1   **RESEARCH PROTOCOL**

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3   **STUDY TITLE: Curriculum for Airway Skills in Critically Ill Adults: a Delphi**

4   **Evaluation (CASCADE)**

5   **Training Curriculum for Physicians Involved with Airway Management in**

6   **Critically Ill Patients: a Delphi Study**

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8   Clinicaltrials.gov: NCT06689748

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10   Dated: February 20, 2025

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32   **INVESTIGATORS** (Steering committee members)

33   Sheila Nainan Myatra MD, Mumbai, India

34   Andy Higgs, Warrington, UK

35   Robert Greif, Bern, Switzerland

36   Prashant Nasa MD, Wolverhampton, UK

37   George Kovacs, Halifax, Canada

38   Aaron Joffe, Phoenix, AZ, USA

39   Massimiliano Sorbello, Enna, Italy

40   Wade Brown MD, Nashville, TN, USA

41   Craig S. Jabaley MD, Atlanta, GA, USA

42   Mary Jarzebowski MD, Ann Arbor, MI, USA

43   Kunal Karamchandani MD, Dallas, TX, USA

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45   **Need and Scope of the Project**

46   Airway management in critically ill patients is associated with significant morbidity and

47   mortality.[1,2] In an international Delphi study, the need for a training curriculum for

48   airway management in critically Ill patients was identified.[3] While attempts have been

49   made to collaborate and define the training, and learning requirements in this field[4],

50   significant discrepancies remain between different countries and even between different

51   specialities in the same jurisdiction. Further clarity is needed. In order to define the

52   essential components of the training curriculum for airway management in critically ill

53   patients, we plan to conduct a Delphi study involving a diverse group of international

54   experts from various specialities involved with airway management in critically ill adults.

55   The stakeholders include physicians involved with airway management in critically ill

56   patients, including (but not limited to) the specialities of Emergency, and Acute

57   Medicine, Pulmonology (or Respiratory Medicine), Critical Care Medicine, Internal

58   Medicine, and Anaesthesiology. The proposed components of this Delphi include,

59   identifying the scope of such training, description of the training methods, and detailing

60   the specifics of training requirements for patient preparation and optimisation. The

61   Delphi will also include domains defining mandatory (core practice) and desirable

62 (advanced practice) components of training requirements for airway management, and

63 airway monitoring, as well as assessment of training, and future research priorities.

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67 **OBJECTIVES**

68 1. To generate consensus on different components of curriculum for physicians

69   involved with airway management in critically ill patients.

70 2. To generate consensus on the teaching and training methods and assessment of

71   both for physicians involved with airway management in critically ill patients.

72 3. To generate consensus statements on the mandatory (core practice) and desirable

73   (advanced practice) components of training requirements for physicians involved

74   with airway management in critically ill patients.

75 4. To generate consensus on educational requirements pertaining to physiologic

76   monitoring of critically ill patients during airway management.

77 5. To identify research priorities for future of training and learning curricula

78   regarding airway management in critically ill patients.

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METHODOLOGY

Steering Committee

A Steering Committee (SC) comprised of physicians with experience in airway management in critically ill patients was formed including a Delphi methodologist. The Steering Committee selected Experts from across the globe based on pre-defined criteria.

Selection of Experts

A diverse (specialty, geography, sex, country, resource setting) group of physicians meeting ALL the following inclusion criteria:

1. Clinical expertise in airway management of critically ill patients
2. Educators with expertise in teaching and training in airway management of critically ill patients.
3. At least one publication and/or research project related to airway management in critically ill patients.
We will include 3-5 learners, for whom these criteria will be liberalized,. As they represent the group to whom training curricula apply.

The Delphi process

The Delphi process is a well-established methodology to generate consensus on a particular topic using the "collective intelligence" of panel members.[5,6] The steering committee members will perform a literature search on the available evidence, including existing curriculum for airway management, draft the initial statements, and will conduct iterative Delphi rounds to generate consensus among the experts. The Steering Committee members will not participate in the Delphi surveys. The study findings will be reported according to the ACCORD criteria.[7]

Steps of the Delphi process

110   *Step 1: Establishing a preliminary list of broad domains*

111   A focused literature review was performed by the members of the SC and based on their

112   findings, the steering committee identified the following broad domains, which were used

113   to draft statements for Round one of the Delphi process.

114   List of domains:

115   1. Educational need and scope

116   2. Teaching and Training methods in Airway Management

117   3. Patient preparation for Airway Management

118   4. Mandatory or Core teaching and training requirements in Airway Management

119   5. Desirable or Advanced teaching and training requirements in Airway
120   Management

121   6. Training in patient monitoring modalities during Airway Management

122   7. Assessment of teaching and training progress, and evaluation of the curriculum

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124   *Step 2: Preparation of the Delphi Round One Survey*

125   The list of questions related to the domains outlined above will be sent to the Experts as a

126   Delphi questionnaire. The anonymity of the Experts will be maintained until the end of

127   the Delphi rounds. The Experts will be asked to answer questions related to the

128   curriculum based on their experience and knowledge of the subject. The questions will

129   either be multiple choice or a 7-point Likert scale (*strongly agree, agree, somewhat*

130   *agree, neither agree nor disagree, somewhat disagree, disagree, strongly disagree*). The

131   experts can also provide their opinion regarding additional questions, deletion of

132   questions or modification using free-text. The responses of experts will be collated during

133   the analysis of results and shared in the following survey as controlled feedback.

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135   *Step 3: Subsequent Delphi Rounds*

136 The steering committee will review the results of round one. The statements listed will be
137 modified, deleted, or added if found ambiguous based on the feedback and comments of
138 the experts. The remaining statements will be continued in the subsequent rounds until
139 the stability of the responses is achieved. The cumulative results of round two will be
140 presented to experts along with anonymized comments, and the survey process will be
141 repeated with the modified questionnaire. The Delphi rounds will be continued until the
142 desired consensus and stability is achieved for statements. .

143 *Step 4: Final Consensus*

144 Only the statements that achieved consensus and stability will be used develop consensus
145 statements. The results of the last stable round will be used to issue the consensus
146 statements related to the above-mentioned domains. The results of the final survey,
147 consensus statements, and the manuscript will be circulated among the experts for
148 approval before submission for publication.

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150 **Statistical analysis**
151 A descriptive analysis of the preliminary survey will be performed. For the Delphi
152 process, stability will be checked by non-parametric chi-square ($\chi2$) tests or Kruskal-
153 Wallis test from round two onwards. A statement is said to be stable if p-value is > 0.05
154 for two consecutive rounds *Consensus* will be considered reached when a statement
155 achieves $>=75\%$ of votes for multiple-choice questions and likert-scale statements. A
156 statement will be continued in the questionnaire round until response stability is
157 achieved. Consensus statements will be considered as those that generate both consensus
158 and stability.

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160 **PROPOSED TIMELINE**
161 10/2025: Preliminary survey development, dissemination, and analysis
162 03/2025: Development and dissemination of the Round one Delphi survey
163 04/2025: Subsequent Delphi rounds
164 07/2025: Analysis of Delphi survey results and preparation of statements
165 10/2025: Manuscript writing and submission for publication

166 **Excurse on medical education terms:**

167 **Education** is in the broader context a lifelong comprehensive process of learning and
168 acquiring knowledge, skills, values, and beliefs (attitudes). It aims to develop critical
169 thinking, problem-solving, and creativity. Education includes the learning of abstract
170 concepts and theories. This encompasses a curriculum, which provides the specific
171 content and methods used to achieve educational goals to achieve during specialist
172 training (in this case for airway management in critical ill patients – very specific).

173 **Curriculum** is a roadmap, a planned course of study or instruction, outlining the goals,
174 objectives, content, and methods of teaching. This provides a tailored framework and the
175 structure within which education, teaching, and training takes place for each objective.

176 **Teaching** is the delivery mechanism or method of imparting knowledge and skills to
177 others, within a structured curriculum. It facilitates learning, using various methods (e.g.
178 lectures, discussions, and hands-on activities, tutoring, etc.) to help learners to understand
179 and to apply the content of the curriculum. It must be adapted to the learner's' needs.

180 **Training** is skill-focused learning, a targeted approach to developing specific skills and
181 competencies as part of a curriculum. Training emphasizes hands-on practice, application
182 of knowledge, and interaction of health care providers within the team, often in a
183 simulated or real-world setting.

184 **Relationships:**

Feature	Education	Teaching	Training	Curriculum
Scope	Broad	Specific	Specific	Structured
Focus	Knowledge, skills, values, beliefs	Knowledge & skill transfer	Skill development	Content & methods
Timeframe	Long-term	Medium-term	Short-term	Varies
Setting	Formal & informal	Structured	Structured or unstructured	Formal & informal
Role of the facilitator	Guide & support	Active instruction	Facilitate practice	Design & implement

195 • Training enhances skills: Training programs often focus on specific skills identified

196   within a curriculum, such as technical and non-technical skills.

197 • Teaching supports learning: Effective teaching helps learners acquire the knowledge,

198   skills and attitudes outlined in the curriculum.

199 • Curriculum informs teaching: Teachers use the curriculum to plan lessons, select

200   materials, assess the learners and evaluate the learning process.

201 • Education is the ultimate goal: It is the overarching framework that encompasses

202   curriculum, teaching, and training, with the goal of fostering lifelong learning and

203   personal growth.

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