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Sepsis

Long-term mortality and quality of life in intensive care patients treated for pneumonia and/or sepsis☆
Predictors of mortality and quality of life in patients with sepsis/pneumonia

Kim C. Honselmann, MD [a], Franziska Buthut, MD [a], Bjoern Heuwer, MD [a], Sevin Karadag, MD [a], Friedhelm Sayk, MD [a], Volkhardt Kurowski, MD [a], Holger Thiele, MD [a], Daniel Droemann, MD [b], Sebastian Wolfrum, MD [a,c,*]

[a] Medical Clinic II, Cardiology/Angiology/Intensive Care Medicine, University Hospital Schleswig–Holstein, Campus Luebeck, Ratzeburger Allee 160, 23552 Luebeck, Germany
[b] Medical Clinic III, Pulmonology/Infectious Diseases, University Hospital Schleswig–Holstein, Campus Luebeck, Ratzeburger Allee 160, 23552 Luebeck, Germany
[c] Department of Emergency Medicine, University Hospital Schleswig–Holstein, Campus Luebeck, Ratzeburger Allee 160, 23552 Luebeck, Germany

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ABSTRACT

Purpose: The purpose of this study is to evaluate long-term mortality and quality of life (QoL) of intensive care patients with pneumonia and/or sepsis 1 year after discharge and to identify potential predictors for these outcome measures.
Methods: This retrospective cohort study analyzed all patients admitted to the intensive care unit (ICU) of a German university hospital with diagnosis of pneumonia and/or sepsis between 2008 and 2009. Quality of life was assessed by telephone interview or mail using the standardized EuroQol 5-dimension questionaire.
Results: Of 1406 patients treated in the ICU within the observational period, 217 met the inclusion criteria. Whereas in-hospital mortality differed significantly between pneumonia (17%) and sepsis (46%) ($P < .001$), 1-year mortality was not statistically significant (51% and 65%, $P = .057$). A high Simplified Acute Physiology Score (SAPS) II value was associated with high in-hospital mortality but failed to predict 1-year mortality. Quality of life, measured 1 year after discharge by visual analog scale (VAS), was 50% ± 25%, which was significantly lower than in a matched control group (70% ± 20%; $P < .001$). A high SAPS II score on admission did not correlate with VAS but was an independent predictor of a low EuroQol 5-dimension index.
Conclusions: The high post-ICU mortality of patients with pneumonia and sepsis emphasizes the need to focus on long-term follow-up in ICU studies and demonstrates that even when sepsis signs are missing, critically ill patients due to pneumonia have high 1-year mortality. Simplified Acute Physiology Score II does not predict long-term mortality, but a low SAPS II on admission might be useful to identify patients with good physical status after 1 year.
Take home message: Hospital mortality of patients treated for pneumonia and/or sepsis is high and increases significantly within the first year after discharge. The SAPS II predicts in-hospital mortality and the physical components of QoL but not long-term mortality.
Tweet: One-year mortality of ICU pneumonia patients is equally high as in sepsis patients. Simplified Acute Physiology Score II cannot predict long-term mortality but can predict QoL.

1. Introduction

Pneumonia is the most common and sepsis the second most common reason for admission to intensive care units (ICUs) [1-3]. Despite progress in treatment, mortality of patients with sepsis remains high [4-6]. For those surviving intensive care treatment, many develop long-term sequelae such as permanent kidney injury, dementia, etc. Consequently, health-related quality of life (QoL) is frequently diminished [7,8]. Quality of life has grown in importance as an outcome measure [8,9]. Prolonged hospital stay, complications as well as high costs of extensive treatment are weighed against acceptable and preferably long-term outcome including health-related QoL [10]. The question arises whether there are clinical predictors measured during ICU treatment defining long-term QoL and mortality. Yet, there has been little work about long-term predictors of QoL in ICU patients with sepsis and pneumonia. Accordingly, we studied these subgroups of ICU patients and measured

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* Corresponding author. University Medical Center Schleswig–Holstein, Campus Luebeck, Ratzeburger Allee 160, 23552 Luebeck, Germany. Tel.: +49 451 500 6613; fax: +49 451 500 3838.
E-mail address: sebastian.wolfrum@uksh.de (S. Wolfrum).

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QoL and mortality 1 year after admission and tried to identify clinical parameters associated with both survival and good QoL.

2. Methods

2.1. Study population and data collection

All patients admitted to the adult medical ICU of the University Medical Center of Schleswig–Holstein, Campus Luebeck, Germany, between February 1st, 2008, and January 31st, 2009, were registered in a database including the cause of admission. Those patients with diagnosis of pneumonia, sepsis, or both as the leading cause for admission to the ICU were identified, and diagnoses were confirmed using the full patient records. Sepsis was defined according to the current guidelines of American College of Chest Physicians/Society of Critical Care Medicine [11]. Pneumonia was confirmed by radiographic evidence of a new or changed infiltrate and clinical features according to guidelines of the German College of Pulmonology [12]. Patient characteristics, laboratory, and clinical values as well as medical therapy at admission were assessed through chart review. We used a modified calculation of the Simplified Acute Physiology Score (SAPS) II during the first 4 days after admission. We excluded the Glasgow Coma Scale (GCS) because use of sedatives and analgesics might influence the GCS without reflecting the degree of cognitive dysfunction due to the underlying disease.

The modified SAPS II has previously been shown to predict in-hospital mortality equally to the original SAPS II [13]. To further evaluate the predictive value of modified SAPS II, patients were divided into quartiles with respect to their modified SAPS II scores for each of the first 4 days after admission to the ICU. Survival at ICU and hospital discharge was extracted from the patient records. Data on survival at 1 year after hospital discharge were collected by a standardized telephone interview with patients, their relatives, or patient's general physicians.

The QoL was determined either by mail or through telephone interview using the standardized EuroQol 5-dimension (EQ-5D) questionnaire [14]. Reliability of the EQ-5D questionnaire has been described elsewhere [15]. The EQ-5D index was calculated as previously described [16,17]. As part of the EQ-5D, the visual analog scale (VAS) was used. This is a visual scale ranging from 0 to 100, where 100 is the best possible health state and 0 the worst. The interview was extended by several other questions including self-evaluation of the patients regarding their well-being before and 1 year after the ICU stay. Quality of life was compared with a local age- and sex-matched control group (n = 83) with similar comorbidities such as hyperlipidemia, hypertension, diabetes, coronary artery disease, renal insufficiency, and pulmonary disease but no stay in an ICU within the last year. In addition, data of the EuroQoL Group for an age-matched German reference group (n = 828) were used for comparison [14]. When patients were readmitted to the ICU within 1 year, only data from their first admission were analyzed. Informed consent was obtained from the patients or their relatives during the telephone interview or by mail. Because of the retrospective nature of the analysis, informed consent was waived for patients known to be deceased from the patients' records or by information of the general physician. Permission to perform the study was granted by the local ethics committee of the University of Luebeck, Germany.

2.2. Statistical analysis

All data are presented as mean ± SE, if normally distributed or as median with the 25th and 75th percentile, if nonnormally distributed. Differences between groups were calculated in contingency tables using χ^2 (with large samples) and Fisher exact test (with small samples) for categorical variables. For continuous data, Student *t* test (normal distribution) or Mann-Whitney *U* test (nonnormally distributed) was used to compare 2 groups; for more than 2 groups, the analysis of variance or Kruskal-Wallis tests were used accordingly. Multivariate analysis was calculated via backward stepwise logistic regression with listwise exclusion for QoL and survival 1 year after discharge using patient characteristics and clinical parameters with a $P < .05$ in univariate analysis. For 1-year survival, 2 of 7 parameters and for QoL, 3 of 4 parameters were included into the final logistic regression model. Results were depicted as odds ratio (OR) and 95% confidence intervals (CIs). We assumed statistical significance at $P < .05$. Statistical analyses were conducted in SPSS (SPSS 19; SPSS, Chicago, IL); graphs were generated in Prism 3.0 (Graph Pad Software Inc, San Diego, CA).

3. Results

We identified 227 patients with pneumonia and/or sepsis that met our inclusion criteria; 10 patients were lost to follow up, leading to 217 patients included in the statistical analysis. Sepsis was present in 145 patients (67%), all of them fulfilling the criteria for severe sepsis. Septic shock was common with 47% in the sepsis group. Sepsis was of pneumogenic origin in 68% (n = 99 of 145) and was classified as community-acquired pneumonia (CAP) in 50%, as hospital-acquired pneumonia in 40%, and in nursing home-acquired pneumonia in 10% of the cases. In patients with pneumonia but without sepsis, a CAP could be diagnosed in 75% of the cases (n = 54 of 72).

Fig. 1 depicts ICU, in-hospital, and 1-year mortality of the studied cohort and its subgroups. Whereas mortality during ICU stay was moderate (n = 53, 24%), there were 26 more patients (an additional 12%) who died after ICU discharge within the hospital stay. After 1 year, overall mortality increased to 60%. Patients with pneumonia without criteria of sepsis had significantly lower ICU (7%) and in-hospital (17%) mortality rates as compared with patients with sepsis (13% and 34%) or septic shock (56% and 60%). However, 1 year after discharge, mortality was comparably high in pneumonia and sepsis patients ranging between 51% and 48% ($P = .057$). Although, septic shock was the most lethal condition (79%).

Baseline characteristics for all patients as well as those for survivors and nonsurvivors (1 year) are depicted in Table 1. On average, patients were 69 ± 13 years old, 38% were female, and comorbidities were frequent.

At admission, nonsurvivors were significantly older, had higher SAPS II scores, higher serum lactate dehydrogenase levels, lower diastolic pressures, lower serum albumin levels, more frequently needed vasopressors with higher doses, and were more often neutropenic at admission ($P < .05$ for each variable). However, as depicted in Table 2A, we only found age older than 71 years (median) and albumin levels below 24 mg/dL (median) to be predictors of death at 1 year after hospital discharge in a multivariate approach.

The SAPS II on admission, divided into quartiles, correlated well with in-hospital mortality but lost its ability to predict deaths when calculated for day 2 or later, especially among the lower quartiles (Fig. 2A). In addition, SAPS II failed to discriminate 1-year mortality at any of the analyzed time points (Fig. 2B).

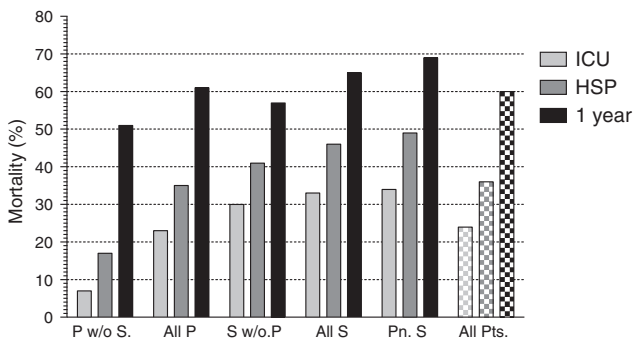

Fig. 1. Intensive care unit, in-hospital, and 1-year mortality. All S, all patients with sepsis; S w/o P, sepsis patients without pneumonia; Pn.S, pneumogenic sepsis; all P, all pneumonia patients; P w/o S, pneumonia patients without sepsis; All Pts, all patients; HSP, hospital.