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# Optimizing patient outcomes in severe pneumonia: Timing of Multiplex PCR in critically ill pa-tients V.1

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**Keywords:** patient outcomes in severe pneumonia, patients with severe pneumonia, multiplex pcr on the mortality rate, severe pneumonia, severe pneumonia case, timing of multiplex pcr, multiplex pcr, multiplex polymerase chain reaction, implementing multiplex polymerase chain reaction, acute respiratory failure, survival rate of these patient, medical intensive care unit, survival rate, intensive care unit, optimizing patient outcome, pcr, mortality rate

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## Disclaimer

The authors declare no conflict of interest.

## Abstract

The impact of multiplex PCR on the mortality rate of patients with severe pneumonia in the intensive care unit remains uncertain. Hence, this retrospective cohort study sought to ascertain the most effective timing for implementing multiplex polymerase chain reaction (PCR) in the management of patients with severe pneumonia, and to assess its potential to improve the survival rate of these patients. Patients admitted to the medical intensive care unit (MICU) with acute respiratory failure and severe pneumonia were included in accordance with the diagnostic criteria outlined by the Infectious Diseases Society of America (IDSA). Through the analysis of these factors, this study aimed to provide valuable insights into the management of severe pneumonia cases.

## Materials

This retrospective single-center cohort study was conducted at a medical center in Taiwan between July 1, 2021 and October26, 2022. This study used anonymous data and was approved by the Medical Ethics Committee of the Far Eastern Memorial Hospital (approval number: 111211-E). Patients admitted to the medical intensive care unit (MICU) with acute respiratory failure and severe pneumo-nia were included in accordance with the diagnostic criteria outlined by the Infectious Diseases Society of America (IDSA). These criteria necessitated the presence of either new or progressive chest X-ray consolidations combined with clinical symptoms, such as dyspnea, cough, sputum production, fever, and abnormal breathing sounds indicative of pulmonary consolidation. The effects of these factors on patient outcomes were subsequently investigated [6, 13]. Spe-cific exclusion criteria were implemented to maintain a focused analysis. Patients who did not receive invasive me-chanical ventilation were excluded. Additionally, those who died within 3 days after undergoing FA-PP examination were not considered, nor were patients with hospital stays exceeding 90 days.

## Troubleshooting

## 1 Study population

Number of Subjects Enrolled: 110 patients from Far Eastern Hospital.

1. Inclusion Criteria:(1)Patients admitted to the medical intensive care unit (MICU) with acute respiratory failure and severe pneumonia were included in accordance with the diagnostic criteria outlined by the Infectious Diseases Society of America (IDSA). (2)These criteria necessitated the presence of either new or progressive chest X-ray consolidations combined with clinical symptoms, such as dyspnea, cough, sputum production, fever, and abnormal breathing sounds
   indicative of pulmonary consolidation. (3)Age greater than or equal to 20 years.
2. Exclusion criteria :
   (1)Patients who did not receive invasive mechanical ventilation were excluded. (2)Those who died within 3 days after undergoing FA-PP examination were not considered. (3)Patients with hospital stays exceeding 90 days.
3. This retrospective single-center cohort study was conducted at a medical center in Taiwan between July 1, 2021 and October26, 2022. This study used anonymous data and was approved by the Medical Ethics Committee of the Far Eastern Memorial Hospital (approval number: 111211-E)

## 2 Data collection

1. As a retrospective study, data will be collected from July 1, 2021, to October 26, 2022.
2. Data Collection includes Age, Gender, APACHE II, Smoking status, Past history, Admission date, ICU date, Diagnosis date, Intubation date, Duration of intubation days, Duration of ICU days, Duration of hospital days, Outcome (survival or mortality upon discharge), Antibiotics, Sputum culture date, Sputum culture result, Sputum FilmArray date, Sputum FilmArray result, Antibiotics adjustment (including Escalation and De-escalation).
3. Follow-up or necessary rehabilitation plans for subjects:
   Case tracking will be conducted from July 1, 2021, to October 26, 2022.
4. Based on lower respiratory tract microbiological culture and Multiplex PCR analysis, patients will be categorized into those with consistent or inconsistent results between microbiological culture and Multiplex PCR analysis. The adjustment of antibiotics will be assessed in relation to patient prognosis.
5. For critically ill pneumonia patients, the time from diagnosis to the report generated by Multiplex PCR will be analyzed to determine its association with patient outcomes.

## 3 Statistical analysis

Statistical analyses were performed using SPSS Statistics software version 19 (IBM Corp.Armonk, NY, USA). The primary analytical methods employed the chi-square test to compare categorical data while continuous data were compared using Student's *t*-test.We further performed a univariate analysis to identify potential risk

factors associated with mortality in patients with severe pneumonia. The chi-square test was used for categorical data and Student's *t*-test was used for continuous data. Factors exhibiting p-values less than 0.05 were deemed statistically significant, and subsequently included in the multivariate logistic regression model. Statistical significance was defined as a p-value less than 0.05.

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