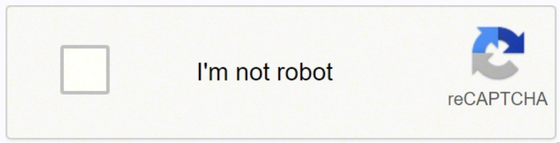

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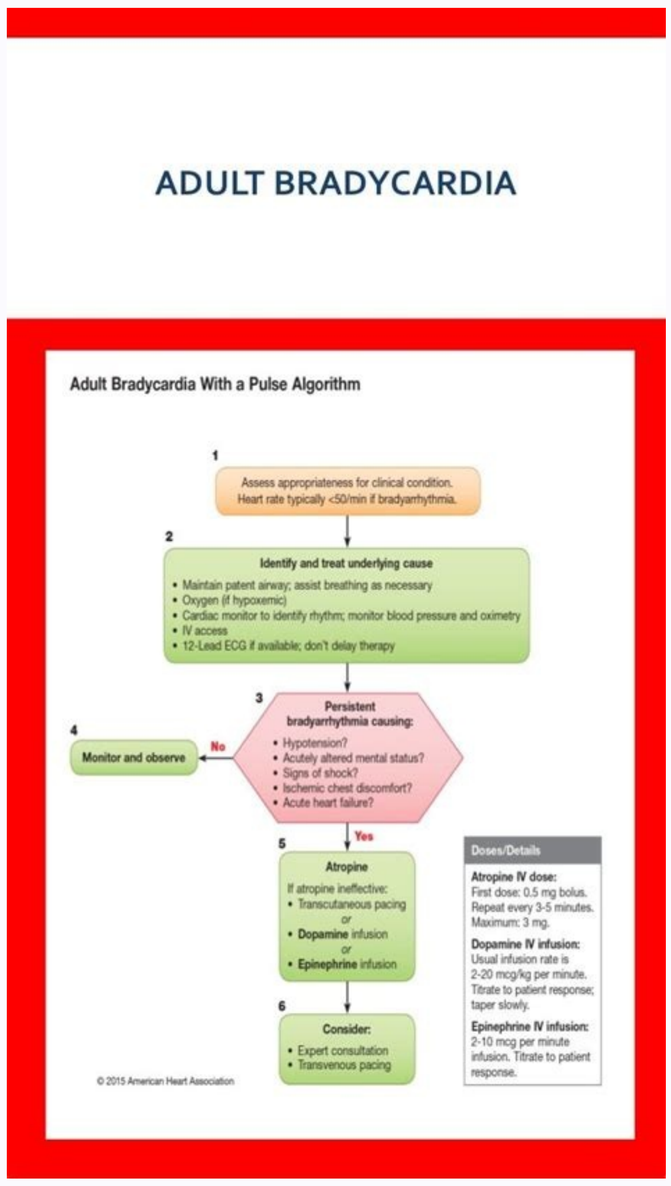

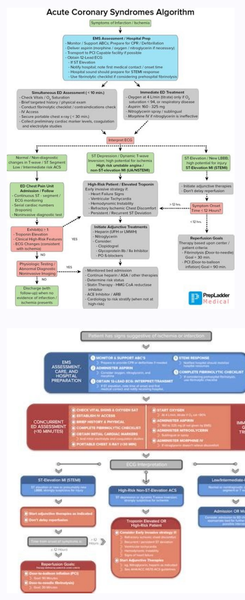

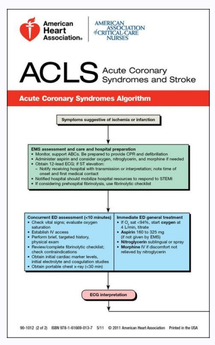

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In this 2018 ACLS guidelines focused update, the updated treatment recommendations include consideration of either amiodarone or lidocaine for shock-refractory VF/pVT, whereas previous guidelines favored amiodarone as the first-line therapy. The polysorbate-based formulation is currently available in concentrated form for rapid administration.Figure 1. MorleyUniversity of Melbourne Clinical School, Royal Melbourne Hospital, AustraliaNoneNoneNoneNoneNoneNoneNoneReviewer DisclosuresReviewerEmploymentResearch GrantOther Research SupportSpeakers' Bureau/HonorariaExpert WitnessOwnership InterestConsultant/Advisory BoardOtherPeng-Sheng ChenIndiana UniversityNoneNoneNoneNoneNoneNoneNoneNoneSumeet S. HirschStanford UniversityNEUROPROTECT Post-CA Trial (studying post–cardiac arrest hemodynamic targets)*; American Heart Association (PI studying post–cardiac arrest EEG and functional MRI biomarkers)*; Lund University, Center for Cardiac Arrest (site investigator for the TTM-2 trial studying post–cardiac arrest temperature targets)*NoneNoneNoneNoneNoneNoneNonePeter J. Survival to hospital discharge and survival with favorable neurological outcome were not improved by amiodarone, but neither study was powered for those outcomes.In ROC-ALPS (Resuscitation Outcomes Consortium–Amiodarone, Lidocaine or Placebo Study), a large out-of-hospital randomized controlled trial that compared captisol-based amiodarone with lidocaine or placebo for patients with VF/pVT refractory after at least 1 shock, there was no overall statistically significant difference in survival with good neurological outcome or survival to hospital discharge.11 In this study, ROSC was higher in patients receiving lidocaine compared with those receiving placebo but not for those receiving amiodarone compared with patients receiving placebo. Multicenter randomized trial and a systematic overview of lidocaine in acute myocardial infarction.Am Heart J. In addition, the optimal bundle of care for shock-refractory VF/pVT has not been identified.Use of Antiarrhythmic Drugs During Resuscitation From Adult VF/pVT Cardiac Arrest2018 Evidence SummaryAmiodaroneIntravenous amiodarone is available in 2 approved formulations in the United States. Teo KK, Yusuf S, Furberg CD. 2002; 19:57–62. Soar J, Donnino MW, Maconochie I, Aickin R, Atkins DL, Andersen LW, Berg KM, Bingham R, Böttiger BW, Callaway CW, Couper K, Couto TB, de Caen AR, Deakin CD, Drennan IR, Guerguerian A-M, Lavonas EJ, Meaney PA, Nadkarni VM, Neumar RW, Ng K-C, Nicholson TC, Nuthall GA, Ohshimo S, O'Neil BJ, Ong GY-K, Paiva EF, Parr MJ, Reis AG, Reynolds JC, Ristagno G, Sandroni C, Schexnayder SM, Scholefield BR, Shimizu N, Tijssen JA, Van de Voorde P, Wang T-L, Welsford M, Hazinski MF, Nolan JP, Morley PT; on behalf of the ILCOR Collaborators. Prophylactic lidocaine for post resuscitation care of patients with out-of-hospital ventricular fibrillation cardiac arrest.Resuscitation. Hassan TB, Jagger C, Barnett DB. 2017 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations summary [published correction appears in Circulation. Rather, the primary objective of antiarrhythmic drug therapy in shock-refractory VF/pVT is to facilitate successful defibrillation and to reduce the risk of recurrent arrhythmias. This prophylaxis includes continuation of an antiarrhythmic medication that was given during the course of resuscitation or the initiation of an antiarrhythmic after ROSC to sustain rhythm stability after VF/pVT cardiac arrest. Adult Cardiac Arrest Circular Algorithm—2018 Update. Allegra J, Lavery R, Cody R, Birnbaum G, Brennan J, Hartman A, Horowitz M, Nashed A, Yablonski M. In 1 study, the ARREST trial (Amiodarone in the Out-of-Hospital Resuscitation of Refractory Sustained Ventricular Tachyarrhythmias),9 amiodarone (300 mg) in polysorbate improved survival to hospital admission compared with a polysorbate placebo. The review did not specifically address the selection or use of second-line antiarrhythmic drugs or different antiarrhythmic medications given in combination to patients who are unresponsive to the maximum therapeutic dose of the first administered drug, and limited data are available to direct such treatment. 1997; 350:1272–1276. Thus, establishing vascular access to enable drug administration should not compromise the performance of CPR or timely defibrillation, both of which are associated with improved survival after cardiac arrest. ChughCedars-Sinai Medical CenterNHLBI (principal investigator, R01HL126938)†; NHLBI (principal investigator, R01HL122492)†NoneNoneNoneNoneNoneNonePaul DorianSt. Michael's Hospital, CanadaNoneNoneNoneNoneNoneNoneNoneSaman NazarianUniversity of PennsylvaniaBiosense Webster (research grant for ablation lesion imaging)†; Siemens (research grant for real-time MRI guidance)†; ImriCor (research grant for real-time MRI guidance)†NIH/NHLBI (imaging use for VT ablation)†NoneNoneNoneBiosense Webster*; CardioSolv*NoneAlbert L. In another study, the ALIVE trial (Amiodarone Versus Lidocaine in Prehospital Ventricular Fibrillation Evaluation),10 5 mg/kg amiodarone in polysorbate improved survival to hospital admission compared with 1.5 mg/kg lidocaine with polysorbate. These drugs may be particularly useful for patients with witnessed arrest, for whom time to drug administration may be shorter (Class IIb; Level of Evidence B-R).Magnesium Recommendation—Updated1.The routine use of magnesium for cardiac arrest is not recommended in adult patients (Class III: No Benefit; Level of Evidence C-LD). doi: 10.1056/NEJMoa1514204CrossrefMedlineGoogle Scholar12. Dorian P, Cass D, Schwartz B, Cooper R, Gelaznikas R, Barr A. Neurological status at discharge was not reported in the subgroup analysis. The only medications studied in this context are β-adrenergic–blocking drugs and lidocaine. The captisol-based formulation of amiodarone used in this trial is currently marketed only as a premixed infusion and is not marketed in the concentrated form that was used for rapid injection in the study.These randomized trials did not explore the timing or sequence of amiodarone versus epinephrine administration. Brussels, Belgium: International Liaison Committee on Resuscitation (ILCOR) Advanced Life Support Task Force. Later studies noted a disconcerting association between lidocaine and higher mortality after acute myocardial infarction, possibly resulting from a higher incidence of asystole and bradyarrhythmias; thus, the routine practice of administering prophylactic lidocaine during acute myocardial infarction was abandoned.21,22 One observational study with propensity-matched cohorts23 found that lidocaine was not associated with increased survival when administered prophylactically after ROSC in adults with VF/pVT cardiac arrest, although it decreased the recurrence of VF/pVT. Link MS, Berkow LC, Kudenchuk PJ, Halperin HR, Hess EP, Moitra VK, Neumar RW, O'Neil BJ, Paxton JH, Silvers SM, White RD, Yannopoulos D, Donnino MW. KudenchukUniversity of WashingtonNIH/NINDS/NHLBI (PI for ROC and SIREN at University of Washington)†NoneNoneNoneNoneNoneNoneMichael C. doi: 10.1161/01.CIR.77.2.392CrossrefMedlineGoogle Scholar17. 1997; 35:237–241. The optimal sequence of ACLS interventions, including administration of antiarrhythmic drugs during resuscitation, and the preferred manner and timing of drug administration in relation to shock delivery are still not known.For the 2018 ILCOR systematic review, the ALS Task Force considered new evidence published since the 2015 CoSTR. Randomised trial of magnesium in in-hospital cardiac arrest.Lancet. Kudenchuk PJ, Newell C, White L, Fahrenbruch C, Rea T, Eisenberg M. doi: 10.1161/CIR.0000000000000253LinkGoogle Scholar6. CPR indicates cardiopulmonary resuscitation; ET, endotracheal; IO, intraosseous; IV, intravenous; PEA, pulseless electrical activity; pVT, pulseless ventricular tachycardia; and VF, ventricular fibrillation.Figure 2. 2018. Kleinman ME, Goldberger ZD, Rea T, Swor RA, Bobrow BJ, Brennan EE, Terry M, Hemphill R, Gazmuri RJ, Hazinski MF, Travers AH. Survival to hospital admission was higher in patients receiving either amiodarone or lidocaine than in those receiving placebo, and this outcome did not differ between the 2 active drugs.In a prespecified subgroup analysis of patients with bystander-witnessed out-of-hospital cardiac arrest, a significant survival benefit (a 5% absolute improvement compared with placebo) was observed with either amiodarone or lidocaine. Although no antiarrhythmic drug has yet been shown to increase long-term survival or to improve neurological outcome after VF/pVT cardiac arrest, the writing group also considered the small increase in the short-term outcome of ROSC in those treated with amiodarone in the 1999 ARREST study9 and in those treated with lidocaine in the most recent ROC-ALPS trial.11 In addition, the writing group considered the improved survival to hospital admission in patients receiving either amiodarone or lidocaine (compared with placebo) in the most recent ROC-ALPS trial, as well as the improved survival to hospital discharge among patients with witnessed cardiac arrest who received amiodarone or lidocaine.11 These considerations contributed to the weak recommendation for consideration of amiodarone or lidocaine in the context of a disease process for which there are limited therapeutic options other than CPR and defibrillation.Lidocaine is now included with amiodarone in the ACLS algorithm for treatment of shock-refractory VF/pVT (Figures 1 and 2). 2016; 107:150–155. doi: 10.1016/j.resuscitation.2013.05.022CrossrefMedlineGoogle Scholar The wording of this recommendation is consistent with the AHA's 2010 ACLS guidelines.7DiscussionThe writing group recommends that amiodarone or lidocaine may be considered for VF/pVT that is unresponsive to defibrillation. 2017; 136:e424–e440. A multiple logistic regression analysis of in-hospital factors related to survival at six months in patients resuscitated from out-of-hospital ventricular fibrillation.Resuscitation. A description of the ILCOR continuous evidence review process is available in the 2017 CoSTR summary.3The ILCOR systematic reviews use the Grading of Recommendations Assessment, Development, and Evaluation methodology and its associated nomenclature to determine the quality of evidence and strength of recommendations in the published CoSTR statement. Part 8: adult advanced cardiovascular life support: 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care.Circulation. ChanMid America Heart Institute and the University of Missouri–Kansas CityNHLBI (NIH research grant)†NoneNoneNoneNoneNoneNoneMarina Del RiosUniversity of Illinois at Chicago College of MedicineMedtronic Philanthropy (Heart Rescue Grant)*; NIH (SIREN, site principal investigator)*NoneNoneNoneNoneMedtronic Philanthropy (co-investigator, Heart Rescue Grant)*Michael W. For example, no study has considered or evaluated amiodarone for this indication.SummaryAs noted in the ACLS portion of the 2010 guidelines,7 CPR and defibrillation are the only therapies associated with improved survival in patients with VF/pVT. The draft ALS CoSTR was posted online for public comment,1 and a summary containing the final wording of the CoSTR has been published simultaneously with this focused update.2AHA guidelines and focused updates are developed in concert with the ILCOR systematic evidence review process. Although improved survival is the ultimate goal of such treatment, other shorter-term outcomes (even in the absence of a survival benefit) may still be important. The use of magnesium for torsades de pointes is supported by only 2 observational studies.16,17 Magnesium administration was not beneficial in a series of 5 patients with polymorphic VT associated with normal-QT interval.16 The 2018 ILCOR systematic review identified no published randomized controlled trials of magnesium for torsades de pointes.2018 Recommendations for Use of Antiarrhythmic Drugs During Resuscitation From Adult VF/pVT Cardiac ArrestAmiodarone and Lidocaine Recommendation—Updated1.Amiodarone or lidocaine may be considered for VF/pVT that is unresponsive to defibrillation. Driver BE, Debaty G, Plummer DW, Smith SW. Lee YH, Lee KJ, Min YH, Ahn HC, Sohn YD, Lee WW, Oh YT, Cho GC, Seo JY, Shin DH, Park SO, Park SM. Adult Cardiac Arrest Algorithm—2018 Update. In a total of 4 small randomized clinical trials, magnesium administration did not increase ROSC or survival to hospital discharge. DonninoBeth Israel Deaconess Medical CenterNoneNoneNoneNoneNoneNoneMary Fran HazinskiVanderbilt University School of NursingNoneNoneNoneNoneNoneAmerican Heart Association Emergency Cardiovascular Care Programs†NoneKaren G. Magnesium sulfate in the treatment of refractory ventricular fibrillation in the prehospital setting.Resuscitation. doi: 10.1136/emj.19.1.57CrossrefMedlineGoogle Scholar16. In concert with shock delivery, antiarrhythmics can facilitate the restoration and maintenance of a spontaneous perfusing rhythm. BergBeth Israel Deaconess Medical CenterNIH (K23 award; topic: in-hospital cardiac arrest)*NoneNoneNoneNoneNoneNoneJosé G. Part 2: evidence evaluation and management of conflicts of interest: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care.Circulation. There was no statistically significant difference in survival between the 2 active drugs in this subgroup. Conversely, intravenous β-blockers can cause or worsen hemodynamic instability, exacerbate heart failure, and cause bradyarrhythmias, making their routine administration after cardiac arrest potentially hazardous. doi: 10.1016/j.resuscitation.2014.06.032CrossrefMedlineGoogle Scholar20. 2013; 84:1512–1518. Antiarrhythmic drugs for cardiac arrest in adults and children consensus on science and treatment recommendations. Skrifvars MB, Pettilä V, Rosenberg PH, Castrén M. 2015; 132(suppl 2):S368–S382. Further evolution of the ACC/AHA clinical practice guideline recommendation classification system: a report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines.Circulation. Refractory ventricular fibrillation treated with esmolol.Resuscitation. doi: 10.1016/S0300-9572(03)00238-7CrossrefMedlineGoogle Scholar21. In the large ROC-ALPS out-of-hospital randomized controlled trial comparing captisol-based amiodarone with lidocaine or placebo for patients with VF/pVT cardiac arrest refractory after at least 1 shock, there was no overall statistically significant difference in survival with good neurological outcome or survival to hospital discharge.11 ROSC was higher in those receiving lidocaine compared with those receiving placebo. 2018 International Consensus on Cardiopulmonary Resuscitation and Emergency Cardiovascular Care Science With Treatment Recommendations summary.Circulation. 2017;136:e468].Circulation. There is insufficient evidence to recommend for or against the routine initiation or continuation of other antiarrhythmic medications after ROSC following cardiac arrest. PanchalThe Ohio State University Wexner Medical CenterNoneNoneNoneNoneNoneNoneNoneKatherine M. Olasveengen TM, de Caen AR, Mancini ME, Maconochie IK, Aickin R, Atkins DL, Berg RA, Bingham RM, Brooks SC, Castrén M, Chung SP, Considine J, Couto TB, Escalante R, Gazmuri RJ, Guerguerian AM, Hatanaka T, Koster RW, Kudenchuk PJ, Lang E, Lim SH, Løfgren B, Meaney PA, Montgomery WH, Morley PT, Morrison LJ, Nation KJ, Ng KC, Nadkarni VM, Nishiyama C, Nuthall G, Ong GY, Perkins GD, Reis AG, Ristagno G, Sakamoto T, Sayre MR, Schexnayder SM, Sierra AF, Singletary EM, Shimizu N, Smyth MA, Stanton D, Tijssen JA, Travers A, Vaillancourt C, Van de Voorde P, Hazinski MF, Nolan JP; on behalf of the ILCOR Collaborators. Accessed July 30, 2018.Google Scholar2. Magnesium may be considered for torsades de pointes (ie, polymorphic VT associated with long-QT interval) (Class IIb; Level of Evidence C-LD). Kudenchuk PJ, Brown SP, Daya M, Rea T, Nichol G, Morrison LJ, Leroux B, Vaillancourt C, Wittwer L, Callaway CW, Christenson J, Egan D, Ornato JP, Weisfeldt ML, Stiell IG, Idris AH, Aufderheide TP, Dunford JV, Colella MR, Vilke GM, Brienza AM, Desvigne-Nickens P, Gray PC, Gray R, Seals N, Straight R, Dorian P; on behalf of the Resuscitation Outcomes Consortium Investigators. In 2 out-of-hospital, blinded, randomized controlled trials in adults with shock-refractory VF/pVT who received at least 3 shocks and epinephrine, paramedic administration of intravenous amiodarone improved survival to hospital admission. There is no evidence addressing the use of β-blockers after cardiac arrest precipitated by rhythms other than VF/pVT.LidocaineEarly studies in patients with acute myocardial infarction found that lidocaine suppressed premature ventricular complexes and nonsustained VT, rhythms that were believed to presage VF/pVT. The recommended dose of lidocaine is 1.0 to 1.5 mg/kg IV/IO for the first dose and 0.5 to 0.75 mg/kg IV/IO for a second dose if required. Sadowski ZP, Alexander JH, Skrabucha B, Dyduszynski A, Kuch J, Nartowicz E, Swiatecka G, Kong DF, Granger CB. 2010; 122(suppl 3):S729–S767. doi: 10.1016/S0300-9572(00)00375-0CrossrefMedlineGoogle Scholar15. All other recommendations and algorithms published in "Part 7: Adult Advanced Cardiovascular Life Support" in the 2015 guidelines update6 and "Part 8: Adult Advanced Cardiovascular Life Support" in the "2010 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care"7 remain the official ACLS recommendations of the AHA ECC Science Subcommittee and writing groups. Although the most recent clinical trial of lidocaine used a standardized bolus dose for ease of execution,11 this 2018 recommended dose is made with a focus on patient safety through weight-based dosing. A randomised trial to investigate the efficacy of magnesium sulphate for refractory ventricular fibrillation.Emerg Med J. A prespecified subgroup analysis of patients with bystander-witnessed arrest found that survival to hospital discharge was higher in patients receiving either amiodarone or lidocaine than in those receiving placebo. CabañasWake County Emergency Medical ServicesNoneNoneNoneNoneNoneNonePaul S. . Intravenous treatment with magnesium in recurrent persistent ventricular tachycardia.N Trends Arrhythmias. 2018; 138:e714–e730. An antiarrhythmic drug alone is unlikely to pharmacologically convert VF/pVT to an organized perfusing rhythm. 1988; 77:392–397. Some antiarrhythmic drugs have been associated with increased rates of return of spontaneous circulation (ROSC) and hospital admission, but none have yet been demonstrated to increase long-term survival or survival with good neurological outcome. 1993; 270:1589–1595.CrossrefMedlineGoogle Scholar23. It is also important to note that the captisol-based formulation of amiodarone is currently marketed only as a premixed infusion, not in concentrated form, making it impractical for rapid administration during cardiac arrest. doi: 10.1056/NEJM199909163411203CrossrefMedlineGoogle Scholar10. This 2018 American Heart Association focused update on advanced cardiovascular life support guidelines summarizes the most recent published evidence for and recommendations on the use of antiarrhythmic drugs during and immediately after shock-refractory ventricular fibrillation/pulseless ventricular tachycardia cardiac arrest. KurzUniversity of Alabama at BirminghamZoll Medical Corporation (PI for Multicenter International Trial of Predictive Algorithms)†; Society of Critical Care Medicine (grant to examine coagulation after OHCA)†; Emergency Medicine Foundation (grant to examine coagulation after OHCA)†NoneZoll Medical Corp*NoneRapid Oxygen Co†NoneNoneMark S. Thel MC, Armstrong AL, McNulty SE, Califf RM, O'Connor CM; on behalf of the Duke Internal Medicine Housestaff. WaldoUniversity Hospitals Cleveland Medical CenterNoneNoneNoneNoneNoneNoneNoneFootnotesReferences1. Fatovich DM,

Prentice DA, Dobb GJ. doi: 10.1161/CIR.0000000000000611LinkGoogle Scholar3. Kudenchuk PJ, Cobb LA, Copass MK, Cummins RO, Doherty AM, Fahrenbruch CE, Hallstrom AP, Murray WA, Olsufka M, Walsh T. 1991; 7:437–442.Google Scholar18. 2016; 133:1426–1428. Thus, evidence supporting a potential role for prophylactic lidocaine after VF/pVT arrest is relatively weak, limited to short-term outcomes, and nonexistent for cardiac arrest presenting with nonshockable rhythms.2018 Recommendations for Antiarrhythmic Drugs Immediately After ROSC Following Cardiac Arrestβ-Blocker Recommendation—Updated1.There is insufficient evidence to support or refute the routine use of a β-blocker early (within the first hour) after ROSC.Lidocaine Recommendations—Updated1.There is insufficient evidence to support or refute the routine use of lidocaine early (within the first hour) after ROSC.2.In the absence of contraindications, the prophylactic use of lidocaine may be considered in specific circumstances (such as during emergency medical services transport) when treatment of recurrent VF/pVT might prove to be challenging (Class IIb; Level of Evidence C-LD).DiscussionEvidence supporting the prophylactic use of lidocaine or β-blockers on ROSC after VF/pVT cardiac arrest is insufficient to support or refute their routine use. doi: 10.1161/CIR.0000000000000541AbstractGoogle Scholar4. 2014; 85:1337–1341. In these patients, time from collapse to drug administration was likely shorter than among patients with an unwitnessed arrest. doi: 10.1161/circulationaha.110.970988LinkGoogle Scholar8. In 1 observational study that was evaluated for the ACLS guidelines in the 2015 guidelines update, oral or intravenous metoprolol or bisoprolol administration during hospitalization after VF/pVT cardiac arrest was associated with a significantly higher adjusted survival rate in recipients compared with nonrecipients at 72 hours after ROSC and at 6 months.20 This study was not considered by ILCOR in the 2018 evidence review because predefined criteria for the evaluation of post-ROSC prophylactic antiarrhythmic drugs included only drug administration within 1 hour (as opposed to within 72 hours) after ROSC. doi: 10.1016/S0002-8703(99)70401-1CrossrefMedlineGoogle Scholar22. Amiodarone, lidocaine, or placebo in out-of-hospital cardiac arrest.N Engl J Med. There are no new studies that address this topic. Morrison LJ, Gent LM, Lang E, Nunnally ME, Parker MJ, Callaway CW, Nadkarni VM, Fernandez AR, Billi JE, Egan JR, Griffin RE, Shuster M, Hazinski MF. Effects of prophylactic antiarrhythmic drug therapy in acute myocardial infarction: an overview of results from randomized controlled trials.JAMA. CPR indicates cardiopulmonary resuscitation; ET, endotracheal; IO, intraosseous; IV, intravenous; pVT, pulseless ventricular tachycardia; and VF, ventricular fibrillation.The writing group reaffirms that magnesium should not be used routinely during cardiac arrest management but may be considered for torsades de pointes (ie, polymorphic VT associated with long-QT interval). AbstractAntiarrhythmic medications are commonly administered during and immediately after a ventricular fibrillation/pulseless ventricular tachycardia cardiac arrest. The recommended dose for amiodarone is unchanged, with randomized trials supporting an initial IV/IO dose of 300 mg with a second IV/IO dose of 150 mg if required.10,11 Both the ROC-ALPS and ALIVE trials permitted dose reductions in lower-weight patients; however, higher cumulative bolus doses of amiodarone have not been studied in cardiac arrest. There was no statistically significant difference in patient survival between the 2 active drugs. The other formulation contains captisol, which has no known vasoactive effects. This underscores the potential importance and effects of early recognition and treatment of out-of-hospital cardiac arrest on outcome. In 2015, the ILCOR process transitioned to a continuous one, with systematic reviews performed as new published evidence warrants them or when the ILCOR ALS Task Force prioritizes a topic. This randomized trial did not explore the timing or sequence of lidocaine versus epinephrine administration.No randomized trials were identified that assessed the efficacy of lidocaine for treatment of in-hospital cardiac arrest.MagnesiumMagnesium acts as a vasodilator and is an important cofactor in regulating sodium, potassium, and calcium flow across cell membranes. Use of esmolol after failure of standard cardiopulmonary resuscitation to treat patients with refractory ventricular fibrillation.Resuscitation. LinkUniversity of Texas Southwestern Medical CenterNoneNoneNoneNoneNoneNoneNonePeter T. The expert writing group for this 2018 ACLS guidelines focused update reviewed the studies and analysis of the 2018 CoSTR summary2 and carefully considered the ILCOR consensus recommendations in light of the structure and resources of the out-of-hospital and in-hospital resuscitation systems and the providers who use AHA guidelines. This article includes the revised recommendation that providers may consider either amiodarone or lidocaine to treat shock-refractory ventricular fibrillation/pulseless ventricular tachycardia cardiac arrest.This 2018 American Heart Association (AHA) focused update on the advanced cardiovascular life support (ACLS) guidelines for cardiopulmonary resuscitation (CPR) and emergency cardiovascular care (ECC) is based on the systematic review of antiarrhythmic therapy and the resulting “2018 International Consensus on CPR and ECC Science With Treatment Recommendations” (CoSTR) from the Advanced Life Support (ALS) Task Force of the International Liaison Committee on Resuscitation (ILCOR). Future randomized studies are needed with rigorous evaluation of the impact of magnesium on survival and neurological outcomes to determine the importance of magnesium administration in this condition.The writing group is aware of increased interest in and early studies of β-adrenergic–blocking drugs used during cardiac arrest.18,19 The question of the effectiveness of these drugs has been referred to ILCOR for future systematic review.Antiarrhythmic Drugs Immediately After ROSC Following Cardiac ArrestThe 2018 ILCOR systematic review sought to determine whether the prophylactic administration of antiarrhythmic drugs after successful termination of VF/pVT cardiac arrest results in better outcome. doi: 10.1056/NEJMoa013029CrossrefMedlineGoogle Scholar11. Halperin JL, Levine GN, Al-Khatib SM, Birtcher KK, Bozkurt B, Brindis RG, Cigarroa JE, Curtis LH, Fleisher LA, Gentile F, Gidding S, Hlatky MA, Ikonomidis J, Joglar J, Pressler SJ, Wijeysundera DN. Amiodarone as compared with lidocaine for shock-resistant ventricular fibrillation.N Engl J Med. Treatment for this indication is arguably beneficial even if there are as yet no studies showing long-term survival benefit, provided that the intervention itself is not harmful. Although both drugs have precedent for use during acute myocardial infarction, the evidence for their use in patients immediately after resuscitation from cardiac arrest is limited. Amiodarone for resuscitation after out-of-hospital cardiac arrest due to ventricular fibrillation.N Engl J Med. The sequence and timing of interventions recommended in the current ACLS Adult Cardiac Arrest Algorithms (Figures 1 and 2) will be affected by the number of providers participating in the resuscitation, their skill levels, and the ability to secure intravenous/intraosseous access in a timely manner.Writing Group DisclosuresWriting Group MemberEmploymentResearch GrantOther Research SupportSpeakers’ Bureau/HonorariaExpert WitnessOwnership InterestConsultant/Advisory BoardOtherAshish R. doi: 10.1161/CIR.0000000000000261LinkGoogle Scholar7. However, the writing group acknowledges that there are circumstances (eg, during emergency medical services transport of a resuscitated patient after VF/pVT arrest) when recurrence of VF/pVT might prove logistically challenging to treat; in such situations, the use of lidocaine may be considered to prevent recurrence. 2003; 59:319–328. For example, reducing the risk of recurrent arrhythmias with the use of arrhythmia prophylaxis can reduce the risk of recurrent cardiac arrest and its sequelae during transport, which may be particularly important when transport intervals are prolonged. Soar J, Donnino MW, Andersen LW, Berg KM, Böttiger BW, Callaway CW, Deakin CD, Drennan I, Neumar RW, Nicholson TC, O’Neil BJ, Paiva EF, Parr MJ, Reynolds JC, Ristagno G, Sandroni C, Wang TL, Welsford M, Nolan JP, Morley PT. The fact that only 2 observational studies addressing this question have been performed to date underscores a sizeable knowledge gap and limits the conclusions that can be drawn from currently available information.2018 Evidence Summaryβ-Adrenergic–Blocking Drugsβ-Adrenergic–blocking drugs blunt the heightened catecholamine activity that can precipitate cardiac arrhythmias. One formulation contains the diluent polysorbate, which is a vasoactive solvent that can potentially cause hypotension. Part 7: adult advanced cardiovascular life support: 2015 American Heart Association guidelines update for cardiopulmonary resuscitation and emergency cardiovascular care.Circulation. Tzivoni D, Banai S, Schuger C, Benhorin J, Keren A, Gottlieb S, Stern S. 2017 American Heart Association focused update on adult basic life support and cardiopulmonary resuscitation quality: an update to the American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care.Circulation. Two of the trials compared magnesium with placebo for cardiac arrest with any presenting rhythm,12,13 and 2 trials compared magnesium with placebo for VF/pVT cardiac arrest.14,15 Although the 4 trials were underpowered to evaluate long-term outcomes, with a total of only 217 patients randomized to magnesium and 227 randomized to placebo across the 4 studies, the results were consistent in showing no benefit associated with magnesium administration.Magnesium is commonly used to treat torsades de pointes (ie, polymorphic ventricular tachycardia [VT] associated with long-QT interval), but it actually acts to prevent the reinitiation of torsades rather than to pharmacologically convert polymorphic VT. In addition, the “2017 American Heart Association Focused Update on Adult Basic Life Support and Cardiopulmonary Resuscitation Quality: An Update to the American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care” contains updated AHA recommendations for CPR delivered to adult patients in cardiac arrest.8 Through this systematic evaluation process, several issues have been identified in related areas that may be the subject of future systematic reviews.BackgroundShock-refractory VF/pVT refers to VF or pVT that persists or recurs after ≥1 shocks. 2001; 49:245–249. These drugs also reduce ischemic injury and may have membrane-stabilizing effects. Magnesium in cardiac arrest (the MAGIC trial).Resuscitation. However, it is unclear whether these medications improve patient outcomes. In addition, the writing group determined Classes of Recommendation and Levels of Evidence according to the most recent recommendations of the American College of Cardiology/AHA Task Force on Clinical Practice Guidelines4 (Table) by using the process detailed in “Part 2: Evidence Evaluation and Management of Conflicts of Interest” in the “2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care.”5Table. doi: 10.1016/S0300-9572(97)00062-2CrossrefMedlineGoogle Scholar13. Because no antiarrhythmic drug has yet been shown to increase long-term survival or survival with good neurological outcome, these treatment recommendations are based primarily on potential benefits in short-term outcomes (such as ROSC or survival to hospital admission) and on a potential survival benefit in patients with witnessed arrest, for whom time to drug administration may be shorter.Finally, the optimal sequence of ACLS interventions for VF/pVT cardiac arrest, including administration of a vasopressor or antiarrhythmic drug, and the timing of medication administration in relation to shock delivery are not known. Survival to hospital admission was higher in patients receiving either amiodarone or lidocaine than in those receiving placebo, but there was no statistically significant difference between the 2 active drugs. 2018; 137:e7–e13. doi: 10.1161/CIR.0000000000000312LinkGoogle Scholar5. 2002; 346:884–890. doi: 10.1016/S0140-6736(97)05048-4CrossrefMedlineGoogle Scholar14. doi: 10.1161/CIR.0000000000000539LinkGoogle Scholar9. No randomized trials were identified that address the use of amiodarone during in-hospital cardiac arrest.LidocaineIntravenous lidocaine is an antiarrhythmic drug of long-standing and widespread familiarity. Once the ILCOR ALS Task Force develops a CoSTR statement, AHA ACLS science experts review the relevant topics and update the AHA’s ACLS guidelines as needed, typically on an annual basis. Unfortunately, these recommendations are based on low-quality evidence, representing a significant knowledge gap concerning the use of magnesium for VF/pVT. Treatment of torsade de pointes with magnesium sulfate.Circulation. 1999; 137:792–798. 1999; 341:871–878. ACC/AHA Recommendation System: Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care* (Updated August 2015)This 2018 ACLS guidelines focused update includes updates only to the recommendations for the use of antiarrhythmics during and immediately after adult ventricular fibrillation (VF) and pulseless ventricular tachycardia (pVT) cardiac arrest. Manz M, Pfeiffer D, Jung W, Lueritz B. Neumar RW, Otto CW, Link MS, Kronick SL, Shuster M, Callaway CW, Kudenchuk PJ, Ornato JP, McNally B, Silvers SM, Passman RS, White RD, Hess EP, Tang W, Davis D, Sinz E, Morrison LJ. doi: 10.1016/j.resuscitation.2016.07.243CrossrefMedlineGoogle Scholar19. 2015; 132(suppl 2):S444–S464. 2016; 374:1711–1722.

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