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| Question | |
| **Should FBAO removal interventions vs. no intervention be used for foreign body airway obstruction?** | |
| **Population:** | foreign body airway obstruction |
| **Intervention:** | FBAO removal interventions |
| **Comparison:** | no intervention |
| **Main outcomes:** | Survival with good neurological outcome- finger sweep; Survival- finger sweep; Return of spontaneous circulation- finger sweep; Relief of airway obstruction- finger sweep; Injuries/ complication- finger sweep; Survival with good neurological outcome- back blows; Survival- back blows; Return of spontaneous circulation- back blows; Relief of airway obstruction- back blows; Injuries/ complications- back blows; Survival with good neurological outcome- abdominal thrusts; Survival- abdominal thrusts; Return of spontaneous circulation- abdominal thrusts; Relief of airway obstruction- abdominal thrusts; Injuries/ complications- abdominal thrusts; Survival with good neurological outcome- chest thrusts; Survival- chest thrusts; Return of spontaneous circulation- chest thrusts; Relief of airway obstruction- chest thrusts; Injuries/ complications- chest thrusts; Survival with good neurological outcome- magill forceps; Survival- magill forceps; Return of spontaneous circulation- magill forceps; Relief of airway obstruction- magill forceps; Injuries/ complications- magill forceps; Survival with good neurological outcome- airway clearance devices; Survival- airway clearance devices; Return of spontaneous circulation- airway clearance devices; Relief of airway obstruction- airway clearance devices; Injuries/ complications- airway clearance devices; Survival with good neurological outcome- FBAO removal by bystanders; Survival- FBAO removal by bystanders; Return of spontaneous circulation- FBAO removal by bystanders; |
| **Setting:** | All settings |
| **Perspective:** |  |
| **Background:** |  |
| **Conflict of interests:** | None |

# Assessment

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| Problem Is the problem a priority? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ○ Probably yes ● Yes ○ Varies ○ Don't know | Foreign body airway obstruction (FBAO) is a common problem. Many cases are likely to be resolved easily, without the need to involve healthcare providers. FBAO is however an important cause of early mortality that typically affects the young and old, or individuals with impaired neurological function / swallowing. Current strategies to remove FBAO are well known to many people, but interventions can cause harm that may lead to death. Delays in treatment increase the risk of death.  In recent years, manual suction devices (airway clearance devices) have been developed that use a vacuum to remove foreign bodies. These devices have not previously been considered by ILCOR.  There is a need to carefully balance the risks and benefits of strategies to removing foreign airway. Our focus is on pre-hospital emergency interventions to remove FBAO. We do not consider advanced hospital-based interventions such as bronchoscopy. |  |
| Desirable Effects How substantial are the desirable anticipated effects? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Trivial ○ Small ○ Moderate ○ Large ● Varies ○ Don't know | Evidence of benefit in relation to the important outcome of relief of FBAO has been reported for all interventions. These data were derived mainly from case series. We were not able to report success rates of interventions as the denominator (number of individuals treated) was not robustly reported and it is often difficult to reliably determine the precise intervention that was responsible for FBAO relief.  In some case series, survival was attributed to the successful relief of FBAO, although justification for this assertion was often unclear.  For critical outcome of survival with good neurological outcome, we identified data from two cross-sectional studies. These studies reported that use of chest thrusts/ compressions and magill forceps were associated with an improvement in outcome. The effect size was large, with wide confidence intervals. There is a high risk of residual confounding despite statistical adjustment. |  |
| Undesirable Effects How substantial are the undesirable anticipated effects? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Large ○ Moderate ○ Small ○ Trivial ● Varies ○ Don't know | Evidence of harm has been reported for strategies of back blows, abdominal thrusts, chest thrusts, and blind finger sweeps. No case reports of harm were identified in relation to magill forceps or airway clearance devices, but the number of uses is likely to be low.  The majority of case reports reported harm from abdominal thrusts. Injuries reported include gastro-oesophageal injury, vascular injury, and thoracic injury. Blind finger sweeps were associated with pushing the FBAO to the larynx or trachea, and injury to soft tissues.  In some cases, the intervention removed the FBAO, but caused complications that led to death.  Airway clearance devices which incorporate a plastic tube that is inserted in to the mouth, could conceivably cause harm in a similar way to a blind finger sweep. Further evidence on safety is required. |  |
| Certainty of evidence What is the overall certainty of the evidence of effects? | | |
| Judgement | Research evidence | Additional considerations |
| ● Very low ○ Low ○ Moderate ○ High ○ No included studies | The overall certainty of evidence across all outcomes for all interventions was assessed as very low.  Our findings were based on case reports, case series and cross-sectional studies, all with important sources of bias including selection bias and confounding. For some interventions and outcomes, we further downgraded evidence certainty due to imprecision and indirectness. For case series, presented data precluded an estimate of a treatment effect (such that we were unable to consider imprecision) and limited information on included cases made assessment of directness challenging, such that we could not downgrade for indirectness. |  |
| Values Is there important uncertainty about or variability in how much people value the main outcomes? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Important uncertainty or variability ○ Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ● No important uncertainty or variability | The main outcomes were survival outcomes, effectiveness at removing FBAO, and harm. We do not anticipate important certainty in how people value these outcomes. |  |
| Balance of effects Does the balance between desirable and undesirable effects favor the intervention or the comparison? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ○ Probably favors the intervention ○ Favors the intervention ○ Varies ● Don't know | There are reported cases of benefit for back blows, chest thrusts/ compressions, abdominal thrusts, magill forceps, finger sweeps, and suction-based airway clearance devices.  There are reported cases of harm for back blows, chest thrusts, abdominal thrusts, and blind finger sweeps.  Balancing the risks and benefits of these interventions is challenging because:  - There are no robust data as to the proportion of individuals with FBAO derive benefit from these interventions; and  - There are no robust data as to the proportion of individuals with FBAO that are harmed from these interventions.  There are important sources of bias across the literature, such as:  - Individuals with FBAO where the obstruction is quickly relieved are unlikely to seek advice from a health professional, leading to under-reporting of benefit from strategies such as back slaps.  - Individuals may receive multiple interventions by both bystanders and health professionals, making it difficult to determine which interventions produced a benefit or harm, and to what extent there is an interaction between interventions. Publications often fail to report all interventions that were received.  - Some case series relied on self-report of episodes of FBAO. These series are subject to selection bias as they are more likely to receive cases of success. |  |
| Resources required How large are the resource requirements (costs)? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Large costs ○ Moderate costs ○ Negligible costs and savings ○ Moderate savings ○ Large savings ● Varies ○ Don't know | Most interventions (finger sweep, back blows, abdominal thrusts) require no equipment. The key cost relates to training costs.  For some ambulance personnel, use of magill forceps forms part of standard airway management training. Relevant equipment is routinely carried by these personnel.  Airway clearance devices are commercially produced and sold specifically for FBAO. Costs include the cost of the device and training. |  |
| Certainty of evidence of required resources What is the certainty of the evidence of resource requirements (costs)? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Very low ○ Low ● Moderate ○ High ○ No included studies | Cost was not specifically considered in the review, but there is moderate certainty regarding the resource requirements in this area.  For most interventions, the principal costs relate to training. |  |
| Cost effectiveness Does the cost-effectiveness of the intervention favor the intervention or the comparison? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Favors the comparison ○ Probably favors the comparison ○ Does not favor either the intervention or the comparison ○ Probably favors the intervention ○ Favors the intervention ○ Varies ● No included studies | We did not specifically examine the cost-effectiveness of interventions. |  |
| Equity What would be the impact on health equity? | | |
| Judgement | Research evidence | Additional considerations |
| ○ Reduced ○ Probably reduced ○ Probably no impact ● Probably increased ○ Increased ○ Varies ○ Don't know | The majority of interventions are easy and free to deliver, so there a potential for a positive effect on health equity. |  |
| Acceptability Is the intervention acceptable to key stakeholders? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know | The majority of interventions are already in established practice, so are likely acceptable to stakeholders. |  |
| Feasibility Is the intervention feasible to implement? | | |
| Judgement | Research evidence | Additional considerations |
| ○ No ○ Probably no ○ Probably yes ● Yes ○ Varies ○ Don't know | The majority of interventions are already in established practice, so are feasible to implement. |  |

# Summary of judgements

|  | **Judgement** | | | | | | |
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| **Problem** | No | Probably no | Probably yes | **Yes** |  | Varies | Don't know |
| **Desirable Effects** | Trivial | Small | Moderate | Large |  | **Varies** | Don't know |
| **Undesirable Effects** | Large | Moderate | Small | Trivial |  | **Varies** | Don't know |
| **Certainty of evidence** | **Very low** | Low | Moderate | High |  |  | No included studies |
| **Values** | Important uncertainty or variability | Possibly important uncertainty or variability | Probably no important uncertainty or variability | **No important uncertainty or variability** |  |  |  |
| **Balance of effects** | Favors the comparison | Probably favors the comparison | Does not favor either the intervention or the comparison | Probably favors the intervention | Favors the intervention | Varies | **Don't know** |
| **Resources required** | Large costs | Moderate costs | Negligible costs and savings | Moderate savings | Large savings | **Varies** | Don't know |
| **Certainty of evidence of required resources** | Very low | Low | **Moderate** | High |  |  | No included studies |
| **Cost effectiveness** | Favors the comparison | Probably favors the comparison | Does not favor either the intervention or the comparison | Probably favors the intervention | Favors the intervention | Varies | **No included studies** |
| **Equity** | Reduced | Probably reduced | Probably no impact | **Probably increased** | Increased | Varies | Don't know |
| **Acceptability** | No | Probably no | **Probably yes** | Yes |  | Varies | Don't know |
| **Feasibility** | No | Probably no | Probably yes | **Yes** |  | Varies | Don't know |

# Type of recommendation

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| Strong recommendation against the intervention | Conditional recommendation against the intervention | Conditional recommendation for either the intervention or the comparison | Conditional recommendation for the intervention | Strong recommendation for the intervention |
| ○ | ○ | ○ | ○ | ○ |

# Conclusions

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| Recommendation |
| We suggest that back slaps are used initially in patients with a FBAO and an ineffective cough (weak recommendation, very low certainty of evidence).  We suggest that abdominal thrusts are used in adults and children with a FBAO and an ineffective cough where back slaps are ineffective (weak recommendation, very low certainty of evidence).  We suggest that rescuers consider the manual extraction of visible items in the mouth (weak recommendation, very low certainty of evidence).  We suggest against the use of blind finger sweeps in patients with a FBAO (weak recommendation, very low certainty of evidence).  We suggest that appropriately skilled individuals consider the use of magill forceps to remove FBAO in OHCA patients with a FBAO (weak recommendation, very low certainty of evidence).  We suggest that chest thrusts are used in unconscious patients with a FBAO (weak recommendation, very low certainty of evidence).  We suggest that bystanders undertake interventions to support FBAO removal as soon as possible after recognition (weak recommendation, very low certainty of evidence). |
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| Justification |
| The task force recognises the importance of early removal of FBAO in order to prevent cardiac arrest. Bystanders should be encouraged to support patients with FBAO to rapidly remove the obstruction. The initial response to foreign body airway obstruction in a conscious individual should be to encourage coughing as this is a normal physiological response that may be effective and is unlikely to cause harm. The sequence of interventions in individuals without an effective cough suggested in treatment recommendations seeks to balance the benefits of early removal of the FBAO with the potential harms of interventions, such as abdominal thrusts.  We prioritised consistency with current treatment recommendations. We note the difference in methodological approaches used in this review, compared with previous reviews. In particular, previous reviews included cadaver, animal, and manikin studies.  We note that evidence for all outcomes is assessed as being of very low certainty. Research on FBAO is challenging as many FBAO are treated immediately and effectively by bystanders. It is unlikely to be possible to undertake a randomised controlled trial in the area of FBAO.  The task force distinguished between the situation where a FBAO can be visualised in the mouth and the situation where no object can be visualised. Where an obstruction can be visualised in the mouth, the manual removal of the item was considered appropriate. Where an item could not be visualised in the mouth, the potential harm to the casualty associated with the rescuer placing and moving their fingers in the casualty’s mouth (a blind finger sweep) and lack of clear benefit to this approach led to a suggestion against the use of blind finger sweeps.  The task force treatment recommendation limits use of abdominal thrusts to adults and children. This was driven by concerns that in infants the limited protection of the upper abdominal organs by the lower ribs may mean that the harm of abdominal thrusts outweighs any potential benefit. This is consistent with previous treatment recommendations.  The task force treatment recommendation supporting the use of chest thrusts/ compressions is based on evidence from case series of successful relief of FBAO (unknown whether patients in cardiac arrest) and an observational study that found that chest compressions improved neurologically intact survival in unresponsive patients with FBAO. Our current recommendation is consistent with previous treatment recommendations.  The introduction of a treatment recommendation supporting the use of magill forceps by suitably trained individuals reflects the potential benefit of the intervention and the availability of relevant equipment to trained individuals. The task force expects that these trained individuals will already be skilled in advanced airway management. The treatment recommendation is based on evidence from case series of successful relief of FBAO (unknown whether patients in cardiac arrest) and an observational study that found magill forceps use was associated with improved neurologically intact survival in OHCA patients.  The task force acknowledges that there are some data from a case series demonstrating the efficacy of suction-based airway clearance devices. We felt that these data were insufficient to support the implementation of a new technology with an associated financial cost. We noted that the limited number of cases is likely insufficient to provide preliminary data on harm. On this basis, the task force felt that there was insufficient evidence to make a treatment recommendation in relation to these devices. The task force has outlined recommendations for further research in relation to these devices. |

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| Subgroup considerations |
| It may be appropriate to consider different strategies to FBAO removal depending on the type of material ingested (e.g. solid, sticky), but there were insufficient data to support such an approach.  We note that there are different strategies that may be used to apply some FBAO interventions, in particular abdominal thrusts.  Novel approaches to abdominal thrusts have been described in specific circumstances such as victims unable to stand (e.g. the table manoeuvre) or victims that experience FBAO while alone. We did not identify any specific evidence related to these strategies that was eligible for inclusion in this review. |

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| Implementation considerations |
| Our treatment recommendations broadly reflect current treatment.  Recommended interventions require either no equipment or use of equipment that will already be available. |

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| Monitoring and evaluation |
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| Research priorities |
| There is a need for high-quality observational studies that accurately describe the incidence of FBAO, patient demographics (age, setting, comorbidities, food type, conscious level), full range of interventions delivered, who delivered interventions (health professional/ lay responder), success rates of interventions, harm of interventions, and outcomes. It is unlikely that such a study can be conducted using only health service data.  There is a need for further evidence specifically on the benefits and harms of suction-based airway clearance devices. The task force would encourage the prospective registration of all device uses. Reports should detail key demographics (e.g. age, setting, comorbidities, food type, conscious level), full range of interventions provided, who provided intervention (lay versus healthcare professional) and outcomes This evidence may initially come in the form of published case series. |