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Research paper

The impact of oral care on oral health status and prevention of ventilator-associated pneumonia in critically ill patients

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ABSTRACT

Background: Ventilator-associated pneumonia is one of the most common nosocomial infections which increase mortality rate and length stay of hospitalisation. Oral care would not only improve patient's oral health and well-being, but it can also reduce the incidence rate of ventilator-associated pneumonia.
Objectives: The objective of this study was to identify the impact of oral care practices on oral health status of patients in intensive care unit and the incidence rate of ventilator-associated pneumonia.
Methods: This clinical trial recruited 100 participants who were randomly assigned to a control group (receiving oral care by nurses) and an intervention group (receiving systematic care by the researcher) during 2015–2016. Beck Oral Assessment Scale was used to determine the required number of times for receiving oral care with regard to patient's oral health in the intervention group. Each care included adjusting endotracheal tube cuff pressure, brushing with toothpaste, using antiseptics and moistening the lips. The oral cavity was examined using BOAS and Mucosal-Plaque Score, and Clinical Pulmonary Infection Score was used for detecting pneumonia.
Results: The BOAS scoring showed significant differences between the two groups from the first to fifth day ($P < 0.001$). The mucosal-plaque index was significantly different between the two groups from the third day to fifth day ($P < 0.001$). The incidence rate of pneumonia on the third and fifth day was 10% (5) and 14% (7) in the control group, and 4% (2) and 10% (5) in the intervention group, respectively. The Fisher test did not show significant difference ($P = 0.538$), however, the incidence rate in the intervention group reduced compared with the control group.
Conclusion: Although following a systematic oral care program could not significantly decrease the incidence of ventilator-associated pneumonia in critically ill patients compared to the conventional oral care practices, it significantly improved the oral health and mucosal-plaque index.

1. Introduction

Oral health care is one of the essential aspects of nursing in intensive care unit (ICU) that can improve patient's health and prevent serious complications such as pneumonia.[1] Ventilator-associated pneumonia (VAP) is an infection that occurs due to infectious agents at the time of admission an date least 48 h after hospitalisation.[2] VAP incurs high costs to the healthcare system.[3] The increasing need for mechanical ventilation (MV) has increased the risk of VAP from 9% to 40%.[4] The prevalence rate of VAP was two per 1000 days of MV in 1749 hospitals in the United stated in 2009.[5] More than 90% of pneumonia incidences in ICUs appear during MV

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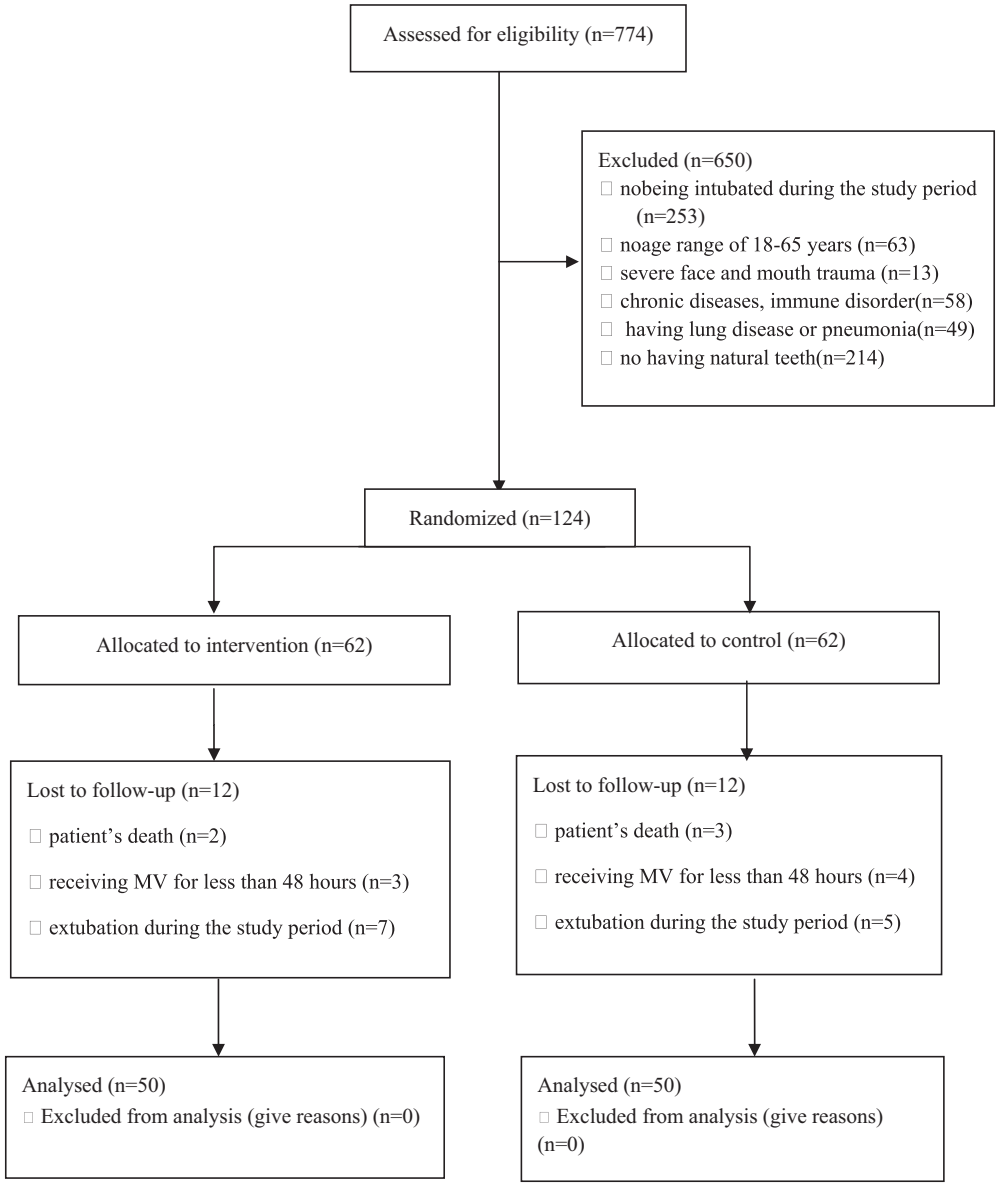

Fig. 1. The flow diagrams of the participants through each stage of the study.

and 50% are caused by MV within the first four days[6] which result in a 20–70% mortality rate increase.[7]

Bacterial accumulation in the oral cavity is one of reasons bacteria accumulate in trachea and bronchus.[8] The pathogens that cause VAP are *Staphylococcus aureus* and *Pseudomonas aeruginosa* which exist in oral cavity of ICU patients.[9] Dental plaques are important reservoirs for growth and accumulation of respiratory pathogens causing VAP.[10] Microbial plaques can be removed using anti micro bialagents such as mouthwashes and brushing.[11] There is a large body of evidence that supports the association between pneumonia and inadequate oral care in ICU patients[12] that can cause microbial accumulation. Micro aspiration of these microbes plays a role in causing hospital-acquired pneumonia in ICU patients.[13] Therefore, oral care should be an important aspect in nursing care practices. Providing patients with a systematic and evidence-based oral care with a detailed protocol can decrease the incidence of pneumonia and other problems.[14] A lack of knowledge about the importance of oral care is a major cause of ignoring such hygiene practices.[15] Accordingly, some studies have mainly focused on the pathophysiology of VAP and discussed the importance of oral care while reviewing physiology of oral cavity.[13] Other studies have evaluated nurses' performance in oral care through self-reporting questionnaires or have compared nurses' opinions with registered reports in patients' medical records.[16,17] Some studies have investigated oral care related tools and solutions.[18] Much more controversy exist on the role of tooth brushing as a way to prevent VAP.[19] so the studies recommended that further research be done on this aspect oral care.[18,19]

The current study intended to evaluate the impact of oral care program on oral health status of ICU patients and the incidence rate of VAP.

2. Material and methods

The present clinical trial aimed to investigate the impact of oral care on oral health status and the incidence rate of VAP in ICU patients in teaching Hospital in Sari, affiliated to Mazandaran University of Medical Sciences in Iran. Convenient sampling method was used to select all ICU patients. The patients who met the inclusion criteria were randomly assigned to a control group and an