The AIM Malawi Program – Innovation in Maternal Health

Demonstration Project to Tailor a U.S. Maternal Health Quality Improvement Program in a Low-Resource Setting

November 2017

The American College of Obstetricians and Gynecologists (ACOG), BCM College of Medicine/Texas Children’s Hospital (BCM) and the Malawi Ministry of Health (MOH) have collaborated to implement the Alliance for Innovation in Maternal Health in Malawi program (AIM Malawi). AIM Malawi is a modification of the AIM program that has successfully reduced maternal mortality and severe morbidity in the United States.\(^1\) Results of the 18-month demonstration project show that the program has been effectively implemented in three facilities in Lilongwe, reducing incidents of maternal mortality and morbidity and improving team-based care and referral networks for maternal health care.

Innovation in Maternal Health Care: The AIM Approach

AIM is an integrated, multidisciplinary approach to improving maternal safety through a commonly shared data-driven quality improvement process and evidence-based implementation resources to streamline maternal safety bundle implementation. AIM supports:

- Development of a common work culture that fosters communication, team building, team function, multi-disciplinary collaboration and leadership among all health care providers through drills, simulations and team training.
- Implementation of standardized protocols and checklists within maternity facilities treat or prevent obstetrical emergencies.
- Use of maternal safety “bundles” to implement proven quality improvement and best practices.
- Collection and use of data for rapid-cycle quality improvement to create meaningful process and outcome metrics.
- Establishment of timely and efficient referral and transfer protocols and management of anesthesia, blood and antiseptic needs.
- Engagement of the patient and family in the quality improvement process.

The AIM process supports facility-developed protocols to tailor and implement maternal safety bundles – sets of evidence-based practices that, when performed with fidelity, will lead to improved patient outcomes. Each bundle consists of Readiness, Recognition, Response and Reporting/Systems Learning to prepare hospital staff for an emergency, provide early recognition of an adverse event, and execute a standardized, effective response.

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\(^1\) For more information on AIM, please visit [www.safehealthcareforeverywoman.org/aim-program/](http://www.safehealthcareforeverywoman.org/aim-program/)
In partnership with the Malawi Ministry of Health and BCM, ACOG has tailored the successful U.S.-based AIM program to reduce maternal deaths from postpartum hemorrhage (PPH) in Malawi. Malawi has the 13th highest maternal mortality ratio in the world at 634/100,000\(^2\). AIM Malawi was implemented in three facilities: Kamuzu Central Hospital (KCH), Area 25 Health Center, and Bwaila Maternity Hospital, all in Lilongwe. AIM Malawi targeted obstetric hemorrhage, one of the leading causes of maternal mortality and morbidity in sub-Saharan Africa. ACOG Fellow/BCM staff physician Joseph Sclafani, MD, managed the program in Malawi with technical support from AIM and ACOG experts. Dr. Sclafani worked closely with the district health officials, hospital director, chair of the Department of Obstetrics and Gynecology and other leadership at the facilities to foster collaboration and catalyze local ownership of the program for sustainability.

To implement AIM in health facilities in Malawi, ACOG, the Malawi Ministry of Health and Baylor College of Medicine:

- Co-created a local steering committee and identified program champions within facilities.
- Conducted skills trainings in communications and obstetric hemorrhage
- Built upon existing quality improvement programs at facilities and developed ways to celebrate team success.

AIM Malawi participants were trained in emergency leadership, communication skills, and the obstetric hemorrhage protocol that was derived from AIM Hemorrhage Bundle and was consistent with the existing Malawi protocol. Nursing staff and clinical officers received training in the placement of uterine balloon catheters, non-pneumatic shock garments and other life saving measures. Hospital housekeepers, nurses’ aides, ambulance drivers, and even family members are sometimes incorporated into the emergency team.

AIM Malawi adapted materials developed by AIM to stress preparedness, early recognition, and rapid transfer with excellent hand-off communication to a higher level of care when appropriate. The program introduced fundamental principles of multidisciplinary teamwork and structured communication that are the foundation for implementation of the AIM bundles.

In first year: protocol.

- 395 staff were trained in team communication and PPH at KCH and Area 25.
- 14 skills labs were conducted to train staff in emergency procedures.
- Social media was used to facilitate team communication within facilities and to strengthen the referral network between KCH and Area 25 during patient transfer.
- Teams co-developed tailored PPH recognition, readiness, response and reporting materials.
- Obstetric hemorrhage carts were equipped and in use.

**Results of the AIM Malawi Program: Feasible, Scalable and Effective**

In Malawi, ACOG and BCM implemented the AIM program in two phases. In May 2016 the AIM Malawi Program was introduced at Kamuzu Central Hospital (KCH) and Area 25 Health Center;

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the program at Bwaila Maternity Hospital was introduced in July 2017. Our preliminary findings indicate that 1) the AIM program can be successfully implemented in Malawi with modifications to adjust for Malawi’s limited medical resources; 2) the program is scalable to community health centers, large regional hospitals and a regional perinatal center; and 3) the AIM Program can improve maternal outcomes by educating hospital staff about patient safety fundamentals and by providing hands-on training in critical interventional skills.

Program Design

- Between May 2016 and December 2017 AIM Malawi will have provided training and ongoing support at Kamuzu Central Hospital, the regional perinatal center for central Malawi. The hospital performs approximately 3,500 births each year. Ninety percent of patients are referred from other health care facilities throughout the central region of Malawi. The incidence of obstetric hemorrhage was 8.3% during the first twelve months of the demonstration period.
- AIM Malawi training was conducted at Area 25 Health Center, a low-resource rural facility near Lilongwe performing approximately 3,700 low-risk births annually. The incidence of obstetric hemorrhage during the first twelve months of the demonstration period was 1.9%. The AIM program at this small health facility stresses early identification of patients at risk for maternal hemorrhage and preparation for timely referral to a higher level of care.
- In July 2017 AIM Malawi training began at Bwaila Hospital, which performs approximately 17,000 births per year and is the busiest maternity hospital in Malawi. Most uncomplicated deliveries are performed by midwives with backup support for operative deliveries by clinical officers and physicians. The hospital can handle most cases of obstetric hemorrhage. The clinical staff was trained to place B-Lynch sutures, perform uterine artery ligation, and insert a condom catheter to control hemorrhage. However, the hemorrhage protocol at Bwaila was modified to facilitate the rapid transfer of life-threatening cases to Kamuzu Central Hospital.

Implementation of the AIM Program: A Five Step Process

Step I: Engage Health System Leadership
The AIM Program was presented to the leadership at the Malawi Ministry of Health, the Lilongwe District Health Officer, the KCH Hospital Director, and the obstetrics and gynecology department head at KCH prior to program implementation. The health management administrative team provided demographic information, assisted in site selection, and identified staffing and resource challenges. Their support and endorsement was critically important to the overall success of the program.

Step II: Perform a Baseline Assessment of Unit Safety
The Agency for Healthcare Research and Quality (AHRQ) Hospital Safety Survey was conducted at all three facilities prior to the implementation of the AIM Program. This survey is extensively used by hospital facilities throughout the United States to measure teamwork between and within hospital units, the level of communication among all caregivers, and the overall perception of safety within units. A follow up survey was conducted at all three facilities six months and twelve months after implementation. [Survey results are discussed in the outcomes section of this report.]
Step III: Introduce the AIM Malawi Training Program
The first day of the two-day AIM Training Program was an interactive session modeled after the TEAMSTEPPS® program developed by AHRQ. TEAMSTEPPS trains participants in team dynamics and structured communication. Each training session was organized to include representation by all clinical disciplines to foster multidisciplinary cooperation and focused on the AIM Malawi obstetric hemorrhage protocol and the use of the hemorrhage checklist, that was created by the steering committee.

The second day consisted of a skills lab to train hospital staff on the essential interventional skills that reduce morbidity and mortality from obstetric hemorrhage, which include:

- Placement of a non-pneumatic anti-shock garment (NASG).
- Placement of a condom catheter (uterine balloon tamponade).
- Placement of a B-Lynch suture.
- Uterine artery ligation.
- Accurate quantification of blood loss.

The Program also included a two-hour simulation of an obstetric hemorrhage followed by a debriefing session. This exercise provided participants with supervised training in team skills in a clinical setting that prepared them for a true emergency hemorrhage.

Step IV: Follow-up Surveys to Measure Change
Follow-up surveys were conducted after the introduction of the training program to measure changes in the safety culture and collect clinical data to assess changes in clinical performance. 

[Results are discussed in the outcomes section of this report.]

Step V: Long Term Support for Sustained Systems Change
ACOG and BCM are providing long-term collaboration with KCH, Area 25, and Bwaila to provide technical assistance with data collection and analysis to support continual improvements in clinical performance and safety culture. As demonstrated in the U.S., the transition to a culture of safety takes time. Staff engagement by AIM leadership is necessary throughout the change process to train new staff, ensure high quality implementation of bundles, and to identify positive and negative performance trends. During this period of culture change, social media platforms are often used to broadcast success stories, disseminate program information, and share feedback from participants. Each clinical unit is expected to transition through a two- to three-year maturation process and progression to a fully developed, self-sustained safety culture.

Behavioral and Clinical Outcomes of the AIM Malawi Program
Kamuzu Central Hospital and Area 25 Health Center
May 2016 – November 2017

1. Improvements in Teamwork, Communication, and Overall Safety Culture

In May 2016 patient safety attitudes at KCH and Area 25 Health Center were poor (Table 1). Six months after the start of AIM implementation, clinical and nursing staff attitudes regarding overall safety, teamwork and communication skills had significantly improved.
TABLE 1: HOSPITAL SAFETY SURVEY SCORES

<table>
<thead>
<tr>
<th>AIM MALAWI PROGRAM</th>
<th>Steering Committee May 2016</th>
<th>Steering Committee Nov 2016</th>
<th>All Participants Nov 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of positive responses</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERALL GRADE OF PATIENT SAFETY</td>
<td>0</td>
<td>44</td>
<td>40</td>
</tr>
<tr>
<td>“VERY GOOD” or “EXCELLENT”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. Teamwork within units and between units</td>
<td>44</td>
<td>67</td>
<td>67</td>
</tr>
<tr>
<td>III. Communication, Handoffs and Reporting of Clinical Errors</td>
<td>22</td>
<td>47</td>
<td>42</td>
</tr>
</tbody>
</table>

2. Increase in Staff Preparedness to Manage a Maternal Hemorrhage

- The AIM Malawi Program trained 395 midwives, physicians, clinical officers, administrators, and anesthetists over a 12-month period. 207 participants (52%) were posted to KCH and Area 25 Health Center. 188 participants (48%) were employed at Bwaila Hospital.
- Fourteen two-hour skills labs were conducted over a 12-month period to train staff in four emergency lifesaving procedures: 1) B Lynch suture; 2) Uterine Artery Ligation; 3) Uterine balloon tamponade; 4) Use of a Nonpneumatic Anti-Shock Garment (NASG).
- After the AIM Malawi training, there was a 9.8 % increase in the placement of B-Lynch sutures and 17.1% increase of NASG for cases of postpartum hemorrhage of greater than 1000mL secondary to uterine atony (p= 0.04, 0.05, respectively). There was also an increase in the use of a condom catheter and in the need for hysterectomy (p=NS).
- A total of 10 NASG were placed during the post-implementation period for indications ranging from placenta previa (N=1), uterine atony (N=6), ruptured uterus (N=1), placenta accrete (N=1), and unknown (N=1). Prior to AIM training, the NASG was not utilized, even though it was readily available on the labor ward because staff did not know how to use it.
- After skills lab training, there was a marked improvement in knowledge and confidence in performing all technical skills as reported by program participants (P< .001)
- A hemorrhage cart or emergency tray was in use at only one of the three labor wards prior to the AIM Malawi program. After program implementation, emergency equipment was in use in all three labor wards. Where administrative or clinical leadership was strong, the cart was used well and restocked regularly. Where the leadership was weak, the cart also suffered from lack of utilization and attention.

“It was amazing to build an effective team when working with completely new people. It helped me to save mothers.”

AIM Training Program Participant
Between May 2016 and October 2017 there were at least 56 maternal hemorrhage simulations conducted at all three facilities as part of the AIM Malawi training program. In situ simulation, had never been conducted on the labor ward prior to the AIM Malawi program.

3. Increase in the Recognition and Prevention of Obstetric Hemorrhage

- Prior to the AIM Malawi program, there was no formal mechanism at any of the three facilities to screen high-risk patients for postpartum hemorrhage on admission to the labor ward. A risk assessment checklist was designed and implemented at KCH and Area 25 and will be implemented at Bwaila Hospital in November 2017. The highest utilization rate of the risk assessment checklist was at Area 25, where it was used on admission in 64% of patients. Periodic stockouts of the form were the principal cause of interruptions in the use of the checklist.
- Oxytocin was used in the third stage of labor in 94% and 98% of cases at KCH and Area 25 Health Center respectively. This is a high usage, and was very promising that this practice would continue.
- All participants of the AIM Malawi Training Program received classroom education and hands-on training in the quantification of blood loss. The number of identifiable postpartum hemorrhages increased from 7.4% to 9.5% at KCH after quantification training (p = .20). This increase is believed to be due to improved recognition of PPH because of the shift to quantification of blood loss.
- The incidence of maternal deaths due to postpartum hemorrhage decreased from 0.90% before implementation of the AIM Malawi Program to 0.61% between 3 and 6 months after the program was completed (p = .05).

Phase 1 Impact Analysis of the AIM Malawi Program
May 2016 – November 2017

<table>
<thead>
<tr>
<th></th>
<th>KCH</th>
<th>Area 25</th>
<th>Bwaila</th>
<th>Annual Predicted Births</th>
<th>Annual Obstetrical Hemorrhages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate of Maternal Hemorrhage</td>
<td>8.3%</td>
<td>1.9%</td>
<td>5%²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phase 1 (June 2016- May 2017)¹</td>
<td>3547</td>
<td>3671</td>
<td></td>
<td>7,218</td>
<td>434</td>
</tr>
<tr>
<td>Phase 2 (June 2017- Dec 2017)¹</td>
<td>1773</td>
<td>1835</td>
<td>8297</td>
<td>11,905</td>
<td>597</td>
</tr>
<tr>
<td>Births Impacted by AIM Program over 18 months (May 2016-December 2017)</td>
<td></td>
<td></td>
<td></td>
<td>19,123</td>
<td>1,031</td>
</tr>
</tbody>
</table>

¹²Projected births based on 2015 statistics
²Hemorrhage rate for Bwaila Hospital is an estimate

“In ten days, I have managed to save two mothers.” AIM project member

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Conclusions and The Next Phase of Implementation
The results of the demonstration project have led to several conclusions about the scalability and replicability of the program:

- The AIM Malawi Program demonstrates that a U.S. Program can be successfully implemented in a low-resource country and can make a significant impact on maternal mortality and morbidity in both high volume facilities and health centers with limited resources.
- Implementation of screening protocols and referral networks have demonstrated clinical improvements in the timely management of maternal emergencies.
- Participants in AIM Malawi report improved knowledge and confidence in performing technical skills necessary to recognize and treat maternal complications especially PPH.
- The use of condom catheters, B-Lynch sutures, and uterine artery ligation can reduce the incidence of hysterectomy and maternal morbidity.

ACOG presented preliminary results of this work to Andrew Likaka, MD, Head of the Quality Management Directorate at Malawi’s Ministry of Health. Dr. Likaka expressed eagerness to see the AIM Malawi program implemented in all facilities within the greater Lilongwe region with a long-term goal of implementation across Malawi. The program was also presented to the Reproductive Health Department of the Ministry of Health that also supported the program. ACOG and BCM will continue to work with the MOH and hospital leadership to refine and extend the program.

ACOG and BCM are seeking additional funding to sustain AIM Malawi at KCH, Area 25, and Bwaila and to introduce the program to other poorly performing hospitals in the country.

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FOUR KEY DRIVERS OF A SUCCESSFUL QUALITY IMPROVEMENT PROGRAM

I. Engage the Ministry of Health, District, and Facility Leadership

The leadership at all levels of the Malawi Health System was instrumental in the program’s success. Their ongoing support was also essential to the success of the program.

II. Engage the Hospital Staff in the Program Design Phase

There were 393 hospital staff trained to manage maternal hemorrhage over a twelve-month period. This represents a participation rate of more than 95% of the obstetrical staff at KCH and Area 25 Health Center, and 81% of staff at Bwaila Hospital. The initial forum to engage the staff was the AIM Malawi Steering Committee, which provided physicians, clinical officers, midwives, and anesthetists with a venue to take local ownership of the program. Twenty-three members of the medical staff from KCH and Area 25 participated on the Steering Committee. The committee staff modified the U.S. AIM hemorrhage protocols to align them with available resources and existing Malawi clinical protocols. The committee also created screening tools and checklists and served as the speakers and skills lab trainers that were at the core of the AIM Malawi Training Program. The staff at Bwaila Hospital modified the KCH hemorrhage protocol to adapt it to their facilities and resources. They also created an admission form that integrated AIM Malawi screening tools and checklists into their clinical workflow. The engagement by local staff facilitated their acceptance of many critical changes and enabled them to claim ownership of the program.

III. Identify Program Champions

We identified individuals who played an important role in the success of their unit. Program Champions can be a catalyst that motivates others to lean in and support the program through their words and actions.

IV. Celebrate the Program’s Success

When staff members adopt best practices and work as a team, success usually follows. A successful intervention should be followed by spotlighting effective clinical performance to serve as an example for others. We used social media to highlight these “success stories” and give public recognition to all team members.