Preterm Birth: Epidemiology and Consequences
Babies born before 37 completed weeks of gestation are considered preterm babies. More than one in ten babies are born preterm. Preterm birth (PTB) and the complications arising from PTB are the leading causes of newborn deaths worldwide, resulting in more than one million deaths per year. Preterm babies have numerous challenges including difficulty feeding and maintaining body temperature. More serious complications can develop such as necrotizing enterocolitis (death of intestinal tissue) and intraventricular hemorrhage (bleeding into the brain). The primary cause of newborn death and disability from PTB is respiratory distress syndrome (RDS) – difficulty breathing due to underdevelopment of the lungs. Of babies born preterm, survivors may experience lifelong health challenges such as cerebral palsy, impaired learning ability, chronic lung disease, vision and hearing disabilities, and compromised physical health.\(^1\)\(^2\)

A Three-Phased Approach to Preterm Birth

The Role of Antenatal Corticosteroids
As illustrated in the above graphic, action can be taken to intervene at critical windows of opportunity on the continuum of care from preconception through the care of a preterm baby to reduce the consequences of preterm birth. This technical briefer focuses specifically on the use of antenatal corticosteroids as one of the key interventions to be implemented by a skilled birth attendant.

How effective are ACS?

<table>
<thead>
<tr>
<th>How effective are ACS?</th>
<th>Antenatal administration of ACS is the single most beneficial intervention for improvement of newborn outcomes among babies born prematurely.(^3)</th>
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<tbody>
<tr>
<td>34% reduction in RDS</td>
<td>Near universal coverage of ACS across 75 priority countries may result in a 40% reduction in newborn deaths arising from complications associated with prematurity.(^2)</td>
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<td>46% reduction in IVH</td>
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<td>54% reduction in NEC</td>
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<td>31% reduction in death</td>
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ACS are extremely effective in reducing RDS severity and mortality. They are inexpensive, available in most settings, and can be administered by all skilled birth attendants.
**Best Practice**
A single course of antenatal corticosteroids should be given to a mother who is preterm\(^1\) and (a) for whom PTB is anticipated within seven days, such as in preterm labor or preterm prelabor rupture of membranes, or (b) with a maternal condition that threatens a mother's life, such as antepartum hemorrhage or severe pre-eclampsia/eclampsia before term.\(^6\) Ideally, the course of ACS should be initiated at least 48 hours prior to delivery to have maximum benefit.

<table>
<thead>
<tr>
<th>Overview of Antenatal Corticosteroids for PTB</th>
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<tr>
<td><strong>Medication</strong></td>
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<td>Give <strong>dexamethasone</strong> 6mg IM every 12 hours for four doses. Alternatively, give <strong>betamethasone</strong> 12mg IM every 24 hours for two doses. <strong>Note</strong>: Dexamethasone and betamethasone are clinically equally effective, however dexamethasone is preferable since it is a more widely available, less expensive drug. Give the first dose immediately upon determining that the woman has a condition that increases her chance of preterm birth within the next seven days. The maximum benefit of the medication is achieved 48 hours after the first injection. However, even partial or incomplete regimens provide some benefit. Because the precise time of delivery cannot be predicted, the medication should be initiated immediately when a condition leading to preterm birth is identified. <strong>Note</strong>: There is no additional benefit of rapid administration (less than 48 hours) of all doses prior to an imminent birth.(^iii)</td>
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<tr>
<td><strong>Mechanism of Action</strong></td>
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<td>Preterm babies do not have enough surfactant in their lungs. Surfactant helps the lungs expand during breathing, and therefore babies who lack surfactant commonly develop RDS. The steroids increase the natural production of surfactant, and thus reduce the risk that newborns will develop severe RDS if born early. ACS have also been shown to have a protective effect on the cerebral blood vessels, thus reducing the risk of intraventricular hemorrhage, and on the intestines, thus reducing the chance of necrotizing enterocolitis.</td>
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<tr>
<td><strong>Considerations</strong></td>
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<td>Any pregnant woman who is preterm and has an increased likelihood of delivery within seven days should receive ACS, with few exceptions. The first dose of an ACS course should be given even if it is believed that the full course is not likely to be completed prior to delivery. Delivery should not be delayed in order to complete the ACS course in cases where delivery should be expedited, such as eclampsia. In women with diabetes, blood sugars should be closely monitored and an increased insulin requirement should be anticipated. Women on chronic steroids can receive ACS but may also need a stress dose of their steroids at the time of delivery. There are no absolute contraindications for ACS.</td>
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<tr>
<td><strong>Medication Administration</strong></td>
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<td>Corticosteroid injections are given intramuscularly at a 90 degree angle with a 22-25 gauge, 1-1.5 inch long sterile needle into the upper arm, buttock, or thigh. Be sure to document medication, dose, time, and date, as well as the site of administration.</td>
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<tr>
<td><strong>Administering Provider</strong></td>
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<td>The decision to give ACS is typically made by a skilled birth attendant. The injection can be administered by personnel trained to give injections, according to local country policy.</td>
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\(^1\) Beneficial effects have been observed at all gestational ages, however evidence is conclusive when administered between 26-34 weeks at hospital level. Country guidelines may differ on the recommended gestational age range for administration.
Steps to Administer ACS

Follow these steps for proper administration of ACS.

1. Once a woman who presents with threatened PTB has been evaluated and a condition increasing the likelihood of PTB is identified, ACS are indicated. Determine if ACS can be administered at your facility or if referral is needed.

2. Facilities that provide basic EmONC should be able to initiate a course of ACS by administering the first dose prior to transfer. If referral is needed, follow facility protocol for immediate referral.

3. If able to administer ACS, follow these steps:
   a. Explain to the woman what will be done.
   b. Wash and dry hands and put on clean gloves.
   c. Prepare the IM injection site (either the upper arm, buttock, or thigh). Clean the skin with cotton and alcohol or spirits.
   d. Using a small sterile syringe and needle, draw up 4mg (1ml) of dexamethasone from first ampoule. Maintain sterile technique and draw up 2mg (0.5ml) of dexamethasone from the second ampoule. Discard both ampoules and remaining drug.
   e. Tell the woman what will be done and give injection.
   f. Properly dispose of needle and syringe in an appropriate sharps container.
   g. Properly remove gloves and discard appropriately.
   h. Wash and dry hands.
   i. Document medication, dose, site of administration, and time it was given in the patient record. Document the time when the next dose should be administered.
   j. Advise the woman of the timing of the next dose.

Clinical Considerations

Partial dose: If a woman receives only a partial dose of ACS before her baby is born, there is still a reduction of the risk of RDS. Document in the patient record the dose and time of each injection administered.

Single course or repeat courses: If a woman receives a complete course of ACS for threatened PTB but does not give birth, one additional course can be considered if the prior ACS treatment was given more than 14 days ago, if the woman has intact membranes and if she is assessed to likely give birth in the next seven days. There is evidence to demonstrate a small additional benefit to the baby from a single additional course of ACS within these parameters. Repeated courses, at weekly or other intervals, however, are not recommended.

Challenges to ACS administration: The major difficulty is correctly identifying women who have an increased likelihood of PTB in time to administer ACS 48 hours prior to the PTB. Timely and appropriate diagnosis is critical through immediate assessment of women who present for evaluation with complaints of bleeding, contractions, loss of fluid, or symptoms of pre-eclampsia/eclampsia. Clinical teams must develop a “heightened awareness” of the conditions that lead to preterm birth and must be able to initiate therapy to those women with an increased likelihood of PTB.

Giving ACS when there are other complications of pregnancy: Administration of ACS is recommended to speed fetal lung maturity in all preterm women who have an increased likelihood of giving birth within seven days, regardless of other complications of pregnancy, with few exceptions (such as clear evidence of maternal sepsis). ACS should be initiated even if it is believed that the full course may not be completed prior to delivery. Delivery should not be delayed in order to complete the ACS course in cases where delivery should be expedited, such as eclampsia. In women with diabetes,

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2 It is anticipated that in 2013 WHO will convene a guidelines development committee to produce new guidelines on management of prematurity.
blood sugars should be closely monitored and an increased insulin requirement should be anticipated. Women on chronic steroids can receive ACS but may also need a stress dose of their steroids at the time of delivery. There are no absolute contraindications for ACS.

**Additional Care for Woman with Threatened PTB**

_Tocolysis:_ Medications to stop uterine contractions can be given to prolong pregnancy for a short time (up to 48 hours) to allow administration of ACS or transfer to a higher level facility. Possible tocolytics include salbutamol, nifedipine, or indomethacin. Tocolysis has not been shown to reduce the rate of preterm birth but can delay birth by a few days. vii iii

_Transfer to a higher level facility:_ A woman with an increased likelihood of a preterm birth should be cared for in a facility where both the mother and baby can receive appropriate care. If a lower level facility is unable to provide adequate care, and if the mother is stable, transfer should take place while the baby is still in utero. Otherwise, stabilize the newborn and transfer to a higher facility.

_Antibiotics:_ There is strong evidence supporting antibiotic use for preterm prelabor rupture of membranes (PPROM) because it delays labor and reduces neonatal infection rates. ii Antibiotics should be given to women with PPROM. Give ampicillin 2gms IV twice daily and erythromycin 250mg orally three times daily for two days, followed by amoxicillin 500mg orally and erythromycin 250mg orally three times daily to complete seven days of therapy. Multiple studies have shown no improvement in outcomes from the use of antibiotics in women with intact membranes and preterm labor.viii iii

**Supportive Environment Needed to Implement ACS as Best Practice**

- Establish national service delivery guidelines/protocols for use of ACS in PTB management or ensure it is integrated into existing guidelines.
- Ensure functioning supply and delivery systems in place to support a continuous supply of necessary medication and supplies.
- Incorporate updated ACS guidelines into pre-service education for healthcare providers who administer ACS. Ensure education includes didactic and practical learning based on nationally standardized competencies for ACS.
- Engage professional associations of healthcare cadres administering ACS in supporting the dissemination and adoption of ACS as best practice.
- Provide in-service training on ACS administration for all healthcare providers administering ACS and provide necessary supportive supervision to ensure best practice is integrated into care.
- Strengthen antenatal screening to include information for all women to report to a facility if conditions that predispose a woman to PTB occur, such as preterm uterine contractions, preterm rupture of membranes, and symptoms of pre-eclampsia/eclampsia.ix
- Increase community awareness of the importance of preterm birth prevention and the signs of threatened preterm birth to encourage early and appropriate referral of women and babies needing preterm birth care.
- Support the provision of essential newborn care after delivery, including Kangaroo Mother Care or other appropriate services or referrals for babies born prematurely.

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