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# Effectiveness of Chlorhexidine Mouthwash Prophylaxis for Prevention of Ventilator - Associated Pneumonia among Children Receiving Mechanical Ventilation in Paediatric Intensive Care Unit at KGMU, Lucknow, U. P.

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**Abstract:** ***Ventilator associated pneumonia (VAP) is common problem among mechanically ventilated patients. However improvements in oral hygiene in these patients may prevent ventilator - associated pneumonia. The goal of this study was to determine the efficacy of 0.12% chlorhexidine gluconate mouth care to prevent the VAP among mechanically patients admitted in PICU. A randomized control trial was carried out on 70 patients, where equal number of patients randomized in experimental (35 patients) and control group 35 subjects. Study was conducted to assess the efficacy of 0.12% chlorhexidine gluconate mouth care in prevention of VAP among mechanically ventilated patients. Study found that mouth care with 0.12% chlorhexidine twice daily was significantly effective in prevention of VAP among mechanically ventilated patients as compared to conventional method of mouth care without any significant adverse event (p<0.05). furthermore, it found that increased duration of mechanical ventilation escalates the risk of VAP, however, chlorhexidine mouth care was consistently effective with even longer duration of mechanical ventilation (day 7 p<0.05). Mouth care twice daily with 0.12% chlorhexidine is significantly effective in prevention of VAP among mechanically ventilated patients. Therefore, it is recommended to provide mouth care twice daily with 0.12% chlorhexidine to mechanically ventilated patients for prevention of VAP.***

**Keywords:** Chlorhexidine mouthwash prophylaxis, ICU, Prevention, Ventilator associated pneumonia, children, Mechanical Ventilation.

## 1. Introduction

Ventilator associated pneumonia (VAP) is defined a pneumonia in mechanically ventilated patients, that develops at 48 hours or later after the patient has been placed on ventilator. It is the second most common hospital acquired infection among paediatric intensive care unit patient's. VAP is further classified as early onset or late onset pneumonia. VAP occurs in 3 to 10% of ventilated paediatric patients. Incidence of late VAP reported in literature is as high as 63.5%.[1]

According to data published by the National Nosocomial Infection Surveillance System (NNIS) program sponsored by the Centre for Disease Control and Prevention (CDC), VAP rates in PICU oscillate from 1.4 to 7 episodes per 1000 ventilator days. Incidence of paediatric VAP as mentioned in western literature varies from 5.1% to 33%. However, in developing countries the reported rates are significantly higher, ranging from 16.1 to 89 episodes per 1000 ventilator days. The incidence of VAP increases with the duration of mechanical ventilation. Estimated rates are 3% per day for the first 5 days, 25 per day for days 6 - 10, and 1% per day after day 10.[2]

The pathogenesis of ventilator associated pneumonia (VAP) involves aspiration of bacteria from the oropharynx into the lung, and subsequent failure of host defences to clear the bacteria resulting in development of lung infection. In mechanically ventilated, intensive care unit patients, the major potential respiratory bacterial pathogens (PRPs) patients.[4]

As children differ greatly from adults in their anatomy, physiology and underlying disease, specific etiology for VAP in them is described. In neonates and paediatric patients, microbial diagnosis of VAP is based on the culture of samples obtained from the lower respiratory tract by tracheal aspirate, which is considered a less invasive method and may have an acceptable diagnostic accuracy. The risk amplifies with increased length of time intubated. Incidence reportedly occurs in upto 25% of ventilated patients. Bacteria that cause VAP occur naturally in the oral cavity and reside on the teeth and throat. Dental plaque and bacteria normally resident in the mouth and oropharynx and colonization due to endemic antibiotic resistant organisms, are accepted sources of VAP development. The pooling of subglottal secretions and saliva, formed within the oral cavity, and associated endotracheal or nasotracheal intubation, increases risk of bacteria entering the lungs by up to twenty fold.[19]

Prevention of ventilator - associated pneumonia is a health care goal. Although data is inconsistent, some studies suggest that oral chlorhexidine may decrease rates of pneumonia in mechanically - ventilated patients.5

VAP defined as pneumonia occurring>48 hours following endotracheal intubation. Efforts to reduce the development of VAP have primarily focused on sedation management, spontaneous breathing trials, stress ulcer, venous

thromboembolism prophylaxis, head of bed elevation and oral hygiene. VAP in PICU is governed by various risk factors. Various factors associated with increased risk of developing VAP are: reintubation, prior antibiotic use, central nervous disorders, mechanical ventilator for >3 days and chronic obstructive pulmonary disease. VAP is also an important cause of morbidity and mortality in patients in the ICU.

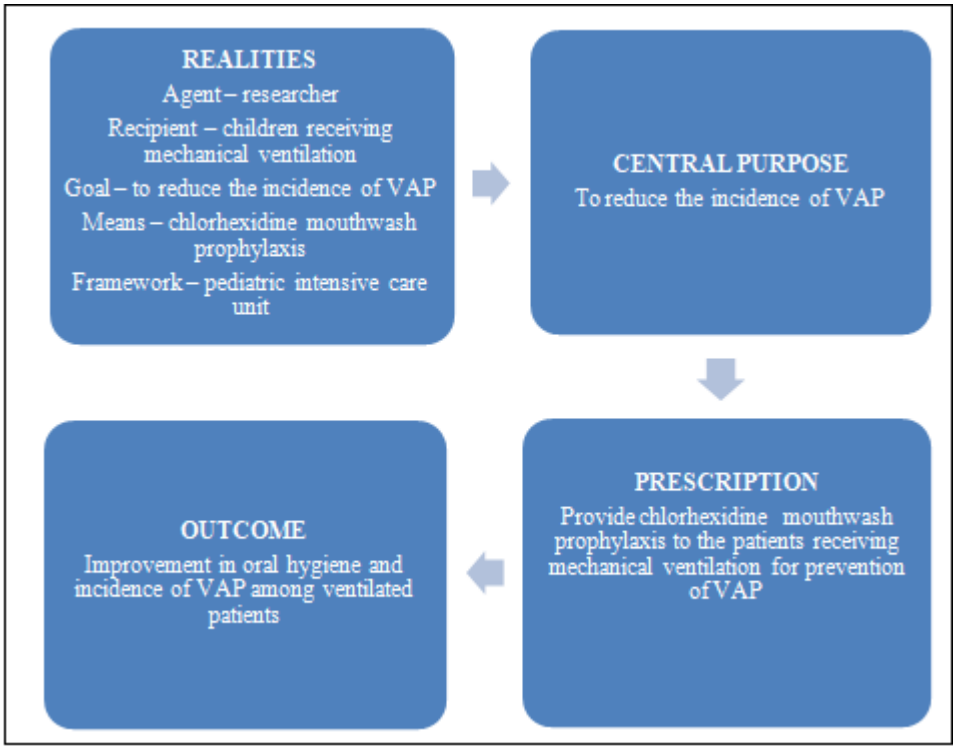
Chlorhexidine is a topical antibiotic and rinse with activity against both gram - positive and gram - negative organisms, which has shown efficacy in similar studies for VAP prevention. These studies have found significant reductions in nosocomial infection rates, incidence of pneumonia and significantly less gram negative organism from the use of chlorhexidine 0.12% solution.[6]

## 2. Literature

Review I: Literature related to patients need during mechanical ventilation.

Review II: Ventilator associated pneumonia is common problem among mechanically ventilated patients.

## 3. Conceptual Framework




## 4. Methodology

Research approach tells the researcher to what data have to collect and how to analyze it. It is an overall plan or blueprint chosen to carryout study. It also suggests the possible conclusions to be drawn from the data in view of the nature of the problem and to accomplish objectives of the present study, an experimental approach was considered to be most effective.

Prospective randomized control study performed in a pediatric ICU unit at KGMU Lucknow. The sample consists of mechanically ventilated children randomly allocated to the chlorhexidine group and the control group. Ventilator associated pneumonia determined by using the Clinical Pulmonary Infection Score (CPIS).

Clinical pulmonary infection score parameters had maximum score of 12 indicates presence of ventilator associated pneumonia, minimum sore is 0 and patient score <6 indicate absence of ventilator associated pneumonia and patients scoring >6 is having ventilator associated pneumonia. Scoring done on the basis of the values of the parameters. Clinical Pulmonary Infection Scores were calculated at the time of admission into the study.

Researcher conducts daily screening of all patients for eligibility. If the patients who met the inclusion criteria, the study explained to the parents and informed consent obtained. Routine oral care (2 times daily) and oral care with a chlorhexidine oral swab twice daily performed. Data collected from the time of admission to the study through day 7 of intubation or till diagnosis of VAP or until extubation. Ventilator - associated pneumonia measured by using the Clinical Pulmonary Infection Score. CPIS score>6 indicate ventilator - associated pneumonia.

## 5. Result and Findings

Measurable investigation is a technique for delivering quantitative data, into significant and coherent. Without the guide of measurements, the quantitative information gathered in an exploration venture would be minimal in excess of a turbulent mass of numbers. Factual methods empower the examination to decrease, sum up, coordinate, assess, decipher and impart numeric data. clinical aspiratory

contamination score of test bunch is 23, and of control bunch is 24.71. SD upsides of clinical pneumonic disease score of test bunch is 3.18, and of control bunch is 2.844. It is observed that chlorhexidine mouthwash prophylaxis is successful in trial bunch for counteraction of ventilator related pneumonia among youngsters getting mechanical ventilation in PICU at p0.020 level ($p<0.05$). At day 7 chlorhexidine mouthwash prophylaxis had huge decrease in the frequency of ventilator related pneumonia among youngsters getting mechanical ventilation in exploratory gathering at p0.017 level ($p<0.05$).

**Section 1:** Effectiveness of chlorhexidine mouthwash prophylaxis between experimental and control group

| Group | Mean± SD (CPIS Score) | p value |
|---|---|---|
| Experimental group | 23±3.18 | 0.020 |
| Control group | 24.71±2.844 | |

**Section 2:** Effectiveness of chlorhexidine mouthwash prophylaxis between experimental and control group day wise

| Days | Mean ± SD (CPIS Score) | | p value |
|---|---|---|---|
| | Experimental group | Control group | |
| Day 1 | 3.6±0.5531 | 3.77±0.547 | 0.39 |
| Day 3 | 5.14±0.55 | 5.42±0.65 | 0.104 |
| Day 5 | 6.65±1.02 | 6.97±1.01 | 0.404 |
| Day 7 | 7.6±1.55 | 8.54±1.35 | 0.017 |

## 6. Discussion

Present study found that0.12% chlorhexidine mouth care twice daily was significantly effective in prevention of ventilator associated pneumonia among mechanically ventilated patients. In experimental group incidence of ventilator associated pneumonia is less compared to control group at p0.020 level ($p<0.05$).

## 7. Similar Study Finding

**Sharma S., Kaur J (2012)** previous study found that mouth care with 0.12% chlorhexidine twice daily was significantly effective in prevention of VAP among mechanically ventilated patients as compared to conventional method of mouth care (VAP: 5.7% vs 35.4%) without any significant adverse event ($p<0.05$).

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