Chapter 5
Resuscitation

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INTRODUCTION

In a person whose heart is healthy, the functioning of the heart is intricately timed and orchestrated to supply the brain, lungs, body tissues, and organs with blood. When a person's heart stops beating, or beats so ineffectively that blood circulation is not sufficient to supply the brain with oxygen and nutrients, the brain is irreversibly damaged within minutes, spontaneous breathing cannot be recovered, and death ensues quickly. Cardiopulmonary resuscitation (CPR) offers a way to reverse the imminent threat to life,

Developed only 25 years ago, CPR is a widely applicable means of restoring and maintaining blood circulation and breathing in a person who has experienced a cardiac arrest. Basic CPR, that is, external cardiac massage and mouth-to-mouth ventilation, is familiar to most Americans, and many people have been trained to perform it. Advanced resuscitative techniques, such as the use of drugs and electrical shock to the heart, are less familiar to most people and are almost always performed by trained professionals.

CPR can be applied to anyone whose heart stops beating. Hence, all of the roughly 2 million people who die in the United States each year—70 percent of whom are elderly–are potential recipients. Because the alternative for a patient in cardiac arrest is death, ensuring access to CPR for all who need it is a vital public concern. Government agencies and nonprofit organizations, such as the American Red Cross and the American Heart Association, have developed large-scale educational programs to teach the basics of CPR to laypersons in local communities. Nevertheless, some elderly and other people who might benefit from CPR do not receive it. There are concerns that elderly people may be less likely than younger people to receive CPR because of a widespread perception that elderly people are less likely to benefit from it.

Somewhat paradoxically, given concerns about the underuse of CPR, many observers are also concerned about the possible overuse of CPR. Poor long-term survival rates, the risk of injuries and complications associated with the procedures, and the possibility of survival with severe physical and neurological impairment have prompted some observers to question the appropriateness of this technology for certain patients, especially those who are terminally ill and severely debilitated.

Because of the suddenness of cardiac arrest and the urgency of initiating treatment quickly if at all, decisions about CPR must be made momentarily after the arrest or at some time before an arrest occurs. In the community, cardiac arrest is usually unexpected. Paramedics, emergency medical technicians, and trained laypersons who perform CPR in this setting often know nothing of the patient background and are not qualified to assess the patient's medical condition. In the community, therefore, the presumption is generally that efforts to resuscitate victims of a cardiac or respiratory arrest should be initiated automatically, as quickly as possible, and continued until effective spontaneous circulation and breathing are restored, the patient is transferred to a hospital, or the rescuer is exhausted and unable to continue.

CPR is also usually initiated automatically in hospitals. For some patients, however, the possibility of cardiac arrest is anticipated, and a decision about whether to administer CPR is reached in advance. For some of these patients, a decision is made to withhold CPR.

There are many problems in arriving at and implementing decisions to withhold CPR. In some cases, physicians, nurses, and other caregivers disagree about whether a particular patient should be resuscitated. Many physicians do not discuss decisions about resuscitation or the possibility of a Do-Not-Resuscitate (DNR) order with their patients (5). DNR orders are sometimes inadequately documented or not documented at all in the patient's medical chart. Some health care facilities

do not allow physicians to write DNR orders, and some physicians avoid writing such orders for fear of legal liability (43,9 o).

These problems have prompted many observers to encourage adoption of clearly formulated institutional policies to define procedures for making decisions about resuscitation (14,69,71). In response, the Joint Commission on Accreditation of Hospitals (JCAH) has developed a standard that will require hospitals and nursing homes to have a formal policy about how such decisions should be made in order to be accredited by JCAH (67).

This chapter discusses resuscitation techniques, their use for elderly patients, and the processes by which decisions about CPR are made. CPR includes a range of techniques that vary in their technological sophistication and invasiveness. Since decisions about resuscitation also involve decisions about which of these techniques should be used, the chapter includes some information about the various techniques.

DESCRIPTION OF RESUSCITATION

Cardiac Arrest: The Need for Resuscitation

People need resuscitation as a result of either cardiac or respiratory arrest. Cardiac arrest is the sudden unexpected cessation of heartbeat and blood pressure. It leads to loss of consciousness within seconds, irreversible brain damage in as little as 3 minutes, and death within 4 to 15 minutes (14)87).

Respiratory arrest is the sudden cessation of effective breathing (see ch. 6). Without effective breathing, the blood is unable to supply adequate oxygen to the heart and brain or eliminate carbon dioxide from body tissues. Consequently, respiratory arrest will be followed within minutes by gradual loss of consciousness and then by cardiac arrest. Ascertaining whether a cardiac arrest was caused by a respiratory arrest is often impossible, and virtually all cardiac arrests are accompanied within minutes by cessation of breathing (14).

Although the majority of people who suffer cardiac arrest are elderly, the nature and underlying causes of their arrest vary widely. Cardiac arrest frequently results from a myocardial infarction (loss of blood supply to the heart, commonly known as a heart attack), but can result from a variety of other conditions, including kidney failure, hemorrhage, and metabolic disorders. The frequencies of various causes of cardiac arrest cannot be precisely ascertained, because the underlying medical conditions that result in arrest are often not known or not reported, and an autopsy is usually not performed (13).

In the vast majority of patients, cardiac arrest is the end point in the course of coronary artery disease. Atherosclerosis—the accumulation of fatty substances and growth of fibrous coronary tissue in the walls of arteries underlies most coronary artery disease and is a distinctly age-related disorder.

Many patients who experience cardiac arrest also have other physiological problems that contribute to their arrest by placing strain on the heart. The most common problems are renal failure, diabetes, pneumonia, and cancer—conditions that are more prevalent among elderly than younger people (6).

Any one of various heart disturbances—arrhythmias, asystole, or electromechanical dissociation—may precede or initiate cardiac arrest. The most serious of the cardiac arrhythmias (abnormal heartbeats) is ventricular fibrillation, in which the ventricles of the heart twitch or beat in an uncoordinated pattern without effective contraction and cardiac output. Ventricular fibrillation occurs in approximately 60 to 90 percent of cardiac arrests taking place in the community and in 33 to 40 percent of those taking place in the hospital (14). It is also the most frequent cause of death prior to hospital admission (66). Other arrhythmias associated with cardiac arrest are ventricular tachycardia, which is characterized by rapid regular or only slightly irregular beats; and bradycardia, or abnormally slow heartbeats.

Asystole (the absence of electrical activity in the heart) and electromechanical dissociation (the failure of a normal electrical impulse to cause con-

traction of the heart) cause a smaller proportion of cardiac arrests than arrhythmias (26). Arrhythmias, asystole, and electromechanical dissociation can be diagnosed with the aid of an electrocardiograph (EKG) machine, that measures the electrical activity of the heart and graphically depicts the heartbeat by a series of waves.

History of Resuscitation

Attempts to resuscitate people with cardiac or respiratory arrest began almost as early as recorded history. Modern closed-chest cardiac massage, however, was not developed until 1960, when W.B. Kouwenhoven and his associates first applied it (45). Prior to that time, cardiac arrest was sometimes treated by surgically opening the patient's chest and directly massaging the heart. With the method developed in 1960, however, a rescuer rhythmically applies pressure to the patient's sternum (breastbone); this pressure compresses the heart and restores circulation without opening the patient's chest.

Successful application of closed-chest cardiac massage and the increased technological capability to monitor heart rhythm and to safely apply electrical shock all contributed to the rapid and widespread acceptance of CPR in hospitals during the 1960s and shortly thereafter by emergency rescue teams.

It was soon discovered that the outcome of CPR depended largely on how quickly it was initiated. In many cases where people collapsed outside a hospital, brain damage or death occurred before an ambulance arrived. In an attempt to minimize this time lag and to bring the ability to resuscitate out of the hospital and into the community, public agencies and nonprofit organizations developed programs to teach the basics of CPR to community laypersons, high school students, and others (14).

Procedures Involved in Resuscitation

Many people think of resuscitation as it is portrayed on television—a bystander, a paramedic, or an emergency room physician pumping on a person's chest until the person either dies or is revived. In fact, however, resuscitation consists of a wide array of procedures, often involving sophisticated and specialized techniques and equipment.

> It was a Thursday morning, rounds were done, and the intern and medical student sat down for a quick breakfast. Suddenly, from overhead, "Code blue . . . Code blue . . . Code blue . . . Code blue . . .!" They leapt up and ran.
>
> . . . When they arrived, resuscitation was already in progress. Another medical student was rhythmically pushing on Mr. H's chest, and having difficulty with the position, climbed onto the bed to continue. A large cart loaded with drugs was near the door to the room, manned by two nurses. Another nurse was giving him oxygen with a mask and a bag, and an anesthesiologist was standing by, ready to put a breathing tube in Mr. H's trachea. The intern periodically drew blood from the groin and a medical student ran the blood samples to the lab to measure oxygen and acid.
>
> Above the confused chatter, shouts of "atropine!", "more bicarb!", "epinephrine!", and other names of drugs could be heard from the resident who took charge of the code. The EKG machine spewed out yards of paper strips showing no heart beat. The resident took the defibrillator paddles several times, applied them to the reddened, raw chest, shouted "All clear!") and everyone momentarily moved back. The lifeless body jerked with each shock (14).

In describing the spectrum of procedures involved in resuscitation, it is helpful to divide the process into two stages: basic and advanced life support. Basic life support is administered to a person in cardiac arrest by a "rescuer," either a trained bystander, an emergency medical technician, a paramedic, a nurse (especially if initiated in a hospital), or any other health professional. Advanced cardiac life support includes basic cardiac life support and other specialized equipment and techniques and is administered by paramedics or other medical personnel. In the hospital, advanced cardiac life support is usually initiated by nurses and continued within minutes by a team of physicians.

Basic Life Support

Basic life support consists of what are referred to as the ABCs of resuscitation: Airway, Breath-

ing, and Circulation (see fig. 5-1).[1] When a rescuer arrives at the scene of a collapsed victim, he or she determines that the person is unresponsive and immediately calls for help. After positioning the victim and ensuring that the victim's airway is open, the rescuer determines whether he or she is breathing by looking for chest movement and listening and feeling over the mouth for airflow.

If no breath is detected, the rescuer performs mouth-to-mouth ventilation. This involves blowing air into the victim's mouth and determining whether the victim's lungs are being ventilated by watching for chest movement and hearing or feeling the air escape during exhalation.

If a carotid pulse at the victim's neck is absent, the rescuer begins external chest compressions. Rhythmic compressions of the sternum provide circulation to the heart, lung, brain, and other organs. Blood circulated to the lungs by external chest compressions will receive enough oxygen to maintain life when accompanied by properly performed mouth-to-mouth ventilation (64).

Advanced Cardiac Life Support

Advanced cardiac life support consists of basic life support and the techniques and machinery that sustain life after the immediate, manual steps are taken. It frequently involves the use of special equipment and procedures for establishing an airway and maintaining effective ventilation and circulation.

Depending on the setting, condition of the victim, and skill of the available personnel, an airway device may be inserted through the victim's nose or mouth into the throat to keep open a path for air behind the tongue (see fig. 5-2). The airway of an unconscious victim is most effectively secured with an endotracheal tube (a tube inserted through a person's nose or mouth into the trachea), An endotracheal tube can protect the patient's esophagus during artificial ventilation (14).

To maintain ventilation, a bag-valve unit (a mask attached to a bag) can be used to deliver either room air (when the mask is placed over the mouth and nose and the bag is squeezed) or oxygen (when a source of supplemental oxygen source is attached to the bag-valve device). A bag-valve unit or a mechanical ventilator can be attached to an esophageal obturator airway (see fig. 5-2), or an endotracheal tube. The efficacy of ventilation is determined by monitoring the patient's pulse, pupil reaction and size, and spontaneous respirations, and by periodically testing the blood for oxygen and carbon dioxide levels.

Supplemental oxygen is used as soon as it becomes available. This is necessary to correct low levels of oxygen in a patient's bloodstream.

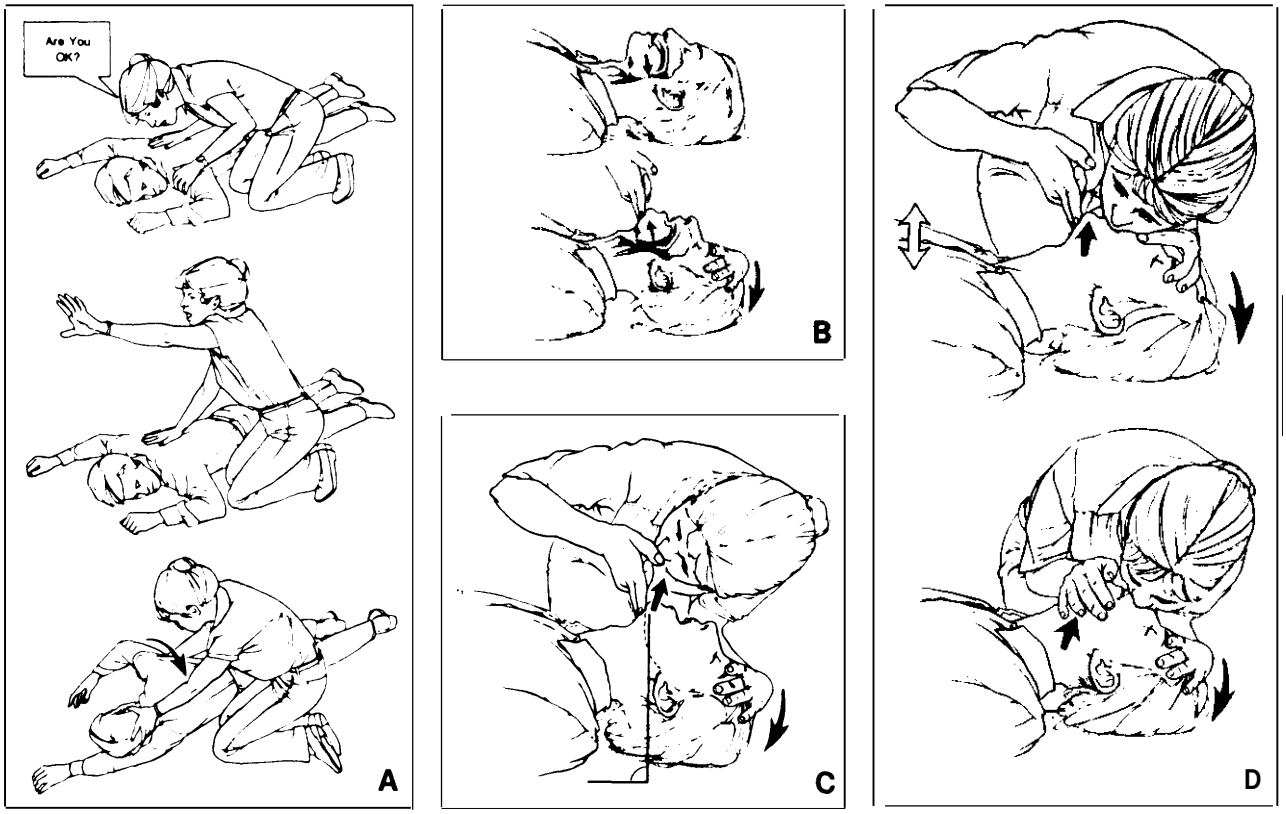
Several devices can help to maintain circulation. A cardiac arrest board, placed under the patient's back, provides a firm surface to aid in compression of the chest and heart. Gas- or oxygen-powered mechanical devices for external chest compression may be used to allow consistency in the depth and length of compressions. These devices are found in some emergency rooms and intensive care units (ICUs) and maybe used in addition to manual chest compression for cases where prolonged resuscitative efforts are necessary.

An electrical defibrillator is used to convert ventricular fibrillation to a normal heart rhythm. A defibrillator produces a high-voltage current averaging 4,000 volts, which is delivered over 4 to 12 milliseconds via two paddles placed externally on the patient's chest, on either side of the heart, When left in place, the paddles can also detect the patient's heart rhythm and display it on a monitor (14). An electrical defibrillator can also be used to convert ventricular tachycardia to a normal heart rhythm, a process called cardioversion. Like defibrillation, cardioversion involves a brief electrical shock to the heart, delivered through two paddle electrodes placed on the patient's chest; cardioversion differs from defibrillation in that it is timed to the heart's electrical activity.

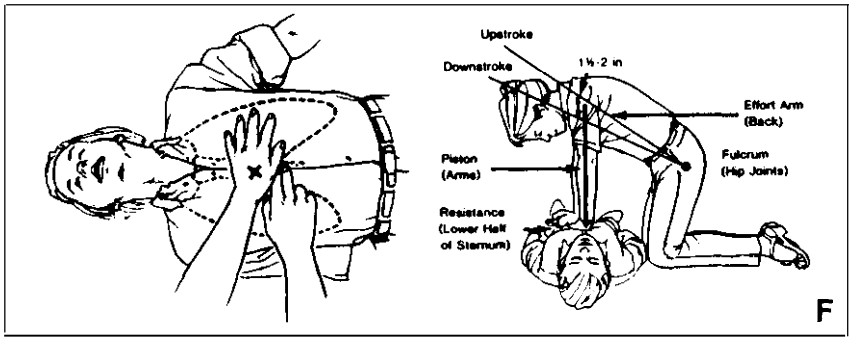
In adult patients who experience cardiac arrest while being monitored, a precordial thump (a sharp, quick, blow administered over the midportion of the sternum within the first minute after cardiac arrest) may be effective in converting ventricular fibrillation or ventricular tachycardia to a normal rhythm. Recent studies indicate that precordial thump should not be used

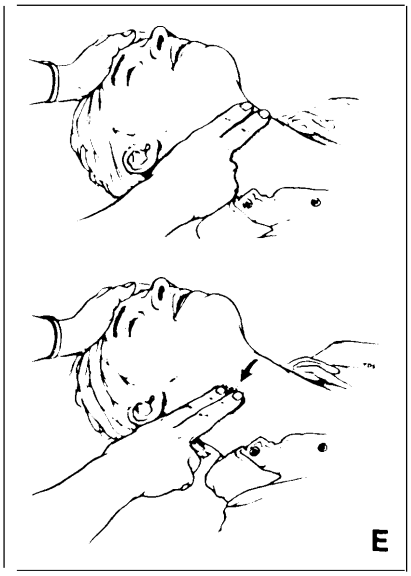
***Although ABC stands for Airway, Breathing, and Circulation, the American Heart Association agreed in 1985 that ABC should stand for Assess, Breathe, and Circulate, as this was a more accurate description of what the rescuer must do (28).**

Figure 5-1 .—Administration of Basic Life Support



A: Initial steps of cardiopulmonary resuscitation. Top, Determining unresponsiveness; center, calling for help; bottom, positioning the victim.
B: Opening the airway. Top, airway obstruction produced by tongue and epiglottis; bottom, relief by head-tilt/chin-lift.
C: Determining breathlessness.
D: Rescue breathing. Top, mouth-to-mouth; bottom, mouth-to-nose,
E: Determining pulselessness.
F: External chest compression. Left, locating the correct hand position on the lower half of the body; right, proper position of the rescuer with shoulders directly over the victim's sternum and elbows locked.





SOURCE: National Conference on Cardiopulmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC). "standards and Guidelines for Cardiolmlmonary Resuscitation (CPR) and Emergency Cardiac Care (ECC), " *Journal of the American Medical Association 255(21):2916-2920,1986.*

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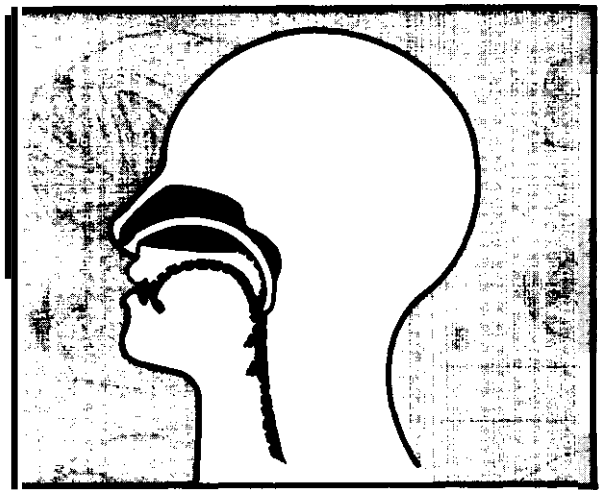
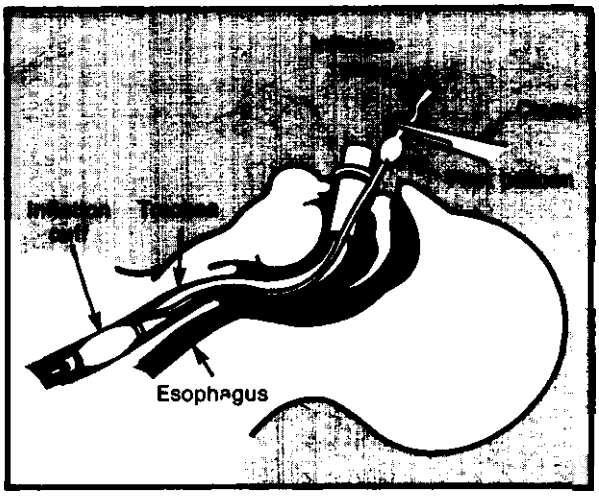
Figure 5-2.—Examples of Airway Devices Used in Advanced Cardiac Life Support

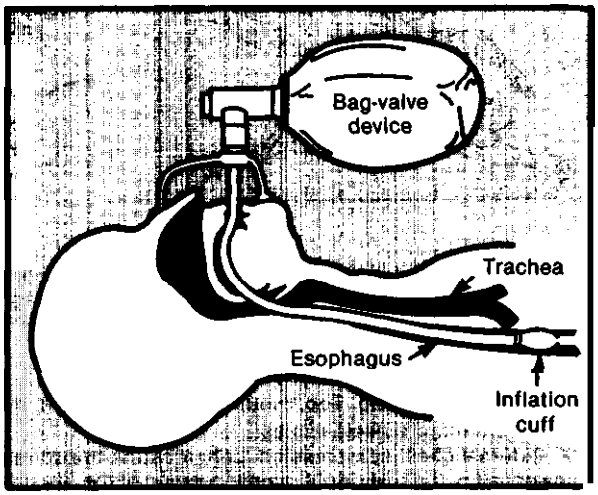


A nasopharyngeal airway may be inserted through the nose to the back of the throat to keep a path for air open.



An endotracheal tube with an inflatable cuff may be inserted through the nose or mouth (as pictured here) into the trachea. It is the most effective means of securing the airway of an unconscious patient.

An oropharyngeal airway may be inserted through the mouth to keep a path for air open.



An esophageal obdurator airway consists of a cuffed tube that is inserted through the mouth into the esophagus. Airholes in the portion that is in the throat allow passage of air into the trachea. A sealed mask prevents air leakage from the patient's mouth and nose. When the cuff in the esophagus is inflated, air is prevented from entering the stomach, stomach contents are prevented from entering the trachea and an open airway exists that can be used with a bag-valve device (shown) or a mechanical ventilator.

SOURCE: C.K. Cassel, M. Silverstein, J. La Puma, et al., "Cardiopulmonary Resuscitation in the Elderly," prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, November 1985.

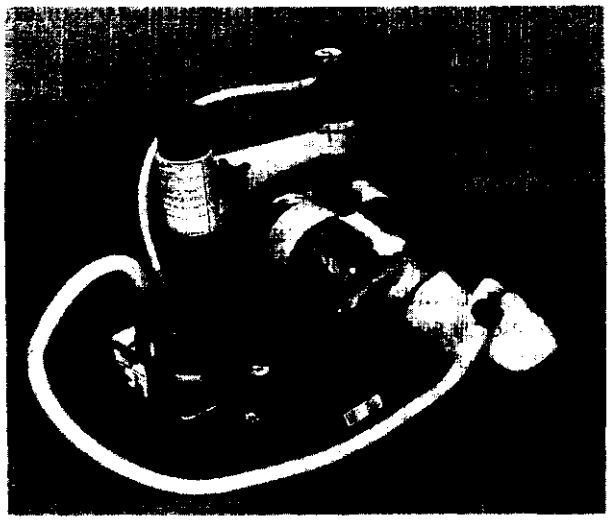


Photo credit: Hewlett Packard Co.

A mechanical device for external chest compression, demonstrated on a mannikin here, is sometimes used instead of manual chest compression, especially when prolonged resuscitative efforts are needed.

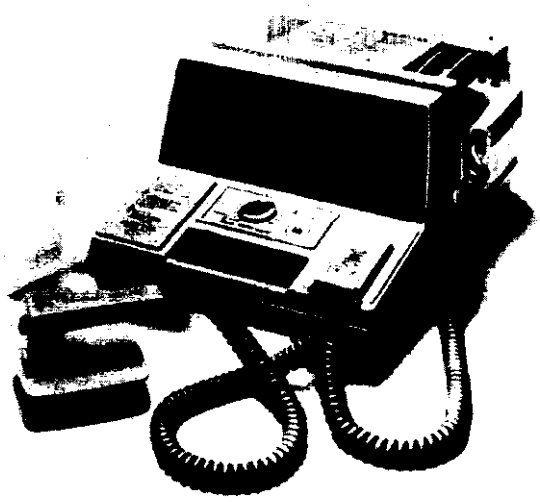


Photo credit: Hewlett Packard Co,

An electrical defibrillator can be used to deliver a shock to a patient's chest to restore normal heart rhythm.

in out-of-hospital resuscitation because of the risk that it may thump the victim into a more malignant rhythm (13).

Drugs, administered either intravenously, by direct injections to the heart, or via endotracheal tube, play an essential role in advanced cardiac life support. Some drugs (e.g., sodium bicarbonate) can treat life-threatening accumulations of acid caused by lack of oxygen and retention of carbon dioxide. Many drugs (e.g., epinephrine and atropine) influence heart rate and contractility, as well as blood pressure. Some drugs (e.g., low doses of dopamine) dilate blood vessels, and others (e.g., methoxamine, phenylephrine, and high doses of dopamine) constrict them. Other drugs (e.g., lidocaine, procainamide, and bretyllium) can correct arrhythmias in some cases. Finally, some drugs can also make a patient with ventricular fibrillation more responsive to electrical shock (14).

Although not a common part of the resuscitation procedure itself, temporary cardiac pacing is sometimes used to regulate a patient's heart rhythm. Temporary pacemakers are ineffective for some heart rhythm disturbances and tend to be used late in resuscitation, after other therapies prove inadequate to establish stable circulation (22). There are three basic approaches to cardiac pacing during CPR: external, transthoracic, and transvenous. External pacing uses skin electrodes to pass repetitive electrical impulses through the chest wall, to electrically stimulate the heart. In transthoracic pacing, the physician inserts the pacing electrode through the patient's chest and into the heart muscle. In transvenous pacing, the physician inserts the pacing electrode through a large vein near the patient's collarbone and into the heart. In all three cases, the pacing electrode is connected to an external temporary pacemaker.

Open-chest cardiac massage is the most drastic means of attempting to restore circulation. This procedure involves surgically opening the patient chest and breaking the ribs so that the heart can be directly massaged. It is sometimes used for patients who fail to respond to standard, closed-chest methods of resuscitation. The American Heart Association currently recommends using open-chest cardiac massage for patients with penetrating chest injuries, severe hypothermia, cardiac tamponade (where the sac surrounding the heart fills with blood or fluid), or anatomical deformity that precludes closed-chest compression, and in patients who suffer a cardiac arrest in the operating room when their chest is already open (64).

An in-hospital resuscitation attempt may include one, all, or any combination of the various meas-

ures described above, applied once, repeatedly, or continuously. There is no theoretical limit to the number of times a patient can be resuscitated, although the chance of complications and injuries increases with every attempt. In a hospital, it is not uncommon for a patient with multiple cardiac arrests to be resuscitated repeatedly, A review of 13,266 hospital CPR cases reported in the medical literature from 1960 to 1980 found that 11 percent of CPR patients were resuscitated twice in one hospital stay; 2 percent were resuscitated three times; and about 1 percent were resuscitated four times (23). One terminally ill patient was reportedly resuscitated 70 times in a 24-hour period (2).

For patients who survive a cardiac arrest, recovery is rarely a simple matter of "waking up" after the resuscitation is completed. A patient's heart rhythm may continue to be abnormal and may require continuous monitoring, intravenous medication, or a pacemaker. A patient may also require continuous infusion of medicine to support his or her blood pressure and maintain effective blood flow (14).

Successfully resuscitated patients are critically ill due to serious underlying disease, cardiac arrest, and the risk of recurrent cardiac arrest. They typically require intensive medical care and are frequently admitted to the hospital's ICU or coronary care unit (CCU) (14).

When To Discontinue CPR

There is no theoretical limit on the duration of a resuscitation attempt. Resuscitation attempts may extend anywhere from a few minutes to hours, although they usually last 30 to 60 minutes (14). Patients whose hearts begin to beat spontaneously within 15 minutes are more likely to survive than patients requiring CPR for a longer time (6).

The 1980 American Heart Association Standards for Cardiopulmonary Resuscitation and Emergency Cardiac Care (ECC) state that CPR should be continued until a patient recovers or "is found to be unresuscitable and is pronounced dead." In general, death may be determined on the basis of: 1) irreversible cessation of circulatory and respiratory functions, or 2) irreversible cessation of all functions of the entire brain, including the brain stem, i.e., brain death (see ch. 2). Brain death cannot be determined before or during resuscitation, however, because 6 to 24 hours of observation are needed, along with more than one flatline EKG. Other indicators of brain death, such as lack of pupil response and reflexes, are unreliable–particularly in elderly patients, who may have unreactive pupils due to cataract surgery or who are taking medications that may affect neurological responses (64). Thus, according to experts, a decision to discontinue CPR should be based on a finding of irreversible cessation of cardiovascular function after basic and advanced life support have been properly applied (56,63,64).

Specific clinical criteria for when CPR should be discontinued have been proposed, but examples of the complete recovery of patients whose resuscitation would have been terminated under some of the proposed criteria can be cited (14). Some observers argue that no criteria would be appropriate in all cases and that the decision about when to discontinue CPR must be made on a case-by-case basis (16).

Special Considerations in the Use of CPR for Elderly Patients

The use of some resuscitative procedures for elderly patients may be complicated by age-associated illness or physiological changes. Arthritis of the vertebrae in the neck, a condition that is common in elderly people can create difficulty in some of the airway maneuvers. Rheumatoid arthritis, which frequently affects the joint where the jaw joins the skull, can interfere with CPR by making the mouth difficult to open fully. Moreover, age-associated illness or physiological changes may increase the risk of resuscitation-related injuries (see "Complications and Injuries Associated With CPR" below). These age-associated problems are not known to affect short- or long-term survival following CPR (14).

In comparison to younger people, elderly people tend to have less muscle mass, more fatty tissue, and reduced blood flow to the liver and kidneys (two main organs of drug elimination and metabolism). These age-related physiological changes may affect the way an elderly person's body ab-

sorbs, metabolizes, distributes, and eliminates drugs (see ch. 9). How the drugs used in resuscitation are affected by these changes is not known, although anecdotal evidence suggests that there may be increased variability in response among elderly patients. No guidelines exist for dosages of these drugs for elderly patients.

Other age-associated problems may impede monitoring an elderly patient's response to a resuscitation attempt. Many elderly people have stiffer arteries than younger people, making their pulse more difficult to detect (14). Furthermore, some elderly people take medications that affect their reflexes and other necrologic responses. Detecting symptoms or changes in neurological status in such individuals can be difficult.

Although age-associated factors may complicate resuscitative procedures for some elderly patients, impede monitoring of their response to treatment, and increase the risk of resuscitation-related injuries, there is no evidence that CPR is performed differently on elderly people than on younger people. Many of the procedures must be applied in full force in order for maximum benefit to be achieved. Thus, although a patient's age may affect the decision to resuscitate (see section below on "Making Decisions About Resuscitation"), once the decision to resuscitate has been made, the procedures that are used are the same regardless of the patient's age, and little is done to reduce any additional risks associated with advanced age (13).

Treatment Settings

Most large hospitals have the necessary equipment and trained personnel for both basic and advanced cardiac life support. Some small hospitals do not have an ICU or CCU, and unstable resuscitated patients maybe transferred by ambulance or helicopter to a larger facility (14).

In nursing homes, the specialized equipment and the personnel necessary for advanced cardiac life support are frequently not available. Most nursing homes do not have equipment for defibrillation. Thus, nursing home residents in cardiac arrest must be transferred to a hospital by ambulance after basic life support measures have been initiated. Some nursing home personnel are not even trained in basic CPR (14,41).

In the community, resuscitation is frequently performed by emergency medical technicians or paramedics attached to an ambulance rescue team. Even if basic CPR has been started by laypersons or medical personnel who happened to be present at the time of a cardiac arrest, it is often continued by an ambulance rescue team or occasionally a helicopter rescue team.

Emergency medical technicians and paramedics are trained in basic life support techniques. Since the 1970s, paramedics have also been trained to recognize various arrhythmias and use a defibrillator. Apart from the initial, standard treatment with external cardiac massage, incubation, intravenous line insertion, and defibrillation, however, all medications and treatment given by paramedics must be given on the orders of a physician based in an emergency room and in contact with the paramedics by radio (26).

CPR skills deteriorate rapidly if not practiced. With the exception of trained personnel who work in emergency rooms, ICUs, and CCUs, ambulance and helicopter rescue teams, and some interns and residents, few people use CPR often enough to maintain their skills. There are no data on how deterioration of CPR skills affects patient survival in any treatment setting (14).

UTILIZATION AND COST OF RESUSCITATION

Utilization of Resuscitation

For several reasons, accurate information on the utilization of CPR is difficult to obtain. Existing medical records systems do not necessarily code CPR. Thus, the progress notes made in the patient's chart by a nurse or physician are sometimes the only record of a resuscitation attempt, and these notes may be difficult to discern and quantify. No government or private agency keeps records of CPR attempts per se. Furthermore, reports of CPR administered in individual hospitals fail to provide information on the number of admissions per year or the number of bed-days

(days per year in which available hospital beds are occupied by a patient) associated with CPR (14).

Nursing homes seldom have comprehensive records of CPR attempts, because many nursing home residents who are resuscitated are transferred by ambulance to a hospital either before the arrest occurs or immediately after basic life support is initiated. Records of CPR attempts in the community are neither readily available nor necessarily comparable. Moreover, the records of emergency ambulance and helicopter rescue teams often do not include the number of people in the referral area, the number of ambulance calls, or the number of emergency room visits (14).

Several other problems limit the availability of accurate utilization data. In many reports, the patients receiving CPR are inadequately described, followup information is incomplete, and the population at risk for CPR or from which patients were obtained is not described or adequately reported. In addition, many reports of CPR include patients with trauma, hypothermia, or cold water drowning—groups of patients in whom the indications for CPR, utilization, and outcomes may differ from other groups. Elderly patients experiencing CPR may not be uniformly distributed in these groups (14).

As a result of these problems, there are no accurate figures on the number of persons who receive CPR in this country. Data from the 1984 National Hospital Discharge Survey, based on information from the medical records of a national sample of patients discharged from short-stay non-Federal hospitals, indicate that 120,000 persons of all ages received one or more of five specified CPR procedures[2] about 73)000 (61 percent) of these persons were over age 65 (82). These numbers from the National Hospital Discharge Survey are much lower than estimates based on other sources on information, and they probably significantly underestimate the number of persons who receive CPR in hospitals.[3]

Data from other sources suggest that 370,000 to 750,000 or more persons of all ages may receive CPR in hospitals each year. One basis for this estimate is the observation that approximately 700,000 persons discharged from U.S. hospitals in 1984 had a diagnosis of acute myocardial infarction (81); although how many of these persons received CPR is unknown, it is likely that many of them did, Moreover, many patients with diagnoses other than myocardial infarction also receive CPR. In addition, data from several studies in individual hospitals suggest that 1 to 2 percent of patients in those hospitals received CPR (6,47). Applying this percentage to the approximately 37,200)000 patients discharged from short-term non-Federal hospitals in 1984 (81) yields a rough estimate that 372,000 to 744,000 patients may have received CPR in hospitals nationally.

The best available data suggest that cardiac arrest occurs in the community in 58 to 71 persons per 100,000 nationally (14). Yet, how many persons who experience cardiac arrest in the community receive CPR or how many are included in the hospital figures cited above is not known. No information about the number of persons who receive CPR in nursing homes or hospices is available.

Data compiled for OTA indicate that approximately 55 percent of hospitalized patients who receive CPR are elderly (14). Studies in some hospitals have found an even higher percentage of elderly persons among patients who received CPR. Of 294 patients who received CPR in a Boston hospital from 1981 to 1982, for example, only 20 percent were under 60 years old; 23 percent were

[2]The five procedures are conversion of cardiac rhythm; cardiopulmonary resuscitation, not otherwise specified; other electric countershock of the heart; closed-chest cardiac massage; and open-chest cardiac massage (80).

[3]One reason the National Hospital Discharge Survey data may underestimate the number of people receiving CPR in hospitals is that the survey collects information on up to four medical procedures for each patient, and CPR may not be included as one of the four in some cases. This is especially likely since the survey form requests four "surgical and diagnostic procedures" (80). Moreover, CPR attempts may only be noted in the physician's or nurses' progress notes and thus not easily extracted in the survey process.

60 to *70; 34* percent were 70 to 80; and 23 percent were over 80 (6).

If an average of 55 percent of patients who receive CPR in hospitals are elderly, and 370,000 to 750,000 or more persons of all ages receive CPR in hospitals, then 204,000 to 413,000 or more elderly persons may receive CPR in hospitals. Although very rough, this range corresponds to other estimates based on the finding that CPR is performed in about one-third of all hospital deaths (14). In *1984,689,000* elderly persons died in short-stay non-Federal hospitals **(81);** if CPR was performed in one-third of these hospitalizations (or about 230,000 cases) and if death occurs in 75 to 90 percent of hospital CPR attempts (as discussed below), then it can be estimated that 255,000 to 307,000 elderly patients received CPR in hospitals.

Studies of patients receiving CPR in the community indicate that their mean age is 62. Detailed age distributions are rarely reported (14), but it is likely that most of the patients receiving CPR in both settings are over age 65. More than 75 percent of patients resuscitated in the community and 70 percent of those for whom resuscitation is attempted in the hospital are men (14), probably because men are more susceptible to atherosclerosis than women.

Cost of Resuscitation

Costs associated with resuscitation include the direct costs of procedures, equipment, and staff for a resuscitation attempt in the community or hospital; the cost of intensive care following resuscitation; and the cost of hospitalization following intensive care.

Some studies have analyzed the cost of community CPR by comparing program costs of establishing and maintaining an emergency medical service with the number of lives saved. OTA is not aware of any studies that measure the direct cost of procedures, equipment, and staff for a community CPR attempt. It is likely that the costs vary greatly from program to program, depending on the range of procedures performed and equipment available, the proportion of volunteer to paid staff, and the size of the service area.

In-hospital CPR may include any of several combinations of procedures (incubation, ventilation, defibrillation, pacemaker insertion, laboratory tests, drugs), and the costs of particular resuscitation attempts vary, depending on which procedures are used, the duration of each procedure, the number and type of personnel involved, and the costs associated with each. OTA is not aware of any studies that have observed and measured these components during actual CPR and then ascertained their costs.

To determine the charges associated with in-hospital CPR, one would need to observe the event, record the components, determine from the hospital bill which of the components had, in fact, generated charges, and total these charges. OTA is not aware of any study that has done this.

Patients alive at the conclusion of a resuscitation attempt are in almost all cases cared for in an ICU or CCU. One published report examined the charges for 2,693 patients admitted to a medical ICU between 1977 and 1979 (78). The mean hospital bill for 41 resuscitated patients with discharge diagnoses of cardiopulmonary arrest who required active interventions was $7,235; the mean stay in the ICU for these patients was 4.3 days (out of a total average stay in the hospital of **12.2** days). The hospital charges for these patients generally reflected the patient's length of stay in the ICU, the length of the patient's total stay in the hospital, and the degree of intervention needed.

Reimbursement for Resuscitation

The Federal Government bears a large share of the costs generated by resuscitation of elderly people. The reason is that virtually all individuals who are successfully resuscitated are admitted to a hospital, and hospital care for most elderly patients is reimbursed by Medicare. Under Medicare's Part A (Hospital Insurance) prospective payment system (PPS), each hospitalized patient is assigned to a diagnosis-related group (DRG) on admission to the hospital (see ch. 2). Patients admitted in cardiac arrest maybe assigned to the DRG category for cardiac arrest (DRG 129); patients who suffer an arrest while in the hospital, however,

have typically been assigned to a DRG other than DRG 129 at the time of hospital admission (14).

Medicare's hospital payment rates are higher for some DRGs than for others, depending on the average cost of care associated with each diagnosis. Anecdotal evidence suggests that hospitals try not to assign patients to DRG 129 because the Medicare payment rate for DRG 129 is less than for other DRGs to which these patients may reasonably be assigned (14).

The Federal Government also pays for care administered in Veterans Administration (VA) hospitals. OTA has not determined the number or proportion of elderly patients resuscitated in these hospitals or the costs of their care.

Emergency medical services that administer CPR in the community are funded from a variety of sources, including Federal, State, and local governments and private insurers. Some communities have emergency medical services that are run on a volunteer basis, without government subsidies, and these services usually do not charge patients. Medicare Part B (Supplementary Medical Insurance) covers some charges associated with CPR in the community.

OUTCOMES OF RESUSCITATION

Clinical Outcomes

Resuscitation can deliver a person from the brink of death. It can restore a patient to his or her prior lifestyle within a few weeks, with only bruises and soreness as reminders of the ordeal. Fortunate patients can resume their everyday activities, as the following case illustrates.

Mrs. W. had been hospitalized for intestinal problems. She was 83 years old, and the profuse diarrhea of the past week had caused tremendous weakness, made worse by the fact that she had continued to take the diuretic prescribed for her high blood pressure. Thus, she was not only dehydrated, but her blood potassium level was low, causing weakness and a predisposition to dangerous cardiac arrhythmias.

As she was sitting in the hallway, waiting for her admission chest X-ray to be taken, she suddenly slumped in the wheelchair and slid to the floor. A nurse who was passing rushed to Mrs. W's side as she fell to the floor. The nurse felt her neck for a pulse and, feeling none, gave her a fist-thump on the chest. "Code blue" was announced on the loudspeaker and people rushed to the scene with a cart of equipment. An EKG machine attached to her arms and legs showed ventricular fibrillation. Paddles from the defibrillator were applied to the chest and current applied. Her body jerked with the shock and she began gasping for air. Regular heartbeat and blood pressure were reestablished, and she was taken to the ICU, where she was monitored for 24 hours and discharged to the ward.

She developed pneumonia after the resuscitation, but it responded to antibiotics and her heart rhythm remained stable after the blood potassium level was restored to normal. In 10 days she was home again, living independently (14).

For most patients, the outcome of CPR is not so positive. Some patients who are successfully resuscitated face a long, difficult recovery, and some never resume their normal daily activities. Others survive with serious physical impairment or brain damage.

If a person's blood circulation stops or is inadequate for more than a few minutes, he or she may suffer brain damage due to lack of oxygen. On average, 1 in 20 patients who survive a cardiac arrest has severe brain damage (16). In rare cases, such brain damage can lead to prolonged coma. Although elderly people may be more vulnerable than younger people to oxygen deprivation, there are no data on the incidence of new neurological deficits in elderly patients following resuscitation.

Many patients who receive CPR do not survive. The following case is one example.

. . . Resuscitation was in progress . . . Several people were there, watching, with no specific task. More people trickled in to watch or help as the minutes ticked by, and at one point there were 14 people in and around the room. At times a tall, somber chaplain would appear, crane his neck, speak briefly to a nurse or doctor, and then re-

turn to a small waiting room where four family members were sitting.

After 2 hours, the doctors and nurses stopped trying. The chaplain reported that a daughter wanted to see her father.

Reluctantly, she was allowed in. As perople slowly filed out and started cleaning up, the daughter desperately pleaded, "Dad! Come back! Come back, Dad! It's me, . . . come back for me, Dad!') After she saw no response, the chaplain took her back to her family. A nurse firmly pulled the curtain around the bed (14).

Some patients die despite repeated resuscitation over a period of hours. A "spiraling down" effect is often seen in these patients, as they arrest and are resuscitated again and again, growing continually weaker (74).

If resuscitation is unsuccessful in a hospital, death is generally accompanied by chest compression, a tube in the throat, needles stuck in the groin and elsewhere, and possibly several high-energy electrical shocks. In extreme cases, a needle is inserted directly into the heart or the chest is opened and ribs broken to directly massage the heart. It is not known how the dying person perceives this process, if at all, or whether the process increases the suffering associated with death. Most patients who die during CPR are unconscious (4). In the very few studies asking survivors about their memories, most have no memory of any part of the resuscitation process, although, as discussed below, some say they would not want it done again (6,30).

Long lingering death after CPR appears to be the publicized exception rather than the common occurrence (6). Most patients who die following resuscitation do so within the first few days.

The medical literature on outcomes of resuscitation exhibits several methodologic problems in addition to the limitations already described for utilization data. The greatest problem in comparing available studies is that different studies use different definitions of ***success (e.g.,*** restoration of a spontaneous pulse, restoration of circulation, or remaining alive for 24 hours) and different definitions of ***survival (e.g.,*** living until discharge from hospital, for 1 month, for 6 months, for a year, or more). The way these terms are defined determines, to a large extent, the outcomes that are reported (14).

Although widely varying success rates have been reported, on average, one-third to one-half of CPR attempts in hospitals are initially successful. For patients with cardiac arrhythmias, the initial success rate is better-about two thirds of CPR attempts with these patients initially succeed. Not all patients who are successfully resuscitated recover enough to be discharged from the hospital, however. Only about one-third to one-half of those who are successfully resuscitated (approximately 10 to 25 percent of those for whom CPR is attempted) survive long enough to be discharged from the hospital.'

Very little information is available about the outcomes of CPR in nursing homes. One study of 1,918 persons admitted to a New York State nursing home over an 8-year period found that only 32 persons (2 percent) received CPR in the facility. Of these, 9 persons (28 percent) survived more than 24 hours, and 5 of the 9 (16 percent of all those who received CPR) were still alive 30 days later (42).

The hospital admission rate for patients resuscitated in the community is a practical measure of the initial success rate of community CPR. Using this measure, several studies indicate an average success rate of 35 percent (range 23 to 44 percent) for community CPR (14). Among persons who are successfully resuscitated in the community and hospitalized, the percentage who recover enough to be discharged from the hospital varies greatly, depending on the cause of their cardiac arrest, whether the cardiac arrests were witnessed, how soon after cardiac arrest CPR was initiated, and whether paramedic care or only basic life support was provided (21).

Long-term survival of patients resuscitated in any setting is rare (14,69). Recurrent sudden cardiac death is the most likely eventual cause of death in those initially surviving cardiac arrest.

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[4]**These overall averages are based on reviews of the** literature by **the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research (69) and by Cassel, et al. (14).**

Factors That Affect the Clinical Outcome of Resuscitation

A patient's underlying diagnosis and severity of illness are major determinants of resuscitation outcome (6,15,30). One study of 294 patients resuscitated in a Boston hospital found, for example, that although 14 percent of the patients survived to leave the hospital, no patients who had metastatic cancer or pneumonia and only 2 percent of patients with renal failure survived to leave the hospital (6). Patients with multiple diseases usually fail to recover from cardiac arrest despite prolonged CPR and eventually die through failure of one organ system or another (57).

A patient's level of functioning prior to cardiac arrest is a predictor of outcome of resuscitation (6,15). One study found that only 4 percent of patients who had been homebound prior to their cardiac arrest survived cardiac arrest and CPR, compared to 27 percent of patients who had been active outside the home before their cardiac arrest (6).

The nature of a patient's cardiac arrest is another strong predictor of outcome. Patients with ventricular fibrillation are more likely to survive than patients with asystole or electromechanical dissociation (6,21). Patients with ventricular tachycardia have intermediate success rates (89).

Some CPR procedures are not effective when certain heart irregularities are present. Defibrillation, for example, is an effective means of restoring heartbeat for patients with ventricular fibrillation but not for patients with asystole (37). Likewise, pacing can be effective for asystole but is ineffective in treating ventricular fibrillation and electromechanical dissociation (72).

The time between occurrence of the cardiac arrest and initiation of resuscitative measures—"down time"–greatly influences the patient's chance of recovery. In the past decade, at least nine studies have found that survival following cardiac arrest is related to early initiation of CPR (21).

Long-term survival in patients resuscitated after a delay of more than 5 minutes has been documented, but the chance of brain damage increases **(16,21).** The 1974 American Heart Association standards stated:

> The technique of CPR is most effective when started immediately after cardiac arrest. If cardiac arrest has persisted for more than 10 minutes, CPR is unlikely to restore the victim to his prearrest central nervous system status (62).[5]

Duration of the resuscitative effort is also a strong predictor of outcome. As duration increases, survival rates decrease. Resuscitation efforts lasting longer than 30 minutes are usually unsuccessful (6,16,57), Some patients have recovered completely following 2 to 3 hours of resuscitative effort, but such cases are usually associated with hypothermia in drowning or with drug overdose (14).

The relationship of outcome to the number of resuscitative attempts that a patient receives during a single episode has not been determined. The poorer outcomes observed with more resuscitation attempts in some studies may be due to the longer total duration that naturally accompanies a greater number of attempts.

A patient's age is not a good predictor of the outcome of resuscitation (6,14,15,30,31,32,48,68). Some studies show no significant difference between success rates for elderly and younger patients (see, e.g., references 6 and 15). Other studies (e.g., reference 30) show that elderly patients as a group have somewhat poorer outcomes than younger patients but that the poorer outcomes in elderly patients reflect the higher prevalence of multiple diseases in these patients. Although the likelihood of multiple diseases increases with age, any particular older individual may not be affected. Thus, ail these studies support the conclusion that a patient's age alone is not a good predictor of resuscitation outcome.

Within the elderly population, the initial success rate for CPR does not decrease significantly in older age groups (12,14)32). One study of 1,345 persons who received CPR in the community found no significant difference in the percentage

[5]**The brain may be viable for a longer period of time in special cases of barbiturate and sedative overdose, hypothermia, and drownings.**

of patients in four age groups over 65 (ages 65 to 69; 70 to 74; 75 to 79; and 80 to 99) who were resuscitated and hospitalized. The percentage of successfully resuscitated patients who recovered enough to be discharged from the hospital, however, decreased significantly with age—from 15 percent of patients aged 65 to 69 to only 8 percent of those aged 80 to 99 (79). Thus although patients in the very old age groups were successfully resuscitated as often as patients aged 65 to 69, patients in the very old age groups were less likely to survive to be discharged from the hospital.

The same study (79) found that cardiac arrest was witnessed more often for elderly patients. Yet bystanders provided CPR prior to the arrival of paramedics more often for younger patients.

Use of Other Life-Sustaining Technologies Following CPR

Following resuscitation, many patients require not only admission to an ICU or CCU and extended hospitalization but also invasive hemodynamic monitoring, prolonged mechanical ventilation, or dialysis. In one study, 78 percent of the patients admitted to hospital ICUs for a cardiac arrest required such a major intervention (18).

The life-sustaining technology most likely to be required for patients who survive resuscitation is mechanical ventilation (14). Respiratory function is often inadequate immediately after successful resuscitation, and recovery to independent breathing may take days or weeks. There is some evidence that outcome for patients receiving ventilatory assistance following CPR is not as good as that of other patients (88), probably because patients requiring such assistance tend to be more ill in general than patients who do not need such assistance.

Complications and Injuries Associated With CPR

Resuscitation can be accompanied by a wide array of complications and potential injuries that may be long-lasting and even life-threatening, particularly for individuals who are already seriously ill.

Brain damage is the result of cardiac arrest and the consequent interruption in the supply of oxygen to the patient's brain. Some people think of it as a complication of resuscitation, and, in fact, delayed initiation of CPR and inadequately performed CPR increase the risk of brain damage in persons who are successfully resuscitated.

Each of the various basic and advanced life support procedures carries its own set of risks and potential complications. The major problems that may be encountered as a result of procedures used during resuscitation are summarized in table 5-1.

The most common resuscitation-related injuries include rib fracture, collapsed lung, ruptured stomach, and broken teeth. In survivors of resuscitation, these problems can cause pain, make breathing difficult, impede weaning from a mechanical ventilator, or produce other problems that complicate postresuscitative care.

Little information is available about the incidence of resuscitation-related injuries, but one study of 63 survivors of cardiopulmonary arrest found such injuries in over 25 percent of the patients (10). Elderly patients, because they are more likely to have osteoporosis (brittle bones), are at an increased risk of fractures, but no age-specific data are available to indicate whether such injuries are more common in elderly survivors of resuscitation than younger ones (14).

Psychological Outcomes of Resuscitation

In the aftermath of a cardiac arrest, many survivors experience psychological repercussions. Several of the resuscitated patients in a study at Beth Israel Hospital in Boston reported that the hardest part of their subsequent hospitalization was adjusting to "feeling sick" and dealing with their new loss of independence (6). Depression was present in most of these patients at the time of their discharge, although it tended to resolve itself within 6 months. Every resuscitated patient in this study, regardless of age, reported some decrease in daily activities. In many cases, the fear of another arrest led patients to regulate their daily lives and limit their activities to ensure immediate access to medical care.

Surveys of patients' attitudes towards resuscitation indicate that some survivors do not wish to be resuscitated again, although they had not

Table 5=1.-Potential Complications Associated With Specific Resuscitation Procedures

Basic life uppoti procedures:
- **regurgitation**
- **aspiration**
- **gastric distension (with mouth-to-mouth)**
- **rib fracture**
- **collapsed lung**
- **ruptured stomach**
- **spinal cord compression**

Tracheal Intubation:
- **insertion of the tube into the esophagus**
- **trauma to the trachea or esophagus**
- **damage to the vocal cords**
- **narrowing of the trachea following tube removal**

Defiberllation:
- **myocardial necrosis (damage to heart muscle)**

Pracordial thump:
- a **more dangerous heart rhythm**

Drugs:
- *Sodium bicarbonate (in excess)*
  - **—alkalosis**
  - **—sodium and water overload**
  - **—paradoxical cerebral spinal fluid acidosis**
- *Atropine*
  - **—ventricular fibrillation**
  - **—tachycardia**
  - **—increased oxygen demand by the heart with increased heart rate**
- ***Calcium*** *chloride*
  - **—intracellular damage**

Temporary cardiac pacemakers:
- *External pacers*
  - **—severe muscle contractions**
  - **—local tissue burns**
- *Transvenous pacers*
  - **—local trauma**
  - **—infection**
  - **—laceration of the heart muscle**
  - **—blood clots**
  - **—ventricular arrhythmias**
- *Transthoracic pacers*
  - **—collapsed lung**
  - **—heart injury, including laceration**
  - **—laceration of blood vessels**

SOURCES: **C.K. Cassel,** M.D. **Silverstein,** J. LaPuma, et al., **"Cardiopulmonary Resuscitation** in the Elderly," prepared for the Office of Technology Assessment, U.S. Congress, Washington, DC, November 1985; **R.H. Falk,** L. Jacobs, A. Sinclair, et al., "External **Noninvasive** Cardiac **Pacing** in Out-of-Hospital Cardiac Arrest," ***Critical*** *Care* ***Medicine*** 11(10): 779-782, 1983; and **J.R.** Roberts and MI. Greenberg, "Emergency **Transthoracic** Pacemaker," *Anna/s of Emergency* ***Medicine*** 10(11): 800-812, 1981.

been opposed to their first resuscitation and they are content with their present quality of life. One study found that when 38 survivors of resuscitation were asked if they would choose to be resuscitated in the future if it were necessary, 21 (55 **percent)** said yes, 16 (42 percent) said no, and 1 was ambivalent. At a followup 6 months later, three patients had changed their minds: two patients no longer desired resuscitation and one said she would choose it (6).

Resistance to a second resuscitation seems to be found particularly among older survivors. A study in a hospital in Nuremberg, Germany, found that older survivors of resuscitation tended to be more negative about resuscitation than younger survivors (30). Eighteen 6-month survivors, all of whom were satisfied with their current life and state of health, were asked about their opinions toward resuscitation. All of the nine survivors under age 60 said they would agree to another resuscitation, but seven of the nine survivors over age 60 said they would not (the other two had no opinion). Similarly, six of the nine survivors under age 60 thought it reasonable to resuscitate aged persons under all circumstances, and three thought it reasonable only with certain indications. In contrast, seven of the nine survivors over age 60 thought it reasonable to resuscitate aged persons only on certain indications, and two had no opinion.

MAKING DECISIONS ABOUT RESUSCITATION

In the first 15 years following the development of CPR, physicians tended to implement both basic and advanced life support measures without hesitation whenever the need arose. Over time, however, there has been a growing recognition among physicians and others of problems associated with resuscitation, particularly the low chance of success and the risk of debilitating or life-threatening complications.

In 1976, the New ***England Journal of Medicine*** published two articles on withholding life support, particularly resuscitation, from terminally ill patients (20,70). An accompanying editorial entitled "Terminating Life Support: Out of the Closet" (29) praised the two articles for making public the "open secret" that resuscitation (and other life-sustaining treatments to a lesser degree) were being withheld or withdrawn from some terminally ill patients.

Since then, criteria and procedures for deciding to withhold CPR have been widely analyzed and debated. Although debate about these criteria and procedures continues, it is now generally accepted that CPR is not an appropriate treatment for ***every*** patient in cardiac arrest. A strong presumption in favor of resuscitation remains, nevertheless. As one observer has noted:

> [CPR] is the only medical intervention that can be performed by nonphysicians without a physician's order; a physician's order is required only if CPR is to ***be withheld,*** even in the patient home (90).

In the case of persons who experience unexpected cardiac arrest in the community and in the case of most patients in hospitals and other health care facilities, it is assumed that CPR should be attempted, because the alternative for the individual is certain death. For some patients, however, CPR is withheld. Withholding of CPR may occur as the result of a unilateral decision made by a physician at the time of the person's cardiac arrest. Alternatively, CPR maybe withheld on the basis of a prior decision by the physician sometimes in consultation with other health care providers, the patient, and/or the patient's family. In such cases, a DNR order—a directive to withhold CPR—may be written in the patient's medical chart.

This section discusses the factors that affect physicians' decisions to withhold CPR, the usual role of physicians, nurses, and patients and their families in the decisionmaking process, what is known about the current use of DNR orders, and problems associated with their use. The same factors are associated with physicians' decisions to withhold CPR as reflected in research on: 1) their stated attitudes about which types of patients should not receive CPR; 2) their actual decisions to withhold CPR, especially in hospitals; and 3) their decisions about which patients should have a DNR order. Data from all three sources are summarized below.

Factors That Affect Physicians' Decisions About Resuscitation

Many factors enter into physicians' decisions about whether resuscitation is appropriate for a given patient. First and foremost are indicators of the potential for successful outcome. Physicians are not obliged to provide futile or useless treatment, and a decision not to resuscitate is generally considered appropriate when CPR would be futile (51). Thus, a patient's underlying diagnosis and other determinants of resuscitation efficacy (see "Outcomes of Resuscitation") are important considerations in physicians' decisions to withhold CPR.

The presence of a terminal illness in a patient is frequently mentioned by physicians as a reason for withholding CPR. In the Portland, Oregon area, 87 percent of 78 emergency medicine physicians surveyed said they would stop CPR on a patient in the end stage of a terminal disease (16). Similarly, cancer was the most common diag-

nosis of patients in one Boston hospital who died without receiving resuscitative measures (6), and several studies have shown that patients with cancer are more likely than other patients to have a DNR order (25,73).

Severity of illness is another frequently mentioned factor in physicians' decisions about resuscitation. Many physicians believe that resuscitation should be withheld from patients with multiple or severe diseases that are chronic, progressive, or irreversible (15,40). Some physicians argue that although CPR is technically possible in such patients, it is right to exclude patients with chronic, progressive, disabling diseases who are highly dependent on others (32).

Some physicians believe that it is appropriate to withhold CPR from some patients who have severe illnesses but who are not terminally ill. One study of DNR orders in a medical ICU found that a patient severity of illness was the most important predictor of his or her DNR status, but over 60 percent of patients with DNR orders did not have a diagnosis of terminal illness (91). Likewise, in a community hospital, 40 percent of those with DNR orders did not have a terminal illness documented in their medical record (49).

Another factor that is considered in resuscitation decisions is "downtime." The Portland study of emergency medicine physicians found that 44 percent said they would cease CPR if it had been initiated in the community more than 10 minutes after the patient went into cardiac arrest (16). Down time is associated with brain damage, as discussed earlier, and one expert in resuscitation has cautioned that "litigation is more likely to follow when the patient survives (a cardiac arrest) with permanent brain damage than when the patient dies" (56).

In addition to factors that have been shown to affect the medical outcome of resuscitation, such as severity of illness and "downtime," several other factors that do not affect the medical outcome of resuscitation often play an important role in physicians' attitudes and decisions about its use. One such factor is the patient's mental status. When presented with case descriptions of one demented and one mentally retarded patient in cardiac arrest and two cognitively normal patients also in cardiac arrest, 63 physicians in a Philadelphia internal medicine residency program said that they would be less likely to initiate CPR on the demented and mentally retarded patients than the cognitively normal patients (27). Likewise, the Portland study found that 54 percent of the 78 physicians stated that they would cease CPR if they learned that a patient had a known severe mental impairment, such as dementia or mental retardation (16).

A patient's mental status may also influence physicians' decisions about whether a patient should have a DNR order. In one Boston hospital, 49 percent of patients who were given a DNR order had abnormal mental status (i.e., they were comatose or disoriented), compared to only 15 percent of a control group of patients who did not have abnormal mental status (73). In another hospital, terminally ill patients who were mentally alert were generally not given a DNR order (36).

Another factor that influences resuscitation decisions is a patient's residence in a nursing home. One study found that the knowledge that a patient in cardiac arrest had been admitted to the hospital from a nursing home was enough to discourage some physicians from continuing CPR; 18 percent of 78 emergency room physicians surveyed in Oregon said they would cease CPR if the patient had been transferred from a nursing home (16). Another study found that patients who were admitted from a nursing home were three times more likely to be given a DNR order than a matched control group of patients who were not admitted from a nursing home (73).

Finally, although research shows that patient age alone does not alter the outcome of resuscitation and many authors recommend against the use of age as a factor in decisions about CPR (40,55,59), in practice, age plays a significant role in these decisions (15,19). Gordon and Hurowitz described a bias against elderly patients in physicians' decisions about whether to administer CPR:

> For younger patients, a physician's decision not to resuscitate is usually made after conscious deliberation. This is not always so for the elderly, and yet, most physicians do not resuscitate many of their elderly patients. It is not clear at precisely what level the decision to resuscitate is made, but

in the majority of elderly deaths, CPR attempts have not been carried out (31).

A survey of physicians in a Philadelphia internal medicine residency program found that a patient's age influenced their attitudes about whether to administer CPR. When presented with two hypothetical cases, one of a 32-year-old patient with a pulmonary embolism and the other of a 98-year-old patient with the same condition, all of the 63 physicians responding to the survey stated that they would be much more likely to resuscitate the younger patient than the older one. The physicians' disinclination to resuscitate older patients was also evident, although less strongly, when the age of the older patient was changed to 64 (27).

There is some evidence that the patient's age is a predictor of DNR designation. A study of ICU patients in a Cleveland hospital found the average age of the 71 patients with such orders was 66 years, while the average age of the 435 patients without DNR orders was less than 58 years (91). This difference could not be solely attributed to the facts that DNR patients are usually seriously ill and that the incidence of serious illness increases with age, because 166 seriously ill patients without DNR orders had an average age of less than 61 years.

The rationale for the use of a patient's age as a factor in decisions about administering CPR is not clear. Some physicians may not resuscitate elderly patients particularly in instances of unobserved cardiac arrest or when the effort is not promptly successful because of their perceptions that CPR may simply prolong the process of dying and that many elderly patients fear death less than prolonged dying or dependence on others. According to one physician:

> The vast majority of my patients over 65 tell me that 1) they do not dread death, and hope that theirs will be sudden; and 2) they do fear incarceration in a nursing home or total dependence on others (3).

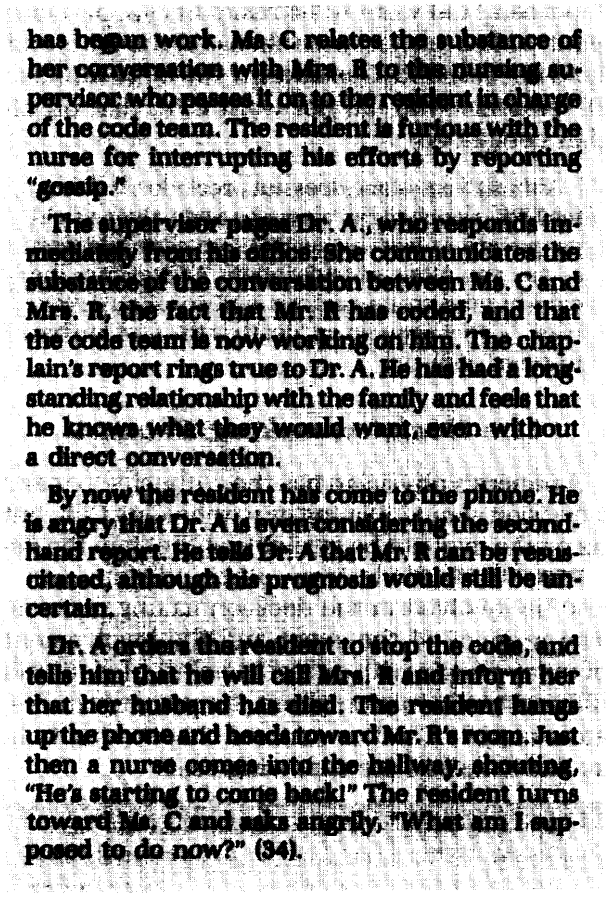
Another physician, who asked 153 decisionally capable elderly (aged 66 to 98 years) nursing home residents whether they wanted to receive CPR in the event of a cardiac arrest found that 77 residents (50 percent) did not want CPR; 11 residents (7 percent) did want it; 64 residents (42 percent) wanted their physician to choose at the time; and I did not respond. Considering the large number of residents who did not want CPR, that physician concluded:

> Although age alone does not preclude candidacy for CPR, the changed attitudes and values of old people are at least as germane to case selection as are any other consideration. As a group, the elderly tend to be realistic and to often recognize . . . that sometimes "death is the best life has to offer" (86).

The Decisionmaking Process

A patient's physician has the authority to make a decision about initiating or withholding CPR, but he or she may not be available at the time the decision must be made. Many other individuals may also be involved in the decisionmaking process. The urgency of the event and the involvement of many people with different points of view and different information about the patient can create a complex and sometimes chaotic situation, as illustrated in the following case:

> Mr. R, 65 years old, is brought into the emergency room by ambulance. The emergency room staff determines that he suffered a heart attack and was not breathing for an unknown period of time before he was by paramedics.
>
> After initial evaluation, Dr. A, the family physician, tells Mrs. R that her husband's condition is serious and that he may have suffered irreversible brain damage. Before he leaves for his office, Dr. A also says that he is ordering a neurological consultation and that he wants to monitor the situation for the next 72 hours.
>
> waiting room, Mrs. R encounters Ms. C, the chaplain's intern assigned to the emergency room. Over coffee, Mrs. R confides to Ms. C that she and her husband had talked about the possibility of such an event and that both wished that "nothing extraordinary should be done to keep them alive." Ms. C also learns that Mrs. R had not given this information to Dr. A; she makes a mental note to do so. Meanwhile, other families occupy her attention.
>
> Approximately 1 hour later a "Code blue" is called. Mr. R has suffered a cardiac arrest. By the time Ms. C responds to the code, the code team



has begun work. Ms. C relates the substance of her conversation with Mrs. R to the nursing supervisor who passes it on to the resident in charge of the code team. The resident is furious with the nurse for interrupting his efforts by reporting "gossip."

The supervisor pages Dr. A., who responds immediately from his office. She communicates the substance of the conversation between Ms. C and Mrs. R, the fact that Mr. R has coded, and that the code team is now working on him. The chaplain's report rings true to Dr. A. He has had a longstanding relationship with the family and feels that he knows what they would want, even without a direct conversation.

By now the resident has come to the phone. He is angry that Dr. A is even considering the secondhand report. He tells Dr. A that Mr. R can be resuscitated, although his prognosis would still be uncertain.

Dr. A orders the resident to stop the code, and tells him that he will call Mrs. R and inform her that her husband has died. The resident hangs up the phone and heads toward Mr. R's room. Just then a nurse comes into the hallway, shouting, "He's starting to come back!" The resident turns toward Ms. C and asks angrily, "What am I supposed to do *now*?" (34).

Potential Participants in Decisions About Resuscitation

In general, only **a** physician may decide to withhold CPR. Emergency rescue teams have standing orders to initiate CPR as quickly as possible. In hospitals, staff members are generally required to initiate CPR unless there is a physician's order not to resuscitate a particular patient.

In hospitals that have staff physicians, residents, and interns, these individuals frequently make decisions about resuscitation. A study in one hospital found, for example, that the patient's physician was involved in decisions to withhold CPR in only 39 percent of cases, and residents and interns made the decision in the other cases (80).

Nurses cannot legally make decisions about resuscitation, yet research indicates that they often have strong feelings about whether their patients should be resuscitated. It is not known how often nurses are involved in such decisions. One study found that nursing involvement in decisions about DNR orders had been documented in only 10 percent of cases; however, nurses had played an active role in assessing the patient's and family's attitudes about the patient's condition and treatment and encouraging open discussion between the patient and the physician about the patient's resuscitation status (7).

In the event of a sudden and unexpected cardiac arrest, a patient cannot participate in the decision about whether to resuscitate, and the involvement of the patient's family is severely limited by time constraints. In the great majority of cases, however, advance deliberation is possible, and patients and families can be involved in decisionmaking.

Patient and Family Involvement in Decisions About Resuscitation

Physicians once made decisions about whether to resuscitate patients behind closed doors, paternalistically protecting their patients from what the physician believed would be upsetting for the patient. Recent legal developments and changing attitudes of the public as well as many physicians support the rights of decisionally capable adults to be informed about their medical condition and to participate in decisions about their medical care, including resuscitation (1,64).

Yet patients are not always consulted about their desire for CPR. The findings of one study suggest that although many physicians believe that patient participation in resuscitation decisions is important, they often do not act accordingly (5). The researchers interviewed 157 physicians involved in the care of 154 patients who had been resuscitated (24 of the patients survived). Almost all the physicians said they believed that patients should participate in decisions about resuscitation, but only 10 percent of the physicians had actually discussed resuscitation with their patients prior to the patient's cardiac arrest (s).

Almost all the physicians interviewed thought they knew what their patients would want, but their opinions correlated only weakly with the preferences expressed by the 24 surviving patients, particularly the patients who did not want

to be resuscitated. For example, although 8 of the 24 patients stated that they had not wanted CPR, only 1 of the 16 physicians caring for these 8 patients was aware of this preference; 10 of the physicians thought their patients wanted CPR; 3 thought their patients were ambivalent, and 2 had no opinion (5).

Other studies indicate that patients are usually not involved in decisions about DNR orders. A study of 95 patients with DNR orders in a Boston hospital found that consent for the DNR order had been given by the patient in only 18 percent of the cases. The family had given consent in 66 percent of the cases (73). A study of DNR orders in one ICU found that patients' wishes were listed as a reason for the decision in only 15 percent of the cases. There were no written justifications for the DNR orders in 42 percent of the cases, but in cases where there was documentation, it more commonly included poor prognosis (59 percent) or the perception of poor quality of life (24 percent) than patient preferences (9 I).

At the time decisions about DNR orders are made for them, many patients of all ages are not decisionally capable. In one ICU, 55 percent of patients with DNR orders were unable to participate in decisionmaking because of coma or reduced consciousness (92). In another hospital, 76 percent of patients for whom a DNR order was written were unable to participate in the decision as a result of preexisting dementia, newly acquired coma, or other conditions that caused reduced consciousness or cognitive impairment. Only 11 percent of the patients, however, had been too cognitively impaired to participate in decisionmaking at the time of their admission to the hospital (7).

Even for patients who are decisionally capable, physicians may consult the family rather than the patient. A study of DNR orders in three Texas teaching hospitals found that the patient and/or family was involved in 83 percent of decisions not to resuscitate; in at least 20 percent of these cases, the decision was discussed with the family, not the patient, even though the patient was considered decisionally capable (25). As one ethicist has noted, failure to involve decisionally capable patients in a decision to withhold CPR in the event of a cardiac arrest is a serious ethical problem (85).

Decisions to resuscitate maybe discussed with patients and families even less often than decisions not to resuscitate (90). In the three Texas teaching hospitals mentioned above, researchers found that physicians' decisions that patients should be resuscitated in the event of cardiac arrest had been discussed with only 22 percent of the affected patients or their families (25).

Some physicians refrain from discussing resuscitation with their patients in order to protect them or because they feel it is unnecessary to bring up the issue (5). Some physicians also believe that patients will initiate a discussion about resuscitation if they wish. Many patients, however, believe that physicians would rather not discuss treatment options, particularly if the discussion might lead to an emotional scene, might take a lot of time, or could be interpreted as implying lack of trust (l). In addition, many physicians have difficulty discussing issues related to death or dying (see ch. 10). As one physician has noted, finding the "right time" for such discussions is also difficult:

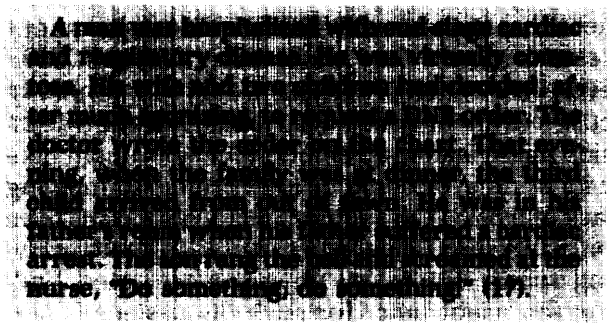
> Despite all arguments favoring open discussion, it is difficult to broach the issues of death and treatment limitation with a patient or family. No time seems like the right time. When patients are relatively healthy, we do not want to upset them needlessly; when they are terribly sick, we do not want to upset them further. If we wait too long, they may become incompetent. There is no simple answer to this question of timing. In general, it is easier if discussions about these issues have been part of the ongoing physician/patient relationship, instead of being precipitated for the first time by a crisis ***(90).***

Some physicians and other health care providers are more reluctant to discuss treatment options with older patients than younger ones. This may be because they assume that older patients prefer to have treatment decisions made for them; because they assume that older patients will not understand the discussion; or because older patients are more likely than younger ones to have hearing or speech impairments that may ***inter***fere with communication. Thus, elderly people may be less likely than younger people to be involved in decisions about their treatment.

Disagreement Among Participants in Decisions About Resuscitation

Even when patients and their families are consulted, decisions about resuscitation are not easily made. A consensual decisionmaking process that involves many people may remove the full burden of the decision from the shoulders of the physician, but can also make the process even more difficult.

Family members may disagree about the appropriate treatment, as the following case illustrates:



A patient's physician and staff physicians, residents, and interns may also disagree about whether the patient should be resuscitated. OTA is not aware of any research on the frequency of such disagreements when a decision about resuscitation is made without advance deliberation at the time of a patient's cardiac arrest. One study of DNR orders at three Texas hospitals, however, found that staff physicians disagreed with the decisions about DNR made by patients' physicians for 43 (6 percent) of the 758 patients: only 1 of the 43 disagreements involved a patient who had a DNR order; the remainder involved patients whom staff physicians thought should have a DNR order but did not (25).

Sometimes nurses disagree with patients' physicians and with staff physicians, residents, and interns about the appropriate treatment decision for a particular patient. Although the patient's physician is ultimately responsible for the decision, several observers argue that physicians should carefully consider decisions about a patient's DNR status that meet with persistent, thoughtful disagreement from staff nurses. They point out that nurses sometimes have a greater awareness of patient and family emotional responses and treatment preferences than the physician (50,90).

In some instances, a physician may disagree with the patient or family about whether resuscitation should be provided. Some physicians who disagree with a patient's or family's directive not to resuscitate override that directive. A physician may do this when a patient is not terminally ill or has few serious conditions. In such cases, the physician acts in what he or she considers the patient's "best interest," reasoning, for example, that "resuscitation is not what the patient meant when she said that she wanted no extraordinary measures taken," or that "the patient was just depressed when he signed the DNR order and will be thankful later" (4,11).

Conversely, some physicians override a patient's or family's wishes for treatment when they believe that their demands for resuscitation are unreasonable or that treatment will not benefit the patient (51). unilateral decisions by physicians not to provide CPR when the patient or family has requested it are controversial, however, and increase risk of litigation. To avoid these problems, some physicians may give a verbal order not to resuscitate the patient but fail to document the order in the patient's medical record (52).

Obtaining Informed Consent for Resuscitation

Informed consent for resuscitation is usually not obtained in any treatment setting, partly because of the strong general presumption that all patients who experience cardiac arrest should be resuscitated unless there is a physician's order to withhold CPR. Some observers have noted that the lack of a requirement for informed consent for resuscitation supports a lack of communication between physicians and patients (75). At least minimal discussion about many other invasive medical procedures is ensured because informed consent is required. Resuscitation differs from these procedures in that its need is sudden and often unanticipated. Yet advance deliberation is theoretically possible in virtually all cases.

There is currently much debate about the desirability of requiring informed consent for resuscitation at some point during a patient's hospitalization. Some observers favor such a requirement as a means of ensuring prior discussion of the resuscitation decision. According to one physician:

> It would seem that the time has arrived when all patients should have an opportunity to express their desire for or against resuscitation on routine admission to the hospital. The use of a standard written form for patients to consider on admission might force a more thorough discussion of the issue between patient and physician (75).

In a meeting of the advisory panel for this OTA assessment, the majority of panelists favored requiring informed consent for resuscitation after the first 24 hours of hospitalization for patients for whom the issue is appropriate (see box 5-A).

Other observers believe that requiring informed consent for resuscitation is unrealistic and inadvisable. They argue that requiring physicians to discuss resuscitation with all hospitalized patients who may die "would provoke unnecessary anxiety" (15).

Trying to ascertain a patient's preference about resuscitation at the time of hospital admission may be inappropriate for several reasons. At the time they enter the hospital, patients are often under emotional stress and may not be able to fully and properly consider a resuscitation decision. They may fail to fully understand the consequences of their decision or to anticipate all circumstances in which cardiac arrest might occur. Temporary depression at the time of admission to a hospital might color some patients' decisions. Finally, the vitally important decision about whether or not to resuscitate might get buried amidst the numerous questions patients must answer and forms they must sign on hospital admission.

Some nursing homes solicit residents' preferences about resuscitation at the time of admission or during their stay in the facility. The written information about CPR provided to residents by one such facility and the form used to obtain residents' responses are illustrated in figures 5-3 and 5-4. The blank spaces at the bottom of the form used to obtain residents' responses are for changes in residents' previously expressed wishes. When a resident of the nursing home is hospitalized, a photocopy of the form expressing his or her preference about resuscitation is sent to the hospital with other medical information (86).

Box 5-A.—Majority Opinion of OTA Advisory Panel Members Regarding Informed Consent for Resuscitation

- A presumption in favor of attempting resuscitation (in the absence of a DNR order) should operate in the first 24 hours of hospitalization. There may, however, be some patients for whom a DNR order is clinically indicated during this time.
- During the course of hospitalization, the issue of whether to resuscitate should be discussed with patients for whom the issue is appropriate.
- The decisionally capable patient or family/guardian of the decisionally incapable patient should be involved in the discussion with medical staff.
- For the decisionally incapable patient, in the absence of a surrogate decisionmaker, the medical team should be involved in the decision.

SOURCE: OTA Advisory Panel for Life-Sustaining Technologies and the Elderly, 1986.

physicians' Directives About Resuscitation

The Use of DNR Orders

The use of DNR orders has at least two widely understood goals: 1) to ensure that physicians who are most familiar with a particular patient decide on the appropriateness of resuscitation attempts before such attempts are needed and without the stress induced by a sudden arrest; and 2) to encourage physicians to consult with patients, or with the families of decisionally incapable patients, to determine their wishes concerning further treatment (25).

Some observers suggest that the following procedures should be followed by physicians issuing DNR orders (59):

- The physician fully evaluates the patient's medical condition.
- The physician, with the rest of the health care team, determines the appropriateness of a DNR order for the patient.
- When the patient is decisionally capable, the DNR decision is reached between the patient and physician.

- When the patient is decisionally incapable, the physician consults family members or other surrogate decisionmakers.
- If the patient or family members disagree with the DNR order, it is not implemented.
- Once the DNR decision is made, the physician discusses its meaning with the other health care personnel involved in the patient's care (59).

There are no national data on the percentage of patients with DNR orders. Data from individual hospitals indicate the percentage varies among different hospitals. Recent studies in hospitals in San Francisco and Boston have found that 3 to 4 percent of all patients have DNR orders (7,49, 52)73), whereas 9 percent of patients in three Texas hospitals had DNR orders (25).

Figure 5.3.—information About CPR Provided to Residents of One Nursing Home

THE MATHER HOME
1615 Hinman Avenue
Evanston, Illinois, 60201

To Our Residents:

In all procedures, whether performed on our Health Center or in the Evanston Hospital, you--the patient--will have final governance over what is done for you and you will be given full disclosure of all facts involved to enable you to make the right decision.

The objective of all examinations and treatments is your well being and comfort. Therefore, we do not subscribe to heroic measures to sustain life if such measures would **cause** great suffering and if life would be of poor quality afterwards. Neither, on the other hand, can we do less than support you humanely in a lingering illness.

This brings us to the final consideration: cardiac arrest. It happens in infinitely varied circumstances: inappropriately, in the young, with all other systems intact; appropriately, in our own age group, as a result of general failure of interdependent systems. Since cardiac arrest stops all pumping action of the heart, cardio-pulmonary resuscitation is instituted at once in all hospitalized patients because the brain will not tolerate more than four minutes of no circulation without permanent damage. Cardio-pulmonary resuscitation, or CPR, is a manual maneuver which rhythmically compresses the heart between the front and back of the chest by pushing the breast bone down. [n this way, circulation can be maintained until electroshock can be arranged to start the heart up again.

The problem in age is that the ribs are no longer elastic, but brittle, so that the pushing required to squeeze the heart effectively regularly breaks ribs. These sometimes lacerate the lung as well. Only rarely, at this predictable cost, can we actually achieve our objective of happy survival.

Our request that you give the attached statement careful consideration follows established policies. You may wish to discuss the issue with your family and/or with the Home's physician. Please complete the form, insert it in the enclosed envelope, seal the envelope and place it in the slot box in our Mail Room.

Administration

SOURCE: The Mather Home, Evanston, IL.

Figure 5-4.— Form Used by One Nursing Home To Obtain Resident Preferences About CPR

THE MATHER HOME
1615 Hinman Avenue
Evanston, Illinois, 60201

To: The Mather Medical Department

Subject: PATIENT'S WISH REGARDING CARDIO-PULMONARY RESUSCITATION (supplemental form)

I have been fully informed about Cardio-Pulmonary Resuscitation, its techniques, its objectives, its successes and failures.

I further understand that in the event of cardiac arrest from any cause in the hospital, I will automatically and immediately be given CPR unless this has been ruled out in advance by my attending physician, who must be guided by my prior informed decision.

Based upon my consideration of this information, I elect the option indicated below:

1. I do not wish CPR under any circumstance.
2. I do wish CPR to be performed in any situation of cardiac arrest regardless of the attendant circumstances.
3. I wish my physician to make the decision regarding the propriety of CPR at whatever time it may become a contingency, and give the force of my wish to his decision.

Date	Option	Signature

SOURCE: The Mather Home, Evanston, IL.

Studies in 14 ICUs across the country found that the frequency of DNR orders varied from less than 1 percent to 14 percent of all patients (91,92). These variations were not explained by differences in patient characteristics in the different ICUs and may instead reflect differences in physician attitudes toward aggressive treatment (92).

The use of DNR orders is beginning in a few nursing homes (see "Resuscitation Policies in Hospitals and Other Institutions") but is not as common in nursing homes as in hospitals. For many nursing home residents, the critical decision with regard to resuscitation is often a decision not to hospitalize the resident, thus limiting treatment to that available in the nursing home (8).

Agreement between physicians and family members about a patient's DNR status maybe difficult to reach because many family members fear that a patient with DNR orders will be neglected by the medical staff, DNR policies commonly state that the administration of other forms of care should be independent of the decision to withhold resuscitation. The withdrawal of caregivers from patients with DNR orders has been clinically observed, however, and may be a particular problem for elderly patients (46).

Disaggregating Decisions About Treatment: DNI and DNT Orders

Patients and their families often come into contact with the health care system during periods of personal crisis. At such times, they may request that "no heroics" be provided or, conversely, that "everything possible" be done. These broad directives are open to a variety of interpretations by health care providers, and patients and families sometimes fail to consider or to understand the implications of their requests.

Resuscitation can be the starting point for prolonged dependence on other technologies such as mechanical ventilation. The patient and/or family members who request "no heroics" may feel quite differently about a fairly simple procedure like external cardiac massage than they feel about more invasive techniques like open-chest massage, defibrillation, and pacing. Yet there is no way to distinguish among life-sustaining technologies when wishes are expressed in global terms such as those just noted. This ambiguity demonstrates the need for clear definition of terms.

A DNR directive can itself be made clearer by the disaggregation into a variety of more specific directives. With partial codes, CPR is initiated, but drugs are not administered, incubation is not performed, or resuscitation is stopped after a predetermined period of time (51). Do-Not-Treat (DNT) orders prohibit all active treatment, while Do-Not -Incubate (DNI) orders state that the range of resuscitative efforts short of incubation may be performed. The decision of whether or not to intubate may in the mind of the patient or family be separate from the decision to administer external chest compressions (25), and some patients may desire a partial code.

"Show Codes" and "Slow Codes"

Sometimes, rather than issue a written DNR order, a physician may verbally direct staff to perform a few resuscitative procedures to reassure the patient's family that "everything was done" (51, but with the intention of letting the patient die. This has been called a "show code." A similar method that is used to reassure the family is a "slow code"—the physician may direct health care personnel on call to "Walk, not run, if the patient arrests." Or the physician may ask the nurses to page him or her personally rather than alert the CPR team over the loudspeaker, A slow code increases the chances of permanent brain damage, because in order to be effective, CPR must be instituted with all possible speed (14).

Slow and show codes are considered by many to be dishonest and entirely inconsistent with established ethical principles. Moreover, they can place caregivers in legal jeopardy (43). Yet they are frequently applied when an explicit DNR order cannot be written, either because it has not yet been discussed with the family or because there is disagreement among the family, the patient, and the physician. For patients who are not terminally ill, for example, a DNR decision is often difficult to make. The phenomena of slow and show codes has prompted some observers to call for continuing education of caregivers and other strategies to discourage these practices (65,71,90).

Legal Concerns About Physicians' Directives To Withhold Resuscitation

No caregiver has ever been found liable for a properly derived and documented DNR order, and caregivers can be held liable for battery if they

resuscitate a patient against the patient's wishes. Yet there remains a wide range of beliefs regarding what the law requires (43).

Some health care professionals are reluctant to withhold resuscitation even with a DNR order because of fear of legal liability—especially if there is not unanimous agreement with the DNR order among all the concerned parties. This fear exists despite one court's ruling that the appropriateness of a DNR order is a question "to be answered in accordance with sound medical practice in consideration of the individual patient's conditions and prognosis" (38).

Caregivers are also uncertain about withholding CPR from decisionalIy incapable patients with no available guardian to authorize a DNR order. In rare cases, they seek recourse in the courts, but they more commonly resuscitate or perform a "slow code."

In some cases, physicians who have issued DNR orders without the knowledge of patients or their families have tried to protect themselves from liability by leaving no record of the DNR order. In 1984, a special grand jury investigating a death in a Queens, New York hospital found that the hospital had been using an informal "purple dot" system to denote which of the patients were not to be resuscitated in the event of a cardiac arrest. Nurses recorded DNR orders for hospital staff by affixing purple decals, available in the hospital gift shop, to their index cards. The nursing cards including the purple decals were destroyed after the patients died. The system insured both secrecy, since neither the patients nor their families were aware of the DNR decision, and lack of accountability for the decision (76).

In recent years, nurses have become increasingly concerned about their own legal responsibility and liability, and nurses may be particularly afraid of legal repercussions in decisions about resuscitation when all parties to the decision do not agree. Nurses are often first to respond to a cardiac arrest. If a DNR order has been written without the knowledge of or against the wishes of the patient or family, the nurse may bear responsibility for withholding CPR. Conversely, if a nurse knows the patient does not want resuscitation but the physician has not written a DNR order, the nurse could still be in legal jeopardy for initiating resuscitation. An even more difficult situation occurs when the physician gives an oral order not to resuscitate the patient, but does not write a formal order in the chart. Nurses who follow such oral orders have no documentation that the physician told them not to resuscitate and hence they risk legal liability. For these reasons, many nurses favor the establishment of explicit institutional policies for decisions about resuscitation (43,44).

Resuscitation of Patients With DNR Orders by Emergency Medical Services

The use of CPR by ambulance and other emergency medical personnel for nursing home and hospice patients who have DNR orders is an issue of growing concern. Emergency medical personnel are usually unfamiliar with a particular patient's medical background and treatment plan and usually have standing orders to resuscitate all patients in cardiac arrest (58).

In order to avoid resuscitation of patients with DNR orders, many hospices now instruct their clients not to activate the emergency medical services system (i.e., call an ambulance) for an apparently terminal event. This approach denies patients relief from severe, potentially reversible symptoms, however, and denies families assistance with difficult events (35).

One county in Minnesota has developed a policy allowing paramedics and emergency physicians to honor orders in nursing home records not to resuscitate or intubate residents (58). The patient's physician is required to document the directive in the medical record and to update it periodically. The patient with a DNR or DNI order remains eligible for hospitalization and other emergency care.

DNR Orders and Other Life-Sustaining Treatments

Many experts agree that a DNR order should not imply that other treatments will be withheld or withdrawn, and they point out that patients with DNR orders may still be appropriate candi-

dates for mechanical ventilation, dialysis, and even surgery and chemotherapy (24,40,59,64,69,91). Research and anecdotal evidence suggest, however, that such treatments are frequently withheld or withdrawn from patients with DNR orders.

The type of care provided to patients with DNR orders varies in different hospitals. A study in one ICU found that treatments such as blood transfusions, dialysis, and mechanical ventilation were withheld from 68 percent of patients with DNR orders and withdrawn from 40 percent of patients with DNR orders (92). A study in another ICU found, however, that life-sustaining treatments were not routinely withheld or withdrawn after a DNR order was written. Ninety-eight percent of patients receiving mechanical ventilation prior to the DNR order continued to receive it afterwards. Likewise, vasoactive drugs and intravenous antibiotics were withheld from less than 25 percent of patients after a DNR order was written (91).

Another study that was not restricted to ICU patients found that life-sustaining treatments were withheld or withdrawn from 28 percent of patients after DNR orders were written. Within this group, mechanical ventilation was withdrawn from all the patients who had been receiving it before the DNR order was written; dialysis was withdrawn from 40 percent of patients who had been receiving it and withheld from 60 percent of patients for whom it would otherwise have been provided; and intravenous fluids and antibiotics were withheld or withdrawn from about half of the patients. These changes in level of care were discussed with the family in 71 percent of the cases, the patient in 8 percent of the cases, and neither in 21 percent (7).

Finally, a study of patients in a community hospital (49) found that resource use, as measured by hospital charges, was reduced significantly after DNR orders were written. On average, charges for patients with DNR orders dropped $97 on the day after the DNR order was written. On subsequent days, hospital charges were, on average, $100 less per day for patients with DNR orders than for patients without DNR orders—a difference of 40 percent of median daily charges (excluding room rate) for all patients. The level of care provided for patients with DNR orders varied widely however:

> Six percent received no medical care after DNR orders, that is, they died immediately after DNR designation, Twenty-five percent received hospice-type care, including pain control, counseling from the hospital's Human Support Team, and/or psychosocial support from the nursing staff. Moderate levels of care were given to 27 percent of the patients; this type of care included the administration of antibiotics for sepsis, fever, or pneumonia and medication for a chronic condition. High levels of care characterized the treatment given to *29* percent of patients; patients with multiple medical problems receiving numerous medications were likely to fall into this group. Finally, 12 percent of patients received maximal levels of therapy after DNR designation, including renal dialysis, ventilator assistance, hyperalimentation, major surgical procedures, and/or invasive cardiac monitoring *(49).*

There was no relationship between patient age and the type of care provided after the DNR designation (49).

Although the kinds of treatment provided following DNR designation vary greatly among patients, several studies indicate that the kinds of care to be provided or withheld are not usually documented by the physician in the patient's medical record. As a result, nurses and others who are caring for such patients may be confused about what treatments are to be provided (7, 25,49).

In addition, anecdotal evidence suggests that Medicare payment for hospitalization and some medical treatments is sometimes denied for patients with DNR orders. The Association of Community Cancer Centers is currently surveying its member institutions concerning any experience with Medicare payment denials for terminal patients, particularly those with DNR orders (77)

Finally, although most experts agree that other life-sustaining treatments should not be automatically withheld or withdrawn when a DNR order is written, some have questioned the meaning of a DNR order when other aggressive life-sustaining treatments are continued (49,91). In this context, it is interesting to note that data from three studies show that many hospital patients with DNR orders (27, 39, and 51 percent, respectively) left the hospital alive (7,49,73).

RESUSCITATION POLICIES IN HOSPITALS AND OTHER INSTITUTIONS

With varied and often conflicting attitudes about the role and responsibilities of the patient's physician, staff physicians, nurses, patients, and families, and, overall, about the goal of treatment itself, there has developed a need for mechanisms by which decisions about resuscitation can be made. In response to this need, some hospitals, nursing homes, and hospices have developed institutional guidelines and policies governing decisions about resuscitation. One hospital's guidelines for decisions about resuscitation are shown in figure 5-5.

One survey of hospitals in five Midwestern States found that over 60 percent either had or were in the process of developing a formal resuscitation policy. Two variables—institutional size and the presence of an ethics committee—were associated with the presence of resuscitation policies in the responding hospitals (61).

A 1986 survey conducted by the Joint Commission on Accreditation of Hospitals (JCAH) found that 57 percent of hospitals, 20 percent of nursing homes, and 43 percent of hospices responding to the survey had formal resuscitatation policies (39). Larger institutions, institutions accredited by JCAH, and institutions with an ethics committee were more likely than other institutions to have a formal resuscitation policy. One resuscition policy identified in the survey was instituted in 1969, but the great majority had been put into effect since 1983 (53).

Hospital, nursing home, and hospice resuscitation policies have become more sophisticated and systematic in the past few years. Terms such as "competent patient," "incompetent patient," and "guardian" are defined. The responsibilities of the patient, family members, physicians, nurses, and other medical personnel are clearly delineated. Even the meaning of resuscitation itself has been more specifically defined (14).

Many institutional resuscitation policies include statements about the following:

. resuscitation as a standing order, to be initiated unless there is a physician's order to the contrary;
- who may write DNR orders;
- the medical conditions that justify a DNR order;
- procedures for determining the patient's decisionmaking capacity;
- procedures for ascertaining the patient's wishes;
- the role of the family, close associates, and other persons in the decisionmaking process;
- the scope of the DNR order (e.g., a DNR order does not limit other forms of medical intervention);
- documentation of the DNR order in the patient's record;
- discussion of the DNR order with involved staff; and
- procedures for periodic review (e.g., subject to daily review, maybe revoked at any time) (14,53).

Beyond the common elements listed above, existing resuscitation policies show considerable diversity, reflecting the characteristics of different institutions.

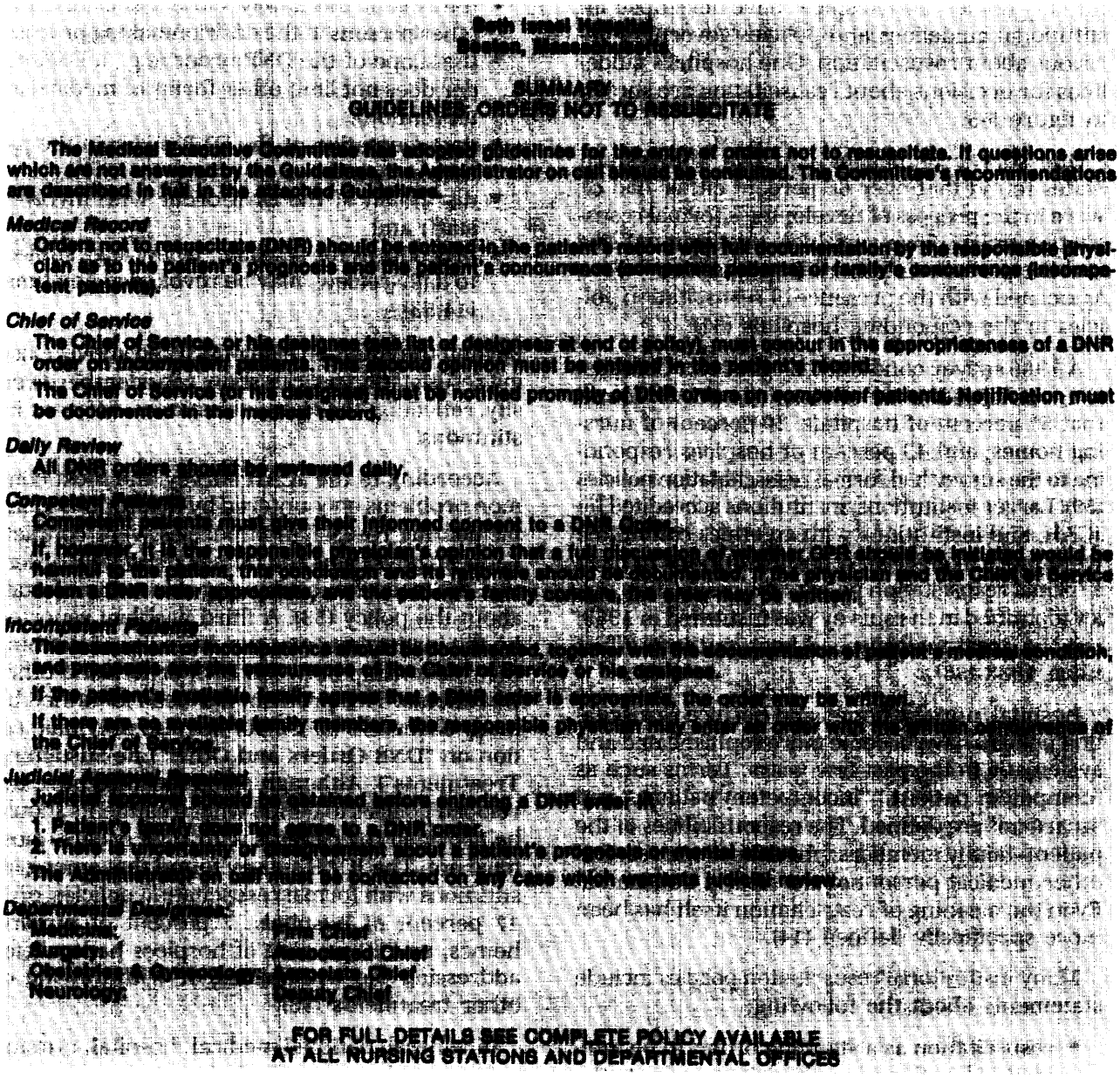
According to the JCAH survey, the most common problems encountered by institutions in implementing resuscitation policies were conflicts between physicians and nurses about DNR orders and the need for continuing education of staff about the policy (53). A third problem reported by the institutions was the difficulty of defining the relationship between DNR orders and other treatments. This problem has been identified by many observers (25,33)60) (see also previous section on "DNR Oders and Other Life-Sustaining Treatments"). Although some facilities have developed policies to define what treatments should be provided for patients with DNR orders, most have not. The JCAH survey found that among institutions with formal resuscitation policies, only 17 percent of hospitals, 7 percent of nursing homes, and 12 percent of hospices had policies addressing the withholding or withdrawing of other treatments (53).

In general, national medical, hospital, nursing home, and hospice associations have not developed specific guidelines for institutional resusci-

tation policies. Some have issued general statements on the use of CPR, however. The following statement by the 1973 National Conference on Standards for Cardiopulmonary Resuscitation and Emergency Cardiac Care is an example.

> The purpose of cardiopulmonary resuscitation is the prevention of sudden, unexpected death. Cardiopulmonary resuscitation is not indicated in certain situations, such as in cases of terminal, irreversible illness where death is not unexpected or where prolonged cardiac arrest dictates the futility of resuscitation efforts. Resuscitation in these circumstances may represent a positive violation of an individual's right to die with dignity (62).

Figure 5-5.—Resuscitation Policy Adopted by One Hospital



SOURCE: Beth Israel Hospital, Boston, MA, Jan. 1, 1984.

In addition, many national associations support their member institutions by providing information or facilitating communication among institutions about resuscitation policies.

The VA has developed standards to guide VA facilities in formulating resuscitation policies tailored to the population they serve. The standards acknowledge that:

> . . . there will be those cases where, in the exercise of sound medical judgment, a licensed physician who knows the patient may appropriately give an instruction not to institute resuscitation at the bedside of a patient who has just experienced an arrest" (83).

The most recent VA statement recognizes the variation among States in statutory and case law relevant to decisions about life-sustaining treatment and requires VA facilities to develop resuscitation policies that are consistent with both existing State law and applicable VA standards (84).

In 1983, the President's Commission for the Study of Ethical Problems in Medicine and Biomedical and Behavioral Research recommended that "in order to be accredited, hospitals should be required to have a general policy regarding resuscitation" (69). In response to this recommendation and widespread agreement about the need for such policies, JCAH has developed a new standard for accreditation of hospitals and nursing homes that will require each institution to have a policy for decisions about resuscitation. The new JCAH standard will be implemented in 1988 (67).

The proposed JCAH standard does not require hospitals and nursing homes to address the relationship between DNR orders and other life-sustaining treatments that might be provided for the patient. Such a requirement could be a logical next step. In the meantime, national hospital and nursing home associations might encourage their member facilities to adopt institutional policies that require explicit consideration and documentation of what other treatments are to be provided or withheld once a DNR order has been written.

FINDINGS AND IMPLICATIONS

CPR involves various procedures that can be classified as either basic or advanced cardiac life support. The basic procedures, external cardiac massage and mouth-to-mouth ventilation, can be administered anywhere, by any person trained in the techniques. The more advanced procedures must be performed by trained health professionals, usually in a hospital where the equipment is readily available.

Since its development in 1960, the tremendous life-saving potential of this technology has become widely recognized, for at some point in the dying process of every person, the heart stops beating and resuscitation can be applied. Indeed, resuscitation is used for thousands of people each year, the majority of whom are elderly.

Specific data for utilization or cost of resuscitation are not available. Rough estimates indicate that 204,000 to 413,000 elderly persons may receive CPR in hospitals annually, and an additional but unknown number receive CPR in the community. Research is needed to develop accurate utilization and cost figures.

In contrast, the outcomes of resuscitation have been extensively studied. On average, one-third to one-half of resuscitation attempts in hospitals are initially successful. Among those patients who are successfully resuscitated in the hospital, one-third to one-half (about 10 to 25 percent of all those who receive CPR) initially recover enough to be discharged from the hospital.

Various complications and injuries may accompany resuscitation. The most common complications are injuries such as rib fractures, collapsed lungs, and ruptured stomachs. Some survivors suffer permanent brain damage or need mechanical ventilation, dialysis, and/or invasive hemodynamic monitoring.

Factors that influence resuscitation outcomes include the patient's underlying physical condition, the nature of the cardiac arrest, the elapsed time between cardiac arrest and initiation of resus-

citative efforts, and duration of the resuscitation attempt. The patient's age alone is not a good predictor of resuscitation outcomes.

Several age-related conditions, such as osteoporosis, cataracts, arthritis, and altered metabolism, however, may increase risk of complications. Available evidence indicates that resuscitation is not performed differently with elderly patients than with younger ones. More research is needed to assess any added risks associated with age.

More is known about how decisions about resuscitation are made than about how decisions about other life-sustaining technologies are made. Although resuscitation decisions vary from individual to individual, factors that are frequently involved include the clinical indicators of the chance of success, as well as the patient's mental status. The patient's age is sometimes a factor in decisions about resuscitation, although age alone is not a good predictor of outcome.

It is now widely accepted that resuscitation is not appropriate for every patient. When cardiac arrest occurs unexpectedly and/or there has been no advance deliberation of the appropriateness of resuscitation, CPR is almost always attempted because the alternative for the patient is death. For patients in hospital and other settings, decisions about whether to initiate CPR are sometimes considered in advance of a patient's cardiac arrest. Although the bias towards attempting resuscitation is very strong, there is increasing use in these institutions of DNR orders-directives to withhold CPR.

Problems with DNR orders include lack of patient and family involvement in decisions about their use, lack of documentation of the orders, and disagreements among physicians, nurses, and family members about whether a particular patient should have a DNR order. In order to address these problems, some hospitals, nursing homes, and hospices have developed formal resuscitation policies, but many have not.

JCAH has recently issued new standards that require hospitals and nursing homes to develop resuscitation policies in order to be accredited. Such policies will help resolve some of the problems in existing decisionmaking procedures and may provide some legal protection for physicians, nurses, and others who adhere to them. At the least, such policies will clarify for health care professionals, patients, and families how decisions about whether to provide CPR will be made in each facility. National hospital, nursing home, and hospice associations and physicians' and nurses' associations have a role in providing expert advice and consultation to facilities and individual professionals involved in the development of institutional resuscitation policies.

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