Applying the Model for Improvement to Strengthen the Care for Children with Severe Acute Malnutrition (SAM) and Medical Complications in Malawi

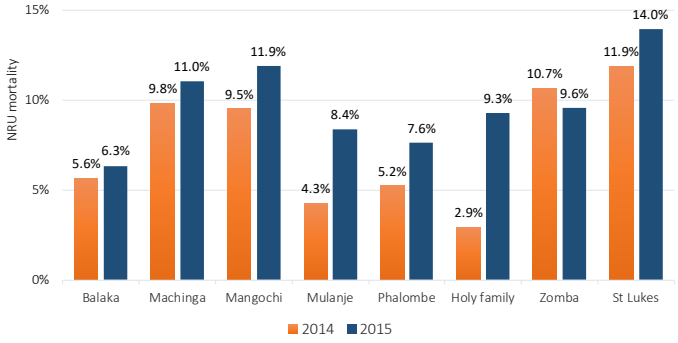
In 2014 and 2015, seven hospitals in Malawi's South-East Zone (SEZ) were experiencing death rates of up to 11.6 percent among children with severe acute malnutrition (SAM) with medical complications. This was well above the World Health Organization (WHO) standard of acceptable death rates for children with SAM of less than 10 percent. Even in facilities where the death rate was lower than 10 percent, there was an increasing trend of high death rates over the two years (see Figure 1 for death rates in eight districts in the South East Zone of Malawi).

Based on their success in integrating nutrition into the national HIV care and treatment using the FHI 360 Quality improvement (QI) Model for Improvement[a] (see Figure 2 below), the Nutrition Unit of Malawi's Ministry of Health (MOH), working with the Food and Nutrition Technical Assistance III Project (FANTA), decided to use the QI model to strengthen the quality of care in the management of children with SAM—and so reduce child death rates.

Analysis of the Problem

In March 2016, FANTA and the MOH worked with health care providers from the seven SEZ hospitals—Mangochi District Hospital, Machinga District Hospital, Balaka District Hospital, Mulanje District Hospital, Mulanje Mission Hospital, St Lukes Mission Hospital, and Holy Family Mission Hospital—to identify and understand the root cause of the high death rates. Through a baseline assessment conducted at each hospital, and a problem analysis of the 13 critical steps in management of SAM (see Box 1), they identified five aspects of case management that lead to increased risk of death for SAM children:

Figure 1. Comparison of death rates between 2014 and 2015 in the South-East Zone (SEZ) of Malawi



- Care of critically ill SAM children was often left to home-craft workers and ward attendants who lacked the knowledge and skills necessary to effectively manage patients with SAM. Clinicians did not review, monitor, or provide treatment and care.
- Emergency Triaging Assessment and Treatment (ETAT) was not provided properly, resulting in under-identification of SAM children with medical complications. This delayed initiation of care and treatment, including the emergency care needed to treat hypothermia, hypoglycemia, and dehydration.

a Langley GL, Moen R, Nolan KM, Nolan TW, Norman CL, Provost LP. *The Improvement Guide: A Practical Approach to Enhancing Organizational Performance (2nd Edition)*. San Francisco, California, USA: Jossey-Bass Publishers; 2009.

Box 1. 13 Critical Steps in the Management of SAM in Malawi

The Malawi Guidelines for Community-based Management of Acute Malnutrition (CMAM) recommends the following critical steps in the management of SAM with medical complications:

1. Initial nutrition and clinical assessment
2. Prevention or treatment of hypoglycaemia
3. Prevention or treatment of hypothermia
4. Prevention or treatment of dehydration
5. Correcting urea and electrolyte imbalances
6. Treatment and prevention of infections
7. Testing and linking children to HIV treatment and care
8. Correcting micronutrient deficiencies
9. Starting immediate and cautious feeding
10. Giving catch-up diet for rapid growth
11. Providing loving care, play, and stimulation
12. Preparing the child for follow-up and discharge to the outpatient care
13. Conducting death audits within 72 hours

- Staff was not properly trained in using treatment charts to document child care or in managing handovers between shifts.
- Staff trained in the management of SAM children was frequently rotated out of the SAM inpatient care ward to other wards and replaced with staff not trained to manage SAM children.
- Audits were not conducted when a SAM-related death occurred.

Design of the Improvement Collaborative

To encourage providers to address these problems, FANTA and the MOH designed and implemented improvement efforts over a 17-month implementation period (April 2016 to August 2017). The improvement efforts followed the logic of the FHI 360 Quality Improvement Model, and incorporated key features from the Institute for Healthcare Improvement's Collaborative Model[b] to facilitate the implementation process as follows:

1. Common improvement aims and objectives were developed through consultation workshops with the District Health Management Teams (DHMTs) and health care providers in each hospital. During the workshops, each hospital formed a QI team that identified and prioritized improvement objectives that would improve case management and contribute to the overall aim of reducing death rates. The following are five of the most critical objectives the teams developed:

1. All children with SAM admitted to the inpatient care facility receive initial clinical and nutrition assessment according to the national protocol.
2. All children with SAM admitted to the inpatient care receive interventions to prevent dehydration according to the national protocol.
3. All children with SAM admitted to the inpatient care facility and with confirmed dehydration are treated according to the national protocol.
4. All children with SAM admitted to the inpatient care facility are started on immediate cautious feeding according to the national protocol.
5. All SAM child deaths are audited within 72 hours of occurrence.

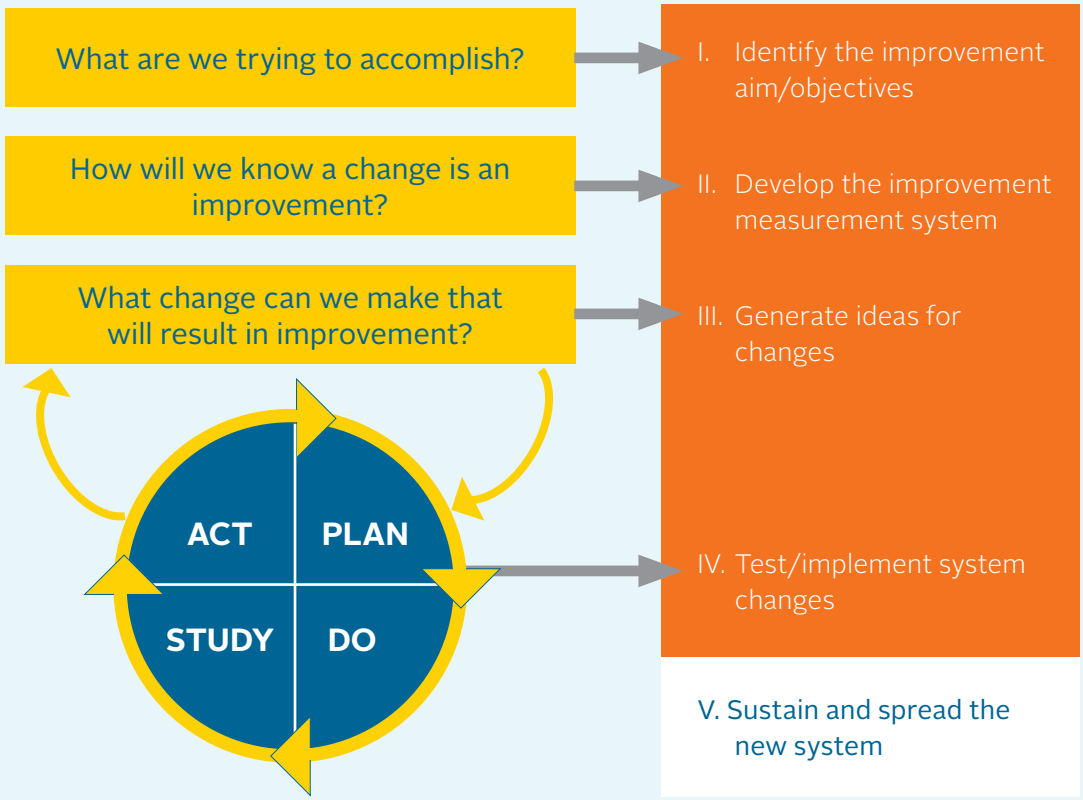
b The Breakthrough Series: IHI's Collaborative Model for Achieving Breakthrough Improvement. IHI Innovation Series white paper. Boston: Institute for Healthcare Improvement; 2003.

2. A common improvement monitoring system, including monitoring tools and standard operating procedures, was developed to facilitate understanding and harmonisation of the core indicators that each facility's QI team defined to measure improvement, and for which they set targets. The QI teams were trained on how to document and track progress of their improvement using run charts. Below are examples of indicator targets:

- At St. Luke's Hospital we will increase the number of SAM children who receive initial nutrition and clinical assessment at the outpatient department (OPD) and pediatric ward from 13 percent to 100 percent from April to December 2016.
- At Mangochi District Hospital, we will ensure that all SAM children with dehydration are treated according to the national protocol by December 2016.
- At Mulanje Mission Hospital, we will conduct all SAM child death audits within 72 hours of occurrence by December 2016.

3. The PDSA-based (plan, do, study, act) process from the Quality Improvement Model was applied by each QI team to test and implement changes and analyze their impact during action periods of 6–8 months (see Figure 2 and the section on results below).

Figure 2. FHI 360 Quality Improvement Model



Adapted from Langly, G.L.; Nolan, K.M.; Nolan, T.W.; Norman, C.L.; and Provost, L.P. 1996. *The Improvement Guide: A Practical Approach to Enhancing Organization Performance.* Jossey-Bass Publishers: San Francisco.

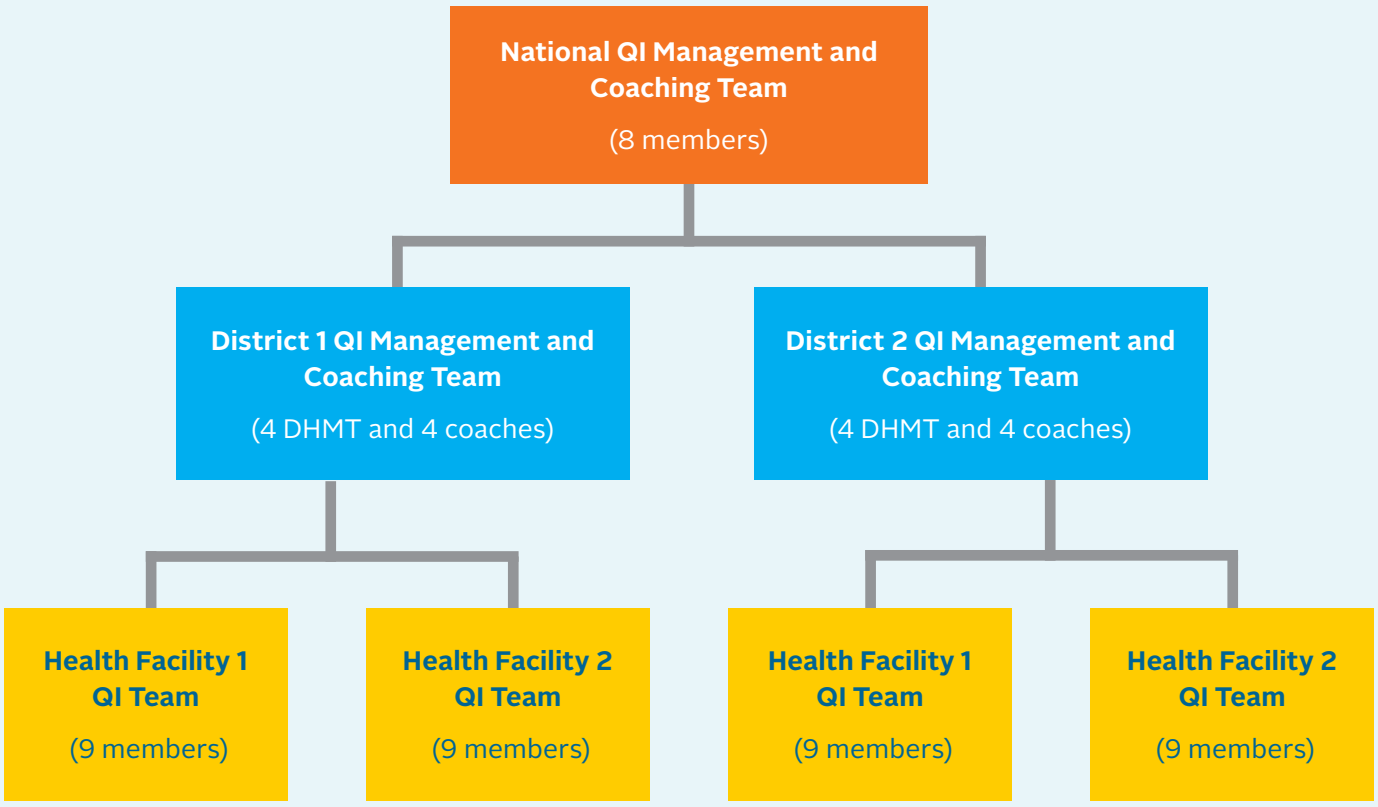
4. An operational structure was established comprising the following teams (see Figure 3):

- A national QI management and coaching team of pediatricians, nutritionists, public health specialists, and managers from the MOH, Malawi College of Medicine, College of Health Sciences, and FANTA.
- DHMTs, including district-level coaches who are clinicians, nurses, nutritionists, and environmental health officers.
- Facility-based QI teams with technical expertise including clinical care, nursing care, nutrition, environmental health, patient attendance and support.

5. A mentorship and coaching plan was put into place to support the teams to implement, test, and measure the effectiveness of the changes developed. Mentorship and coaching visits were conducted monthly by the national coaching teams and every two weeks by the district coaching teams.

6. Two learning sessions were conducted where the seven hospitals presented progress of their QI work and learned about best practices from other teams. QI teams also developed improvement objectives and change ideas to test and implement over the following 6 months.

Figure 3. The Malawi CMAM NRU QI Management Structure



Results

Overall, the seven hospitals reported an improvement in the five common objectives, an indicator of improvement in the care for children with SAM.

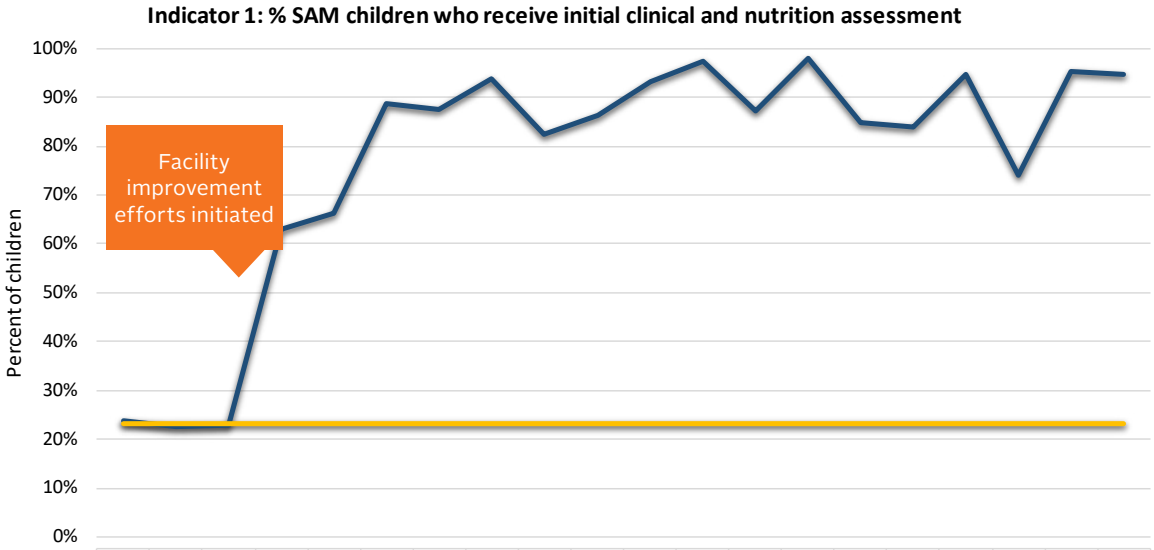
Objective 1: All children with SAM admitted to inpatient care receive initial clinical and nutrition assessment according to the national protocol

Findings: As presented in Figure 4, the seven hospitals reported an improvement in the initial clinical and nutrition assessment of children with SAM. They started to implement the objective in April 2016, noting a steady improvement from a median of 23 percent prior to QI; by August 2017 the hospitals were conducting initial clinical and nutrition assessment for 95 percent of children with SAM.

The improvement is the result of the following changes: The improvement was the result of increased participation of clinicians in the initial care of children with SAM. Before QI, clinicians referred SAM children for management by home-craft workers and nurses, waiting to be called only

Participants at a learning session hear about QI efforts at Machinga District Hospital in September 2016.

Figure 4. % of SAM children receiving initial clinical and nutrition assessment at the 7 hospitals



	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17
Numerator	14	16	17	58	43	39	28	30	28	25	41	37	94	101	83	57	53	17	39	35
Denominator	59	71	74	92	65	44	32	32	34	29	44	38	108	103	98	68	56	23	41	37
% assessed	23.7%	22.5%	23.0%	63.0%	66.2%	88.6%	87.5%	93.8%	82.4%	86.2%	93.2%	97.4%	87.0%	98.1%	84.7%	83.8%	94.6%	73.9%	95.1%	94.6%
Baseline	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%	23.0%

when there was an emergency in the ward. The clinicians did not have confidence in their skills to manage a child with SAM. After training in QI and inpatient management of SAM, clinicians became aware of how crucial the first 24 hours of admission are to preventing child deaths due to SAM. A thorough clinical assessment upon admission is now mandatory in all seven hospitals.

Specific changes introduced include:

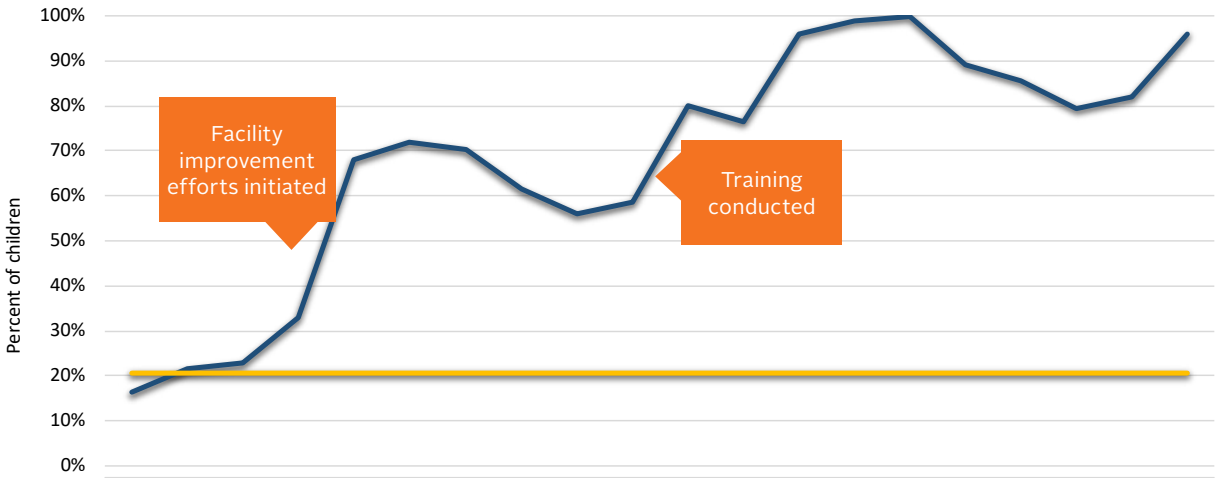
1. Changing the mindset of clinicians to understand that they are the first and most important case managers of children with SAM. This was achieved through meetings and presentations by the QI team at the Continuous Professional Development (CPD) sessions, monthly mentoring from national QI coaches, and training on inpatient management of SAM.
2. Frequent mentorship and on-the-job training of the QI teams by district coaches ensure that new staff are oriented on the initial management of SAM.
3. Introduction of a duty roster for nurses and clinicians ensure that there is always a skilled health care provider available to conduct the clinical and nutrition assessment within the first hour of a child's admission to inpatient care.

Issues reported by teams: Challenges still exist in each of the OPDs where some health care providers do not have the required expertise to identify and manage SAM complications in children. In addition, the seven hospital OPDs are usually overcrowded, evidence that ETAT is not done properly.

Objective 2: All children with SAM admitted to inpatient care receive interventions to prevent dehydration according to the national protocol

Findings: The seven hospitals reported a slow but steady improvement in the prevention of dehydration, from a baseline of 20.6 percent before QI to 95 percent in August 2017 (see Figure 5). The first increase was noted in April when QI was

Figure 5. % of SAM children who had interventions administered to prevent dehydration at the 7 hospitals



	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17
Numerator	12	19	22	41	34	41	26	27	23	34	40	42	98	82	66	25	41	23	23	23
Denominator	73	88	96	125	50	57	37	44	41	58	50	55	102	83	66	28	48	29	28	24
% properly managed	16.4%	21.6%	22.9%	32.8%	68.0%	71.9%	70.3%	61.4%	56.1%	58.6%	80.0%	76.4%	96.1%	98.8%	100.0	89.3%	85.4%	79.3%	82.1%	95.8%
Baseline	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%	20.6%

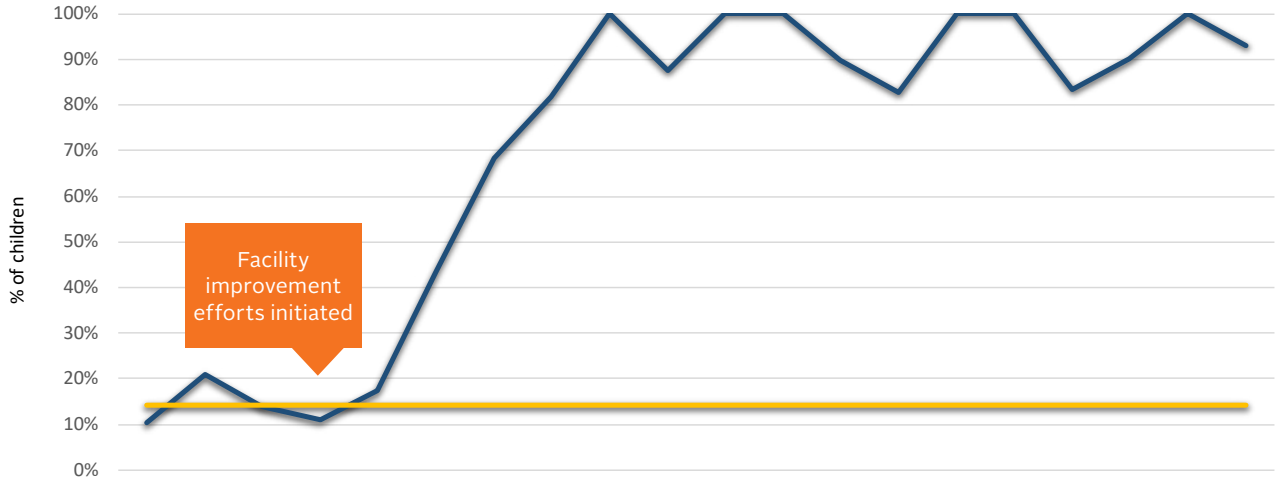
launched in the hospitals, and another increase occurred in October 2016 after health care providers received training on inpatient care management of SAM.

The improvement is the result of the following changes: Increased knowledge among health care providers on when and how to administer and monitor rehydration solution for malnutrition (ReSoMal) led to better prevention of dehydration. Before QI, the health providers usually prescribed ReSoMal but relied on the mothers to give it to their children. This lack of oversight increased the risk of death from either heart failure, resulting from fluid overload or untreated dehydration, resulting from mothers' reluctance to give their children ReSoMal. With the introduction of QI, health care providers regularly supervise and monitor the administration of ReSoMal to SAM children.

Specific changes introduced include:

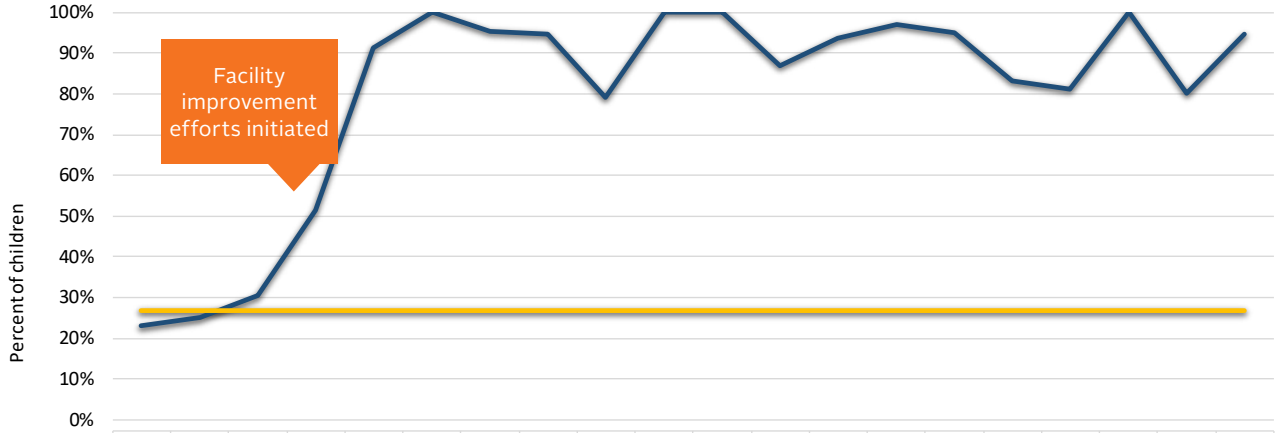
1. Regular health talks and counseling of caregivers on improved hygiene practices, the importance of timely reporting when a child has diarrhea, and how to care for the SAM child with diarrhea.
2. Consistent management and monitoring of diarrhea in SAM children by ensuring that there was always a nurse or clinician available in the SAM ward to review and monitor children with diarrhea, as well as the severity of the diarrhea. Nurses and clinicians were also encouraged to document episodes and care provided to child.
3. Orientation and on-the-job mentoring of health care providers caring for SAM children helped to improve knowledge and skills on dilution and administration of ReSoMal.
4. Posting flow charts on the management of diarrhea in the ward and regularly referring to the flow charts.

Figure 6. % of SAM children with dehydration who were treated according to protocol at the 7 hospitals



	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17
Numerator	4	5	4	7	4	10	13	9	12	14	20	6	35	19	9	9	5	9	8	13
Denominator	39	24	29	63	23	23	19	11	12	16	20	6	39	23	9	9	6	10	8	14
% properly treated	10.3%	20.8%	13.8%	11.1%	17.4%	43.5%	68.4%	81.8%	100.0	87.5%	100.0	100.0	89.7%	82.6%	100.0	100.0	83.3%	90.0%	100.0	92.9%
Baseline	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%	14.1%

Figure 7. % of SAM children who were started on cautious feeding according to protocol at the 7 hospitals



	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17
Numerator	9	12	18	38	31	34	21	18	19	19	26	20	74	69	58	15	13	18	8	18
Denominator	39	48	59	74	34	34	22	19	24	19	26	23	79	71	61	18	16	18	10	19
% received correct feeds	23.1%	25.0%	30.5%	51.4%	91.2%	100.0%	95.5%	94.7%	79.2%	100.0%	100.0%	87.0%	93.7%	97.2%	95.1%	83.3%	81.3%	100.0%	80.0%	94.7%
Baseline	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%	26.7%

Objective 3: All children with SAM and confirmed dehydration are treated according to the national protocol

Findings: The seven hospitals reported an improvement in the treatment of dehydration from the baseline of 14.1 percent before QI (see Figure 6). The improvement was sustained at above 80 percent for a 12-month period (August 2016 to August 2017).

The improvement is the result of the following changes: Improved competence of health care providers to diagnose and treat SAM children with dehydration using ReSoMal or intravenous fluids such as Ringers Lactate in case of shock due to dehydration led to reduced incidence of dehydration. Understanding that oral rehydration solution and normal saline solution should not be used to treat dehydration in SAM children helped to prevent death.

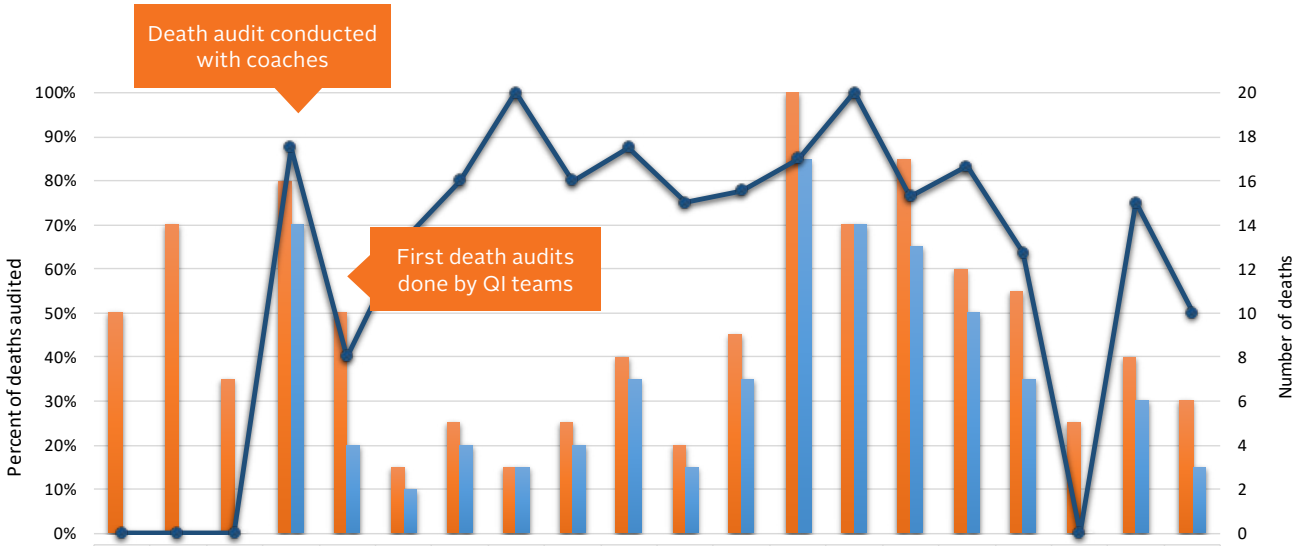
Specific changes introduced include:

1. Routine orientation and on-the-job mentoring of health care workers working in the OPD on the diagnosis and treatment of dehydration in children with SAM. This helped ensure that dehydration in SAM children is identified and managed correctly prior to and during admission to the inpatient care.
2. Posting flow charts on the treatment of dehydration in the ward and OPD and regularly referring to the flow charts.
3. Twenty-four-hour monitoring of fluid input and output during the treatment of dehydration

Objective 4: All children with SAM are started on immediate cautious feeding according to the nation protocol

Findings: As seen in Figure 7, the seven hospitals reported improvement in immediate cautious feeding. Improvements were noted from a baseline of 26.7 percent before QI to 50 percent during the

Figure 8. % of SAM deaths audited and reported within 72 hours of occurence at the 7 hospitals



	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17
Total Deaths	10	14	7	16	10	3	5	3	5	8	4	9	20	14	17	12	11	5	8	6
Deaths Audited	0	0	0	14	4	2	4	3	4	7	3	7	17	14	13	10	7	0	6	3
% deaths audited	0.0%	0.0%	0.0%	87.5%	40.0%	66.7%	80.0%	100.0	80.0%	87.5%	75.0%	77.8%	85.0%	100.0	76.5%	83.3%	63.6%	0.0%	75.0%	50.0%

first month of implementation (April 2016). From May 2016 to August 2017, the improvement was sustained at above 75 percent.

The improvement is the result of the following changes: Health care providers have improved understanding of the need for children with SAM to be fed with therapeutic milk immediately upon admission to the inpatient care. Before QI, children with SAM were kept waiting for up to 3 hours before being provided the initial feed, contributing to deaths due to hypoglycemia or dehydration.

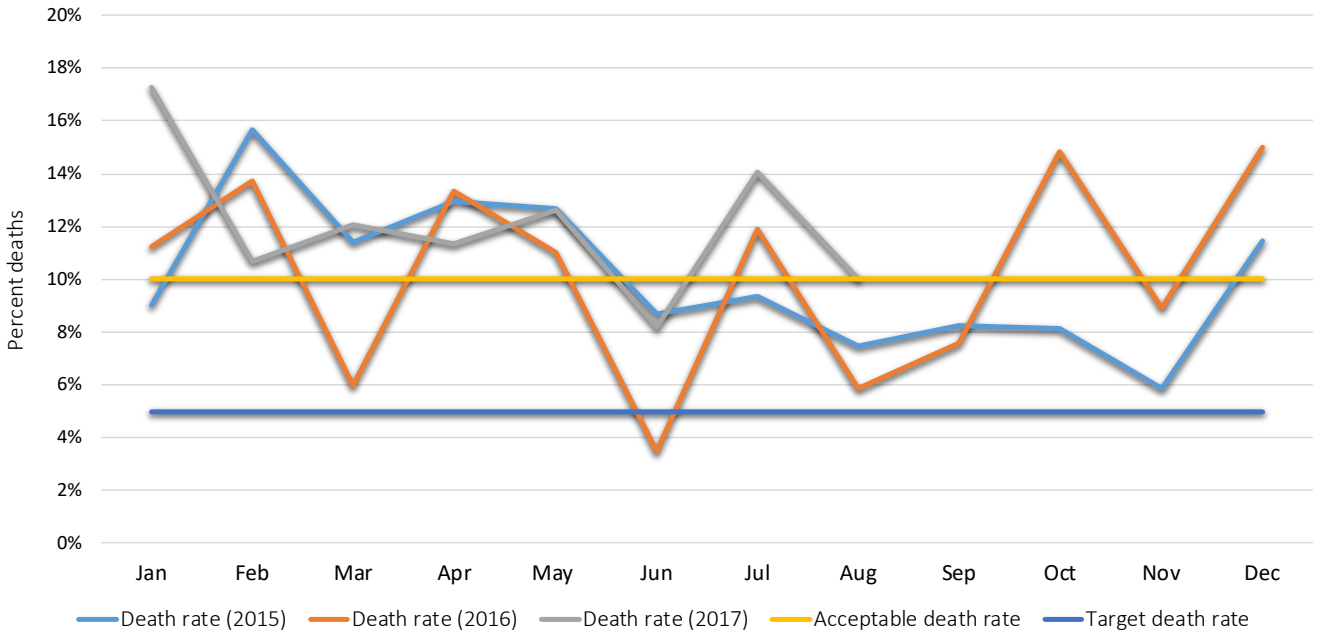
Specific changes introduced include:

1. Ensuring that staff is available around the clock to prepare and feed SAM children, and to document feeds and handovers when changing shifts to keep track of the feeding schedules.
2. Prepared and posted on the ward walls feeding schedules and instructions, and ensured proper documentation at the time of admission.
3. Provided regular orientation to health care providers and home-craft workers on feeding SAM children.

Objective 5: All SAM children deaths are audited within 72 hours of occurrence

Findings: The first death audits were conducted in April 2016 (see Figure 8) as part of on-the-job training with facility QI teams and national and district coaches. Eighty-eight percent of deaths were audited. In May 2016, when the facility QI teams were testing and learning effective ways of conducting death audits, only 40 percent of the deaths were audited. As teams became more competent and experienced in organizing and conducting death audits, the percentage of audits climbed until June 2017, when no deaths were audited, the result of nurses and clinicians managing SAM children in the pediatric ward being transferred to other wards. This resulted in a limited number of QI team members available to conduct the death audits. A learning session on death audits conducted at the end of June helped to reinvigorate the team's interest in the improvement efforts.

Figure 9. Comparison of SAM death rates 2015-2017 in the 7 hospitals



The improvement is the result of the following changes:

1. Formation of a SAM children death audit team and orientation of the team on the importance of conducting death audits within 72 hours.
2. Ensuring that the death audit forms were always available to the QI teams.

Issues reported by teams: Conducting a death audit within 72 hours remains a challenge because all QI team members do not attend the death audit meetings due to competing work priorities. This results in some deaths being audited too late, hence the fluctuation in the trends of the indicator. Some QI teams are exploring conducting death audits during the weekend when there is less work pressure.

Results of the overall aim to reduce SAM death rate

The overall death rates for children in the inpatient care in the seven facilities were 10.9 percent, 10.2 percent, and 12.3 percent in 2015 (before QI), 2016, and 2017 respectively. The death rates were variable over the months with no comparable pattern among the years (see Figure 9).

The death audits revealed that most of the deaths were due to late presentation of children with SAM and medical complications, mismanagement of emergencies in the OPD, and lack of essential antibiotics. SAM children admitted into inpatient care are at very high risk of death and so require intensive care, which is not usually accessible at a district hospital. In addition, challenges persist, such as erratic supply of drugs, late patient presentation to the hospital, and shortage of staff, which are beyond the capacity of QI teams to solve. These challenges are not unique to the management of children with SAM—they extend to other parts of the health system.

Lessons Learned

Through the implementation of the QI efforts to improve case management in the seven hospitals in South East Zone of Malawi, several lessons were learned:

- **Inpatient management of SAM cannot improve without improving ETAT procedures at OPD.** Improving the initial assessment remains a challenge because ETAT is not properly conducted for the following reasons: 1) sick children go through a complicated patient flow during admission at the pediatric OPD making ETAT procedures difficult to execute; 2) health care providers at the pediatric OPD comprise medical assistants, patient attendants, and health surveillance assistants who are not skilled to conduct ETAT; 3) critically ill children are missed because of the numerous long patient queues; and 4) even when critically ill children are identified early, the pediatric departments do not always have adequate equipment and personnel to treat emergencies. Because SAM children are mismanaged during admission, by the time they receive care it is often too late to save their lives.
- **For improvements in SAM case management, it is necessary to reduce frequent staff rotation in the pediatric ward and nutrition rehabilitation unit (NRU), and ensure new staff is equipped with skills to manage SAM.** There was a general improvement in case management until facilities started to rotate to other wards trained staff managing children with SAM in the pediatric ward and NRU. As a result, well-trained staff on the management of SAM children was being replaced by new, untrained staff.
- **Regular mentoring and coaching by district and national coaches motivates QI teams and builds their confidence in achieving targets.** Many QI teams reported challenges with organizing regular meetings to discuss QI progress due to the high work load and competing work priorities. Regular, supportive supervision from coaches builds confidence and boosts the morale of QI teams.
- **Clinicians, nurses, hospital attendants, and home-craft workers managing children with SAM require specialized competence-based SAM training.** FANTA and MOH started implementing QI in the SEZ prior to training health care providers in the updated national guidelines on inpatient management of SAM. Most of the health care providers had difficulty identifying problems and proposing realistic change ideas as they were unfamiliar with the updated treatment protocols. This meant the national coaches had to combine mentorship of QI with on-the-job training of the new protocols. Ascertaining the competence of health care providers in service delivery is crucial before implementing QI.

The Way Forward

Although the QI teams at the seven hospitals have not reached the target of reducing death rates to less than 5 percent, they have made improvements in SAM case management and are continuously looking for new solutions to achieve the goal. A higher level of engagement with senior health managers and policy makers is urgently needed, as well as ensuring availability of vital supplies and equipment for SAM, pediatric, and child health service delivery. The progress of QI and its potential to improve case management has been well received by the MOH and other partners such as UNICEF and Organized Network of Services for Everyone's (ONSE) Health, who intend to implement QI in Malawi's remaining NRUs.

Malawi QI Team

MOH National Team:	Sylvester Kathumba, Janet Guta, Frank Msiska, Blessings Muwalo, Wilfred Gaven
FANTA/FHI 360 Malawi Team:	Alice Nkoroi, Jaden Bendabenda, Phindile Lupafya, Chawanangwa Jere, Pamela Gunda, Nancy Manyenje
FANTA/FHI 360 HQ Team:	Alisa Alano, Rebecca Egan, Nilufar Rakhmanova, Bruno Bouchet

MOH DISTRICT & FACILITY TEAMS:

Zomba (S. Luke's Hospital)	Edda Kumakanga, Rhodina Kachepatsonga, Chisomo Eneya, Loney Maloya, Arthur Bunyani, Chrissie Black, Maggie Chiwaula, Andrew Nyirenda, Regina Nzako, Aggrey Mtenda
Phalombe (Holy Family Hospital)	Patrick Kaziyale, Wilson Khoriyo, Nelson Mwango, Sophatie Luwanika, Blandina Kampion, Nancy Mbandanga, Emmanuel Mzolo, Stephen Mzonda
Mangochi District Hospital	Getrude Maida, Shaarifa Senga, Billiam Nthinda, Mercy Chikuse, Hope Kumwenda, Matthews Mithanje, Florence Chidyaonga, Myness Menyere, Lucy Bvumbwe, James Bonya
Balaka District Hospital	Dickson Mambula, Zione Masiye, Kanyasho Malunga, Anne Salamu, Susan Matope, Fanny Sokole, Agness Kandeu, Mercy Paul, Cecilia Mponya
Mulanje District Hospital	Tshepiso Nankhuni, James Manyenje, Mayamiko Makondi, Chrissy Lungu, Grace Shaba, John Makhanamba, Lucy Mpachika, Mary Mukuma, Christopher Nsanyama
Mulanje Mission Hospital	Sarah Kadango, Mirriam Konesi, Eliza Jailosi, Fungai Chimkango, Leah Mabuwa, Ruth Kalepa, Vivian Kathoma, Ireen Chilodzeni, Florence Ndango, Sunganani Sabuni, John Sanane
Machinga District Hospital	Agnes Chinkhokwe, Mario Muhota, Clifford Katumbi, Beatrice Lipande, Khumbo Mkandawire, Rhoda Mpheta, Adija Mkolola, Margret Matekete, Pacciah Drake, Daisy Ndeche, Ruth Jailosi, Catherine Banda

www.fantaproject.org

@FANTAproject

Contact Information:

Food and Nutrition Technical Assistance III Project (FANTA)
FHI 360
1825 Connecticut Avenue, NW
Washington, DC 20009-5721
Tel: 202-884-8000
Fax: 202-884-8432
Email: fantamail@fhi360.org

Recommended Citation: Food and Nutrition Technical Assistance III Project (FANTA). 2018. *Applying the Model for Improvement to Strengthen the Care for Children with Severe Acute Malnutrition (SAM) and Medical Complications in Malawi*. Washington, DC: FHI 360/FANTA.

This brief is made possible by the generous support of the American people through the support of the Office of Health, Infectious Diseases, and Nutrition, Bureau for Global Health, U.S. Agency for International Development (USAID) and USAID/Malawi, under terms of Cooperative Agreement No. AID-OAA-A-12-00005, through the Food and Nutrition Technical Assistance III Project (FANTA), managed by FHI 360.

The contents are the responsibility of FHI 360 and do not necessarily reflect the views of USAID or the United States Government.