Failures Modes and Effects Analysis with Risk Priority Number

**Focus groups with infection prevention experts, RNs and RPs at these facilities were conducted and then transcribed by a JHH approved team. A qualitative analysis was conducted on the transcriptions in excel by the constant comparative method. During the focus groups, a Failure Modes and Effect Analysis (FMEA) methodology were implemented to each of the step of the tracheostomy procedure to determine the risk of compromising patient safety in terms of infection if the steps were not completed correctly.**

A Risk Priority Number (RPN) rating scale was used to formally quantify each step: i) the severity (the amount of harm or damage failure of this step could present to the patient in terms of risk of infection), ii) the probability (the likelihood that the failure occurs in daily care in the facility), and, lastly, iii) the detectability (likelihood that failure to complete this step will not be detected). RNs & LTC’s participants and stoma care were asked to go through each step of the policy with the FMEA and assign each step an RPN rating. A clinical lead and HFE expert described the rating scale and provided clarifications throughout the session. After RPNs were calculated, the top 3-4 steps with the highest RPNs were identified, shared with the focus group, and then discussed to obtain a better understanding of the specific components that may contribute to the failure of that step. Information was recorded in a tabular format, and strategies to prevent these failures were discussed at the completion of the focus group.

### Methods

**SEIPS Model**

This project was guided by the Systems Engineering Initiative for Patient Safety (SEIPS) model which is a human factors engineering (HFE) framework comprised of three main parts: structure, process, and outcome [2]. The SEIPS model looks at how the elements of an organization’s work system interact with each other to contribute to the safety and quality of processes and outcomes of the system [2]. The work system element of the SEIPS model consists of five components (person, tasks and technologies, physical environment, and organizational conditions) which all interact with one another and may affect the overall process, and therefore the outcome for patients, staff, and the organization [2]. By systematically evaluating the various work system components in the LTC setting that may contribute to breaches in infection prevention, we were able to identify risk mitigation strategies that may improve the process of respiratory care in LTC.

### Results

The human factors analysis of tracheostomy and stoma care revealed three steps in policy with the highest risk priority numbers (RPNs), indicating an increased risk of a HCW compromising patient safety if the step is incorrectly done. These three steps include: donning clean gloves (RPN= 270), hand hygiene (RPN=252), and intermittently suctioning as the suction catheter is withdrawn (RPN=192). Strategies for risk mitigation were determined using the SEIPS model for each step:

- **Dressing gloves**
  - Conveniently stock gloves in each room
  - Incorporating a designated glove restocking system

- **Hand hygiene**
  - Conveniently placing hand sanitizer outside of rooms
  - Peer to peer reinforcement of hand hygiene policies

- **Suctioning**
  - Modify organizational policy to only trained healthcare workers to perform task
  - Implement in-service training with staff feedback
  - Engage and train family on suctioning procedures

### Conclusions

Of the top three steps risking patient safety if incorrectly performed or not done, errors in patient protective equipment (PPE) (dressing gloves and hand hygiene) were more frequent than tracheostomy or specific to the facility. This suggests that the most important initial targets to minimize infection in LTC include clarifying PPE practice guidelines during tracheostomy and stoma care.

### References


### Future Directions

Further research should be directed towards implementing the interventions identified in this analysis to determine if this has an impact on infection transmission and patient safety in the LTC setting.

### The Helene Fuld Leadership Program for the Advancement of Patient Care and Safety

The Helene Fuld Leadership Program for the Advancement of Patient Care and Safety is a joint initiative of The Johns Hopkins University, The American Hospital Association, and The Joint Commission. The program is designed to improve patient care and safety by promoting evidence-based practices and best practices in healthcare settings. It encourages healthcare organizations to engage in continuous improvement initiatives to enhance the quality and safety of patient care.

### Background

Inappropriate or inadequate infection prevention practices related to tracheostomy and stoma care is associated with an increased risk for infection with mechanical ventilation (LTC). Guidelines for infection prevention related to ventilator and tracheostomy care exist in acute care settings, however, it is uncertain whether they are transferable for use with prolonged ventilator management in long-term care (LTC) (3, 5, 7). Bundles created to reduce the incidence of ventilator-associated pneumonia (VAP) do not include clear step by step instructions for nursing or respiratory care, or specific recommendations to prevent healthcare-associated infections [3, 5, 7, 9]. Long term care populations are particularly at risk for infection complications related to ventilator and tracheostomy care due to their prolonged healthcare experience, older age, antibiotic exposure, and dependence on caregivers [10]. It is important to provide LTC institutions clear, evidence-based tracheostomy device-care guidelines to decrease the ambiguity of care and the risk of hospital-acquired infections in LTC [6].

### Objectives

- Evaluate tracheostomy and stoma care in LTC setting using a human factors engineering (HFE) approach
- Identify potential failure modes that may risk patient safety during LTC tracheostomy and stoma care

- Use Failure Modes Effects and Analysis (FMEA) to identify interventions and strategies to guide the formation of LTC tracheostomy guidelines

### Methods

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