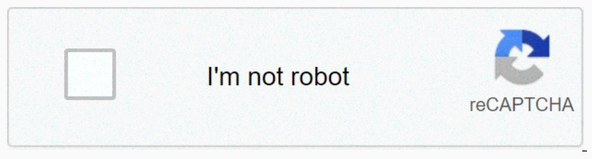

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Asystole acls guidelines

Last updated: May 31, 2020 Version control: This document is currently in connection with the 2016 American Heart Association® Guidelines for CPR and ECC. The updated 2020 guidelines have been published by the AHA, by enrolling in our courses you will receive current learning materials (2016 guidelines) now and also AUTOMATICALLY have free access to the 2021 guidelines when available. Please note that our companies typically apply new training guidelines up to a year before the AHA releases their updates. Management of patients in heart attacks with asystole follows the same path as PEA management. The top priority remains the same: Follow the steps in the ACLS Pulseless Capture Algorithm and identify and correct treatable and underlying asystole causes. The algorithm assumes that scene safety has been assured, personal protective equipment is being used, and no obvious signs of death are present. Start with the main survey to assess the patient's condition: In the absence of breathing and pulse in the presence of asystole (present in two prospects) consideration of cessation of effort should be made. Follow the ACLS Pulseless Capture Algorithm for asystole: Check the patient's rhythm, less than 10 seconds to assess. Verify the presence of asystole in at least two prospects. Continue CPR at compression rates from 100-120 per minute. Rotate team members every 2 minutes with rhythm breaks to help maintain high-quality CPR. As soon as IV or IO access is available, give epinephrine 1mg IV/IO. Don't stop CPR to give drugs. During CPR, locate and treat possible contributing causes (see Reversible Causes, H and T in PDF version). Check the rhythm. If there is no electrical activity (the patient is in the asystole), continue CPR. If electrical activity is there, see if the patient has a pulse. If the patient does not have a pulse or there is any doubt about the pulse, continue CPR. If a good pulse is present and the rhythm is regulated, begin post-resuscitation treatment. IV/IO access is a priority over advanced airway management. If advanced airways are placed, change to continuous chest compressions with no pause for breath. Give 10 breaths per minute (once every 6 seconds) and check the rhythm every 2 minutes. Without pulse or electrical activity on the ECG, the emergency care team needs to decide when resuscitation efforts should stop. The patient's wishes and family concerns need to be considered. © ACLS Training 2020 | Privacy | Terms | Restoring Asystole is defined as a heart attack rhythm in which no electrical activity is visible on the ECG monitor. As a result, it is sometimes referred to as a flatline. Confirmation that the flatline is really asystole is an important step in the ACLS protocol. Make sure that asystole is not another rhythm that looks like a flatline. The smooth VF can look asystole, and the line on the monitor can be caused by an operator error or equipment failure. Equipment. the following are common causes of isoelectric lines that are not asystole: 1. loose or disconnected prospects; 2.loss of power to ECG monitor; 3. Low signal gain on ECG monitor. Asystole for many patients is the result of a prolonged illness or heart attack, and the prognosis is very poor. Some patients will likely have positive results and the success of heart attack treatment with asystole will usually involve identification and correction of the underlying cause of asystole. H and T of ACLS should be reviewed to identify underlying causes that can precipitate asystole. Some of the most common reasons for stopping or withholding resuscitation efforts are: DNR status threats to the safety of Family rescuers or personal information such as life warrants or follow-up directions Rigor mortis Asystole is treated using the proper branch of the Heart Attack Algorithm. Click below to see a diagram of the Heart Attack Algorithm. When you're done click again to close the diagram. See The Heart Attack Algorithm Diagram. Members Download High Resolution PDF Here. Vasopressor Vasopressor is a drug that produces vasoconstriction and increased blood pressure. The vasopressor used for treatment in the proper branch of the Heart Attack Algorithm is epinephrine. Epinephrine is mainly used for its vasoscotric effects. Vasoconstriction is important during CPR as it will help improve blood flow to the brain and heart. When treating asystole, epinephrine can be administered as soon as possible but its administration should not delay the initiation or continuation of CPR. After the initial dose, epinephrine is administered every 3-5 minutes. Rhythm checks should be performed after 2 minutes (5 cycles) of CPR. Limit rhythm checks to less than 10 seconds to minimize interference in CPR. A pulse check should be performed when a rhythm check reveals a change in rhythm to a regulated rhythm and can result in a pulse. Originally published22 August 2000Sirkulasi. 2000;102:I-136–I-165 The passing of time encourages all aspects of the ECC. The final result is determined by the interval between the collapse or onset of an emergency and the delivery of basic and advanced interventions.1A2A The probability of survival decreases sharply with each minute of cardiopulmonary compromise passing. Some interventions, such as basic CPR, slow down the rate at which this decrease in probability occurs. CPR contributes to this by supplying some blood flow to the heart and brain. Some single interventions, such as tracheal intubation, cleaning the obstructed airways, or defibrillating the heart in VF, are enough alone to restore a beating heart. For all these interventions, independently sufficient or just contributory, the longer it takes to administer this therapy, the lower the likelihood of benefits. PeriodEmergency Periarrest cardiovascular care is no longer just patients in cardiac arrest. Emergency services providers narrow their purposes only to the country of arrest. They must recognize and effectively treat those patients on the way to a heart attack and those recovering in the immediate post-resuscitation period. Once this patient is identified, ECC personnel should be able to quickly initiate appropriate therapy. If respondents treat critical conditions correctly in this periarrest or prearrest period, they can prevent full cardiopulmonary arrest from occurring. As a result, international ACLS recommendations present science-based clinical guidelines and some educational materials for this periarrest condition:Acute coronary syndromeAkut pulmonary edema, hypotension, and shockSymptomatic bradycardiasStable and unstable tachycardiasAcute ischemic strokeImpairments of rate, rhythm, or cardiac function in the postresuscitation period (by definition a periarrest/prearrest condition)Other parts of the ECC and CPR guidelines provide guidelines for more specific causes of heart attacks, such as electrolyte abnormalities, drug toxicity or overdose, and patientresuscitation toxicity challenging service providers to make decisions quickly and under pressure. Providers sometimes have to limit their focus for a short time to certain aspects of resuscitation efforts: starting iv infusion lines, placing tracheal tubes, identifying rhythms, and remembering the right drug to order. But rescuers constantly have to return to the overall view of any resuscitation efforts. Flow charts or algorithms focus learners on the most important aspects of resuscitation efforts: airway and ventilation, basic CPR, VF defibrillation, and medications suitable for certain patients under certain conditions. Organization Code: Using the ABCD Survey's Primary and Secondary InternationalMany Perspective Approach for existing code organizations. The section that follows describes the approach taught in the AHA course for ACLS and resuscitation of the child. This does not imply that the organizational method of code used in other countries is wrong or less successful. Why Is Training in ACLS Intentionally Multidisciplinary? An understandable tendency exists internationally to separate highly trained professionals from less skilled personnel during ACLS training. Such a practice, however, would jeopardize one of the most important objectives of resuscitation training. The goal is for each member of the multidisciplinary response team to know and understand the skills and roles of each other team member. An accomplished senior doctor can claim, I already know the resuscitation guidelines and already have psychomotor skills. Why should I attend a study session with poorly trained respondents who are not authorized to perform tracheal intubation, start IV drops, or order medication? Experienced instructors may respond in several ways, but responses should be experts that he or she or she is have to keep working with the whole team that responds. Experts should know what other team members can and cannot do so that resuscitation efforts take place smoothly, calmly, and effectively. More importantly, ACLS team members who have the lowest level of professional training will attend future resuscitation efforts as critical quality control agents. Nurses, for example, who work in critical care and emergency care areas may not perform intubation or defibrillation in some settings, but they can detect with surprising speed and accuracy when other team members try the procedure incorrectly! In American hospitals, particularly academic teaching centers, nurses prevent countless medical errors during resuscitation efforts. They gently (and sometimes not so gently) indicate when the tracheal tube is mis-placed, the IV line has become a subcutaneous line, CPR is inadequate, or the drug is bespoke or wrongly dosed. While emergency personnel are encouraged to know and experience the role of team leader, training should concentrate on the team aspect of the resuscitation effort. The course of resuscitation efforts may be complex and unpredictable. Indeed, a good resuscitation team has been sucked in with a good symphony orchestra.3A The team recognizes team leaders for their organizational skills and extensive performance. They recognize individual team members for specific performance skills. Like orchestras, all perform equal parts, polished by practice and experience, with attention to detail and results. There is no excuse for the irregular and frenetic code scenes. Team leaders must determine and compose. The team had to stick to the ABC (airway, breathing and circulation) and keep the resuscitation room calm so that all personnel could hear without repeated commands. Team members must Take care of vital signs every 5 minutes or with any changes in the parameters that the State monitors when procedures and medications are completedRequest clarification of each commandFind primary and secondary assessment informationSet up team leaders should communicate their observations and should actively seek advice from team members. Evaluation of the airways, breathing, and circulation should guide the effort whenever vital signs are unstable, when the treatment appears to fail, before the procedure, and for periodic clinical updates. The next section describes primary and secondary ABCD surveys. These aides provide a memorable list of content and a specific sequence of assessment and management measures of resuscitation efforts. Primary and Secondary ABCD SurveyAll those who respond to cardiorespiratory emergencies should arrive well trained with a simple and memorable approach. The ACLS Provider course teaches primary and secondary survey approaches to emergency cardiovascular care. Memory assistance describes 2 sets of 4 steps: A-B-C-D (8 total steps). With each of them respondents conduct an assessment and then, if the finished assessment shows, management. Do a Major ABCD Survey The Primary ABCD Survey requires your hands (gloved!), a barrier device for CPR, and an AED for defibrillation. The Main ABCD survey assesses and manages most direct life threats:Airway: Assessing and managing Airways with noninvasive techniques. Breathing: Assess and manageBreathing with positive pressure ventilation. Circulation: Assessing and managing Circulation, performing CPR until an AED is brought to the scene. Defibrillation: Assesses and managesDefibrillation, assesses heart rhythm for VF/VT and delivers defibrillaatory shocks in a safe and effective manner if necessary. Conducting a Secondary ABCD Survey This survey requires sophisticated and medically invasive techniques to re-assess and manage patients. Rescuers seek to restore respiration and spontaneous circulation to patients and when successful, continue to assess and manage patients until released by appropriate emergency professionals. In short: resuscitate, stabilize, and transfer to a higher level of treatment. Airway: Assess and manage. Sophisticated rescuers manage a compromised airway by placing tracheal tubes. Breathing: Assess and manage. Assess respiratory and ventilation adequacy by examining the placement and performance of tubes; fix all detected problems. Manage breathing by treating inadequate ventilation with positive pressure ventilation through tubes. Circulation: Assessing and managing blood circulation and drug delivery by —Starting a peripheral IV line —Attaching an ECG leads to checking the ECG for the most frequent heart attack rhythm (VF, VT without pulse, asystole, and PEA) —Managing the right rhythm-based medication Indifferent Diagnosis: Assessing and managing differential diagnoses you develop as you search, find, and treat Resuscitation Efforts as Critical Incidents: Code Critique and DebriefingAfter each team member's resuscitation efforts must perform code criticism. In emergency departments or busy casualties, carving out the necessary minutes can be difficult. The primary physician, however, must shoulder the responsibility of gathering as many team members as possible for at least a pause to reflect. This briefing provides feedback to prehospital personnel and in hospitals, provides a safe place to express sadness, and provides opportunities for education. Table 1 provides information on the stress briefing of critical incidents. An alternative approach to critical stress debriefing is presented by Kenneth V. Iserson, M.D., in his book Pocket Protocols:Notifying Survivors About Sudden, Unexpected Deaths,4A from which excerpts in Table 2 are adapted. Family Presence in Resuscitation AreasIn a number of countries, hospitals have begun allowing family members and loved ones remain in the resuscitation chamber during actual procedures and resuscitation efforts. Evaluation of these programs, these, by critical care and emergency nurses, has confirmed the overwhelming level of approval and gratitude by the participating family members. These evaluations, mostly in the case of children, have noted significant reductions in posttrauma stress and self-reports of a greater sense of resolution and fulfillment. In the children's resuscitation guidelines in 2000, the presence of families in the resuscitation area had class IIb positive recommendations. Provisions should be made for a professional to accompany family members during this observed effort, to direct the position, answer questions, and explain the procedure. In addition, accompanying professionals can observe signs of acute discomfort in family members and can end observations. We do not have sufficient evidence of family presence during adult resuscitation, but this is only due to the absence of research in adults. Success in the program for adults is predictable, provided that the professionals involved show the same high level of care and care as shown by nurses and social workers involved in child resuscitation efforts. BLS and ACLS Clinical Ethics and Practices: Failed Resuscitation Efforts? Crucially, but often overlooked in the rush to learn all the advanced resuscitation training, we must not forget the resuscitation team and team members, as well as the friends and relatives who are still alive. As soon as you declare death for an arrest victim, you immediately acquire a new set of patients — family, friends, and loved ones of the deceased (see Table 3). Remember that when a person's heart or brain in arrest cannot be restarted, do not use the word fail. The team did not fail to restore the heartbeat, nor did the heart itself fail to respond to such efforts. Instead think in terms of efforts to restore the liver too good to die5A than the liver is too sick to live. 6A At first, however, the clinical reality is unknown; caregivers have no way of knowing the status of the liver that was suddenly captured when they arrived at the scene of a cardiac emergency. In the past we used the phrase giving CPR trials; the only way to recognize too well to die versus too sick to live is to give patients a rapid and aggressive evaluation period of BLS and ACLS. If spontaneous circulation does not return quickly, then we assume that the verdict in the CPR trial is the person at the end of his life. In such situations the ongoing resuscitation efforts are inappropriate, futile, dignified, and demeaning to patients and rescuers. Part 2: Aspects of CPR and ECC Ethics provide an ethical framework for considering resuscitation efforts and present specific recommendations for prehospital and hospital care providers. Circulation. I)I-136–I-165. Table 1. Recommendations for the Resuscitation Team Criticism and Briefing Members of the Ask team to gather immediately after the event. With a few exceptions all team members must group in a private place if possible. Use the resuscitation space if available. State the purpose: We would like to have a brief review (briefing) of our resuscitation efforts. Start with a review of events and code behavior. Let's start with the paramedics. Can (nurses) review our intervention sequences? Stating which algorithms or protocols should be followed; discuss what is actually being done; discuss why there are variations. So this is VF's arrest outside the hospital being treated by medics. When we are assumed to care, what protocols are indicated? How good are we doing? Analysis of decisions and actions carried out correctly and effectively. Discuss decisions that may be wrong; discuss any actions performed less optimally. Allow free discussions. When the patient's pulse is restored it looks like everyone is leaving the room. Only (the nurse) was in the room when Pak (the patient) was pulled back. Who wants to explain the delay? All team members must share their feelings, anxiety, anger, and possible guilt. I was annoyed because when the team admitted they arrived they were really annoying, demanding a lot of tests and X-rays. They made me feel that we had done a bad job. Ask for recommendations or suggestions for future resuscitation efforts. How can we do this better next time? (Nurse:) I don't think we should call a recognized team until the patient is completely stable and ready to go upstairs. Informing team members they cannot attend the briefing of the process followed, discussions generated, and recommendations made. Chuck, we're going to implement that plan to allow family members in the code room during resuscitation. I know you're against that. What if we appoint our social workers to stay by the side of family members all the time they are near resuscitation? Team leaders should encourage team members to contact them if questions arise later. Table 2. Critical Incident Stress Debriefing of Professionals: A Simplified ProtocolThere are 4 consecutive aspects for critical incident stress interviews (CISD). This is an on-site briefing, initial taming, formal CISD, and advanced CISD. However, not all 4 aspects are always used. On-Scene or Near-Scene DebriefingThis is performed by a knowledgeable officer, pastor, or health professional in both CISD and team operations. This individual mainly supervises the development of signs of acute stress reactions. Instead of formal briefings, it's mainly a period of conscious observation. DefusingPerformed early in the hours after the incident, this was a situation where participants had the opportunity to discuss their feelings and reactions in a positive and supportive atmosphere. These discussions can be led by a senior officer or health professional who with CISD who have good interpersonal skills, or may not have a leader at all and become spontaneous among team members. This is best done through mandatory team meetings. The key to success at this stage is to maintain a supportive atmosphere rather than a critical atmosphere, to maintain the confidentiality of comments, and to prohibit comments that are difficult, insensitive, or can be interpreted as gallows humor. If this is not done, it will quickly end the feeling of sharing among team members. Formally CISDTypically led by a mental health professional familiar with CISD, this formal session was held within 24 to 48 hours after the incident. Specially trained public and private CISD teams now exist throughout the United States, Canada, and in many other countries. Many of these are attributed to local or regional police or firefighters (who can also be contacted to find other competent teams). These sessions often follow the standard format by first laying out the basic rules of noncritique and confidentiality. Then the participants were asked to describe themselves and key activities during the incident, their feelings during the incident and current, and the unusual symptoms they experienced or experienced. Participants can be asked to explore the linkages between previous events and events, nonjudgmentally describe the actions of others (to help describe their own actions), and describe their own and group's successes during incidents. The facilitator then described typical symptoms of posttraumatic stress disorder (PTSD) and eventually suggested activities to help them regain a sense of purpose and unity (such as attending a memorial service for the victims). During this session, leaders also tried to identify those who may need more intensive counseling. Follow-up CISDNot is always or even frequent, this session is held from a few weeks to months after the incident. They can be held back to solve specific group problems or more often to help specific individuals. (When held individually, this is basically a psychological counseling session.) Groups that will experience events that trigger PTSD during their work must have this service available before it is required. Individuals who provide these counseling services may be subject to PTSD, and, if so, must also undergo a briefing. Additional ResourcesFor more information to help professionals working with PTSD victims, contact the PTSD National Center at 802-296-5132, email , or the website or post traumatic stress resources webpage at . Table 3. DeliverIng a Sudden Obituoes to Family MembersCall the family if they haven't been notified. Explain that their relatives have been treated at the Emergency Department and that the situation Survivors should not be informed of the deaths over the phone. Get as much information as possible about the patient and the circumstances surrounding the death. Be careful going over events like the one that happened in Department.Asking someone to take a family member to a private area. Come in, introduce yourself, and sit down. The address of the closest relative. Briefly describes the circumstances that led to death. Go to the sequence of events in the Emergency Department. Avoid euphemisms as she passed on, she was no longer with us, or she left us. Instead, use certain phrases and words such as death, dying, or death. Your mother died peacefully, without suffering. ... His death was peaceful and peaceful. ... Take the time for the shocks to be absorbed. Make eye contact, touch, and share. Convey your feelings with phrases like you have my (our) sincere sympathies than I (we) apologize. Allow as much time as necessary for questions and discussions. Visit the event several times to make sure everything is understood and to facilitate further inquiries. Allow families the opportunity to see their relatives. If the equipment is still connected, notify the family. Know in advance what happens next and who will sign the death certificate. Doctors can burden staff and families if they fail to understand policies on death certification and body disposition. Know the answers to these questions before meeting family. Ask for the help of social workers or clerics if they are not present. Offer to contact the attending doctor or the patient's family and be available if you have any further questions. Set up for follow-up and resume support during the grieving period. Table 4. Approach Algorithms for Emergency Heart Care These guidelines use algorithms as educational tools. They are illustrative methods for summarizing information. Emergency care providers should look at algorithms as summaries and memory assistance. They provide a way to treat a wide range of patients. Algorithms, naturally, oversimplify. Teachers and effective care providers will use it wisely, not blindly. Some patients may require treatment that is not specified in the algorithm. If clinically appropriate, flexibility is accepted and encouraged. Many interventions and actions are listed as considerations to help providers think. This list should not be considered an endorsement or requirement or standard of care in a legal sense. Algorithms do not replace clinical understanding. Although algorithms provide good cookbooks, patients always need a thinking chef. The following clinical recommendations apply to all treatment algorithms:· First, treat the patient, not the monitor. Algorithms for heart attacks assume that the conditions being discussed continue, that the patient remains in cardiac arrest, and that CPR is always performed.· Apply different interventions whenever there is an appropriate indication. Flowcharts present most Class I recommendations (acceptable, definitely effective). existing Class IIa (acceptable, possibly effective), Class IIb (acceptable, possibly effective), and Class III (not indicated, may be Recommendations. Adequate airway, ventilation, oxygenation, chest compressions, and defibrillation are more important than administering drugs and take precedence over starting intravenous lines or injecting pharmacological agents. Some medications (epinephrine, lidocaine, and atropine) can be administered through the tracheal tube, but doctors should use endotracheal doses of 2 to 2.5 times intravenous doses. With a few exceptions, intravenous drugs should always be administered quickly, in the bolus method. After each intravenous drug, give 20- to 30-mL bolus intravenous fluid and immediately increase the extremities. This will increase the delivery of the drug to the central circulation, which may take 1 to 2 minutes. Lastly, treat patients, not monitors. Figure 1. ILCOR Universal/International ACLS algorithm. Figure 2. Comprehensive ECC algorithm. Figure 2A. Primary and Secondary ABCD Survey Figure 3. Ventricle Fibrillation/ Pulseless VT Algorithm. Figure 4. Algorithm of Electrical Activity Without Pulses. Figure 5. Asystole: Silent Heart Algorithm. Figure 6. Bradycardia algorithm. Figure 7. Tachycardia Overview Algorithm. Figure 7B. Rate and Rhythm Control (Continued from Takikardia Overview) Figure 7C. Rate and Rhythm Control (Continued from Takikardia Overview) Figure 8. Supraventricular Takikardia Algorithm Narrow Complex. Figure 9. Stable Tachycardia Ventricular Tachycardia (Monomorphic or Polymorphic) algorithm. Figure 10. Synchronized Cardioversion Algorithm. References 1A Cummins RO, Chamberlain DA, Abramson NS, Allen M, Baskett P, Becker L, Bossaert L, Delooz H, Dick W, Eisenberg M, et al, American Heart Association Task Force, European Resuscitation Council, Canadian Heart and Stroke Foundation, and Australian Resuscitation Council. Recommended guidelines for reporting uniform data from heart attacks outside hospitals: Utstein style [see comments]. Ann Emerg Med.1991; 20:861–874.CrossrefMedlineGoogle Scholar2A Cummins RO, Ornato JP, Thies WH, Pepe PE. Improving survival from sudden cardiac arrest: the concept of a survival chain: a statement to health professionals from the Advanced Heart Life Support Subcommittee and the Emergency Heart Care Committee, American Heart Association. Circulation.1991; 83:1832–1847.CrossrefMedlineGoogle Scholar3A Burkle FM Jr., Rice MM organization. Code. Am J Emerging Med.1987; 5:235–239.CrossrefMedlineGoogle Scholar4A Iserson KV. Pocket Protocol for Notifying Survivors of Unexpected Sudden Deaths. Tuscon, Ariz.: Galen Press, Ltd.; 1999.Google Scholar5A Beck C, Leighninger D. Reversal of death in a good heart. J Cardiovasc Surg.1962; 3:357–375.Google Scholar6A Safar P, Bircher N. Cardiopulmonary Cerebral Resuscitation: World Federation of Societies of Anaesthesiologists International CPCR Guidelines. Philadelphia, Pa.: WB Saunders Co.; 1988.Google ScholarcirculationahaCirculationCirculationCirculationCiulation0009-73221524-4539Lippincott Williams & Williams & WilkinscirculationahaCirculationCirculationCirculation0009-73221524-4539Lippincott Williams & Wilkins220820002208200022082000SWedding the ACLS algorithm first appeared in the ECC Guidelines and CPR 1986.1B These lines of 4 algorithms present interventions for 4 rhythms of capture, using twice the distance lines of the type connected by vertical arrows. Since the first primitive algorithm, diagrams have been the primary tool for describing critical observations, critical actions, and important decision points in resuscitation. Since 1986 a similar algorithm has been published by the Council of European Resuscitation (1992)2B3B and in southern Africa (1995).4B5B6B7B In the years since 1986 various algorithmic approaches have emerged. Differences have been in design and detail, not in science or clinical recommendations. Each set of ACLS algorithms contains information about the general principles of the same resuscitation but presents it in a unique style with varying amounts of detail and a very different target audience.4B5B Algorithm StructureAll resuscitation algorithms describe observation steps and actions. These steps usually take turns. Observation steps serve as a series of decision-making points or decision nodes. You identify the problem in the decision node and then choose the right action to take. The observation measures and decisions alternating in algorithms strongly resemble alternating assessment-governance measures that are fundamental to emergency care and resuscitation. In 2000 in this set of algorithms, we have provided all the curved angle

observational boxes and all square angle action boxes. The treatment of any resuscitation emergency can be mapped into a series of steps managed by this value, with repeated loops and reassessments. The philosophy of Algorithmic Algorithms has grown to mean different things to various resuscitation boards around the world. They mean different things for the training network in the resuscitation board. In some resuscitation boards, algorithms are designed to sift through important information about the identification and treatment of problems to their essence — such concise displays target novice practitioners and encourage experts to provide their own details or additional information. Such an approach was favored by Dr Walter Kloeck, National Chairman of the South African Resuscitation Council. Dr Kloeck's sparse and clean design aims to illustrate the most common assessments and actions taken for most patients. This algorithm is designed for early learners or CPR, ECC, and ACLS learners. This simple elegant teaching material style has dominated the teaching materials of many international resuscitation boards.7BAt at the same time, in the AHA algorithms come to be used by experienced instructors and doctors as teaching tools. The training network began to ask for more inclusion and more details for to a wider range of clinical situations with more and more information for doctors and for ACLS instructors. These algorithms, although more complex, are considered more useful during actual resuscitation and more useful for teaching the scope of resuscitation practices. Clearly, every approach—concise versus complex—has its benefits. When the first international algorithm was developed for the ILCOR Advisory Statement, the differences in algorithmic approach became apparent.8B Since ILCOR's advisory statements are evidence-based consensus documents, the emerging algorithms have reserves. They are limited to the points of assessment and treatment of existing absolute agreement. The algorithms contained in the International Guidelines 2000 represent the second iteration of international algorithms, developed by scientists at the Evidence Evaluation Conference and at the 2000 Guidelines Conference. They represent a compromise between the concise approach of many international resuscitation councils and the detailed approach favoured within the AHA. Details are provided in the text and in boxes that are pulled out of the main body of the algorithm. The application of Algorithm Algorithm Is designed to serve as adjutant-mémoire, to remind doctors of important aspects of assessment and therapy. They are not designed to be comprehensive or restrictive. Doctors should always determine whether the algorithm is appropriate for the patient and should be prepared to deviate from the algorithm if the patient's condition warrants. The algorithm should be considered a common recipe of a valued grandmother — the general guiding principles are there, but her wealth will be in individual applications. Algorithms may provide recipes but they still require chefs to think (see Table 4). Algorithms are described in sequential formats. However, this is misleading because in most situations multiple service providers resuscitation is present, and many assessments and interventions are achieved simultaneously. Many of these algorithms contain notes on assessment and evaluation that should be considered throughout resuscitation (for example, verifying the proper placement of tracheal tubes, identifying and treating reversible causes). Students and doctors are not expected to memorize the algorithm in detail. They are expected to consult the algorithm. It is expected that a copy of this algorithm will be available in the course and a written evaluation for the course. The reasons for this approach are realistic and professional, based on established principles of adult education. The doctor should know where to find the right information and how to apply it. Algorithms are intended to lead physicians along the lines of assessment and intervention during resuscitation experiences. Ilcor algorithm presents the actions to be taken and decisions that must be faced for everyone who seems to be at heart unresponsive, with no signs of life. The victim is not breathing normally, and no rescuer can feel a carotid pulse within 10 to 15 seconds. Since 1992 the resuscitation community has examined and reaffirmed the wisdom of most of the recommendations formulated by international groups until the 1990s. Sophisticated clinical trials provide high levels of evidence in which to base some new drugs and interventions. Finally, we have learned that we must continue to place a strong emphasis after 2000 on establishing a critically acclaimed international scientific evidence base. Evidence-based reviews open many eyes; only a small part of resuscitation treatments are focused on the basis of strong evidence. Note: The numbers below, such as 1 (Figure 1), match the numbers in the algorithm. Figure 1: ILCORFigure 1 Universal/International ACLS Algorithm, ILCOR Universal/International ACLS Algorithm, and Figure 2, Comprehensive ECC Algorithm, are innovative efforts to unify and simplify important information of adult ACLS. They showed integration of BLS measures, initial defibrillation, and ACLS. The ILCOR algorithm (Figure 1) shows how the overall approach can be presented, with minimum elaboration of separate measures. The Comprehensive ECC Algorithm (Figure 2) provides more details, primarily to support the AHA teaching approach based on the Primary and Secondary ABCD Survey. Both of these algorithms illustrate many new concepts and interventions since 1992.Note to ILCOR Universal/International ACLS Algorithm1 algorithm1 (Figure 1)BLS. Simple instructions BLS algorithm directs rescuers to start 6 basic steps international BLS algorithm: Check responsiveness Open airway Respiratory Check Give 2 breaths effectively Assess circulation Chest compresses (no signs of circulation detected)Note that step 6 does not use the term pulse. In their 1998 BLS guidelines, the European Resuscitation Council and several ILCOR boards dropped specific references in their algorithms to check carotid pulses. They replaced pulse checks with directions to check for signs of circulation, that is, looking for any movements, including swallowing or breathing (more than occasional gasps). Their guidelines instruct lifesavers to check carotid pulses as one of the signs of circulation, but pulse checks do not accept the prominent emphasis derived from inclusions in the algorithm. By 2000 many locations had confirmed the success of this European approach. Additional evidence has accumulated that pulse examination is not a good diagnostic test for the presence or absence of a beating heart. After an international panel of experts reviewed the evidence at the 2000 Guidelines Conference, they also supported the approach of eliminating pulse checks for layman of the International Guidelines 2000.2 (Figure 1)Attach defibrillator/monitor; assess the rhythm. After respondents started the BLS algorithm, they to attach a defibrillator/monitor and assess the rhythm.3 (Figure 1)VF/VT without pulse. If they use conventional defibrillators and monitors display VF, rescuers try defibrillation, up to 3 times more is required. If using an AED, the rescuer follows the device's signal and sound prompt, attempting defibrillation with up to 3 shocks. After 3 shocks they should immediately resume CPR for at least 1 minute. At the end of the minute, they have to repeat the rhythm and shock assessment when appropriate.4 (Figure 1)Non-VF rhythm. If a conventional defibrillator/monitor displays non-VF tracking or no surprise AED signal indicated, respondents should immediately check the pulse to determine if an indetenable rhythm produces spontaneous circulation. If not, then start CPR; continue CPR for approximately 3 minutes. With non-VF rhythms lifesavers need to go back and re-examine the rhythm for repeating VF or for spontaneously organized rhythmic return in a beating heart. At this point the algorithm enters the comment center column.5 (Figure 1)During CPR: placement of the tracheal tube; IV access. In this period the rescuer has many tasks to complete. The central column includes the main interventions of ACLS: placing and confirming tracheal tubes, starting an IV, providing the right remedy for rhythm, and finding and repairing reversible causes. Note that the ECC Comprehensive Algorithm (Figure 2) conveys this same approach using the help of Secondary ABCD Survey memory. In this survey A=advanced airway (placement of tracheal tubes); B=confirm tube location, oxygenation, and ventilation; and access to circulation C=through iv lines and circulatory drugs.6 (Figure 1)VF/VT refractory to initial shocks: epinephrine or vasopressin. Ilcor's Universal algorithm shows that response personnel give all heart attack patients a strong vasopressor, either epinephrine IV or vasopressin. This recommendation for vasopressin is one of the more interesting new guidelines. Discussions about adding amiodarone are detailed later in this section. Consider buffers, antiarimic, pacing, atropine; find and fix reversible causes. This brief phrase includes many of the interventions discussed and debated during the International Evidence Evaluation Conference and 2000 Guidelines Conference: some antiariritmic, neutralizing acidosis, and transcultant pacing. The word consider has become an informal code in the resuscitation community that is interpreted to mean that we have no evidence that defines one intervention as superior to the other. Whether this means that two interventions are equally effective or equally ineffective is a constantly waged debate in resuscitation research.7 (Figure 1)Consider potentially reversible causes. These guidelines apply primarily to non-VF/VT patients. For groups there are often specific causes of effective loss of heart rate. Effective. The 2000 International Guidelines take innovative steps to list the 10 most common reversible causes of non-VF/VT capture at the bottom of the algorithm. This is discussed in detail in the section on electrical activity without a pulse. End Algorithm NotesFigure 2: Comprehensive ECC AlgorithmBoth universal ILCOR algorithm and Comprehensive ECC Algorithm (Figure 2) conveys the concept that all heart attack victims are in 1 of 2 rhythms: VF/VT rhythm and non-VF rhythm. Non-VF consists of asystole and PEA, which are treated equally. Therefore, there is no important need to separate the subject into VF, VT without pulse, PEA, or asystole. All heart attack victims received 4 of the same treatment intubation CPRTrachealVasoconstrictorsAntiarrhythmics The only distinguishing treatment for arrest victims is that rescuers treat VF/VT patients with defibrillator shocks. The algorithms in Figures 1 and 2 show simple concepts. Ilcor Universal Algorithm and Comprehensive ECC Algorithm are the only teaching/learning saviors need because they treat everyone in a heart attack in this way. Note to Comprehensive ECC Algorithm 1 (Figure 2)Start primary ABCD Survey. Unresponsive; not breathing. Boxes 1 and 2 cover the steps of the BLS Algorithm and include the Main ABCD Survey. This survey is a memory aid and does not convey therapeutic values as stated and displayed. Primary and Secondary ABCD surveys are simple mnemonics that aid early learning. They also provide a useful mental hook to review and recall later. Listing further details in the algorithm provides an easy review of the steps, especially when the student has not participated regularly in the actual resuscitation effort.2 (Figure 2)VF/VT: defibrillation efforts (up to 3 shocks if VF persists). Advanced rhythm and CPR assessments are at the center of the Comprehensive ECC Algorithm. The metaphor of the clock beating away for heart attack victims in VF is over-used but accurate. With every minute of persistent VF, the probability of survival decreases. Two hours of racing. One of them is a clock that measures therapeutic intervals (from collapse to the arrival of defibrillators). One of them is a clock that measures irreversible intervals of damage (from the cessation of blood flow to the brain to the beginning of permanent irreversible brain death). Here are observations that will put the racing clock into perspective. Some experts have observed that a significant amount of time and money is spent on the development of new defibrillation waveforms, new antiariritmics, innovative vasopressors, and fresh approaches to ventilation and oxygenation. The total combined effect on the survival of this intervention equates to nothing more than cutting the interval from collapse to defibrillatori shock by 2 (Figure 2) Non-VF/VT. ILCOR's recommendation is to consider non-VF/VT rhythms as a single rhythm when a patient is in cardiac arrest. Consider non-VF/VT as asystole or or The treatments in the algorithm are the same for both: epinephrine, atropine, transkutan pacing. Electrical activity on the monitor screen is a more positive rhythm than asystole. Later in this discussion PEA and asystole are presented in more detail. Both rhythms have differential diagnoses in terms of what entities can produce PEA and asitolik rhythms. Respondents should aggressively evaluate PEA victims to find potential reversible causes. There are narrow diagnostic intervals of only a few minutes on PEA discovery. Asystole, on the other hand, is rarely saved unless reversible causes (e.g., severe hyperkalemia, fenofiazine overdoses) are found. Only occasionally does asystole respond to epinephrine in higher doses, atropine, or pacing, as patients are only destined to die, given the nature of the original rainfall event.4 (Figure 2)Secondary ABCD Survey. Use of vasopressor: epinephrine for non-VF/VT, vasopressin for VF reflector. This section of the algorithm makes the same points about persistent capture of VF/VT and non-VF/VT as ILCOR Universal Algorithms. The ECC Comprehensive Algorithm, however, uses the help of Secondary ABCD Survey memory, a device that is repeated across all heart attack algorithms. Note the algorithm expanded on these concepts.5 (Figure 2)Possible reversible causes. Sudden VF/VT capture is very easy in their management. Management consists of initial defibrillation, which can succeed independently of other interventions and independently discover the cause of arrhythmias. However, with non-VF/VT capture, successful spontaneous pulse recovery is almost entirely dependent on recognizing and treating potentially reversible causes. As mémoire's aide, Figure 1 places the following list, referred to as 5 H's and 5 T's, in the algorithmic layout: 5 H HypovolemiaHypoxiaHydrogen ions (acidosis)Hyperkalemia/hypokalemia and metabolic disordersHypothermia/hyperthermiaThe 5 TToxins/illicit drugs)Tamponade, heartTension pneumothoraxThrombosis, coronaryThrombosis, ParuFigure 2, Comprehensive ECC Algorithm, expands the table of reversible causes by listing possible therapeutic interventions next to each potential cause. Consider: Do any of the following conditions play a role? Hypovolemia (volume infusion)Hypoxia (oxygen, ventilation)hydrogen ions—acidosis (buffer, ventilation)Hyperkalemia (CaCl plus others)Hypothermia (see Hypothermia Algorithm in Part 8)Tablets (drug overdoses, accident)Tamponade, heart (perikardesis)Tension pneumothorax (decompression—need coronary (fibrinolytics)Thrombosis, lung (fibrinolytics, surgical evacuation)End Algorithm Notes Newly Recommended Agent: Vasopressin for VF/VTPeople knowledgeable about the ACLS recommendations during the 1990s will soon notice that recommendations for vasoconstrictor are necessary, epinephrine, epinephrine, Changed. The first 3 algorithms—the Universal ILCOR algorithm, the Comprehensive ECC Algorithm, and the Ventricular Fibrillation—each contain the same recommendations for vasopressin as the epinephrine equivalent adrenergic agent for VF/VT heart attacks. This is one of the most important new recommendations in the International Guidelines 2000. Vasopressin, a natural substance of antidiuretic hormones, becomes a powerful vasoconstrictor when used at much higher doses than is usually found in the body. Vasopressin has a positive effect that duplicates the positive effects of epinephrine. Vasopressin does not duplicate the adverse effects of epinephrine. (See Pharmacology II: An Agent for Optimizing Cardiac Output and Blood Pressure for more detailed materials on vasopressin.) Vasopressin received a Class IIb recommendation (acceptable, harmless, supported by fair evidence) from an international panel of experts on adreneromeration. Note that vasopressin is recommended as a single dose 1 time in humans. Vasopressin requires less administration because vasopressin 10 to 20 minutes half life is much greater than the half-part epinephrine of 3 to 5 minutes. After a single dose of vasopressin, the algorithm allows a return to the epinephrine if there is no clinical response to vasopressin. Returning to epinephrine has no specific human evidence to provide support, although at least 1 clinical trial in Europe is underway. In an informal poll of experts on the adrenergy panel, everyone received this recommendation to return to epinephrine after 10 to 20 minutes. (The possibility of a second dose of vasopressin in 10 to 20 minutes is discussed and seems rational. However, this is listed as an Inde certain Class recommendation because we lack research in humans that addresses this question.) The rather inappropriate timeframe between the dose of vasopressin and subsequent administration of epinephrine allows flexibility in decisions about when to give the next adrenergic. The dilemma is: give too quickly and cause adverse effects of excessive vasopressin; give late and the probability of a positive result vanishes. Primary and Secondary ABCD SurveysIn some locations, especially in courses for ACLS providers, learners are taught memory assistance called Primary and Secondary ABCD Surveys. These 8 measures apply to all cardiovascular cardiopulmonary emergencies. The course director created an ABCD survey to help ACLS providers remember special action measures. By memorizing 2 surveys, ACLS students learn certain actions in a specific order. Surveys use the familiar mnemonics of the first 4 letters of the alphabet, and they retain the traditional actions associated with those 4 letters:A=AirwayB=BreathingC=CirculationD=Defibrilation (or Differential Diagnosis in Secondary ABCD Surveys)Since repetition is a well-documented aid for learning, Primary and Secondary ABCD surveys repeated other algorithms: VF/VT, PEA, and asystole. Figure 3, VF/VT without pulse, conveys more details about Secondary ABCD Survey:A = Airway control with endotrachealB intubation = Breathing effectively: verification with confirmation of proper primary and secondary tube placementC = Circulation, which combines vital signs, monitoring of ECG, access to circulation through iv lines, and then the administration of a rhythmic drugD = Differential DiagnosisA directive to consider differential diagnosis improves the resuscitation protocol, since it is a recommendation to stop and think: What caused this arrest? With the addition of this step, the resuscitation team will identify more heart attacks with reversible causes. While we have no evidence to support the use of this memory aid, its use has a strong common sense appeal. The Secondary ABCD survey in Figure 2 states perhaps the most important new recommendations for out-of-hospital care providers. We make stronger and more explicit recommendations to confirm the placement of tracheal tubes. We recommend that resuscitation personnel take special measures to prevent removal of the tube after the correct initial placement. From 1999 to 2000, publications on child resuscitation outside the hospital documented high levels of tube removal. The researchers found that on arrival and evaluation at the Emergency Department, 8% to 12% of tracheal tubes were in the esophagus or hypopharynx. Given the study's design, the researchers were unable to determine whether this possibly deadly error was caused by incorrect initial tube placement or dislodged after placement. This information has raised concerns that ACLS providers may be doing undetectable damage while making our most critical interventions. Figure 3: VF/Pulseless VTFigure 3 includes VF/VT treatment without pulse in more depth than Numbers 1 and 2. Figure 3 was created as a teaching tool to convey specific details about primary and secondary ABCD surveys. The treatments described in Figures 1, 2, and 3 are identical: CPR, defibrillation if VF/VT, advanced airway control, intravenous access, rhythmic medications. Always Assume VF (Figure 1 Through 3)Note that Figure 1, ILCOR Universal ACLS Algorithm, Figure 2, ECC Comprehensive Algorithm, and Figure 3, Ventricular Fibrillation/ Pulseless VT Algorithm, state this teaching unequivocally: lifesavers should assume that all sudden adult heart attacks are caused by VF/VT without pulse. Therefore, all training efforts place a strong emphasis on recognition and treatment of VF/VT without pulse. Proper treatment with initial defibrillator shock allows the VF/VT without pulse to provide the majority of adult heart attack survivors. MATURE EMS systems, such as Seattle/King County, Washington, USA, have been collecting data for >25 years. Year after year VF/VT contributes 85% to 95% of survivors. Energy Levels for Waveforms Shock and Defibrillation Biphasic Biphasic Appearance defibrillators have generated great enthusiasm in the resuscitation community. Reaching out to ems organizations in 1996, the first biphasic defibrillator approved for the market surprised only at energy levels 1, about 170 J. Competitive market forces caused considerable controversy over the efficacy of biphasic wave shocks in general and no energy levels in particular. This unusual chapter in the history of medical device manufacturers has been reviewed in detail in the Medical Scientific Statement of the Senior Science Editor and chairs the subcommittee ECC.1C Biphasic waveform defibrillator is conditionally acceptable — regardless of the initial shock energy level and regardless of the energy level of the next shock (no one calculates). The conditions that must be met are clinical data that affirm the equivalent or superior effectiveness of monophasic defibrillators when used in the same clinical context. For example, to meet this condition the manufacturer was unable to compare rescue defibrillation shocks delivered to cardiac fibrillation in the Electrophysiological Stimulation Laboratory versus defibrillaatory shocks delivered to patients with 12-minute-old VF in the absence of CPR efforts from bystanders. (See Defibrillation in Part 6 for more details on waveforms and energy levels.) International Guidelines panel 2000 experts, ILCOR representatives, and other delegates thought that the recommended classes for biphasic shocks, energy levels that did not exist, should be upgraded from Class IIb in 1998 to Class IIa in the 2000s.CPR, VF, and DefibrillationAfter 3 failed attempts to achieve defibrillation, the first 3 algorithms instructed rescuers to provide about 1 minute of CPR. It produces some blood reoxogenation and some of this blood circulation to the heart and brain. The exact effect of these CPR minutes on VF refrtori is unclear. Stimulated by the publication of a 1999 retrospective analysis of cardiac arrest data outside hospitals from Seattle, Washington, EMS systems, the Evidence Evaluation Conference (September 1999) included this topic on its agenda. EMS personnel initially use protocols where arriving EMTs attach an AED and analyze and surprising VF rhythms as quickly as possible. Then the protocol directs EMTs to perform 60 to 90 seconds of CPR before attaching a surprising AED and VF. The survival rate for hospital discharge was significantly higher during the specified preshock CPR period. Other experts argue that myocardium fibrillation suffers from an incessant deterioration as long as VF continues, CPR or no CPR. A minute or so of preshock CPR does not prevent this deterioration. The recommendations of these guidelines are classed as indespective because the quality and amount of evidence, on both sides of the question, is at a lower level: retrospective data (Level 5) and extrapolation of data from (Level 7), especially animal studies (Level 6). Reduced Roles Drugs in VF Capture Universal ILCOR Algorithm, Comprehensive ECC Algorithm, and similar comments in Figure 3 relegate adrenerential agents, antiarimic agents, and buffer therapies for secondary roles for VF and non-VF patients. This secondary role applies to time-honored agents such as epinephrine, lidocaine, procainamide, and newly available buffer agents and agents such as amiodarone. A thorough and systematic review reveals that relevant, valid and credible evidence to confirm the merits of these agents does not exist at all. This does not mean that resuscitation drugs were chosen capriciously by the pioneers of resuscitation decades ago. They apply common sense, rational conjecture, and extrapolation from animal studies to arrive at the antiarrhythmics used over the past decade. If the agent is indicated in animal models to raise the fibrillation threshold and lower the threshold of defibrillation, then the reasonable assumption is that the drug will facilitate the defibrillation of the human heart to the rhythm that perfumes. This kind of rational conjecture results in a rather eclectic group of drugs that have been hoarding resuscitation kits for more than a decade. Moreover, it wasn't until the 1990s that researchers discovered the grim truth that antiariritmic drugs act more like proarrhythmic agents. Drugs administered to prevent VF/VT arrests appear to result in VF/VT arrests. With reappraisal critical findings that interfere with this undermine the validity and credibility of the study scores are designed and executed very well. Through the use of critical assessment, most researchers in this field realized that the only proper evaluation of the new resuscitation agent should be prospective, randomized clinical trials in which the only acceptable control group had to be a placebo. The design of new drug studies versus standard therapies is unacceptable for obvious reasons — if standard therapies and new drugs make heart attack victims worse, we can never get valid results. The adverse effects will not be recognized unless one agent is significantly worse than the other. Ironically, the researchers will conclude that more or less bad drugs are actually superior agents of positive benefit for patients. See Pharmacology I: Agents for Arrhythmias and Pharmacology II: Agents for Optimizing Cardiac Output and Blood Pressure for more detailed materials that support this observation. New Class Of Recommendations for Epinephrine and Lidocaine: Does not specifyA large number of animal studies and lower-level human studies exist on epinephrine in heart attacks. These projects are outstanding in the homogeneity of the results — these findings are consistent and always positive. But almost no valid, consistent, and relevant human evidence exists to support epinephrine over a placebo in a human heart attack. Clinical researchers have not conducted clinical trials prospective, placebo-controlled in humans on this topic. As a result, as a result, Evidence-based guidelines should conclude that epinephrine is Class Not Necessarily.Similarly, there is no research that shows that lidocaine is effective as an agent for use in human capture of shock-resistant reflective VF. Our growing awareness of the effects of proarrythmics antiarrhythmics now requires researchers to evaluate lidocaine and other antiarrhythmics against placebo, and not against some other antiariritmics. No clinical differences will be observed if 2 antiarirhythmics are equally ineffective or even equally harmful. At this time, therefore, lidocaine accepts the recommendation of the Undified Class. Note to Figure 3: VF/Pulseless VT AlgorithmAssume that VF/VT persists after each intervention. 1 (Figure 3)Defibrillatory shock waveformsUse monophasic shocks at the listed energy levels (300 J, 300 to 360 J, 360 J) or biphasic shocks at documented energy levels are clinically equivalent (or superior) to monophasic shocks. 2 (Figure 3)2A Confirmation of placement of tubes with physical examination criteriaPrimary plus Daily confirmation device (CO_2 end-tidal, final diastolic diameter) (Class IIa)2B Safe traca tubeTo prevent removal, especially in patients at risk of moving, using a custom-made (commercially available) tracheal tube holder, which is superior to the tie and ribbon method (Class IIb)Consider the cervical collar and backboard for transportation (Class Indeterminate)Consider a continuous and quantitative end-tidal CO_2 monitor (Class IIa)2C Confirmation of oxygen and ventilation with MONITOREND-tidal CO_2 and Saturation MonitorOxygen 3 (Figure 3)3AEpinephrine (Un specified Grade) 1 mg IV thrust every 3 to 5 minutes. If this fails, a higher dose of epinephrine (up to 0.2 mg/kg) is acceptable but not recommended (there is growing evidence that it may be dangerous).3B Vasopressin is recommended only for VF/VT; there is no evidence to support its use in asystole or PEA. There is no evidence of repeated vasopressin dosage values. There is no evidence of the best approach if there is no response after one bolus vasopressin. The actions of not necessarily the following Classes are acceptable, but only based on rational conjecture. If there is no response of 5 to 10 minutes after one dose of IV vasopressin, it is acceptable to continue epinephrine 1 mg IV thrust every 3 to 5 minutes. 4 (Figure 3)4AAntiarrhythmics is not specified or Class IIb: acceptable; only fair evidence supports the possible benefits of antiarrhythmics for VF/VT shock-refractory. Amiodarone (Class IIb) 300 mg IV thrust (dose of heart attack). If VF/ pulseless VT relapses, consider administration of a second dose of 150 mg IV. Maximum cumulative dose: 2.2 g for 24 hours. Lidocaine (Class Not Decisive) 1.0 to 1.5 mg/kg PUSH IV. Consider repeating in 3 to minutes up to a maximum cumulative dose of 3 mg/kg. A single dose of 1.5 mg/kg in a heart attack is acceptable. Magnesium sulfate 1 to 2 g IV in polymorphic VT (torsades de pointes) and suspected hyponamathetic state. Procainamide 30 mg/min in VF (maximum total dose: 17 mg/kg) is acceptable but not recommended due to long administration times not suitable for heart attacks.4BSodium bicarbonate of 1 mEq/kg IV is indicated for some conditions known to trigger sudden cardiac arrest. See Notes in asystole and PEA algorithms for details. 5 (Figure 3)Continue defibrillation efforts: use 360-J shocks (or equivalent biphasics) after each drug or after every minute of CPR. Acceptable pattern: CPR-drug-shock or CPR-drug-shock-shock-shock. End Note Algorithm Figure 4: Electrical Activity Without Pulses Is a detectable pulse and the presence of some type of electrical activity other than VT or VF defines this group of arrhythmias. When electrical activity is regulated and no pulse can be detected, doctors have traditionally used the term electromechanical dissociation (EMD). The term is, however, too specific and narrow. Strictly, EMD means that organized electrical depolarization occurs throughout the myocardium, but no synchronous shortening of myocardial fibers occurs and mechanical contractions do not exist. In the early 1990s the international resuscitation community began to adopt the term summary of electrical activity without pulse (PEA). PEA will more accurately embrace a group of heterogeneous rhythms that include pseudo-EMD, idioventricular rhythms, ventricular escape rhythms, postdefibational idioventricular rhythms, and bradyasystolic rhythms. Additional research with cardiac ultrasound and indwelling pressure catheters has confirmed that often patients without a pulse with electrical activity also have associated mechanical contractions. This contraction is too weak to produce blood pressure that can be detected by the usual method of palpation or sphygmomanometry. Crucially, ACLS providers should know that PEA is often associated with certain clinical circumstances that can be reversed when identified early and treated appropriately. Note to Figure 4: Electricity Activity Without PulsaBoth VF/VT and PEA is the rhythm of survival. People in VF/VT can be resuscitate with the arrival of defibrillators on time, and people in PEA can be resuscitate if the cause of the reversible PEA is identified and treated appropriately. Pea algorithms place great emphasis on searching for specific, reversible PEA causes. The algorithm displays a table of the top 10 causes of PEA, compiled as 5 H and 5 T. If reversible causes are not considered, rescuers will have little chance of successful recognition and treatment. Sodium bicarbonate provides a good example of how the cause of PEA relates to therapy. Sodium bicarbonate can vary between being a Class I intervention and being a Class III intervention, depending on the cause. 1 (Figure 4) Sodium bicarbonate of 1 mEq/kg is used as follows:Class I (can be supported by definitive evidence) If the patient has known, class IIa hyperkalemia that has existed before (acceptable, good supporting evidence)If known, known, bicarbonate-responsive acidosisIn a tricyclic antidepressant overdoseFor alkalinization of urine in aspirin or other drug overdoseClass IIb (acceptable, only fair evidence provides support) In intubat and ventilated patients with long arrest intervalsOn circulation return, after a long arrest interval It may be dangerous (Class III) in hypercarbitic acidosis 2 (Figure 4)Epinephrine: the recommended dose is 1 mg IV thrust every 3 to 5 minutes (Unspecified Class). If this approach fails, a higher dose of epinephrine (up to 0.2 mg/kg) may be used but not recommended. (Although one dose of vasopressin is acceptable for persistent VF or shock-refractory, we currently lack evidence to support routine vasopressin use in PEA or asystole victims.) 3 (Figure 4) Atropine: shorter dose intervals of atropine (every 3 to 5 minutes) may help in heart attacks. Atropine 1 mg IV if electrical activity is slow (absolute bradycardia=rate <60 bpm) orRelatively slow (relative bradycardia=rate less than expected, relative to the underlying condition)End Algorithm Notes Arrhythmia heart attack without other pulses is one in which the electrical activity (complex QRS) is wide versus narrow and fast versus slow. Most clinical studies have observed poor survival rates of complex and slow PEA. These rhythms often show damage to the myocardium or cardiac conduction system, as occurs with large AMEs. These rhythms can represent the last electrical activity of the dying myocardium, or they can indicate certain critical rhythm disturbances. For example, severe hyperkalemia, hypothermia, hypoxia, a previously existing acidosis, and a wide range of drug overdoses can be complex PEAS. Overdoses of tricyclic antidepressants, β-blockers, calcium channel blockers, and digitalis will result in a slow and complex PEA. Conversely, a fast and complex PEA indicates a relatively normal heart responding exactly as it should to severe hypovolemia, infection, pulmonary embolism, or cardiac tamponade. This condition has special interventions. The main action to be taken for heart attack victims in pea is to look for possible causes. This rhythm is often a response to certain conditions, and useful clues can appear if one sees only the width and rate of electrical activity. Hypovolemia is the most common cause of electrical activity without measurable blood pressure. Through rapid recognition and proper therapy, many causes of hypovolemia can often be corrected, including hypovolemia from bleeding or from anaphylactic-induced vasodilation. Other causes of PEA are cardiac tamponade, pneumothorax strain, and large pulmonary embolism. Nonspecific therapeutic interventions for PEA include epinephrine and (if slow levels) atropine, as presented in Figure 4. In addition, personnel should provide proper airway management and aggressive hyperventilation because hypocventilation and hypoxemia are often the causes of Doctors can provide fluid challenges because PEA may be due to hypovolemia. A direct assessment of blood flow by a Doppler ultrasound can reveal an actively infected heart and significant blood flow. Blood pressure and flow, however, can fall below the detection threshold with simple arterial palpation. Any PEA patient with doppler detected bloodstream should be treated aggressively. These patients require volume expansion, norepinephrine, dopamine, or some combination of the three. They may benefit from early transkutan pacing because a healthy myocardium exists and only the heart conduction system is disrupted while standing between survival and death. Although in general PEA has poor results, reversible causes should always be targeted and never missed when present. Figure 5: Asystole: The Silent Heart Algorithm in heart attacks found on defibrillator monitor screens in asystole has a dismal survival rate — usually as low as 1 or 2 people out of 100 heart attacks. During resuscitation efforts, a brief period of organized complex can appear on the monitor screen, but spontaneous circulation rarely appears. Like PEA, the only hope for a person's resuscitation in asystole is to identify and treat reversible causes. Figure 5, The Asystole Algorithm, outlines an approach more in line with our current understanding of the issues surrounding asystole. Asystole's algorithm focuses on not starting and when to stop. With prolonged refractory asystole, the patient makes the transition from life to death. ACLS providers who try to make that transition sensitive and dignified may be serving their patients well. Note to Figure 5: Asystole1 (Figure 5)Scene Survey: DNAR Patient? If Yes: do not start/attempt resuscitation. Any objective indicators of DNAR status? Bracelet? An anklet? Written documentation? Family statement? If Yes: do not start/attempt resuscitation. Any clinical indicators that resuscitation efforts are not indicated, for example, signs of death? If Yes: do not start/attempt resuscitation. 2 (Figure 5) Confirm true asystoleCheck lead and cable connectionMonitor power is on? Monitor up? Verify asystole in other prospects? 3 (Figure 5) Sodium bicarbonate 1 mEq/kgIndications for use include: tricyclic antidepressant overdose; to alkalinize urine in an overdose; patients with tracheal intubation plus long arrest intervals; return of spontaneous circulation if there is a long arrest interval. Ineffective or dangerous in hypercarbiic acidosis. 4 (Figure 5) Pacing TranskutanTo be effective, it should be done early, combined with drug therapy. The evidence does not support the routine use of transkutan pacing for asystole. 5 (Figure 5) Epinephrine The lauded dosage is 1 mg IV thrust every 3 to 5 If this approach fails, a higher dose of epinephrine (up to 0.2 mg/kg) may be used but not recommended. We currently lack evidence to support regular use of vasopressin treatment of asystole. 6 (Figure 5) AtropineUse shorter dosing intervals (every 3 to 5 minutes) in asitolik capture. 7 (Figure 5) Reviewing the quality of resuscitation effortsWas there are adequate BLS trials? from ACLS? Has the team done the following:Achieved tracheal intubation? Doing effective ventilation? VF surprised if present? Get IV access? Given epinephrine IV? atropine IV?Ruled out or corrected reversible causes? Asystole that continues > 5 to 10 minutes after all of the above has been achieved? 8 (Figure 5) Reviewed for atypical clinical features? Not drowning or hypothermia? No therapeutic overdoses or drugs reversible? —Yes to the questions in Notes 7 and 8 means the resuscitation team complies with the recommended criteria for ending resuscitation efforts in which patients are located (Class IIa) —If the response team and patient meet the above criteria, then withhold urgent field-to-hospital transport by continuing CPR = Class III (dangerous; no benefit) 9 (Figure 5) Cutting or stopping resuscitation efforts outside the hospitalIf the criteria in 7 and 8 are met : Field personnel, in jurisdictions where authorized, must initiate protocols to stop resuscitation attempts or pronounce death outside the hospital (Class IIa). In most U.S. settings, medical control officials must authorize it directly from voice to voice or on the spot. Advance planning for this protocol must occur. Planning should include specific directions for —Leaving the body on the scene —Certification of death —Transfer to funeral services —On-site family advocates —Religious or nondenomination counselingEnd of Algorithm Notes Asystole most often represents confirmation of death rather than rhythm to care for. Team leaders can stop attempts to resuscitate patients from confirmed and persistent tracheal intubation when the resuscitation team has done the following:Provided that cprEliminated VFAchieved's appropriate basic tracheal intubation is successful with primary confirmation and Secondary tube placement Confirmed through throughout the effort that the tube is safe and has not disengagedSemitored oxygen saturation and co2 end of tides to ensure that oxygenation and ventilation are best achievedEstablished successfully IV accessMaintained this intervention for ≥ 10 minutes , during that time the confirmed rhythm is asystoleAdministered all rhythmic medicationsUpdated waiting for family members, spouses, or friends to be available about the severity of the patient's condition and lack of response to interventionsDiskus concept programs to support family attendance during resuscitation efforts and offer that option to appropriate family members. Note that the family's presence on resuscitation efforts is not a current offer, extended or not extended at the whim of the supervising physician. On the contrary, the presence of resuscitation efforts require formal programs, with upfront planning, assigned roles, and even to Stop? Is it possible to state a certain time interval beyond which the rescuer never resuscitates the patient? Does any resuscitation effort have to continue for that long to ensure that anyone who can be saved will be identified and saved? As outlined in the algorithm notes, the resuscitation team must make careful and competent efforts to give the patient a trial of CPR and ACLS, provided that the person has not yet stated the decision to abandon the resuscitation effort. The final decision to halt the effort can never be as simple as an isolated time interval, but clinical judgment and respect for human dignity must enter decision-making. Many people in the resuscitation community strongly believe that we have been deeply lost in the tendency to attempt prolonged and excessive resuscitation efforts. The emergency medical response system should not require field officers to transport any heart attack victims back to the hospital or the Emergency Department (ED). In European countries, most out-of-hospital ALS treatments are provided by medical doctors, so decisions about stopping CPR, transport back to ED, and declaring death are handled by official medical doctors in the field. Transportation by continuing CPR is justified if there are interventions available in ED that cannot be performed in the field (such as central core rewarming equipment) or field interventions (such as tracheal intubation) that are unsuccessful in the field. In the United States, the outdated concept of EMS treatment can last for years. For example, many systems still dictate spoon and run practices in all major medical patients, not just major trauma. Solid evidence of nontrauma heart attacks confirms that ACLS treatment in ED does not offer an advantage over ACLS treatment in the field. Stated succinctly—if ACLS treatment in the field can't resuscitate the victim, ED won't care either. Civil rules, administrative problems, medical insurance requirements, and even increased reimbursements often lead to the requirement to transport all heart attack victims back to the hospital or ED. If these are un chosen requirements, they are inappropriate, futile, and ethically unacceptable. There should be no requirement for ambulance transport of all patients suffering a heart attack outside the hospital. This is especially true when the patient is not throbbing and CPR is continued during transportation. Researchers and EMS experts continue to publish observational studies on the practice of transporting all field resuscitation back to ED, most often for the pronunciation of death. For the resuscitation team to succeed with one of these victims and then make the survivors of hospital discharge very rare, usually <1%. Likewise, it is inappropriate for doctors to the rules stop routinely without thinking about a particular situation. Part 2: The Ethical Aspects of ECC and CPR provide a more detailed discussion of these issues. Termination of Termination in prehospital settings, following system-specific criteria and under direct medical control, should be standard practice in all EMS systems. Figure 6: BradycardiaNotes to Figure 6: Bradycardia1 (Figure 6) If the patient has any serious signs or symptoms, make sure they are linked to a slow rate.2 (Figure 6) Clinical manifestations include Symptoms (chest pain, shortness of breath, decreased level of consciousness)Signs (low blood pressure, shock, pulmonary congestion, congestive heart failure) 3 (Figure 6) If the patient is asymptomatic, do not delay transcular pacing while waiting for IV access or for atropine to take effect. 4 (Figure 6) Denervated transplanted hearts will not respond to atropine. Go at once for pacing, infusion of catecholamine, or both. 5 (Figure 6) Atropine should be administered in repeated doses every 3 to 5 minutes to a total of 0.03 to 0.04 mg/kg. Use shorter dosing intervals (3 minutes) in severe clinical conditions. 6 (Figure 6) Never treat a combination of a third-degree heart block and a ventricular escape beat with lidocaine (or any agent that suppresses the ventricular escape rhythm). 7 (Figure 6) Verification of patient tolerance and mechanical arrest. Use analgesia and sedation as needed. The end of the Transcutaneous Notes Algorithm is a Class I intervention for all asymptomatic bradycardia. If doctors are concerned about the use of atropine in higher-level blocks, they should bear in mind that transkutan pacing is always appropriate, although it is not available as atropine. If bradycardia is severe and the clinical condition is unstable, apply transkutan pacing immediately. There are several other caveats to keep in mind about the treatment of asymptomatic bradycardia. Lidocaine may be deadly if bradycardia is a ventricular escape rhythm and un watchful doctors think they are treating preventrikel contractions or slow VT. In addition, transkutan pacing can be painful and may fail to produce effective mechanical contractions. Sometimes the patient's symptoms are not due to bradycardia. For example, hypotension, which is associated with bradycardia, may be due to myocardial dysfunction or hypovolemia rather than performing system or autonomic problems. Figure 6 lists interventions sequentially based on assumptions of worsening clinical severity. Give patients who arrest pre-cardia, or move in that direction, some intervention in quick order. Begin preparations for pacing, Atropine IV, and infusion of epinephrine. If the patient presents only mild problems due to bradycardia, then atropine of 0.5 to 1.0 mg IV can be administered in repeated doses every 3 to 5 minutes, to a total of 0.03 mg/kg. (For severe bradycardia or asystole, a maximum dose of 0.04 mg/kg is recommended.) The selection of dosing intervals (3 to 5 minutes) requires an assessment of the severity of the patient's symptoms. Providers should repeat atropine at shorter intervals for patients who Depressed. Dopamine (in (in 2to 5 μg/kg per minute) can be added and increased rapidly to 5 to 20 μg/kg per minute if low blood pressure is associated with bradycardia. If the patient shows severe symptoms, the doctor can go directly to the epinephrine infusion. Transkutan pacing should begin quickly in patients who do not respond to atropine or who are very asymptomatic, especially when the block is at or below his Purkinje level. Newer defibrillators/monitors have the ability to perform transkutan pacing. These interventions, unlike the insertion of transvenous pacemakers, are available for and can be performed by almost any ECC provider. This gives transkutan pacing a huge advantage over transvenous pacing because transkutan pacing can be started quickly and comfortably at the bedside. At the 1999 Evidence Evaluation Conference and the 2000 Guidelines Conference, experienced electrophysiologists, arrhythmia experts, and clinical cardiologists led the review of evidence and discussions on takicardia (Numbers 7, 8, and 9). They bring their expertise, their experience using new antiarirhythmics, and their knowledge of incumbent takikardia algorithms. Reviews and discussions of evidence contribute to many insights, revisions, and new medicines. The algorithm of takikardia from the early 1990s forced an immediate decision with respect to stable versus unstable. The same emphasis remained in 2000 — the most important clinical decision to make when a rapid heartbeat was recorded was whether the patient also experienced signs and symptoms due to a rapid heartbeat. In such situations the universal recommendation is direct cardioversion rather than antiariritmic trials (see Figure 10, Electrical Cardioversion Algorithm). For takikardia patients who do not require direct cardioversion, the International Guidelines 2000 place more emphasis on 2 previously un highlighted themes: Making a diagnosis of a particular rhythmManizing takikardia patients who have significantly impaired heart function (ejection fraction <40%; signs of excessive heart failure)The emphasis on these themes has resulted in not only 1 complex algorithm for takikardia but 3 new algorithms and 1 table. The 2000 Guidelines Conference experts, doctors and teachers reject any activities that would make ACLS training and learning more complicated. However, on studying background reasons, clinical leaders in resuscitation have accepted the need for broader algorithms, in return for providing better and safer acute care. Special Rhythm DiagnosisAdenosine, first approved for marketing shortly before the publication of the 1992 guidelines, has become a highly successful agent for supraventricular arrhythmias. Teaching has emphasized its security and diagnostic capabilities. If the patient's monitor displays a complex tycardia width, the doctor becomes almost about pushing in higher and higher amounts of adenosine to see if converted from the supposed supraventricular tachycardia with aberransi. Most of these patients are in VT with an extensive complex. Faced with persistent wide complex takicardia, after 3 or 4 skips adenosine doctors faced dawn awareness that treatment with adenosine or some calcium channel blocker for 30 to 45 minutes of persistent typhicardia did not help. This approach also exposes the patient to the unpleasant side of affecting adenosine, the possibility of poorer rhythms, and destabilization of heart rate and blood pressure. As a result the International Guidelines 2000 seek to avoid a simple approach of excessive use of adenosine for diagnostic purposes. Instead, doctors are expected to devote more attention to making explicit diagnoses, within the scope of available resources. Antiarrhythmics or Proarrhythmics? Another new concept that dominated the 2000 approach to takikardia stems from continued evidence that antiarrhythmics are just as likely to be proarrhythmic agents as they would be antiaric agents. Their tendency to induce arrhythmias becomes very acute in damaged or disturbed hearts. In the liver damaged normal functional myocardium is likened to scar tissue and damaged. These areas are a source of re-entry arrhythmia, irritable focus, and blocked conduction. Regardless of their Vaughn-Williams classification, all antiarrhythmics are capable of proarrhythmic effects. When a second antiarrhythmic is added to the milieu these negative consequences increase exponentially. As a result—with rare exceptions—the International Guidelines 2000 recommend 1 and only 1 antiarimic per patient. This should lead to far fewer events where >1 antiarimic causes a significant deterioration of the patient's condition and a much lower threshold for cardiovert patients on a nonurgene scale, before they become much more asymptomatic. Figure 7: Tachycardia Overview Algorithm The classic dilemma of chickens or eggs often occurs in asymptomatic tachycardia events. Does stress and discomfort of acute, severe, substernal chest pain cause a cardiac response to takicardia? or does the marginally compromised heart develop ischemia and chest pain as sequels to paroxysmal takicardia? Patients diagnosed as unstable will soon be treated with urgent cardioversion, electrical, and synchronized. Note: The number of records, such as Note 1, matches the numbers in the algorithm. Note to Figure 7: Tachycardia Overview Algorithm Irreversible conditions must be related to tachycardia. Signs and symptoms can include chest pain, shortness of breath, decreased levels of consciousness, low blood pressure, shock, pulmonary congestion, congestive heart failure, and AMEs. End Algorithm Note The Tachycardia Overview Algorithm (Figure 7) divides tachycardia into 4 categories (In algorithms, 4 columns have numbers at the top to better steer the reader): Atrial Atrial tachycardiasWide-complex tachycardia of an unknown typeStable monomorphic and polymorphic tachycardia1. Atrial Fibrillation/Atrial Flutter (Column 1)Figure 7 reminds ACLS providers to focus on evaluation: Are patients clinically unstable? Is heart function impaired? Is Wolff-Parkinson-White syndrome present? Is the onset of atrial or atrial fluttering fibrillation clearly recognized by the patient? Has atrial fibrillation/fluttering been present for more than or less than 48 hours? The focus of treatment for fibrillation/atrial flutter is in 4 areas as well: Unstable versus stable? Treat it immediately. Control level with agents that reduce conduction rate across AV nodes. Convert rhythm with medication or cardioversion when indications are present and urgent. Give anticoagulation if indicated. See Part 5: Pharmacology I and Part 6: Pharmacology II for a more detailed presentation on these topics. The table accompanying Figure 7 provides details of treatments for atrial fibrillation and fluttering. The table shows the main questions to ask and factors to consider when formulating a treatment plan for fibrillation / fluttering atrial: What is the status of the heart? Normal? Disorders? Does the person have Wolff-Parkinson-White syndrome? What is the duration of atrial fibrillation? Can you date and time the onset firmly? Is it less than or more than 48 hours long? Is anticoagulation indicated? Electrical cardioversion? Will pharmacological conversion pose a higher risk of embolism? Is the rate too high?2. Tachycardia (Atrial Fibrillation and Flutter)See the table accompanying Figure 7.Narrow-Complex ACLS provider needs to move from the end of column 2, Narrow-Complex Tachycardias (Figure 7), to Figure 8: Narrow-Complex Supraventricular Tachycardia.Figure 7, under Narrow-Complex Tachycardias, shows an emphasis in 2000 on establishing a specific diagnosis first by closing the ECG analysis, then by consulting a cardiologist if available. Consultants can choose to use esofag-lead ECG or echocardiogram as well as serial 12-lead ECG. In complex and stable supraventricular tachycardia, algorithms recommend the use of diagnostic maneuvers vagal and adenosine. These diagnostic efforts should result in diagnoses such as PSVT, ectopic attribution takicardia, or MAT. The overview algorithm then directs the doctor to Figure 8, Narrow-Complex Supraventricular Tachycardia. Here doctors make clinical assessments of heart function, with ejection fractions < 40% qualify as sufficient compromises to change the therapeutic approach. Figure 8: Narrow-Complex Supraventricular TachycardiaIn common, narrow complex supraventricular tachycardia can be treated with amiodarone, β-blocker, or calcium channel blocker if heart function is maintained. (This list is in alphabetical order and does not imply 1 in 3 is better than the others.) If the function of the heart is misled, then the choice of medicinal drugs for only amiodarone, the agent with the best balance between side effects and effectiveness in heart failure patients. Note the ban on DC cardioversion in all patients with impaired heart function.3. Stable Wide Complex Tachycardias: Unknown TypeFigure 7, Column 3, recommends the same diagnostic/therapeutic approach as recommended for narrow complex tachycardia. After a series of diagnostic efforts the doctor should be able to establish which of the 3 categories of arrhythmias, Wide complex tachycardia includes: Narrow complex tachycardia with narrow QRS blur aberransi (hereinafter referred to Figure 8: Narrow-Complex Supra Tachycardiaventrikk)Monomorphic or polymorphic VT stable (subsequently this patient is referred to Figure 9: VT Stable: Monomorphic or Polymorphic)Stable wide complex tachycardia:if this is the most likely rhythm diagnosis for you and your patient, proceed to evaluate the functional status of the heart. Figure 7 shows that D.C. cardioversion and amiodarone are recommended treatments for patients with tycardia who have clinical heart failure. Be careful by adding anything to the treatment for these patients. For patients with well-maintained heart function, choose DC cardioversion (Figure 10) or procainamide or amiodarone. Most experts choose D.C. cardioversion as their first treatment and treatment of choice for all complex and extensive takicardia regardless of heart function. That way they can easily add other antiarirrhythmias if cardioversion fails; however, the opposite (use cardioversion if antiarrhythmic fails) does not always apply. Figure 9: Tachycardia Ventricle Stable: Monomorphic or Polymorphic?4. Monomorphic and Polymorphic VTFigure 7, Column 4, directs physicians to Figure 9 for more details on the treatment of stable VTs included in 2 subsets: monomorphic VT and polymorphic VT. If polymorphic VT has prolonged QT intervals, it becomes a question of whether the patient suffers from torsades de pointes. With such an exotic name, it is only true that polymorphic VT rhythms look distinctive and unusual, with the whole rhythm tracking resembling an up and down pattern, thick and thin that is characterized as a spindle and node pattern. Polymorphic VT gets special attention because it is a common arrest rhythm suffered by drug overdose patients and toxic patients from exposure to nonmedicinal drugs. Figure 9 provides direction for the immediate treatment of this arrhythmia, with a very important status of heart function. Note that amiodarone becomes the only acceptable antiarimic agent for the elderly and those who have a progressive decline in heart function. See callout records for stable VTs for more details. Note for Figure 9: STABLE VT: Monomorphic or Polymorphic?1 (Figure 9)Monomorphic VF with normal heart functionUse 1 agent (to avoid the proarrmic effects of combination therapy). It reduces adverse effects Effect. Select 1 agent from this list:Top agentsProcainamide (IIa)Sotalol (IIa)Other acceptableAmiodarone (IIb)Lidocaine (IIb)2 (Figure 9)Monomorphic or poly VTmorphic with impaired heart functionIf clinical signs indicate LV malfunction (ejection fraction <40% or congestive heart failure) in long or normal-QRS takiccardia, use Amiodarone (IIb)Lidocaine (IIb)then use Synchronized Cardioversion3 (Figure 9)Detailed dose of amiodarone (Class IIb) in patients with impaired heart function150 mg IV bolus for 10 minutes (international dose: 5 mg/kg)Repeat 15 0 mg IV (more than 10 minutes) every 10 to 15 minutes as needed Additional infusion: 360 mg for 6 hours (1 mg/minute for 6 hours), then 540 mg for 18 hours remaining (0.5 mg/min)Maximum total dose : 2.2 g in 24 hours. This means that all dosages (including those used in resuscitation) should be added together, so the total cumulative dose per 24 hours is limited to 2.2 gSee guidelines or ECC Handbook Drug Table4 (Figure 9)Detailed dose of lidocaine (Non-Decisive Class) in patients with impaired heart function0.5 to 0.75 mg/kg IV pushRepeat every 5 to 10 minutesInfuses 1 to 4 mg/minimal totalum dose: 5 to 10 minutesInfuses 1 to 4 mg/minimal totalum dose: 5 to 10 minutesInfus 1 to 4 mg/minimal totalum dose: 1 3 mg/kg (more than 1 hour)5 (Figure 9)If rhythm suggests torsades de pointesStop/avoid treatments that prolong QTIdentify and treat Electrolytes AbnormalMedications (all Grades Not Decisive):MagnesiumOverdrive pacing (with or without β-blockers)Isoproterenol (as a temporary measure for pacing overdrive)Phenytoin or lidocaineEnd of Algorithm Notes August 22, 2000Vol 102, Suppl_1