Nrp guidelines 2018 algorithm

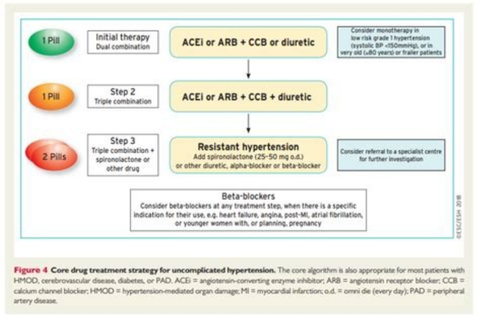
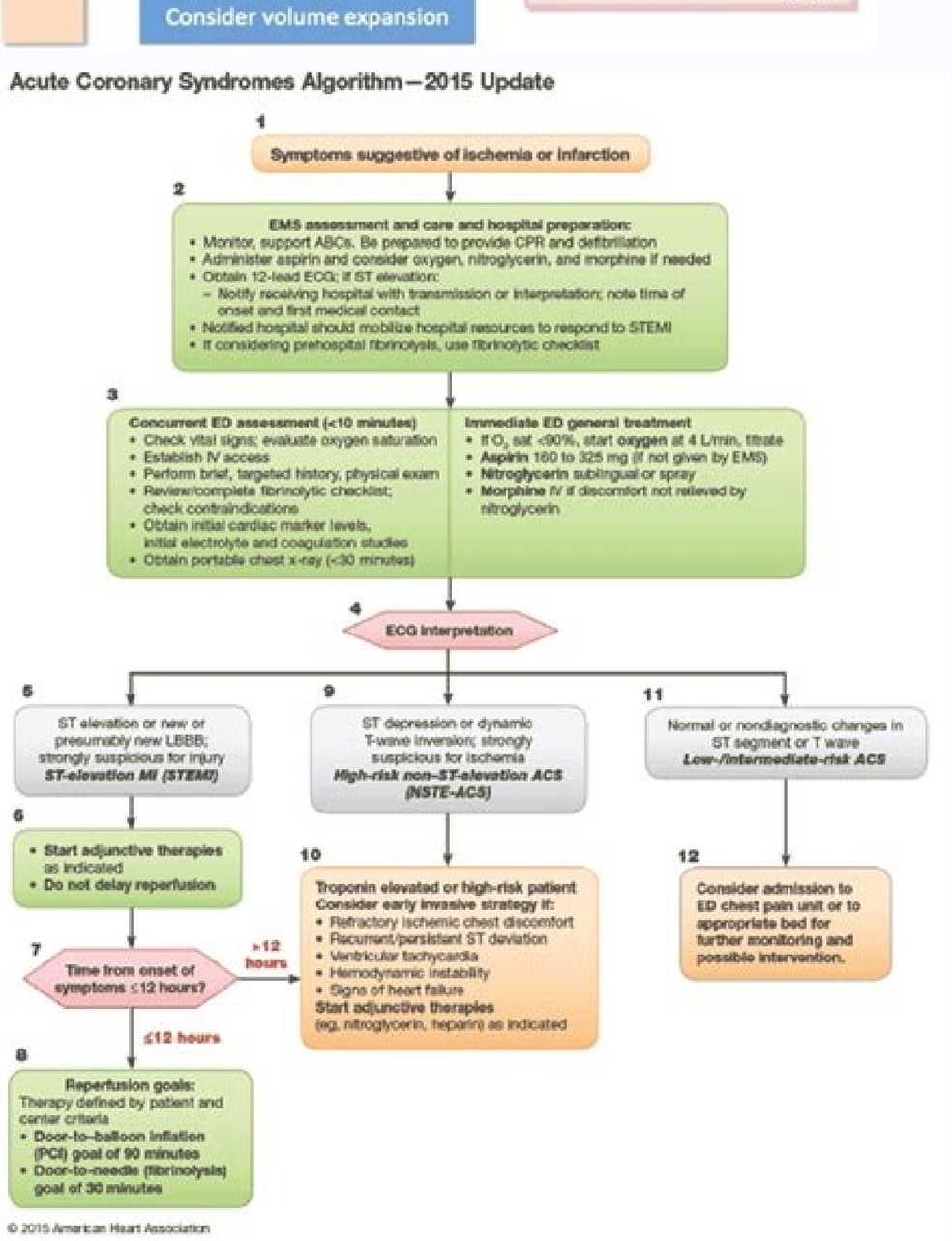
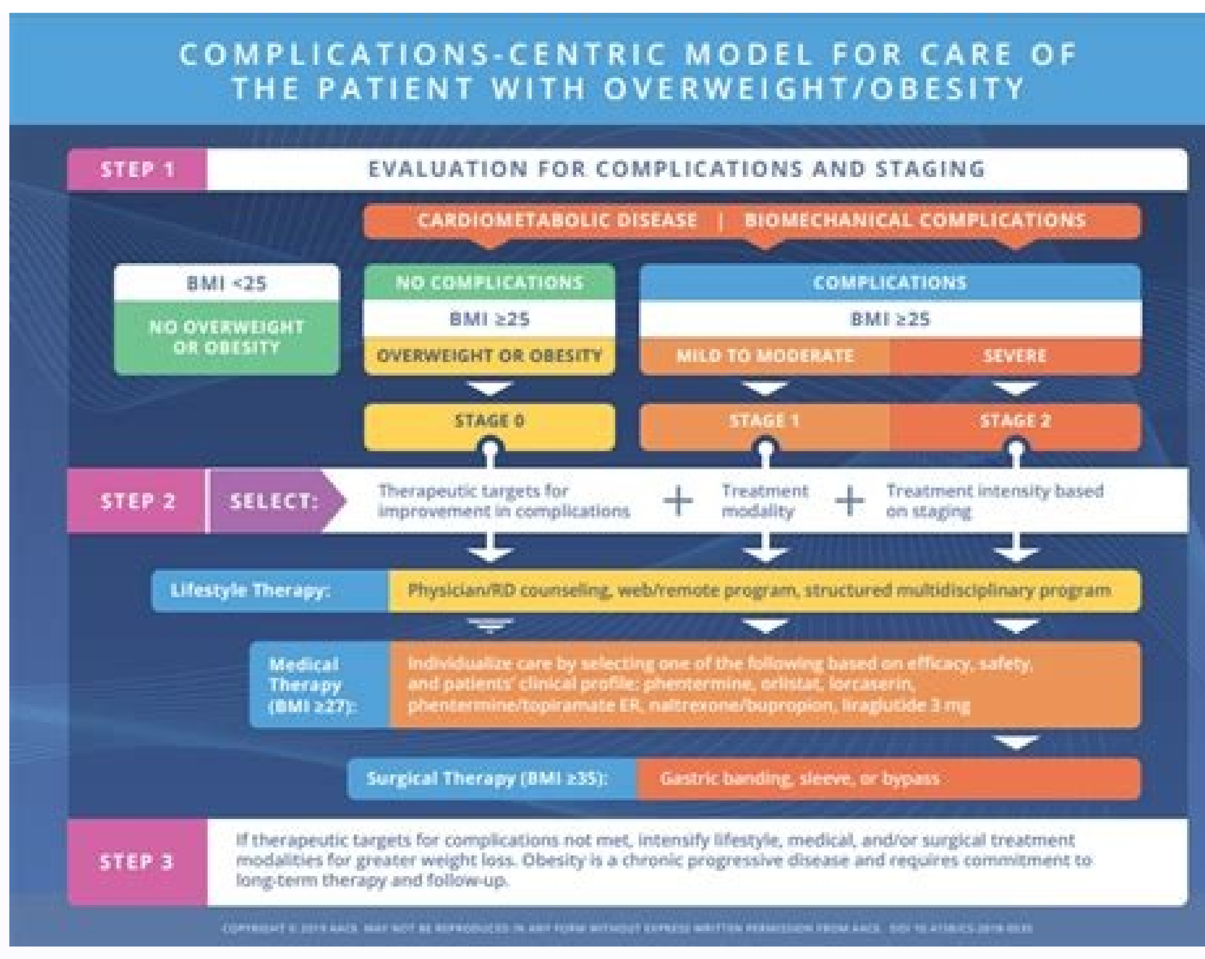


Figure 4 Core drug treatment strategy for uncomplicated hypertension. The core algorithm is also appropriate for most patients with HMOD, cerebrovascular disease, diabetes, or PAD. ACEi = angiotensin-converting enzyme inhibitor; ARB = angiotensin receptor blocker; CCB = calcium channel blocker; HMOD = hypertension-mediated organ damage; MI = myocardial infarction; o.d. = omni die (every day); PAD = peripheral artery disease.





Nrp guidelines for resuscitation. Nrp age guidelines. Nrp 2015 guidelines. Nrp ppv guidelines.

Newborn resuscitation requires anticipation and preparation by providers who train individually and as teams.Most newly born infants do not require immediate cord clamping or resuscitation and can be evaluated and monitored during skin-to-skin contact with their mothers after birth.Inflation and ventilation of the lungs are the priority in newly born infants who need support after birth.A rise in heart rate is the most important indicator of effective ventilation and response to resuscitative interventions.Pulse oximetry is used to guide oxygen therapy and meet oxygen saturation goals.Chest compressions are provided if there is a poor heart rate response to ventilation after appropriate ventilation corrective steps, which preferably include endotracheal intubation.The heart rate response to chest compressions and medications should be monitored electrocardiographically.If the response to chest compressions is poor, it may be reasonable to provide epinephrine, preferably via the intravenous route.Failure to respond to epinephrine in a newborn with history or examination consistent with blood loss may require volume expansion.If all these steps of resuscitation are effectively completed and there is no heart rate response by 20 minutes, redirection of care should be discussed with the team and family.It is estimated that approximately 10% of newly born infants need help to begin breathing at birth,1–3 and approximately 1% need intensive resuscitative measures to restore cardiorespiratory function.4,5 The neonatal mortality rate in the United States and Canada has fallen from almost 20 per 1000 live births6,7 in the 1960s to the current rate of approximately 4 per 1000 live births. The inability of newly born infants to establish and sustain adequate or spontaneous respiration contributes significantly to these early deaths and to the burden of adverse neurodevelopmental outcome among survivors. Effective and timely resuscitation at birth could therefore improve neonatal outcomes further.Successful neonatal resuscitation efforts depend on critical actions that must occur in rapid succession to maximize the chances of survival. The International Liaison Committee on Resuscitation (ILCOR) Formula for Survival emphasizes 3 essential components for good resuscitation outcomes: guidelines based on sound resuscitation science, effective education of resuscitation providers, and implementation of effective and timely resuscitation.8 The 2020 neonatal guidelines contain recommendations, based on the best available resuscitation science, for the most impactful steps to perform in the birthing room and in the neonatal period. In addition, specific recommendations about the training of resuscitation providers and systems of care are provided in their respective guideline Parts.9,10IntroductionScope of GuidelineThis guideline is designed for North American healthcare providers who are looking for an up-to-date summary for clinical care, as well as for those who are seeking more in-depth information on resuscitation science and gaps in current knowledge. The science of neonatal resuscitation applies to newly born infants transitioning from the fluid-filled environment of the womb to the air-filled environment of the birthing room and to newborns in the days after birth. In circumstances of altered or impaired transition, effective neonatal resuscitation reduces the risk of mortality and morbidity. Even healthy babies who breathe well after birth benefit from facilitation of normal transition, including appropriate cord management and thermal protection with skin-to-skin care.The 2015 Neonatal Resuscitation Algorithm and the major concepts based on sections of the algorithm continue to be relevant in 2020 (Figure). The following sections are worth special attention.Figure. Neonatal Resuscitation Algorithm. CPAP indicates continuous positive airway pressure; ECG, electrocardiographic; ETT, endotracheal tube; HR, heart rate; IV, intravenous; O2, oxygen; Spo2, oxygen saturation; and UVC, umbilical venous catheter.Positive-pressure ventilation (PPV) remains the main intervention in neonatal resuscitation. While the science and practices surrounding monitoring and other aspects of neonatal resuscitation continue to evolve, the development of skills and practice surrounding PPV should be emphasized.Supplemental oxygen should be used judiciously, guided by pulse oximetry.Prevention of hypothermia continues to be an important focus for neonatal resuscitation. The importance of skin-to-skin care in healthy babies is reinforced as a means of promoting parental bonding, breast feeding, and normothermia.Team training remains an important aspect of neonatal resuscitation, including anticipation, preparation, briefing, and debriefing. Rapid and effective response and performance are critical to good newborn outcomes.Delayed umbilical cord clamping was recommended for both term and preterm neonates in 2015. This guideline affirms the previous recommendations.The 2015 American Heart Association (AHA) Guidelines Update for Cardiopulmonary Resuscitation (CPR) and Emergency Cardiovascular Care (ECC) recommended against routine endotracheal suctioning for both vigorous and nonvigorous infants born with meconium-stained amniotic fluid (MSAF). This guideline reinforces initial steps and PPV as priorities.It is important to recognize that there are several significant gaps in knowledge relating to neonatal resuscitation. Many current recommendations are based on weak evidence with a lack of well-designed human studies. This is partly due to the challenges of performing large randomized controlled trials (RCTs) in the delivery room. The current guideline, therefore, concludes with a summary of current gaps in neonatal research and some potential strategies to address these gaps.COVID-19 GuidanceTogether with other professional societies, the AHA has provided interim guidance for basic and advanced life support in adults, children, and neonates with suspected or confirmed coronavirus disease 2019 (COVID-19) infection. Because evidence and guidance are evolving with the COVID-19 situation, this interim guidance is maintained separately from the ECC guidelines. Readers are directed to the AHA website for the most recent guidance.12Evidence Evaluation and Guidelines DevelopmentThe following sections briefly describe the process of evidence review and guideline development. See “Part 2: Evidence Evaluation and Guidelines Development” for more details on this process.11Organization of the Writing CommitteeThe Neonatal Life Support Writing Group includes neonatal physicians and nurses with backgrounds in clinical medicine, education, research, and public health. Volunteers with recognized expertise in resuscitation are nominated by the writing group chair and selected by the AHA ECC Committee. The AHA has rigorous conflict of interest policies and procedures to minimize the risk of bias or improper influence during development of the guidelines.13 Before appointment, writing group members and peer reviewers disclosed all commercial relationships and other potential (including intellectual) conflicts. Disclosure information for writing group members is listed in Appendix 1.Methodology and Evidence ReviewThese 2020 AHA neonatal resuscitation guidelines are based on the extensive evidence evaluation performed in conjunction with the ILCOR and affiliated ILCOR member councils. Three different types of evidence reviews (systematic reviews, scoping reviews, and evidence updates) were used in the 2020 process. Each of these resulted in a description of the literature that facilitated guideline development.14–17Class of Recommendation and Level of EvidenceEach AHA writing group reviewed all relevant and current AHA guidelines for CPR and ECC18–20 and all relevant 2020 ILCOR International Consensus on CPR and ECC Science With Treatment Recommendations evidence and recommendations21 to determine if current guidelines should be reaffirmed, revised, or retired, or if new recommendations were needed. The writing groups then drafted, reviewed, and approved recommendations, assigning to each a Level of Evidence (LOE; ie, quality) and Class of Recommendation (COR; ie, strength) (Table).11Table. Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care (Updated May 2019)*This table defines the Classes of Recommendation (COR) and Levels of Evidence (LOE). COR indicates the strength the writing group assigns the recommendation, and the LOE is assigned based on the quality of the scientific evidence. The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).Classes of RecommendationCOR designations include Class 1, a strong recommendation for which the potential benefit greatly outweighs the risk; Class 2a, a moderate recommendation for which benefit most likely outweighs the risk; Class 2b, a weak recommendation for which it’s unknown whether benefit will outweigh the risk; Class 3: No Benefit, a moderate recommendation signifying that there is equal likelihood of benefit and risk; and Class 3: Harm, a strong recommendation for which the risk outweighs the potential benefit.Suggested phrases for writing Class 1 recommendations includeIs recommendedIs indicated/useful/effective/beneficialShould be performed/administered/otherComparative-effectiveness phrases include treatment/strategy A is recommended/indicated in preference to treatment B, and treatment A should be chosen over treatment B.Suggested phrases for writing Class 2a recommendations includeIs reasonableCan be useful/effective/beneficialComparative-effectiveness phrases include treatment/strategy A is probably recommended/indicated in preference to treatment B, and it is reasonable to choose treatment A over treatment B.For comparative-effectiveness recommendations (COR 1 and 2a; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.Suggested phrases for writing Class 2b recommendations includeMay/might be reasonableMay/might be consideredUsefulness/effectiveness is unknown/unclear/uncertain or not well-establishedSuggested phrases for writing Class 3: No Benefit recommendations (generally, LOE A or B use only) includeIs not recommendedIs not indicated/useful/effective/beneficialShould not be performed/administered/otherSuggested phrases for writing Class 3: Harm recommendations includePotentially harmfulCauses harmAssociated with excess morbidity/mortalityShould not be performed/administered/otherLevels of EvidenceFor LOEs, the method of assessing quality is evolving, including the application of standardized, widely-used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee. LOE designations include Level A, Level B-R, Level B-NR, Level C-LD, and Level C-EO.Those categorized as Level A are derived fromHigh-quality evidence from more than 1 randomized clinical trial, or RCTMeta-analyses of high-quality RCTsOne or more RCTs corroborated by high-quality registry studiesThose categorized as Level B-R (randomized) are derived fromModerate-quality evidence from 1 or more RCTsMeta-analyses of moderate-quality RCTsThose categorized as Level B-NR (nonrandomized) are derived fromModerate-quality evidence from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studiesMeta-analyses of such studiesThose categorized as Level C-LD (limited data) are derived fromRandomized or nonrandomized observational or registry studies with limitations of design or executionMeta-analyses of such studiesPhysiological or mechanistic studies in human subjectsThose categorized as Level C-EO (expert opinion) are derived fromConsensus of expert opinion based on clinical experienceCOR and LOE are determined independently (any COR may be paired with any LOE).A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.Guideline StructureThe 2020 guidelines are organized into “knowledge chunks,” grouped into discrete modules of information on specific topics or management issues.22 Each modular knowledge chunk includes a table of recommendations using standard AHA nomenclature of COR and LOE. A brief introduction or short synopsis is provided to put the recommendations into context with important background information and overarching management or treatment concepts. Recommendation-specific text clarifies the rationale and key study data supporting the recommendations. When appropriate, flow diagrams or additional tables are included. Hyperlinked references are provided to facilitate quick access and review.Document Review and ApprovalEach 2020 AHA Guidelines for CPR and ECC document was submitted for blinded peer review to 5 subject matter experts nominated by the AHA. Before appointment, all peer reviewers were required to disclose relationships with industry and any other potential conflicts of interest, and all disclosures were reviewed by AHA staff. Peer reviewer feedback was provided for guidelines in draft format and again in final format. All guidelines were reviewed and approved for publication by the AHA Science Advisory and Coordinating Committee and AHA Executive Committee. Disclosure information for peer reviewers is listed in Appendix 2.References1. Little MP, Järvelin MR, Neasham DE, Lissauer T, Steer PJ. Factors associated with fall in neonatal intubation rates in the United Kingdom–prospective study.BJOG. 2007; 114:156–164. doi: 10.1111/j.1471-0528.2006.01188.xCrossrefMedlineGoogle Scholar2. 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Neonatal life support: 2020 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations.Circulation. 2020; 142(suppl 1):S185–S221. doi: 10.1161/CIR.0000000000000895LinkGoogle Scholar22. Levine GN, O’Gara PT, Beckman JA, Al-Khatib SM, Birtcher KK, Cigarroa JE, de Las Fuentes L, Deswal A, Fleisher LA, Gentile F, Goldberger ZD, Hlatky MA, Joglar JA, Piano MR, Wijeysundera DN. Recent Innovations, Modifications, and Evolution of ACC/AHA Clinical Practice Guidelines: An Update for Our Constituencies: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines.Circulation. 2019; 139:e879–e886. doi: 10.1161/CIR.0000000000000651LinkGoogle ScholarMajor ConceptsThese guidelines apply primarily to the “newly born” baby who is transitioning from the fluid-filled womb to the air-filled room. The “newly born” period extends from birth to the end of resuscitation and stabilization in the delivery area. However, the concepts in these guidelines may be applied to newborns during the neonatal period (birth to 28 days).The primary goal of neonatal care at birth is to facilitate transition. The most important priority for newborn survival is the establishment of adequate lung inflation and ventilation after birth. Consequently, all newly born babies should be attended to by at least 1 person skilled and equipped to provide PPV. Other important goals include establishment and maintenance of cardiovascular and temperature stability as well as the promotion of mother-infant bonding and breast feeding, recognizing that healthy babies transition naturally.The Neonatal Resuscitation Algorithm remains unchanged from 2015 and is the organizing framework for major concepts that reflect the needs of the baby, the family, and the surrounding team of perinatal caregivers.Anticipation and PreparationEvery healthy newly born baby should have a trained and equipped person assigned to facilitate transition. Identification of risk factors for resuscitation may indicate the need for additional personnel and equipment. Effective team behaviors, such as anticipation, communication, briefing, equipment checks, and assignment of roles, result in improved team performance and neonatal outcome.Cord ManagementAfter an uncomplicated term or late preterm birth, it is reasonable to delay cord clamping until after the baby is placed on the mother, dried, and assessed for breathing, tone, and activity. In other situations, clamping and cutting of the cord may also be deferred while respiratory, cardiovascular, and thermal transition is evaluated and initial steps are undertaken. In preterm birth, there are also potential advantages from delaying cord clamping.Initial ActionsWhen possible, healthy term babies should be managed skin-to-skin with their mothers. After birth, the baby should be dried and placed directly skin-to-skin with attention to warm coverings and maintenance of normal temperature. There should be ongoing evaluation of the baby for normal respiratory transition. Radiant warmers and other warming adjuncts are suggested for babies who require resuscitation at birth, especially very preterm and very low-birth-weight babies.Stimulation may be provided to facilitate respiratory effort. Suctioning may be considered for suspected airway obstruction.Assessment of Heart RateHeart rate is assessed initially by auscultation and/or palpation. Oximetry and electrocardiography are important adjuncts in babies requiring resuscitation.Positive-Pressure VentilationPPV remains the primary method for providing support for newborns who are apneic, bradycardic, or demonstrate inadequate respiratory effort. Most babies will respond to this intervention. An improvement in heart rate and establishment of breathing or crying are all signs of effective PPV.Oxygen TherapyPPV may be initiated with air (21% oxygen) in term and late preterm babies, and up to 30% oxygen in preterm babies. Oximetry is used to target the natural range of oxygen saturation levels that occur in term babies.Chest CompressionsIf the heart rate remains less than 60/min despite 30 seconds of adequate PPV, chest compressions should be provided. The suggested ratio is 3 chest compressions synchronized to 1 inflation (with 30 inflations per minute and 90 compressions per minute) using the 2 thumb–encircling hands technique for chest compressions.Vascular AccessWhen vascular access is required in the newly born, the umbilical venous route is preferred. When intravenous access is not feasible, the intraosseous route may be considered.MedicationsIf the heart rate remains less than 60/min despite 60 seconds of chest compressions and adequate PPV, epinephrine should be administered, ideally via the intravenous route.Volume ExpansionWhen blood loss is known or suspected based on history and examination, and there is no response to epinephrine, volume expansion is indicated.Withholding and Discontinuing ResuscitationIt may be possible to identify conditions in which withholding or discontinuation of resuscitative efforts may be reasonably considered by families and care providers. Appropriate and timely support should be provided to all involved.Human Factors and SystemsTeams and individuals who provide neonatal resuscitation are faced with many challenges with respect to the knowledge, skills, and behaviors needed to perform effectively. Neonatal resuscitation teams may therefore benefit from ongoing booster training, briefing, and debriefing.AbbreviationsAHAAmerican Heart AssociationCORClass of RecommendationCPAPcontinuous positive airway pressureECCemergency cardiovascular careECGelectrocardiogram/electrocardiographicH2OwaterHIEhypoxic-ischemic encephalopathyILCORInternational Liaison Committee on ResuscitationLOELevel of EvidenceMSAFmeconium-stained amniotic fluidPEEPpositive end-expiratory pressurePPVpositive pressure ventilationRCTrandomized controlled trialROSCreturn of spontaneous circulationAnticipation of Resuscitation NeedSynopsisApproximately 10% of newborns require assistance to breathe after birth.1–3,5,13 Newborn resuscitation requires training, preparation, and teamwork. When the need for resuscitation is not anticipated, delays in assisting a newborn who is not breathing may increase the risk of death.1,5,13 Therefore, every birth should be attended by at least 1 person whose primary responsibility is the newborn and who is trained to begin PPV without delay.2–4A risk assessment tool that evaluates risk factors present during pregnancy and labor can identify newborns likely to require advanced resuscitation; in these cases, a team with more advanced skills should be mobilized and present at delivery.5,7 In the absence of risk stratification, up to half of babies requiring PPV may not be identified before delivery.6,13A standardized equipment checklist is a comprehensive list of critical supplies and equipment needed in a given clinical setting. In the birth setting, a standardized checklist should be used before every birth to ensure that supplies and equipment for a complete resuscitation are present and functional.8,9,14,15A predelivery team briefing should be completed to identify the leader, assign roles and responsibilities, and plan potential interventions. Team briefings promote effective teamwork and communication, and support patient safety.8,10–12Recommendation-Specific Supportive TextA large observational study found that delaying PPV increases risk of death and prolonged hospitalization.1 A systematic review and meta-analysis showed neonatal resuscitation training reduced stillbirths and improved 7-day neonatal survival in low-resource countries.3 A retrospective cohort study demonstrated improved Apgar scores among high-risk newborns after neonatal resuscitation training.16A multicenter, case-control study identified 10 perinatal risk factors that predict the need for advanced neonatal resuscitation.7 An audit study done before the use of risk stratification showed that resuscitation was anticipated in less than half of births requiring PPV.6 A prospective cohort study showed that risk stratification based on perinatal risk factors increased the likelihood of skilled team attendance at high-risk births.5A multicenter quality improvement study demonstrated high staff compliance with the use of a neonatal resuscitation bundle that included briefing and an equipment checklist.8 A management bundle for preterm infants that included team briefing and equipment checks resulted in clear role assignments, consistent equipment checks, and improved thermoregulation and oxygen saturation.9A single-center RCT found that role confusion during simulated neonatal resuscitation was avoided and teamwork skills improved by conducting a team briefing.11 A statewide collaborative quality initiative demonstrated that team briefing improved team communication and clinical outcomes.10 A single-center study demonstrated that team briefing and an equipment checklist improved team communication but showed no improvement in equipment preparation.12References1. 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Effect of a statewide neonatal resuscitation training program on Apgar scores among high-risk neonates in Illinois.Pediatrics. 2001; 107:648–655. doi: 10.1542/peds.107.4.648CrossrefMedlineGoogle ScholarUmbilical Cord ManagementSynopsisDuring an uncomplicated term or late preterm birth, it may be reasonable to defer cord clamping until after the infant is placed on the mother and assessed for breathing and activity. Early cord clamping (within 30 seconds) may interfere with healthy transition because it leaves fetal blood in the placenta rather than filling the newborn’s circulating volume. Delayed cord clamping is associated with higher hematocrit after birth and better iron levels in infancy.9–21 While developmental outcomes have not been adequately assessed, iron deficiency is associated with impaired motor and cognitive development.24–26 It is reasonable to delay cord clamping (longer than 30 seconds) in preterm babies because it reduces need for blood pressure support and transfusion and may improve survival.1–8There are insufficient studies in babies requiring PPV before cord clamping to make a recommendation.22 Early cord clamping should be considered for cases when placental transfusion is unlikely to occur, such as maternal hemorrhage or hemodynamic instability, placental abruption, or placenta previa.27 There is no evidence of maternal harm from delayed cord clamping compared with early cord clamping.10–12,28–34 Cord milking is being studied as an alternative to delayed cord clamping but should be avoided in babies less than 28 weeks’ gestational age, because it is associated with brain injury.23Recommendation-Specific Supportive TextCompared with preterm infants receiving early cord clamping, those receiving delayed cord clamping were less likely to receive medications for hypotension in a meta-analysis of 6 RCTs1–6 and receive transfusions in a meta-analysis of 5 RCTs.7 Among preterm infants not requiring resuscitation, delayed cord clamping may be associated with higher survival than early cord clamping is.8 Ten RCTs found no difference in postpartum hemorrhage rates with delayed cord clamping versus early cord clamping.10–12,28–34Compared with term infants receiving early cord clamping, term infants receiving delayed cord clamping had increased hemoglobin concentration within the first 24 hours and increased ferritin concentration in the first 3 to 6 months in meta-analyses of 12 and 6 RCTs,9–21 respectively. Compared with term and late preterm infants receiving early cord clamping, those receiving delayed cord clamping showed no significant difference in mortality, admission to the neonatal intensive care unit, or hyperbilirubinemia leading to phototherapy in meta-analyses of 4,10,13,29,35, 10,12,17,19,21,28,31,34,36,37 and 15 RCTs, respectively.9,12,14,18–21,28–30,32–34,38,39 Compared with term infants receiving early cord clamping, those receiving delayed cord clamping had increased polycythemia in meta-analyses of 1310,11,13,14,17,18,21,29,30,33,39–41 and 8 RCTs,9,10,13,19,20,28,30,34 respectively.For infants requiring PPV at birth, there is currently insufficient evidence to recommend delayed cord clamping versus early cord clamping.A large multicenter RCT found higher rates of intraventricular hemorrhage with cord milking in preterm babies born at less than 28 weeks’ gestational age.23References1. Dong XY, Sun XF, Li MM, Yu ZB, Han SP. 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