ORIGINAL ARTICLE

Utility of Failure Mode and Effect Analysis to Improve Safety in Suctioning by Orotracheal Tube

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Objective: *The objective of the study was to use the Failure Mode and Effect Analysis (FMEA) tool to analyze the technique of secretion suctioning on patients with an endotracheal tube who were admitted into an intensive care unit.*

Materials and Methods: *Brainstorming was carried out within the service to determine the potential errors most frequent in the process. After this, the FMEA was applied, including its stages, prioritizing risk in accordance with the risk prioritization number (RPN), selecting improvement actions in which they have an RPN of more than 300.*

Results: *We obtained 32 failure modes, of which 13 surpassed an RPN of 300. After our result, 21 improvement actions were proposed for those failure modes with RPN scores above 300.*

Conclusions: *FMEA allows us to ascertain possible failures so as to later propose improvement actions for those which have an RPN of more than 300.*

Keywords: *patient safety, FMEA, orotracheal suctioning, ETT, improvement actions, RPN.*

PATIENT SAFETY HAS taken on a strategic value in health care organizations. Improvement of patient safety by using numerous resources may decrease errors and adverse events during hospital stays. Owing to the fact that "error" is an intrinsic characteristic of human beings and processes, the consequences of errors must be minimized. An error may cause anything from an incident of little importance to a patient's death.

Poorly designed or executed processes may lead to increased risk to patient safety. An improvement in patient health and patient safety is the most important objective of quality in health care. A significant interest in this topic has developed over the last century. Various international[1] and national[2,3] publications took on the task of increasing awareness about its importance in the health care world. Safety has become a fundamental objective for our society. Different tools which are used, such as the Failure Mode and Effect

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Conflicts of Interest: None to report.

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Analysis (FMEA) tool, are applied to critical patient care in this report.

The objective of FMEA is to identify and prioritize any problems which may arise in a process even before such problems can arise. It consists of determining each of the possible failures to evaluate how serious their effects are and how often the causes which lead them to occur, establishing a prioritization of the actions to be performed to improve their design. Acquired from the US aerospace industry and applied to many fields in the industrial world, it has gradually been implemented in the world of health care.[4]

Critical patients constitute a safety challenge. Their status makes them more vulnerable to any error and its consequences. In Intensive Care Medicine, FMEA may be useful, although there are not many prior studies in the field of critical patients.[5] Critical patients may be sedated with a decrease in reflexes and are subject to very aggressive therapeutic treatments. There is interaction with a great deal of devices, and the patient is alone and suffers a prolonged time of being bedridden.[6] To this vulnerability we add error as a characteristic of human nature, which is accentuated by such an aggressive environment as an intensive care unit (ICU). Stress, working conditions, high complexity of tasks, and time constraints in providing care are the factors which promote the occurrence of errors among ICU staff members.

The health care system makes huge efforts to guarantee safety, although adverse events continue to arise. One "adverse event" is nondeliberate injury caused by actions/treatments performed in the health care system which results in measurable disability.[2,3] Symptoms of this would be "damaging effect to health," "adverse consequences," and "negative impact." The adverse events prolonged the hospitalization, produced a disability at the time of discharge, or both.[7] They may be preventable or nonpreventable, those which are preventable being those of most interest to us because they may be avoided.

FMEA makes it possible to prioritize potential failures in accordance with risk, probability of occurrence, and the likelihood of detection and can result in corrective actions to eliminate or reduce the probability that they will occur. FMEA allows for the identification of the weakest parts of the processes being studied. Because it is preventive, the error need not occur to be studied. FMEA can improve health care quality, and it identifies and eliminates procedural failures in advance, prioritizing any deficiencies, strengthening problem prevention, providing an orientation toward the improvement of controls and development while decreasing costs and promoting work in a multidisciplinary team. FMEA, with demonstrated benefits in other fields, may decrease such errors, and when they are not prevented, it can minimize their consequences. If the error is inevitable, FMEA may be a solution.

Periodic suctioning of secretions is essential when patients are intubated with an endotracheal tube (ETT) to avoid bronchial aspirations and infections and to improve ventilation and oxygenation. Suctioning intubated patients requires very careful monitoring.

Hypothesis

Proposals for improving patient safety in the ICU are possible during the process of suctioning secretions by ETT with the help of FMEA by analyzing potential risks and proposing improvement actions in a systematic manner.

Objective and Aims

The overall objective is to use FMEA to detect possible failures in the selected process. The specific aims are as follows:

1. To identify which points in the critical patient care process may fail (failure modes) and specify for each of them the means and procedures for detection.
2. To carry out the quantitative evaluation of each failure mode.
3. To recommend actions which reduce the likelihood of failures in critical patient care processes for those failures which have an RPN of more than 300. The chosen RPN is superior to 300 because of the complexity of the critical patient.

Materials and Methods

The FMEA tool was used in the ICU of the Hospital General Universitario Gregorio Marañón (HGUGM; Madrid, Spain).