

EmONC signal function operational definitions

Obstetric signal functions	Intervention description/definition ¹
Administer medications to treat postpartum hemorrhage	Uterotonics (oxytocin alone as the first choice) are used to treat postpartum hemorrhage (PPH) most commonly caused by atonic uterus. In settings where oxytocin is unavailable, the use of other injectable uterotonics or oral misoprostol is recommended. In addition, the use of tranexamic acid is recommended. Use of uterotonic medications as part of active management of the third stage of labor is not counted towards performance of this signal function.
Administer parenteral antibiotics (maternal)	Parenteral antibiotics are used for suspected or established severe maternal infections of the pelvic organs (e.g. uterus – endometritis; fallopian tubes; ovaries) or upper urinary tract.. Their use is also recommended in cases of maternal generalized bacteremia and septicemia. Parenteral includes administration of a drug through the intravenous route or as intra-muscular injections.
Administer magnesium sulfate	Magnesium sulfate is given to women diagnosed with severe pre-eclampsia or eclampsia to prevent and treat convulsions.
Remove retained products of conception	Retained products of conception (POC) can occur as a result of an incomplete spontaneous or induced abortion. Vacuum aspiration entails inserting an appropriately sized cannula into the uterus, creating vacuum in a plastic syringe, connecting it to the cannula and removing the POC with gentle aspiration using a rotating movement. POC can also be removed by dilatation and evacuation. Medical management with misoprostol is another way to remove retained POC.
Perform manual removal of retained placenta	This procedure addresses retained placenta or fragments of the placenta. The manual removal of retained placenta is recommended if the placenta has not expelled within 30 minutes after birth of baby, especially in cases of heavy bleeding. It entails antiseptic procedure, pain relief, and insertion of sterile gloved hand into the uterus to locate the edge of the placenta, separating the placenta in its entirety from the uterine wall and removing it. Manual removal of placenta should only be attempted at the Basic EmONC level when there is hemorrhage.
Perform assisted vaginal birth	This procedure is performed during the second stage of labor to deliver the baby for indications of fetal distress or prolonged second stage of labor. Prerequisite conditions are a skilled health provider, fully dilated cervix and a presenting fetal head that has descended sufficiently. Assisted vaginal birth can be performed using a vacuum extractor (ventouse) or forceps.
Provide IV fluid replacement therapy	Intravenous replacement fluids during pregnancy and labor as replacement therapy or in the postpartum period to treat shock are the first-line treatment for hypovolemia due to hemorrhage (antepartum/postpartum), sepsis or other cause. In case of postpartum hemorrhage it maintains the circulation whilst interventions to control bleeding are performed and assessment is made for whether blood transfusion is needed.
Administer antenatal corticosteroids	The administration of antenatal corticosteroids (ACS) to women at risk of imminent preterm birth is used to stimulate fetal lung maturation and refers to dexamethasone or betamethasone administered by intramuscular injection for women at risk of imminent preterm birth (anticipated within the subsequent 7 days) from 24 weeks to 34 weeks gestation.

¹ The content in this table was adapted from: World Health Organization, UNFPA, UNICEF (2017). Managing Complications in Pregnancy and Childbirth: a EmONC guide for midwives and doctors – 2nd edition, Geneva: World Health Organization; 2017. License: CC BY-NC-SA 3.0 IGO; and, World Health Organization (2023). WHO recommendations on the assessment of postpartum blood loss and treatment bundles for postpartum haemorrhage. Geneva: World Health Organization; 2023. Licence: CC BY-NC-SA 3.0 IGO.

Obstetric signal functions	Intervention description/definition ¹
Perform cesarean section	Cesarean section is performed for multiple maternal and fetal indications that commonly include prolonged or obstructed labor, fetal distress, malpresentation or placenta previa.
Perform blood transfusion	The need for the transfusion of whole blood or blood products can occur due to antepartum or postpartum hemorrhage leading to shock, loss of a large volume of blood such as with ruptured ectopic pregnancy or an operative birth, or with coagulation disorders or severe anemia late in pregnancy.
Provide intensive level organ support	Intensive-level support of one or more organs (i.e., mechanical ventilation or dialysis) may be required for women with severe complications, including severe PPH or sepsis, septic shock, acute renal failure, respiratory distress or cerebral hemorrhage.

Neonatal signal functions	Intervention description/definition ²
Perform newborn resuscitation with bag and mask	Basic newborn resuscitation at the time of birth comprises a set of interventions required to establish breathing and circulation in a newborn who is not spontaneously breathing/crying at birth. This procedure includes providing positive-pressure ventilation with a bag and mask equipment of an appropriate size (i.e., it does not refer to simple stimulation by rubbing, drying).
Initiate and support early and exclusive breastfeeding	All women should be supported to initiate breastfeeding as soon as possible after birth, within the first hour after delivery. Women should receive practical support to enable them to initiate and establish breastfeeding and manage common breastfeeding difficulties. Mothers should also be given support and practical training on how to express breast milk as a means of maintaining lactation in the event of their being separated temporarily from their infants. In the case of small and sick newborns, breastmilk is especially important to protect vulnerable babies from infection and problems with the gut, as well as support neurodevelopment and overall growth.
Administer parenteral antibiotics (newborn)	Parenteral antibiotics are used for suspected or established infections including the clinical syndromes of sepsis, meningitis or pneumonia in newborns based on clinical presentation diagnosed via clinical algorithm or confirmed via positive blood culture. Parenteral includes administration of a drug through the intravenous route or as intra-muscular injections. At the Basic EmONC level, antibiotics may be given at least as an intramuscular dose as pre-referral treatment. At a Comprehensive and Intensive care level, antibiotics may be given as IV doses or infusions.
Practice immediate kangaroo mother care for preterm and LBW infants	Kangaroo mother care (KMC) is an evidence-based approach to care of preterm and/or LBW infants involving continuous and prolonged skin-to-skin contact with the mother (or other caregiver) in an upright position. The aim is for early initiation of KMC (immediate KMC) and for continuous performance (>18 hours per day). At Basic EmONC level KMC can be provided for most of the day for small babies who do not require level 2 care or higher. KMC provided at a Comprehensive or Intensive care level would be provided alongside other supportive care. Other key components of KMC are support for exclusive and early breastmilk provision and timely discharge from the hospital with appropriate follow-up. When babies are not in KMC position with the mother or another care-giver, appropriate thermal care should be provided.

² The content in this table was adapted from: World Health Organization, UNFPA, UNICEF (2017). Managing Complications in Pregnancy and Childbirth: a EmONC guide for midwives and doctors – 2nd edition, Geneva: World Health Organization; World Health Organization (2020). Standards for improving quality of care for small and sick newborns in health facilities. Geneva: World Health Organization; and, World Health Organization (2015). World Health Organization recommendations on interventions to improve preterm birth outcomes. Geneva: World Health Organization.

Neonatal signal functions	Intervention description/definition ²
Administer oxygen therapy with pulse oximetry	Small and sick newborns with hypoxia require appropriate oxygen therapy. Pulse oximetry determines the presence of hypoxia and hyperoxia, and guides health workers to administer oxygen therapy within safe limits. At the Basic EmONC level, safe oxygen therapy with pulse oximeter monitoring may be initiated only in order to stabilize and transport the newborn to Comprehensive or Intensive EmONC level. At a Comprehensive and Intensive care level, oxygen therapy would involve administration of oxygen via appropriately sized neonatal nasal prong using low-flow metres with pulse oximetry, air oxygen blenders and humidifiers.
Provide thermal care with radiant warmer or incubator	Preterm newborns and/or LBW infants at risk of hypothermia who are unstable or who cannot be cared for in kangaroo mother care, require thermal care using a clean incubator or under a radiant warmer (or equivalent warming device). Close temperature monitoring is also required.
Provide CPAP	Continuous positive airway pressure is a non-invasive type of respiratory support which can be delivered without endotracheal intubation and is used for small and sick newborns (especially preterm) with surfactant deficiency. When administering oxygen via CPAP, attention should be paid to safe oxygen therapy including use of pulse oximetry.
Provide phototherapy	Jaundice is common in all newborns and without treatment can lead to severe illness (e.g. kernicterus) and death. Administering phototherapy for neonatal hyperbilirubinemia refers to treatment with effective, safe phototherapy (e.g. high-intensity light emitting diodes (LED)).
Perform blood transfusion	The need for transfusion of blood or blood products can occur due to multiple complications including anemia of prematurity, post-jaundice management or other conditions. Blood transfusion for newborns requires fresh, irradiated blood that is negative for cytomegalovirus and warmed for administration with management of the newborn for transfusion reactions.
Enable assisted feeding with expressed breast milk (with cup and spoon and tube feeding)	Assisted feeding of newborns is performed for babies that cannot effectively breastfeed due to prematurity, small size or sickness. It refers to the provision of cup and/or gastric tube feeding of newborns using expressed breastmilk or donor milk.
Provide IV fluids	Intravenous fluids (containing glucose) are required for some newborns with delayed or impaired sucking, or those with severe illness. Fluids are administered through an infusion pump and a neonatal burette, the volume is recorded, and the IV site is checked regularly.
Perform mechanical ventilation	Mechanical ventilation is an invasive type of respiratory support for extremely small and sick newborns involving endotracheal intubation and breathing support with a mechanical ventilator. Mechanical ventilation requires a high level of monitoring and supportive care.
Perform screening and treatment for retinopathy of prematurity	Retinopathy of prematurity (ROP), a complication of preterm birth, is a vision-threatening disease associated with abnormal retinal vascular development that can lead to blindness and visual impairment. Services for retinopathy of prematurity require inpatient screening of eligible at-risk infants for ROP by an experienced ophthalmologist (using indirect ophthalmoscopy) or a trained technician or nurse (using widefield digital imaging with image grading by an ophthalmologist). Outpatient screening may also be required after discharge. Infants developing signs of sight threatening (Type 1) ROP will require treatment within 24 to 72 hours. Treatment consists of laser by indirect delivery and/or intravitreal injection of an AntiVEGF agent by an ophthalmologist. At Comprehensive EmONC level facilities, screening by ophthalmologists, trained technicians or nurses should be provided, with urgent referral to an appropriate facility for treatment if needed.

Referral signal function	Intervention description/definition
Arrange ambulance, with trained and equipped provider, to a facility that can provide definitive care	<p>Arrange ambulance transfer (emergency referral), with a trained care provider who is equipped to perform interventions addressing maternal and newborn emergencies, to a facility at which capacity to provide definitive care has been confirmed in advance. <u>Arrange</u> = ability to rapidly coordinate a functioning ambulance, fuel, driver, provider, and necessary equipment. <u>Ambulance</u> = a vehicle that permits monitoring and intervention as needed during transport. <u>Provider</u> = a healthcare provider, in addition to the vehicle's driver, who would typically be responsible for caring for maternal and/or newborn emergencies in the context being evaluated. <u>Trained</u> = possessing adequate training, based on local norms and regulations, to perform the maternal and newborn interventions (maternal: provision of IV fluids, control of bleeding w/external maneuvers – uterine massage, compression, aortic compression, administration of uterotonics) (newborn: maintenance of body temperature through ongoing KMC and covering neonate, ensuring airway patency through positioning or head tilt/chin lift and monitored by observation through transport, performance of neonatal basic life support – to include maintenance of respiratory support via O2 and bag mask ventilation, including monitoring through observation and vital signs with pulse oximetry; includes neonatal CPR as well for HR < 60). <u>Equipped</u> = access to care tools required to perform maternal and newborn interventions listed under “trained.” <u>Capacity</u> = current presence of space, necessary provider types and access to essential interventions (medications, procedures) required to provide definitive care. <u>Definitive care</u> = comprehensive and conclusive care for a patient's specific condition. <u>Confirmed</u> = verified through communication with receiving facility in real-time. This signal function is only assessed at the Basic EmONC level.</p>