; USI, urinary stress incontinence; SBA, skilled birth attendant; FGD, focus group discussion; RCT, randomized controlled trial; CBT, cognitive behavioural therapy; PTSD, post-traumatic stress disorder.
Women for Development (TERREWODE) Uganda activities: Emasu\textsuperscript{56} described training in music, dance, and drama for community performance and education. Income earned enabled participation in savings and loan schemes. Ayotaru et al.\textsuperscript{57} presented TERREWODE’s social reintegration model on social and economic well-being as accounting for large variability in social well-being of stakeholders. Tripathi et al.\textsuperscript{58} assessed TERREWODE participation among women with incurable fistula and found significant improvement in emotional distress, quality of life, and health satisfaction. Kabayambi et al.\textsuperscript{59} (Uganda) described a community participatory reflection approach including engaging community stakeholders to facilitate family counseling, financial assistance, and social group participation, which resulted in stigma mitigation and improved emotional status. In Pakistan, Syed\textsuperscript{60} presented on fistula management results in improved patient expectations and outlook. In Ethiopia, Fentaw et al.\textsuperscript{61} described an integrated adult learning program for women with inoperable fistula including basic literacy that resulted in further formal education, increased self-confidence, and readiness for starting businesses. In Bangladesh, Mohiuddin et al.\textsuperscript{62} and Haque et al.\textsuperscript{63} described the process and performance of reintegration and rehabilitation through...
microcredit-linked services including livelihood skills training, financial assistance for fistula clients and family members, and mobilization of local institutions. Outcomes were not provided; programmatic perspectives suggest the strategy is effective and efficient. In Burkina Faso, Ouedraogo et al.\textsuperscript{64} presented a medico-surgical management intervention combined with social and economic support that resulted in increased social participation, resumption of sexual intercourse, and return to work. In Kenya, Pollaczek et al.\textsuperscript{65} and Mohamed and Pollaczek\textsuperscript{66} reported on Action on Fistula, a comprehensive initiative focused on expanding fistula care access including support groups to enhance social and psychological health and boost livelihood development opportunities. Enhanced follow-up measures are implemented for longer-term outcomes of continence status, social and psychological well-being, and economic health. In Bangladesh, Rahman and Akhter\textsuperscript{67} presented results of financial support and training in income-generating activities, basic literacy and numeric training, psychosocial counseling, accommodation in wait-in centers, and medical support. Rehabilitated patients became community fistula advocates—starting new lives and gaining self-confidence. Finally, Shallon et al.\textsuperscript{68} identified National Obstetric Fistula Strategic frameworks emphasizing multisectoral and multidisciplinary approaches, with exemplar countries: Nigeria, Uganda, Tanzania, and Guinea.

Review of programs from the three Global Maternal Newborn Health Conferences (New Delhi, 2010; Arusha, 2013; Mexico City, 2015) identified one eligible abstract. Traore and Maartens\textsuperscript{69} presented on the integration of family planning services into fistula care in Mali. Abstract books from two of the five Women Deliver conferences (Copenhagen, 2016; Vancouver, 2019) included no eligible abstracts.

4 | DISCUSSION

To our knowledge this is the first study to review and consolidate published and unpublished literature on programming adjunct to female genital fistula surgery. Programming identified included various combinations of health education, physical therapy, social support, psychosocial counseling, and economic empowerment, and was based largely in sub-Saharan Africa. Authors supported holistic approaches...
TABLE 3  Summary of multicomponent programming identified in grey literature review.*

<table>
<thead>
<tr>
<th>Organization</th>
<th>Geography</th>
<th>Summary of programming</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beyond Fistula</td>
<td>Kenya</td>
<td>Counseling, vocational training, business training, and educational scholarships</td>
</tr>
<tr>
<td>Comprehensive Community-Based</td>
<td>Tanzania</td>
<td>Mabinti Center offers psychological counseling, family planning, and HIV/AIDS prevention in addition to a vocational training program in handicrafts that helps women to start their own businesses and become financially independent</td>
</tr>
<tr>
<td>Rehabilitation in Tanzania</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Freedom from Fistula</td>
<td>Madagascar, Malawi, Kenya</td>
<td>Classes in literacy/numeracy, handicrafts, micro-finance support and business; contraceptive counseling; seeks to develop patient advocates</td>
</tr>
<tr>
<td>Hamlin Hospital</td>
<td>Ethiopia</td>
<td>Comprehensive learning, health, and reintegration services including nutrition, physiotherapy, psychological counseling, and training in income-generating skills</td>
</tr>
<tr>
<td>TERREWODE</td>
<td>Uganda</td>
<td>Postsurgical care, nutritional support, psychosocial counseling, life-skills training, health education, and income-generating skills development. TERREWODE develops patients as advocates, and builds individual and community resources for support and stigma reduction</td>
</tr>
<tr>
<td>WADADIA</td>
<td>Kenya</td>
<td>Health education, psychosocial support, and training in income-generating activities for economic empowerment</td>
</tr>
<tr>
<td>Worldwide Fistula Fund</td>
<td>Kenya</td>
<td>Psychosocial support, literacy and leadership training, and the development and facilitation of fistula solidarity groups—cooperative groups that identify an enterprise or activity for income generation</td>
</tr>
</tbody>
</table>

*Organizations provided included an adequate level of detail in the unpublished literature to abstract this information; other organizations may provide similar programming, but this information was not accessible during our review.

to reintegration programming, calling on resource expansion to meet the physical and psychosocial needs of women recovering from fistula. Additionally, strategies to improve feasibility, acceptability, and effectiveness of patient-centered, informed intervention programming were identified.

Interventions addressed components of postsurgical social reintegration and rehabilitation needs demonstrated in the literature through education, counseling, physical rehabilitation, improving economic stability, and incorporating a full continuum of care approach. However, no one program modeled the holistic approach recommended by authors. Implementation challenges included training, staffing, funding, and limited scope. Facility-based program delivery was perceived as too limited in dose and breadth to have meaningful long-term impacts; however, this strategy allows for efficient delivery. Data were limited to short-term outcomes; only two primary studies assessed longer-term outcomes, despite broad interest.

Implementation remains a major gap in the literature, including feasibility and outcomes. Only 11 studies were eligible and reported adequate detail on intervention components for inclusion within primary results; intervention dosage varied greatly. Despite recommendation of comprehensive programming, very few measured broad outcomes. Standardization of objective and patient-reported outcomes would enable comparison across implementation approaches. In addition, while quality of study design was not evaluated formally, most studies were not controlled, and some reported no outcomes. While tested modalities align theoretically with improved outcomes, robust research design would allow testing of gains possible by program types and intensity, and inform cost-effectiveness of various approaches.

The available evidence suggests positive outcomes result from several reintegration approaches. Physical therapy should be considered, both pre- and postoperatively, including strengthening exercises and instruction on postures and techniques to protect the pelvic floor. Similarly, incorporation of evidence-based psychosocial counseling modalities is critical. Future research should include controlled assessment of multicomponent interventions (e.g. health education, physical therapy, community and individual level psychosocial counseling, and economic empowerment), acknowledging the multilevel and multidomain nature of reintegration. In addition, efficient strategies for long-term follow-up and for integrating community and family linkage are needed.

Other challenges identified include a mismatch between the short-term nature of the economic empowerment programming offered and women's needs; also seen in general poverty alleviation literature, some economic programming described was considered inadequate for substantial socioeconomic status improvement. Insufficient funding at multiple levels also hampers postrepair rehabilitation and reintegration, as it does prevention of fistula and other maternal morbidities. UNFPA cites a concerning decline overall in development assistance for maternal and newborn health.

Strengths of our study include our systematic protocol, our broad search strategies, and inclusion of unpublished literature. Despite finding a deficit of published information, our review synthesized the available outcomes and challenges prior studies have encountered and identified priorities for reintegration research. The lack of published articles and our language eligibility criteria may limit these findings. Additionally, no formal quality grading was conducted. As subsequent robust studies are implemented, a systematic review may become appropriate. Additionally, results were not reportable by our review may become protocol, our broad search strategies, and inclusion of unpublished literature. Despite finding a deficit of published information, our review synthesized the available outcomes and challenges prior studies have encountered and identified priorities for reintegration research. The lack of published articles and our language eligibility criteria may limit these findings. Additionally, no formal quality grading was conducted. As subsequent robust studies are implemented, a systematic review may become appropriate. Additionally, results were not reportable by
The existing literature supports holistic fistula care including meeting postrepair physical, psychosocial, and economic needs of women through reintegration programming targeting short- and long-term outcomes. However, the evidence base lacks robust research designs and systematic detailed reporting of intervention components and outcomes. We strongly encourage researchers and service providers to implement more robust evaluation designs and to broadly disseminate the results of their work so that the global fistula community can benefit through the development of best practices in reintegration.

AUTHOR CONTRIBUTIONS
AE, JB, SO, and JKB conceived the project. AE, CP, and JB-W drafted the protocol. AE, CP, AD, JB-W, SO, JB, AK, and JK revised the protocol and agreed upon the final protocol version. AE, CP, RB, and LL reviewed the literature. AE, CP, and JB-W drafted the manuscript. All authors revised the manuscript and approved the submitted version.

ACKNOWLEDGMENTS
This work was supported in part by the Eunice Kennedy Shriver National Institute of Child Health and Human Development grant number R00HD086232. The funding agency was not involved in the review, interpretation, or decision to publish. We thank Soufiene Makranou for his assistance in developing the programming for our grey literature search, and Rachel Bigley and Lizzy Lighty for their assistance with screening the grey literature.

CONFLICTS OF INTEREST
The authors have no conflicts of interest.

REFERENCES


65. Pollacek L, Mohamed H, Chomba B. Building a countrywide treatment network: lessons from Kenya and Zambia. 7th Conference of...
69. Traore D, Maartens I. Integrating family planning into obstetric fistula treatment services: Experiences from Gao, Mali. Women Deliver. Copenhagen, Denmark, 2016.


SUPPORTING INFORMATION
Additional supporting information may be found online in the Supporting Information section at the end of the article.

Table S1. Search strategy for all databases. All searches were limited to January 1, 2000–July 8, 2019.

Data S1. List of organizational websites identified by the Campaign to End Fistula Partners (UNFPA) that were searched for relevant content.