TRAINEE RESEARCH IN INTENSIVE CARE NETWORK
PROJECT 2023

ID-ACCT

Identification of Difficult Airways in Critical Care uniTs

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PROPOSAL DETAILS

PROJECT TITLE	Identification of Difficult Airways in Critical Care uniTs (ID-ACCT)		
SUBMITTED BY	Dr T McClelland	**PROJECT TYPE**	Service Evaluation
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PROJECTED START DATE	December 2023	**PROJECTED COMPLETION DATE**	April 2024

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1. ID-ACCT OVERVIEW

1.1 Background

The fourth National Audit Project (NAP4) of the Royal College of Anaesthetists and Difficult Airway Society, published in 2011, examined the prevalence and causation of major complications of airway events in UK hospitals over a 12-month period(1). Airway-related complications were over 50 times more common in intensive care than in anaesthesia, and more likely to lead to serious patient harm(2). Over 60% of events reported to NAP4 from ICUs resulted in death or brain damage, compared to 14% of events during an anaesthetic(3). Route-cause analysis revealed poor identification of at-risk patients and poor planning were amongst the reasons for adverse airway events. The report highlighted organisational issues such as lack of equipment, policies and training as well as individual errors, including human factors, judgement errors, and loss of situational awareness(4). Importantly, the report suggested deaths due to airway-related complications were avoidable(3).

NAP4 made multiple recommendations to improve patient safety, including:

- Patients risk of airway events should be identified and clearly identifiable to those caring for them
- At-risk patients should have primary and back-up plans airway management plans made and documented.
- Airway management plans should identify any additional equipment and skills necessary to carry out the plan, and should be communicated to on-coming staff at each staff handover
- Every ICU should have immediate access to a difficult airway trolley and a fibrescope

A two-year follow up national survey by Cook et al. (2) examined the impact of NAP4 on the 'safety gap' between current and ideal practice. Vast improvements were noted with the use of continuous capnography, difficult intubation policies and intubation checklists. However, assessment, planning and handover of potential/known airway difficulty remained suboptimal (2).

1.2 Aims of ID-ACCT

1. Evaluate whether and how patients are identified as having a potentially difficult airway
2. Assess the prevalence of patients with known or predicted difficult airway management.
3. Evaluate whether airway management plans are documented for patient with known or predicted difficult airway management.
4. Survey whether emergency airway equipment (emergency airway trolleys and fibrescopes) and intubation checklists are available on ICUs for unplanned airway events.

1.3 Why this service evaluation is important?

Of all clinical settings examined by NAP4, ICUs reported the greatest incidence of airway-related complications, most harm to patients secondary to these complications, highest rates of suboptimal practice, and highest rates of avoidable deaths(3). There is a dearth recent and high-quality published data on the incidence of difficult airways in intensive care. Two studies examining emergency intubations in critically ill populations highlighted initial intubation failure rates of >10% and a significant burden of serious life-threatening complications(5, 6). This proposed service evaluation has the potential to produce high-quality data on the incidence of difficult airway management in intensive care and provide an evidence-base for national guideline development to reduce the avoidable deaths from airway complications.

2. ID-ACCT ORGANISATIONAL STRUCTURE

ID-ACCT is a Trainee Research in Intensive Care (TRIC) Network study. The TRIC Network consists of a central committee, which has contributed to the study design, and regional leads, whose role involves the identification of local hospitals and trainees interested in contributing to national research and audit projects.

2.1 Explanation of roles

Regional Leads
Role:

- Identification and co-ordination of local site leads in hospitals within the region
- Communication with site leads to co-ordinate data collection within the data collection window

Site Leads
Role:

- Ensure appropriate registration of the service evaluation with local governance requirements
- Feedback to the ID-ACCT study team with confirmation of project registration
- Identification of a 48-hour window of data collection within the permitted two-week period, in coordination with the Regional Lead.
- Organisation of database access for local study team members by liaising with the central study team.
- Co-ordinate data collection at their site
- Feedback to TRIC network to confirm data collection is completed

3. METHODOLOGY

This study will follow methodology for a service evaluation.

3.1 Study Setting

Adult ICUs in the UK offering Level 2 and/or Level 3 care, including but not limited to, high-dependency units, intensive care units, specialist intensive care units (neurological/cardiothoracic/hepatic) and post-anaesthesia care units.

3.2 Population

All inpatients in intensive care settings at each registered hospital meeting the following screening against the following criteria:

Inclusion Criteria

- Adult (>18 years of age)
- Patient in an intensive care setting with an artificial airway device e.g. endotracheal tubes, tracheostomy **OR** a non-intubated patient who **does not have** treatment escalation decisions in place which would preclude insertion of an artificial airway (e.g. endotracheal tube)
- Over 12 hours since admission to intensive care **OR** within 12 hours of admission if the patient has a documented review by an ICU consultant

Exclusion criteria

- Patients with documented treatment escalation plans such that, in event of deterioration, an artificial airway (e.g. endotracheal intubation) **would not** be inserted (or re-inserted if an artificial airway device is already in situ)

3.3 Definitions

Patients 'at-risk' of or anticipated to have difficult airway management:

- Presenting complaint pertaining to the airways e.g. airway oedema/epiglottitis
- Surgical intervention affecting airway or its management e.g. head and neck surgery, ENT surgery,

neurosurgery

- Facial/neck trauma e.g. unstable or uncleared C-spine, facial/jaw trauma, penetrating neck injuries
- Patient factors: MOCACHA Score ≥3 [see Appendix 1]
- Alternative airway devices e.g. tracheostomy
- Clinician discretion: pragmatic decision on airway difficulty accepted if it does not fit the above criteria provided adequate explanation of decision is provided

Patients known to be difficult airway:

- Previously documented difficult intubation (Grade III and above, or equivalent difficulty with video-assisted methods)
- Previously documented difficulty in bag-valve mask ventilation

3.4 Data collection

Data will be collected at each study site during a continuous 48-hour period within a 2-week national data collection window. Data will be collected for all patients in intensive care and any new admissions meeting the inclusion criteria during the chosen 48-hour period.
Please refer to Appendix 3 for a flowchart of the data collection process.

There are two categories of data collection:

1. Unit-level data

A point-survey of institutional preparedness for emergency airway events to include:

- Presence and availability of
    - a difficult airway trolley (including contents)
    - emergency front-of-neck access kit
    - video-assisted laryngoscopy
- Formalised local polices/checklists on:
    - Intensive care intubation

2. Patient-level data

No patient identifiable data will be collected by this service evaluation.

a) Basic demographic data: BMI

b) Presence of airway pathology, surgical intervention to airway, facial/neck trauma

c) Airway status: intubated, self-ventilating, tracheostomy

   a. If intubated or previously intubated during current admission: intubation details including place of intubation, intubating healthcare professional, device used, documented grade of intubation and other features of reported difficulty, use of capnography

   b. If self-ventilating: airway assessment (if applicable) using non-invasive clinical examination including cervical spine mobility and Mallampati score, as well as presence of obstructive sleep apnoea, level of consciousness and hypoxia

   c. If tracheostomy present: tracheostomy safety mechanisms (presence of standardised bedside alert algorithms, tracheostomy boxes, emergency management algorithms)

d) Identification of patient (if known/predicted difficulty in airway management): bedside alert, handover documentation, electronic alerts

3.5 Data security and requirements of participating hospitals

This service evaluation is co-ordinated by Queen's Hospital (Barking, Havering and Redbridge University Hospitals Trust).

Data will be collected from individual hospitals will be entered directly to an electronic case report form (CRF) using a secure data entry web portal, 'Research Electronic Data Capture' (REDCap, www.project-redcap.org). This platform is secure, password protected, and hosted by the University of Liverpool. Patient identifiable information will not be collected by this service evaluation and will not be entered to the online database.

Submitted data will be analysed centrally by authorised users within the ID-ACCT study group.

Only authorised users at each participating NHS hospital will have access to the electronic case report form. User accounts for the service evaluation database will not be issued unless the ID-ACCT study team has received evidence of:

- Successful registration of ID-ACCT via local clinical governance processes
- Caldicott Guardian permission for data to be submitted to the ID-ACCT database

2.5 Consent

A sub-group of patients identified by this study will require clinical examination as part of the data collection process. This clinical examination involves a non-invasive assessment of airway difficulty using a validated scoring system of known risk factors suggestive of difficult airway management in ICU patients (See Appendix 1). This examination is an established and routine standard of care carried out by healthcare professionals in the context of patients requiring intubation or other airway interventions. In current practice, verbal patient consent is recognised as appropriate prior to this clinical examination.

2.6 Risks and Patient Safety

Improved patient safety is the central theme of this study.
In the event a patient is identified as 'at-risk' of an airway event (either known difficult airway management or predicted difficult airway management as a result of assessment of risk factors identified by this study), the data collector will be prompted to highlight this finding to an appropriate member of the clinical team. This will actively promote clinical awareness of potential difficulty in airway management and empower the clinical team to act appropriately in response to this information ensuring patient safety is maintained. As a service evaluation, this protocol does not suggest alteration to current airway management or interfere with clinical management decisions, which will remain the remit of the clinical team caring for the patient.

4. DISSEMINATION AND REPORTING

No patient identifiable data will be collected.

Study findings will be disseminated at the conclusion of data collection and analysis via:

- Peer-reviewed academic publications
- Summary infographics for enrolled sites
- Conference papers and presentations

5. CONFLICTS OF INTEREST AND FUNDING

At time of writing there are no funding sources or applications for funding awaited. In the event the study receives funding, the appropriate details will be made available.

Conflicts of interest:

All current authors have no conflict of interest.

6. RELATED DOCUMENTS

NAME	DESCRIPTION	FILE NAME / LOCATION / LINK
ID-ACCT Organisational Structure	Description of ID-ACCT Network and requirements of regional/site leads	
Instructions for Collaborators	Step-by-step instructions for local site leads	

References

1. Cook TM, Woodall N, Frerk C. NAP4: Major Complications of Airway Management in the United Kingdom. 4th National Audit Project of The Royal College of Anaesthetists and The Difficult Airway Society. 2011.
2. Cook TM, Woodall N, Frerk C. A national survey of the impact of NAP4 on airway management practice in United Kingdom hospitals: closing the safety gap in anaesthesia, intensive care and the emergency department. BJA: British Journal of Anaesthesia. 2016;117(2):182-90.
3. Cook TM, Woodall N, Harper J, Benger J. Major complications of airway management in the UK: results of the Fourth National Audit Project of the Royal College of Anaesthetists and the Difficult Airway Society. Part 2: intensive care and emergency departments. British Journal of Anaesthesia. 2011;106(5):632-42.
4. Cook TM, Astin JP, Kelly FE. Airway Management in ICU: Three Years on from NAP4. ICU Management and Practice. 2014;14(2).
5. Schwartz DE, Matthay MA, Cohen NH. Death and other complications of emergency airway management in critically ill adults. A prospective investigation of 297 tracheal intubations. Anesthesiology. 1995;82(2):367-76.
6. Jaber S, Amraoui J, Lefrant JY, Arich C, Cohendy R, Landreau L, et al. Clinical practice and risk factors for immediate complications of endotracheal intubation in the intensive care unit: a prospective, multiple-center study. Crit Care Med. 2006;34(9):2355-61.

APPENDIX 1: MACOCHA SCORE

TABLE 5. MACOCHA SCORE CALCULATION WORKSHEET

Factors	Points
Factors related to patient	
Mallampati score III or IV	5
Obstructive sleep apnea syndrome	2
Reduced mobility of cervical spine	1
Limited mouth opening <3 cm	1
Factors related to pathology	
Coma	1
Severe hypoxemia (<80%)	1
Factor related to operator	
Nonanesthesiologist	1
Total	12

Definition of abbreviation: MACOCHA = Mallampati score III or IV, Apnea syndrome (obstructive), Cervical spine limitation, Opening mouth <3 cm, Coma, Hypoxia, Anesthesiologist nontrained.

Coded from 0 to 12: 0 = easy; 12 = very difficult.

Figure 1 - The MACOCHA score - Table from De Jong et al. 2013.

References:

1. De Jong A, Molinari N, Terzi N, Mongardon N, Arnal JM, Guitton C, Allaouchiche B, Paugam-Burtz C, Constantin JM, Lefrant JY, Leone M, Papazian L, Asehnoune K, Maziers N, Azoulay E, Pradel G, Jung B, Jaber S; AzuRéa Network for the Frida-Réa Study Group. Early identification of patients at risk for difficult intubation in the intensive care unit: development and validation of the MACOCHA score in a multicenter cohort study. Am J Respir Crit Care Med. 2013 Apr 15;187(8):832-9. doi: 10.1164/rccm.201210-1851OC. PMID: 23348979.

APPENDIX 2: EXAMPLAR CLINICAL GOVERNANCE FORM

Title: ID-ACCT (Identification of Difficult Airways in Critical Care uniTs) – A national service evaluation		**Advisory notes**
Division:	Critical Care and Anaesthetics	*Your local site division or department may have a different name*
Specialty:	Intensive Care Medicine	
Departmental Audit/Clinical Governance lead:	Dr X Y (Consultant in Intensive Care Medicine)	*This will be the consultant within your unit who has overall role for audit/clinical governance*
Audit/Project Supervisor:	Dr X Y (Consultant in Intensive Care Medicine)	*In most hospitals, this will require a named consultant to sponsor the project*
Project lead:	[Your Name]	
Other project team members:		*Insert names of other collaborators for data collection*
Type of project:	☐ Local ☐ National ☐ NICE ☐ Quality standard	*Select national or equivalent*
Site:	X X Hospital	*Insert your hospital name or if your trust has intensive care units across multiple sites, list them all*
Proposed start date:	4/12/2023	
Proposed completion date:	17/12/2023	

National Patient Data Opt-Out/Information Governance		
Are you using anonymous data (non-identifiable patient data)?	Yes	*ID-ACCT does not request nor hold data which is identifiable or likely to be identifiable.*
Do you have the patient's consent to use their data?	No	
Does this audit have CAG approval under Section 251? *(National Audits only)*	No	
Do you intend to present the audit findings outside the Trust?	Yes	*You must inform your local information governance team this project will have data collected centrally.*

Further common aspects of audit/QI/service evaluation registration forms:

1. Standards/Guidelines being reviewed/audited:

Name: National Audit Project (NAP4) – Major Complications of Airway Management in the United Kingdom

Standard(s):
NAP4 made multiple recommendations to improve patient safety in ICUs, including:

- Patients risk of airway events should be identified and clearly identifiable to those caring for them
- At-risk patients should have primary and back-up plans airway management plans made and documented.
- Airway management plans should identify any additional equipment and skills necessary to carry out the plan, and should be communicated to on-coming staff at each staff handover
- Every ICU should have immediate access to a difficult airway trolley and a fibrescope

2. Aims

The Fourth National Audit Project (NAP4) examined the prevalence, causation and complications of major airway events in UK hospitals over a 12-month period. A key finding of this audit was at least 1 in 4 major airway events occurred in an ICU or emergency department setting. Importantly, the outcomes of these events was more likely to result in patient death or permanent harm to the patient. Given the risk of harm is significant, evaluating the service we provide to patients and improving our identification, awareness and planning of/for major airway events is key to improving patient safety.

ID-ACCT aims to:

1. Evaluate whether and how patients are identified as having a potentially difficult airway
2. Assess the prevalence of patients with known or predicted difficult airway management.
3. Evaluate whether airway management plans are documented for patient with known or predicted difficult airway management.
4. Survey whether emergency airway equipment (emergency airway trolleys and fibrescopes) and intubation checklists are available on ICUs for unplanned airway events.

3. Audit criteria

Audit Criteria (What should be happening, e.g. Prescriptions should be clearly signed and dated)	**Acceptable audit target** (% of cases where this should happen)	**Exception** (Any circumstances where you would not expect this to happen)
Assessment of patients at risk of airway events (those at increased risk of problems or for whom the standard algorithms are not appropriate)	100%	Patients with defined escalation decisions
Clear mechanism for identification of patients at risk of airway events (those at increased risk of problems or for whom the standard algorithms are not appropriate)	100%	Patients with defined escalation decisions
Documentation of primary and back-up plans for patients at risk of airway events	100%	Patients with defined escalation decisions

Availability of difficult airway trolley (including cricothyroidotomy kit) and fibrescope on each unit	100%	

4. Methodology

This service evaluation is co-ordinated by Queen's Hospital (Barking, Havering and Redbridge University Hospitals Trust). Data will be collected from individual hospitals will be entered directly to an electronic case report form (CRF) using a secure data entry web portal, 'Research Electronic Data Capture' (REDCap, www.project-redcap.org). This platform is secure, password protected and hosted by the University of Liverpool. Patient identifiable information will not be collected by this service evaluation and will not be entered to the online database.

Submitted data will be analysed by authorised users within the ID-ACCT study group.

Only authorised users at each participating NHS hospital will have access. User accounts for the service evaluation database will not be issues unless the ID-ACCT study team has received:

- Successful registration of ID-ACCT via local clinical governance processes
- Caldicott Guardian permission for local data to be submitted to the ID-ACCT database

Sample size:
All current inpatients in [insert intensive care name] and new admissions during a 48-hour data collection window meeting the following screening criteria.

All inpatients in intensive care settings at each registered hospital meeting the following screening against the following criteria:

Inclusion Criteria

- Adult (>18 years of age)
- Patient in an intensive care setting with an artificial airway device e.g. endotracheal tubes, tracheostomy **OR** a non-intubated patient who **does not have** treatment escalation decisions in place which would preclude insertion of an artificial airway (e.g. endotracheal tube)
- Over 12 hours since admission to intensive care **OR** within 12 hours of admission if the patient has a documented review by an ICU consultant

Exclusion criteria

- Patients with documented treatment escalation plans such that, in event of deterioration, an artificial airway (e.g. endotracheal intubation) **would not** be inserted (or re-inserted if an artificial airway device is already in situ)

Timeframe:
48-hour [insert time frame you have selected within national two week data collection period, Monday 4th December to Sunday 17th December]

Methods:

Prospective data collection
Data collected via RedCap (Research Electronic Data Capture) software (University of Liverpool)

No patient identifiable data is collected.

Definitions:
Patients 'at-risk' of or anticipated to have difficult airway management:

- Presenting complaint pertaining to the airways e.g. airway oedema/epiglottitis
- Surgical intervention affecting airway or its management e.g. head and neck surgery, ENT surgery, neurosurgery
- Facial/neck trauma e.g. unstable or uncleared C-spine, facial/jaw trauma, penetrating neck injuries
- Patient factors: MOCACHA Score $\geq$3
- Alternative airway devices e.g. tracheostomy
- Clinician discretion: pragmatic decision on airway difficulty accepted if it does not fit the above criteria provided adequate explanation of decision is provided

Patients known to be difficult airway:

- Previously documented difficult intubation (Grade III and above, or equivalent difficulty with video-assisted methods)
- Previously documented difficult bag-valve mask ventilation

Data collection has two categories:

1. Unit-level data

A point-survey of institutional preparedness for emergency airway events to include:

- Presence and availability of
    - a difficult airway trolley (including contents)
    - emergency front-of-neck access kit
    - video-assisted laryngoscopy
- Formalised local polices/checklists on:
    - Intensive care intubation

2. Patient-level data

No patient identifiable data will be collected by this service evaluation.

A sub-group of patients identified by this study will require clinical examination as part of the data collection process. This clinical examination involves a non-invasive assessment of airway difficulty using a validated scoring system of known risk factors suggestive of difficult airway management in ICU patients (MACOCHA). This examination is an established and routine standard of care carried out by healthcare professionals in the context of patients requiring intubation or other airway interventions. In current practice, verbal patient consent is recognised as appropriate prior to clinical examination.

e) Basic demographic data: BMI
f) Presence of airway pathology, surgical intervention to airway, facial/neck trauma
g) Airway status: intubated, self-ventilating, tracheostomy
    a. If intubated or previously intubated during current admission: intubation details including place of intubation, intubating healthcare professional, device used,

documented grade of intubation and other features of reported difficulty, use of capnography

   b. If self-ventilating: airway assessment (if applicable) using non-invasive clinical examination including cervical spine mobility and Mallampati score, as well as presence of obstructive sleep apnoea, level of consciousness and hypoxia
   c. If tracheostomy present: tracheostomy safety mechanisms (presence of standardised bedside alert algorithms, tracheostomy boxes, emergency management algorithms)

h) Identification of patient (if known/predicted difficulty in airway management): bedside alert, handover documentation, electronic alerts

APPENDIX 3: DATA COLLECTION FLOW CHART