

# Four Pocket Masks: Ease of Assembly and

# Sturdiness

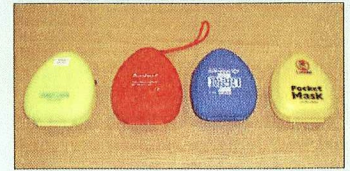
Dr K Collingwood, SpR Anaesthetics, Mr S Beaumont, EME Department  
Dr A J Walmsley, Consultant in Anaesthetics

Eastbourne District General Hospital  
Kings Drive, Eastbourne, UK

## Purpose of study

The aim was to test the ease of assembly, sturdiness and integrity of four Pocket Masks - Allied, Ambu, Laerdal and Lifeguard.

The study was divided into two parts. The first part was to assess the ease of assembly of each mask and its ease of use. The second part tested the masks for leakage and filter efficiency.



## Methods

### STUDY 1

Eight theatre porters and health care assistants, with no experience in resuscitation, were asked to carry out three tasks.

Firstly, each person was asked to remove each of the four masks in turn from its packaging and using the instructions if necessary, to prepare the mask for use. The end point was taken as the placing of the mask correctly on to the face of a mannequin. The order of use of the masks was organised so that each mask was used first, second, third and fourth an equal number of times to ensure familiarisation with assembly was not a factor. A brand new, previously unopened, mask was used each time.

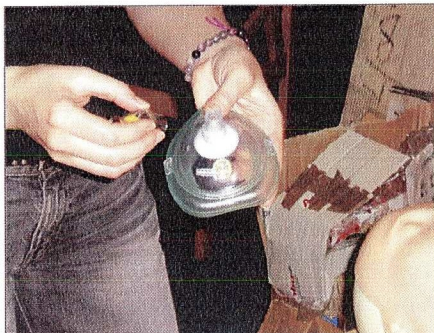
Secondly, once the mask was placed on the mannequin, the subject was asked to connect the mask to a piece of oxygen tubing. This time was noted.

Finally, each subject was asked a series of questions about the four masks.

### STUDY 2

Part a). Four of each of the masks were held firmly on a flat surface and the cavity of the mask filled with expanding builders foam. The pressure on the mask was maintained for one minute. Each mask was assessed for any leakages and the site of leakage noted and timed.

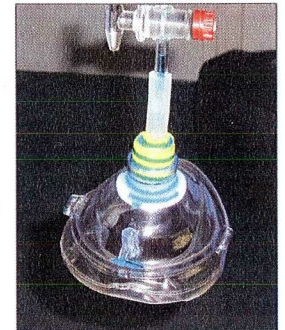
Part b). The other four of each mask had coloured water dropped from a burette at a constant rate onto the mask filters from above. The volume of coloured water was noted when leakage occurred through the filter.



Study 1: Time to prepare and assemble mask for use



Study 2a: Builders foam introduced whilst mask held flat on surface to check for areas of leakage (valve)



Study 2b: Coloured water dripped from burette onto filter. Volume measured to when leakage occurred from filter

## Results

### STUDY 1 - Time to open and prepare mask for use (secs)

MASK	AVERAGE TIME TO MANNEQUIN	AVERAGE TIME TO ADD O <sub>2</sub>	TOTAL
AMBU	27.49	8.26	35.75
LAERDAL	38.28	7.18	45.46
LIFEGUARD	29.57	10.69	40.26
MERLIN	19.77	10.80	30.57

### QUESTIONNAIRE (First choice only)

	AMBU	LAERDAL	LIFEGUARD	MERLIN
Container easiest to open?	0	6.5	0	1.6
Directions easiest to understand?	0	5	2	1
Which easiest to connect to oxygen?	0.5	5.5	1.5	0.5
Which mask most resilient?	1	6	1	0
Which mask provides most protection to rescuer?	0	7	1	0
Which mask provides the most protection to patient?	0	7	1	0

### STUDY 2

#### Part a).

All four masks of each make did or didn't leak consistently from the same places in exactly the same time.

MASK	LEAKED	TIME LEAKED	SITE OF LEAK
AMBU (x4)	YES	5 secs	Valve + O <sub>2</sub> port
LAERDAL (x4)	NO	-	-
LIFEGUARD (x4)	YES	5 secs	O <sub>2</sub> port only (with cap off)
MERLIN (x4)	YES	5 secs	Valve & O <sub>2</sub> port

#### Part (b)

Average volume of coloured water when filter leaked (mls)

MASK	1	2	3	4	AVERAGE
AMBU	3.5	3.3	3.5	3.1	3.35
LAERDAL	5.7	6.1	6.2	5.9	6.0
LIFEGUARD	4.7	4.8	4.7	4.9	4.75
MERLIN	3.4	3.2	3.2	3.0	3.2

## Conclusions

Although there was a difference in the speed of assembly of the four different masks, this was not considered significant. The Laerdal mask was slowest to assemble and apply to the mannequin but the fastest to attach to oxygen tubing. Both of these were associated with the stiffness and sturdiness of these masks. This was backed up in the questionnaire.

In the questionnaire the Laerdal mask was considered to provide the best protection to rescuer and patient.

The foam test could simulate patient vomiting and therefore protection to the rescuer. Only the Laerdal and Lifeguard masks didn't leak through their valves. The Lifeguard mask did however leak from the oxygen port when its stopper was removed. The Laerdal mask didn't leak from any site.

The filter barrier is important in mouth to mouth rescue. Contamination can be transferred via droplets and so the filters' ability to hold back water droplets is crucial. The water column test showed the Laerdal filter held the most water before leakage occurred with the Merlin mask holding the least.