

## Pain Management during Endotracheal Tube Suctioning: An Evidence-Based Approach for Nurses

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### ABSTRACT

**Background:** Endotracheal tracheal tube suctioning (ETS) is one of the most common forms of pain facing by critically ill adult patients. Inadequate pain management during ETS is however, still evidenced. Optimal pain management during ETS is highly needed.

**Objectives:** The purpose of this study is to develop evidence-based nursing interventions to manage pain during ETS.

**Methodology:** The step in conducting integrative review was employed. A set of recommendations to manage pain during ETS was synthesized. A set of nursing intervention recommendations was also developed in check-list form and algorithm. The final draft was discussed with experts in clinical setting.

**Results:** A set of evidence-based nursing intervention to manage pain related ETS consists of the recommendations for pain management before ETS, the management of pain during ETS and, the management of pain after ETS.

**Conclusion:** Evidence-based interventions to manage pain during ETS were feasible to manage pain in adult. This intervention should be further utilized in combination with other guidelines as well as to other healthcare providers.

### Keywords

Pain, Endotracheal tube suctioning, Evidence-based.

### Introduction

Pain is a major health problem affects people throughout the lifespan with no exception for critically ill patients [1]. Previous studies revealed the majority of adult critically ill patients (70%) experienced pain during their stays in intensive care unit (ICU) [2,3]. Unrelieved pain has long been identified as one of the greatest concerns for ICU patients [1]. Unrelieved pain also can cause insufficient sleep and becomes one of the main sources of psychological stress for ICU patients [1]. Besides the physical suffering, acute pain elicits psychological responses such as fear, anxiety, demoralization, and feeling of helplessness, fatigue, and loss of control. In addition, pain associated with stress can persist

after hospital discharge as a result of developing a long-term psychological burden on patients [1].

Several factors can account for the high incidence of pain as well as inadequate pain management in critical care setting. These factors include the underlying disease requiring ICU admission, the inability of mechanically ventilated patients to report pain and pain from procedures [3]. Procedural-related pain is one of the most common forms of pain facing by critically ill patients on a regular basis [1]. Previous studies revealed patients reported repeated painful procedures as strong negative memories of the time in intensive care unit [2,1]. Many procedures occur in health care setting causing actual or potential tissue damage, as a result, producing pain [4]. In critical care setting, common procedures as well as nursing procedures that can induce pain such as turning,

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tracheal suctioning, wound care, line insertion, and chest drain removal [1].

Endotracheal tube suctioning (ETS) has been identified as one of the most painful procedures in critically ill adult patients with a mechanical ventilator [5]. Fifty percent of the patients undergoing endotracheal tube suctioning experienced moderate to severe pain [5]. Unrelieved pain during ETS can lead to adverse physical and psychological patient outcomes [6,5]. The physical consequences of inappropriate pain management in ETS-related pain are hemorrhage, lesions of the tracheal mucosa, infections, atelectasis, cardiovascular disorder, hypoxemia and increase intracranial pressure [6]. ETS is also a fearful, depressed, anxious, and unpleasant and it may create a sense of helplessness and even hopelessness [5].

To date, there have been remarkable advances in the understanding of procedural pain management, however; there is a lack of literature which is illuminated or synthesized strategies in preventing and managing procedural pain management during ETS. The aim of this review is to summarize strategies for managing pain-related ETS with a specific focus in adult patients.

### **Aims of the study**

The aim of this review is to summarize strategies for managing pain during ETS with a specific focus in adult patients.

### **Material and Methods**

#### **Search methods**

The step in conducting integrative literature review was conducted [7].

Focused review question: In mechanically ventilated adult patients, what strategies are effective for managing pain related ETS?

#### **Search strategy**

The following bibliographical electronic databases were searched: The Cochrane Library, National Library of Medicine – Medline Ovid, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Science Direct, Scopus and Scopus journal analyser, ProQuest Nursing & Allied Health. Searches were restricted to English language.

The following search terms and keywords were used to search all databases: 1) “Endotracheal tube suctioning” OR “Tracheal suctioning” 2) “Pain related endotracheal tube suctioning” OR “Pain related ETS” OR “Pain related tracheal suctioning” 3) “Procedural pain” OR “Pain from procedure” 4) “prevent\*” or “manag\*” AND strategy\* AND/OR Nurs\*.

The published articles that examined or discussed pain related endotracheal tube suctioning, pain related tracheal suctioning, procedural pain, and ETS were reviewed. The search was re-run with restriction pain related endotracheal tube suctioning (ETS) and prevent\*, manage\*, strateg\* and in adult patients, and no

restriction to study designs. There was no result when restrict to nurs\*. Additional articles were further retrieved from the references of the identified studies and from reviews on the topic.

### **Inclusion and Exclusion Criteria**

In this review, the final inclusion screening was guided by three inclusion criteria: (1) the report of an original research study, not restricted by methods (2) a study focused on management of pain related ETS in adult patients and, (3) a study focused on procedural pain management in adult patients, (4) when the population of interest were >18 years of age. Exclusion criteria were: (1) studies not specific to pain related ETS or procedural pain; (2) animal studies and case report.

### **Screening and data extraction**

The processes of critical appraisal and data extraction were done by the reviewers. The methodological quality evaluation was performed by the reviewers following the criteria of each study design of the “Critical Appraisal Skill Programme” (CASP). 32 articles remained in the data set after the final screening.

### **Data Extraction**

The reviewers independently extracted the data from the included studies and consensus was reached as to the inclusion and interpretation of each individual study. The information was extract from a paper using a standard format to find essential elements of each single study using the evaluation Table. A data extraction form or an evidence Table was developed according to the aims of this review and specific PICO question, including characteristics of the studies and study quality or level of evidence. The data was then summarized in a common format to facilitate synthesis and coherent presentation of. A summary Table for a PICO (focused) question or a matrix Table was developed to see the heterogeneity between studies and develop narrative synthesis. Three phases of procedural pain management, namely: (1) before the procedure, (2) during the procedure and (3) after the procedure, proposed by The American Society for Pain Management Nursing (ASPMN) were used to categorize management strategies of the final synthesis.

### **Results**

A set of evidence-based nursing intervention to manage pain related ETS was developed based on the current best available evidence, experts’ opinion, and a local context. A position statement and clinical practice recommendations related to procedural preparation and comfort management in 2011 proposed by The American Society for Pain Management Nursing and a clinical practice guideline of suction an adult patient with artificial airway proposed by NSW Agency for Clinical Innovation were mainly used to develop a set of interventions [4,8]. In addition, critical appraisal of answers or recommendations with experts and clients’ preference was also conducted prior to implement or change practice and make appropriate clinical changes based on the evidence.

Pain management before ETS consists of the following

recommendations: 1) ETS should be considered a biopsychosocial experience for the patient; 2) assessment of the patient to identify the need to suction; 3) perform ETS when clinically indicated by signs; 4) assessment pain intensity use an appropriate instrument to assess the baseline pain; 5) establish a plan for managing pain related ETS which include select appropriate pharmacologic and nonpharmacologic interventions, establish a mutually agreed upon comfort goal with the patient and family if indicated, develop a plan to help the patient cope during the procedure; 6) provide education tailored to meet the patient and family needs to be given, give a clear information regarding the suction procedure including the need for suction, the consequences of not suctioning when it is required and the effects of suctioning; 7) use non-pharmacologic interventions in conjunction with pharmacologic interventions which include relaxation, distraction, ice pack application, music therapy, and coping techniques based on patient preference, capabilities, and experience; 8) decide how the patient will communicate unrelieved pain or anxiety to the nurse during the procedure; 9) administer premedication or preemptive analgesia, selecting opioids (Fentanyl) as an appropriate pharmacologic agent for pain-related ETS, ensure that medications are ordered, available, and administered to allow sufficient time for effectiveness before the procedure; 10) mutual goal setting or outlining the expectations for pain related ETS management during and after ETS (CPOT <3, NRS<4).

The recommendations for the management of pain during ETS consist of: use the size of the suction catheter less than half the internal diameter of the tracheal tube; 2) take the total suction procedure (from insertion to removal of catheter) a maximum of 15 seconds with negative pressure applied continuously as the catheter is being withdrawn from the tracheal tube; 3) having a procedure temporarily stopped to provide additional comfort; use the maximum occluded suction pressure limited to - 80 to 150mmHg (20kPa) for OSS and CSS and the wall outlet should have a high-pressure gauge attached; 4) use an appropriate instrument to assess pain intensity; 5) secure and hold the tube during suctioning and; 6) provide psychological support, touch or hold patients hand, gently talk to patients, ask for readiness (if possible).

The recommendations for the management of pain after ETS consist of 1) discuss /evaluate the procedure with patient and family if applicable; 2) document the procedure, including an evaluation of the patient's experience, from the patient, family, and staff nurses' perspectives including recommendations for future procedures in the nursing record; 3) use an appropriate instrument to assess pain intensity for the need of further pain management.

## Discussion

Applying evidence to guide pain management during ETS with consideration to the health care context could provide a scientific evidence for nurses in managing pain adequately and effectively.

Evidence-based nursing practices have been proofed to increase and achieve positive health outcomes of patients [9].

## Conclusions

Evidence clearly shows that patients continue to suffer from ETS. Optimal pain management from ETS should be assessed and addressed before the procedure begins until after the procedure to prevent the detrimental effects of pain related ETS. The currently available evidence provides sufficient evidence to develop evidence-based, appropriate, safe, and effective pain related ETS recommendations to accomplish the goal.

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