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Mouth to mask respiration

In the absence of any equipment for cardiopulmonary resuscitation, rescuers have to use either mouth to mouth or mouth to nose expired air respiration. In practice, however, these methods may well be unacceptable to the operator should there be any blood, vomit, debris, or signs of infection in the upper airways. Similarly, fear of AIDS (the acquired immune deficiency syndrome) may well deter rescuers, even though there is no evidence of its transmission in saliva.

When basic resuscitation equipment is available (usually in the form of an oropharyngeal airway and a self inflating bag-valve-mask) it is generally not easy to use without extensive training and practice. Inexperienced single operators using a bag-valve-mask commonly find difficulty in maintaining both an airtight seal between the mask and the face and an unobstructed airway with only one hand.¹ Nurses, who are generally the first on the scene of a hospital emergency, tend to find this particularly difficult. Indeed, in one study of 320 emergency medical technicians more than half were unable to adequately ventilate a manikin using a bag-valve-mask.² Mask design also influences performance.^{2,3} Indeed, when using a bag-valve-mask two resuscitators may well be needed—one to hold the mask on to the face and to maintain a clear airway (using both hands), and the other to squeeze the bag.⁴

Equipment for intubating the trachea is occasionally available outside the hospital environment, since many ambulance crews now carry laryngoscopes and cuffed endotracheal tubes. Intubation is not without its hazards, however, and is certainly not a manoeuvre for the inexperienced.⁵

With all these difficulties, one current suggestion is that when a suitable facemask is available then mouth to mask expired air respiration⁶⁻⁹ should be the method of first choice for inexperienced operators.^{6,7}

Mouth to mask expired air respiration was described and investigated over 30 years ago and shown to be highly effective,¹⁰ so it is surprising that the technique is so little known. Few texts on resuscitation even mention it. The main features of the technique are, firstly, that both hands are free

to hold the mask on to the face, making it much easier to achieve an airtight seal; secondly, that the fingers of both hands may be used to manipulate the lower jaw, forward if necessary, in order to maintain a clear airway; thirdly, that the operator's mouth does not come into direct contact with the patient; and, fourthly, that the operator is at the head end of the patient and is therefore well positioned to assess chest expansion during inflation.

The superiority of mouth to mask expired air respiration over bag-valve-mask resuscitation in unskilled hands is related not only to the improved seal between the mask and the face but also to the large reserve volume of air in the resuscitator's lungs. In one study of unskilled rescuers using a standard resuscitation manikin, the mean tidal volume generated by mouth to mask expired air respiration was the same as that with endotracheal intubation (about 1 litre).⁶ A similar value for mouth to mask expired air respiration was found by Elling and Politis.² The mean tidal volume for bag-valve-mask ventilation in both of these studies was well below the minimum value of 800 ml recommended by the American Heart Association.

Ideally, masks specifically intended for use in mouth to mask expired air respiration should have a valved oxygen inlet^{6,8} as well as other characteristics.⁷ In tests using the Laerdal pocket mask a mean fractional inspired oxygen concentration of 50% was achieved with expired air respiration at a rate of 12 inflations a minute (tidal volume 1 litre) using an oxygen flow of 10 litres a minute.⁸ Although oxygen enrichment is important, however, it does not appear to be as critical as delivery of an adequate tidal volume.¹¹

Mouth to mask expired air respiration is a simple and effective technique and should be more widely included in resuscitation teaching programmes, particularly for those who are likely to have access to facemasks and oropharyngeal airways—for example, hospital staff, general practitioners, and accident and emergency personnel. Indeed, a strong case may be made for including a comprehensive range of both oropharyngeal airways and suitable facemasks in even very basic first aid kits. A description of this technique could then usefully be included in the Resuscitation Council's handbook *Resuscitation for the Citizen*.¹²

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