



# Improving preeclampsia and eclampsia care

## Tested changes and guidance from East Central Uganda

**APRIL 2018**

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This change package for improving preeclampsia and eclampsia care was prepared by University Research Co., LLC (URC) under the United States Agency for International Development (USAID) Applying Science to Strengthen and Improve Systems (ASSIST) Project. The work was funded by USAID's Bureau for Global Health, Office of Maternal and Child Health and Nutrition. This document was authored by Anjali Chowfla, Tamar Chitashvili, Connie Namajji, Jorge Hermida, Esther Karamagi, and Silvia Holschneider of URC. It was developed as part of a larger activity to improve the quality of integrated antenatal care delivery and the quality of integrated care for preeclampsia/eclampsia activities in Uganda implemented by the USAID ASSIST Project, which is made possible by the generous support of the American people through USAID.



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Anjali Chowfla, University Research Co., LLC  
Tamar Chitashvili, University Research Co., LLC  
Connie Namajji, University Research Co., LLC  
Jorge Hermida University Research Co., LLC  
Esther Karamagi, University Research Co., LLC  
Silvia Holschneider, University Research Co., LLC

### DISCLAIMER

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## Acronyms

ANC	Antenatal care
ASSIST	USAID Applying Science to Strengthen and Improve Systems Project
BEmONC	Basic emergency obstetric and newborn care
BP	Blood pressure
CEmONC	Comprehensive emergency obstetric and newborn care
CME	Continuing medical education
HC	Health centre
HMIS	Health management information system
MCH	Maternal and child health
MOH	Ministry of Health
NMS	National Medical Stores
PDSA	Plan-do-study-act
PE/E	Pre-eclampsia/eclampsia
QI	Quality improvement
RRH	Regional Referral Hospital
USAID	United States Agency for International Development
WHO	World Health Organization

## Glossary of Terms

**Antenatal care:** A planned program of medical care offered to pregnant women by a skilled birth attendant from the time of conception to delivery aimed at ensuring a safe and satisfying pregnancy and birth outcomes.

**Change concept:** A category of change ideas or solutions that are similar and have a common underlying thought pattern.

**Change idea:** A specific intervention that a health facility quality improvement team has tested.

**Change package:** An organized summary of strategies and interventions that have been tested and proven to improve care in a given context.

**Improvement collaborative:** A collection of quality improvement teams that work independently to address a common challenge, but are periodically brought together to share and learn from one another, so that emerging best practices are easily and rapidly spread at scale.

**Inputs:** Include, for example, trained staff, equipment, infrastructure, drugs, guidelines and policies.

**Plan-Do-Study-Act (PDSA) cycle:** A structure for an efficient trial-and-learning methodology used to test different change ideas and learn from them. It begins with a plan and ends with action according to the learning gained from the plan, do and study phases of the cycle. In most cases, multiple PDSAs are needed to achieve successful changes.

**Processes of care:** the actions of providers during the care of mothers and babies.



## I. INTRODUCTION

Hypertensive disorders of pregnancy are one of the leading causes of severe morbidity, disability and death among mothers and their babies and in addition to anemia and syphilis are a major contributor to stillbirths in developing countries. In Africa, about 10% of maternal deaths are associated with hypertensive disorders in pregnancy<sup>1</sup>; in Uganda, they were the third leading cause of maternal death in 2015/16. Preeclampsia, a condition that affects 5% of all pregnancies worldwide, and eclampsia stand out as the most challenging of the hypertensive disorders affecting pregnancy.

Preeclampsia and eclampsia (PE/E) are major risk factors for pre-term delivery and require integrated care of the mother and the neonate to reduce incidence and prematurity-associated morbidity and mortality. Although preeclampsia may not be completely preventable, deaths due to hypertensive disorders can be avoided through provision of timely, effective and appropriate prenatal care for all women. Early detection, careful monitoring, and treatment of preeclampsia are crucial in preventing mortality related to this disorder. In particular, early recognition of complications at household and primary levels and effective referral and counter-referral continue to be significant obstacles for improving outcomes for mothers with PE/E and their term and premature neonates.

Pre-eclampsia cannot be diagnosed unless blood pressure measurement and screening for protein in urine during antenatal care sessions and deliveries begins to improve. Screening for these conditions during antenatal care, as per the goal-oriented care guidelines of the Ugandan Ministry of Health (MOH), allows for early identification and treatment and can prevent further complications for both the mother and her baby and reduce the high macerated still birth rate.

From June 2015 through March 2017 the USAID Applying Science to Strengthen and Improve Systems (ASSIST) Project implemented an improvement activity in a “slice” of the health care system in Jinja, Uganda to improve the quality of primary antenatal care (ANC) services through implementation of an integrated package of antenatal care best practices that includes early detection, initial management and referral of the most common obstetric conditions with an emphasis on improving screening, diagnosis, treatment and referral of preeclampsia/eclampsia as one of the major causes of preventable maternal death. ASSIST implemented the activity in 10 randomly selected facilities across all levels of the health system, within the catchment area of the Jinja Regional Referral Hospital (RRH). These facilities included Jinja RRH, Buwenge General Hospital, Buwenge Health Centre (HC) IV, Budondo HC IV, Mpumudde HC IV, Lukolo HC III, Kakaire HC III, Magamaga HC III, Butagaya HC III, and Budima HC III.

This activity generated important learning about effective models for improving delivery of quality care for PE/E including early recognition, initial treatment, and referral from primary care to the hospital level as well as addressing quality gaps at the hospital level. The changes implemented by quality improvement (QI) teams that are discussed in this document demonstrate effective ways to overcome common gaps in preeclampsia/eclampsia care in a low-resource environment, improve the quality of antenatal care for pregnant women, and reduce maternal and newborn mortality.

### Improvement approach

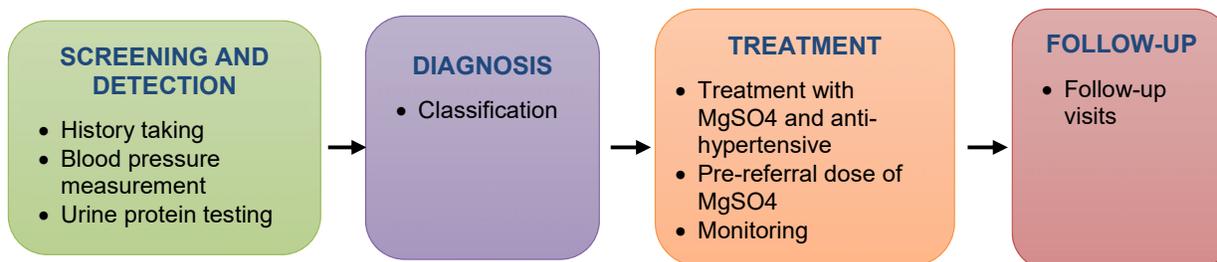
ASSIST began improvement activities in September 2015 by conducting a baseline assessment in 19 health facilities in the Jinja District which included the 10 intervention facilities and 9 additional facilities randomly selected to serve as a control group. Following the baseline assessment, performance gaps were identified at each level of the health system, ranging from inputs and processes of care to technical competence. The most frequent deficiencies in essential inputs for preeclampsia/ eclampsia care were the availability of functioning blood pressure machines, magnesium sulfate, urine protein dipsticks and containers for collecting urine samples. Gaps in processes of care included inconsistency and inaccuracy in taking blood pressure measurements, incomplete documentation, inadequate referral of women identified with severe preeclampsia/ eclampsia, lack of knowledge on when to perform testing for urine protein levels using a dipstick, and lack of confidence in the use of magnesium sulfate to manage severe preeclampsia/ eclampsia.

Based on these findings, ASSIST, the Ministry of Health and the Jinja District Health Office selected the following four care processes as the focus of improvement activities.

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<sup>1</sup> World Health Organization (WHO). 2016. WHO recommendations on antenatal care for a positive pregnancy experience. Geneva: World Health Organization.

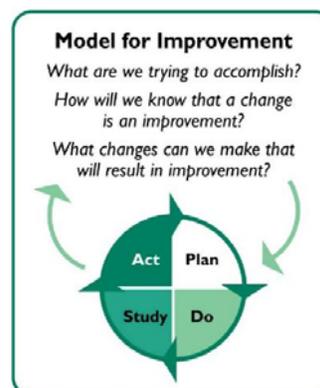
**Figure 1. Four key areas for improving preeclampsia and eclampsia care**



The USAID ASSIST Project's approach to quality improvement is guided by the Model for Improvement (see **Figure 2**), and relies on rapid, iterative plan-do-study-act (PDSA) cycles to test and learn from specific change ideas. With support from ASSIST, quality improvement teams began using this approach to improve preeclampsia/eclampsia care processes in the 10 intervention facilities in October 2015. ASSIST provided support for the following:

- Setting up and orienting QI teams:** Care providers within the maternal and child health (MCH) clinics were oriented on improvement approaches and how QI could be integrated into maternal and child health care. ASSIST staff then worked with each facility to set up a functional multidisciplinary team, review preeclampsia care processes and clinic flow, identify gaps in care, and demonstrate how to use indicators to monitor improvement.
- Trainings:** ASSIST conducted a refresher training on clinical knowledge and critical skills for preeclampsia care as well as methods and tools for quality improvement during the first learning session from November-December 2015. At the end of the clinical training QI teams developed specific action plans for implementing their initial PDSA cycles, which included improvement aims, selected indicators, change ideas and implementation strategies.
- Peer-to-peer learning sessions:** A total of three peer-to-peer learning sessions were conducted by USAID ASSIST in November-December 2015, April 2016, and October 2016. Health workers from all 10 implementing facilities were brought together for three days to share their work, experience, results obtained and challenges faced. The facility QI teams selected members on a rotational basis to attend the peer-to-peer learning sessions. Lower level health facilities were given three slots, while higher level facilities were represented by five to eight staff per facility. Learning sessions offered facility staff an opportunity to learn from successful changes in other facilities and provided a means for rapid sharing of results in improving preeclampsia care delivery.
- Monthly on-site coaching visits:** Through monthly on-site visits by a team of coaches, comprised of regional and district level MOH and ASSIST staff, facility teams were guided on improving processes of preeclampsia care and the use of monitoring indicators to review performance and identify areas for further improvement. Once the capacity of QI teams to monitor performance was built, a data collection tool was shared with teams to record data collected on all the key process indicators from the ANC and maternity register. Coaches validated data collected during on-site visits and areas of discrepancy were rectified.

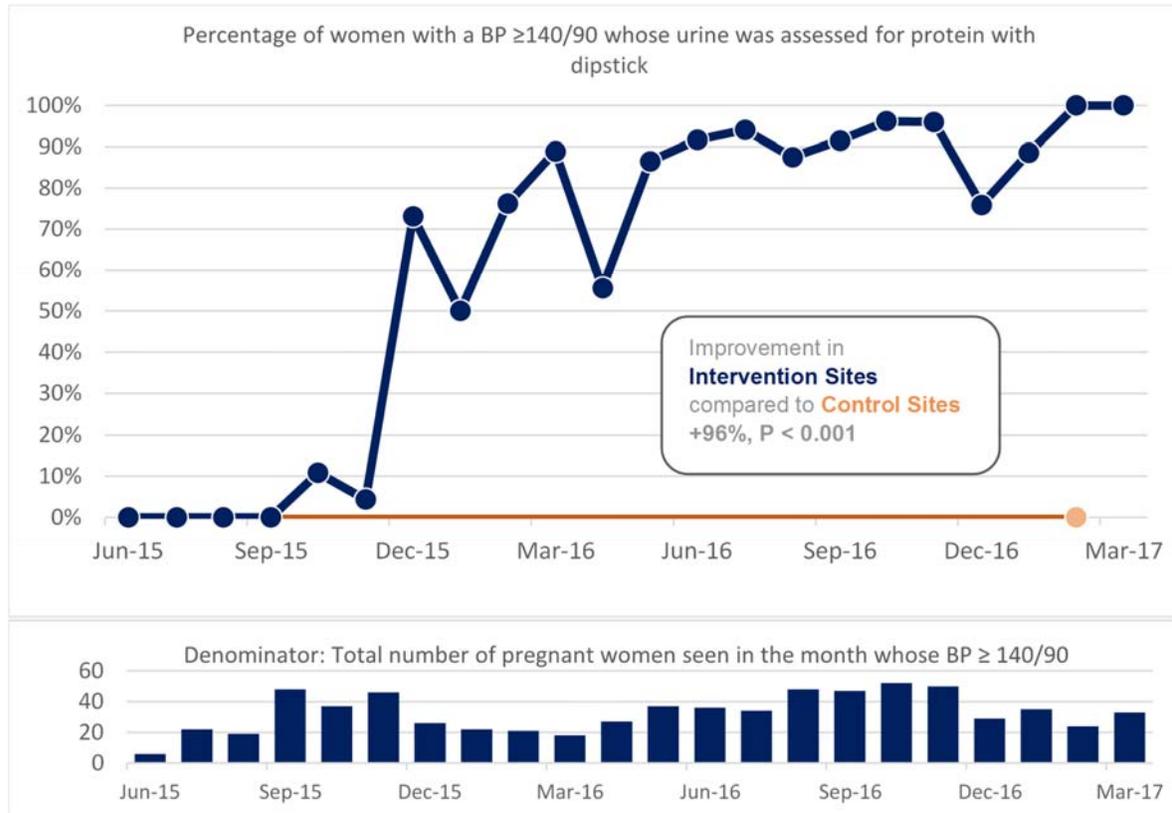
**Figure 2. Model for Improvement**



### Improvements achieved in preeclampsia/eclampsia care

By the end of the improvement intervention, the 10 implementation sites had all achieved strong gains in improving preeclampsia/eclampsia screening, diagnosis, and management. Specifically, intervention facilities saw an improvement in the measurement of blood pressure (BP) for women attending ANC (from 48% during baseline to 98% during end line). In addition, as seen in **Figure 3** in the percentage of women with BP  $\geq$  140/90 who were assessed for protein in urine increased from 0% during the baseline (June-Aug 2015) to 96% during end line (Jan-Mar 2017) in the intervention facilities while remained at zero in control sites.

**Figure 3. Improvement in linking women with BP > 140/90 to urine protein testing in 10 facilities in Jinja District, Uganda (Jun 2015 – Mar 2017)**



Improvements in screening for preeclampsia resulted in a statistically significant ( $p < 0.0001$ ) increase in the percentage of preeclampsia cases diagnosed at ANC visits in the intervention facilities, from 0.1% to 0.7%. However, initial management of women diagnosed with severe preeclampsia through administration of a loading dose of MgSO<sub>4</sub> and referral to a higher-level facility (RRH, general hospital, or health center IV) did not result in significant improvement. The percentage of severe preeclampsia or eclampsia cases seen at the Jinja RRH which received correct treatment – defined as both a loading and a maintenance dose of MgSO<sub>4</sub>, the correct dose of the prescribed antihypertensive, and continuous monitoring of vitals throughout the course of care – and whose treatment was documented in the patient files rose from 4% during baseline to 98% during the end line assessment. However, due to the lack of data for this indicator in the control facilities, a conclusion on statistical significance could not be made.

QI teams tested a number of change ideas to improve early screening, diagnosis, and management of preeclampsia during antenatal care that contributed to these results. These changes are discussed in greater detail in the following sections of this change package.

### Developing the change package

In October 2016, after a year of implementation, a harvest meeting was held to identify effective changes to preeclampsia care and make recommendations for spread to other facilities. Participants from each of the 10 intervention facilities including key staff involved in the implementation of PDSA cycles and those critical to preeclampsia care provision in the antenatal clinics, maternity wards, and laboratories.

The harvest meeting was designed such that each facility was given an opportunity to share challenges, effective changes, details of implementation, and results in small group discussions organized by health sub-district level. Contents of the discussions were then compiled and presented before a plenary by a representative of each group. Poster placards were developed describing the change ideas and the results obtained for each of the main processes of preeclampsia care that

teams worked on. The posters were then grouped into the themes that were being addressed, and the change ideas were documented.

### **Use of the change package**

This change package is intended to provide other quality improvement teams that are seeking to improve early screening, diagnosis, and initial management and referral for preeclampsia/eclampsia during antenatal care with successful change ideas to consider. Teams should not necessarily replicate these change ideas but should adapt them to suit their contexts.

We recommend that teams begin by collecting data on detection, diagnosis, and management of preeclampsia from the health management information system (HMIS) patient tracking tools to assess current performance and gaps in care. Once teams have collected this data, meetings should be held to analyze factors affecting preeclampsia care and brainstorm possible solutions. Teams should use the data collected to prioritize gaps in care to address, assessing their overall impact on health outcomes, the feasibility of the brainstormed solutions, as well as their cost-effectiveness, likelihood of acceptance, and equity. Teams should refer to this change package to understand change ideas that worked to address particular gaps and should use it as a guide for testing and implementing changes.

In addition to the change ideas included in this document, we recommend that teams make an effort to ensure an adequate stock of essential supplies and equipment and focus on strengthening the following areas to support improvements in preeclampsia/eclampsia care:

- Documentation
- Team work
- Analyzing care processes and prioritizing areas for improvement
- Communicating with patients

The following sections are a compilation of the measures taken by facility QI teams to close the gaps in preeclampsia/eclampsia care and are organized by each of the four care processes identified in **Figure 1**. Each section briefly describes the reason for addressing the care process and then organizes the change ideas according to the improvement aim that they address. Similar change ideas that address a singular underlying concept, such as increasing blood pressure measurement for women attending ANC as a means for improving detection of preeclampsia, are grouped together. The tables in each section include notes on the number of sites that tested/implemented the change and the specific steps for doing so. The gap that each change idea aims to address is also included to allow new teams to identify change ideas that respond to specific barriers to improving preeclampsia/eclampsia care that they have identified at their facilities. Where possible, the change ideas in each of the tables are ordered in the sequence in which they were tested. Key change ideas that teams felt were important due to the results they yielded, gaps in services that they addressed, affordability, ease of implementation, and scalability are described in more detail in text boxes throughout the document.

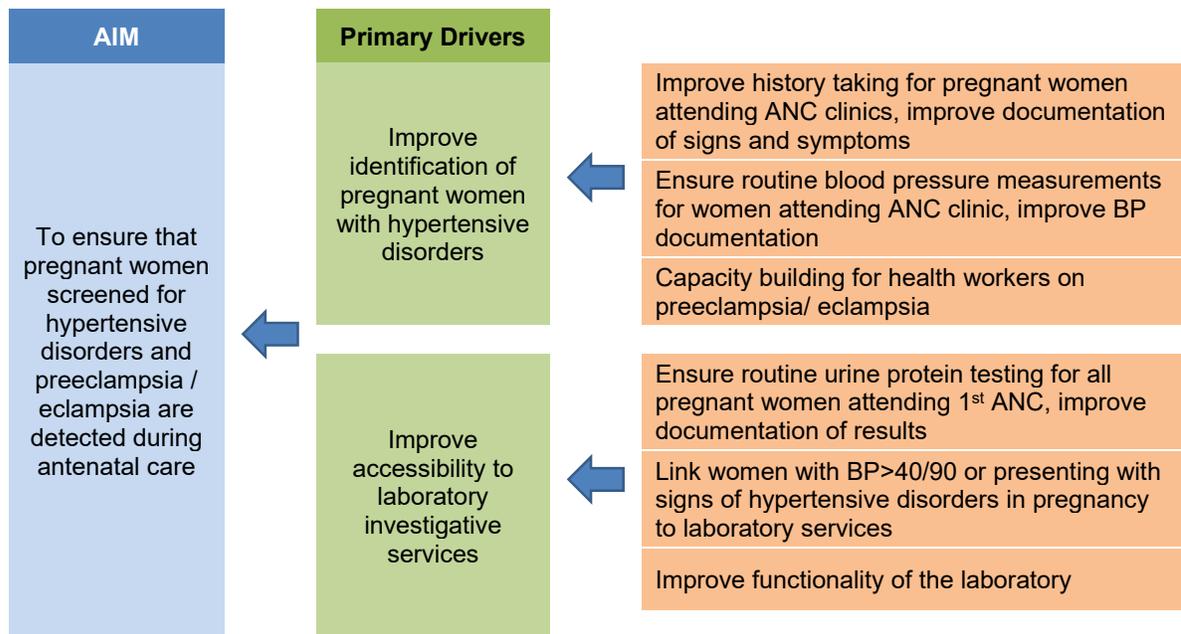
## **II. IMPROVING SCREENING AND DETECTION OF PREECLAMPSIA/ECLAMPSIA**

To screen for preeclampsia, staff must be knowledgeable about the signs and symptoms of the disease, have access to functional BP machines; have access to a functional laboratory for urine protein testing, and be able to interpret the test results for correct classification. This is described in the driver diagram in **Figure 4**. As shown in the diagram, two primary drivers were identified: blood pressure correctly measured and interpreted for each pregnant woman attending an ANC visit and mothers with a BP  $\geq$  140/90 assessed for protein in urine.<sup>2</sup> Gaps in the screening and detection of preeclampsia identified during the baseline assessment included: limited availability of functional BP machines; poor access to laboratory investigations; limited personnel skilled in antenatal care processes; and inadequate medical records (standardization, completion, quality of data), leading to poor documentation of patient information.

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<sup>2</sup> In addition to urine protein testing, teams focused on assessment of signs of neurologic, pulmonary, hepatic, renal and hematologic features (e.g., headache, blurred vision, convulsions or loss of consciousness) to diagnose preeclampsia/eclampsia, but considering availability of essential inputs and the fact that relevant signs/symptoms are not documented in the ANC registry, teams only measured progress in BP and urine protein testing.

**Figure 4. Driver diagram on increasing screening and detection of preeclampsia**



To improve screening and detection of preeclampsia during antenatal care, QI teams conducted a number of PDSA cycles designed to address the following:

- Building knowledge of the key signs of preeclampsia among all staff involved in ANC
- Ensuring that BP is measured for all pregnant women during each ANC visit
- Conducting urine protein testing at the first ANC visit for all pregnant women
- Conducting urine protein testing for all women identified as having BP $\geq$ 140/90mmHg
- Improving documentation within the national HMIS tools (both antenatal and maternity registers).

### **A. Aim 1: Improving identification of pregnant women with hypertensive disorders**

#### **1. Change Concept 1: Assessing for cardinal signs and symptoms of preeclampsia through improved history taking**

History taking is a critical step in the management of any patient seeking care at a health facility. It allows health workers to understand the background of the patient and uncover underlying reasons for the symptoms presented. However, given that the contact time between a client and a skilled health care provider is often limited by the number of clients seeking care, the range of services offered during a visit, and the total number of skilled providers available, a health worker needs to be able to quickly assess a patient for signs of preeclampsia/eclampsia (including neurologic, renal and hematologic among other signs of organ damage features), identify areas of concern in the patient's history warranting further evaluation, and tally these with the presentation of the patient during the visit to determine a course of action. History taking also provides the health worker with information on how well women are able to manage their condition on their own and their health-seeking behavior. The following change idea was tested for this change concept.

### Change idea

#### ***Build staff and student capacity on proper history taking to enhance adequate triaging for key signs of preeclampsia***

**Gaps addressed:** Limited knowledge of symptoms suggestive of preeclampsia among health care providers within MCH departments, lack of a proper triaging system, limited space and privacy for counseling, and lack of guidelines for reference on how to conduct a complete, patient-centered history taking.

#### **Change idea implementation:**

- Identify and assign a competent staff member to take the lead in orienting other staff at the health facility on how to effectively take a full patient history.
- Mentor all staff on history taking with an emphasis on the key symptoms of obstetric complications, especially in relation to preeclampsia and eclampsia, identifying high-risk women, and linking them directly to the clinicians' rooms for immediate attention.
- Develop a job aid on key signs and symptoms of preeclampsia and place it at the triage table and in the clinical rooms as a reference for care providers during history taking. Guide existing staff, students and newly posted staff on the use of the job aid.
- At the triage table, pair a competent staff member with a less competent one to further build capacity.

In addition, staff focused on:

- Asking mothers on arrival whether they had any complaints
- Triageing complaints to identify those that require immediate attention/ care
- Documenting all signs/ symptoms identified during history taking within the ANC register
- Linking women with complaints requiring immediate attention for further evaluation

This change idea was implemented in all 10 health facilities and has greatly improved identification of women presenting with symptoms suggestive of preeclampsia.

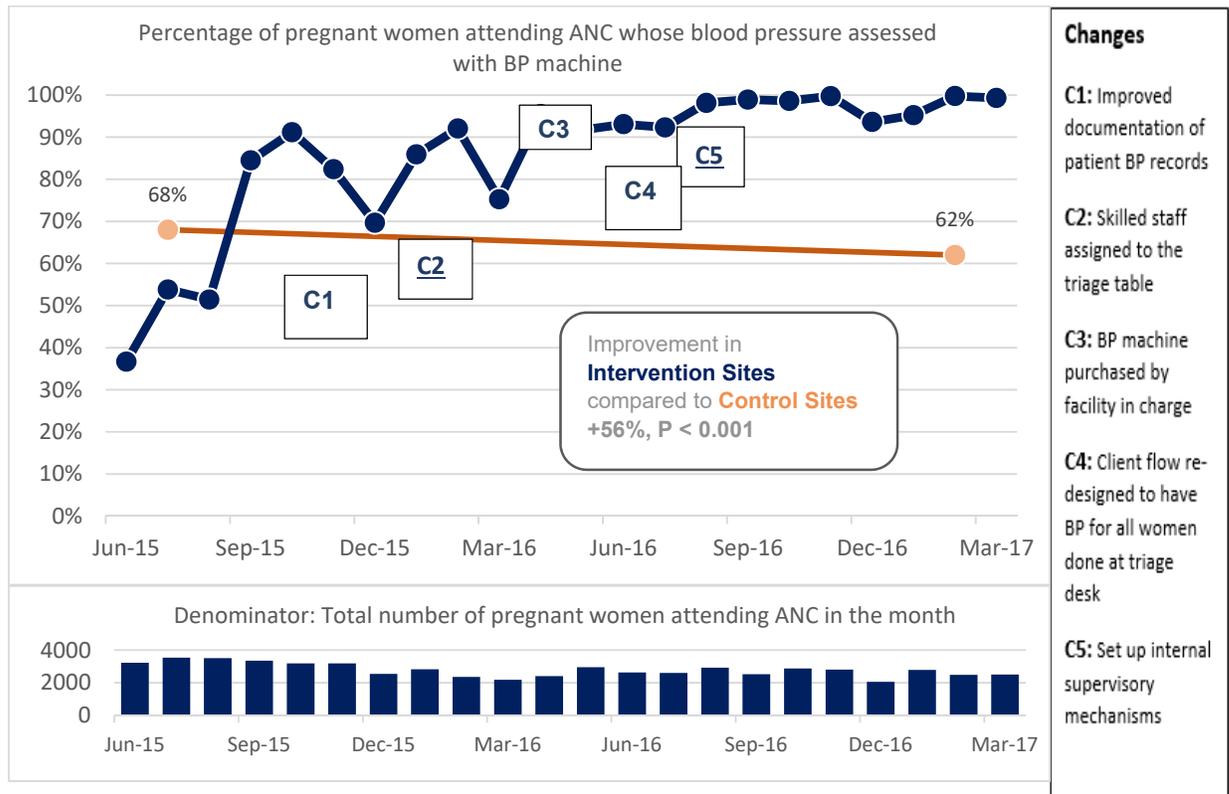
## **2. Change Concept 2: Routine blood pressure measurement for all pregnant women attending antenatal clinics**

Blood pressure measurement is one of the routine physical assessments that needs to be conducted for all patients accessing care. To ensure accurate readings, an appropriate sized BP cuff should be used, and BP should be measured after a  $\geq 10$ -minute rest. BP measurements should be taken by a skilled staff with the patient seated comfortably and relaxed in an upright posture or left lateral recumbent position with the arm at the level of the heart.

For pregnant women, blood pressure measurement is a key examination that should be done at each encounter between the client and a skilled provider. Blood pressure readings should be documented for reference and comparison at the next appointment to ascertain any abnormalities or significant deviations in the value. Blood pressure measurements should always be compared with the normal ranges. When BP measurements register  $\geq 140/90$ mmHg, the reading should be conducted again to confirm accuracy.

Teams' efforts to improve this essential measurement for detection of preeclampsia-eclampsia and other hypertensive disorders during the ANC visits in the 10 intervention facilities resulted in an increase of pregnant women whose blood pressure was taken and documented from 47% during the baseline period (March-September 2015) to 98% during end line (January-March 2017). Using a difference in differences calculation, this represents a 56-percentage point overall increase in performance in blood pressure measurement in intervention sites compared to control sites (**Figure 5**).

**Figure 5. Improvement in measurement of blood pressure during ANC visits, 10 facilities, Jinja District, Uganda (Jun 2015 – Mar 2017)**



### Key change idea (Butagaya HC III and Buwenge HC IV)

#### ***Redesigning clinic flow to have blood pressure taken with a functional BP machine by skilled personnel at triage***

**Gaps addressed:** A lack of a well-defined client flow that ensures that BP is taken for each woman attending an ANC visit. For some clients, blood pressure was taken at the triage table on arrival while for others it was taken at the end of the obstetrical examination, during other clinical examinations/ interactions, or not at all. There was also poor documentation of BP measurements within the ANC register for many women.

#### **Change idea implementation:**

1. Data on the proportion of pregnant women whose BP was taken and recorded in the ANC register was shared during QI team meetings, and the following explanations for gaps in care were discussed:
  - Lack of a specified time for BP measurement: BP taken at triage table, after obstetric examination, during other examinations, or not at all;
  - Non-functional BP machines/limited number of functional BP machines;
  - Poor/inconsistent documentation; and
  - Limited staffing and supervision.
2. QI teams then began lobbying for functional BP machines. However, the lack of a well-defined client flow continued to hinder the ability of the facility team to measure BP and record those measurements for all women within the ANC register.
3. In the next meeting, QI teams decided to change the client flow so that BP measurements for all stable pregnant women arriving at the ANC clinic would be taken at the triage table by a skilled staff member before any other service was rendered. Measurements would be recorded within the client's cards/books to be later added to the ANC register. Functional BP machines were placed at the triage table.

This change idea led to 28% - 42% more women having their blood pressure measured and recorded at Butagaya HC III and Buwenge HC IV from November 2015 to February 2016.

**Table 1** summarizes objectives, measurement indicators, change ideas, implementation details, and the progress of facilities to improve routine blood pressure measurement of pregnant women at ANC visits.

**Table 1. Summary of objectives, measurement indicators, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve routine blood pressure measurement of pregnant women at ANC visits**

**Change Concept 2: Routine blood pressure measurement for all pregnant women attending antenatal clinics**

**Improvement objective:** To increase the number of pregnant women attending antenatal clinics whose blood pressure is measured and recorded within the ANC register from 57% in September 2015 to 100% by February 2016 at the 10 health facilities within Jinja District.

**Monitoring indicator:** Proportion of pregnant women attending antenatal clinic whose blood pressure was measured and recorded in the ANC register.

Specific challenges addressed	Change idea	How the change was tested/implemented	Progress
Lack of a functional BP machine within the MCH department	Lobby for a functional BP machine from key stakeholders, for example health facilities in-charge or implementing partners	<ul style="list-style-type: none"> <li>Identify key stakeholders at the health facility</li> <li>Share challenge of non-functional BP machine with the facility in-charge</li> <li>Facility in-charge to identify other key partners and lobby for BP machine</li> </ul>	<p>Budima HC III, Budondo HC IV, Kakaire HC III and Buwenge General Hospital lobbied and obtained a functional BP machine from the facilities in-charge.</p> <p>ASSIST provided Kakaire HC III and Jinja RRH with a functional BP machine. Butagaya HC III lobbied and obtained one from a different implementing partner (TASO).</p> <p>As the result of obtained BP machine routine blood pressure measurement from 0% in Feb 2016 to 64% in Mar 2016 in Kakaire HC III.</p>
	Share the only functional BP machine	<ul style="list-style-type: none"> <li>Identify department with functional BP machine</li> <li>Request to have the BP machine stationed within the MCH department</li> <li>Share BP machine with other departments</li> </ul>	<p>This change only improved BP taking by a range of 2-10% at Buwenge HC IV, Butagaya HC III and Buwenge General Hospital during various 2-3 months of testing this change.</p> <p>At Mpumudde HC IV, this did not yield any improvements in the number of women whose BP was measured.</p>
	Have a backup plan for BP machines. Encourage students and staff to bring their own BP machine	<ul style="list-style-type: none"> <li>Encourage student nurses and staff to bring their own BP machine to leverage on existing resources</li> <li>Have BP machines standardized so they give accurate readings</li> </ul>	<p>This was implemented at Jinja RRH to address the low proportion of BP machines per mother attending antenatal care.</p> <p>Waiting time for BP measurement at the triage point decreased because of this change idea.</p>
Lack of skilled personnel at the ANC booking/	Assign skilled personnel to be part of the team at the reception/ booking table	<ul style="list-style-type: none"> <li>Identify skilled personnel</li> <li>Draw a duty allocation schedule to include BP taking as one of the daily duties</li> </ul>	<p>This was tested and implemented at Mpumudde HC IV, Budondo HC IV, Jinja RRH and Buwenge HC IV.</p> <p>At Mpumudde, Budondo and Jinja RRH improvements ranged</p>

Specific challenges addressed	Change idea	How the change was tested/implemented	Progress
reception table	on a daily basis	<ul style="list-style-type: none"> <li>Assign skilled staff each day to the reception table</li> <li>Communicate to the staff at the end of each clinic day or beginning of the week on duty allocation</li> </ul>	from 24% - 48% from Jul-Aug 2016. At Buwenge HC IV, a 10% increase was noted during the same period.
Mothers' BP not taken or taken after obstetric examination	Re-design client flow to have BP taken prior to obstetric examination	<ul style="list-style-type: none"> <li>Review the process of BP taking including the timing</li> <li>Re-arrange client flow to have BP taken for all pregnant women attending antenatal clinic at the point of registration</li> <li>Create a triage table and assign staff to manage the activities at the table</li> </ul>	Implemented at Buwenge HC IV. BP measurement by implementing this change improved by 42% from Nov 2015 to Feb 2016.
Heavy workload	Task shift BP taking	<ul style="list-style-type: none"> <li>Identify staff that are redundant</li> <li>Mentor them on BP taking technique</li> <li>Assign them the duty task of working with students at the triage table to take BP</li> </ul>	Implemented at Jinja RRH and resulted in improvement of BP taken and recorded between 62% to 100% within one month (Dec-2015-Jan 2016) and sustained above 80% during remaining intervention period (Jan 2016-Mar 2017).
	Lobby for additional staff from the administration	<ul style="list-style-type: none"> <li>Staff should engage the facility in charge to increase the staffing within the MCH clinics by staff shifts from less heavy areas to busy areas</li> </ul>	Jinja RRH was still awaiting allocation of additional staff at the time the activity ended.

### 3. Change Concept 3: Improving data completeness of clients' BP recording within the ANC registers

Given the importance of blood pressure measurement for pregnant women, BP measurements need to be documented within the recommended registers for reference and comparison during future visits to ascertain abnormalities or significant deviations in value. Blood pressure measurements should always be compared with normal ranges and in instances of BP  $\geq$  140/90mmHg should be retaken to confirm the accuracy of the reading. At baseline, health facility staff reported that they carried out BP measurement for all women attending ANC, however the BP column of the antenatal registers was often incomplete pointing to a gap in recording BP measurements. **Table 2** summarizes objectives, measures, change ideas, implementation details, and the progress of facilities to improve completeness of documenting BP measurement results in the ANC registers.

**Table 2. Summary of objectives, measures, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve completeness of documenting BP measurement results in the ANC registers**

<b>Change Concept 3: Improve completeness of BP recordings within the ANC register</b>			
<b>Improvement objective:</b> To improve documentation of BP measurement results within the ANC register from 57% in September 2015 to 100% by February 2016 at the 10 health facilities within Jinja District.			
<b>Monitoring indicator:</b> Proportion of ANC visits with BP recordings documented in the month.			
<b>Specific gaps addressed</b>	<b>Change idea</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Missing parameters within the register  ANC registers not reviewed for completeness or accuracy	Mentoring staff on completion of the parameters within the ANC register	<ul style="list-style-type: none"> <li>Obtain a copy of the register used to document patient level information</li> <li>Identify and assign a staff knowledgeable on the use of the existing tools/ registers to document client information</li> <li>Identify a practical antenatal case study on the day of the mentorship</li> <li>Carry out a practicum with the staff on how to update the register using the guidance provided on the front page of the register</li> <li>Crosscheck staff understanding and give a chance for questions and clarifications.</li> <li>Refer staff to the job aid for reference during the use of the register</li> </ul>	<p>This change was tested in Mpumudde HC IV and Budima.</p> <p>The change was then implemented at Buwenge HC IV, Budondo HC IV, Lukolo HC III, Kakaire HC III and Magamaga HC III.</p> <p>At Mpumudde HC IV, the change did not yield any improvements in BP measurement as some staff/students missed the mentorship sessions. Mpumudde HC IV saw a decline in BP measurement of between 73%-47% from December 2015 to Jan 2016. The other sites saw better results as more staff were able to attend the mentorship sessions.</p>
Missing BP measurements within the registers even when the staff report having taken BP for all the women attending ANC	Assigning skilled staff daily to oversee documentation of BP measurements within the ANC register	<ul style="list-style-type: none"> <li>Review duty roster to ascertain staff number and cadre present on a specific day</li> <li>Assign staff to supervise documentation of patient vitals and BP within the ANC register during the course of the clinic</li> <li>Once a gap was identified, staff were given one-on-one mentorship on the spot on the need to document BP and students were assigned the duty of updating the ANC register with patient information just before the patient leaves</li> </ul>	<p>This change was tested and implemented by Buwenge General Hospital. It was subsequently modified and spread to four additional facilities (see change idea below).</p>
	Setting up regular records review by a skilled provider/	<ul style="list-style-type: none"> <li>Identify staff knowledgeable on use of the ANC register</li> <li>Assign staff to review the register at the end of the clinic or the following day prior to the start of the clinic session</li> </ul>	

Specific gaps addressed	Change idea	How the change was tested/implemented	Progress
	records' personnel	<ul style="list-style-type: none"> <li>Give staff feedback on the findings within the register</li> <li>Hold a refresher training for all staff on the identified gaps in the register</li> </ul>	<p>Mpumudde HC IV and Budima HC III.</p> <p>Completeness of BP taken and documented with the ANC register improved from 51% in August 2015 to an average of 95% in April 2016 in 10 supported facilities.</p>
<p>Missing BP records within the ANC register</p> <p>Some women would get clinical examination before vitals were taken</p> <p>ANC register at some facilities was updated as service was being delivered</p>	Re-design the ANC clinic client flow to have documentation of the mothers' information done at the end of the clinical session	<ul style="list-style-type: none"> <li>Inform mother on the change in the clinic flow and to go at the triage table to measured</li> <li>Take vital signs of the antenatal women at the triage table</li> <li>Write finding within the mother's book</li> <li>Let the mother access care at the different service delivery points within the clinic with the staff writing details in the ANC card (so called "Mother's booklet") given to pregnant women including any medications prescribed</li> <li>After all sessions have been conducted, call the mother to the designated place where the register and medicines are placed</li> <li>Request mother's hand-held book (ANC card) and update the register with her information</li> <li>Once information is updated in the register, return the hand-held book to the mother reminding her of her return date and send her home</li> </ul>	<p>This change was implemented successfully in Butagaya HC III.</p> <p>Documented BP within the register improved from 54% (80/147) in June 2016 to 100% (122/122) in July 2016.</p>

#### 4. Change Concept 4: Building capacity for health workers in screening and detection of pre-eclampsia for the health workers

**Table 3** summarizes objectives, measurement indicators, change ideas, implementation details, and the progress of facilities to improve routine blood pressure measurement of pregnant women at ANC visits.

**Table 3. Summary of objectives, measurement indicators, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve capacity of health workers to routine measure blood pressure among pregnant women at ANC visits**

**Change Concept 4: Capacity building for health workers in screening of preeclampsia**

**Improvement objective:** To increase the number of pregnant women attending antenatal clinics whose blood pressure is measured and recorded within the ANC register from 56.7% in September 2015 to 100% by February 2016 at the 10 health facilities within Jinja District.

**Monitoring indicator:** Proportion of pregnant women attending antenatal clinic visits whose blood pressure was measured and recorded in the ANC register.

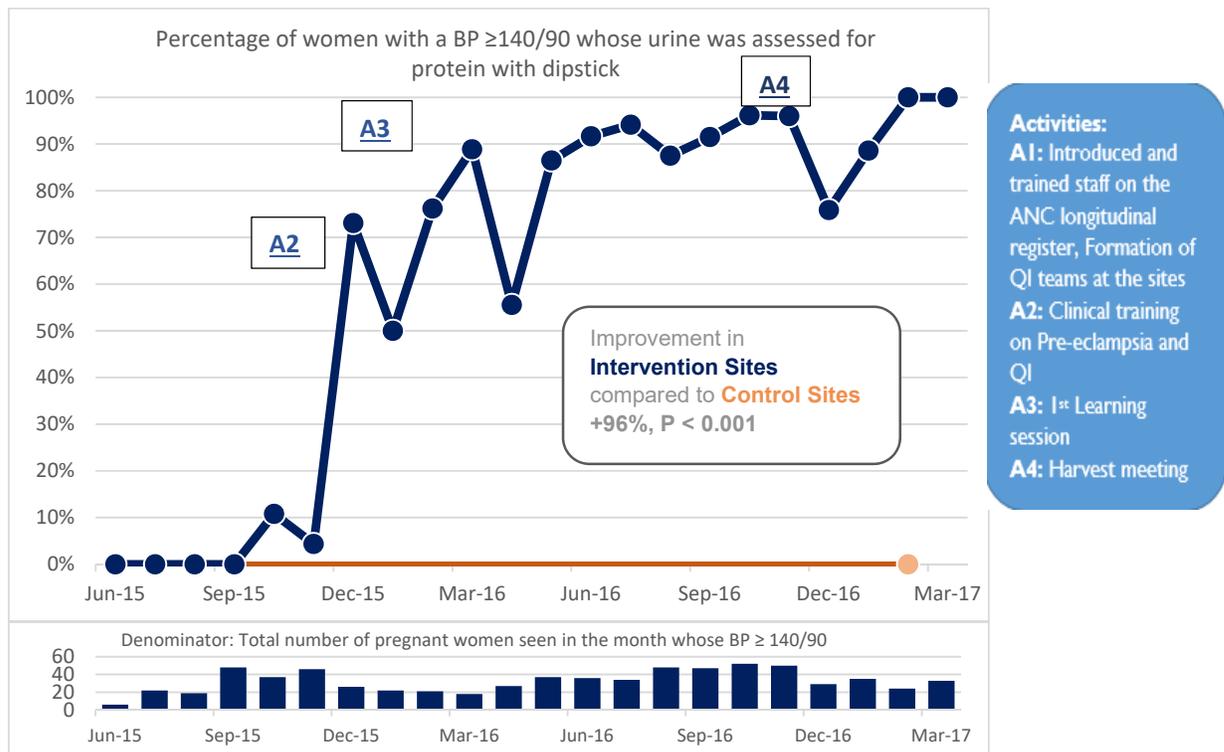
Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
Skills gap among staff and students on BP taking	Build staff capacity on BP measurement skills	<ul style="list-style-type: none"> <li>Mentor staff on procedure of correct BP taking</li> <li>Assign a staff to carry out routine capacity building sessions for the students and new staff</li> <li>Carry out one-on-one mentorship sessions for students</li> </ul>	Implemented at Mpumudde and Jinja RRH. At Mpumudde HC IV, a 24% increase in BP being measured and documented was noted (March 2016-April 2016) while only a 1% increase was registered at Jinja RRH during the same period.
Knowledge gap on BP cut offs for further screening the disease	Orient staff on BP cut offs for pregnant women	<ul style="list-style-type: none"> <li>Mentor staff on BP ranges and cut off values for hypertensive disorders in pregnancy</li> <li>Create a job aid on BP cut-offs and pin it on the clinician's desk or walls for reference</li> <li>Remind staff of the importance of referring to the job aid</li> </ul>	This was implemented at all 10 health facilities. Between 20-40 more women with high BP were identified each month, on average, as compared with the baseline value (6 women, June 2015).
Negative attitude among staff towards routine BP taking	Emphasize the importance of BP taking among staff in the ANC clinic	<ul style="list-style-type: none"> <li>Provide staff with information about the importance of BP measurement for pregnant women</li> <li>Share quick results on BP taking and any cases of preeclampsia identified with staff at the end of the clinic day and/or week</li> <li>Regularly acknowledge staff for improvements made in BP taking</li> </ul>	Implemented at Magamaga, Buwenge HC IV and Jinja RRH. BP measurement improved between 14 % - 38% at Magamaga and Jinja RRH during December 2015- January 2016. At Buwenge HC IV, no improvement in BP taking was noted for the month following implementation of the change. The MCH department in-charge continues to advocate for the importance of BP taking.

Through implementation of the changes listed above, the 10 intervention facilities saw an improvement in routine BP measurement from October 2015 – October 2016. During this period, a total of 5,132 (14%) women attending ANC were identified through history taking as being at risk of developing preeclampsia, all of whom had their BP measured. Of the 35,223 total ANC attendees at the 10 health facilities, 451 (1.2%) women were identified as having high BP  $\geq$  140/90mmHg. 70% (315/451) of these women were linked to the laboratory for urine protein analysis.

## B. Aim 2: Improve urine protein measurement among eligible pregnant women<sup>3</sup>

Linking pregnant women with high blood pressure to laboratory services for urine protein measurement was identified as one of essential gaps in the detection of preeclampsia and eclampsia<sup>4</sup>. **Figure 6** summarizes the main changes tested and implemented by facility teams and the results of these efforts based on routine monitoring and retrospective, controlled, non-randomized assessment at the baseline and end line. Specifically, the data reveal a statistically significant ( $p < 0.0001$ ) increase in the percentage of women with a BP  $\geq 140/90$ <sup>5</sup> who were linked to urine protein testing from 0% during the baseline (Jun-Aug 2015) to 96% during end line (Jan-Mar 2017) in the intervention facilities. No improvement was seen in the control facilities (**Figure 6**).

**Figure 6. Improvement in linking women with BP  $\geq 140/90$  to urine protein testing, 10 facilities, Jinja District, Uganda (Jun 2015 – Mar 2017)**



### 1. Change Concept 1: Routine urine protein testing for all pregnant women attending antenatal visit with BP $\geq 140/90$ mmHg

According to Uganda's Focused ANC Protocol, testing urine for protein is recommended for all pregnant women attending antenatal care visits for those with BP  $\geq 140/90$ mmHg.<sup>6</sup> Urine protein testing using a dipstick is an easy investigation that can be performed by any health care provider, although interpreting the results can be challenging. Nine health facility teams introduced urine protein

<sup>3</sup> Women at the first ANC visit and those after 20 weeks of gestation whose BP either systolic or diastolic is  $\geq 140/90$  mmHg at current or previous visit

<sup>4</sup> In addition to urine protein testing, teams focused on assessment of signs of neurologic, pulmonary, hepatic, renal and hematologic features (e.g., headache, blurred vision, convulsions or loss of consciousness) to diagnose preeclampsia/eclampsia, but considering availability of essential inputs and the fact that relevant signs/symptoms are not documented in the ANC registry, teams only measured progress in BP and urine protein testing.

<sup>5</sup> According to WHO guidance, diagnosis of mild preeclampsia is made after 20 weeks of gestation with systolic BP  $\geq 140$  and/or diastolic BP  $\geq 90$  mmHg and proteinuria 2+ on dipstick without any severe features present, such as neurologic, pulmonary, hepatic, renal, and hematologic.

<sup>6</sup> Given the priority of this risk group, routine monitoring of urine protein measurement was focused on pregnant women whose systolic or diastolic BP was greater than equal to 140 and 90mmHg, respectively.

testing for women with BP  $\geq$  140/90mmHg. Jinja RRH did not work on this change concept due to a lack of availability of urine dipsticks.

#### **Key change idea implemented in nine intervention facilities**

##### ***Link all eligible pregnant women to laboratory investigative services for urine protein.***

**Gaps addressed:** Midwives not sending women whose BP  $\geq$  140/90mmHg at the current or prior ANC visit to the laboratory for urine testing; Limited accessibility to laboratory services (Laboratory not in service for 24 hours/ 7 days a week despite ANC services being available).

##### **Change implementation:**

1. Emphasized that women whose BP  $\geq$  140/90mmHg were to be identified and sent to the laboratory with a lab request for urine protein testing. However, the change that were initially tested in three facilities resulted in increased waiting time at the laboratory and the ANC clinics and was hindered by the occasional inaccessibility of the laboratory. As a result, the change idea was modified to introduce urine protein testing within the ANC clinics.
2. Urine protein testing was integrated within the MCH/ ANC clinics through creation of minilabs.
  - Midwives were trained on urine dipstick testing and result interpretation in a practicum session conducted by the laboratory personnel and a specific staff member was assigned on a daily basis to conduct urine protein testing using urine dipsticks.
  - Space within MCH/ANC clinic was created for urine testing and stocked with urine containers and dipsticks allocated to the MCH department by laboratory personnel.
  - Once a woman whose BP  $\geq$  140/90mmHg was identified, she was given a urine container and told to bring back a sample. A midwife trained on dipstick testing and interpretation then tested the sample at the minilab and immediately interpreted the results. As a result of this modification, urine protein testing among women with BP  $\geq$  140/90mmHg increased from 4% to 73% within one month (Nov-2015-Dec 2015).

**Table 4** summarizes objectives, measurement indicators, change ideas, implementation details, and the progress of facilities to improve urine protein measurement for women whose BP  $\geq$  140/90mmHg at the ANC visit.

**Table 4. Summary of objectives, measurement indicators, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve urine protein measurement for women whose BP  $\geq$  140/90mmHg at the ANC visit**

**Change Concept 1: Improve routine urine protein testing for all pregnant women attending the 1<sup>st</sup> antenatal clinic and those with high BP  $\geq$ 140/90mmHg**

**Improvement objective:** To increase the number and % of pregnant women attending ANC visit with BP  $\geq$  140/90mmHg whose urine was tested for urine protein and recorded in the ANC register.

**Monitoring indicator:** Number and proportion of pregnant women attending ANC visit with BP  $\geq$  140/90mmHg whose urine was tested for urine protein and recorded in the ANC register.

**Monitoring indicator:** Proportion of pregnant women attending antenatal clinic with high BP  $\geq$  140/90 whose urine was tested for urine protein and recorded in the ANC register.

Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
Knowledge gap on the goal-oriented Focused ANC Protocol	Orient staff on the investigations to be done for eligible pregnant women with high BP	<ul style="list-style-type: none"> <li>Obtain a copy of the Focused ANC Protocol. Hold a mentorship session at the health facility and take the staff through the protocol, highlighting areas that the staff need to include in the client flow at the health facility</li> <li>Emphasize importance of urine protein testing for mothers with BP <math>\geq</math>140/90mmHg</li> </ul>	Tested successfully at Buwenge HC IV, Magamaga HC III Budima and Kakaire HC III. The improvement ranged from 20%-67% during Oct-Nov 2015 in these facilities.
Staff forget to send eligible women to the laboratory for urine protein investigations	Place a reminder on the clinicians' desk on sending women with high BP for urine protein testing	<ul style="list-style-type: none"> <li>Write out a reminder to staff on who to send for urine protein testing</li> <li>Place the reminder on the clinical desk</li> </ul>	Tested and successfully implemented at one health facility (Kakaire HC III) resulting in 100% of 1 <sup>st</sup> ANC women sent to the lab (Mar 2016).
Limited accessibility to laboratory services (Laboratory not in service for 24 hours/ 7 days a week despite ANC services being available).	Create mini-labs within the ANC clinic	<ul style="list-style-type: none"> <li>Midwives were trained on urine dipstick testing and result interpretation in a practicum session conducted by the laboratory personnel and a specific staff member was assigned on a daily basis to conduct urine protein testing using urine dipsticks</li> <li>Space within MCH/ANC clinic was created for urine testing and stocked with urine containers and dipsticks allocated to the MCH department by laboratory personnel</li> <li>Once an eligible woman was identified, she was given a urine container and told to bring back a sample. A midwife trained on dipstick testing and interpretation then tested the sample at the minilab and immediately interpreted the results.</li> </ul>	Implemented in six facilities. As a result of this change, an average of 89% of women attending their first ANC visit were tested for urine protein (March 2016) in project supported facilities, up from 50% (January 2016).

## 2. Change Concept 2: Improving functionality of the laboratory services for all pregnant women attending antenatal care visits through implementing a 24/7 accessibility policy to laboratory services

Laboratory investigations are essential to guiding the diagnosis of a number of medical conditions in pregnant women and the population at large. To maximize the benefits of laboratory investigations, the laboratory must be able to carry out its activities efficiently and effectively. To do this the laboratory must:

- Be accessible 24/7
- Have all the required inputs to carry out needed investigations (e.g., reagents, containers, kits, gloves, etc.)
- Have competent and qualified staff
- Have quality testing procedures
- Have a procedure for timely delivery of results to the original department/ clinician

Most of the laboratories in the collaborative experienced gaps in proper functioning including limited and inconsistent availability of inputs and supplies, limited accessibility, poor testing procedures, poor technical competence, and delayed delivery of client results. The following are change ideas that the facility teams tested to address these gaps.

### Key change idea

#### ***Creating and functionalizing laboratory services within the Maternal Child Health (MCH) section at Lukolo HC III.***

**Gaps addressed:** Laboratory services at Lukolo HC III were located 300m from the MCH clinic, where ANC services were provided. Women sent to the laboratory would be required to wait a long-time due to the high volume of lab requests and the distance between the laboratory and the MCH clinic. Delivery of results was often delayed.

#### **Change implementation:**

1. Lobby the in-charge of the facility to accept introduction of laboratory services within the MCH clinic
2. Create space within the MCH clinic for a minilab
3. Carry out on-the-job training for midwives on urine protein testing
4. Equip the mini-laboratory with the necessary basic supplies (e.g., microscopes, slides, reagents etc.)
5. Laboratory personnel was assigned to the minilab within the MCH department to carry out a wide range of investigations. Midwives also carried out tests when lab personnel were not available.

As a result, urine protein testing among pregnant women with high BP at the Lukolo HC III increased from initial 0% in Oct 2015 to 100% in Jan 2016 and was sustained since then for most of the months until the end line (March 2017). The mini-laboratory currently carries out basic investigations necessary for ANC care including testing for malaria, syphilis, and HIV in addition to urine protein.

**Table 5** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through implementing a 24/7 accessibility policy to laboratory services.

**Table 5. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through implementing a 24/7 accessibility policy to laboratory services**

<b>Change Concept 2: Improve functionality of laboratory services for all pregnant women attending antenatal care through implementing a 24/7 accessibility policy to laboratory services</b>			
<b>Specific challenge addressed</b>	<b>Change tested and sites that tested/ implemented the change</b>	<b>Details on change testing/ implementation</b>	<b>Progress</b>
Laboratory is not always accessible when needed.	Involve lab personnel in the improvements within MCH Department	<ul style="list-style-type: none"> <li>• Hold a meeting with the staff working within the MCH department and the laboratory to address limited accessibility and coordination with lab services</li> <li>• Share challenges faced by clients in accessing laboratory services at the health facility including timely delivery of test results to the MCH department</li> <li>• Share information on the importance of laboratory investigations especially urine protein testing for pregnant women</li> <li>• Request cooperation from the laboratory staff in increasing access to laboratory investigation. Continuously engage the laboratory staff in increasing accessibility.</li> </ul>	Implemented in Budondo, Buwenge, Budima, Butagaya HCs. Laboratory personnel were happy to be part of the improvements in maternal health care.
	Improve coordination and communication between the lab and the MCH department	<ul style="list-style-type: none"> <li>• Work with the laboratory staff to identify a someone to be part of the QI team</li> <li>• Assign specific role on the QI team for the person seconded from the laboratory</li> <li>• During QI team meetings, share updates including results on the improvement projects and the challenges related to the laboratory</li> <li>• Request the contact person debrief other members within the laboratory</li> </ul>	Implemented in 3 HC IVs; 2 HC IIIs, Jinja RRH. Eventually all facilities co-opted laboratory staff onto their QI team. For lower-level health centers, all laboratory staff were able to be included in the QI team and attend the meetings given the limited number of staff at these health facilities.
	Introduce urine protein testing within the MCH department	<ul style="list-style-type: none"> <li>• Staff within the ANC clinic were trained by the laboratory technician on how to test urine using a dipstick and interpret results</li> <li>• The duty roster was revised to have a recently trained staff paired with one that didn't receive training to build capacity on urine testing</li> <li>• Urine testing supplies (urine dipstick and specimen containers) were allocated to the MCH department and placed with the supplies for HIV testing</li> </ul>	Tested successfully at Magamaga and Budima HCs. At Budondo HCIV (December 2015-January 2016), a decline from 100% to 0% was noted due to stock-out of urine dipsticks in January. This change was later implemented at all the facilities although it was not sustained at the Jinja RRH.

**Table 6** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through improving availability of laboratory supplies and commodities.

**Table 6. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through improving availability of laboratory supplies and commodities**

<b>Change Concept 3: Improve functionality of the laboratory services for all pregnant women attending antenatal care through improving availability of laboratory supplies and commodities</b>			
<b>Specific challenges addressed</b>	<b>Change idea</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Availability of necessary laboratory supplies and commodities	Ration urine strips and create a space in the lab for storage of urine strips	<ul style="list-style-type: none"> <li>Identify space within the lab and allocate it to supplies for the MCH department</li> <li>Upon receipt of additional supplies ration what goes to the MCH department depending on previous consumption</li> <li>Count off and store supplies for MCH within the designated stores</li> </ul>	This was implemented in Buwenge General Hospital as a way of maintaining supplies for the MCH department. This change requires that supplies are taken from the designated MCH space only for use with a pregnant woman.
	Liaise and lobby for additional lab commodities from implementing partners and stakeholders	<ul style="list-style-type: none"> <li>Share challenges in improving service delivery due to lack of lab commodities with implementing partners</li> <li>Maintain contact with the focal person responsible for laboratories with the implementing partners</li> <li>Request commodities once a shortage is realized</li> </ul>	Implemented in Kakaire, Lukolo, and Mpumudde HCs. This is not considered a sustainable change given that implementing partners may not be able to keep supplying a buffer stock.
	Assign MCH staff to the lab logistics requisition team to provide accurate forecast and requisition for adequate stock of urine dipsticks	<ul style="list-style-type: none"> <li>Identify and assign a staff responsible for store management within the MCH department to participate on lab logistics team</li> <li>Assigned staff to share data on utilization of urine dipstick including average number of ANC attendances</li> </ul>	Implemented in Budondo and Buwenge HC IVs. Data on monthly urine dipstick consumption was shared with the laboratory in-charge and was used to ration the proportion of dipsticks that were allocated to the ANC clinic once a consignment was received.
	Leverage existing resources, for example those designed to increase access to services (e.g., voucher projects)	<ul style="list-style-type: none"> <li>Identify existing opportunities for improving maternal health</li> <li>Determine components within the identified opportunities that can be used to support improvements in availability of critical commodities. For example, The Uganda Reproductive Health Voucher Project implemented by Marie Stopes International has a component for increasing availability of supplies and commodities for MCH.</li> </ul>	Implemented in Lukolo, Kakaire, Budondo and Buwenge HCs. This change idea reduced stock outs at the health facility since the facility had alternative avenues to purchase essential supplies. This resulted in facilities having on average one container of urine dipsticks in stock.

Specific challenges addressed	Change idea	How the change was tested/implemented	Progress
	Acquire specimen containers from nearby facilities	<ul style="list-style-type: none"> <li>Identify facilities with sufficient urine containers in stock</li> <li>Write a supplies requisition through the facility in-charge</li> <li>Assign a staff member to deliver the requisition to the nearby health facility</li> <li>Once the urine containers are obtained, hand them over to the laboratory</li> </ul>	Implemented by Jinja RRH, Budondo HC IV. A total of 15 additional containers were received by these facilities from nearby health centers.
	Reuse specimen containers	<ul style="list-style-type: none"> <li>Identify and designate a place for decontamination of used specimen containers within the ANC clinic</li> <li>Obtain buckets and decontaminants for decontamination of urine containers</li> <li>Decontaminate the used urine containers</li> <li>Air-dry the containers</li> <li>Keep the decontaminated containers in a clean environment</li> </ul>	Implemented in Butagaya HC III. After implementation of the change in August 2016, urine testing increased and has been sustained at 100% level during the remaining intervention period (September 2016-March 2017). This change idea was implemented after the laboratory realized that other means for restocking specimen containers were not working.
	Improvise urine containers by using sputum containers, medicine cups, etc.	<ul style="list-style-type: none"> <li>Look for alternative containers within the laboratory</li> <li>Engage the laboratory staff to ascertain feasibility of using alternative containers to collect urine samples</li> <li>Clean and decontaminate the containers after use to make them readily available for reuse, thus maintain a regular flow of containers</li> </ul>	Tested and implemented successfully in Budima, Butagaya, Budondo and Jinja RRH. This change, initially started and succeeded in Budima HCIII was successfully spread to six other health facilities to sustain improvements in urine protein testing.

**Table 7** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through reducing waiting time at the laboratory

**Table 7. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through reducing waiting time at the laboratory**

**Change Concept 4: Improve functionality of laboratory services for all pregnant women attending antenatal care through reducing waiting time at the laboratory**

Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
Long waiting time at the laboratory	Escort mothers with high BP to the lab	<ul style="list-style-type: none"> <li>Mentored staff on BP cut-offs and who should be linked to the laboratory for urinalysis</li> </ul>	Tested at 3 HCs. In Buwenge, waiting time for mother at the laboratory reduced from 1 hour to an average of 15 minutes on

Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
		<ul style="list-style-type: none"> <li>Upon taking BP, staff at the triage table identified women with high BP <math>\geq 140/90</math>mmHg</li> <li>Assigned a junior staff or student to escort the mother to the laboratory</li> <li>Explained to the lab personnel the client's history and the need for urine protein test</li> </ul>	average. At Budondo HC IV, this change was not sustainable given that at times there were no available staff to escort the women. As a result, the facility introduced a card system (see change idea below).
	Introduce a card system for mothers going to the laboratory	<ul style="list-style-type: none"> <li>Write out numbered cards for women with high BP</li> <li>Discuss and agree with laboratory staff that women with numbered cards will be given priority</li> <li>Hand out numbered cards to women requiring urinalysis (those with BP <math>\geq 140/90</math>mmHg)</li> <li>Send eligible women to laboratory for urine protein investigations.</li> </ul>	This was tested and implemented in Budondo HC IV after failing to sustain the change idea of escorting pregnant women to the laboratory. Women with high BP whose urine was tested for protein increased to 100% (April 2016) from 50% in March 2016.
	Introduce urine protein testing within MCH department to reduce waiting time for women at the laboratory.	<ul style="list-style-type: none"> <li>Staff within the ANC clinic were trained on-the-job by the laboratory technician on how to test urine using a dipstick and interpret results</li> <li>The duty roster was revised to have a recently trained staff paired with one who did not receive training to build capacity on urine testing.</li> <li>The facility allocated urine testing supplies (urine dipstick and specimen containers) to the MCH department. Urine testing supplies were included among those at the HIV testing point within the ANC clinic.</li> </ul>	<p>Tested successfully at Magamaga and Budima HCs. At Budondo HCIV (Dec 2015-Jan 2016), a decline from 100% to 0% was noted due to stock-out of urine dipsticks in January.</p> <p>This change was later implemented at all the facilities although it was not sustained at the Jinja RRH.</p>

**Table 8** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through improving technical competence of laboratory personnel.

**Table 8. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through improving technical competence of laboratory personnel**

**Concept 5: Improve functionality of laboratory services for all pregnant women attending antenatal care through improving technical competence of laboratory personnel**

Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
Technical competence of laboratory personnel	Build staff skills in use of urine dipsticks	<ul style="list-style-type: none"> <li>Liaise with the in-charge of continuing medical education (CME)</li> <li>Share the topic for inclusion on the schedule of topics</li> <li>Identify a day and assign a staff to lead the CME session. Combine both</li> </ul>	Orientation was done at all 10 health facilities.

Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
		theory and practicum on urine protein testing	
	Build staff capacity to accurately interpret urine test results	<ul style="list-style-type: none"> <li>Obtained urine samples and urine dipsticks for capacity building exercise</li> <li>Laboratory staff conducted a practicum on urine testing and result interpretation for the MCH staff</li> <li>Each MCH staff member was given a chance to carry out a urine protein test and write down the interpretation</li> <li>Each staff's interpretation and the results slip were shared with the rest of group so that the interpretation could be evaluated and discussed.</li> <li>The laboratory personnel then granted clearance for the staff on use of the dipstick</li> </ul>	<p>Implemented in Magamaga and Kakaire HC IIIs.</p> <p>Staff within the ANC department gained sufficient skills to introduce urine testing within the ANC department and was able to routinely perform urine protein testing.</p>

**Table 9** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through improving documentation of laboratory results.

**Table 9. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve functionality of the laboratory services for all pregnant women attending antenatal care visits through improving documentation of laboratory results**

Change Concept 6: Improve functionality of the laboratory services for all pregnant women attending antenatal care through improving documentation of laboratory results			
Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
Lack of documented laboratory results	Identify and agree on the place within the register to document urine test results	<ul style="list-style-type: none"> <li>Review the existing ANC HMIS tool/register</li> <li>Identify and agree on the place within the register to record urine test results</li> <li>Draw a column within the integrated ANC register</li> <li>Communicate the idea to each MCH care provider at the health facility. Train staff on what and how to document urine results within the column in the revised ANC register.</li> </ul>	<p>Tested in Buwenge HC IV. Urine testing among pregnant women with high BP increased from 0% in Sept 2015 to 33% in Oct 2015.</p> <p>The change was implemented by the remaining 9 health facilities by adapting the integrated ANC register that was already in existence in all facilities.</p>
	Build staff capacity to document urine results within the ANC registers	<ul style="list-style-type: none"> <li>Identify staff who are competent in using the ANC registers</li> <li>Allocate a day and time for the identified trainer to provide training to the rest of the MCH department on the ANC register</li> <li>Use the job aid to guide staff through the process of updating the register</li> </ul>	Implemented at all the 10 health facilities.

Specific challenge addressed	Change idea	How the change was tested/implemented	Progress
		<ul style="list-style-type: none"> <li>Hold a practical session on how to fill in the results from the urine protein testing. Assign another competent staff member to oversee the documentation of urine protein results within the register on an ongoing basis.</li> </ul>	
	Update ANC register with urine test results from laboratory register before close of clinic activities	<ul style="list-style-type: none"> <li>Assign staff to oversee updating of the register.</li> <li>Immediately update the ANC register with urine test results from the laboratory.</li> <li>Before close of clinic activities, get assigned staff to check and compare urine test results in the lab register and the ANC register</li> <li>Upon reviewing the ANC and lab register, if gaps/discrepancies are seen, update the ANC register with information from the laboratory register.</li> </ul>	Tested and implemented in Jinja RRH
	Mentor student nurses on interpreting and documenting urine test results	<ul style="list-style-type: none"> <li>Mentor staff on key elements of laboratory results to look for and to detect preeclampsia</li> <li>Encourage staff /students to review the lab results and update ANC register</li> <li>Data entered on urine test results is reviewed by a competent staff. If a gap is identified, staff demonstrates how to correctly interpret and document test results for the student.</li> </ul>	Tested in 2 HC IIIs. This was spread to 5 other facilities, 3 HC IVs, and 2 HC IIIs. Performance in accurately documented urine protein results across ANC and lab registers improved in all these clinics.

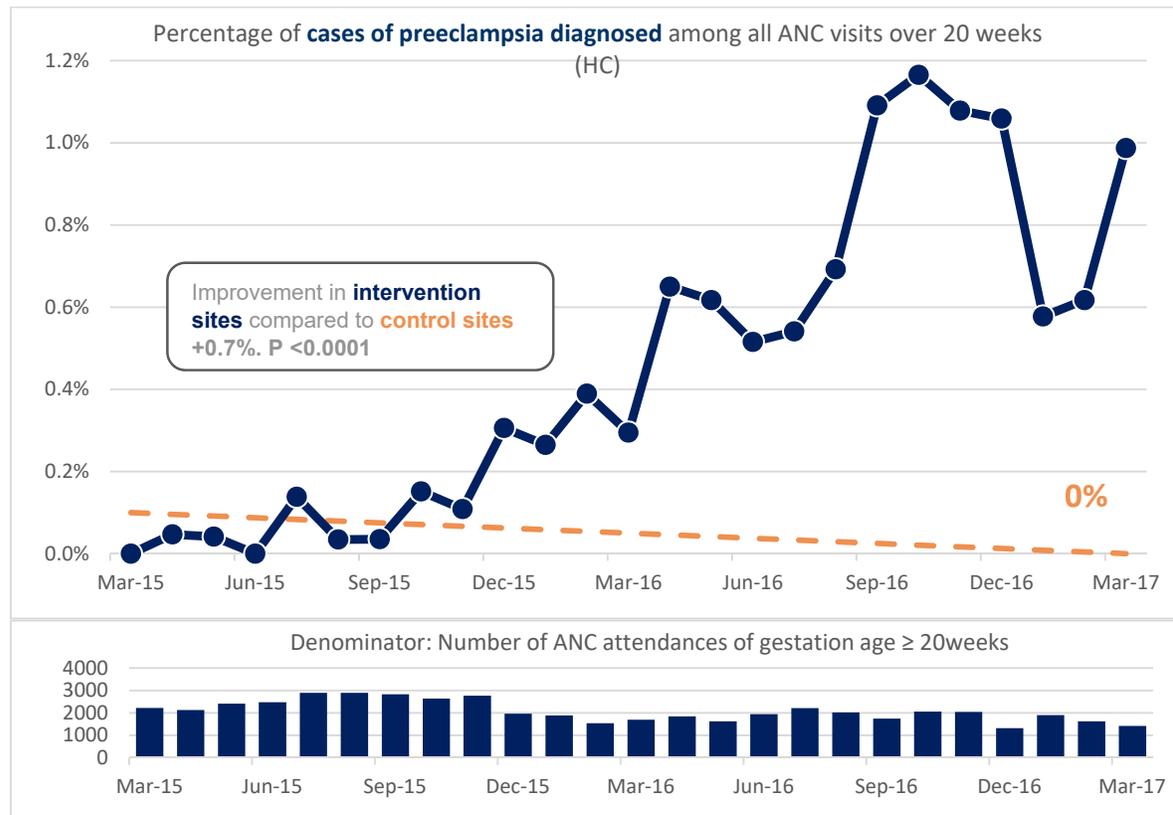
### III. IMPROVING DIAGNOSIS OF PREECLAMPSIA AMONG WOMEN ATTENDING ANTENATAL CARE

Proper classification and diagnosis of preeclampsia and its severity is a critical step in timely and effective care of this dangerous condition. Facility teams addressed gaps in diagnosis of pregnant women with preeclampsia/eclampsia at lower-level health facilities through:

1. Improving documentation of patient diagnosis within the ANC registers especially for women with a high BP  $\geq$  140/90mmHg and varying levels of proteinuria
2. Improving provider's knowledge and practices in classification of the identified cases of preeclampsia into mild/ severe for appropriate management

The changes resulted in a statistically significant ( $p < 0.0001$ ) increase in the percentage of preeclampsia cases diagnosed at ANC visits in the intervention facilities, as seen in **Figure 7**, from 0.1% at baseline (June-August 2015) to 0.7% at the end line (Jan-Mar 2017), or from 0 to 10 women per 1000 women attending ANC clinic during the intervention period (June 2015-March 2017).

**Figure 7. Improvement in the cases of preeclampsia diagnosed among all ANC visits in 10 facilities in Jinja District, Uganda (Mar 2015 - Mar 2017)**



#### Key change idea

*Mentoring staff to correctly detect and classify preeclampsia/ eclampsia*

**Gap addressed:** Staff lack confidence in making a diagnosis of preeclampsia and assessing its severity

#### Change implementation:

- Trained staff on the key signs and symptoms that can serve as indicators for preeclampsia during history taking and the parameters of laboratory investigations to be considered in making a diagnosis of preeclampsia
- A diagnostic guide summarizing key findings from history taken, BP cut offs and results from laboratory investigations was created and placed on clinicians' desks for reference.

**Results:** Correctly diagnosed and documented preeclampsia/ eclampsia cases within the ANC register increased from 0.4/1000 in March-June 2015 to 10/1000 antenatal women in March 2017 at project supported 10 health facilities.

**Table 10** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve diagnosis and severity classification of preeclampsia/eclampsia.

**Table 10. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to improve diagnosis and severity classification of preeclampsia/eclampsia**

**Change ideas to build staff capacity to make final diagnosis of preeclampsia/eclampsia**

**Improvement objective:** To increase the proportion of women attending antenatal clinics that are correctly diagnosed for pre-eclampsia from around 0 per 1000 women in June 2015 to 8 per 1000 pregnant women visiting ANC clinics by March 2017.

**Indicator:** Percentage of pregnant women attending antenatal care visit diagnosed with preeclampsia.

Specific problem addressed	Change ideas tested /implemented	How the change was tested/implemented	Progress
Knowledge gap among health care providers on how to diagnose preeclampsia based on history signs/ symptoms and lab measurements	Orient staff on the history taking, cardinal symptoms/ signs of preeclampsia / eclampsia, lab measurements and its severity classification	<ul style="list-style-type: none"> <li>Identify a day for the orientation</li> <li>Assign staff to take the lead in training all other staff on how to diagnose and classify preeclampsia and eclampsia</li> <li>Take staff through the process of history taking to identify cardinal symptoms of preeclampsia</li> <li>Take the staff through what to look for at examination including required laboratory investigations and their interpretation</li> <li>Give a summary of take home messages on diagnosing and classification of preeclampsia</li> </ul>	<p>Initially implemented in Buwenge GH, Budondo, Mpumudde and Magamaga HCs. This was later taken up by all other health facilities.</p> <p>Cardinal symptoms/ signs are now being assessed while women are at triage. In Budondo, 3 women with a history of pre-eclampsia were identified in Jul 2016 through health workers assessing cardinal signs.</p>
	Create a job aid on cardinal signs/symptoms	<p>After orienting staff on the cardinal symptoms/ signs of preeclampsia:</p> <ul style="list-style-type: none"> <li>Create a job aid and place it on the clinician's desk</li> <li>Pin a copy of the job aid in each consultation room for reference by the clinicians and the midwives. Guide the staff on how to use the job aid as reference.</li> </ul>	<p>This was implemented by Buwenge GH and Lukolo HC III.</p> <p>Women with signs suggestive of preeclampsia were linked to the lab for urine protein testing and sent for further evaluation by the doctors.</p>
Staff lack confidence in diagnosing preeclampsia so they fail to record the diagnosis in the diagnosis column of the register	Assign a focal person to review entries in the register and mentor staff on how to make a diagnosis	<ul style="list-style-type: none"> <li>Identify a staff knowledgeable, skilled and confident enough to diagnose preeclampsia among women attending the antenatal clinic</li> <li>Assign the staff the role of overseeing the processes of recording the diagnosis of preeclampsia in the register</li> </ul>	<p>Implemented in Budondo HC IV initially.</p> <p>This was seen as good practice and was spread to the 9 other health facilities after the harvest meeting.</p>
Preeclampsia is diagnosed but the disease is not categorized	Develop a guide on classification of preeclampsia	<ul style="list-style-type: none"> <li>Write out a guide on classification of pre-eclampsia to include:</li> </ul>	Implemented in 9 health facilities.

Specific problem addressed	Change ideas tested /implemented	How the change was tested/implemented	Progress
Lack of guidelines at the health facility on diagnosing preeclampsia	Create job aids on the diagnostic criteria for preeclampsia	<ul style="list-style-type: none"> <li>- BP cut offs</li> <li>- Urine protein measurement results</li> <li>- Cardinal signs and symptoms of organ damage</li> </ul>	Implemented at 9 health facilities.
The register lacks an area to record vital parameters (e.g., BP)	Draw a column within the maternity register to document BP on admission and other vital parameters	<ul style="list-style-type: none"> <li>• Identify space within the existing maternity register and draw and label a column for vital parameters</li> <li>• Brief staff on the guide and changes to the register</li> </ul>	<p>Implemented in Jinja RRH and after the second learning session, this change idea was spread to other health facilities.</p> <p>As a result of these three change ideas, the percentage of women diagnosed with preeclampsia as an aggregate for the collaborative increased from 1.52 per 1000 pregnant from Oct 2015 to 6.5/1000 in Apr 2016.</p>

#### IV. IMPROVING MANAGEMENT OF WOMEN DIAGNOSED WITH PREECLAMPSIA/ECLAMPSIA

Teams focused on three key processes to improve management of preeclampsia/eclampsia: building health worker confidence in the use of magnesium sulfate, strengthening referral mechanisms, and ensuring active patient monitoring upon admission. While treating severe preeclampsia requires termination of the pregnancy through the fastest and safest methods available, magnesium sulfate (along with antihypertensive medications and close maternal and fetal monitoring) need to be administered for both prophylaxis and treatment of the seizures resulting from the condition. As such, the change ideas presented below focus on the administration of MgSO<sub>4</sub> for initial management of preeclampsia/eclampsia and referral to higher level facility for further care.

Gaps in management of preeclampsia identified at baseline included:

- Limited knowledge on the use of magnesium sulfate in managing severe preeclampsia and eclampsia both as a pre-referral dose and then for maintenance and ongoing management upon admission
- Limited stock and frequent stock outs of magnesium sulfate
- Limited stocks of a range of anti-hypertensives (e.g., hydralazine)
- Lack of updated patient monitoring charts

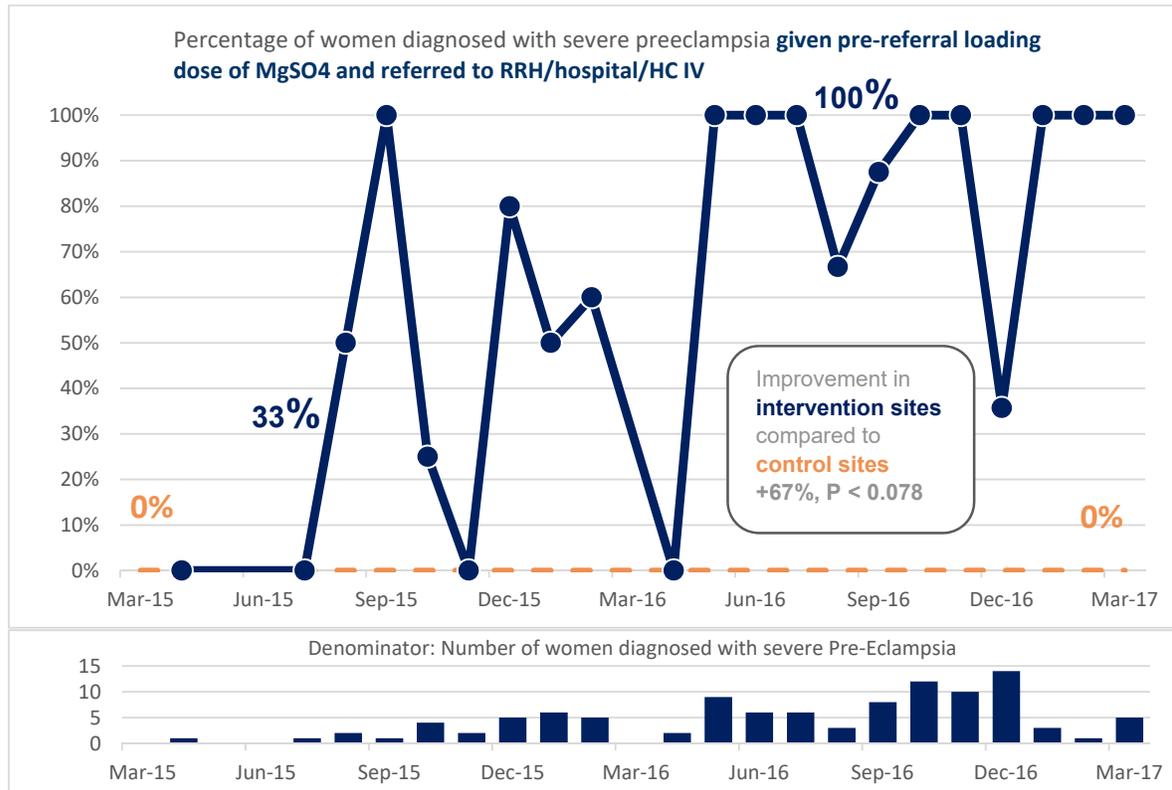
During the learning sessions and on-site coaching, staff competence was built in administering magnesium sulfate both as a pre-referral treatment when transferring patients from lower-level health facilities to higher-level facilities for advanced care and for management upon admission at higher level facilities.

Staff were supported in using data to report on preeclampsia/eclampsia cases as a hypertensive disorder of pregnancy in the HMIS to ensure adequate supplies of magnesium sulfate from the National Medical Stores. In cases where magnesium sulfate was not available, giving diazepam was considered or patients were requested to purchase the drug. At higher level facilities, staff were taken using data to forecast and place orders for magnesium sulfate and antihypertensive drugs.

The tested changes to improve initial management of women diagnosed with severe preeclampsia through administration of a loading dose of MgSO<sub>4</sub> and referral to a higher-level facility (RRH, general hospital, or health center IV) did not result in statistically significant improvement. Routine monitoring result of initial treatment and referral of severe preeclampsia shows improvement – though due to a

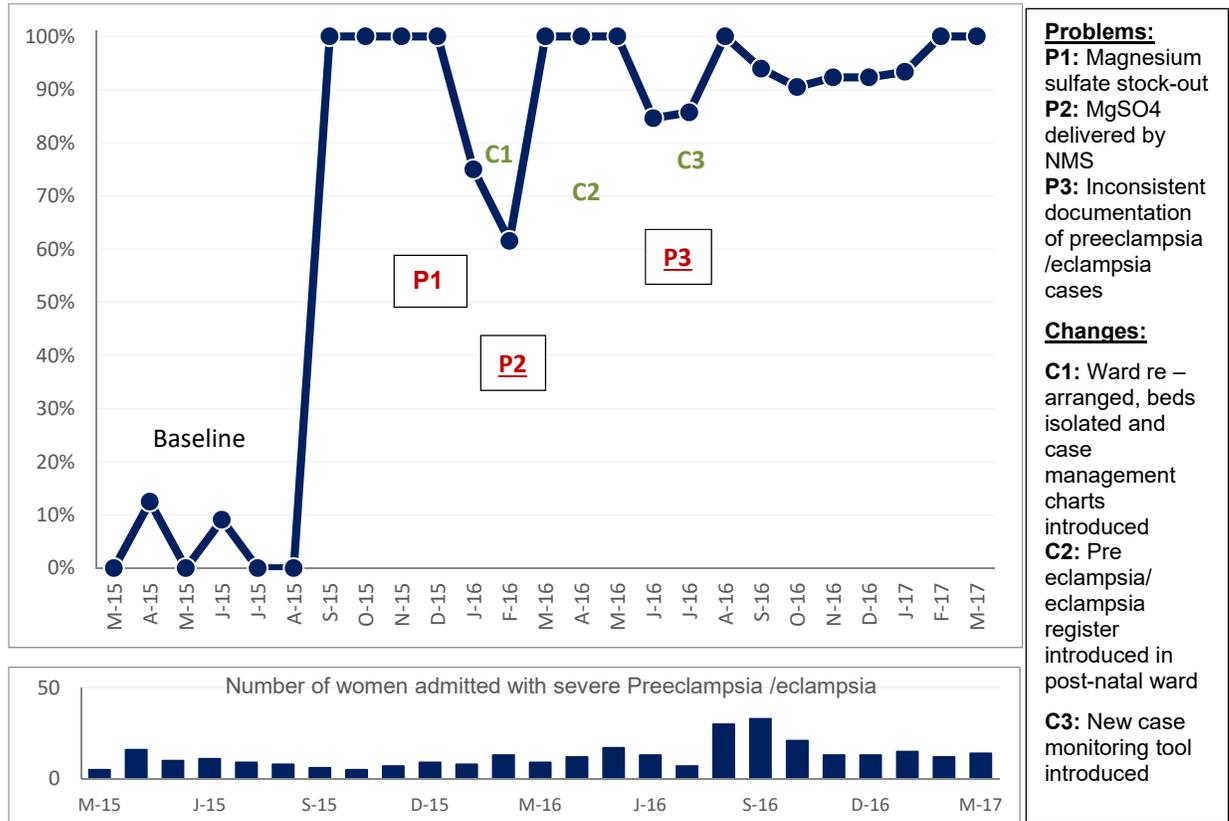
small number in the denominator – the indicator is fluctuating (**Figure 8**). Similarly, baseline and end line assessment revealed that baseline performance in intervention facilities has improved from 33% (at baseline) to 100% (March 2017) while it remained unchanged (0%) in control facilities. But due to the same reason (small number in denominator), attributable improvement in intervention facilities compared to control facilities (67%) was not statistically significant ( $p=0.078$ ).

**Figure 8. Initial treatment and referral of women with severe preeclampsia in facilities in Jinja District, Uganda (Mar 2015 - Mar 2017)**



At the Jinja RRH, the percentage of severe PE/E cases seen which received correct treatment (defined as both a loading and a maintenance dose of MgSO<sub>4</sub>, the correct dose of the prescribed antihypertensive, and continuous monitoring of vitals throughout the course of care) and whose treatment was documented in the patient files rose from 4% during baseline to 98% during the end line assessment (Jan – March 2017) (**Figure 9**). However due to the lack of data for this indicator in the control facilities a conclusion on statistical significance could not be made.

**Figure 9. Percentage increase in women admitted with preeclampsia/eclampsia receiving correct treatment, problems addressed and changes implemented, 3 facilities, Jinja District, Uganda (Mar 2015 – Mar 2017)**



## Aim 1: Improve use of magnesium sulfate

### 1. Change Concept 1: Building health worker confidence in use of magnesium sulfate (MgSO<sub>4</sub>)

#### Key change idea

**Create a job aid on reconstitution of magnesium sulfate using commonly available syringes.**

**Gaps addressed:** Reconstitution of magnesium sulfate was identified as a challenge for care providers especially given the scarcity of 20ml syringes. 20ml syringes were not commonly available at the ten intervention health facilities. While 5 mls and 10 mls syringes were available, staff were not comfortable with the reconstitution of magnesium sulfate using syringes of these sizes.

**Change implementation:** A job aid on how to prepare a loading and maintenance dose of magnesium sulfate using the commonly available syringes was developed and pinned within the MCH departments for reference by the health care providers.

<b>MANAGING SEVERE PRE – ECLAMPSIA AND ECLAMPSIA DOSE OF MAGNESIUM SULPHATE (MgSO<sub>4</sub>)</b>	
<b>LOADING DOSE:</b>	
<b>Take 4gm MgSO<sub>4</sub> IV as 20% solution</b>	<b>Dilution</b>
Give Intravenously (IV) slowly over 10 - 20 minutes  (Follow the guidance in the next column on how to make 20% from 5ml ampoules of 500mg/ml 50% MgSO <sub>4</sub> depending of the syringe size available)	Making 4g of 20% solution from 50% solution: <ul style="list-style-type: none"> <li>• If you have a 20 ml syringe.               <ul style="list-style-type: none"> <li>- Get 8mls of 50% solution add 12 mls of water for injection/Normal saline; this is now 20mls of 20% solution.</li> </ul> </li> <li>• If you have 10 ml syringes.               <ul style="list-style-type: none"> <li>- Put 4 mls of 50% solution in 2 syringes. Make up to 10mls with water for injection in each syringe. 10ml syringes of 20% solution.</li> </ul> </li> <li>• If you have 5ml syringes.               <ul style="list-style-type: none"> <li>- Put 2mls of 50% solution in 4 syringes. Make up to 5mls with water for injection in each syringe. 5ml syringes of 20% solution.</li> </ul> </li> </ul>
<b>Follow promptly with 10gm as 50% MgSO<sub>4</sub> deep IM</b>	
Give 5gm deep IM in each buttocks	<ul style="list-style-type: none"> <li>• If you have 10mls syringes               <ul style="list-style-type: none"> <li>- Take two 10ml syringes</li> <li>- Draw 2 ampoules of 500mg/ml MgSO<sub>4</sub>50% into each syringe ( a total of 10mls of 50% MgSO<sub>4</sub> = 5gm in total)</li> <li>- Add 0.5mls of 2% lignocaine in each syringe.</li> </ul> </li> <li>• If you have 5mls syringes               <ul style="list-style-type: none"> <li>- Take four 5ml syringes</li> <li>- Draw 4 ampoules of 500mg/ml MgSO<sub>4</sub>50% into each syringe ( a total of 5mls of 50% MgSO<sub>4</sub> = 2.5gm in total)</li> <li>- Add 0.25mls of 2% lignocaine in each syringe.</li> </ul> </li> </ul>
<b>MAINTENANCE DOSE:</b>	
<b>5gm as 50% MgSO<sub>4</sub> deep IM in alternate buttocks every 4 hourly</b>	
Continue same treatment for 24 hours after delivery or the last convulsion, whichever is the last.	<ul style="list-style-type: none"> <li>• If you have 10mls syringes               <ul style="list-style-type: none"> <li>- Take one 10ml syringes</li> <li>- Draw 2 ampoules of 500mg/ml MgSO<sub>4</sub>50% into the syringe ( a total of 10mls of 50% MgSO<sub>4</sub> = 5gm in total)</li> <li>- Add 1ml of 2% lignocaine in the syringe.</li> </ul> </li> <li>• If you have 5mls syringes               <ul style="list-style-type: none"> <li>- Take two 5ml syringes</li> <li>- Draw 2 ampoules of 500mg/ml MgSO<sub>4</sub>50% into each syringe ( a total of 5mls of 50% MgSO<sub>4</sub> = 2.5gm in total)</li> <li>- Add 0.25mls of 2% lignocaine in each syringe.</li> </ul> </li> </ul>
<b>Before repeating MgSO<sub>4</sub>, Always monitor for Toxicity. Withhold or Delay if any of the following</b>	
<ul style="list-style-type: none"> <li>• Respiratory rate &lt;16/minute</li> <li>• Patellar reflexes absent</li> <li>• Urine output &lt;30mL/hr</li> </ul>	<b>If Respiratory Arrest:</b>
	<ul style="list-style-type: none"> <li>• Assist ventilation with bag and mask or intubation</li> <li>• Give Calcium Gluconate 1gm (10mL of 10%) IV slowly until respiration begins.</li> </ul>

**Table 11** summarizes objectives, change ideas, implementation details, and the progress of facilities to build health worker confidence in use of magnesium sulfate to treat severe preeclampsia/eclampsia.

**Table 11. Summary of objectives, gaps being addressed, change ideas, implementation details, and the progress of intervention facilities to build health worker confidence in use of magnesium sulfate to treat severe preeclampsia/eclampsia**

<b>Change Concept 1: Build health worker confidence in use of magnesium sulfate to treat severe preeclampsia/ eclampsia</b>			
<b>Improvement objective:</b> To increase the proportion of women diagnosed with severe preeclampsia given pre-referral loading dose of MgSO <sub>4</sub> and referred to higher level health facility and/or correctly treated at referral facility from 0% at baseline (March 2015) to 60 % at end line (March 2017)			
<b>Indicator 1:</b> Percentage of women diagnosed with severe preeclampsia given pre-referral loading dose of MgSO <sub>4</sub> and referred to higher level health facility			
<b>Indicator 2:</b> Percentage of severe preeclampsia or eclampsia cases seen at referral facility who received correct treatment of preeclampsia and eclampsia			
<b>Specific problem addressed</b>	<b>Change ideas tested /implemented</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Health workers lack confidence in administering magnesium sulfate to manage preeclampsia and eclampsia	Incorporate clinical / practicum session into theoretical trainings on preeclampsia and magnesium sulfate	<ul style="list-style-type: none"> <li>In the facility-based CME training on preeclampsia/eclampsia care, include a practical session on the use of magnesium sulfate including dilution for both the loading and maintenance doses</li> </ul>	Implemented in 9 health facilities.  As a result, staff were more confident in the use of magnesium sulfate. Eight of the facilities that received women with severe preeclampsia were able to give a loading dose and refer to a higher health facility.
	Identify a staff champion to lead others during care and to continuously build staff capacity at each health facility on use of MgSO <sub>4</sub> including drug dilution, pace and doses to be administered (IV/IM)	<ul style="list-style-type: none"> <li>Train all staff in MCH on use of magnesium sulfate</li> <li>Identify one of the staff members as a champion to continuously train and support other personnel and orienting new staff</li> <li>Hold regular refresher on-site trainings on preeclampsia/ eclampsia care</li> </ul>	
	Create an easy to understand job aid on dilution and the administration of magnesium sulfate	<ul style="list-style-type: none"> <li>Create a job aid that includes guidance on how to:                             <ul style="list-style-type: none"> <li>- prepare doses of magnesium sulfate using commonly available syringes</li> <li>- prepare loading and maintenance doses specifying size and strength of dose and route of administration</li> </ul> </li> <li>Pin the job aid on the wall where staff can use it for quick reference</li> </ul>	Implemented at all 10 health facilities.

## **Aim 2: Ensure timely and effective referral of women with severe preeclampsia/eclampsia**

The health care services in Uganda are organized across different levels of health facilities from HC II to regional and national referral hospitals. Lower-level health facilities (HC IIs and IIIs) offer basic emergency obstetric services, while HC IVs, hospitals, and regional and national referral hospitals are designed to offer comprehensive emergency obstetric care including care for cases of severe preeclampsia/eclampsia. However, not all higher-level facilities designed to offer comprehensive care can, meaning that patients identified as having obstetric complications at these facilities and at lower level facilities (HC II and IIIs) are often referred to the regional referral hospital for correct management.

Facility teams worked on improving the referral process and reducing the time patients spent in transit from one facility to another by:

- Giving a pre-referral dose of magnesium sulfate to women with severe preeclampsia/ eclampsia being transferred to a higher-level facility
- Improving communication between referee and referral health facilities
- Improving transport for the clients through strengthening ambulance services
- Escorting women with severe preeclampsia to a higher-level facility

### 1. Change Concept 2: Create effective communication between referee and referral facilities

Table 12 summarizes objectives, change ideas, implementation details, and the progress of facilities to create effective communication between referee and referral facility

**Table 12. Summary of objectives, gaps addressed, change ideas, implementation details, and the progress of intervention facilities to create effective communication between referee and referral facility**

<b>Change Concept 2: Create effective communication between referee and referral facility</b>			
<b>Improvement objective:</b> To increase % of women with severe preeclampsia referred from health centers who were seen at referral facility from 0% at June 2015 to 80% on March 2017			
<b>Indicator:</b> Number/percentage of cases of severe preeclampsia/ eclampsia referred from health centers who were seen at Jinja Regional Referral Hospital/HC IV.			
<b>Specific problem addressed</b>	<b>Change ideas tested /implemented</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Referral facility is provided with unclear information about prior patient management	Use referral forms during referral of patients	<ul style="list-style-type: none"> <li>• Obtain examples of referral forms from other health facilities</li> <li>• Orient staff on how to write out a complete referral note including information on:               <ul style="list-style-type: none"> <li>- Health facility contact details</li> <li>- Patient demographics</li> <li>- History and clinical findings</li> <li>- Results from any investigative procedures done</li> <li>- Diagnosis made</li> <li>- Treatment given</li> </ul> </li> </ul>	Implemented at 9 health facilities (all but Jinja RRH). As a result of this change, mothers were referred with complete information detailing the condition, procedures and treatment administered, and any results seen allowing staff at the receiving end to provide more accurate care based on what had already been done.
Referral units were not always prepared to receive patients	Inform referral unit of referral being made	<ul style="list-style-type: none"> <li>• Obtain contact details of higher level facilities</li> <li>• Pin contact information where it can be easily accessed</li> <li>• Call health facility and give a summary of the referral being made at the time of transfer</li> </ul>	The contact number of the Jinja RRH maternity was shared with the 9 lower-level health facilities. Health workers from lower level facilities would call to alert the Jinja RRH of patients being referred and checked if they received and admitted women with preeclampsia/eclampsia.

## 2. Change Concept 3: Improve access to ambulance services

Given the limited availability of ambulance services within the district and the difficulties in obtaining transport from lower level facilities, QI teams decided work towards improving access to the available district ambulance services.

**Table 13** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve access to ambulance services.

**Table 13. Summary of objectives, gaps being addressed, change ideas, implementation details, and the progress of intervention facilities to improve access to ambulance services**

<b>Change Concept 3: Improve access to ambulance services</b>			
<b>Improvement objective:</b> To increase % of women with severe preeclampsia referred from health centers who were seen at referral facility from 0% at June 2015 to 80% on March 2017.			
<b>Indicator:</b> Number/Percentage of cases of severe preeclampsia/ eclampsia referred from health centers who were seen at Jinja Regional Referral Hospital/HC IV.			
<b>Specific problem addressed</b>	<b>Change ideas tested /implemented</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Limited access to ambulance services leading to delayed referrals	Create open communication channels with all ambulance drivers within the district	<ul style="list-style-type: none"> <li>Meet with District Health Officer (DHO) and Health Sub-District in-charges</li> <li>Share aim for the meeting and request to have an active ambulance network</li> <li>Obtain contacts for all ambulance drivers within the district</li> <li>When a referral is being made, have the lower-level facilities call ambulance drivers beginning with the one located closest to the health facility</li> </ul>	This was implemented at 5 HC IIIs. While no concrete/direct results can be tied to this change idea, facilities felt that it allowed them to be prepared for emergencies and improve timely and appropriate referrals.
	Leverage available resources within the community	<ul style="list-style-type: none"> <li>Identify stakeholders who could improve ambulance resources within the community</li> <li>Meet with key stakeholders and share issues regarding effecting referral of patients across health facilities</li> <li>Lobby for additional resources</li> <li>Engage community members in a meeting to share issue around maternal health service delivery and lobby for community participation especially when it comes to transport to refer women in critical condition to higher health facilities</li> </ul>	Implemented at Mpumudde HC IV.  Mpumudde HC IV has no ambulance but have partnered with someone within the community who lends his car to the facility when a referral need to be made. As a result of this partnership, 4 women were successfully transferred to Jinja RRH from Mpumudde HC IV.
	Lobby the facility in-charge to keep ambulances fueled	<ul style="list-style-type: none"> <li>Hold a meeting with the facility in-charge and request to have a small budget set aside to have ambulances fueled during referrals</li> </ul>	While no concrete/direct results can be tied to this change idea, facilities felt that it allowed them to be prepared for emergencies and improve timely and appropriate referrals.

### 3. Change Concept 4: Improve active patient monitoring during referral

Table 14 below summarizes objectives, change ideas, implementation details and the progress of facilities to improve active monitoring of patients during referral.

**Table 14. Summary of objectives, gaps being addressed, change ideas, implementation details, and the progress of intervention facilities to improve active monitoring of patients during referral**

<b>Change Concept 4: Improve active monitoring of patients during referral</b>			
<b>Improvement objective:</b> To increase % of women with severe preeclampsia referred from health centers who were seen at referral facility from 0% at June 2015 to 80% on March 2017.			
<b>Indicator:</b> Number/Percentage of cases of severe Pre-eclampsia/ eclampsia referred from health centers who were seen (alive) at Jinja Regional Referral Hospital/HC IV.			
<b>Specific problem addressed</b>	<b>Change ideas tested /implemented</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Patients are not actively monitored during referral	Escort women with severe preeclampsia to the referral unit	<ul style="list-style-type: none"> <li>Identify a skilled staff member to escort patient to the referral facility/unit</li> <li>Brief staff on the patient's condition and treatment prior to referral</li> <li>Have the staff member obtain the necessary supplies that may be required for monitoring during the referral</li> <li>Ensure that the staff member has the complete referral form</li> </ul>	<p>This change idea was tested at 2 HC IVs and 1 General Hospital that had ambulance services.</p> <p>Once all lower facilities had access to ambulance services this change idea was spread to the remaining facilities.</p>

The change ideas listed for Improvement Aim II led to an increase in the number of women diagnosed with severe preeclampsia who were effectively referred to higher-level health facilities from 0% (0/1) in August 2015 to 100% (14/14) in March 2017.

### Aim 3: Ensure active monitoring of patients while on admission

Patients active monitoring is key to manage and prevent complications of preeclampsia and eclampsia. ascertaining the progress of a disease and the patient's response to treatment and can provide essential guidance to care providers on how to proceed. For preeclampsia/eclampsia, parameters to monitor include blood pressure; urine output; respiratory rate, deep tendon reflexes, and drug administration. Monitoring results should be recorded on a patient monitoring tool and detail the time the parameter was assessed, and in the case of drug administration the means of administration and dose to be specified. The health worker who assessed the monitoring parameters should be indicated on the monitoring tool in case additional clarification is needed.

#### 1. Change Concept 1: Build capacity of health workers on patient monitoring

Train care providers on proper patient monitoring for preeclampsia/ eclampsia explaining what should be monitored, the frequency of monitoring required for each parameter, and their cut-off points.

Changes to build capacity of care providers in patient monitoring included:

- On-the-job mentorship on preeclampsia/eclampsia patient monitoring
- Holding one-on-one sessions for new staff and students on patient monitoring

#### 2. Change Concept 2: Use patient monitoring tools

Updated monitoring tools provide evidence of active monitoring of admitted patients and provide details of the treatment administered. The following change idea was tested for this change concept.

### Change idea

***Using existing monitoring tools to chart patient monitoring parameters, modify them to capture key aspects of patient monitoring for preeclampsia/eclampsia.***

**Gap being addressed:** Records not indicative of active patient monitoring.

#### **Change implementation:**

- Referral facility teams began by designating beds in a well labelled corner within the maternity ward for admission of women with preeclampsia. An isolation room for women with eclampsia already existed.
- Case management charts for monitoring fetal and maternal wellbeing parameters and administration of drugs were located in the facility store, introduced into the ward, and placed by the patients' beds. Health workers noted that while the charts were used to identify patients admitted with severe preeclampsia, they were hard to update as they were pinned onto the wall by the patient's bed.
- The pink chart was reviewed by the coaches and QI team during a coaching visit. Parameters that were relevant for further monitoring were identified and a decision was made to develop a new patient monitoring chart, incorporating evidence according to WHO guideline for management of preeclampsia and eclampsia and the Guide for Essential Practice during Pregnancy, Childbirth, Postpartum and Newborn Care (WHO 2015).
- Using plain paper, staff drafted new patient monitoring charts.

## **V. IMPROVING FOLLOW-UP OF WOMEN DIAGNOSED AND MANAGED FOR PREECLAMPSIA/ECLAMPSIA IN ANTENATAL AND MATERNITY CARE**

Follow-up of women diagnosed with preeclampsia/eclampsia, provides health workers an opportunity to:

- Evaluate fetal growth and well-being
- Reassess the woman for response to treatment

Follow-up during the antenatal period is primarily conducted for women diagnosed with mild preeclampsia. For women with a documented history of severe preeclampsia/eclampsia, postnatal follow-up is also recommended. Due to unavailability of baseline data and difficulties to identify and track women with mild preeclampsia or history of preeclampsia for the follow up through ANC register, the changes were not routinely monitored by specific indicator.

**Table 15** summarizes objectives, change ideas, implementation details, and the progress of facilities to improve follow-up of women diagnosed and managed for preeclampsia/eclampsia.

**Table 15. Summary of objectives, gaps being addressed, change ideas, implementation details, and the progress of intervention facilities to improve follow-up of women diagnosed and managed for preeclampsia/eclampsia**

<b>Change ideas to improve follow-up of women diagnosed and managed for preeclampsia/eclampsia</b>			
<b>Improvement objective: Improve the percentage of women with mild preeclampsia or history of preeclampsia /eclampsia who were followed up according to WHO guidelines</b>			
<b>Specific problem being addressed</b>	<b>Change ideas tested /implemented</b>	<b>How the change was tested/implemented</b>	<b>Progress</b>
Long review periods for women with preeclampsia in antenatal period	Give short regular review periods for pregnant women	<ul style="list-style-type: none"> <li>Once a woman attending antenatal care is diagnosed with mild preeclampsia, mark her record within the ANC register and on the ANC cards/ mother's passport for easy identification</li> <li>Discuss the condition with her and emphasize the need to have her seen more frequently and regularly</li> <li>Ascertain the day of the week most feasible for the women to attend antenatal care</li> <li>Schedule her for follow up every two weeks</li> <li>Inform her of what to expect on her follow-up visits</li> </ul>	<p>This was implemented at all 10 health facilities where women with preeclampsia were identified within the ANC clinic. On average, return dates were scheduled within two weeks of the initial visit as opposed to more than a month prior to change implementation.</p> <p>While this change idea was not actively monitored, coaches periodically reviewed the ANC longitudinal register and observed that the time between follow-up visits was routinely being shortened.</p>
Poor postnatal follow up of mothers managed for preeclampsia / eclampsia during pregnancy	Schedule follow-up visits for postnatal women within the gynecology and postnatal departments	<ul style="list-style-type: none"> <li>At discharge, counsel woman treated for preeclampsia/ eclampsia on proper care during the postnatal period including danger signs</li> <li>Inform her of the benefits of attending postnatal clinics on a regular basis</li> <li>Schedule her follow-up appointments and communicate the information with her</li> <li>Direct her to where the postnatal clinic is located and inform her of what to expect during the visits</li> </ul>	Implemented at Jinja RRH.
Mothers not linked back to facilities closer to their homes leading to non-attendance of follow-up visits	Link woman back to her initial facility for further reviews	<ul style="list-style-type: none"> <li>Once the woman is cleared of any complications during her postnatal care, link her back to the health facility closer to her home for any further reviews and counseling</li> <li>Write out notes detailing condition and treatment received together with follow up time and place close to women's home</li> <li>Provide her with the notes and request that she bring them to any further appointments at her home facility</li> </ul>	Three mothers treated for severe preeclampsia who used to live far from Jinja RRH were advised on going back to facilities closer to them (where they received routine ANC care) for continued assessment during postnatal period.

## VI. RECOMMENDATIONS

In addition to the change ideas listed above to improve screening/detection, diagnosis, management, and follow-up of cases of preeclampsia/eclampsia, it is recommended that facilities aiming to improve preeclampsia/eclampsia care also address the following areas:

- Ensuring a regular stock of essential drugs, supplies, and equipment
- Improving documentation
- Strengthening team work
- Analyzing care processes and prioritizing areas for improvement
- Communicating with patients

**Teams summarized their high-level guidance to new facilities as follows:**

Screening and detection	<ul style="list-style-type: none"> <li>• Involve all facility staff in improvement work to reduce resistance to change</li> <li>• Ensure consistent availability of laboratory supplies and commodities</li> <li>• Ensure availability of functional and high-quality equipment</li> <li>• Build the capacity of MCH staff in preeclampsia screening on a regular basis</li> <li>• Create and distribute job aids for reference by staff during care provision</li> <li>• Ensure regular documentation of patient records and information within the MOH Health Management Information System tools</li> <li>• Establish regular coordination between the MCH department and the laboratory</li> <li>• Ensure adherence to the MOH Sexual Reproductive Health guidelines</li> <li>• Ensure internal supervision for both students and staff to ascertain their level and quality of work</li> <li>• Promote collaboration between health facilities within a region / district and teamwork within facilities</li> <li>• Establish good communication between the different levels of the facility administration</li> </ul>
Diagnosis	<ul style="list-style-type: none"> <li>• Build staff competence in diagnosis and classification of preeclampsia</li> <li>• Create and distribute job aids on preeclampsia diagnostic criteria (history, BP and urine protein measurement, signs/symptoms)</li> </ul>
Management	<ul style="list-style-type: none"> <li>• Establish a skills laboratory within the region/ district for health workers to continually practice and improve upon key techniques</li> <li>• Ensure client-centered care and be responsive towards work</li> <li>• Hold regular coordination meetings between different departments responsible for providing key services to women diagnosed with preeclampsia/eclampsia, for example between the laboratory department and the ANC clinic, and hold interdepartmental meetings geared towards improvement of service delivery</li> <li>• Functionalize BEmONC/CEmONC facilities</li> <li>• Ensure regular supplies/ commodities for pre-eclampsia care by using data to forecast need and placing timely orders of requirements</li> <li>• Provide job aids to staff for reference during care provision</li> <li>• Continuously build staff capacity in preeclampsia care and use of magnesium sulfate</li> <li>• Functionalize health sub-district structures for supervision and mentorship</li> <li>• Hold regular review meetings before the start of work</li> <li>• Engage the administration in patient care especially referral cases</li> <li>• Establish communication channels with higher level facilities</li> <li>• Ensure timely provision of care</li> <li>• Establish active use of client monitoring charts to document patient parameters</li> <li>• Liaise with the health sub-district, district and regional referral facilities to improve referral and ambulance services within the area</li> </ul>