Question:

In emergency cases of patient intubations, how do patients endotracheally intubated in the emergency department compared to patients endotracheally intubated in the intensive care unit and the general ward in terms of mortality?

Summary:

Endotracheal intubation is a life-saving procedure where a provider inserts a tube through a patient's mouth, then down into their trachea. The tube keeps the trachea open, so oxygenation is maintained. Intubation is indicated to secure the airway in cases of respiratory failure, apnea, reduced levels of consciousness, rapid change in mental status, airway injury, high risk of aspiration, or any trauma to the airway (Avva, et al 2022). Whenever a patient is intubated, the four principles of airway management in Advanced Cardiovascular Life Support (ACLS) must be checked:

1. Is the airway patent?
2. Is the advanced airway indicated?
3. Is the proper placement of the airway device confirmed?
4. Is the tube secure, and is the placement of the tube confirmed frequently?

Emergency intubations must be performed as soon as the patient needs to survive and, in the hospital, there are several instances where patients need to be endotracheally intubated wherever they are found. This paper aims to compare the mortality in patients intubated between these three units of the hospital: the Emergency Department, General Ward, and the Intensive Care Unit.

According to research conducted by *Anesthesiology*, emergency intubations performed in the Intensive Care Unit were associated with worse intubation conditions and an increase in complications. Complication rates for hypoxemia increased by about 25% and hypotension by about 15 to 35% (Taboada, et al 2018). Intubation of the intensive care unit was associated with a worsened glottic view, decreased first-time success rate, and an increase in technical difficulty of intubation and incidence of complications. The research also recommends performing intubations in the operating room whenever it is possible.

A study performed by the *Journal of Acute Medicine* hypothesized that intubations conducted by ICU physicians and ED physicians have different practice patterns that yield different results. Of the 201 patients, the study reveals that intensive care physicians used video laryngoscopes (67% vs 41%), waveform capnography (99% vs 86%), and larger endotracheal tubes (95% vs 60%) more than the emergency physicians. Conversely, ICU physicians use fewer doses of paralytic agents (12% vs 51%) with a higher first-time intubation success (82% vs 67%). The study concludes that ICU physicians adhered to currently considered preferable, evidenced-based practices for endotracheal intubation than ED physicians (Nadeem, et al 2017).

Interestingly, the *Biomedical Journal* compared the outcomes of emergency intubation in three different areas of the hospital: the general ward, the intensive care unit, and the emergency department. As previously established in the *Anesthesiology* article, anesthesiologists recommend performing intubations in the Operating Rooms. These are attributed to multiple factors such as operators, the patient, and the environment where this

procedure is performed (Taboada, et al 2018). Environmental factors including limited space, poor lighting, and suboptimal bed characteristics limit the ability to properly position and access a patient's head and airway. The *Biomedical Journal* solidifies that study, stating that difficult emergency and difficult endotracheal intubations when performed outside the operating room are associated with high complications. The study further explores the damage, hemodynamically and neurologically, and patient mortality.

The article revealed that on 416 non-OR endotracheal intubation calls, the ED had the highest proportion of difficult endotracheal intubation (144) compared to the general ward (85) and ICU (65). Hemodynamic collapse, however, was higher in the general ward (44), followed by the ICU (18) and the ED (16). Among these locations, the ED had the highest rate of neurologically intact patients to hospital discharge (91%), compared to the ICU (56.6%) and the general ward (55%). Finally, the survival rate of endotracheal intubations performed in the general ward is the lowest (55%), which was lower than the ICU (63.3%) and the ED (80.4%). It should also be noted that the mortality rates of intubated patients were associated with the patient's comorbidities, including age and obesity (Hsiao, et al 2020). Mortality during the stay in the ICU is influenced by both the patient's age and the cause of initiating the mechanical ventilation (Hsiao, et al 2020). The *Biomedical Journal* article emphasizes that in emergencies, earlier effective airway management could decrease mortality and neurologically intact survival to discharge.

Conclusion:

In conclusion, several factors affect the mortality of endotracheally intubated patients. Operating rooms are the standard for the procedure because the facility is fully equipped with all the life-saving instruments needed. In emergency cases, however, the controlled environment disappears because everyone has their focuses on saving a patient's life with the materials they have. Extensive research suggests that the location for performing the procedure greatly influences the decrease in mortality. The practice of non-evidence-based intubation in the ED (Nadeem, et al 2017) can be attributed to the highest proportion of difficult intubation. Higher incidences of aspiration also correlated in the ED (4.5%) compared to the ICU (1.6%) and general wards (3.1%) (Hsiao, et al 2020). Emergency and difficult endotracheal intubation in the general ward and the ICU resulted in a higher proportion of hemodynamic collapse and mortality than those performed in the ED. However, these can also be attributed to the general ward not being fully equipped and trained for rapid, emergency intubation. Similarly, the ICU may have the trained personnel and the proper equipment, but the disease progression must be factored in when counting mortalities. It should also be pointed out that ICU doctors practice more evidence-based intubation patterns compared to ED doctors (Nadeem, et al 2017) which would indicate that ICU doctors are doing their due diligence in safely intubating the patients. Therefore, the location and conditions for intubation greatly influence the mortality of the patient, but other factors are equally impactful. Comorbidities, age, and current illness must also be considered.

Works Cited:

Primary Article

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Secondary Article

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Tertiary Article

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