REPORT ON THE STRENGTHENING EMERGENCY CARE PROGRAMME IN LIBERIA (OBSTETRIC AND NEONATAL COMPONENTS) UNDERTAKEN IN A PARTNERSHIP BETWEEN THE MINISTRY OF HEALTH AND SOCIAL WELFARE, WHO, MCAI AND ALSG

This report covers the first 15 months of a continuing programme (from November 1st 2012 to January 24th 2014) that began with a grant awarded by The Tropical Health Education Trust (THET) and UKAID as a formal partnership between Bong County Health and Social Welfare Team (BCHASW) in Liberia and Aneurin Bevan Health Board (ABHB) in Wales, UK. The obstetric and neonatal part of the project is implemented by MCAI and ALSG.

The formal partnership and its funding ends during February 2014 but the project is set to continue under the auspices of MOHSW, WHO, MCAI and ALSG from then onwards.

Summary of outputs achieved to date

- 170 health workers (159 midwives and nurses, 4 doctors, 5 nurse anaesthetists and 2 physician assistants) successfully completed 3 day courses on the emergency care of pregnant women and newborn infants. All were given manuals, pocket-books, bag valve masks, logbooks and a set of videos at the end of each course.
- 5 Liberian health-workers have become fully accredited ALSG instructors following successful completion of a generic instructor course (GIC) and series of instructor candidacies. An additional 8 Liberian health workers are awaiting the next GIC course.
- 12 midwives and 1 nurse anaesthetist successfully underwent a two day basic neonatal course. All were given a neonatal care manual, pocket watch, stethoscope, thermometer, calculator and bag and mask at the end of the course.
- A newly renovated and greatly expanded emergency room has been opened at Phebe Hospital.
- Equipment (including 2 vacuum delivery kits, 2 pulse oximeters, an air conditioner, an infant nasal CPAP and oxygen delivery system) has been provided for Phebe and CB Dunbar Hospitals.
- Two midwives are undergoing training in advanced obstetrics including emergency surgery after provisional registration with the Liberian Medical and Dental Council. Already they have conducted 8 caesarean sections under supervision and assisted with 70 others. Two more midwives are ready to start when appropriate and agreed by MOHSW.
- The labour and delivery wards at Phebe Hospital have been re-organised to provide better efficiency and safety.
- Ongoing weekly clinical audit meetings for doctors and the two trainee midwives in advanced obstetrics have been established at CB Dunbar Hospital.
- Baseline monitoring and evaluation, including data from every clinic and hospital in Bong County, has been completed.
- An initiative to reduce puerperal sepsis has been implemented.
- In the waiting home at Phebe Hospital, a telephone for waiting mothers to contact their families, wellingtons and two re-chargeable torches to protect them from snakebites when walking 400 yards to the labour ward have been provided for safety and communication.
- Anti-venom for snake bites is now available at Phebe Hospital

Two midwives undertaking caesarean section under immediate supervision by an international consultant obstetrician

Details of the short course teaching programmes 1. Emergency Surgical Skills-Emergency Maternal and Neonatal Healthcare courses (ESS-EMNH courses)

Dr Obed Dolo holding a workshop on triage

Full instructor Aaron Soneh giving a lecture on airway and breathing in pregnancy. Aaron is a nurse anaesthetist

Four visits involving short courses in emergency obstetric and neonatal care have been conducted as part the project so far. A total of 8 EESS-EMNH Essential and **Emergency Surgical Skills-Emergency Maternal and Neonatal Healthcare** courses have to date been conducted. All candidates were given the EMNH manual to read 4-6 weeks before the course began. Each course was of 3 days duration and has, to date, taught a total of 170 candidates (159 midwives or registered nurses: including 6 from outside Bong County, 2 Physician Assistants from Bong County and 4 doctors [3 from Phebe Hospital and 1 from MCAI UK], and 5 nurse anaesthetists from Bong County). All candidates passed the EMNH courses. **Appendix 1** provides the outline of a typical EMNH course.

Hannah Gibson (left) teaching Neonatal resuscitation

Brigid Hayden (left in white) course director supporting Famara Fatty (white shirt in glasses) demonstrating a scenario on post-partum haemorrhage.

A combination of international and Liberian accredited ALSG instructors, were involved in teaching EMNH courses.

DrFrank van Raaij teaching scenario on neonatal illness

Skill station on vascular access

Korpu Gbozee teaching a workshop

Hannah Gibson teaching workshop on eclampsia

Each of the candidates on the EESS-EMNH courses received the following items at the end of each course: a bag and 2 masks for lung inflations in patients (particularly newborn infants) who are not breathing, a pocketbook of the essential components of emergency care for pregnant women, newborn infants and children, and a logbook in which they have each been asked to enter details of every emergency intervention that they perform from then onwards on patients. (These data will be used for the monitoring and evaluation for this project). They also each received a CD rom of emergency obstetric and neonatal care including over 100 teaching videos.

Feedback forms filled out by candidates

Feedback forms (see **Appendix 2**) were completed by all candidates attending the latest two EMNH courses.

47 evaluation sheets were completed, which were divided into sections as follows:

General views:

Overwhelmingly positive in terms of content and delivery. All felt that the courses were important for saving lives and that they had gained new knowledge as well as a reminder of skills and information they may have forgotten. A strong appreciation of the practical aspects of the courses. Other comments noted that the courses were directed to the right people and were especially suited to rural areas due to the emphasis on recognition of critical scenarios.

Lessons for the workplace:

All candidates were happy that they would bring new and improved knowledge and practices to the work place, most notably: resuscitation of the newborn, the ABC method, when and why to refer patients, opening IV line on the bone and ankle vein, management of shoulder dystocia, breech delivery, eclampsia and post-partum haemorrhage.

More confident: All respondents said yes.

Suggested additions to the course:

Almost all candidates said they would add more time to the courses for study and practice as well as teaching time. Many felt that the courses should be repeated regularly as refreshers and that all healthcare workers in Liberia should undertake the courses. Other requested additions with more emphasis on neonatal care, vacuum delivery, treatment of malaria in pregnancy. There was also one non-specific request for more equipment.

Suggested changes:

All the comments in this section requested that the courses should be longer – suggestions varied from 5 or 6 days to two weeks. There was one request to make more time for sections that needed more explanation. All felt that other health workers should be trained.

Suggested omissions:

With only one exception, all respondents felt that everything on the course was essential and that nothing should be left out. One individual would have omitted training on venous cut down.

2. The Generic Instructor Courses (GIC)

An important part of this program is to ensure sustainability by providing Liberian trainers for the EMNH courses. A two day course designed to achieve this (GIC course) has been undertaken on two occasions during the last 15 months. **Appendix 3** provides an outline of the GIC course.

8 Instructor Candidates (7 from Liberia following their success in the first Generic Instructor Course) also taught on the last set of courses in November 2013 (Frank van Raaij, Gertrude Cole, Korpu Gbozee, Patty McLean, Marie Padmore, Taiwah Bombo, Seratta Glee, Peter S Sumo). As a result, Korpu Gbozee and Patty McLean completed their instructor training and became fully accredited ALSG instructors along with Hannah Gibson, Aaron Soneh and Obed Dolo (total = 5). **Soon these Liberian instructors will be able to undertake the majority of the EMNH teaching** with quality control input from a small number of international ALSG instructors.

At this latest set of EMNH courses in November the instructors selected an additional 8 candidates (1 nurse anaesthetist, 2 registered nurses, 1 doctor, 1 physician assistant, 2 midwives and 1 nurse/midwife) to go forward to participate in the next GIC Course which will occur in a future visit early in 2014.

Dr Brigid Hayden handing out certificate

Dr Brigid with Table containing hand outs

Dr Johan Creemers teaching shoulder dystocia management and breech delivery skill station

Marie Padmore (IC) teaching shoulder dystocia

Dr Johan Creemers handing out certificate

End of one of the EESS-EMNH course photograph

3. Basic training course on the care of newborn infants

The first 2 day course for 12 senior nurses and midwives involved in **caring for newborn infants** at Phebe and CB Dunbar Hospitals was undertaken by Dr Barbara Phillips and Professor David Southall with major assistance from Jeremiah Akoi on 13-14th June 2013. All candidates had been given the new manual of neonatal care 4-6 weeks before the course began and all successfully completed the course.

Each of the candidates on this neonatal course received the following: a nurse's watch to count respiratory and heart rates etc., a stethoscope, a low reading digital thermometer, a calculator, pencil case and a neonatal bag and mask resuscitation system.

A set of 200 baby cups for breast feeding, 2 pulse oximeters with neonatal probes, baby hats for low birth weight babies, 6 hot water bottles, wraps for skin to skin mother baby care, nasogastric tubes for feeding low birth weight babies, 50 infant nasal cannula, A2 laminated posters on neonatal feeding (**Appendix 4**), neonatal resuscitation (**Appendix 5**), and the recognition of neonatal sepsis (**Appendix 6**) and videos on aspects of hospital neonatal care were provided for the 2 hospital neonatal units.

A subsequent course on more advanced neonatal care, especially for nurse anaesthetists and a small number of selected midwives will be undertaken in 2014.

Appendix 7 outlines details of the first basic neonatal care programme.

Dr Barbara Phillips with the help of Aaron demonstrating skin to skin maternal infant care

Dr David holding a workshop on neonatal hypothermia

Two midwives demonstrating skin to skin maternal infant care

Improvements to the maternity and neonatal wards at Phebe and CB Dunbar Hospitals

Certain developments at both Phebe and CB Dunbar hospitals which would enhance safe and efficient emergency care for pregnant women and their babies include:
1. Expansion, renovation and provision of equipment in the Emergency Room at Phebe Hospital
2. Renovation and equipment for the neonatal and maternity units at Phebe Hospital
3. Equipment for the neonatal and maternity units at CB Dunbar Hospital, including an air conditioner.

MCAI/ALSG under their Strengthening Emergency Healthcare programme have already provided funds to achieve some of these developments and will continue to work on this through further fund-raising efforts. A container with essential equipment is soon to be dispatched to Liberia.

Opening of the new emergency room at Phebe Hospital funded by MCAI/ALSG

A few days after the end of our visit in November 2013, the extended emergency room at Phebe Hospital was opened to treat patients by Dr Jefferson Sibley (the Medical Director) and Reverend Bruce Moilan (senior administrator). In a meeting between Prof David Southall and the Chief Medical officer for Liberia (Dr Bernice Dahn) it was agreed that Dr Sibley and Professor David would provide a list of new medical equipment for this emergency room so that Dr Dahn could look for potential donors. **Appendix 8** describes the equipment needed.

Two patients in the existing emergency room (entrance shown above left)

Pictures of the new emergency room extension at Phebe Hospital funded by MCAI (above right showing outside of the new building where a septic tank and two toilets are being finalised) and below inside the rooms in the new unit.

"Needs assessment" visits to the neonatal and maternity units at Phebe and CB Dunbar Hospitals for guiding future improvements

On two occasions Professor Southall has attended both neonatal units and maternity units with Dr Sibley, Dr Dolo, and with the senior nurses/midwives responsible, Mrs Patty R McLean for Phebe Hospital and Mrs Marie B. Padmore for CB Dunbar Hospital, to undertake "needs assessments". The findings were as follows:

Neonatal unit Phebe Hospital. This needs extensive renovation and the neighbouring ward set aside for skin to skin mother baby care also requires inclusion in this renovation work. The wards need decorating, tiling to 8 feet from the floor, more electrical sockets for monitoring, and plumbing to ensure sufficient hand washing facilities. The unit needs the following equipment: 2 oxygen concentrators, an examination light, a resuscitation platform incubator, blood glucose sticks and meter, an electric suction system, a phototherapy system for jaundice (a pulse oximeter has just been provided: see above) and weighing scales.

The existing incubators in the unit are an infection hazard, do not work and need removing. There should be suitable washable mats for the entrance as well as hand-washing dispensers.

Neonatal unit at CB Dunbar Hospital. This does not need renovation
The following equipment is required: an oxygen concentrator (the one present is broken), a phototherapy unit (the existing one is broken and if it cannot be repaired will need to be replaced), a resuscitation platform incubator (one present is broken), blood glucose sticks and meter and an electric suction system. Two broken incubators need removing as they are an infection risk. The examination lamp is broken and needs repair or replacement.

Labour and delivery wards at Phebe Hospital
Apart from general renovation, including tiling to 2 metres from the floor all round, plumbing and electrical work, the following equipment is required: 6 beds for mothers to labour on (the current mattresses are all broken and dirty), 1 additional delivery bed, 2 portable examination lights (none are working),1 portable ultrasound scanner, weighing scales for mothers and newborn infants, 1 neonatal platform incubator/resuscitaire, 1 oxygen concentrator, stainless steel trolleys, resuscitation trolley, 4 blood pressure machines (1 automatic), 1 high dependency bed, 1 suction system, 1 pulse oximeter.

Maternity wards at CB Dunbar Hospital
An air conditioner is urgently required as it is too hot in the postnatal ward creating an infection risk for where post-operative patients are being treated. An additional two pulse oximeters are required.

The training of selected midwives in advanced emergency obstetrics, including surgery

The Liberian medical and dental Council LMDC and MOHSW have now approved the pre-registration of the first two selected midwives (Ms Naomi Lewis and Ms Hannah Gibson) to undergo advanced obstetric training, including surgery, following a curriculum prepared by MCAI.

Between 12th and 21st October, Dr Johan Creemers a consultant obstetrician from the Netherlands and MCAI, visited Liberia to initiate the programme with Dr Sibley and Dr Dolo. The latter were to be the main providers of this advanced obstetric training in Phebe and CB Dunbar Hospitals respectively, using an apprenticeship approach. These trainers and the first two identified midwives were also given the curriculum and initial training materials together with a log book in which to enter all advanced obstetric interventions that they undertake (anonymised for patient confidentiality).

Dr Creemers and Professor Southall have also prepared an electronic logbook and database for the interventions to be recorded on an IPAD provided by the project for both trainers and trainees using Filemaker Pro software. These IPADs also contain the teaching materials needed for this advanced obstetric training such as videos (especially those of WHO, MCAI and Medical Aid Films), manuals and textbooks so that they can most easily learn from them. The IPADs have an 11 hour battery life which is important considering the presence of mains electricity for only 12 hours. The teaching materials include the obstetric chapters of the new MCAI/ALSG textbook on obstetric, neonatal and paediatric hospital care for low income settings due to be published early in 2014 by Radcliffe Publishers of Oxford. The IPADs loaded with teaching materials were provided to Hannah and Naomi during Dr Creemers' visit to Liberia from 13th December 2013 to 24th January 2014 along with a mini Wi-Fi router system to enable them to communicate with MCAI in the UK.

Naomi Lewis (on the left) and Hannah Gibson having just completed a caesarean section together supported by Dr Creemers

Naomi Lewis and Hannah Gibson operating under the close supervision of Dr Creemers who was standing next them fully surgically dressed to help with any problems.

Dr Creemers was accompanied on the current latest 6 week visit to Liberia by Dr Elizabeth McMillan, a consultant obstetrician from the UK and MCAI. Elizabeth is working alongside Dr

Creemers and focusing her work on upgrading the labour and delivery wards at Phebe Hospital and training midwives in both Phebe and CB Dunbar in vacuum deliveries. Both Dr Creemers and Dr McMillan are registered with the Liberian Medical and Dental Council to undertake clinical work and clinical teaching in Liberia.

Both doctors Creemers and McMillan organized a series of teaching sessions in both hospitals using existing project manikins and a new manikin donated by Dr Creemers (MamaNatalie) on 1. neonatal resuscitation 2. vacuum delivery (using new kits provided to each hospital by MCAI) and 3. post-partum haemorrhage.

Already two babies in Phebe Hospital have been successfully delivered using the vacuum delivery kits. One of these was undertaken by a midwife where a large baby was born successfully to a primigravida mother experiencing significant delay in the second stage of labour. Prior to Dr McMillan's teaching at Phebe this latter situation would have likely resulted in a caesarean section.

Here are the latest (by 12th January 2014) results of the training of the two trainee midwives:

Midwife undertaking advanced obstetric training	**Procedure**	**Number**
Hannah Gibson	Caesarean as assistant	28
	Undertaken caesarean section under supervision	3
	Manual removal of placenta	8
	Manual Vacuum Aspiration for miscarriage	6
	Balloon tamponade for post-partum haemorrhage	1
Naomi Lewis	Caesarean as assistant	42
	Undertaken caesarean section under supervision	5
	Manual removal of placenta	12
	Manual vacuum aspiration	10
	Vaginal breech delivery	3

An additional senior international obstetrician from MCAI (Dr Alice Clack) is ready to start work with helping train midwives in advanced obstetrics for 4 months from March 2014.

Two additional midwives have been identified as potentially suitable for this training and we are intending to discuss these with MOHSW and LMDC later this month.

In addition to apprenticeship based training, Dr Creemers has arranged a weekly morning meeting in the maternity unit for doctors and the two trainee midwives for them to present, discuss and audit patients at CB Dunbar Hospital. The aim is for these midwives to become highly competent in all aspects of managing obstetrics as if they were doctors.

Dr McMillan has already made major improvements to the delivery ward at Phebe (see figure) and arranged for a new oxygen concentrator/nasal CPAP system donated by MCAI to be installed in the neonatal ward for babies with respiratory failure.

Improving the standards of obstetric care at Phebe and CB Dunbar Hospitals

Newly organized and cleaned delivery room at Phebe Hospital produced under the supervision of Dr McMillan

New nasal CPAP and oxygen concentrator in the neonatal unit at Phebe Hospital

Monitoring and evaluation

During the June 2013 visit, Professor Southall, as part of the baseline monitoring and evaluation exercise, attended every clinic and hospital in Bong County with the support of the WHO, including their vehicle and senior driver. A baseline report on this activity prepared by MCAI volunteer (dr Edward Southall) is now available.

In the November 2013 visit, Professor Southall, as part of the baseline monitoring and evaluation exercise, met with Dr Nestor Ndayimirije and Dr Musu Duworko at WHO in Monrovia. Discussions concerning the confidentiality of the data were undertaken and also the way forward with future monitoring now that the baseline data have been documented. It was considered that WHO should now be in charge of future monitoring and evaluation with MCAI/ALSG having a quality control involvement. Professor Southall put Dr Musu in touch with Emmanuel Dweh the public health officer who is in charge of collecting the raw maternal and neonatal data as well as the maternal and neonatal death audits. Dr Musu will also involve the new Director of Bong County Health Team Dr S. Arzoaquoi.

Emmanuel Dweh was loaned a netbook computer by MCAI and loaned their camera for taking the photographs of the birth registers from both the hospitals and the clinics. Mr Dweh has already obtained the hospital data for the first intervention year of the project; from November 1st 2012 to November 1st 2013. Mr Dweh was asked to present the baseline data at a THET meeting in Sierra Leone on 13th-14th November which he did. Mr Dweh also has placed a password on the new computer to ensure that patient confidentiality is maintained.

The Phebe Hospital Waiting Home built by Africaire

Members of MCAI/ALSG international team have attended the waiting home at Phebe Hospital on a number of occasions over the last 15 months. It has 18 beds and accommodates pregnant women at high risk of complications from 7-9 months of pregnancy. There is a live-in midwife (Mrs Viola Makor). The waiting home has a garden where food is grown and there is a security guard and the home has its own pet dog (called "Rescue").

Three mothers in the waiting home at Phebe Hospital

Head supervisor Patty McLean and security guard outside waiting home at Phebe Hospital

A number of problems were identified which have now been addressed by MCAI. These are:
1. When women go into labour they have to walk around 400 metres to the hospital on a path through the bush where there are snakes. They do not have torches or any protection to their legs. MCAI agreed to provide a set of rubber knee-length boots and two torches with re-chargeable batteries to address this risk.
2. Many of the expectant mothers do not have mobile telephones or money to pay for either calls home or food whilst living in the waiting home (which can be for periods of several months depending on the risk factors). MCAI has provided a wall-mounted telephone to allow regular short telephone calls for those who cannot communicate with their families. Ongoing discussions with Hospital management will decide on how these calls will be paid for.
3. Prof Southall discussed the problem of food for the expectant mothers with Viola the midwife in charge (who frequently pays for food with her own money) and with Dr Arzoaquoi (Director Bong County Health Team).

Mothers in the waiting home using the new telephone to contact their families at home

Viola Makor the midwife in charge of Phebe waiting home wearing the anti-snake wellington boots provided for her and for mothers walking when in labour the 400 yards to the hospital for delivery

Other issues relevant to the continuing programme to enhance emergency obstetric and neonatal care at Phebe and CB Dunbar hospitals

Prevention of life-threatening infection
The initial background monitoring and evaluation for Bong County performed by WHO and MCAI as part of this project has shown that puerperal and neonatal sepsis is a major problem causing many deaths. During the EMNH courses there was considerable emphasis placed on the prevention of hospital-based infection, including a workshop on this subject.

One possible solution, discussed in the workshop, was the use of obstetric Chlorhexidine cream (Hibitane cream) for all pelvic examinations in labour, especially after ruptured membranes. An initial supply of this material has been given to both hospitals to assess its possible value.

Perhaps of much more importance, was information obtained from the infection control workshop indicating how much of the puerperal sepsis probably arises in those poorest families where the mother cannot afford sanitary towels to keep her genital tract clean during the puerperium. As a result of this finding, MCAI has now started raising funds to provide, if possible, every woman or girl who has just given birth with a pack containing essential basic materials to help prevent infection (sanitary towels, soap, hand towels etc.).

Finally there have been a number of serious post-operative infections at CB Dunbar Hospital, possibly related to the humid and very hot post-operative ward area. An air conditioner will now be provided by MCAI and placed in this area with the hope of reducing the risk of wound infection.

More post-partum hygiene kits for new mothers designed to reduce infection have been assembled and made available to those mothers using the waiting home (see above). An air-conditioner (funded by MCAI) has also now been installed in the neonatal ward and one to help reduce the risk of wound infection is about to be installed in the post-operative ward at CB Dunbar Hospital.

Pathways of care concerning some of the life threatening complications of pregnancy and delivery in Liberia
Following work undertaken by Dr Dolo and Professor Southall, two algorithms presented as A2 laminates have been prepared for distribution to all maternity units, emergency rooms and health facilities in Bong County. These are Figures 1 and 2 and 42 copies of these were delivered to the clinics and hospitals.

Provision of anti-snake venom
During one set of the training, a two-headed Black Mamba snake fell from a tree under which the training was occurring (the electricity supply had temporarily failed). Fortunately a local man killed the snake and there was no injury. This emphasises the need for the anti-venom that we have supplied to the hospital.

The initial supply of anti-venom has been used on two patients admitted to Phebe Hospital. A new supply has been obtained by MCAI and is at present in the hospital pharmacy.

Condom catheters for the treatment of severe post-partum haemorrhage
Skill stations in the EMNH courses confirmed our initial opinion that condom catheters (to provide balloon tamponade of the uterus) should be made available (with additional training) for cases of severe post-partum haemorrhage not responding to standard treatment in all hospitals and clinics in Bong County. A manual on this procedure is currently being prepared. An additional skill station was undertaken as part of the present two EMNH courses to help address this. The use of a condom catheter containing air rather than IV fluid is also under investigation and could be much easier to use.

Accommodation, food and security for the international visitors
All involved thank Mr Jeremiah Akoi for ensuring that all of these 3 areas of support were in place during our visits to Liberia. House 13 on the Phebe Hospital compound was completely renovated with funds as part of the THET grant and was used throughout the last visit. The food in the Flagpole Restaurant was nutritious and there were no problems with food-born-diseases.

Acknowledgments
We thank Dr Bernice Dahn, Dr Saye Baawo, Dr Samson Arzoaquoi, Dr Jefferson Sibley, Dr Obed Dolo, Dr Garfee Williams, Dr Lawrence Sherman and the regional health team, especially Jeremiah Akoi, Emmanuel Dweh and Reverend Bruce Moilan, for providing so much support to ensure that this project has progressed so well. We thank Dr Nestor Ndayimirije and Dr Musu Duworko Country Representative and Deputy of WHO Liberia respectively and Dr Meena Cherian Director of the Global Initiative for Emergency and Essential Surgical Care (GIEESC) at WHO in Geneva for all their help and guidance with the first 15 months of this project. The preparation of the candidates, the food, accommodation and security were important in Phebe Hospital and we are particularly grateful to Dr Sibley for his efforts to ensure this. We are also grateful for the invaluable assistance of Raphael Davis and the drivers from WHO, as well as the drivers from Phebe, who all ensured that the international visitors were kept safe during their journeys.
We thanks all international volunteers who have helped with this project.

Professor David Southall Honorary Medical Director, MCAI and ALSG, Project leader
Dr Barbara Phillips, Trustee and Medical Educator ALSG, Leader of the neonatal programme
Dr Brigid Hayden, Leader of the EESS-EMNH courses, lead obstetrician MCAI and ALSG
Dr Johan Creemers, Director of the second EESS-EMNH course and supervisor of the obstetric clinicians and their training, MCAI and ALSG
Dr Elizabeth McMillan, consultant obstetrician MCAI
Dr Rhona MacDonald, Honorary Executive Director, MCAI

Appendix 1 Programmes for the 2 EMNH courses

Emergency Maternal and Neonatal Health Course

Example of course number 2: November 7th to 9th 2013

Faculty	
Johan Creemers (Director)	Jeremiah Akoi: Co-ordinator
Famara Fatty	Frank Van Raaij
Hannah Gibson	
Gertrude Cole (IC)	Aaron Sonah
Taiwah Bombo (IC)	Seratta Glee (IC
Peter S Sumo (IC)	Patty McLean (IC)
Marie Padmore (IC)	Korpo Gbozee (IC)
Naomi Lewis (advanced obstetrics trainee)	

Course Number 2; Day 1

Time:	**Session Title:**	**Faculty Allocation:**
0900 – 0930	Arrival, registration and photographs	**Jeremiah**
0930 –0945	Welcome, introduction and objectives of the course. Life- saving skills.	**Johan**
0945 – 1015	**MCQs**	
1015– 1035	Putting emergency care of mothers and newborn infants into context in Liberia.	**Peter/Hannah**
1035 -1100	**Break**	
1100 – 1130	Structured approach to emergencies in mother and newborn	**Johan**
1130 – 1150	Airway and Breathing management in the mother : Lecture	**Frank/Aaron**
1150 – 1220	Resuscitation at birth: Lecture with demonstration	**Famara**
1220 – 1350	Skills with hands -on practice: -	

Time	**1220– 1305**	**1305 – 1350**
Airway/Breathing Mother **Hannah/Gertrude**	Red	Blue
Airway/Breathing Mother **Famara/Taiwah**	Green	Yellow
Resuscitation at Birth **Johan/Patty/Peter**	Blue	Red

Resuscitation at Birth **Hannah/Seratta**	Yellow		Green	
1350 – 1445	**Lunch**			
1445 – 1645	Workshops			
Time:	**1445 – 1515**	**1515 - 1545**	**1545 – 1615**	**1615 – 1645**
Triage in Pregnancy **Johan/Gertrude**	Red	Blue	Green	Yellow
Twin delivery **Frank/Patty/Taiwah**	Blue	Green	Yellow	Red
Infection control and prevention of HIV/Hepatitis **Famara/Aaron**	Green	Yellow	Red	Blue
Blood transfusions **Hannah/Seratta/Peter**	Yellow	Red	Blue	Green
1645-1710	Serious medical illnesses in pregnancy			**Frank**
1710-1740	**Faculty meeting**			

Course 2; Day 2

Time:	**Session Title:**	**Faculty Allocation:**
0900 – 0930	Shock in pregnancy	**Johan/Patty**
0930 – 1000	Massive obstetric haemorrhage	**Famara/Gertrude**
1000 – 1030	**Break**	
1030 – 1100	Demo scenario on massive PPH	**Instructor: Hannah** **Candidate: Frank** **Evaluator: Johan**
1100 – 1130	Recognising and managing neonatal illness + video	**David**
1130 – 1330	Scenarios:	

Time	**1130-1200**	**1200-1230**	**1230-1300**	**1300-1330**
Scenarios: Station 1 Neonatal illness **Frank/Patty**	Red	Blue	Green	Yellow
Scenarios: Station 2 Massive haemorrhage: PPH APH **Famara/Taiwa/Seratta**	Blue	Green	Yellow	Red
Scenarios: Station 3 Neonatal illness **Hannah/Aaron**	Green	Yellow	Red	Blue
Scenarios: Station 4 Shock due to puerperal sepsis **Johan/Gertrude/Peter**	Yellow	Red	Blue	Green
1330 – 1430	**Lunch**			

1430-1500	Eclampsia Lecture	**Famara**
1500 – 1520	Complications of early pregnancy Lecture	**Johan/Peter**
1520 – 1545	Demo scenario on ruptured ectopic pregnancy	**Instructor: Johan** **Candidate: Famara** **Evaluator : Frank**
1545 – 1600	Videos of external jugular cannulation, IO needle and UVC catheter	**Johan**
1600 – 1700	Skills: Circulation: **Cut down trainer, and instructor's external jugular vein** Workshop/skills: **eclampsia**	
TIME	**1600 – 1630**	**1630 – 1700**
Difficult venous access in pregnancy **Johan/Patty/Peter**	Red	Blue
Eclampsia workshop **Famara/Gertrude**	Blue	Red
Difficult venous access in pregnancy **Frank/Seratta**	Green	Yellow
Eclampsia workshop **Hannah/Taiwah/Aaron**	Yellow	Green
1700 – 1730	Major trauma in pregnancy: Lecture	**Johan**
1730 – 1800	**Faculty meeting**	

Course 2; Day 3

Time	**Session Title**	**Faculty Allocation**
0830 - 0855	Obstructed labour: Lecture	**Frank/Taiwah**
0855 – 0920	Complications of labour and delivery: Lecture	**Famara/Seratta**
0920– 0945	Demo scenario: shoulder dystocia	**Instructor : Hannah Candidate :Johan** **Evaluator : Famara**
0945 – 1005	Demo scenario: vaginal breech delivery	**Instructor : Frank Candidate :Hannah Evaluator : Johan/Peter**
1005 – 1030	**Break**	
1030 – 1230	Delivery-related skills	

Time	**1030 –1100**	**1100 – 1130**	**1130 – 1200**	**1200 – 1230**
Vaginal breech **Famara/Seratta**	Red	Blue	Green	Yellow
Cord prolapse/ uterine inversion **Johan/Gertrude/**	Blue	Green	Yellow	Red

Taiwah				
Shoulder dystocia **Frank/Aaron/ Peter**	Green	Yellow	Red	Blue
PPH Procedures **Hannah/Patty**	Yellow	Red	Blue	Green
1230 – 1300 **1300-1345**	**MCQs** **Lunch**			
TIME	**1345 - 1415**		**1415 – 1445**	
Eclampsia /severe pre-eclampsia **Frank/Taiwah**	Red		Green	
Eclampsia/severe pre-eclampsia **Johan/Gertrude**	Blue		Yellow	
Ectopic / Miscarriage/APH **Hannah/Patty/ Aaron**	Green		Red	
Ectopic / Miscarriage/APH **Famara/Serata/Peter**	Yellow		Blue	
1445-1600	**Test scenarios (10 mins.);1=PPH;2=Eclampsia;3=Neonatal Resusc.**			
1600-1700	**Faculty meeting / Tea**			
1700-1730	Logbooks, record keeping, transfer notes: **Famara/Hannah**			
1730-1800	**Closing ceremony, bag valve masks, pocket books, CD Roms: All Faculty**			

Appendix 2 Feedback form used in both courses and summary of results of feedback

EMNH COURSE EVALUATION FORM

November 2nd to 12th 2013

What do you think of the course? Please write your views here, in your own words. What did you learn on the course that you will take back to your workplace? Do you feel more confident following the course?

Would you add anything to the course? If so what would you add? Would you change anything about the course? If so what would you change? Would you leave out anything from the course? If so what would you leave out?

Only if you wish to, please write your name and your occupation here:

……

Appendix 3 Generic Instructor Course – Programme Nov 2012

Instructor	
Director	
Educator	
Coordinator	

Day One

Time		Learning Outcomes
08.45 – 09.00	Registration	
09.00 – 09.15	Introduction and Welcome	
09.15 – 10.15	Adult Learning ~ Educator	By the end of this session you should be able to: ▪ Describe your own personal learning style ▪ Identify some factors that might facilitate your own learning ▪ Recognise that other individuals are likely to have different learning preferences ▪ Think of ways of planning teaching and learning to suit a variety of learning styles
10.15 – 10.45	**Breakfast**	
10.45 – 11.45	Equipment familiarisation (3 x 20 minute rotations) **All faculty**	By the end of this session you should be able to assemble and safely use: ▪ Manikins By the end of this session you should be able to set up and effectively use: ▪ An overhead projector ▪ A PowerPoint projector
11.45 -12.15	Lecturing Demonstration Lecture & Critique Lecture critique and discussion ~ Educator	By the end of this session you should be able to: ▪ Critically observe a 5 minute lecture and identify its principal features and the 3 phases of set, dialogue and closure ▪ Comment on these features in providing positive feedback ▪ Discuss the lecture as a teaching method, identifying its strengths and weaknesses
12.15 – 12.45	Skills Teaching Demonstration Skill Station & Critique	By the end of this session you should be able to: ▪ Observe, describe and apply the four stage approach to skills teaching

	Critique and discussion ~ Educator	▪ Discuss the main educational features of the four stage approach to skills teaching
12.45 – 13.15 13.15 – 14.15	Practice: lectures, skills, with mentors Lunch	

14.15 – 16.45	Practice Stations: lectures and skills teaching		
Station/Time	14.15 – 15.30	15.30 – 16.45	**Faculty**
Lecture	A	A	
Skill Teaching	B	B	

16.45 – 17.00	Faculty Meeting	

Day Two

Time		**Learning Outcomes**
08.30 – 08.45	Mentor Meetings	
08.45 – 09.45	Closed and Open Discussions Demonstration Closed Discussion and Critique Demonstration Open Discussion and Critique Critique and discussion ~ Educator	By the end of these sessions you should be able to: ▪ Recognise the two different types of approaches to group discussion ▪ Compare and contrast the relative merits and application of closed and open discussion ▪ Plan group discussions, based on a universal structure for teaching ▪ Recognise and apply appropriate techniques for facilitating and controlling the group
09.45 – 10.15	Teaching scenarios and role playing Demonstration Teaching Scenario and Critique Critique and discussion ~ Educator	By the end of this session you should be able to: ▪ Discuss the application of role play and scenario teaching ▪ Recognise the important features of role play and scenario in resuscitation teaching ▪ Both organise and take part in role plays and scenarios
10.15 – 10.45	**Breakfast**	

10.45 – 13.15	Practice Stations: closed discussions and scenario teaching		
Station/Time	10.45 – 12.00	12.00 – 13.15	**Faculty**
Scenario Teach	A	B	
Closed discussion	B	A	

13.15 – 14.15	**Lunch and Faculty meeting regarding decision on candidates suitability for becoming**

	instructor candidates	
14.15 – 15.00	Assessment: skills and scenarios Demonstration Skill Testing and Critique Demonstration Scenario Testing and Critique Critique and discussion ~ Educator	By the end of this session you should be able to: ▪ Describe the basic principles of assessment ▪ Critically discuss the key issues surrounding assessment, especially with regard to making pass/fail decisions and informing candidates of these decisions ▪ Begin to apply these principles to the skills and competencies covered on provider courses

15.00 – 17.00	Practice Stations: assessment of skills and scenarios			
Station/Time	15.00 – 16.00		16.00 – 17.00	**Faculty**
Skills Assess	A		B	
Scenario Assess	B		A	

17.00 – 17.30	For candidates: "Role of the Instructor" Discussion led by Course Director and Course Co-ordinator	By the end of this session you should have: ▪ Discussed the role of the instructor (through open discussion), facilitated by the Course Director
17.30 – 17.45	Faculty Meeting	
17.45 -18.00	Feedback in main lecture room	
18.00	Course closure	

Appendix 4

FEEDING IN THE NEONATE

- Breast milk including colostrum whenever possible: the mother of a pre-term infant produces milk with more nutrition.
- Every two to three hours by cup or gastric tube where appropriate
- The smaller the baby the more frequent but smaller the feeds.
- If not at the breast, still feed on demand but no less than 2 hourly for infants weighing < 1500 Gm and 3 hourly for infants weighing > 1500 Gm

Volumes of milk per Kg per day from birth

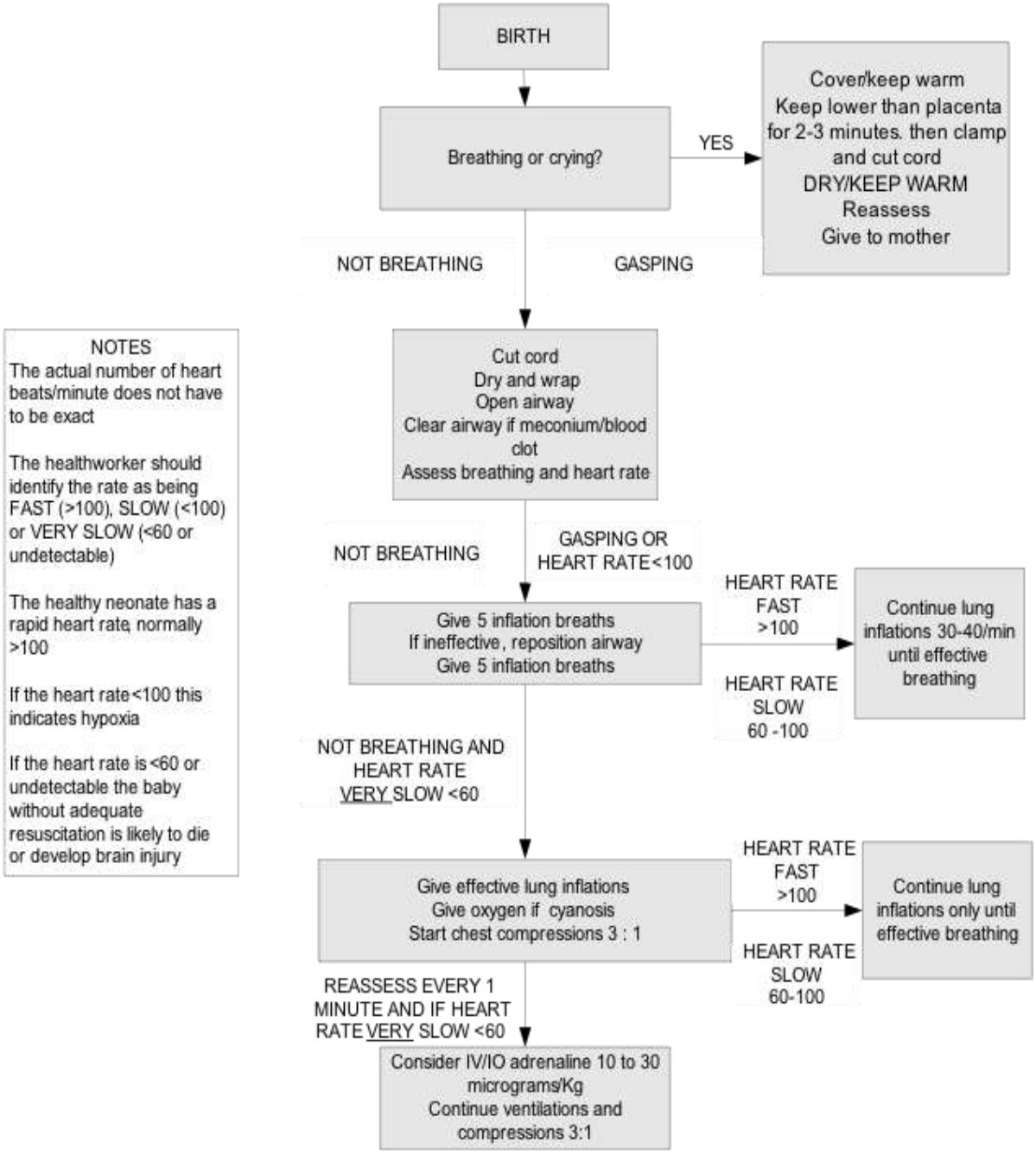
AGE	VOLUME OF MILK PER KG PER 24 HOURS
Day 1	60 ml/Kg/day
Day 2	80 - 90 ml/Kg/day
Day 3	100 - 120 ml/Kg/day
Day 4	120 – 150 ml/Kg/day
Day 5 and onwards	140 – 180 ml/Kg/day

Approximate quantity of milk to feed by cup or gastric tube (in ml) every 2-3 hours from birth by infant's weight

Weight (Kg)	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
1.5 – 1.9 Kg	15 ml	17 ml	19 ml	21 ml	23 ml	25 ml	27 ml	31 ml or more if willing
2.0 – 2.4 Kg	20 ml	22 ml	25 ml	27 ml	27 ml	30 ml	32 ml	35 ml or more if willing
2.5 Kg or more	25 ml	28 ml	30 ml	35 ml	35 ml	40 ml or more if willing	45 ml or more if willing	50 ml or more if willing

Appendix 5

Neonatal resuscitation algorithm



Appendix 6

RECOGNITION AND TREATMENT OF NEONATAL INFECTIONS

Danger signs associated with infection in the neonate: WHO

- Infant feeding less than well than before
- Infant lying quiet and making few spontaneous movements
- Fever > 38ºC or hypothermia
- Capillary refill time > 3 seconds
- Respiratory rate 60 or more breaths per minute
- In-drawing of the lower chest wall when breathing, *or* grunting or apnoeic episodes
- Cyanosis or reduction in oxygen saturation
- History of a convulsion

Less common but important signs include:

- Low respiratory rate < 20/minute or apnoea
- Jaundice
- Abdominal distension
- Skin, eye or umbilical infections

Antibiotics: Ampicillin (or penicillin) PLUS gentamicin IV or IM
Cefotaxime or ceftriaxone is an alternative IV or IM

Drug	Dose	Drug	Frequency
Ampicillin	50 mg/Kg unless meningitis when 100 mg/Kg	**Ampicillin**	12 hourly 1st week 8 hourly 2nd -3rd week 6 hourly 4th week of life onwards
Penicillin	30 mg/Kg unless meningitis or tetanus when 50 mg/Kg	**Penicillin**	12 hourly 1st week 8 hourly 2nd -3rd week 6 hourly 4th week of life onwards
Gentamicin	5mg/Kg unless infant < 2 Kg when give 4 mg/Kg	**Gentamicin**	Once every 24 hours unless infant under 32 weeks gestation when once every 36 hours Also reduce frequency to every 36 – 48 hours if concern about renal function: for example not passing much urine
Cefotaxime	50 mg/Kg	**Cefotaxime**	12 hourly 1st week 8 hourly 2nd -3rd week 6 hourly 4th week of life onwards Except if meningitis when 6 hourly
Ceftriaxone	50 mg/Kg if < 7 days old and 75 mg/Kg if 7 days or older	**Ceftriaxone**	Once every 24 hours

Appendix 7

Neonatal Care Course Programme
Liberia 13th -14th June 2013

Faculty
Instructors: David Southall, Barbara Phillips
Coordinator: Jeremiah Akoi
Observer: Nurse anaesthetist Aaron Sonah

Day 1			
8.00 – 8.30	Faculty meeting		
8.30 - 9.00	Registration and photos		
9.00 – 9.15	Welcome and introduction: what to expect from the course		DS
9.15 – 9.30	Putting care of newborns into context in Liberia		DS
9.30 – 9.45	The small baby		BP
9.45 – 10.15	Hypothermia		DS
10.15 – 10.45	Kangaroo Mother Care		BP
10.45 -11.15	Break		
11.15 – 12.15	Workshop/Skill stations; 1 Kangaroo Mother Care, 2 keeping babies warm,		
Stations	11.15 – 11.45	11.45 – 12.15	
1	A	B	BP
2	B	A	DS
12.15 – 12.45	Infection control		
12.45 -13.15	Nutrition and feeding		
13.15 – 14.15	Lunch		
14.15 – 16.15	Workshops, Skill stations; 1 Breast feeding problems, 2, Hand hygiene and utensil sterilisation, 3, Pain control in babies, 4 Monitoring		
Stations	14.15 – 14.45	14.45 – 15.15	
1	A	B	BP
2	B	A	DS

Stations	15.15 – 15.45	15.45 – 16.15	
3	A	B	BP
4	B	A	DS
16.15 – 16.30	Meet mentees		
16.30	Close of Day 1		

Day 2			
8.15 – 8.45	Faculty meeting		All
8.45 – 9.00	Registration		JA
9.00 – 9.30	Resuscitation at birth		BP
9.30 - 10.30	1 Workshop and 2 skill station on resuscitation at birth		
Station	9.30 – 10.00	10.00 – 10.30	
1	A	B	BP
2	B	A	DS
10.30 - 11.00	Break		
11.00 - 11.45	Infections		DS
11.45 – 12.15	Respiratory problems		BP
12.15 – 13.15	Workshop /skill station on 1. Recognising the sick infant 2. Oxygen use and pulse oximeter		
Station	12.15 – 12.45	12.45 – 13.15	
1	A	B	BP
2	B	A	DS
13.15 – 14.15	Lunch		
14.15 – 14.45	Jaundice		DS
14.45 – 15.15	Convulsions		BP
15.15 – 16.15	Simulations 1. Infections, 2. Convulsions and jaundice		
Station	15.15 – 15.45	15.45 – 16.15	
1	A	B	DS

2	B	A	BP
16.15 – 16.30	Break		
16.30 – 17.00	MCQ		JA
17.00 – 17.30	Simulation test		All
17.30 – 18.00	Presentations and close		All

Appendix 8 Equipment needed for the new Emergency Room at Phebe Hospital

Description	Qty	Price Per	Total
Patient trolley with mattress and side rails	6	840.00	5,040.00
Newlife Oxygen Concentrator, 8 litres/min, dual flowmeter 220v - 240v Std	8	1,200.00	9,600.00
Electrical Aspirator 3A Double Piston 1000ml Jar	4	255.00	1,020.00
Manual suction machine	4	115.00	460.00
Patient Monitor G3H standard configuration with carry handle and mounting bracket	4	1,550.00	6,200.00
Lifebox Pulse oximeter (supplied at cost)	2	160.00	320.00
Nebuliser	4	60.00	240.00
Drip stand with double hook IV pole	12	115.00	1,380.00
Portable examination light with UPS backup	4	4,850.00	19,400.00
Hydraulically operated 3 section operating table for minor procedures with breather hole and plug.	1	1,070.00	1,070.00
Stainless steel instrument trolley	6	240.00	1,440.00
Emergency trolley	2	3,125.00	6,250.00
Automatic defibrillator	1	5,740.00	5,740.00
Solid door pharmacy refridgerator with temperature display	1	2,250.00	2,250.00
Portable ultrasound scanner	1	6,570.00	6,570.00
Mechanical baby scale with sliding weights	1	375.00	375.00
Mechanical flat scale adult scales	1	95.00	95.00
Mobile sphygomomanometer with reusable cuffs. Includes 3 cuffs , 1 each for adult, infant and child	4	300.00	1,200.00
Patient transfer slide with transfer sheet	2	300.00	600.00
Volt Stabiliser 6A 230v	8	200.00	1,600.00
Digital 12 channel ECG machine with interpretation	1	1,760.00	1,760.00
Total Price ex work		s UK £	72,610.00

Current Availability: 8 weeks

Validity: Prices valid for orders placed by 31st January 2014

Figure 1

PATHWAY OF CARE FOR PATIENTS WITH ECLAMPSIA

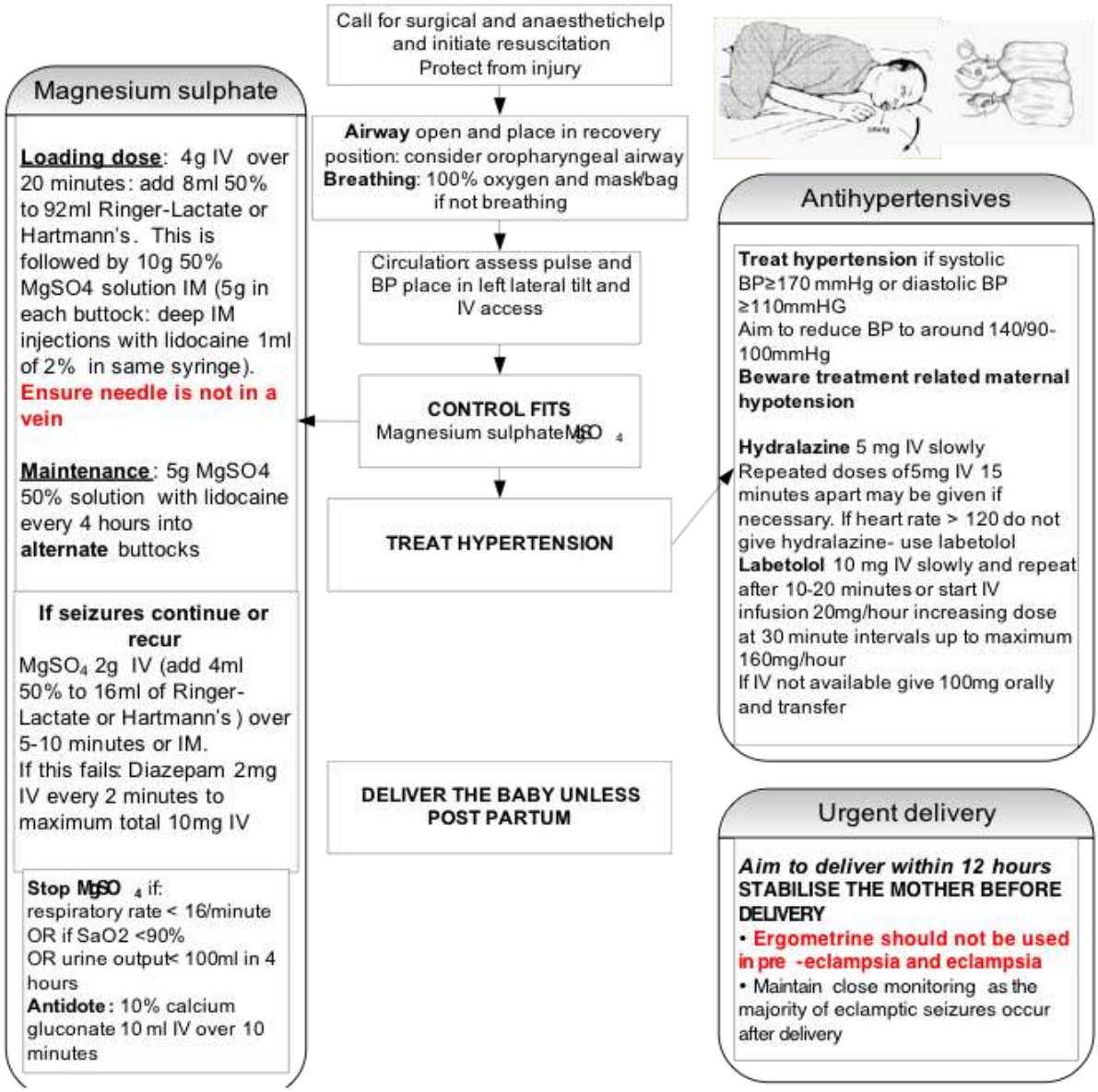
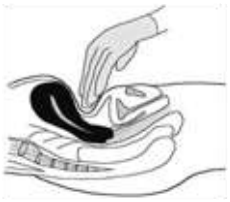


Figure 2

PATHWAY OF CARE FOR PATIENTS WITH POST PARTUM HAEMORRHAGE



Call for help and initiate resuscitation
Immediately **massage the uterus**

Airway
Breathing: high flow **oxygen** and mask/ bag if stops breathing

Take blood for FBC, clotting and cross match 6 units

Once available give warmed blood as much and as rapidly as needed.
Ideally cross matched (takes 1 hour);
Blood type specific (takes 15 minutes);
O negative (immediate)

Circulation: **Stop bleeding** by giving **uterotonic drugs**
Oxytocin 10 units IV and maintain contraction with **oxytocin 40 iu in 500ml** Ringer-Lactate/Hartmann's over 4 hours
Place
2 IV lines (14-16G cannula)

Continually reassess ABC

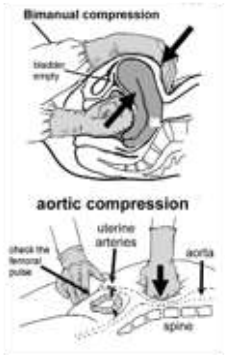
Urinary catheter
Pulse, BP, temp and SaO2

Place baby on breast as soon as well enough

Treat DIC with fresh blood

If shocked: Give **1-2 litres Ringer-Lactate/Hartmann's** as rapidly as possible whilst awaiting blood
Elevate legs

If still bleeding



If **placenta** is in place: **remove** urgently
Pass a urinary catheter if enlarged bladder
If still bleeding: try **ergometrine 250 mcg IV** over 2-3 minutes **plus 250 mcg IM**
If still bleeding: add 800 micrograms of **misoprostol** (4 x 200 micrograms) rectally

If still bleeding

If still bleeding **examine cervix and vagina** for lacerations: if present **pack** and take to theatre for repair
If no lacerations and still bleeding from uterus:
Apply **bimanual compression** whilst assembling hydrostatic balloon (**condom catheter**) into uterus inflated with 250-500 ml sterile Ringer-Lactate/Hartmann's/Normal Saline
Consider **aortic compression**

If still bleeding

Laparotomy and possible hysterectomy
Do not leave it too late