APPENDICES

Improving Care of Mothers and Babies®

APPENDIX A.1

Newborn Practice Exercises – User's Guide

Step 1

Create an improvement team

Case scenario

After meeting with Seetha and hearing about the positive changes in her hospital, Nirmala returns to her own facility with new energy to improve care. Each year, approximately 1,000 babies are born in Nirmala's hospital. Nurse midwives provide prenatal, basic obstetric and postpartum care. Registered nurses and ward assistants help with postpartum care. A senior nurse manager supervises operation of the facility, including ordering supplies. There is a pharmacist on site. Nursing students are usually present in the facility. A physician manages the labor ward and is available for emergencies, but does not provide care for women without complications. Mothers and babies usually remain in the delivery area for one hour after a birth and are then moved to a postpartum room. They are typically discharged about 24 to 48 hours later.

Nirmala wants to become a champion for quality care and wants to create an improvement team.

1. ***Discuss how Nirmala should organize a team to improve care of mothers and babies in this facility. List the members on the team and assign their roles.***
   The improvement could include members who represent all providers of maternal and newborn care at the facility. A team with nurses, ward assistants, nursing students, nurse-midwives, the physician and the senior nurse manager might be too big to function well. A smaller core improvement team (4-6 individuals) could still include a representative of each type of provider. More team members could be added when specific care practices are chosen for improvement (see Step 3). A mother who has given birth at the facility or another community member could represent families' perspectives on care.

   Consider who will fill various roles on the team. One or more team members may be appointed or volunteer to collect data, another to take notes or document the improvement activities, and another to communicate the improvement process more widely.

2. ***Choose an ideal team leader. Describe why you chose this leader.***
   Nirmala may be an ideal team leader, because she wants to be a champion for improved care. One of the other medical professionals, such as the senior nurse manager, could lead the team. The physician might be less desirable because of his less frequent presence at the facility. A nurse midwife might be the best choice because she delivers care to mothers and babies. Whoever is chosen must be an individual respected by all, and must be given the time and resources to serve in this capacity.

Step 2

Decide what to improve

Newborn case scenario

During a meeting of the improvement team at Nirmala's hospital, gaps in quality of newborn care are discussed. Team members are not aware of a serious gap in quality. The leader suggests reviewing recent Delivery Register data to determine if a gap in quality exists.

1. ***Using the sample Delivery Register (see pg. 4), list processes of care and outcomes that might be used as indicators of the quality of newborn care.***

Processes of care	Outcomes
Weighing the baby	*Low birth weight*
Taking the temperature	*Low newborn temperature*
Administering Vitamin K	*Newborn death*

2. ***Calculate the frequency of the following process of care: vitamin K administration.***
   Eleven babies (11/17 or 65%) received vitamin K. You would expect all babies to receive vitamin K, so this indicates a gap in the quality of care.

3. ***Calculate the frequency of two outcomes: low newborn temperature and death.***
   Gaps in the quality of care can also be identified by calculating how frequently outcomes occur. Nine babies (9/17 or 53%) had a temperature <36.5 °C; one baby died (1/17 or 6%). The percentage of babies with low temperature is high, and probably avoidable. It represents a gap in the quality of care. One death among 17 births is high, but this may be misleading because of the small number of births. The single death may or may not have resulted from a gap in the quality of care.

4. ***Choose the gap in quality to improve and record why you have chosen this gap.***
   The team considers the importance, the expected outcome and the impact for each gap. The team chooses to improve low newborn temperature. They believe that is important because low temperature is associated with death and other serious complications, and they know that the rate of newborn death is high in their hospital. They believe that it will be possible to improve this outcome, and low temperature affects 1/2 of all babies. They also consider the importance and impact of improving the administration of vitamin K. Only 1/3 of babies do not receive vitamin K, and the result of not receiving vitamin K, bleeding in the newborn, is relatively rare.

5. ***Write an aim statement for improving low newborn temperature.***

The aim statement should include who (which patients), what (the process or outcome improved), how much (the amount of the desired improvement) and by when (the time period for improvement). One possible aim statement for reducing low temperature among babies born at the facility would be: **We will reduce the percentage of newborns with low temperature (<36.5^{0}C) from 53% to <10% within 6 months.**

"Who" is the group of interest (newborns). "What" is the outcome or process to be improved (low temperature in babies). "How much" is the change from the baseline rate of the outcome (53% based on the register) to a goal (in this case <10%). "By when" is the time over which the change will occur (within 6 months in this example).

DELIVERY REGISTER

Name	Date of Birth	Time of Birth	Delivery Route	Oxytocin	Post-partum Blood Loss	Apgars 1,5 min	Wt	Temp	Vit K	Discharge Date	Baby Disposition	Notes
MSaidou	15-06	00:45	vag	✓	250	8,9	3400	35.4	✓	15-06	Home	
C Bidi	15-06	06:30	cs	✓	450	7,8	2460	34.5	✓	17-06	Home	
A Baucar	15-06	14:30	vag	✓	200	8,9	2350	35.2		16-06	Home	
S. Rashad	16-06	09:20	vag	✓	200	6,8	3310	36.8	✓	17-06	Home	
Z. Saloy	16-06	17:50	vag		350	6,8	2670	37.1	✓	17-06	Home	
H Alai	17-06	02:42	vag		750	5,7	2740	37.9	✓	19-06	Referred	
C. Sidi	18-06	08:16	vag	✓	150	8,9	2851	36.8		19-06	Home	
R Abou	18-06	12:25	vag		400	8,9	2780	37.1	✓	19-06	Home	
B. Aboura	18-06	13:11	vag	✓	300	7,8	3500	34.4	✓	20-06	Referred	
Z Halifa	19-06	11:13	vag	✓	200	9,9	3215	35.2	✓	20-06	Home	
B. Bayou	20-06	04:07	vag		750	7,8	2710	37.8		20-06	Home	
M. Seidou	20-06	11:48	vag		150	7,8	1900	34.2		20-06	Died	mother died
D. Djibri	21-06	07:38	vag		350	8,9	2995	36.8		21-06	Home	
S. Binton	21-06	14:26	vag		1000	7,8	3620	36.4		22-06	Home	
S Bevaca	21-06	21:15	cs	✓	250	8,9	2780	36.7	✓	22-06	Home	
M. Bonou	22-06	18:20	vag	✓	200	8,9	2618	35.8	✓	23-06	Home	
B. Yaoya	22-06	22:10	vag	✓	250	8,9	2651	37.8	✓	24-06	Home	

Step 3

Choose the barriers to overcome

Newborn case scenario

The team has chosen to improve the outcome of low newborn temperature. To help them understand why babies get cold, they consider all of the actions of providers and/or processes of care that occur in the first hour following a birth that might influence a baby's temperature.

1. ***List the processes of care that might affect the outcome of low newborn temperature.***

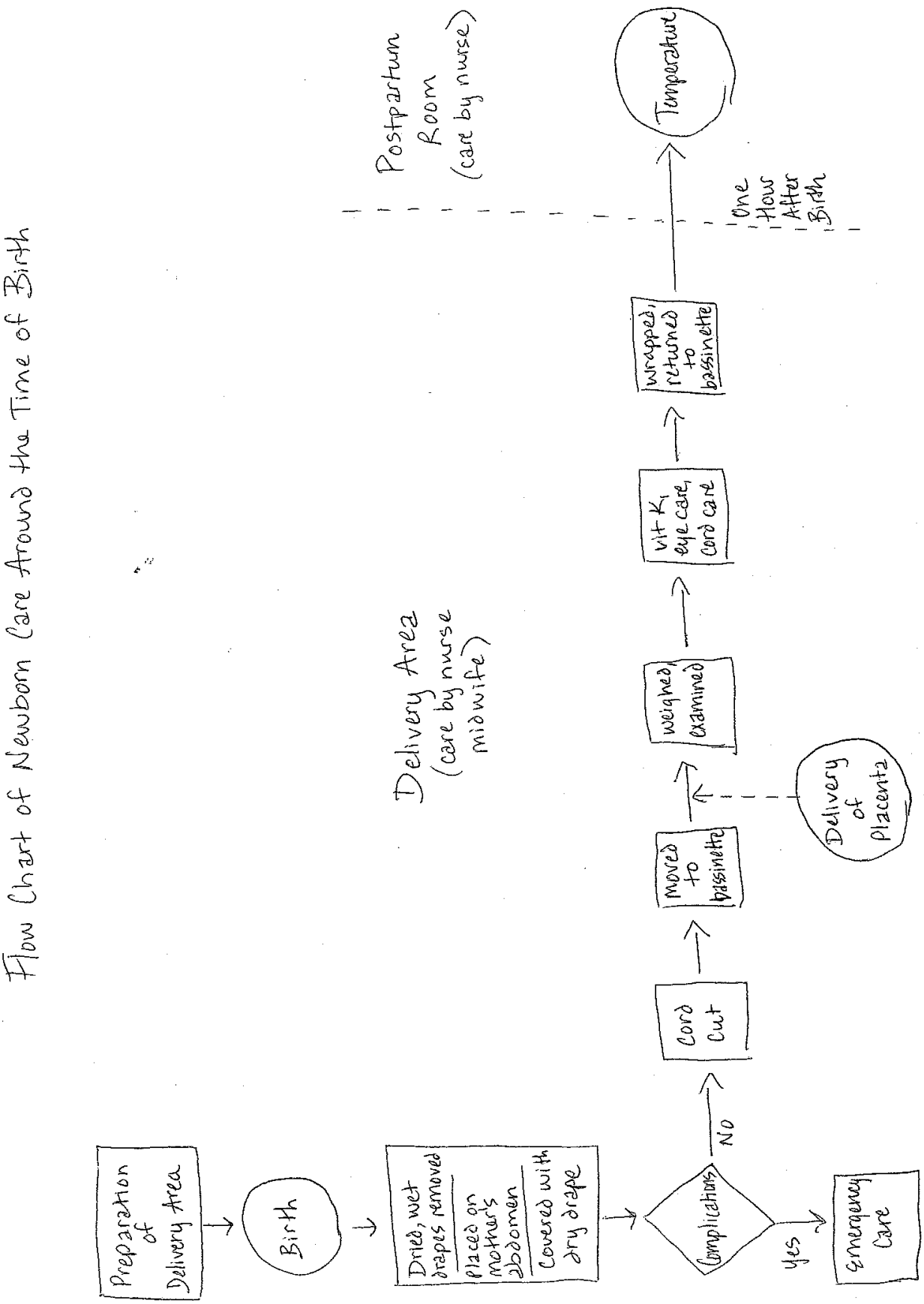
   The team thinks about the ways babies become cold, and identifies a number of possibilities. These include preparation of the delivery area (increasing room temperature, eliminating drafts), drying the baby immediately after birth and removing the wet cloth, covering the baby with a dry cloth and placing a hat on the baby, and keeping the baby skin-to-skin with the mother for the first hour after birth.

Newborn case scenario (continued)

To determine whether the processes of care that affect a baby's temperature are being performed correctly and consistently, the team gathers more information. First, they attend several births to observe the care provided to mothers and babies. They draw a flow chart (see pg. 6) and record other information. They learn the following:

- ***The room where mothers deliver is prepared properly.***
- ***Immediately after birth, the baby is dried, the wet cloths are removed, the baby is placed on the mother's abdomen and covered with a dry cloth.***
- ***A cart that holds an infant scale, vitamin K, eye ointment and chlorhexidine for cord care is in the delivery area.***
- ***After the placenta is delivered, the baby is taken from the mother, weighed, given vitamin K and eye care, and examined. The baby is then wrapped and placed in a bassinette, usually about 30 minutes after birth.***
- ***At about one hour of age, the baby and mother are moved to the postpartum room. The baby's first temperature is taken in the postpartum area.***
- ***All care in the delivery area is provided by nurse midwives. Care in the postpartum room is provided by nurses.***

Next, the team reviews the Ministry guidelines for intrapartum and newborn care and compares the guidelines to the care outlined in their flow chart.


Flow Chart of Newborn Care Around the Time of Birth
Preparation of Delivery Area
Birth
Dried, wet drapes removed
placed on mother's abdomen
Covered with dry drape
Complications
No
Yes
Emergency Care
Cord Cut
Moved to bassinette
Delivery of Placenta
weighed, examined
Vit K, eye care, cord care
wrapped, returned to bassinette
Temperature
Delivery Area (care by nurse midwife)
Postpartum Room (care by nurse)
One Hour After Birth

2. ***List the potential cause of low newborn temperature.***
   The team determines that skin-to-skin care is not being performed correctly because it is not being provided continuously for the first hour after birth. All other aspects of care seem to be provided correctly.

Newborn case scenario (continued)

The team determines that the process of continuous skin-to-skin care for one hour after birth is not being performed correctly because it is interrupted by other newborn care practices. This is a gap in quality of care that may be causing low newborn temperatures. The team decides to improve this process of care. They must now determine the barriers to performing skin-to-skin care correctly.

They interview nurses, nurse midwives and two mothers. They learn the following:

- ***Some providers are not aware of the Ministry's recommendation for continuous skin-to-skin for the first hour after birth.***
- ***The responsibility for weighing, providing eye and cord care, treating with vitamin K, and examining the baby is assigned to the nurse midwives. They want to complete these tasks immediately after birth because of the large number of deliveries and the need to attend to other laboring mothers.***
- ***Skin-to-skin care is allowed when nurse midwives are available to assist.***
- ***Mothers want to hold their babies skin-to-skin immediately after delivery.***

The facility administrator will support changes that agree with the Ministry recommendations, but the team is told there are no funds to hire additional staff.

3. Using the table below, identify the barriers to care that might interfere with placing babies skin-to-skin with mothers immediately after birth and continuing for at least one hour.

INPUT BARRIERS	***IDENTIFIED INPUT BARRIERS TO SKIN-TO-SKIN CARE***
Lack of knowledge and skills	*Some providers are unaware of the Ministry's ´recommendation for skin-to-skin care.*
Staffing shortages	*Midwives do not have time to attend deliveries, delay newborn care for one hour and supervise skin-to-skin care.*
Insufficient supplies	*None; skin-to-skin care in the first hour does not require supplies.*
Unfavorable infrastructure	*None*
Inadequate financial resources	*There are no funds to hire additional staff.*
Traditions and cultural beliefs that interfere with recommended care	*None*

PERFORMANCE BARRIERS	***IDENTIFIED PERFORMANCE BARRIERS TO SKIN-TO-SKIN CARE***
Poorly organized processes	*The organization of newborn care (the assignment of tasks) interferes with the correct performance of skin-to-skin care.*
Misaligned incentives	*None*
Challenges with leadership and management	*None*
Provider's convenience	*The nurse midwives do not always have the time to supervise skin-to-skin care for one hour.*

4. Choose the barriers to overcome. Consider the expected effect, cost and feasibility of overcoming the barrier(s).

The team recognizes that midwives may not always be available to assist with skin-to-skin care and cannot always delay performing newborn practices until one hour after birth. Hiring more midwives would overcome this barrier, but there are no funds to hire more staff. Therefore, the team chooses to reorganize the process of skin-to-skin care. They believe that reorganizing this process will have a big effect on skin-to-skin care, and it will cost very little. They believe that it will be feasible, but they must think creatively about how to do this.

Not all nurse midwives are aware of the benefits of skin-to-skin care and the Ministry's recommendation, so the team also chooses to improve knowledge about the benefits of skin-to-skin care.

Step 4

Plan and test change

Newborn case scenario

The team decides to overcome two barriers to improve the performance of skin-to-skin care. First, they decide to reorganize routine newborn care practices so that the process of skin-to-skin care can be performed correctly. Second, they decide to educate all staff who care for mothers and babies about the importance of keeping babies skin-to-skin with their mothers for one hour after birth.

1. ***List changes that might overcome these barriers to performing skin-to-skin care correctly. Select one or more changes to test.***

The team discusses options for reorganizing newborn care practices and skin-to skin care:

- Delay newborn care (weighing, eye and cord care, vitamin K and examination) until mothers and babies have been moved to the postpartum room. Reassign the responsibility for those practices to the nurses in the postpartum room.
- When the midwife is not available, reassign the responsibility of assisting with skin-to-skin care during the first hour to family members who attend the birth.
- When the midwife is not available, reassign the responsibility of supervising skin-to-skin care during the first hour after birth to nursing students.

Among these options, the team chooses the first and third because they will have a big effect and are also feasible. Family members may not always attend births. They may not know about skin-to-skin care or feel comfortable assisting.

The team discusses options for improving the knowledge of providers about the guidelines for skin-to-skin care:

- Discuss the guidelines for early skin-to-skin care at a monthly staff meeting.
- Hang a wall chart with the guidelines in the delivery area.
- Send a periodic reminder about skin-to-skin care to all providers of newborn care via an SMS text message.

The team decides the first and second options are best. Together, they will reach all of the providers of newborn care, and they are inexpensive. The third choice would be inexpensive and feasible, but is likely to be less effective because only a few providers have cell phones.

Newborn case scenario (continued)

The team plans to reorganize this process by leaving babies skin-to-skin with their mothers for at least an hour after birth. Care during this hour will be supervised by the nurse midwife, with assistance from nursing students. Newborn care will be performed after the first hour and after transfer to the postpartum room by the nurses there. The team plans to improve knowledge about early skin-to-skin care by discussing the recommendations at a staff meeting and hanging guidelines for care on the wall in the delivery area.

These proposed changes are presented to the staff; several nurse midwives express concern. They do not think that mothers really want to have their babies skin-to-skin immediately after birth, and they are not confident that nursing students can assist with this care. They are not confident that the postpartum nurses will perform newborn care practices properly and for all babies.

Before testing this change on a large scale, the team wants to make sure that the change is possible. They decide to test the change on a small scale.

2. ***Describe a small test that would help determine if this plan for change is feasible.***

The small test should address the concerns raised by some nurse midwives. This test could involve one nurse-midwife, who is an advocate for this change, during one shift. She would delegate the responsibility for assisting skin-to-skin care to the nursing students during that shift. After an hour of continuous skin-to-skin care, babies would be transferred to the postpartum room. The nurses there would be advised in advance about their responsibility to perform all newborn care practices.

The results of this small scale test of change would include whether: 1) an hour of skin-to-skin care occurred following each delivery, 2) the mothers were satisfied with skin-to-skin care, 3) the nursing students properly assisted this care and 4) newborn care practices were performed by the postpartum nurses. The success of this small test would not be determined by the number of babies with normal temperatures. The purpose of the small test would be only to determine if the change is feasible.

Newborn case scenario (continued)

The team tests the change on a small scale with one nurse midwife during one shift. They make the following observations:

- ***One nursing student assisted mothers after two births, and both mothers had one hour of uninterrupted skin-to-skin care.***
- ***A second nursing student assisted mothers after three births, and two of the mothers had one hour of uninterrupted skin-to-skin care. The nursing students appreciated having additional responsibility and provided adequate assistance of skin-to-skin care.***
- ***All mothers were enthusiastic about holding their babies skin-to-skin.***
- ***All babies born during this shift received vitamin K, eye and cord care, and were examined.***
- ***Three received this care from the nurse midwife in the delivery area because she happened to be available at one hour after the births.***
- ***The other two received this care from the nurse in the postpartum room.***

From this small test, the team concludes that the change seems feasible and should be tested among all staff, but should be modified slightly. They believe that all newborn care practices should be performed in the postpartum room, so they move the cart holding the scale and supplies out of the delivery area and into the postpartum room. They now need to develop a plan for testing the change on a larger scale.

3. ***Develop a plan to test the change on a larger scale. Identify what actions, who, when, where and what resources are required.***

What actions	Nursing students will assist mothers in providing skin-to-skin care during the first hour after birth if the nurse midwife is not available. One nurse midwife will educate all nursing students about how to assist with this care. After one hour mothers and babies will move to the postpartum room where the nurses will perform all newborn care practices. All staff will be educated about the changes at the next two staff meetings, and a reminder will be hung in the delivery area.
Who	All nurse midwives and postpartum nurses; one midwife will educate the nursing students.
When	Starting on the first of the month, and for the next 7 weeks.
Where	The labor and delivery area and postpartum room.
What resources	Expenses will be minimal. Support of the midwives and the facility administrator will be needed.

4. List what data to collect to understand the effects of reorganizing the skin-to-skin care process.

- What data will show the actions in the change have occurred? How will the team collect this data?
- What data will show the change has resulted in improvement? Assuming this data is not in the medical record, how will the team collect it?

The team must first determine whether the change occurred.
This will involve collecting information about nursing students assisting mothers with skin-to-skin care and the performance of newborn care practices by nurses in the postpartum room.

- Information about assistance with skin-to-skin care could be gathered by interviewing nursing students or having them complete a log of this activity.
- Information about when and where newborn care practices were performed is usually available in the medical record.
- Documentation of the weight, vitamin K administration, eye care, cord care and the examination is entered in the record with a time and name of the provider.
- One team member is assigned the responsibility of collecting these data for mothers and babies for the two weeks prior to the change and the 7 weeks after the change.

Then the team must determine whether the change resulted in improvement.

Did the change result in an improvement in the process of care? Did more mothers provide one hour of continuous skin to-skin care following birth?

If these data are not in the medical record, the team may consider collecting data in the following ways:

- Observe births and document whether skin-to-skin care is provided for the first hour after birth. Since it may not be possible to observe all births, the team might observe a representative sample of births, for example one day per week.
- Interview mothers before discharge and ask whether infants were placed skin-to-skin for one hour immediately following delivery.
- Add a column to the facility's delivery register for documentation of skin-to-skin care after birth, and ask the provider to enter the data.

Did the change result in an improvement in the outcome of fewer babies with low temperatures?
These data are in the Delivery Register.

Finally, the team must also determine whether there were negative effects of the change.
For example, they may want to determine whether babies continue to receive vitamin K, eye care, cord care and are examined and weighed. The team may decide to collect information on only one or two of these. To simplify data collection, these might be the practices that are documented in the Delivery Register.

Step 5

Determine if the change resulted in improvement

Newborn case scenario

The team has tested their changes. They find that changes occurred in the organization of care after birth and provider knowledge. Now they examine the data to decide if the changes have resulted in improvement. The team looks at the number of babies receiving skin-to-skin care and the number of babies with low temperature. A new column has been added to the Delivery Register where providers indicate if the mother provided skin-to-skin care. A member of the team records the number of babies in the Register who had skin-to-skin care and the number of babies with temperature <36.5 °C during a 9-week period (2 weeks before the change and 7 weeks after the change).

1. ***Use the data collected by the team member (table below) to evaluate the effect of the changes to improve the process of skin- to-skin care and the outcome of low newborn temperature. What percentage of babies born at the facility each week received skin-to-skin care in the first hour? What percentage of babies born at the facility each week had a temperature <36.5 °C?***

Data for 9 consecutive weeks describing the number of babies receiving skin-to-skin care and their first temperature

Week	*Number of babies born alive in the facility*	*Number of babies with temperature <36.5 °C*	*Number of babies who received skin-to-skin care in the first hour*	*% babies with low temperature*	*% babies who received skin-to-skin care in the first hour*
1	25	17	4	68.0%	16.0%
2	18	12	3	66.7%	16.7%
3	20	11	5	55.0%	25.0%
4	24	12	13	50.0%	54.1%
5	19	6	12	31.5%	63.1%
6	16	5	11	31.3%	68.8%
7	22	5	16	22.7%	72.7%
8	24	4	18	16.7%	75.0%
9	21	2	17	9.5%	81.0%

*To determine the effect of the **change** on the **performance** of the process of skin-to-skin care, divide the number of babies who received skin-to-skin care during each week by the total number of babies born alive in the facility during that week.*

*To determine the effect of the **change** on the **outcome** of low newborn temperature, divide the number of babies with a temperature <36.5 °C during one week by the total number of babies born alive in the facility during that week.*

2. Create a run chart for the process of skin-to-skin care for the first hour.

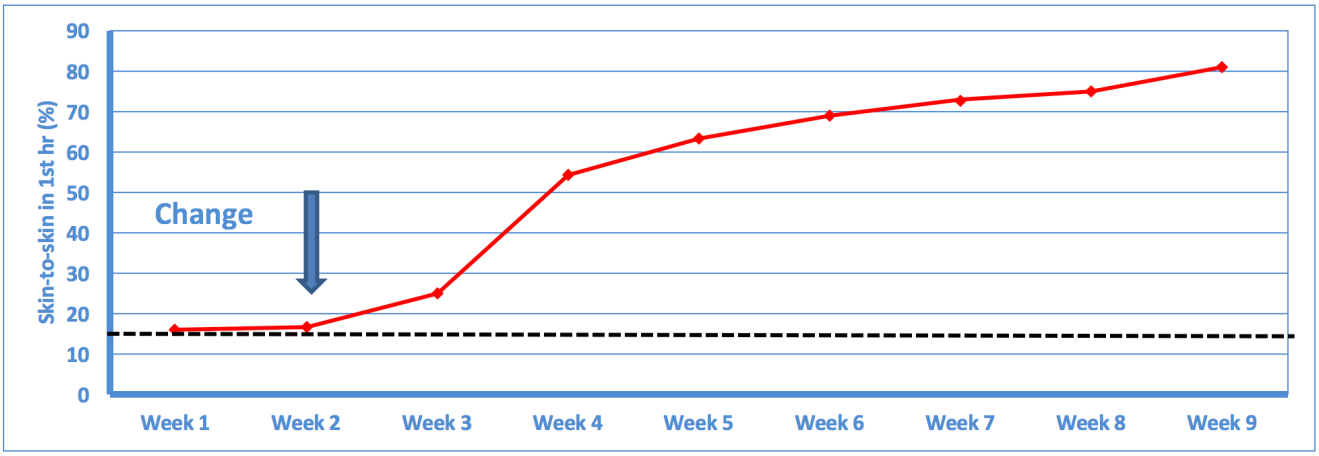
- Label the time of the change on the chart.
- Determine whether the change has resulted in real improvement in this process of care.
- Consider whether there is a shift or a trend.

Create the run chart by plotting the percentage of babies receiving skin-to-skin care on the vertical axis and weeks on the horizontal axis. Graph each number in the column labelled "% babies who received skin-to-skin care in the first hour" using a dot above the corresponding week on the horizontal axis, and connect the dots with a line. Indicate on the graph when the change occurred (after week 2). Notice that the line begins to rise with the third dot (the week after the change). This seems like a significant improvement in the process but the team wants to apply a test to confirm their belief.

Determine if there is a shift by calculating the median prior to the change and counting the number of points above the median. Since there are only two points before the change, a median cannot be accurately determined. However, a value of approximately 16% would be a reasonable estimate of the median. Draw a line at this level on the graph. There are more than 6 points above this line after the change. Therefore, an improvement has been documented by a shift in the line.

Determine if there is a trend after the change. A trend is present in this graph because there are 5 continuous points on the line that are higher than the point after the change. The team can conclude that there has been an improvement in the process of care.

Run Chart of the Percentage of Newborns Receiving Skin-to-skin Care



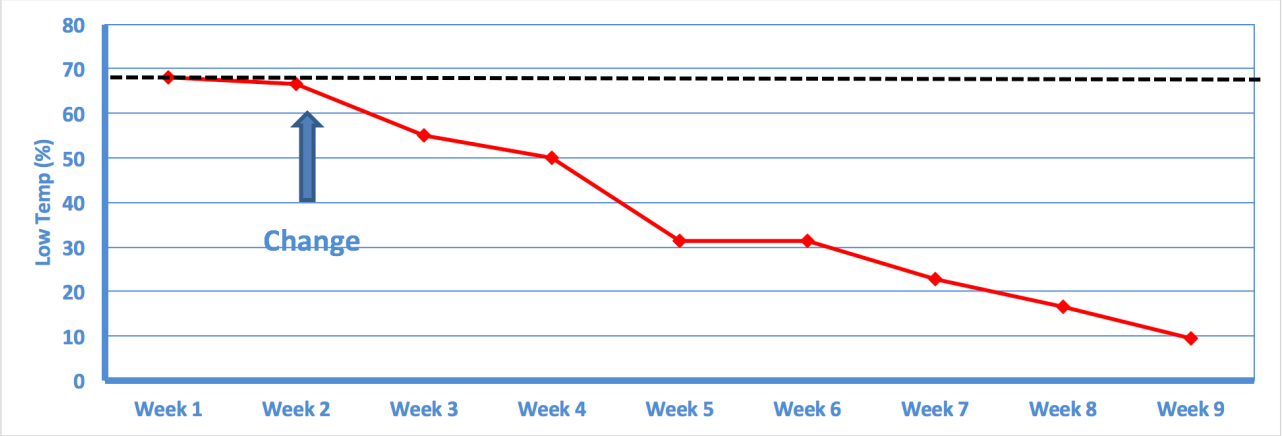
3. ***Create a run chart for the outcome of low newborn temperature.***
   Did the change of increased skin-to-skin care make progress toward achieving the goal in the aim statement?

Create the run chart by plotting the percentage of babies who had low temperatures on the vertical axis and weeks on the horizontal axis. Graph each number in the column labelled "% babies with low temperature" using a dot above the corresponding week on the horizontal axis, and connect the dots with a line. Indicate on the graph when the change occurred. Notice that the line begins to turn downward with the third dot (the week after the change). The timing of this improvement corresponds to the improvement in the process and also seems like a significant improvement in the outcome, but the team uses the same tests to confirm their belief.

Determine if there is a shift by calculating the median prior to the change and counting the number of points below the median. Use 67% as an estimate of the median. There are more than 6 points below the median after the change. Therefore, an improvement has been documented by a shift in the line.

Determine if there is a trend after the change. There are 5 continuous points on the line that are all going down after the change. Therefore, an improvement has been documented by a trend in the line. The team can conclude that there has been an improvement in the outcome.

Run Chart of the Percentage of Newborns with Low Temperature



4. ***Write a summary with the conclusions of the improvement project to share with staff at the facility.***

   The summary should highlight the important points about this improvement cycle, summarize what changes were made to improve skin-to-skin care, and tell how much improvement has occurred. The team decides to hang the run charts in the delivery area so that the facility staff can appreciate the improvement.

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5. ***Decide whether the team should adopt, adapt or abandon the changes and why.***

   Organizing the process of skin-to-skin care and educating providers about its importance made a significant improvement in the number of infants receiving skin-to-skin in the first hour, and reduced the rates of low newborn temperatures at the facility. The team will adopt these changes since they improved the outcome and made progress towards the goal of the aim statement.

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6. ***Assume that less improvement resulted from this change. For example, assume the percentage of low newborn temperature after the change is 35%, but the performance of skin-to-skin care is 93%. What are possible explanations for the unsatisfactory improvement in low newborn temperature?***

   It would not be unusual for a single cycle of change to result in some improvement but not the amount of improvement specified in the aim statement. Possible explanations include:

   - Data describing skin-to-skin care are inaccurate. Perhaps the mothers did not put the baby skin-to-skin as often as reported.
   - Nursing students are sometimes not available to assist mothers with skin-to-skin care.
   - Skin-to-skin care is interrupted for other processes of care such as weighing or examination.
   - Temperatures are not taken or recorded accurately.
   - Babies are becoming cold in other ways. For example, babies are not dried thoroughly or wet cloths are left covering the baby.

These possibilities should be explored. A new change can be planned and tested for improvement in the outcome.

Step 6

Make improvement the norm

Case scenario

The team was excited about the improvements that resulted from their project. Most providers have easily adopted the changes, but others have resisted. The team meets to discuss their next steps.

1. ***Discuss how the team might communicate changes that resulted in improvement.***
   The team decides to share the results of their improvement project with other providers at a staff meeting. They choose to display their run charts in a prominent place where the staff can see them. The team also shows their run charts to the facility administrator. They hope this will encourage the administrator to celebrate and acknowledge their success, and maybe find them additional resources for improvement work. The administrator may also want to publicize the improvement to the Ministry of Health. The Ministry may want to link the successful health facility with a facility that is struggling with this outcome so that the two facilities can collaborate and learn from each other.

2. ***If the team had selected a process for improvement that involved a difficult or challenging skill (for example, bag and mask ventilation), how might they facilitate practice of this skill?***
   Members of the improvement team can work alongside other providers at the facility and serve as role models for the process of care selected for improvement. The team can set up short, frequent skill practice sessions. For example, providers could practice bag and mask ventilation in pairs at the beginning of each shift. If providers have difficulty with the skill, the team might arrange supportive supervision of this activity by a more skilled provider once a week for a month.

3. ***What can the team do to engage individuals who have been resistant to the change? With a partner, role play how a team member would convince a provider who is resistant to change to participate with the other staff in the improvement activities.***
   Start by listening closely to why the provider does not support the changes Help the provider understand how the changes benefit mothers, babies, and providers themselves. Talk about how the changes save time and make the job easier. Slow adopters of change may also be persuaded by the number of other staff changing their practice. Celebrating good outcomes with stories and pictures and recognizing providers who are successfully changing behavior can help build support for the change. Mothers who benefited from the change may publicize this to other mothers in the community and encourage them to participate in the new activity.

4. ***What further actions can the team take to make the change permanent? What might they recommend to management of the facility in order to sustain the improvement?***
   The team will want to communicate the results of their improvement project and their recommendations to management of the facility. For example, to sustain the improvement, they may recommend adding new elements to the delivery checklist used by staff. The team may also recommend changing the job description of the nurse midwives, nurses and other personnel to reflect the change in their responsibilities. They may include education about these responsibilities for all new employees and trainees. The team can continue to follow their progress with run charts to make sure that improved rates do not decline.

APPENDIX A.2

Maternal Practice Exercises – User's Guide

Step 1

Create an improvement team

Case scenario

After meeting with Seetha and hearing about the positive changes in her hospital, Nirmala returns to her own facility with new energy to improve care. Each year, approximately 1,000 babies are born in Nirmala's hospital. Nurse midwives provide prenatal, basic obstetric and postpartum care. Registered nurses and ward assistants help with postpartum care. A senior nurse manager supervises operation of the facility, including ordering supplies. There is a pharmacist on site. Nursing students are usually present in the facility. A physician manages the labor ward and is available for emergencies, but does not provide care for women without complications. Mothers and babies usually remain in the delivery area for one hour after a birth and are then moved to a postpartum room. They are typically discharged about 24 to 48 hours later.

Nirmala wants to become a champion for quality care and wants to create an improvement team.

1. ***Discuss how Nirmala should organize a team to improve care of mothers and babies in this facility. List the members on the team and assign their roles.***

   The improvement could include members who represent all providers of maternal and newborn care at the facility. A team with nurses, ward assistants, nursing students, nurse-midwives, the physician and the senior nurse manager might be too big to function well. A smaller core improvement team (4-6 individuals) could still include a representative of each type of provider. More team members could be added when specific care practices are chosen for improvement (see Step 3). A mother who has given birth at the facility or another community member could represent families' perspectives on care.

   Consider who will fill various roles on the team. One or more team members may be appointed or volunteer to collect data, another to take notes or document the improvement activities, and another to communicate the improvement process more widely.

2. ***Choose an ideal team leader. Describe why you chose this leader.***

   Nirmala may be an ideal team leader, because she wants to be a champion for improved care. One of the other medical professionals, such as the senior nurse manager, could lead the team. The physician might be less desirable because of his less frequent presence at the facility. A nurse midwife might be the best choice because she delivers care to mothers and babies. Whoever is chosen must be an individual respected by all, and must be given the time and resources to serve in this capacity.

Step 2

Decide what to improve

Maternal case scenario

During a meeting of the improvement team, gaps in the quality of maternal care are discussed. Team members are not aware of a serious gap in quality. The leader suggests reviewing recent Delivery Register data to determine if a gap in quality exists.

1. ***Using the sample Delivery Register (below), list processes of care and outcomes that might be used as indicators of the quality of maternal care.***

Sample delivery register

DELIVERY REGISTER

Name	Date of Birth	Time of Birth	Delivery Route	Oxytocin	Post-partum Blood Loss	Apgars 1,5 min	Wt	Temp	Vit K	Discharge Date	Baby Disposition	Notes
MSaidou	15-06	00:45	vag	✓	250	8,9	3400	35.4	✓	15-06	Home	
C Bidi	15-06	06:30	c/s	✓	450	7,8	2460	34.5	✓	17-06	Home	
A. Baucar	15-06	14:30	vag	✓	200	8,9	2350	35.2		16-06	Home	
S. Rashad	16-06	09:20	vag	✓	200	6,8	3310	36.8	✓	17-06	Home	
Z. Saloy	16-06	17:50	vag		350	6,8	2670	37.1	✓	17-06	Home	
H. Alai	17-06	02:42	vag		750	5,7	2740	37.9	✓	19-06	Referred	
C. Sidi	18-06	08:16	vag	✓	150	8,9	2851	36.8		19-06	Home	
R Abou	18-06	12:25	vag		400	8,9	2780	37.1	✓	19-06	Home	
B. Asava	18-06	13:11	vag	✓	300	7,8	3500	34.4	✓	20-06	Referred	
Z. Halifa	19-06	11:13	vag	✓	200	9,9	3215	35.2	✓	20-06	Home	
B. Bayou	20-06	04:07	vag		750	7,8	2720	37.8		20-06	Home	
M. Seclah	20-06	11:48	vag		150	7,8	1900	34.2		20-06	Died	mother died
D. Djibri	21-06	07:38	vag		350	8,9	2995	36.8		21-06	Home	
S. Binton	21-06	14:26	vag		1000	7,8	3620	36.4		22-06	Home	
S Bevaca	21-06	21:15	c/s	✓	250	8,9	2780	36.7	✓	22-06	Home	
M. Bonou	22-06	18:20	vag	✓	200	8,9	2618	35.8	✓	23-06	Home	
R. Yayou	22-06	22:10	vag	✓	250	8,9	2651	37.8	✓	24-06	Home	

The sample page from the Delivery Register lists 12 pieces of information (data fields). From these, outcome and process indicators can be identified. The Register includes two processes of maternal care, administration of oxytocin and postpartum blood loss (indicating that an estimate of the volume of blood lost has been made). Two maternal outcomes are listed in the Delivery Register: maternal death and mode of delivery (vaginal or c-section). Mothers with postpartum hemorrhage can also be identified as those with postpartum blood loss >500 mL.

Processes of care	***Outcomes***
Administering oxytocin	Postpartum hemorrhage
Estimating postpartum blood loss	Mode of delivery
	Maternal death

2. ***Calculate the frequency of two processes of care: oxytocin administration and measurement of blood loss.***
   Gaps in the quality of care can be identified by calculating how frequently processes of care are performed properly. Ten mothers (10/17 or 59%) received oxytocin. All mothers should receive oxytocin, so these data suggest a gap in the quality of care.

3. ***Calculate the frequency of the following maternal outcome: postpartum hemorrhage (blood loss >500 mL).***
   Gaps in the quality of care can also be identified by calculating how frequently outcomes occur. Three mothers (3/17 or 18%) had an estimated blood loss >500 mL and therefore had postpartum hemorrhage. This percentage of mothers with postpartum hemorrhage is high, and this outcome is probably avoidable. Therefore, it represents a gap in the quality of care.

4. ***Choose the gap in quality to improve and record why you have chosen this gap.***
   The team considers criteria for choosing a gap in quality to improve: expected result, importance and impact. They choose to improve the administration of oxytocin immediately after birth because they believe that it will be possible to improve this process of care. It is important because oxytocin treatment is known to reduce postpartum hemorrhage, an outcome that may result in death and other serious complications. They also know that postpartum hemorrhage occurs more than once per week in their hospital and is the leading cause of maternal death.

5. ***Write an aim statement for improving administration of oxytocin after birth to prevent postpartum hemorrhage.***
   The aim statement should include the following elements: who (which patients), what (the process or outcome improved), how much (the amount of the desired improvement) and by when (the time period for improvement). One possible aim statement for improving the administration of oxytocin after all births would be:

   We will increase the percentage of women receiving oxytocin immediately after birth from 59% to 95% within 6 months.

   "Who" is the population of interest (women). "What" is the outcome or process to be improved (administration of oxytocin following birth). "How much" is the change from the baseline rate of the outcome (59% based on the sample described in the register) to a goal for administration (e.g. to 95%). "By when" is the time over which the change will occur (e.g. within 6 months in this example).

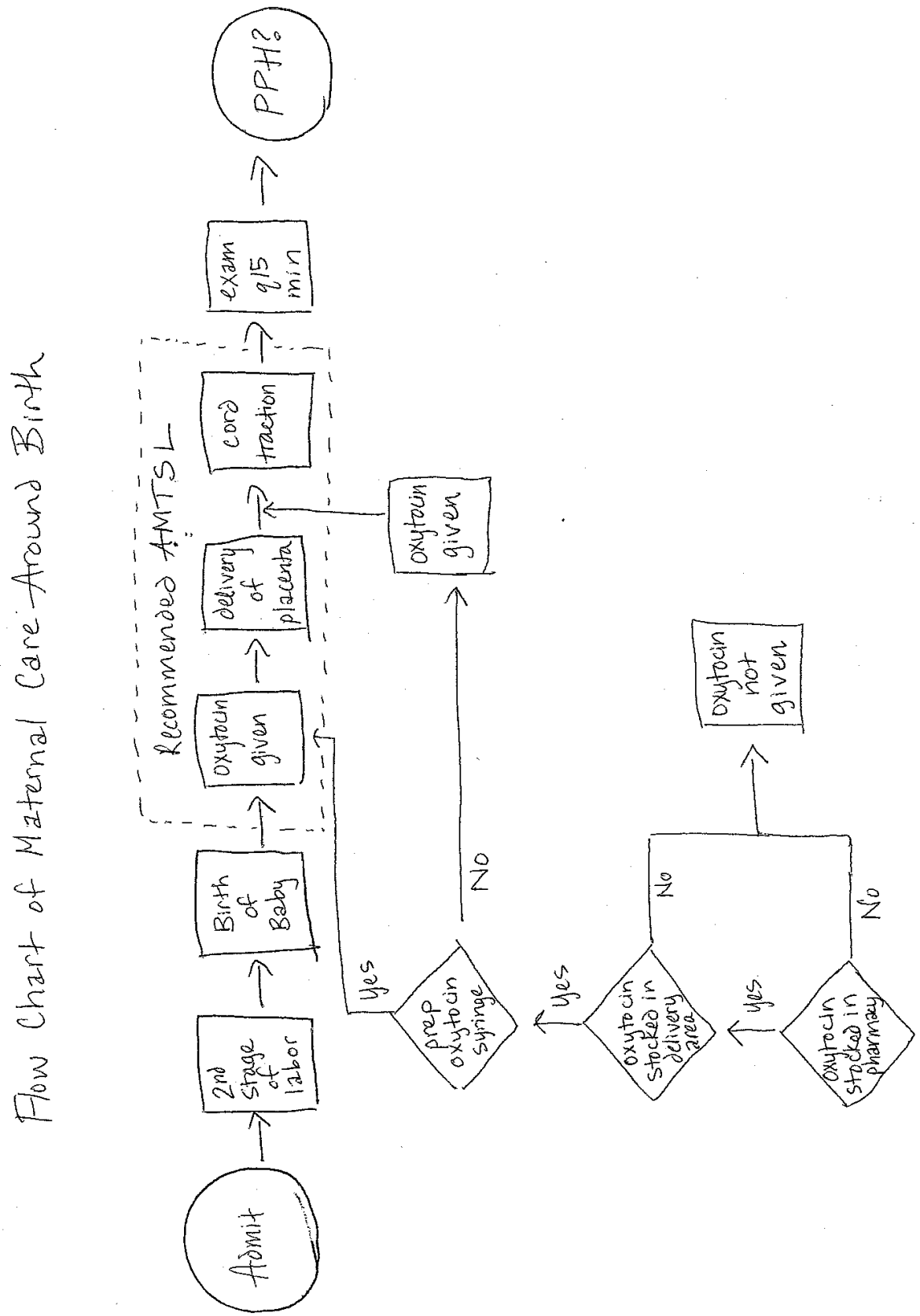
Step 3

Choose the barriers to overcome

Maternal case scenario

The team has chosen to improve the administration of oxytocin after birth for prevention of postpartum hemorrhage. To help them understand why this does not occur after every birth, they observe several births and make a flow chart of the care mothers receive around the time of delivery (see pg. 24). The flow chart shows two things: 1) the events and actions that involve the mother before and around the time of delivery; and 2) the actions involved in making sure that oxytocin gets to the bedside and is given to women soon after delivery. They also review the Ministry's guidelines for maternal care during birth.

1. ***List the actions that might affect the recommended administration of oxytocin.***
   Based on the care that is illustrated in the flow chart, the team might identify a number of actions that prevent all women from being treated with oxytocin at the right time. These include: 1) the availability of oxytocin in the pharmacy; 2) maintaining a supply of oxytocin in the delivery area; 3) preparing the oxytocin syringe in a timely manner; and 4) administering oxytocin immediately after the birth of a baby.


Flow Chart of Maternal Care Around Birth
Recommended AMTSL
Admit
2nd Stage of labor
Birth of Baby
oxytocin given
delivery of placenta
cord traction
exam q15 min
PPH?
oxytocin given
Yes
prep oxytocin syringe
NO
Yes
oxytocin stocked in delivery area
No
oxytocin not given
Yes
oxytocin stocked in pharmacy
No

Maternal case scenario (continued)

The team gathers more information about administering oxytocin. They interview two midwives, the senior nursing officer and the pharmacist.

They learn the following:

Supply of oxytocin in the facility

- ***Oxytocin is provided by the Ministry at no charge to the hospital and is always available in the pharmacy.***

Supply of oxytocin in the delivery area

- ***Oxytocin and syringes are stored in a cabinet in a room located adjacent to the delivery room. It is re-stocked by the nurse-in-charge when there are no vials in the cabinet.***

Preparation of syringe for administration

- ***During the second stage of labor, the midwife prepares a syringe of oxytocin.***
- ***If the medication is prepared before the delivery, it is almost always given immediately after the birth of the baby.***
- ***Only the midwives are permitted to prepare oxytocin for administration. At times, the ward is so busy that they are unable to walk to the cabinet and prepare the syringe before a birth.***

Other issues

- ***Some midwives are not aware of the Ministry's recommendation for administration of oxytocin immediately after birth.***
- ***At times, particularly during the night, the midwife does not have time to prepare an oxytocin syringe because she is the only provider covering the labor and delivery area.***
- ***Ward assistants are assigned to the labor and delivery area at all times, day and night.***
- ***The facility administrator will support changes that agree with Ministry recommendations, but there are no funds to hire additional staff.***

2. ***Using the table below, identify the barriers to care that might interfere with immediate administration of oxytocin after birth.***

INPUT BARRIERS	***IDENTIFIED INPUT BARRIERS TO ADMINISTRATION OF OXYTOCIN***
Lack of knowledge and skills	Some providers are not aware of the recommended use of oxytocin.
Staffing shortages	Because of other responsibilities, midwives sometimes do not have time to prepare oxytocin syringes before delivery.
Insufficient supplies	None; the pharmacy always has oxytocin.
Unfavorable infrastructure	None
Inadequate financial resources	There are no funds to hire additional staff.
Traditions and cultural beliefs that interfere with recommended care	None

PERFORMANCE BARRIERS	***IDENTIFIED PERFORMANCE BARRIERS TO ADMINISTRATION OF OXYTOCIN***
Poorly organized processes	Two aspects of oxytocin administration are poorly organized: stocking the delivery area and preparation of syringes before each birth.
Misaligned incentives	None
Challenges with leadership and management	None
Provider's convenience	None

3. ***Choose the barriers to overcome. Consider the expected effect, cost and feasibility of overcoming the barrier(s).***
   The team chooses two of the barriers: lack of knowledge and the poorly organized process. They believe that overcoming these barriers will have a big effect on the administration of oxytocin. These barriers will not be costly to overcome, and they believe that it will be feasible to overcome them. They know that more staff cannot be hired, so they will try to improve oxytocin treatment without changes in staffing.

Step 4

Plan and test change

Maternal case scenario

The team decides to overcome two barriers to improve oxytocin administration. First, they decide to reorganize the process of administering oxytocin by making certain that the medication is in the delivery room and prepared for injection before every birth. Second, they decide to improve the knowledge among providers about the Ministry's recommendation for administration of oxytocin immediately after birth.

1. *List changes that might overcome these barriers to oxytocin administration. Select one or more changes to test.*

The team discusses options for reorganizing the actions required to prepare a syringe of oxytocin for each birth, including:

- The nurse-in-charge will review the supplies in the cabinet each morning to ensure that enough oxytocin is available for that day and night. The improvement team will review the Delivery Register to estimate the average number of births per 24 hours to help understand the amount of oxytocin which would typically be required.
- The ward assistant assigned to the labor and delivery area will be tasked with placing a vial of oxytocin and syringe next to the delivery pack for each mother upon admission.
- The improvement team will review the Ministry guidelines and the evidence supporting the use of oxytocin at the next two staff meetings.

The team decides that each of these options is feasible.

Maternal case scenario (continued)

The team plans to reorganize this process. The nurse-in-charge will be responsible for assessing the supply of oxytocin and requesting the vials and syringes needed for each day. Based on a review of the Delivery Register, the team estimates that there are about 3 births per day. Therefore, they recommend that the cabinet be stocked with 4 vials and 4 syringes each morning. The ward assistant who is assigned to the labor and delivery area will place a vial of oxytocin and syringe by the delivery pack of every mother upon her admission. The nurse-in-charge will meet with the ward assistant at the beginning of each shift to review his/her responsibility for making sure that the vial and syringe are placed with the delivery packs. The team plans to improve knowledge about administration of oxytocin by discussing the recommendations at a staff meeting and hanging guidelines for care on the wall in the delivery area.

These proposed changes are presented to the staff; several nurse midwives express concern. They worry that oxytocin may not be available for women who are experiencing postpartum hemorrhage if it is given to all women. They also are concerned that the ward assistants may not be available, particularly at night, and will resent having additional responsibilities.

Before testing this change on a large scale, the team wants to make sure that the change is possible. They decide to test the change on a small scale.

2. ***Describe a small test that would help determine if this plan for change is feasible.***

The plan to test the proposed changes on a small scale should address the concerns raised by some of the midwives and the feasibility of the changes. This test could involve two midwives who are advocates for this change, the nurses-in-charge and ward assistants during two shifts. The nurse-in-charge of the day shift would stock the cabinet with four vials of oxytocin and four syringes. She would review with the ward assistant her responsibility for placing a vial and syringe next to the delivery pack for each mother.

The result of this small scale test of change would be determined by noting: 1) whether the medication was available in the cabinet; 2) whether it was prepared and ready in the delivery room; and 3) whether it was administered. This small test is only to determine if the change is feasible, not if there was treatment following all births or whether there was a reduction in postpartum hemorrhage.

Maternal case scenario (continued)

The team tests the change on a small scale with two midwives during one day. They make the following observations:

- ***This was an unusually busy day with 6 births.***
- ***Oxytocin was available at the bedside and administered to 4 mothers.***
- ***One birth took place almost immediately after another birth. The midwife was able to prepare the syringe and administer oxytocin because it was available at the bedside.***
- ***The team interviewed the ward assistants. The ward assistants were pleased with their new responsibilities.***

From this small test, the team concludes that the change seems feasible and should be tested among all staff, but they first want to modify the plan slightly. They know that they must increase the supply of oxytocin in the cabinet to allow for times when there are many births, but they do not want to over-stock the cabinet. Because it is not refrigerated, vials that remain in the cabinet for more than 24 hours must be discarded. They plan to increase the daily supply to 5 vials, and the supply in the cabinet will be checked twice per day by the nurse-in-charge. The date and time that the vial is placed in the cabinet will be written on each vial. They now need to develop a plan for testing the change on a larger scale.

3. ***Develop a plan to test the change on a larger scale. Identify what actions, who, when, where and what resources are required.***

What actions	The nurse-in-charge each day will place the 5 vials and syringes in the delivery area cabinet each day; the evening nurse-in-charge will ensure that a sufficient supply is available for the night shift. She will inform the ward assistant of her responsibility to place a vial and syringe by the delivery pack of each new admission.
Who	All nurse midwives, nurses-in-charge and ward assistants.
When	Starting on the first of the month, and for the next 7 weeks.
Where	The maternity unit.
What resources	No new resources. Support will be sought from the midwives, the dispensary and the facility administrator.

4. ***List what data to collect to understand the effects of reorganizing the process of administering oxytocin.***

- What data will show the actions in the change have occurred? How will the team collect this data?
- What data will show the change has resulted in improvement? Assuming this data is not in the medical record, how will the team collect it?

The team must first determine whether the change occurred. This will involve collecting information about the availability of oxytocin vials and syringes in the cabinet and at the bedside at the time of delivery. These data are not in any existing records. They might decide to develop a log sheet that would be placed on the cabinet. The nurse-in-charge would indicate the number of vials present in the cabinet at the beginning of the shift, and how many vials were added to the stock. A checklist could be placed at the bedside along with the delivery pack on which the availability of oxytocin and a syringe could be added. One improvement team member would be assigned the responsibility of collecting these data for the two weeks prior to the change and the 7 weeks after the change.

Then the team must determine whether the change resulted in an increase in the percentage of mothers receiving oxytocin. These data exist in the Delivery Register.

The team will also want to know if the change resulted in a decrease in the percentage of mothers with postpartum hemorrhage. These data are in the Delivery Register.

Finally, the team must also determine whether there were negative effects of the change. For example, they may want to determine how much oxytocin has been discarded. They could obtain this information by comparing the total number of vials dispensed to the delivery area to the total number of women treated. They may also want to ensure that the treatment of all women has not exhausted the supply of oxytocin in the pharmacy, and that the increased use of oxytocin has not caused budgetary problems for the pharmacy.

Step 5

Determine if the change resulted in improvement

Maternal case scenario

The team developed a log sheet on which the nurses-in-charge recorded the availability of vials of oxytocin in the cabinet at the beginning of each shift. A review of these sheets confirmed that oxytocin was always available in the delivery area. The team also added a tick box for oxytocin vial and syringe to the delivery checklist. Review of the checklist confirms that oxytocin was available for nearly all deliveries. The team concludes that the changes occurred.

Now they examine the data to decide if the changes have resulted in improvement. The team must decide if more mothers received oxytocin and fewer mothers had postpartum hemorrhage. From the Delivery Register, a member of the team records the number of women who received oxytocin and the number who experienced postpartum hemorrhage during a 9-week period (2 weeks before the change and 7 weeks after the change) to determine whether improvement occurred.

1. *Use the data collected by the team member (table below) to evaluate the effect of the changes to improve the process of administration of oxytocin and the outcome of postpartum hemorrhage. What percentage of women giving birth at the facility each week received oxytocin? What percentage of women giving birth at the facility each week had a postpartum hemorrhage?*

Data for 9 consecutive weeks describing the number of women receiving oxytocin after birth and the number with postpartum hemorrhage

Week	Number of women giving birth	Number of women receiving oxytocin	Number of women with PPH	Number of women receiving oxytocin	Percentage of women with PPH
1	25	13	4	52.0%	16.0%
2	18	8	3	44.0%	16.6%
3	20	12	3	60.0%	15.0%
4	24	17	3	71.0%	12.5%
5	19	15	2	78.9%	10.5%
6	16	14	1	87.5%	6.2%
7	22	20	1	90.9%	4.5%
8	24	21	2	87.5%	8.3%
9	21	20	1	95.2%	4.7%

2. Create a run chart for the process of oxytocin administration.

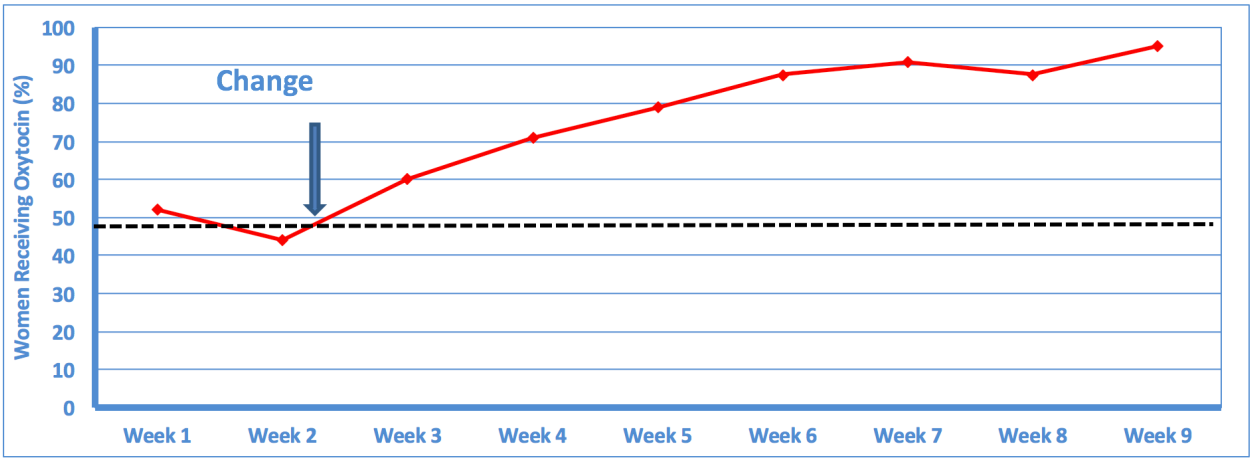
- Label the time of the change on the chart.
- Determine whether the change has resulted in real improvement in this process of care.
- Consider whether there is a shift or a trend.

Create the run chart by plotting the percentage of women receiving oxytocin on the vertical axis and weeks on the horizontal axis. Graph each number in the column labelled "% women receiving oxytocin" using a dot above the corresponding week on the horizontal axis, and connect the dots with a line. Indicate on the graph when the change occurred (after week 2). Notice that the line begins to rise with the third dot (the week after the change). This seems like a significant improvement in the process but the team wants to apply a test to confirm their belief.

Determine if there is a shift by calculating the median prior to the change and counting the number of points above the median. Since there are only two points before the change, a median cannot be accurately determined. However, a value of approximately 48% would be a reasonable estimate of the median, halfway between the two values. Draw a line at this level on the graph. There are more than 6 points above this line after the change. Therefore, an improvement has been documented by a shift in the line.

Determine if there is a trend after the change. A trend is present in this graph because there are 5 continuous points on the line that are higher than the point after the change. The team can conclude that there has been an improvement in the process of care.

Run Chart of the Percentage of Women Receiving Oxytocin



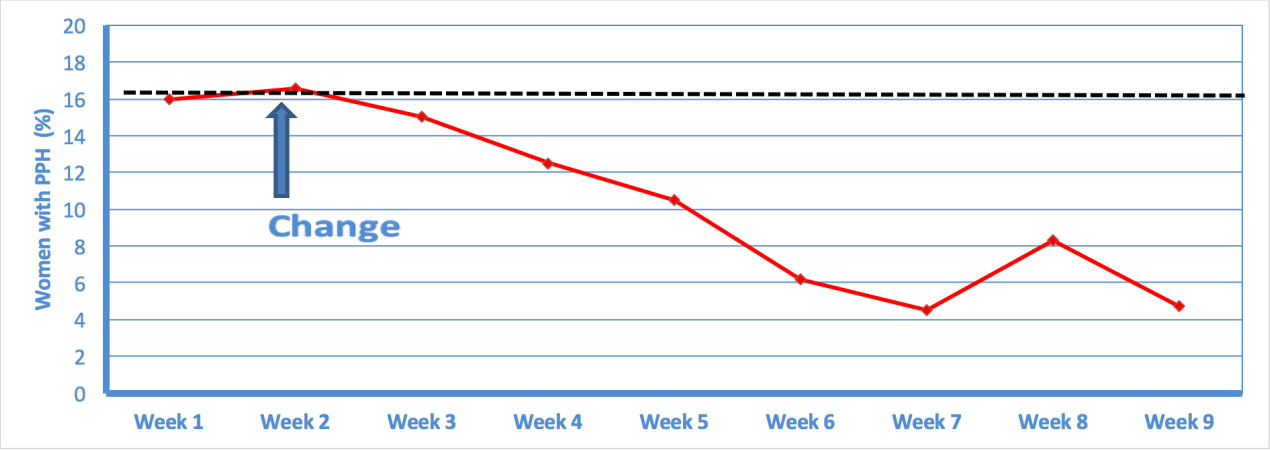
3. ***Create a run chart for the outcome of postpartum hemorrhage. Did the change result in fewer postpartum hemorrhages make progress toward achieving the goal in the aim statement?***

   Create the run chart by plotting the percentage of women with postpartum hemorrhage on the vertical axis and weeks on the horizontal axis. Graph each number in the column labelled "% women with postpartum hemorrhage" using a dot above the corresponding week on the horizontal axis, and connect the dots with a line. Indicate on the graph when the change occurred. Notice that the line begins to turn downward with the third dot (the week after the change). The timing of this improvement corresponds to the improvement in the process and also seems like a significant improvement in the outcome, but the team uses the same tests to confirm their belief.

   Determine if there is a shift by calculating the median prior to the change and counting the number of points below the median. Use 16% as an estimate of the median. There are more than 6 points below the percentage after the change. Therefore, an improvement has been documented by a shift in the line.

   Determine if there is a trend after the change. There are 5 continuous points on the line that are all going down after the change. Therefore, an improvement has been documented by a trend in the line. The team can conclude that there has been an improvement in the outcome.

Run Chart of the Percentage of Women with Postpartum Hemorrhage



4. ***Write a summary with the conclusions of the improvement project to share with staff at the facility.***
   The summary should highlight the important points about this improvement cycle, summarize what changes were made to improve administration of oxytocin after birth, and tell how much improvement has occurred. The team may decide to hang the run chart in the delivery area so that the staff can appreciate the improvement.

5. ***Decide whether the team should adopt, adapt or abandon the changes and why.***

   Organizing the process of oxytocin administration and educating providers about its importance made a significant improvement in the number of women receiving oxytocin, and decreased the rates of postpartum hemorrhage at the facility. The team will adopt these changes since they improved the outcome and made progress towards the goal of the aim statement.

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6. ***Assume that less improvement resulted from this change. For example, assume the percentage of treatment with oxytocin only improved to 75%. What are possible explanations for the unsatisfactory improvement?***

   It would not be unusual for a single cycle of change to result in some improvement but not the amount of improvement specified in the aim statement. Possible explanations include:

   - Data documenting oxytocin administration are inaccurate.
   - A ward assistant may not have been available for all shifts.
   - Some but not all ward assistants understood their responsibility for placing a vial and syringe by the delivery pack.
   - Even when the supplies were at the bedside at the time of delivery, midwives sometimes did not have time to draw up and administer the medication.

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7. ***Assume that the improvement in the administration of oxytocin occurred, but the percentage of women with postpartum hemorrhage did not decrease. What are possible explanations for this lack of improvement?***

   A single cycle of change is even less likely to improve an outcome. The following are possible explanations for the lack of improvement in postpartum hemorrhage:

   - Blood loss is over-estimated; fewer postpartum hemorrhages actually occurred than were reported.
   - Oxytocin was commonly administered more than one minute after birth.
   - Other practices that decrease the likelihood of postpartum hemorrhage (for example, uterine massage and monitoring uterine tone after birth) were not performed.

   These possibilities should be explored. A new change can be planned and tested for improvement in the outcome.

Step 6

Make improvement the norm

Case scenario

The team was excited about the improvements that resulted from their project. Most providers have easily adopted the changes, but others have resisted. The team meets to discuss their next steps.

1. ***Discuss how the team might communicate changes that resulted in improvement.***

   The team decides to share the results of their improvement project with other providers at a staff meeting. They choose to display their run charts in a prominent place where the staff can see them. The team also shows their run charts to the facility administrator. They hope this will encourage the administrator to celebrate and acknowledge their success, and maybe find them additional resources for improvement work. The administrator may also want to publicize the improvement to the Ministry of Health. The Ministry may want to link the successful health facility with a facility that is struggling with this outcome so that the two facilities can collaborate and learn from each other.

2. ***If the team had selected a process for improvement that involved a difficult or challenging skill (for example, bag and mask ventilation), how might they facilitate practice of this skill?***

   Members of the improvement team can work alongside other providers at the facility and serve as role models for the process of care selected for improvement. The team can set up short, frequent skill practice sessions. For example, providers could practice bag and mask ventilation in pairs at the beginning of each shift. If providers have difficulty with the skill, the team might arrange supportive supervision of this activity by a more skilled provider once a week for a month.

3. ***What can the team do to engage individuals who have been resistant to the change? With a partner, role play how a team member would convince a provider who is resistant to change to participate with the other staff in the improvement activities.***

   Start by listening closely to why the provider does not support the changes Help the provider understand how the changes benefit mothers, babies, and providers themselves. Talk about how the changes save time and make the job easier. Slow adopters of change may also be persuaded by the number of other staff changing their practice.

   Celebrating good outcomes with stories and pictures and recognizing providers who are successfully changing behavior can help build support for the change. Mothers who benefited from the change may publicize this to other mothers in the community and encourage them to participate in the new activity.

4. ***What further actions can the team take to make the change permanent? What might they recommend to management of the facility in order to sustain the improvement?***

   The team will want to communicate the results of their improvement project and their recommendations to management of the facility. For example, to sustain the improvement, they may recommend adding new elements to the delivery checklist used by staff. The team may also recommend changing the job description of the nurse midwives, nurses and other personnel to reflect the change in their responsibilities. They may include education about these responsibilities for all new employees and trainees. The team can continue to follow their progress with run charts to make sure that improved rates do not decline.

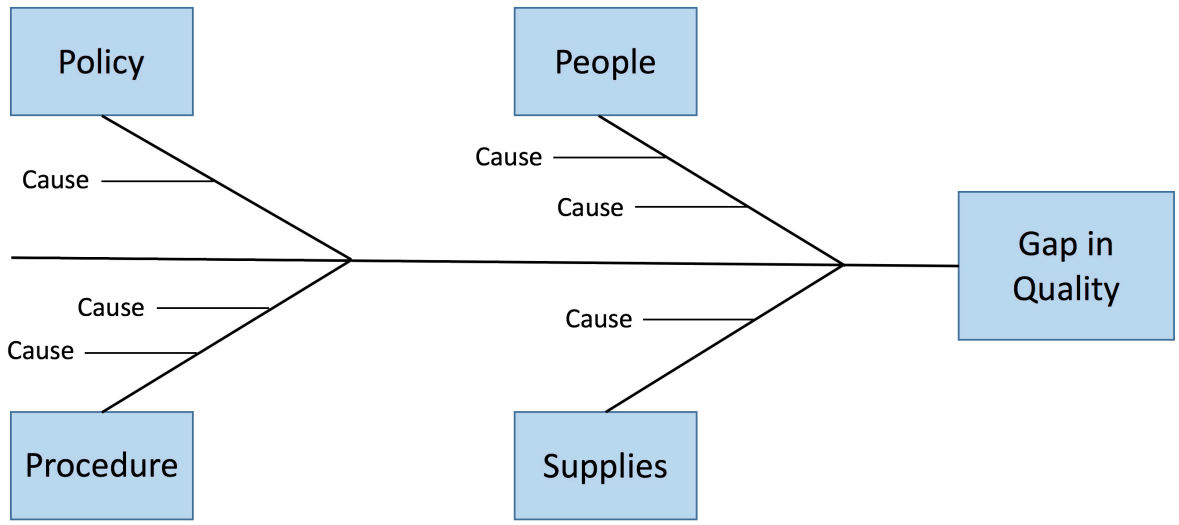
APPENDIX B

Appendix B. 1. The fishbone diagram

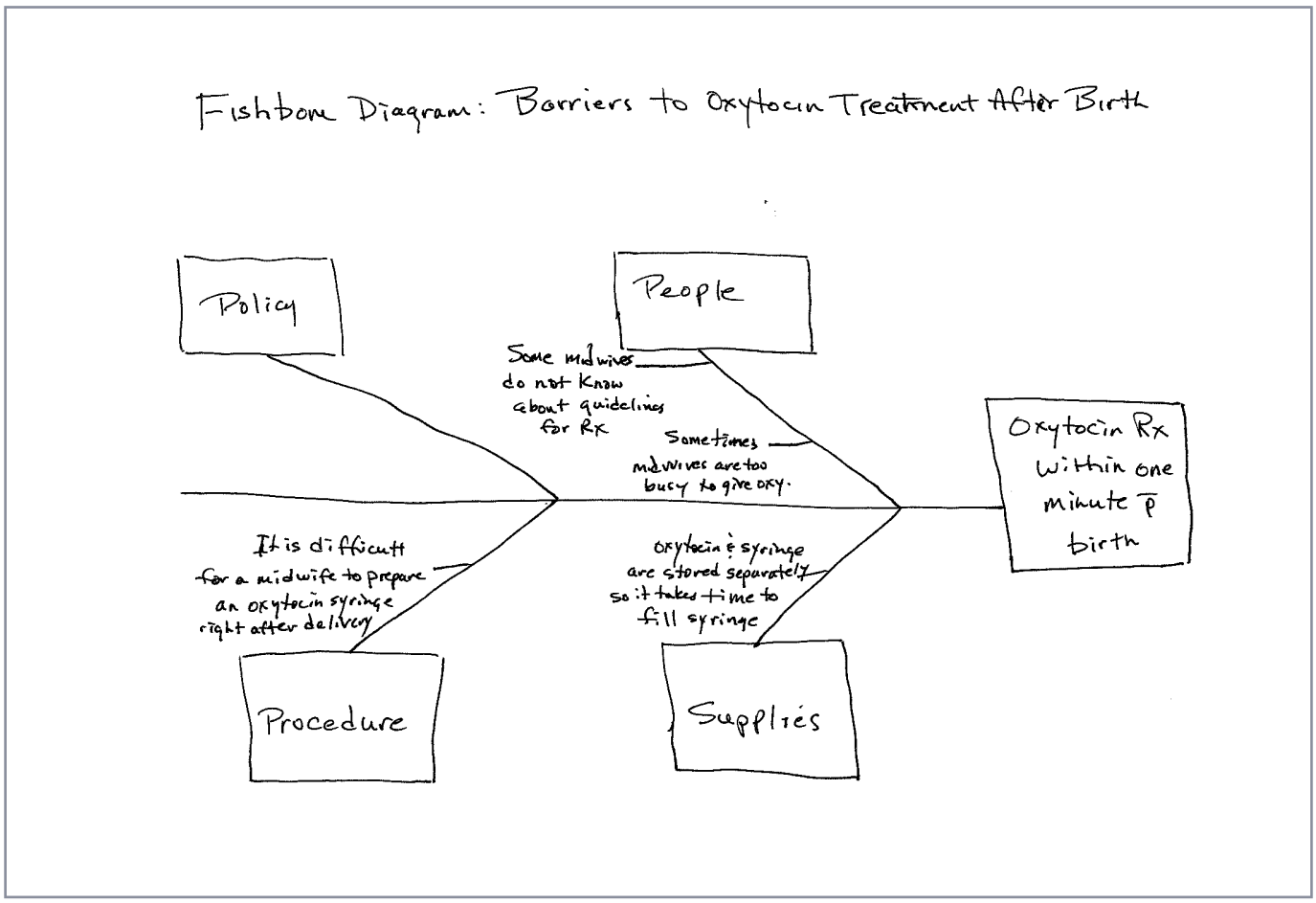
The fishbone diagram is used to identify the causes of a gap in the quality of care. It is most helpful when a gap has multiple contributing causes or barriers. This tool sorts potential causes by typical domains or general areas of care (for example, policies, people, procedures and supplies). Teams use the tool by listing potential causes or barriers that contribute to the gap in quality within each domain. These form the small bones of the fish. After all potential causes have been listed, those that may have the greatest impact or are most easily corrected can be identified.

How to develop a fishbone diagram:

1. Draw a horizontal line. At one end (corresponding to the "head" of the fish), write the gap in quality that you want to improve.
2. Then draw diagonal lines ("bones") from the horizontal line to boxes. Within each, write the name of a domain or major area of care (see figure).
3. Within each domain, identify one or more potential problems or barriers that might cause the gap that you are going to improve.



EXAMPLE:
The midwives at a district hospital recently reviewed the care provided to mothers around the time of birth. They discover that only about ½ of mothers are treated with a uterotonic (oxytocin) within one minute of birth. They draw a fishbone diagram to help them identify barriers to this treatment (see next page).



They identify several barriers to providing oxytocin within minute after birth:

- Lack of knowledge about this treatment
- Insufficient staffing to allow midwives to deliver care to mothers and babies and always give oxytocin
- A poorly organized process of treatment: oxytocin and syringe not stored together; syringe not filled with oxytocin until after delivery

The identification of these barriers will help them develop a plan for change to improve treatment with oxytocin.

Appendix B.2. Five whys root cause analysis

The "five whys" technique is used to identify the root cause of a gap in the quality of care. It is sometimes used with other tools, for example the flow chart, to help discover the single most likely cause of the gap.

How to use the five whys:

1. Start by asking why you have a problem.
2. Then ask why to the answer given and continue to repeat these questions until you discover the root cause of the problem.
3. Develop a plan to improve this root cause.

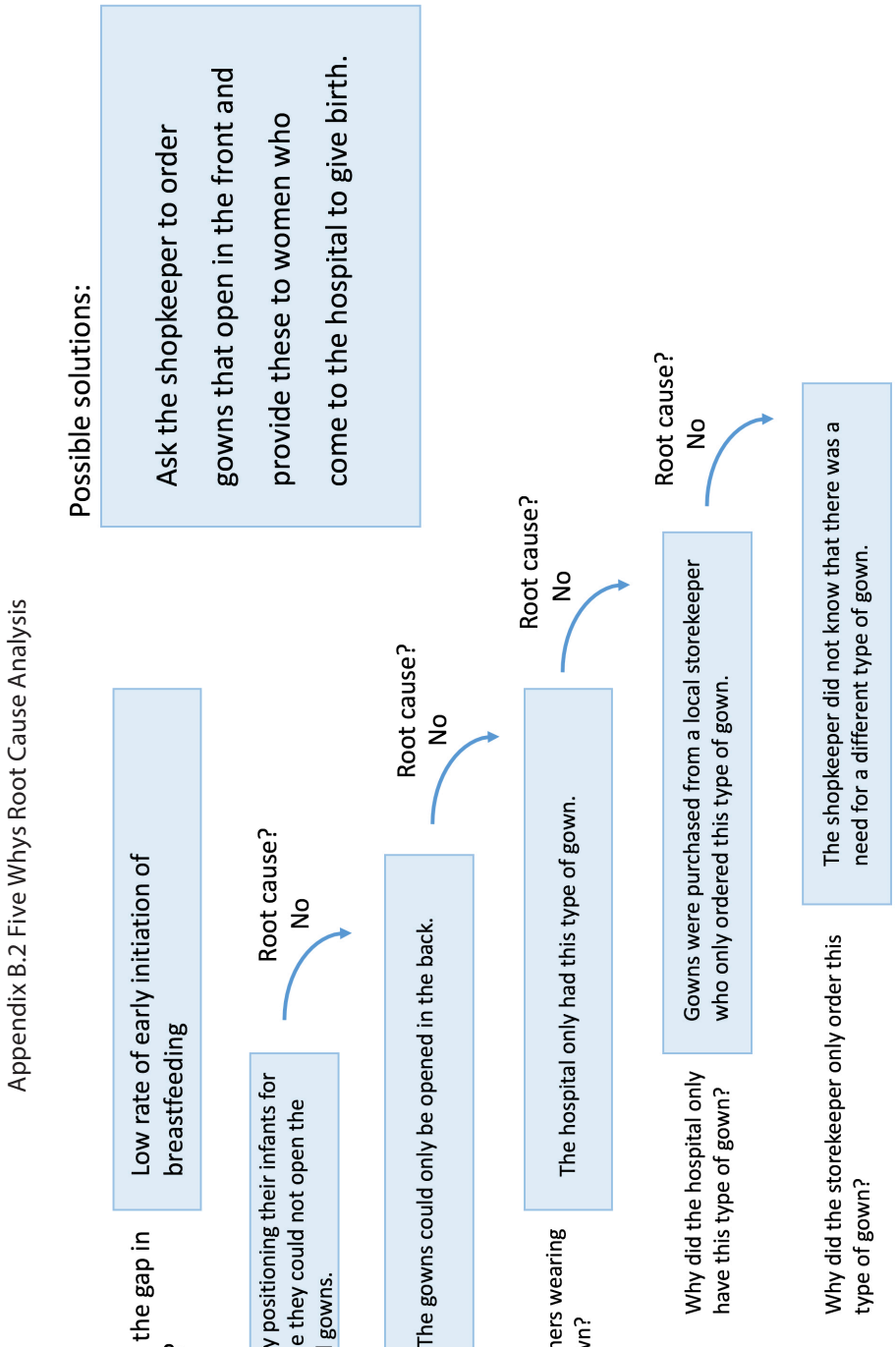
Notes:

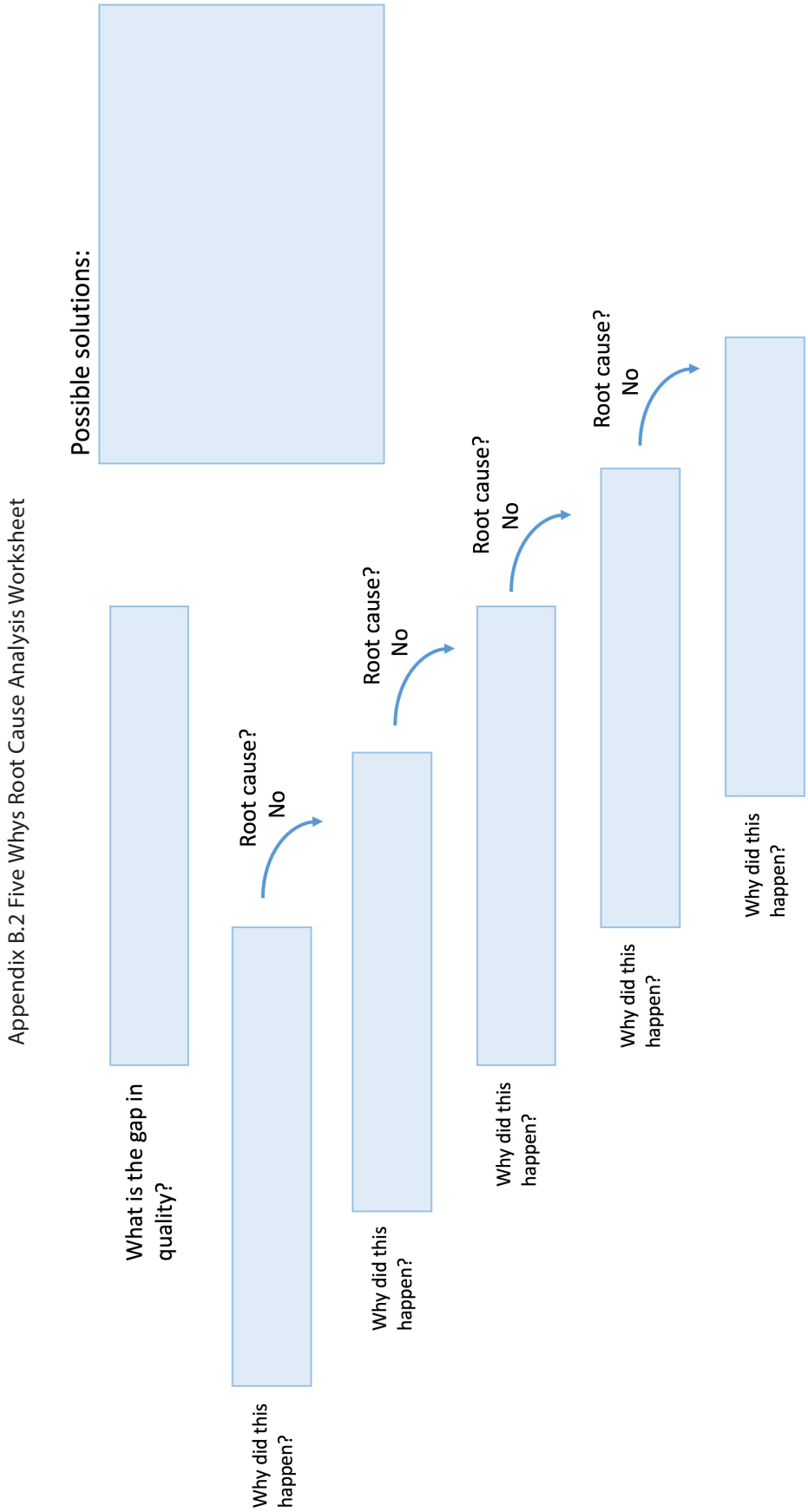
- There is nothing special about asking why five times. Keep asking until you are sure you have discovered the root cause of the problem. This may require fewer than five times, or sometimes more.
- A potential challenge you might face while using this tool is that it does not always lead you to a helpful answer or could lead you to identifying problems that are beyond your control and cannot be fixed.

Example (adapted from the "Improving Quality in Healthcare; Implementation Guide by ASSIST India[1]):

Mothers who give birth in a small district hospital have a low rate of early initiation of breast feeding despite being told about the importance of early breastfeeding. To identify the cause of this low rate, the improvement team used the Five Whys analysis. They first asked women why they were not initiating breast feeding soon after birth. They learned that mothers were unable to easily place their infants to the breast because they could not open the front of their hospital gowns. When they learned this answer, they asked four additional question and discovered the root cause of this gap in quality (see chart on the following page). The root cause suggested a simple solution to the problem.

[1]*Singh R, Singh M, Jha R, Sharma P, Livesley N. 2016. Improving Quality in Healthcare: A practical guide for health care providers. Technical Report. Published by the USAID ASSIST Project. Bethesda, MD: University Research Co., LLC (URC).*


Appendix B.2 Five Whys Root Cause Analysis
What is the gap in quality?
Low rate of early initiation of breastfeeding
Why did this happen?
Mothers had difficulty positioning their infants for breastfeeding because they could not open the front of their hospital gowns.
Root cause? No
Why couldn't they open the front?
The gowns could only be opened in the back.
Root cause? No
Why were mothers wearing this type of gown?
The hospital only had this type of gown.
Root cause? No
Why did the hospital only have this type of gown?
Gowns were purchased from a local storekeeper who only ordered this type of gown.
Root cause? No
Why did the storekeeper only order this type of gown?
The shopkeeper did not know that there was a need for a different type of gown.
Possible solutions:
Ask the shopkeeper to order gowns that open in the front and provide these to women who come to the hospital to give birth.


Appendix B.2 Five Whys Root Cause Analysis Worksheet
Possible solutions:
What is the gap in quality?
Why did this happen?
Root cause? No
Why did this happen?
Root cause? No
Why did this happen?
Root cause? No
Why did this happen?
Root cause? No
Why did this happen?

APPENDIX C.

Examples of Process and Outcome Indicators

Type of indicator	Indicators	Numerator	Denominator	Relevance with global monitoring frameworks
Routine assessment and treatment of women				
Process indicator	% of all women giving birth in the health facility whose progress in labour was correctly monitored and documented using a partograph with a 4-h action line[1]	# of women giving birth in the health facility whose progress in labour was correctly monitored and documented using a partograph with a 4-h action line	Total # of all women giving birth in the health facility	WHO QoC (quality statement 1.1a) output indicator #7
Process indicator	% of all women giving birth in the health facility who received oxytocin within 1 min of birth of their infant	# of women giving birth in the health facility who received oxytocin within 1 min of birth of their infant.	Total # of all women giving birth in the health facility within reporting period	WHO QoC (quality statement 1.1a) output indicator #9
Outcome indicator	Stillbirth rate	# of babies with no signs of life born weighting at least 1000 grams or after 28 weeks of gestation	Per 1,000 total (live and stillborn) births in the health facility	ENAP, Impact
Outcome indicator	Neonatal mortality rate	# of live born infants per year dying before 28 completed days of age	Per 1,000 live births in the health facility	ENAP, Impact
Outcome indicator	Very early neonatal death rate	Live born infants who died before discharge (or within the first 24 hours after birth)	Per 1,000 live births in the health facility	USAID-led initiative *"Helping 100,000 Babies Survive and Thrive"*
Outcome indicator	Institutional maternal mortality ratio	# of maternal deaths in the facility during reporting period	Per 100,000 women giving birth in the health facility	WHO 100 Core Health Indicators
Routine care of newborn immediately after birth				
Process indicator	% of all newborns who were kept in skin-to- skin contact (with body and head covered) with their mothers for at least 1 h after birth	# of newborns with immediate skin-to-skin contact for at least 1h after birth	Total # of live births in the health facility	WHO QoC (quality statement 1.1b) output indicator #8
Process indicator	% of all newborns who were breastfed within 1 hour after birth	# of newborns breast fed within 1 hour after birth	Total # of live births in the health facility	WHO QoC (quality statement 1.1b) output indicator #10

[1]*Correct monitoring defined as reporting as: start plotting when cervix ≥ 4 cm, then cervix should delate ≥1 cm/r, every 30 min plot HR, contractions, fetal HR, every 2 hrs _ temperature and every 4 hours BP.*

Type of indicator	Indicators	Numerator	Denominator	Relevance with Global Monitoring frameworks
Process indicator	% of newborn with Chlorhexidine (CHX) cord cleansing	# of newborns that received at least one dose of CHX (71.%) to the cord on the first day after birth (within 24 hours of birth)	Total # of live births in the health facility	ENAP, (modified for facility level)
Outcome indicator	% of all newborns who had normal body temperature (36.5–37.5 °C) at the time of the first complete examination (between 60 min and 120 min after birth)	# of all newborns who had normal body temperature (36.5–37.5 °C) at the time of the first complete examination (between 60 min and 120 min after birth)	Total # of live births in the health facility	WHO QoC (quality statement 1.1b) output indicator #12
Routine postnatal care of mothers and newborns				
Process indicator	% of all postnatal assessments in the health facility that documented maternal blood pressure, pulse rate, vaginal bleeding/lochia and breastfeeding problems	# of all postnatal assessments in the health facility that documented maternal blood pressure, pulse rate, vaginal bleeding/ lochia and breastfeeding problems	Total # of all women giving birth in the health facility	WHO QoC (quality statement 1.1c) output indicator #11
Treatment of preeclampsia				
Process indicator	% of all women in the health facility with severe pre-eclampsia or eclampsia who received the full dose of magnesium sulfate or loading dose of magnesium sulfate and referral	# of all women in the health facility with severe pre-eclampsia or eclampsia who received the full dose of magnesium sulfate or loading dose of magnesium sulfate and referral	Total # of all women with severe pre- eclampsia or eclampsia in the health facility	WHO QoC (quality statement 1.2) output indicator #4
Outcome indicator	% of all women with pre-eclampsia or eclampsia in the health facility who died as a result of pre-eclampsia and eclampsia	# of all women with pre-eclampsia or eclampsia in the health facility who died as a result of pre-eclampsia and eclampsia	Total # of all women with severe pre- eclampsia or eclampsia in the health facility	WHO QoC (quality statement 1.2) output indicator #7

Treatment of delayed/obstructed labor				
Type of indicator	**Indicators**	**Numerator**	**Denominator**	**Relevance with Global Monitoring frameworks**
Process indicator	% of all women in the health facility with confirmed delay in labour progress who received oxytocin for augmentation of labour[2]	# of all women in the health facility with confirmed delay in labour progress who received oxytocin for augmentation of labour	Total # of all women in the health facility with confirmed delay in labour progress	WHO QoC (quality statement 1.4) output indicator #6
Process indicator	% of all women in the health facility with prolonged and/ or obstructed labour who gave birth by caesarean section	# of all women in the health facility with prolonged and/or obstructed labour who gave birth by caesarean section	Total # of all women in the health facility with prolonged and/or obstructed labour	WHO QoC (quality statement 1.4) output indicator #10
Outcome indicator	% of all women giving birth in the health facility whose active phase of first stage of labour exceeded 12 h	# of all women giving birth in the health facility whose active phase of first stage of labour exceeded 12 h	Total # of all women giving birth in the health facility	WHO QoC (quality statement 1.4) output indicator #11
Newborn resuscitation				
Process indicator	% of newborns who were not breathing spontaneously/crying at birth for whom resuscitation actions (stimulation and/or bag and mask) were initiated	# of newborns who were not breathing spontaneously/crying at birth for whom resuscitation actions (stimulation and/or bag and mask) were initiated	Total # of births in the health facility not breathing spontaneously/ crying at birth, excluding macerated stillbirths and including fresh stillbirths (as surrogate of intrapartum stillbirths)	ENAP, Coverage
Outcome indicator	% of babies not breathing at birth that were resuscitated successfully by stimulation and/or bag and mask	% of babies not breathing at birth that were resuscitated successfully by stimulation and/or bag and mask	Total # of births in the health facility not breathing spontaneously/ crying at birth (excluding macerated stillbirths and including fresh stillbirths) for whom resuscitation actions (stimulation and/ or ventilation with bag and mask) were initiated	USAID Newborn Resuscitation Quality Framework

[2]*Defined for nulliparous women as those not giving birth within 3 h of the start of the second stage and, for multiparous women as those not giving birth within 2 h of the start of the second stage.*

Care of preterm labor/preterm birth/LBW				
Type of Indicator	**Indicators**	**Numerator**	**Denominator**	**Relevance with Global Monitoring frameworks**
Process indicator	Antenatal corticosteroids (ACS) use	All women giving birth in facility who are <34 completed weeks and received one dose of ACS for being at risk of preterm birth	Total # of live births in health facility who are born at <34 completed weeks of gestation	ENAP, Coverage
Process indicator	% of neonates weighing ≤2000 g at birth initiated with facility based Kangaroo Mother Care[3]	# of neonates weighing ≤2000 g at birth initiated with facility based Kangaroo Mother Care	Total # of neonates weighing ≤2000 g at birth in the health facility	ENAP, Coverage
Outcome indicator	Neonatal mortality rate among all low birth-weight babies born in the health facility	# of liveborn infants weighing <2,500 g who died in the health facility before discharge	Total # of low birth-weight newborns in the health facility per 1,000 liveborn infants with <2,500 g in the health facility	WHO QoC (quality statement 1.6b) output indicator #11
Process indicator	% of all birthing or postpartum women in the health facility with signs of infection who received injectable antibiotics	# of all birthing or postpartum women in the health facility with signs of infection who received injectable antibiotics	Total # of all birthing or postpartum women in the health facility with signs of infection	WHO QoC (quality statement 1.7a) output indicator #7
Outcome indicator	% of maternal death due to maternal sepsis in all causes of maternal death	# of maternal death due to maternal sepsis in all causes of maternal death	Total # of maternal deaths in the facility	
Prevention and treatment of newborns with suspected infection or risk factors for infection				
Process indicator	# of all newborns in the health facility with signs of Possible Severe Bacterial Infection (PSBI)[4] who received injectable Ampicillin and Gentamicin	# of all newborns with signs of PSBI who received at least one dose of injectiable Ampicillin and Gentamicin in the health facility	Total # of newborns with PSBI in the health facility	ENAP, Coverage WHO QoC (quality statement 1.7b) output indicator #5
Outcome indicator	% of all early neonatal deaths in the health facility facility that were due to sepsis	# of all neonatal deaths in the health facility facility that were due to sepsis	Total # of all neonatal deaths in the health facility	WHO QoC (quality statement 1.7b) output indicator #8

[3] *Care of a preterm infant with early, continuous skin-to-skin contact, and exclusive breastfeeding or feeding with breast milk.*

[4] *Signs of PSBI include any of the following: not able to feed since birth or stopped feeding well, convulsions, fast breathing (60 breaths per minute or more) among infants less than 7 days old, severe chest in-drawing, fever (38 °C), movement only when stimulated or no movement at all.*

Acknowledgements

Improving Care of Mothers and Babies was conceived and designed by an inter-disciplinary team of physicians, nurse midwives and educators from the Survive & Thrive Global Development Alliance.

Editor
Carl Bose, MD
University of North Carolina
Chapel Hill, NC

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University Research Co, LLC
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Jackie Patterson, MD
University of North Carolina
Chapel Hill, NC

Suzanne Stalls, CNM, MA
American College of Nurse-Midwives
Silver Spring, MD

Illustrator/Art Director
Anne Jorunn Svalastog Johnsen
Laerdal Global Health
Stavanger, Norway

Illustrator
Bjørn Mike Boge
Laerdal Global Health
Stavanger, Norway

Managing Editor
Casey Lowman, MPH
American Academy of Pediatrics
Elk Grove Village, IL

Special Reviewer
Neena Khadka, MBBS, DCH, MA, MPH
Maternal and Child Survival Program/
Save the Children
Washington, DC

Survive & Thrive and the Improving Care of Mothers and Babies Editorial Board acknowledge with appreciation the following individuals for valuable time spent reviewing program materials.

Sheena Currie, RM, MEd
Jhpiego
Baltimore, Maryland

Santorino Data, MD
Mbarara University of Science and
Technology
Mbarara, Uganda

Ashok Deorari, MD, FAMS
All India Institute of Medical Sciences
New Delhi, India

Bernhard Fassl, MD
University of Utah
Salt Lake City, Utah

Brynjar Foss, PhD
Laerdal Global Health
Stavanger, Norway

Kathleen Hill, MD, MPH
Maternal and Child Survival Program/
Jhpiego
Washington, DC

Lily Kak, PhD
Mary Ellen Stanton, CNM, MSN, FACNM
US Agency for International Development
Washington, DC

Douglas W. Laube, MD, MEd
University of Wisconsin
Madison, WI

Jerker Liljestrand, MD, PhD
Bill and Melinda Gates Foundation
Seattle, WA

Arti Maria, MD
Dr. Ram Manohar Lohia Hospital
New Delhi, India

Rajesh Mehta, MD
World Health Organization,
Regional Office for South-East Asia
New Delhi, India

Edward Moses, MScPM
Maikhanda Trust
Lilongwe, Malawi

Magdalena Serpa, MD, MPH
PATH
Washington, DC

Kim Ethier Stover, MA
University Research Co, LLC
Bethesda, MD

Michael Visick, MD
LDS Charities
Logan, UT

Steve Wall, MD, MS, MSW
Saving Newborn Lives/
Save the Children
Washington, DC

Nabila Zaka, MBBS, PhD
UNICEF
New York, NY

This work was made possible through the collaborative efforts of the Survive & Thrive Global Development Alliance.
Special thanks is extended to those partners who provided lead guidance in the development of these materials: the American Academy of Pediatrics (AAP), the American College of Nurse Midwives (ACNM), Jhpiego, Laerdal Global Health, Save the Children, University Research Co., LLC (URC), and the US Agency for International Development (USAID).

Survive & Thrive *is an alliance of government, professional health association, private sector and non-profit partners working alongside country governments and health professionals to improve health outcomes for mothers, newborns and children through clinical training, systems strengthening and policy advocacy. By leveraging the combined resources and expertise of some of the most respected United States and global organizations in maternal and child health, Survive & Thrive is able to energize critical health care interventions during the time when mothers and their children are most vulnerable—from pregnancy through childbirth, and childhood through age five—thereby making a real impact in ending preventable maternal and child deaths worldwide.*

The Alliance consists of the following partner organizations: *USAID, AAP, ACNM, American College of Obstetricians and Gynecologists (ACOG), American Heart Association (AHA), Save the Children, International Pediatric Association (IPA), LDS Charities, Laerdal Global Health, Johnson & Johnson, Jhpiego, Project C.U.R.E., Millennium Villages, Global Health Media, Sigma Theta Tau International Honor Society of Nursing, and USAID's Applying Science to Strengthen and Improve Systems (ASSIST) Project and Maternal and Child Survival Program (MCSP).*

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professional associations, private sector and global health scholars
saving mothers, newborns and children