CHOKING

How to manage foreign-body airway obstruction

BACKGROUND

Foreign-body airway obstruction (FBAO) or choking is a life-threatening event that can occur in dental practices. Although deaths from FBAO are more common among elderly persons, children are also commonly affected. Dental professionals should know the causes, signs, and treatment of FBAO in both adults and children (Figure 10).

CAUSES AND SIGNS

Usually choking occurs when the subject is eating or drinking. In addition, it is more common among individuals who suffer from muscle, neurological, or cerebral impairment. Food is the most common foreign body among those who die from choking, seen in 87% of the choking deaths. Small objects, which are especially common in children, cause 13% of choking deaths.

People at higher risk for suffering FBAO include those with an altered level of consciousness, drug or alcohol intoxication, neurological impairment that affects swallowing and coughing reflexes, respiratory disease, mental impairment, dementia, or poor dental condition, as well as the elderly. If the dental practice uses sedation, the risk of FBAO is also increased. In addition, persons who use pressurized metered dose inhalers can inhale the mouthpiece cover or objects trapped in the device, causing obstruction of the airway.

The signs associated with FBAO are coughing, struggling to breathe or talk, cyanosis, and holding or reaching for the throat. In some cases the subject cannot talk and will hold or point to his or her throat.

TREATMENT

Adults

FBAO tends to resolve if intrathoracic pressure is increased, which can be achieved using back blows, chest thrusts, and abdominal thrusts. Back blows are effective in half of cases, but the other half require more than one technique to manage the obstruction.

The dental care provider should assess the severity of the choking. In mild cases the subject has an effective cough and can talk. In severe cases the subject's cough is ineffective but he or she can respond by moving the head.

For mild airway obstruction, the subject should be seated or standing and encouraged to cough. He or she should be closely monitored until the condition clears. If aspiration or swallowing of a dental product is suspected, medical advice should be sought.

For severe airway obstruction, the dental care provider should call for help, then stand the subject up and encourage coughing. The provider should stand at the subject's side and slightly behind and support the neck with one hand while leaning the individual well forward. This may release the object, but if it doesn't, 5 back blows should be delivered between the scapulae using the heel of the hand. After each blow, the subject should be checked to see if clearing has occurred. If the back blows are ineffective, abdominal thrusts should be added. To deliver these, the provider should stand behind the subject, place a clenched fist between the individual's umbilicus and xiphisternum, and clasp it with the other hand. The subject is leaned forward, then the 5 abdominal thrusts inward and upward are delivered. Pressure to the xiphoid process or lower rib cage should be avoided to protect against abdominal trauma. Again, the subject is checked after each thrust to determine if the obstruction has cleared. Should the airway still be obstructed, the provider should continue delivering 5 back blows alternating with 5 abdominal thrusts.

If the subject loses consciousness, he or she should be carefully supported, usually with the help of several others, to the floor or dental chair placed in a horizontal position. The provider should begin cardiopulmonary resuscitation (CPR) at a pace of 30 chest compressions and 2 ventilations. Someone should call for an ambulance while this is being done.

If the subject is obese or pregnant, it may be impossible to deliver abdominal thrusts. Instead the provider should stand behind the individual and encircle the chest with the arms, placing the hands over the lower end of the sternum and pulling hard into the chest with quick thrusts.

Infants and Children

When the affected subject is an infant or child, the process of assessing the severity of the obstruction is done as for an adult. No external maneuvers are required when the subject has an effective cough. For those whose cough is ineffective in releasing the

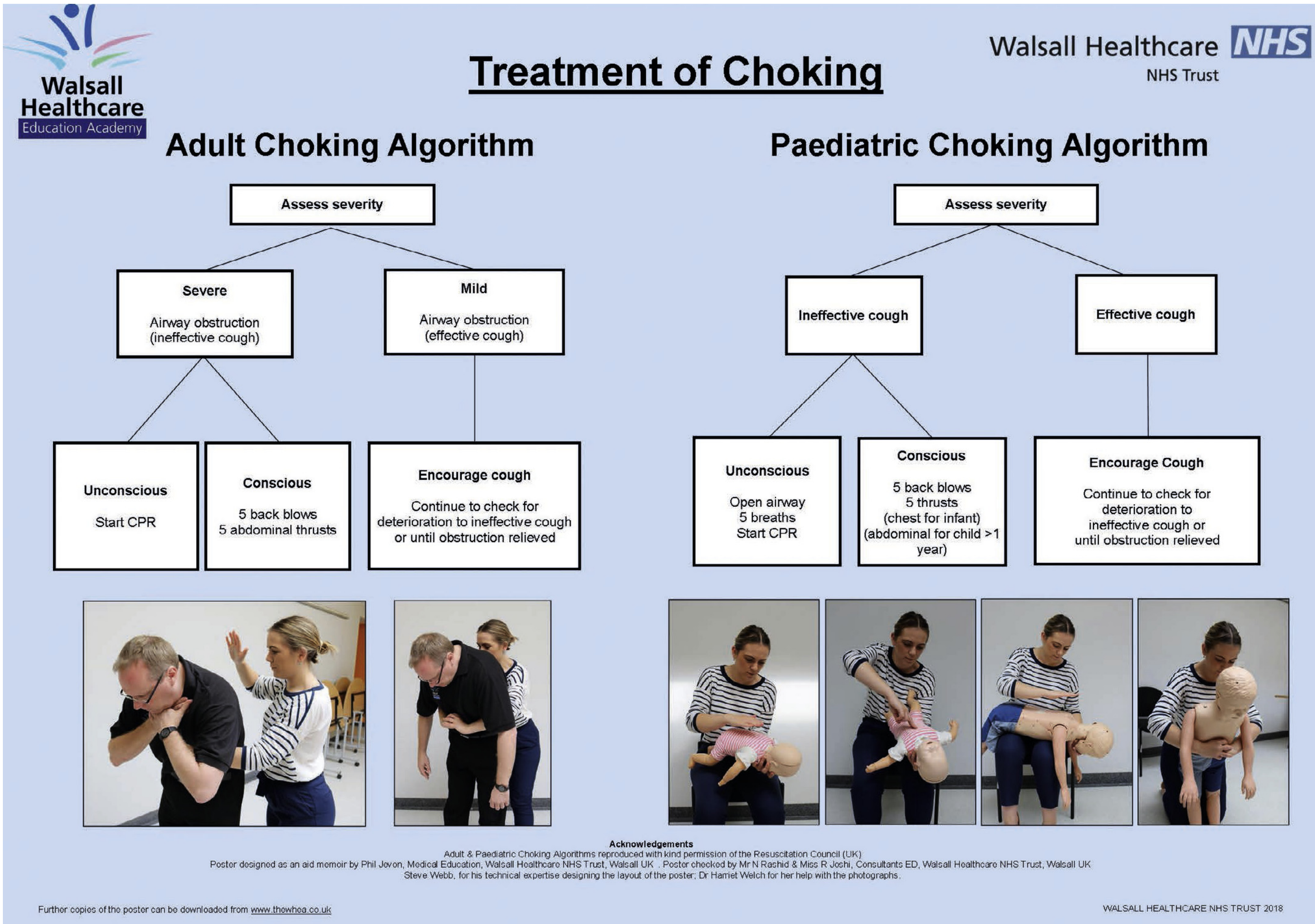

Figure 10. Management of choking in the dental practice poster. (Courtesy of Jevon P: Management of choking in the dental practice. *Br Dent J* 226:183-187, 2019.)

obstruction, the provider should immediately call for help and deliver 5 back blows and, if needed, up to 5 chest thrusts to an infant or abdominal thrusts to a child.

In an infant the back blows should be delivered with the infant prone over the lap with the head downward to facilitate the release of the foreign body. The head is stabilized by clasping the jaw between the thumb and fingers. The 5 sharp back blows are delivered with the heel of 1 hand to the middle of the back between the shoulder blades. After each blow, the infant should be evaluated to see if the obstruction has cleared.

If the back blows are ineffective, chest thrusts should be commenced. The infant is turned supine with the head downward and the arm supporting his or her back while the hand supports the infant's head. The thigh can also provide support. The lower sternum about a fingerbreadth above the xiphisternum is the landmark for chest compressions in an infant. Five chest thrusts are delivered more sharply than chest compressions but at a slower rate. The infant is checked for release of the obstruction after each thrust. If the airway remains obstructed, 5 back blows are alternated with 5 chest thrusts.

Children should be placed over the lap with the head down or, if this is too difficult, held in a forward leaning position. Up to 5 sharp back blows are delivered to the middle of the back between the shoulder blades, checking after each one to see if the obstruction has been cleared.

If the back blows are ineffective, the provider should add abdominal thrusts. The provider stands or kneels behind the child and places a clenched fist between the child's umbilicus and xiphisternum, clasping it with the other hand. The child is then leaned forward and 5 abdominal thrusts are done, avoiding pressure on the xiphoid process or lower rib cage to keep from causing abdominal trauma. The child is checked after each thrust to see if the obstruction has been cleared. If it remains, back blows and abdominal thrusts are alternated.

Should the child or infant be unconscious, the provider should carefully support the subject to a flat surface and ask a colleague to call for an ambulance. The infant or child should not be left alone. The subject's mouth is opened and a single finger sweep is done to try to remove any loose object. This should be done while the provider observes the mouth and not as a blind or repeated sweep. The airway is then opened and 5 ventilations are attempted. The effectiveness of each ventilation is gauged by the rise of the chest. If nothing occurs, the head should be repositioned and ventilations tried again.

If no response occurs, chest compressions are commenced, continuing CPR at a ratio of 30 compressions to 2 ventilations. Ventilations should not be done until the mouth is checked for the obstructing object. If a single rescuer is present, CPR should be done for 1 minute before calling for an ambulance.

FOLLOW-UP PROCEDURES

After the FBAO has been successfully managed, the subject should be checked for additional foreign bodies, dysphagia, persistent cough, or complaints of having something stuck in the throat. If any of these are present, medical help should be sought. When abdominal thrusts and chest compressions have been required, the subject should be evaluated by a medical professional to determine if internal injuries have occurred.

The dental practice team should evaluate the event to determine what was done correctly and what should be changed in any future event. A written record of the analysis should be kept and all lessons learned communicated to the entire team.

Clinical Significance

All dental professionals should be prepared to handle choking emergencies in the dental setting. Even though the use of rubber dams has diminished the number of instances where dental materials are swallowed, the risk still remains, especially in patients who have conditions that compromise their swallowing or coughing reflexes. Keeping a poster outlining what to do and practicing regularly so that everyone knows the drill will help to avoid having a choking episode turn into a tragedy.

Jevon P: Management of choking in the dental practice. *Br Dent J* 226:183-187, 2019

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CHRONODENTISTRY

Tailoring dentistry to body rhythms

BACKGROUND

Molecular clocks in humans are designed to help the body adapt to environmental changes. Their proper functions are essential to a healthy body. Various types of molecular clocks have been identified based on the cycle length of the biological rhythms; these include the circadian clock (24-hr periods), which adapts to daily changes; the circalunar clock (29.5-day periods), which adapts to moon phases; and the circannual clock (365-day periods), which adapts to seasonal changes. In addition, the circadian clock includes the central and various cell-autonomous peripheral circadian clocks in different organs (Figure 1). Many factors serve as input (*zeitgeber*) that determines the pace for circadian clocks. These factors include light, food, body temperature, and cellular redox status. Depending on the input received, the circadian clock modulates the synchronization of physiological processes. With better understanding of molecular clocks, especially circadian clocks, researchers may develop ways to alter the body's responses in disease as well as in health. Chronodentistry is the study of the role of molecular clocks specific to oral health and has identified their role in oral and maxillofacial surgery, restorative dentistry, endodontics, periodontics, and orthodontics.

CLINICAL ROLE OF CIRCADIAN CLOCKS

Oral and Maxillofacial Surgery

The circadian clock has a role in regulating blood vessel formation as well as the cell cycle and growth rates of cells. As a result, it may offer a target for addressing tumor growth and in cancer treatment. In addition, implant therapy may be altered by the interaction of biomaterials and circadian clock core components. In healthy individuals, tumor suppressor genes and oncogenes serve as clock-controlled genes in the human oral mucosa. Thus surgeons may be able to develop therapeutic strategies to interact at more complex levels than drugs or therapies targeted to a specific target. The directed use of circadian clock effects may be especially applicable for oral cancer patients and is termed chronochemotherapy. Disrupted cell cycle control is a characteristic of many cancers. Using this knowledge, chemotherapeutic adverse effects may be less severe if the agents were applied at lower doses in a specific time frame. Several studies have