



Course of community-acquired pneumonia - a descriptive study on the influence of nutritional status

1,2 Anna Gro Eilersen, 1,2 Sine Højlund Christensen, 2 Daniel Faurholt-Jepsen, 2 Birgitte Lindegaard, 2 Maria Hein Hegelund, 1 Jens Rikardt Andersen

1 Department of Nutrition, Exercise and Sports, University of Copenhagen  
2 Department of Pulmonary and Infectious Diseases, North Zealand Hospital, Hillerød, Denmark

Rationale

Among patients hospitalized with community acquired pneumonia the objectives were to:

- 1) identify the effect of nutritional risk at admission on LOS and the immune response
- 2) elucidate if patients at nutritional risk at admission have increased risk of readmission, loss of grip strength, and physical function

Methods

In this prospective cohort, we analyzed data from 141 CAP patients admitted to North Zealand Hospital, Denmark between January 2019 and October 2019. CAP was defined by infiltrate on chest x-ray + at least one relevant symptom. Nutritional risk was assessed using Nutritional Risk Screening 2002 within 48 hours after admission. Patients with a score ≥3 was identified as being in nutritional risk.

Level of physical function (Barthel Index-100) and HGS (hand dynamometer) was measured within 48 hours of admission and at discharge to identify change during hospital stay.

The immune response (neutrophil-to-lymphocyte ratio (NLR)) was measured at admission.

Statistical methods: Mann-Whitney's U test, Fisher's exact test, Spearman's Rank correlation, relative risk with Mantel Haenzel. General logistic regression analysis with Wald test was used to test for confounders. The following variables were tested: gender, age, CURB-65, presence of comorbidities.

The patients included – Baseline data		
Mean ± SD, amount (%), median (IQR)		
Age (years)	71.0 ± 15.3	n=230
Females	51.3%	n=118
NRS-2002 ≥3	73 (52%)	n=141
BMI	27.2 ± 6.5	n=165
Smoking		n=214
Never	45 (21%)	
Present	42 (20%)	
Previous	127 (59%)	
White Cell Count (x10^9/L)	12.1 ± 7.4	n=201
CURB-65 score		n=229
Score 0-2	1 (1-2) (90%)	
Score 3-4	(9%)	
Score 5	(0.4%)	
Temperature (°C)	37.9 ± 1.0	n=226
Comorbidities		n=230
COPD	178 (77%)	
Asthma	82 (36%)	
Bronchiectasis	30 (13%)	
Lung-fibrosis	9 (4%)	
Other lung disease	5 (2%)	
Diabetes mellitus	10 (4%)	
Heart disease	41 (18%)	
Heart failure	119 (52%)	
Myocardial infarction	32 (14%)	
Peripheral arterial disease	28 (13%)	
Cerebrovascular disease	5 (2%)	
Kidney disease	31 (14%)	
	7 (3%)	

n=number of patients with the variable noted in the database

Results

Nutritional risk significantly affected LOS in CAP patients as patients at nutritional risk had longer LOS than patients not at nutritional risk (5 vs. 4 days (p=0.043)).

Nutritional risk did not affect NLR on day of admission (p=0.21). No association was found between nutritional risk and readmission <30 days (p=0.84) or < 6 months (p=0.86) or loss of physical function during hospital stay (p=0.19).

Nutritional risk at admission was associated with loss of HGS during hospitalization (RR=1.93 (p=0.03)). Patients losing HGS lost on average 2.15 kg during admission equal to 0.280 kg a day (n=30).

Test for confounders showed no confounding variables.

Test for effect modification showed that both CURB-65 score and age are modifying the association between nutritional risk and loss of HGS during admission.

An increase of CURB-65 score by 1 will increase the risk of losing HGS by 4-fold. An increase in age by 1 year will increase the relative risk of losing HGS by 11%.

CAP-patients in nutritional risk where:

- admitted one day longer (5 days vs. 4 days)
- in increased risk of losing HGS during admission by 93%

Test for effect-modification in the assosiation between nutritional risk and loss of HGS during hospitalization

Covariate: Nutritional risk (NRS 2002)		
Effect-modificator	Slope	p-value
*CURB-65 score, day 1	4.22 (1.15-19.32)	0.04
*Leukocyte count, day 1	-0.03 (-0.08 – 0.03)	0.31
*Age	1.11 (1.01- 1.24)	0.04
Confounders	Slope	p-value
+Gender	4.50 (0.60 -37.96)	0.15
+Age	1.02 (0.98 – 1.07)	0.38
+CURB-65 score, day 1	1.06 (0.60-1.91)	0.85
+Leucocyte counts, day 1	0.96 (0.85-1.09)	0.53
+ Length of stay	1.06 (0.97-1.17)	0.26

CURB-65 Score is a tool to determine the severity of pneumonia and predict the risk of death. 1 point is given for each of the following:

- confusion
- uraemia (p-carbamid > 7 mmol/l)
- respiration frequency >30 /min
- blood pressure: diastolic < 60 mmHg or systolic < 90 mmHg
- age > 65 years.

Conclusion

In patients hospitalized with CAP, nutritional risk was associated with:

- Longer hospital stay
- Increased risk of losing HGS during hospital stay

This indicates that these patients could benefit from nutritional therapy.

Analysis did not show increased risk of:

- Readmission
- Losing physical function during hospital stay

The immune response on the day of admission were not affected by nutritional status.