

Aircrew Ear Clearance Techniques

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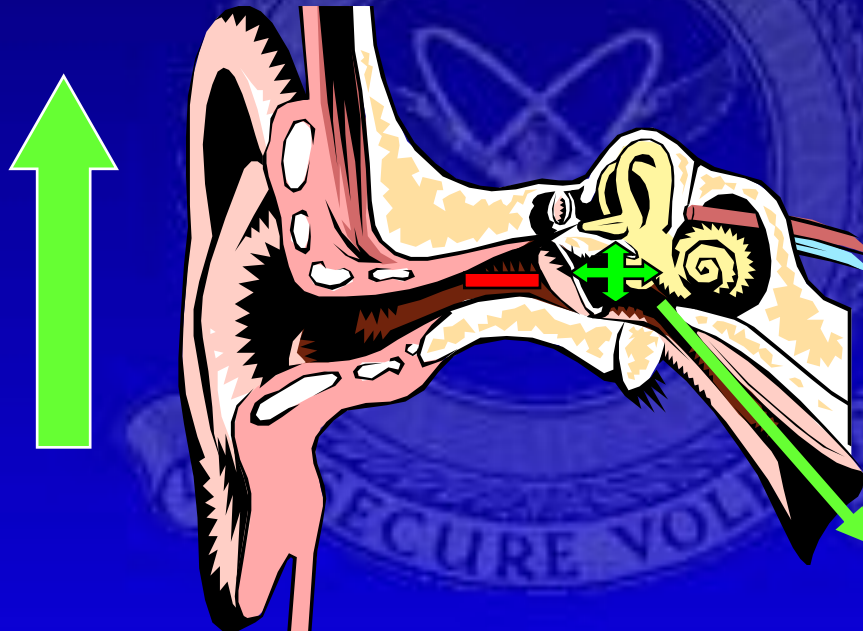
Overview

- Study background
- Methodology
- Results
- Conclusions



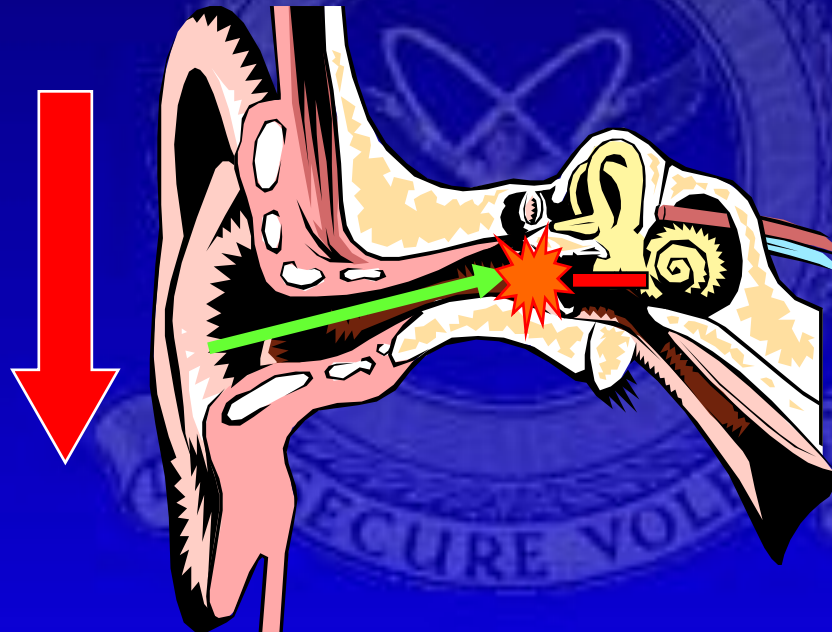
Background

- Changes in pressure creates a pressure gradient between the middle ear and the outside



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Why do we need to know how aircrew clear their ears?

- Many techniques
- Develop design criteria for oxygen masks



Methods

- Fifty aircrew completed the survey
 - Attending refresher training at RAF CAM
- Flight experience of the 50 aircrew totals 78,226 flight hours



Methods

- Participants were asked
 - How often they needed assistance clearing their ears
 - What technique they used
 - Success rate of first attempt
 - How often they needed a second/third attempt
 - How often flight would be effected if they couldn't block their nose to equalise pressure



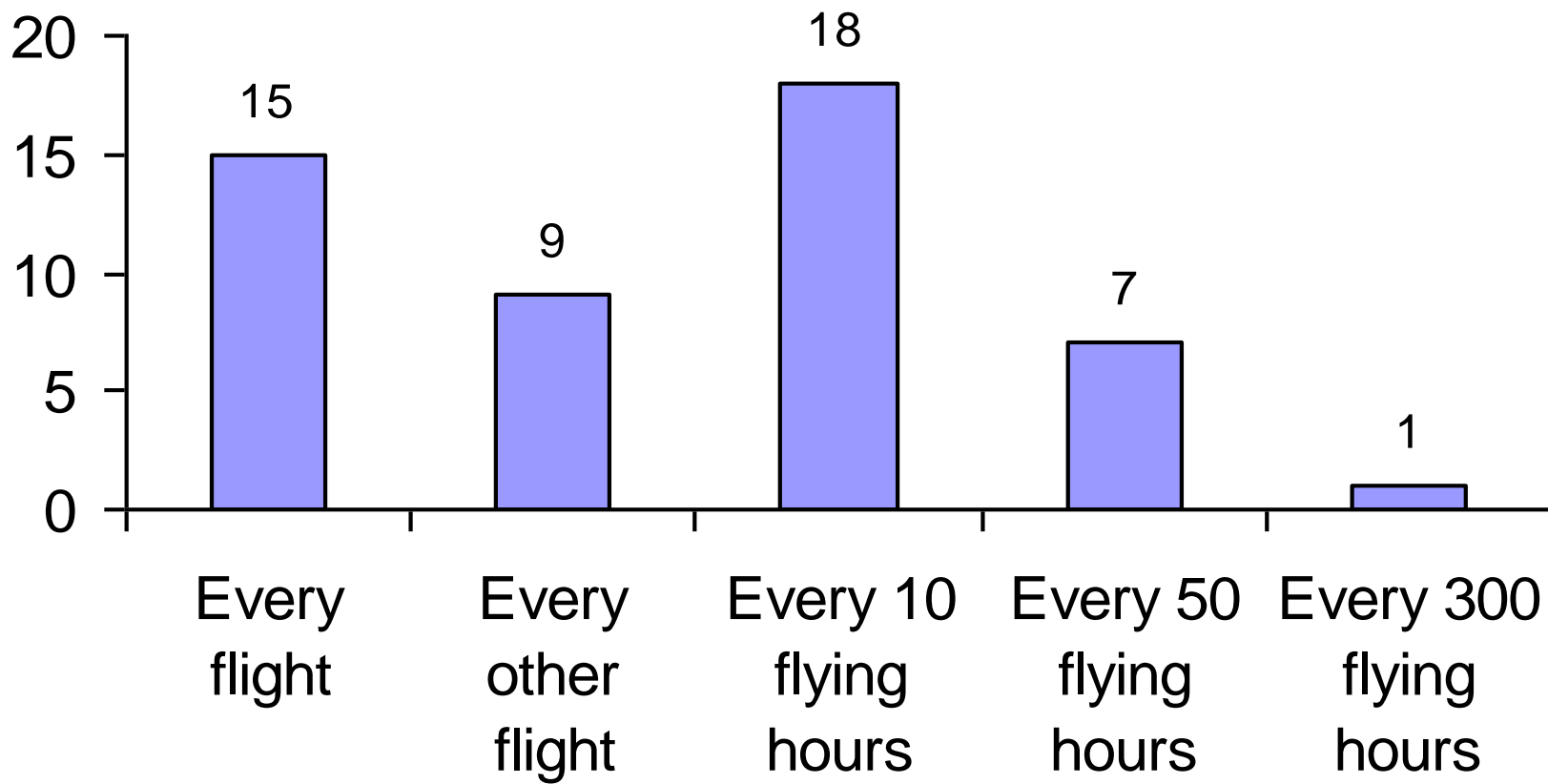
Results

Total Participants
n=50

Participants needing second attempt
n=39

Participants needing third attempt
n=22

How frequently do you need to assist ear clearance?



When you carry out ear clearance, which method most closely describes your first choice?	Number of yes response	%
Swallowing	16	34
Yawning	13	28
Stretching or turning neck	2	4
Squeezing nose and blowing – with mask on	6	13
Dropping mask and then squeezing nose	7	15
Blocking expiratory part of mask with palm of hand then blowing into mask	1	2
Other	2	4

When you carry out ear clearance, which method most closely describes your first choice?	Number of yes response	%
Swallowing	16	62
Yawning	13	
Stretching or turning neck	2	4
Squeezing nose and blowing – with mask on	6	28
Dropping mask and then squeezing nose	7	
Blocking expiratory part of mask with palm of hand then blowing into mask	1	2
Other	2	4

How often is this first attempt successful?	Number of yes response	%
100%	11	22
90% - 100%	21	42
80% - 90%	12	24
50% - 80%	5	10
25% - 50%	1	2
0% - 25%	0	0

How often is this first attempt successful?	Number of yes response	%
100%	11	88
90% - 100%	21	
80% - 90%	12	
50% - 80%	5	10
25% - 50%	1	2
0% - 25%	0	0

If this fails, what mechanism would you try next?	Number of yes response	%
Swallowing	5	13
Yawning	4	10
Stretching or turning neck	2	5
Squeezing nose and blowing – with mask on	8	21
Dropping mask and then squeezing nose	15	38
Blocking expiratory part of mask with palm of hand then blowing into mask	4	10
Other	1	3

If this fails, what mechanism would you try next?	Number of yes response	%
Swallowing	5	13
Yawning	4	10
Stretching or turning neck	2	5
Squeezing nose and blowing – with mask on	8	59
Dropping mask and then squeezing nose	15	
Blocking expiratory part of mask with palm of hand then blowing into mask	4	10
Other	1	3

With this second attempt, how often is this successful?	Number of yes response	%
100%	17	44
90% - 100%	15	38
80% - 90%	4	10
50% - 80%	3	8
25% - 50%	0	0
0% - 25%	0	0

How often do you need to make a 3 rd attempt?	Number of yes response	%
Every flight	0	0
Every other flight	0	0
Every 10 flying hours	1	5
Every 50 flying hours	9	41
Every 300 flying hours	5	23
Every 1000 flying hours	2	9
Never	4	18

If the ability to squeeze your nose was impossible, how often do you feel this would adversely affect your flying?	Number of yes response	%
Never (< 1 in 1000 hrs)	3	6
Very rarely (< 1 in 500 hrs)	14	28
Rarely (< 1 in 100 hrs)	9	18
Occasionally (< 1 in 50 hrs)	15	30
Frequently (< 1 in 10 hrs)	4	8
Always (every flight)	1	2

If the ability to squeeze your nose was impossible, how often do you feel this would adversely affect your flying?	Number of yes response	%
Never (< 1 in 1000 hrs)	3	6
Very rarely (< 1 in 500 hrs)	14	76
Rarely (< 1 in 100 hrs)	9	
Occasionally (< 1 in 50 hrs)	15	
Frequently (< 1 in 10 hrs)	4	8
Always (every flight)	1	2

Conclusion

- Aircrew frequently need assistance clearing their ears
- First attempt by most does not involve pinching the nose
- Most would need a second attempt to clear ears
- Squeezing the nose in an attempt to clear their ears is first choice for second attempt



Conclusion

- Oxygen masks should be designed with the ability to occlude the nose

