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Timing of Intubation in Acute Respiratory Failure Associated With Sepsis: A Mixed Methods Study

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Abstract

Objective: To analyze bedside clinicians' perspectives regarding the decision process to optimize timing of intubation in sepsis-associated acute respiratory failure.

Participants and Methods: This mixed methods study was conducted from March 1, 2015, through June 30, 2016. Using qualitative research methods, factors that influenced variability in the decision to intubate were organized into categories and used to build a theoretical explanatory model grounded in current practice variance. All coding schemes were independently reviewed for accuracy and consistency. Themes and findings were then refined with member checking by feedback from individuals and from an anonymous questionnaire until saturation was achieved.

Results: The practice of intubation varied according to 3 domains: (1) patient factors included the nature of the acute illness, comorbidities, clinical presentation, severity, trajectory, and values and preferences; (2) clinician factors included background, training, experience, and practice style; and (3) system factors included workload, policies and protocols, hierarchy, communications, culture, and team dynamics. In different contexts, intubation was considered early (elective), just in time (urgent), or late (rescue). The initial assessment, initial decision, and reassessment mattered.

Conclusion: Recognizing that the variability in both the decision to intubate and its timing depends on many factors, and not on clinical criteria alone, should render the clinician more attentive to the eventual progression of the acute respiratory failure.

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In sepsis, acute respiratory failure is frequent and is associated with high mortality rates.[1] Early identification of patients at risk for acute respiratory failure is predictable.[2] Aside from managing sepsis,[3,4] treatment includes supplemental oxygen and noninvasive and invasive mechanical ventilation.[5-11] In general, clinicians tend to limit intubation to the most critical patients to prevent complications associated with mechanical ventilation.[12,13] Although they may agree on the need to intubate patients for airway protection or frank respiratory distress, clinicians commonly disagree in cases of hemodynamic compromise, often citing fear of worsening cardiopulmonary status with intubation.[14,15] So, some patients may have delayed intubation and eventually worse respiratory failure.[16,17] In a recent epidemiologic study on acute respiratory distress syndrome (ARDS), across a spectrum of severity, the same proportion of patients was given noninvasive ventilation, with an increasing rate of failure and mortality with increasing severity.[18] Delayed intubation, however, is not always associated with a worse outcome,[19] and early intubation may expose patients to unnecessary risk.[20] Therefore, the timeline for intubation remains unclear.

Evaluation and standardized measurement of the clinician perspective on the clinical decision-making process is an essential step before considering behavior changes. Moreover, it must incorporate the complex and interdependent relationship between clinicians and patients.[21] Decision making is associated with some degree of uncertainty, and there is substantial variability in therapeutic options provided by clinicians.[22] Hence, the threshold for intubation can be ambiguous and relies on the judgment of the clinician, which varies within as well as between individuals. Guidelines have been established to reduce practice

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variation, but adherence to them is low. A clinical decision analysis might follow a net benefit model, defining a threshold above which risks of intubation outweigh benefits.[23] Attitudes toward risk taking likely also have important implications on clinical decision making.[24]

How do we explain the evidence that such vulnerable patients (ie, those with sepsis) are those for whom it is most difficult to decide to intubate?[25] It has been proposed that early intubation may provide protection (so-called prophylactic intubation).[26] To understand how clinicians decide to intubate or not, we first explored their perspective and practice. Then, we developed a theoretical model that combined those factors and their effect on the timing of intubation. We hypothesized that the decision to intubate is more complex than using plain criteria or critical clinical values[27,28] and that there is a window of opportunity for optimal timing of intubation outside of which intubation is either too early or too late and potentially detrimental to patient outcomes.

PARTICIPANTS AND METHODS

Study Overview

Using mixed methods,[29] we first conducted a qualitative analysis[30,31] of semistructured interviews with critical care clinicians in a convenience sample of patients with sepsis-associated acute hypoxemic respiratory failure at a single academic center in the United States to determine what triggers the decision to intubate or not. Once we determined a variety of factors involved in the process, and their consequences on the timeline of intubation, we expanded the analysis with member checking and feedback from a larger group from the same institution.[32]

Study Design

Setting. The study took place in 3 intensive care units (ICUs) (1 closed medical ICU and 2 semiclosed medicosurgical ICUs) at a single institution with 24-hour in-house faculty staffing coverage. Fellows and nurse practitioners/physician assistants perform intubations under the supervision of faculty intensivists in each ICU, with the assistance of registered nurses and respiratory therapists. They follow a standardized institutional protocol and are backed up, if necessary, by an emergency airway anesthesia team. A convenience sample was identified that included patients in the unit who met Sepsis 2.0 criteria,[33] had acute respiratory failure, and required intubation. Patients were excluded if they were intubated before admission to the ICU or if they were under the direct care of one of us (P.R.B., J.K.P., and O.G.). No apparent change in practice occurred during the study period.

Participants. To capture a breadth of the intubation decision-making process, clinicians that were interviewed included registered nurses, respiratory therapists, nurse practitioners/physician assistants, critical care or anesthesiology fellows, and faculty intensivists. They were invited by email to participate within 1 week after each reference intubation (Supplemental Appendix 1, available online at http://www.mayoclinicproceedings.org). Each individual was interviewed only once.

Research Team. Analysts from the Center for the Science of Health Care Delivery at Mayo Clinic, Rochester, Minnesota, who were experts in qualitative studies (A.K., M.E.W., J.S.E.) conducted the interviews to establish a list of criteria for intubation and to assess variability among the participants. Clinicians with a preexisting relationship with the participants (P.R.B., J.K.P., R.K., and O.G.) did not participate in the interviews and did not share their opinions with colleagues who were subject to the interview.

Data Collection. Patients' clinical characteristics were collected. Semistructured interviews were conducted by telephone or face to face (A.K., J.S.E.). Interviews lasted approximately 30 minutes and used an interview guide that was pilot tested beforehand (Supplemental Appendix 1). All interviews were audio recorded, transcribed verbatim, checked for accuracy, and deidentified.

Data Analysis. Using the qualitative research software NVivo (QSR International), two researchers (A.K., J.S.E.) independently coded the data using principles of the grounded theory method.[34] Final codes were assigned after discussion with the research team (Table 1). Data were iteratively reviewed, compared, and analyzed until a theoretical saturation was reached. Factors that influenced variability in