

Personal Interview On The Heimlich Maneuver

By Anne McClellan-Thiel

Staff Writer

Credit: International Rescue and Emergency Care Assn.

Q: Dr. Heimlich, did your past working experiences in your field bring about the development of the Heimlich Maneuver, or what in particular influenced its development

A: People look at the maneuver and think that it is such a simple thing, which is fine, because that is what makes it work. I first described the maneuver in a medical journal in June of 1974. In 1973, there was a lot of publicity given to plastic forceps, big things that reach down into the throat to pull out whatever would be choking an individual. At that time, the figures showed that around 4,000 people choked to death in the United States alone. So, this being my field, I felt this was a worthwhile problem to work on. I had thought that choking to death was an occasional happening until these figures were introduced, and at the same time, I realized that the methods being used were of very little value because people were still dying. The forceps would never be where they were needed. More importantly, they proved to be very dangerous because of the possibility of grabbing the tonsils and causing great damage. I knew something had to be done that could be performed by anyone. There is not enough time to call a doctor, so I developed the maneuver making it possible to diagnose and treat a condition that could be fatal. Having the knowledge of pressure within the chest, the amount of air in the lungs, and swallowing problems, it all came together—what would push out the foreign matter was the air in the lungs. I then went to a research laboratory and worked it out using anesthetized dogs. I then had to devise it so it would be safe for humans.

Q: What actually takes place while one is choking—what are the signs and where is the foreign matter lodged?

A: A choking victim can neither speak nor breathe. He turns blue because oxygen is not circulating. He collapses because the brain is not getting oxygen. The throat divides into two tubes, one is the esophagus which carries food down to the stomach; the other is the trachea, or airway, which carries air to the lungs. The voice box is on top of the trachea, and on top of the voice box is a little valve called the epiglottis. It prevents food from entering the windpipe during the act of swallowing. If one swallows too big of a piece of food or if food gets under or on top of the epiglottis, it closes off the air to the lungs causing a person to choke. I have developed the "Heimlich Sign" which is putting the thumb and forefinger to the throat—so a victim may alert others that he is choking.

Q: How long does it take for someone to actually choke to death, and what is the death rate of people who lose their lives by choking?

A: The commonly used figure is four minutes, from the onset of choking until death. Obviously, in some instances it would take less than that and longer in other cases. You must go from what is the most likely figure. As mentioned the past year is no good to me.



Dr. Henry J. Heimlich, the physician-thoracic surgeon who developed the Heimlich Maneuver to prevent death by choking, has been involved in the treatment of swallowing and lung problems for the past 20 years. He has developed an operation to construct a new esophagus; a portable oxygen supply for persons with emphysema and chronic lung diseases; and is presently working on lung cancer research.

before, about 5,000 deaths per year happen in the United States. Blowing that figure up for the world, we can estimate 70,000 to 80,000 people dying per year, although we suspect it is considerably higher than these figures. Choking to death is the sixth largest cause of accidental death.

Q: Step by step could you explain the maneuver for those not familiar with it?

A: First, stand behind the victim and wrap your arms around his waist.

Second, place your fist (thumb side) against the victim's abdomen, slightly above the navel and below the rib cage.

Third, grasp your fist with your other hand and press into the victim's abdomen with a quick upward thrust.

Fourth, repeat several times if necessary.

When the victim is sitting, the rescuer stands behind the victim's chair and performs the maneuver in the same manner.

OR

First, victim is lying on his back.

Second, facing victim, kneel astride his hips.

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PERSONAL INTERVIEW ON THE HEIMLICH MANEUVER

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Third, with one of your hands on top of the other, place the heel of your bottom hand on the abdomen slightly above the navel and below the rib cage.

Fourth, press into the victim's abdomen with a quick upward thrust.

Fifth, repeat several times if necessary.

The latter method is useful especially in cases where the victim is unusually large or heavy.

Q: Are there any variations of the maneuver for an infant, elderly victim, or someone afflicted with a particular handicap or ailment?

A: Actually, we find that giving one description is best. It must be kept simple because in addition to having to know what to do, one must also be able to learn it quickly. Red Cross, in contrast, has about 27 pages of what to do for choking. What we have with the Heimlich Maneuver is something whereby people can read it in a magazine or hear it over the radio, grasp it, and be capable in a matter of minutes to save lives.

Q: Are there any statistics in regard to the number of lives saved by the maneuver?

A: I have heard of at least 3,000 saves, with 1,000 documented cases of saves.



Demonstration of the Heimlich Maneuver is saving life of a choking victim. You have four minutes to respond and save the victims life.

A person choking on food will die in 4 minutes—you can save a life using the HEIMLICH MANEUVER

HEIMLICH MANEUVER

WHAT TO LOOK FOR

Q: Is the maneuver used in controlled environments such as hospitals—or if there is emergency equipment available, should it be used in place of it?

A: Yes, the Heimlich Maneuver has been used in hospitals in several instances. One case was one in which a cardiac arrest signal came in a hospital, and a resident doctor found a woman blue and not breathing. The nurse told him that the victim had been eating just before the attack came on. The doctor put down the inter-tracheal he was about to use on the patient, and used the Heimlich Maneuver instead. A piece of meat came out, and it was later found that had the doctor proceeded to use the tube, matters would have become further complicated. Another case involved a nurse who was on her lunch break. She had been eating an orange segment, started choking, and fell unconscious. A doctor started to do a tracheotomy, decided to do the Heimlich Maneuver instead, and she was saved as a result. And much less risk was involved with the maneuver.

Q: What sort of follow-up care should be done by emergency personnel?

A: There almost always is none necessary. It is often recommended that the victim see a doctor in case of any problems, but usually people return to their dining table and continue to eat. In many nursing homes, elderly people are given artificial ventilation.

Q: What is the advantage of your maneuver as opposed

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PERSONAL INTERVIEW ON THE HEIMLICH MANEUVER

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to "a slap on the back" or other traditional or even mythical ways to save someone from choking to death

A: Slapping one on the back is indeed a wives tale. Over the years, it has been shown that it can drive an object deeper into the throat causing partial obstruction to become complete. Another technique that medical literature has proven to be harmful is to put fingers into the mouth to remove foreign matter. Some parents have actually killed their children by putting their fingers in the mouth and accidentally pushing the object deeper into the throat, clogging the airway. The Red Cross, meaning the bureaucracy and headquarters in Washington, has been teaching slapping on the back. After the maneuver came out, they were asked why it (slapping on the back) was taught. What was the scientific source? And later asked, what has been done in the ten years that it has been taught to determine whether it was saving lives? Their answer was that nothing has been determined to prove its worth, and it hasn't been proven that it has saved a significant number of lives. Now they say that the National Academy of Science tells us at (Red Cross) to continue teaching slapping on the back as well as the Heimlich Maneuver. Their procedure is to give four slaps on the back and then do the Heimlich Maneuver. In truth, their own people held a meeting at the National Academy of Science and sponsored this. If one asks at this time what scientific evidence there is to support the four slaps on the back, you still will not get an answer. But if you seek the answer, it will be that one of their consultants put four baboons to sleep. Put meat in their throats. Hit their backs, and thought that the meat was loosened, and therefore, said it would be better to hit the back, and then do the Heimlich Maneuver. As a result, I don't associate my name with the incorrect teachings of the Red Cross.

Q: Why do you feel that paramedics or other emergency personnel should know the Heimlich Maneuver?

A: We have had many instances of saves by paramedics and emergency nurses and doctors. In most instances, there is no more reason why they should know it, and the general public not know. In other words, everyone should know it. Emergency personnel, because they are considered somewhat authoritative, should teach it and spread it. If a person calls during an emergency, emergency people should be able to tell the person with the choking victim to do the Heimlich Maneuver and how it is done. It is up to the emergency person to ask if the victim is blue, not breathing, and if he can speak in order to determine if indeed, a choking, not a heart attack, is occurring. It is then that the Heimlich Maneuver instructions should be given. Several lives have been saved in this manner.

Q: Are there any seminars conducted to teach and influence more usage of the maneuver?

A: I lectured in many cities and states, and in some areas, there are days declared specifically to inform the public about the maneuver. These days, I personally lecture to large well-informed groups. Public health officials and medical societies promote the maneuver and I wish more paramedics would promote it among themselves. Unfortunately they have to be taught improperly in order to receive their certificates, but some of the paramedic classes

have taken it upon themselves to teach rescue properly.

Q: How does one know a poor method is being taught?

A: It is up to the paramedic student to ask why he is being taught a certain method of rescue and what sort of evidence proves it to be both necessary and valuable. If these questions can not be answered, and you feel that its use could be harmful, the responsibility is yours, as a professional, to see that the right technique, with proven evidence and questions answered, is taught.

Q: Are there any particular things you are interested in concerning emergency work?

A: I would like the public to know more about emergency techniques. Through simplification, everyone will one day be able to practice emergency maneuvers, and thus, abolish numerous unnecessary deaths.

SIX AGENCIES IN THREE STATES TEAM FOR BETTER BURN CARE

The two Burn Foundation Burn Centers on the Greater Delaware Valley will benefit from action being taken by six Health Systems Agencies in the three state areas served by the centers. The agencies have joined together to develop a burn care plan.

The unique effort, believed to be the first three-state HSA planning effort in any aspect of health care, was initiated by the HSA/SP (the Health Systems Agency of Southeastern Pennsylvania). Joining HSA/SP for this effort are the HSA's serving the Harrisburg, Pa., area, Eastern Pennsylvania, Central and South Jersey, and Delaware. The Planning effort is expected to culminate in June with a report containing a series of recommendations regarding burn treatment and prevention.

HSA/SP planning associate Raymond Groller is convening the Technical Assistance Group working on the plan. Also participating in the effort are representatives of the Philadelphia Fire Department, Pennsylvania and New Jersey EMS organizations, and parents of burn victims, in addition to representatives of the Burn Foundation and its two Burn Centers.

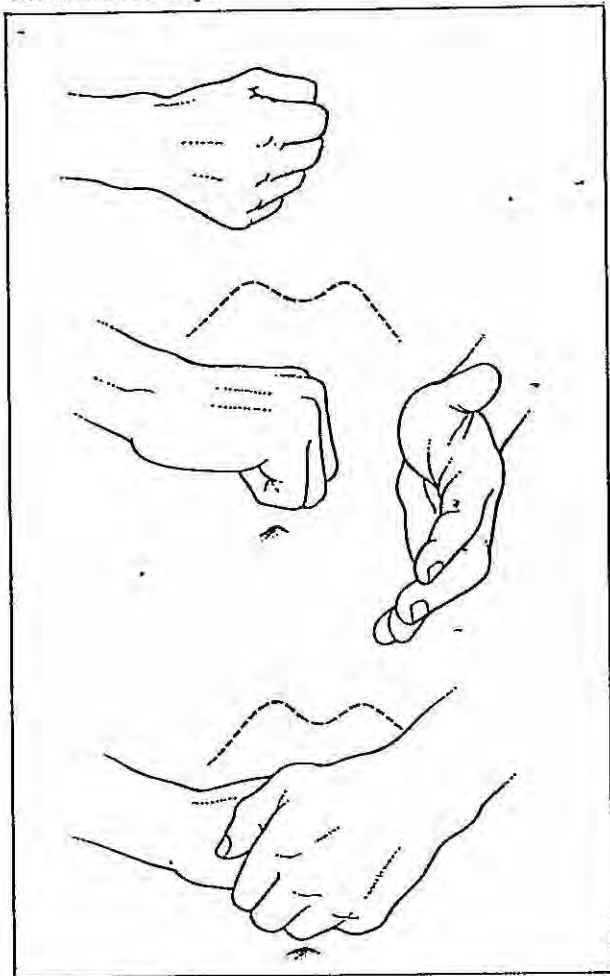
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(Continued From Page 11)

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Mary J. Berryman, Pikesville, became the Past President, of the Ladies Auxiliary. The Maryland Rescue Journal extends a warm congratulations to those elected.

To save a choking victim

The basic technique



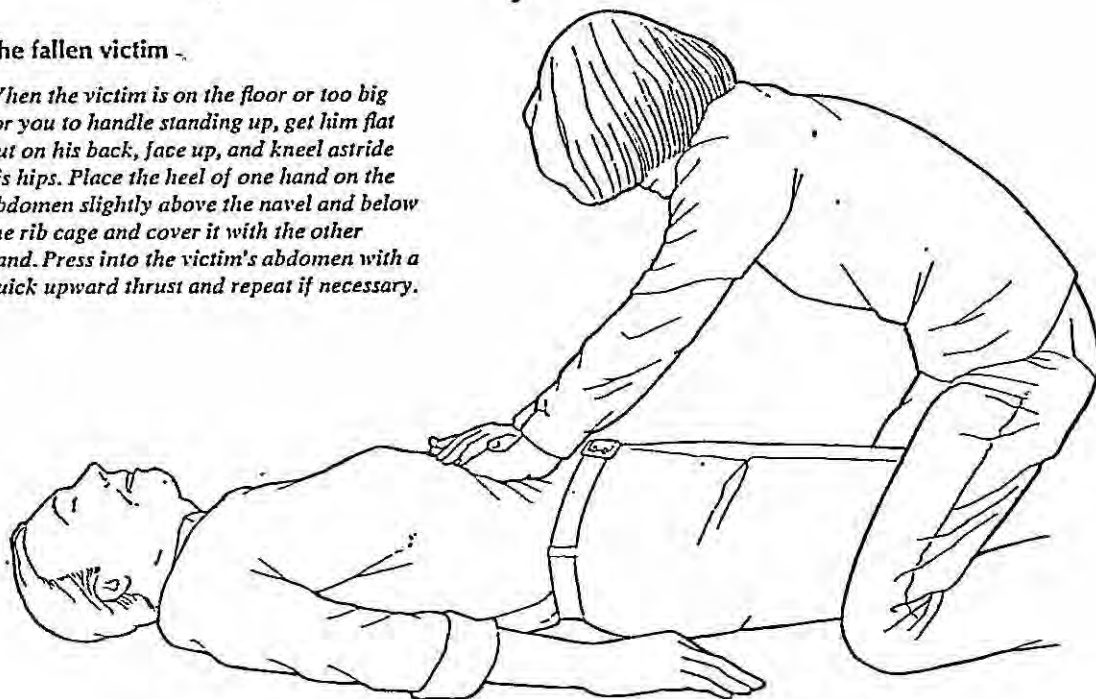
The maneuver devised by Dr. Henry J. Heimlich, professor of advanced clinical sciences at Xavier University in Cincinnati, uses air in the lungs to force an obstruction out of the airway. To move the air you have to apply sudden pressure below the rib cage, which forces the diaphragm up and compresses the lungs. The basic technique (above) begins with a fist. Note the knob formed by the thumb and index finger—that's what helps push the diaphragm upward. Place your fist thumbside against the abdomen, slightly above the navel and below the rib cage. Then grasp your fist with your free hand and press into the abdomen with a quick upward thrust. Do this while standing or kneeling behind a standing or sitting victim with your arms wrapped around his waist (right). Repeat this procedure several times if necessary.



continued

The fallen victim

When the victim is on the floor or too big for you to handle standing up, get him flat out on his back, face up, and kneel astride his hips. Place the heel of one hand on the abdomen slightly above the navel and below the rib cage and cover it with the other hand. Press into the victim's abdomen with a quick upward thrust and repeat if necessary.



The infant victim

There are also two ways to apply the Heimlich maneuver to an infant. You can hold him in your lap and place the index and middle fingers of both hands against the abdomen above the navel and below the rib cage (left), then press into the abdomen with a quick upward thrust. Or you can place the infant face upward on a firm surface and perform the maneuver while facing him (below).



Equipment

Henry J. Heimlich, M.D.
 Professor of Advanced Clinical Sciences
 Xavier University
 Cincinnati, Ohio

Dr. Heimlich is the originator of the Heimlich Maneuver to save the life of a choking victim. Hundreds of lives have been saved by this method since its first scientific publication three years ago. He is a leading chest surgeon, specializing in the treatment of diseases of the esophagus.

The chest drainage valve is a standard item in many emergency departments and emergency vehicles. The United States Defense Department Medical Corps has distributed these valves to all medical facilities and they were carried into combat by corpsmen in the war in Southeast Asia; the U.S. Navy described it as "a lifesaving item," which "saved hundreds of lives." What is a chest drainage valve and how does it work?

When the chest is punctured by a missile, bullet, shell fragment, knife or other object, blood and air collect in the chest cavity, collapsing the lung. Spontaneous pneumothorax, a sudden accumulation of air in the chest due to leakage of air from spontaneous rupture of the pleura lining of the lung, similarly causes the lung to collapse.

Respiratory distress, the primary indication for chest drainage, occurs when fluid or air or both accumulate in the pleural cavity and compress the lung. Blood is not sufficiently oxygenated as it flows through the pulmonary vessels in the collapsed lung. Shortness of breath will occur when the functioning, non-collapsed portion of the lung and the opposite lung are unable to adequately oxygenate the circulating blood.

What is a chest drainage valve? A flutter valve consists essentially of a piece of rubber tubing, one end of which is compressed and retains its flattened shape. The two flat sides of the tubing remain in contact with each other. The flutter valve permits fluid or air to pass in one direction and prevents their reflux. It is closed at rest yet offers minimal resistance to the passage of drainage. The valve will function in any position.

The simple flutter valve was modified so that its leaves would maintain constant contact, yet would not stick together

when stored or while in use. The valve was made long enough to provide adequate security against reflux and wide enough in diameter to permit the passage of all fluids and clots that would be carried through the conventional large catheter used for chest drainage. When clots traverse the valve, the leaflets remain closed around them (a peristaltic-like

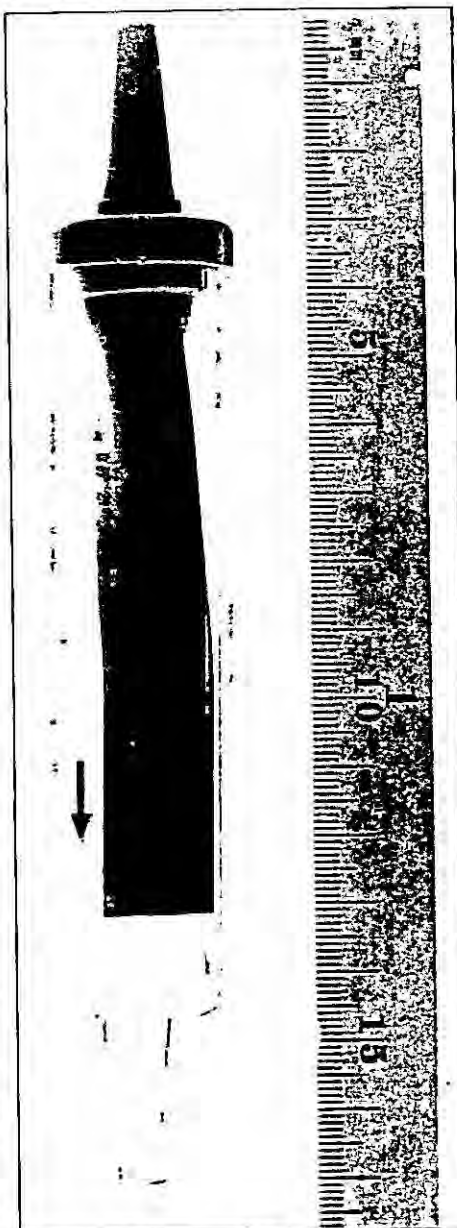
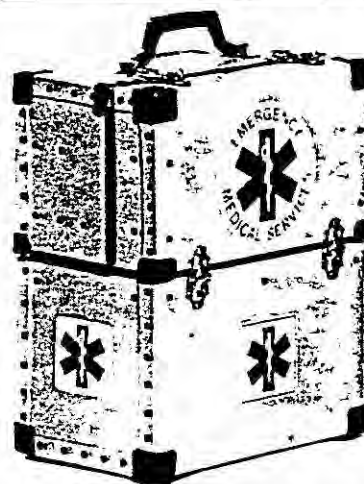


Figure 1: A chest drainage valve.

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Figure 2: Ambulatory patient with chest drainage using a chest drainage valve.

motion): therefore, even at such times, it does not permit reflux.

The flutter valve has been encased in a transparent plastic tube that is tapered at either end (Figure 1). The upper end of the casing fits most chest catheters and the distal end is attached to tubing which drains into a plastic bag (Figure 2). If desired, however, this distal tubing can be connected to regulated suction or, in the field, can simply drain onto the ground.

The manner in which the chest drainage valve functions to drain the chest and enable the lung to expand is shown in Figure 3.

How to use the chest drainage valve.
The needs of the individual patient determine the methods to be used for drainage of fluid or air from the chest. If the patient is in immediate danger from respiratory insufficiency due to tension pneumothorax, hemothorax or hydrothorax, it is necessary to diminish the intrapleural pressure rapidly. This can be accomplished by inserting into the chest a hypodermic needle of the largest bore available, preferably larger than 17 gauge. Attach the needle to an intravenous tubing and connect the tubing to a chest drainage valve. If a needle is not available, any instrument that will make a hole in the chest and release the pressure, such as a scalpel or a clamp, can be used.

In a penetrating injury, such as a bullet wound, a chest catheter with a valve attached is inserted through the wound directly into the chest, following which the space around the catheter is sealed with a firm dressing. In such an emergency, drainage through the valve can flow directly onto the ground, if necessary. It is then possible to transport the patient for further treatment while the chest cavity is being drained.

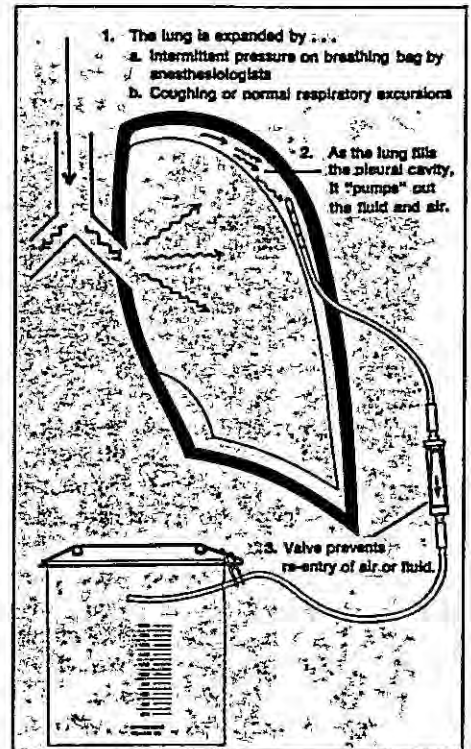


Figure 3: Diagram illustrating how coughing or normal respiratory excursions evacuate fluid and air from the chest cavity. The lung acts as the "piston of a pump." As the lung expands, it fills the chest cavity, forcing fluid and air out the tubing. The valve prevents the fluid and air from re-entering the chest.

It is advantageous to use a chest drainage valve for the following reasons:

- With valve drainage the patient is ambulatory while the chest is being drained.
- The valve functions in any position. The patient can be transported without clamping the chest catheter.
- There is no danger to the patient should separation of any connection occur beyond the attachment of the valve to the chest catheter.
- The valve is easily understood by medical and nursing staff.
- The valve is available in a sterile package and is disposable.*

Several hundred thousand chest drainage valves have been used since inception of this device 15 years ago. The chest drainage valve is widely used by thoracic surgeons after routine chest surgery, eliminating the need for complicated expensive chest drainage apparatus.

*From Bard-Parker, Rutherford, New Jersey.

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Red Cross advice to stop choking assailed

News American 11/10/74

BY ARTHUR J. SNIDER

Chicago Sun-Times News Service

CHICAGO — Dr. Henry Heimlich, developer of the Heimlich Maneuver, designed to stop one from choking on food, has charged that a 14-year-old boy's brain was damaged because his rescuer followed Red Cross advice as he choked on a peanut butter sandwich.

Red Cross instructions call for first slapping the victim on the back four times before applying the Heimlich technique, which involves squeezing the upper abdomen to force out the blockage.

Heimlich has opposed the slapping maneuver strongly, arguing that it wastes valuable time and is not effective in increasing artificial air flow.

"The proof of this lies in a court's recent award of \$352,000 in damages to the

boy," Heimlich said here. "It was an expensive way to find out back blows don't work."

The choking boy, Gary L. Daniels, of Harrisburg, Pa., partially able to breathe, stopped breathing completely after a teacher in a Harrisburg school hit him on the back.

"This apparently wedged the sandwich tighter," Heimlich said. "The teacher continued to give him back blows, and the child lost consciousness. A second teacher then performed the Heimlich Maneuver. Gary's life was saved, but he was already brain-damaged and has been in a coma for over two years."

In his defense, the school district cited the Red Cross instructions for administering back blows first. Testimony showed that literature describing the

Heimlich Maneuver had been distributed to Harrisburg schools several months before the incident.

Heimlich said the Red Cross itself seems confused. He cited a Red Cross booklet, "First Aid for Foreign Body Obstruction of the Airway," calling for the four rapid back blows.

However, in its teaching text, "Standard First Aid and Personal Safety," published a year ago, he said, it recommends slapping on Page 77 and on Page 94 it says:

"Do not allow anyone to slap you on your back if you choke and do not try to dislodge an object from another person's throat by this means, except as a last, desperate effort to save his life."

Heimlich said the Red Cross position is based on only one medical study favoring back blows and that the study was

based on tests performed on four anesthetized baboons, a procedure, he said, that does not duplicate the human situation.

"Back blows are death blows," Heimlich said. "We have documented more than 150 cases of back-blow failures in choking victims who were subsequently saved by the Heimlich Maneuver. Many had become unconscious due to the delay caused by back blows and were, therefore, seconds from brain damage and death."

"The Harrisburg suit demonstrates that a defendant will not be protected by following the Red Cross manual," Heimlich said.

Red Cross officials said they are studying the Heimlich statements and a possible response.

their curriculum to include EMT-A courses. These courses, approved by the DEMS, will initially result in the training of approximately sixty-nine (69) EMT-A's for the region. This is the first time that EMT-A courses have been offered by the community colleges within Region I.

This quarter, the Region I EMS Advisory Council developed their regional needs for FY '78 with the major emphasis on further implementing equipment and training totaling \$67,725 was developed and submitted to the DEMS for coordination into the state's FY '78 1204 application.

The Western Maryland Heart Association submitted an ARC grant request to the Western Maryland Health Systems Agency for the purpose of establishing a massive CPR training project for Allegany and Garrett Counties. The grant request totals \$55,512 (\$33,958 being provided by ARC and the remaining being raised by the Heart Association). The main provision of the grant request is the training of at least 20% of the adult residents in Region I. It also provides for the establishment of eight (8) training stations to be located throughout Allegany and Garrett Counties.

Finally, the Region I EMS Advisory Council elected the following new officers during this reporting period:

President	-	F. W. Miltenberger, M.D.
Vice President	-	Kenneth Richmond
Secretary/Treasurer	-	Robert Shimer

Eleven (11) new members were also appointed to the Council by the Allegany and Garrett County Commissioners who subsequently attended

EVEN
SUN
10/23/78

Hot Dogs Blamed In Chokings

By Jon Franklin

Hot dogs choked six young Maryland children to death between 1970 and 1977, according to a Johns Hopkins health statistician.

Autopsy figures here show that, during the seven-year period, frankfurters were involved in all but two of the food-related choking deaths of children aged 5 and under.

One of the non-frankfurter deaths in-

volved an inhaled gumdrop and the other was caused by an unknown type of food.

The figures are from a study performed by Susan Baker, a researcher in the medical examiner's office and an associate professor at the Johns Hopkins School of Public Health.

Mrs. Baker blamed the deaths on the basic shape of the traditional hot dog, which, while a convenient food for toddlers, is also a perfect size to plug a small windpipe.

She said that, while her numbers are too small to draw nationwide conclusions, the danger is clear enough to merit a warning directed at the parents of young children.

The scientist, whose statistical analyses of autopsy figures have focused national attention on the dangers of many modern products, including motorcycles, trucks and automobiles, said she pinpointed the frankfurter danger by accident.

After reading in a federal report that balloons were among the toys implicated in child deaths, she decided to search the state's autopsy files to see whether balloons were indeed a significant problem in Maryland.

Proceeding on the assumption that a balloon would present the greatest danger if it were inhaled, she compiled all childhood aspiration deaths for the seven-year period.

She found only one such death that could be attributed to a balloon, she said, but the unexpected preponderance of frankfurter fatalities in children under 5 caught her attention.

"Hot dogs are wonderful for the parent. It's a food that can be easily held by the infant. But each bite is going to be round and, if it isn't chewed thoroughly and the child inhales suddenly, it can be drawn into the windpipe.

"I don't want to come off as critical of the hot dog industry," Mrs. Baker said. "But I'd like to challenge the manufacturers to come up with a hot dog which, without being different from the traditional, beloved, American hot dog, might be less likely to asphyxiate children."

Since the basic problem is that a bite of hot dog is very much like a cork, she said, the problem might be solved by changing the shape slightly. For instance, a hole down the center of the hot dog might minimize the danger by allowing the passage of air.

Or, she suggested, hot dogs might be manufactured to split in the cooking process. "You know how you cut the hot dog to put the mustard in it? Perhaps it should automatically open up like that."

In the meantime, Mrs. Baker said, parents might manually split their toddler's hot dog before giving it to them.

ACCENT ON

Your Health

The Evening Sun
Monday, October 16, 1978

Choking; Inhaled Objects Injure, Even Kill, Small Children

By Francis Beckman

Ten years ago, a 3-year-old Maryland boy began having physical problems that lasted for two years. First came chronic lung congestion, then pneumonia, other illnesses, loss of weight and frequent trips to specialists.

Surgeons eventually opened the youngster's chest and, after removing part of a damaged lung, discovered the problem—the top part of a ball point pen in the lung.

The case is still vivid to Dr. Susan H. Mather, director of adult health and epidemiology, Prince George's County Health Department, and president of the American Lung Association of Maryland, which is conducting a campaign to keep children from choking, especially during the Halloween period.

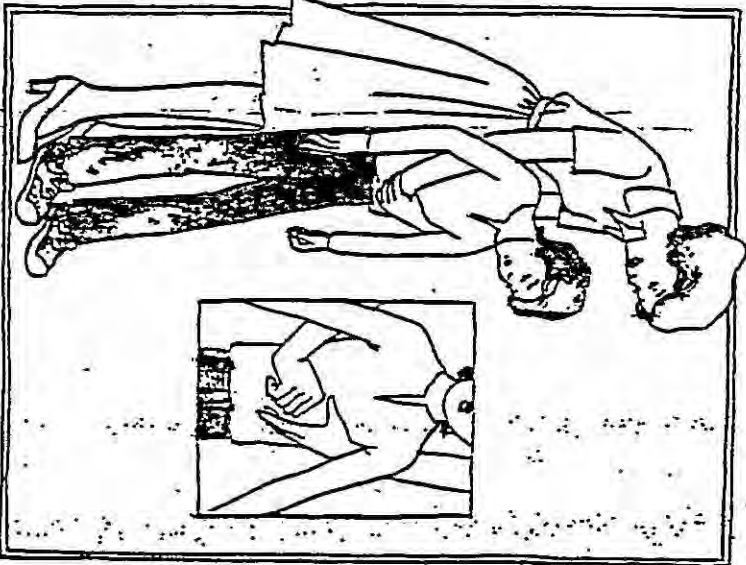
Dr. Mather, who lives in Bowie with her husband, John, an ear, nose and throat specialist, and their two children, Stephen, 9, and Alexander, 3, said 2,000 children die each year in the United States from choking and suffocation because of small objects.

Small, round candy and safety pins are two of the most common objects young children put in their mouths that present problems, Dr. Mather said. She adds that in the past bacteria from dirty objects was a major concern but that the problem today is aspiration, where an object goes into the windpipe instead of the tube (trachea) that leads into the stomach.

Other such objects include paper clips, coins, pins, buttons, crayons, screws, beads, bottle caps, marbles, plastic wrap, pens, pills, pencils and even pieces of glass.

Statistics from the Baltimore City Medical Examiner's Office show that 182 Marylanders of all ages have died since 1971 from choking or suffocation on pieces of meat, bones, biscuits and other objects that lodged in the lungs.

The American Lung Association of Maryland offers a booklet on how to "Keep Your Child from Choking," available free of charge from the association headquarters, 11 East Mount Royal



at Avenue, Baltimore 21202, or by calling 415-4181.

The booklet says, "A youngster grasps something, puts it into the mouth and may choke... Small objects can slide in the throat, or be lodged into the lungs. Such choking, called aspiration, is a foreign body, kills more children under 5 than any other home accident."

The booklet is illustrated to show how to "save your child from choking." It shows a child can breathe, but is coughing or sneezing, don't stop on the back of

Small, round candy and safety pins are among the things most likely to be inhaled by a small child, particularly around Halloween.

If your child cannot breathe, clutches the neck or loses consciousness, you should try these two procedures. Lay the child behind the child. Press thumbs-side of left hand between palm and right hand. Press quickly, up and in. Repeat if necessary. For a baby, use thumb instead of the whole fist. Blight, look into child's throat. Pull out the object if you can see it. Don't waste time if you can't see it, and be careful not to push it further in.

Or, stand behind the child, press thumbs-side of fist between the neck and ribs, grasp the fist with the other hand, press quickly up and in, repeating if necessary. Air pressure may pop out the object. For a baby, use the thumb instead of the whole fist.

Look into the throat and remove the object if visible. Don't waste time if you cannot see it. Be careful not to push the object further in.

After breathing is restored, have a physician see the child for possible damage.

For further information, contact the Lung Association at these telephone numbers:

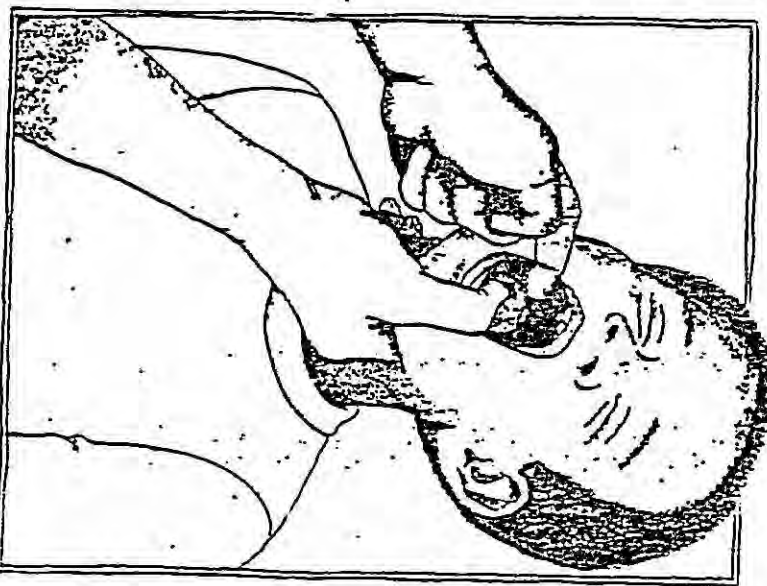
Baltimore city, Anne Arundel county, Upper Eastern Shore—455-6181.

Baltimore, Carroll and Harford counties—233-3991.

Howard, Frederick, Montgomery counties—811-4181.

Chesley, Charles, Prince George's, St. Mary's counties—433-0320.

Allegheny and Garrett counties—717-1561.
Washington County—733-3921.
Lower Eastern Shore—511-0084.



Normal breathing can take place only so long as the pleura is intact. When a broken rib or a foreign object penetrates the pleural sac, air enters the space and destroys the normal means for expanding the lungs. This is a dangerous condition that leads to the collapse of a lung; it will be discussed fully in a later chapter.

THE PROCESS OF BREATHING

Breathing takes place as a result of the combined actions of the muscles that are attached to the chest cage and the diaphragm, a sheet of tough muscle that separates the chest cavity from the abdominal cavity. The lungs operate on the principle that air moves from a high pressure area to a low pressure area. During the inspiration phase of the breathing process (when air is inhaled), two things happen. The muscles attached to the ribs contract, pulling the ribs outward. At the same time, the diaphragm moves downward. These actions increase the size of the chest cavity. Because the pleural sac is attached to the ribs and to the lungs, as the chest cage becomes larger, the lungs also become larger. Since the lungs have expanded in size, a partial vacuum is created, and air rushes through the passages and into the lungs.

In the expiration phase (when air is exhaled), the diaphragm and the muscles that are attached to the ribs relax. The chest cavity is decreased in size, and the lungs become correspondingly smaller. Air is forced from the lungs through the air passages and out of the nose and mouth.

The process of breathing (inspiration and expiration combined) is repeated fifteen to twenty times each minute in the average adult male at rest, and each breath moves about 500cc, or one pint of air.

AIRWAY OBSTRUCTION

Every year in the United States, approximately 100,000 people die from accidents, and 500,000 people die from heart attacks. Of the many deaths that occur annually outside of hospitals, a number would be reversible if modern resuscitative techniques were used. For instance, many of the 50,000 annual deaths from highway accidents occur not because of primary injuries (head injuries, crushing injuries of the chest, bleeding wounds, etc.), but because of airway obstruction, respiratory arrest or shock. These patients, particularly when they are unconscious, often need correction of the airway obstruction and artificial ventilation at the scene of the accident, as well as continued resuscitation efforts while being transported to the hospital.

Many unconscious patients do not require artificial ventilation, but merely proper positioning of the head to allow adequate natural breathing through an open air passage. A good example is the patient with a head injury, whose fate often lies in the hands of the EMT. His brain may suffer irreparable damage in a few minutes if he is not provided with adequate means for breathing. The well-trained EMT, when confronted with an unconscious and nonbreathing patient, should make every effort to restore breathing at the scene of the accident, instead of rushing the dying patient to the hospital immediately without any such effort.

THE IMPORTANCE OF PROMPT ACTION

NOTES

Life is sustained by a close relationship among the heart, the lungs, and the brain. The heart pumps blood to the lungs, where the blood picks up oxygen. The oxygen-enriched blood is returned to the heart, where it is then pumped to the brain and other parts of the body. In the brain the oxygen nourishes the cells that regulate every body activity. As long as its cells receive proper nourishment, the brain sends signals to the heart and lungs to regulate their activity. This cycle continues automatically without interruption throughout the human life-span.

If for some reason the air supply to the lungs is restricted or stopped, the cycle is interrupted. The brain does not get enough oxygen to survive, and the signals that regulate heart and lung activity slow down and stop. As the actions of the brain, heart and lungs cease, so does life itself. This condition is known as asphyxia.

The speed with which asphyxia occurs depends a great deal on the degree of airway obstruction. When the obstruction is complete, the brain cells cease to function in about four to six minutes, and heart action stops only a few minutes later. A partial obstruction initiates a slower process of damage to the brain. The danger of impaired breathing should not be underestimated, since it may eventually be fatal unless corrected quickly.

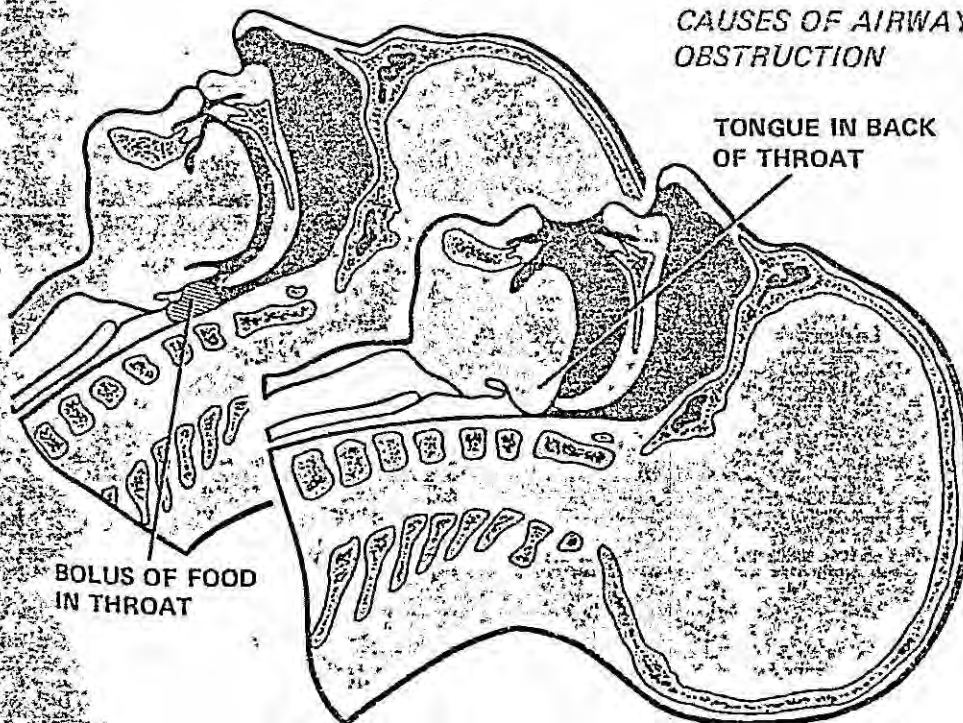
CAUSES OF AIRWAY OBSTRUCTION

The most obvious cause of airway obstruction is, of course, the accumulation of foreign matter in the mouth, throat or windpipe. Vomit, blood, phlegm, food or a foreign object that cannot be eliminated by coughing or swallowing all tend to create effective and dangerous obstructions.

CAUSES OF AIRWAY OBSTRUCTION

TONGUE IN BACK OF THROAT

BOLUS OF FOOD IN THROAT



NOTES

A less obvious although equally dangerous cause of airway obstruction results from a state of unconsciousness. During unconsciousness, regardless of the cause, the muscles that control the lower jaw and tongue relax. This usually leads to an obstruction of the throat when the patient's neck is bent forward. Flexion of the neck causes the lower jaw to sag. Since the tongue is attached to the lower jaw, it drops against the back of the pharynx and over the larynx, causing a blockage.

A person who is under the influence of alcohol or drugs may develop an airway obstruction from nothing more than lying on a bed with a pillow under his head, which causes the neck to be flexed. In a normal situation, automatic reflexes would cause him to turn over in bed when the tongue falls back into the throat. Due to the depressed condition of the nervous system in the alcohol or drug user, however, there may not be an automatic and involuntary reaction to airway blockage.

Although a flexed neck and foreign matter in the air passage are the most common forms of airway obstruction, there are occasionally other blockage sites. When the nasal passage is blocked by congestion or mucus, closure of the lips and teeth may produce an obstruction. Spasms of the vocal cords may also cause a blockage. The EMT should know how to make an immediate survey of possible causes of obstruction in order to take the proper corrective action.

RECOGNITION OF AIRWAY OBSTRUCTION

A "rule of thumb" that may be used to great advantage in surveying patients for airway obstruction is to tilt the patient's head backward and

- LOOK for breathing movements
- LISTEN for airflow at the mouth and nose
- FEEL for air exchange

RECOGNITION OF AIRWAY OBSTRUCTIONS



It is easy to be misled into thinking that a patient is breathing adequately by simply observing that the chest is rising and falling in the usual manner. As a matter of fact, involuntary muscular action may cause continued chest movement even though there is a complete airway obstruction. Looking for breathing movements should be only the first of three steps in determining the patient's respiratory condition.

One should not assume that a patient is breathing adequately unless he can hear and feel an exchange of air through the mouth and nose as well as see that the chest is rising and falling. To make this determination, the EMT should place his ear close enough to the patient's mouth and nose to hear and feel the exchange. In cases of complete obstruction, there will of course be no detectable movement of air. Cases of partial obstruction are easier to detect and may be identified by listening. Noisy breathing is a sign of partial obstruction of the air passages. "Snoring" usually indicates air passage obstruction by the tongue, as in the case of a flexed neck. "Crowing" indicates spasms of the larynx. A "gurgling" sound indicates foreign matter in the windpipe. Under no circumstances should a "noisy" breathing condition go untreated.

CYANOSIS

A dependable sign that the brain is getting too little oxygen is cyanosis. This condition is characterized by a noticeable blue or gray color in the tongue, lips, nail beds and skin. In blacks or other patients with dark complexions, the blue or gray color may be a reliable sign at the tongue and nail beds only.

TREATMENT OF AIRWAY OBSTRUCTIONS

The EMT should learn to recognize air passage obstructions immediately and act within seconds, utilizing the following steps until the obstruction is corrected. The head should be kept tilted back throughout all of the steps. If any step opens the airway, it is not necessary to go any further but only to assure that the patient continues to breathe properly.

Step 1: Quickly Clean Out the Patient's Mouth
Using your finger, quickly sweep the patient's mouth clear of foreign objects, broken teeth or dentures, sand or dirt, etc.



STEP 1-
CLEAR THE
PATIENT'S
MOUTH

ANOXIA - *oxygen is gone*
ASHYXIA *Diff. respiration*
HYPOXIA *Low oxygen*
CYANOSIS *metabolic*
Fe. in system
Acidosis
Oxygenation

NOTES

Step 2: Tilt the Head Back

Place the patient on his back with his face up.

Tilt the patient's head backwards as far as possible, so that the front of the neck is stretched tightly. If necessary, the patient's shoulders can be elevated with a blanket roll to keep the head in a tilted-back position.

Never put a pillow, rolled blanket or other object under the patient's head, as this defeats the purpose of the head tilt by flexing the neck and perhaps blocking the passage even more.

STEP 2 TILT THE HEAD BACK



IF UNCONSCIOUS PATIENT
CANNOT BE PLACED ON BACK,
SUPPORT HIM IN UPRIGHT
POSITION, HEAD BENT BACK-
WARDS AND FACE UP.

This step accomplishes three things simultaneously:

- ⊙ It places the airway in the best possible position for spontaneous breathing, if the breathing processes have not stopped altogether.
- ⊙ It allows the EMT to make an immediate determination of the patient's condition by the LOOK, LISTEN AND FEEL method described above, and by observation of the skin and lips.
- ⊙ It positions the patient properly for artificial ventilation if he is not breathing and if the head tilt does not start spontaneous breathing automatically.

If the unconscious patient cannot be placed on his back, which might be the case in an airplane, a car, a boat or a bus, he should be supported in an upright position with his head bent backwards and his face tilted up, as if looking towards the sky. Forcing air into his lungs while he is in this position is quite possible.

While it may seem a likely means of providing a good airway, a prone position with the face down and chin tilted forward is ineffective for the following reasons:

- ⊙ The rescuer has a great deal of difficulty in holding the head tilted back and the jaw forward to keep the passage open.
- ⊙ The patient's face is concealed so that the rescuer cannot watch the color of the tongue and lips, nor can he clear the throat if necessary.

- Effective ventilation is almost impossible.
- When recovery begins, natural breathing is difficult in the face-down position because a good part of the patient's body weight has to be lifted every time he breathes.

If tilting the head back opens the airway and the patient starts to breathe spontaneously, go no further. Otherwise go on to Step 3.

Step 3: Force Air Into the Lungs

If the head-tilt alone does not succeed in opening the airway, try to force two or three good-sized breaths quickly into the patient's lungs through the mouth while holding the nostrils pinched shut. This forced ventilation may in itself be enough to start spontaneous respiration, or it may overcome partial obstruction that has been restricting breathing.

Watch the chest of the patient for movement indicating that your breaths are reaching his lungs.



If the patient's chest rises and falls with two or three quick ventilations, the airway is unobstructed. If forcing air into the patient's mouth does not open the airway, it is necessary to go on to the following steps.

Step 4: Lift the Jaw

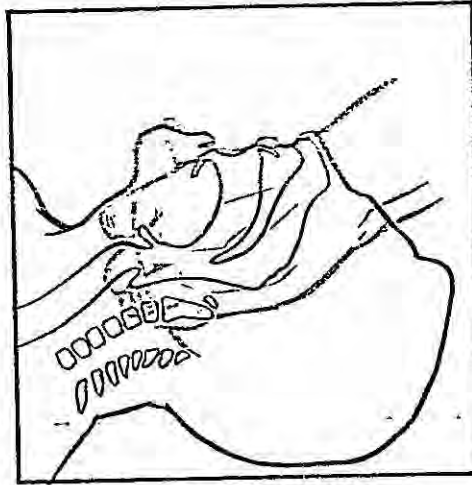
If both head tilt and positive ventilation have failed to get air into the patient's lungs, it may be necessary to accentuate the stretch of the neck to get the tongue out of the way. One of two jaw-lift methods can be used.

To pull the tongue as far forward as possible, insert your thumb between the patient's teeth, and with your fingers under his chin, pull the jaw forward.

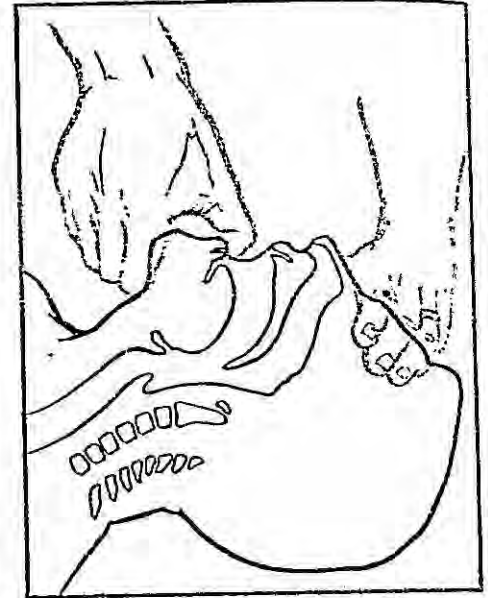
NOTES

If it is not possible to insert your thumb in the patient's mouth because of clenched teeth, try the two-hand jaw-lift. Grasp the angles of the patient's jaw. Pull with both hands just below the ear lobes and lift the jaw forcibly upward so that the lower teeth are in front of the upper teeth. Make sure that you do not flex the head forward when attempting to pull the jaw forward.

STEP 4 LIFT THE JAW



JAW-LIFT METHOD



CHIN-LIFT METHOD

The tongue is now in the most extreme forward position, and it is unlikely that it is blocking the air passage. Another quick breath into the patient's mouth will determine whether or not the airway is clear. If it is clear, artificial ventilation may be carried out. If the airway is still not open, go on to Step 5.

Step 5: Clear the Air Passage

When attempts to establish an open airway by head tilt, forced ventilation and maximum jaw extension all fail, there is probably a foreign object lodged sufficiently deep in the patient's throat that the quick sweep of the mouth in Step 1 failed to reach it. Try to reach the object with your extended index finger. If this fails, attempt to dislodge the object by concussion.

Turn the patient on his side and administer a few sharp slaps to his back between the shoulders. Once again sweep your fingers inside the patient's mouth to see if the object has been dislodged.

If the patient is a child or an infant, hold him upside down and give a few sharp pats between the shoulders. This should dislodge the object without difficulty.

**STEP 5
CLEAR THE AIR PASSAGE**

NOTES



**TURN PATIENT ON HIS
SIDE AND ADMINISTER
SHARP SLAPS BETWEEN
THE SHOULDERS**

Following all of these steps should result in the correction of almost any airway obstruction and should not take more than a few seconds to accomplish.

REMEMBER: *If the patient is in a desperate condition, do not waste time in trying to clear foreign matter from the air passage. Forcing air into his lungs is more important and often succeeds despite some blockage. Speed is of the essence. If it is obvious that efforts to open the airway will not be immediately successful, transport the patient to a medical facility without delay. Surgical procedures will most likely be needed to save his life.*

PULMONARY RESUSCITATION

If the airway has been established and spontaneous breathing is still not present, the EMT must take immediate steps to ventilate the lungs of the patient artificially. There are many methods of artificial ventilation, or pulmonary resuscitation, such as mouth-to-mouth resuscitation, a mouth-to-nose device, a mechanical resuscitator, or a bag-mask resuscitator. However, mechanical devices have one common failing: they must be located, and this process may use up valuable time that a patient cannot afford to lose.

REMEMBER: *Irreversible damage occurs within four to six minutes when the cells of the brain are deprived of their oxygen supply.*

Manual methods of pulmonary resuscitation must be used under certain circumstances, but they have little effect even if the EMT is completely familiar with the techniques. The one method of providing pulmonary resuscitation that is far superior to all other techniques is mouth-to-mouth resuscitation.

NOTES

THE ADVANTAGES OF MOUTH-TO-MOUTH RESUSCITATION

The mouth-to-mouth technique of pulmonary resuscitation has several distinct advantages:

- ⊙ It requires no special equipment — nothing to be found, nothing to be set up, and nothing to malfunction.
- ⊙ It requires only one EMT.
- ⊙ It can be applied immediately in any situation: to drowning victims while they are still in the water; to accident victims while they are still in the wrecked vehicle; in pole-top emergencies; or under any similar adverse circumstance.
- ⊙ It provides the lungs with maximum ventilation, whereas other methods are less effective.
- ⊙ It frees the rescuer's hands so that he may use them to assure an airway, compress the stomach to expel air, and feel for a pulse in the carotid artery.
- ⊙ It is less fatiguing to the rescuer than the body-manipulation methods of artificial ventilation.
- ⊙ It is easier to gauge the effectiveness of the resuscitative effort, since the rescuer can (1) feel the lungs expand, (2) see the chest rise, and (3) hear the air escape during exhalation.

THE TECHNIQUE OF MOUTH-TO-MOUTH RESUSCITATION

This method has been proved both experimentally and clinically to be the most effective means of artificially ventilating a nonbreathing patient.

With the air passage maintained by maximum extension of the head (as described in the section on airway obstruction), pinch the patient's nose shut with your thumb and forefinger. This will prevent air from escaping when you blow into the patient's mouth.



MOUTH-TO-MOUTH RESUSCITATION

EXTEND HEAD

SEAL NOSE WITH THUMB
AND FOREFINGER

SEAL YOUR MOUTH OVER
PATIENT'S MOUTH

QUICKLY BLOW FULL BREATH
INTO PATIENT'S MOUTH

WATCH FOR CHEST TO RISE

REMOVE YOUR MOUTH TO
ALLOW EXHALATION

Take a deep breath, open your mouth wide, and place it over the mouth of the patient, making a tight seal. Quickly blow your full breath into the patient's mouth until you can feel the resistance offered by the expanding lungs and see the chest rise. Remove your mouth and allow the patient to exhale.

For adult patients, the breathing cycle is repeated every five seconds, or about twelve times each minute. Each breath should provide at least 1000cc of air, or about two pints. This is twice the amount of air in a normal breath. Since expired air contains about sixteen percent oxygen and from four to five percent carbon dioxide, the double-sized breaths assure adequate oxygenation of the blood and removal of the carbon dioxide from the patient's lungs.

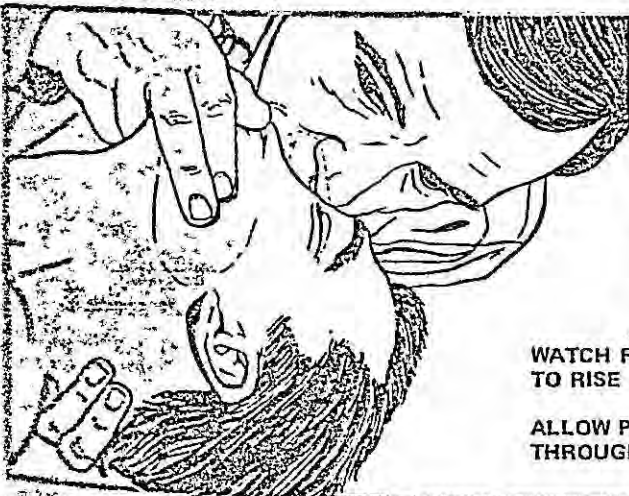
Experience has shown that the three most common errors committed by rescuers while performing mouth-to-mouth resuscitation are:

- Inadequate extension of the patient's head so that the airway is not properly established
- Failure to open the patient's mouth wide enough
- Forgetting to seal the patient's mouth and nose

If the patient's stomach becomes distended (bulged) with air from the inflations, his head should be turned to the side and the stomach gently compressed to expel the air. This bulging results from air that slips past the epiglottis into the esophagus and stomach.

After resuscitative efforts have been started, they should be continued until the patient is carried to the hospital, until a doctor pronounces him dead, or, of course, until he starts to breathe spontaneously.

In some cases it seems distasteful to make direct mouth-to-mouth contact with the patient, and the EMT may balk at performing under what are apparently unsanitary conditions. To avoid direct contact, a gauze square or a handkerchief frequently provides the best and most readily available protection. The use of gauze or a handkerchief will not restrict the flow of air into the patient's lungs in the least.



**MOUTH-TO-NOSE
RESUSCITATION**

CLAMP JAW SHUT WITH
YOUR FINGERS

COVER NOSE WITH
YOUR MOUTH

BLOW INTO NOSE

WATCH FOR CHEST
TO RISE

ALLOW PATIENT TO EXHALE
THROUGH HIS MOUTH

NOTES

MOUTH-TO-NOSE RESUSCITATION

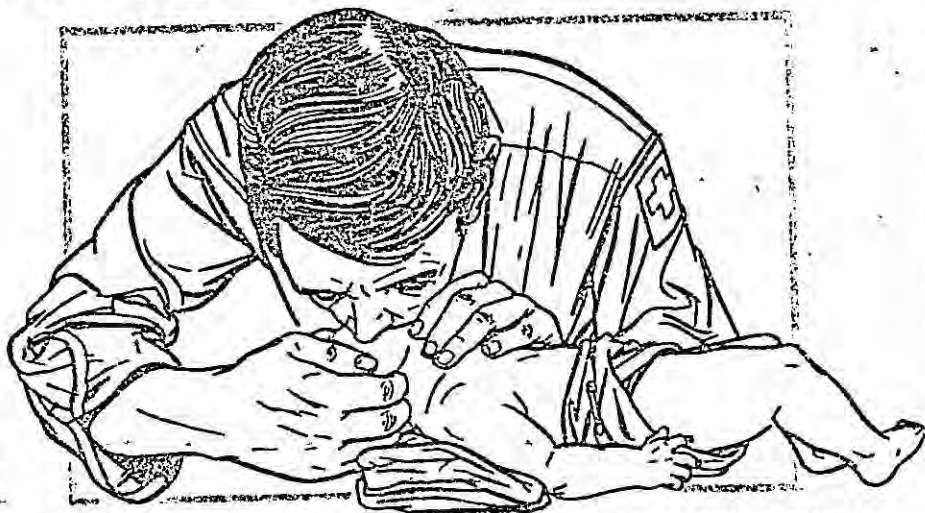
This alternate method might be used if the patient has serious injuries to the lower jaw, or if he has a severely receding chin due to the lack of natural teeth or dentures. The technique of mouth-to-nose resuscitation is essentially the same as the mouth-to-mouth method. The EMT should clamp the patient's jaw shut with his fingers and cover the nose with his mouth. After each breath, the patient's mouth should be allowed to open to provide quick and effective exhalation.

THE TECHNIQUE FOR INFANTS AND SMALL CHILDREN

Because of the small size of the child's face and the limited capacity of his lungs, the technique is slightly different for infants and small children.

Establish an open airway by the head-tilt method. Place your mouth over the mouth and nose of the child. While carefully watching the chest for the amount of movement, inflate the child's lungs with less pressure than that used for an adult, at a rate of about twenty breaths per minute. Give tiny babies only small puffs from your cheeks.

THE TECHNIQUE FOR INFANTS AND SMALL CHILDREN



INFANTS: SMALL PUFFS OF AIR
SMALL CHILDREN: NORMAL BREATH

BREATHING CYCLE:
20 TIMES EACH MINUTE

OTHER METHODS OF PULMONARY RESUSCITATION

It is difficult to move a sufficient volume of air into a patient's lungs by compression and expansion methods because the airway is often obstructed and the chest expansion is usually inadequate. Nonetheless, the techniques that will now be described provide the EMT with an alternate means of resuscitation when it is impossible to use the oronasal techniques. For example, the patient may be the victim of an automobile accident in which he has suffered severe facial injuries. The damage, which might include fractures or

mutilations of the lower jaw, might make the direct breathing methods impossible. If respiratory arrest has occurred, the EMT has no choice but to use an alternate method if he is to save the patient's life.

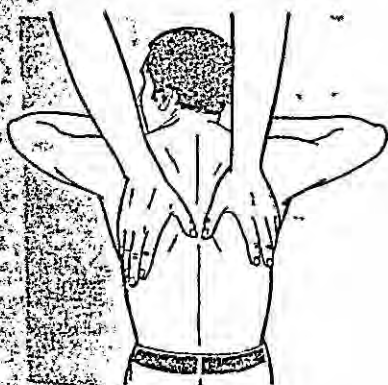
In cases where cardiac arrest has also occurred, there is one technique of manual resuscitation that is also compatible with closed chest compression. The chest-pressure, arm-lift method, since it is performed with the patient on his back, allows a second EMT to perform the chest compressions while the first EMT is manipulating the patient's arms.

You will recall from the discussion of the mechanics of breathing that air exchange takes place as the result of changes in the size of the chest cavity. In the manual methods of resuscitation, the object is to duplicate those changes in chest cavity size by manipulating the arms and compressing the chest. When this is done correctly, air will flow in and out provided there is no obstruction in the airway.

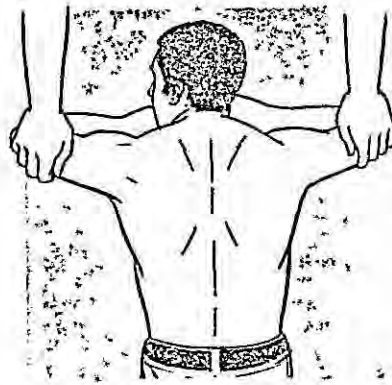
The back-pressure, arm-lift method:

1. Kneel on one or both knees at the head of the prone patient. Place the patient's head on his hands, with his face turned to one side.
2. Make every effort to assure as straight an airway as possible.
3. Place your hands on the patient's midback over the lower part of the shoulder blades.
4. With your fingers spread and your thumbs close to the patient's spine, rock forward and exert moderate pressure downward until you feel firm resistance.
5. Release the pressure and slide your hands beneath the patient's arms to a point just above the elbows, drawing the arms upwards and backwards as you rock backwards. Continue this movement until stiff resistance is felt.
6. Replace the arms at the starting position and repeat the cycle.

BACK-PRESSURE ARM-LIFT METHOD

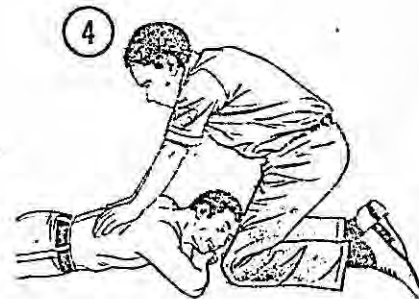
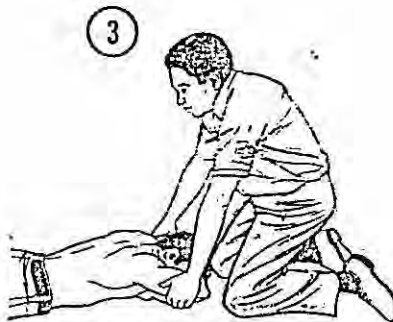
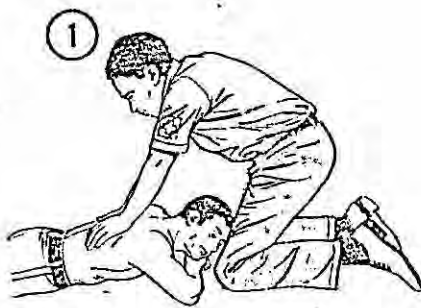


HAND POSITION
BACK PRESSURE



HAND POSITION
ARM LIFT

NOTES



The lift-pressure rate is maintained at ten to twelve cycles per minute. The arm lift enlarges the chest space by hyperextending the spine and stretching the chest muscles, causing air to rush into the lungs. Back pressure compresses the chest, causing the air to be expelled.

Special attention must be given to the airway at all times during the resuscitative efforts. When the patient's arms are pulled forward, the entire body has a tendency to shift forward slightly. This causes the head to flex forward a little with each movement, which might eventually create an obstruction if left uncorrected.

As in the case of mouth-to-mouth resuscitation, there are also situations when the back-pressure, arm-lift method cannot be used. An example is the patient who has back injuries or fractures of the arms.

The chest-pressure, arm-lift method:

- 1 Place the patient on his back.
- 2 Kneel on both knees at the head of the patient.
- 3 Grasp the patient's arms just above the wrists and cross the wrists just over the sternum. Rock forward, exerting moderate pressure almost vertically downward until firm resistance is met.
- 4 Draw the wrists upwards and then above the patient's head until they are almost parallel to his body and touching the ground.
- 5 Replace the patient's arms on his chest, and repeat the cycle ten to twelve times each minute.