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Poster Session V
Lower respiratory tract infections

PREDICTING CARDIAC COMPLICATIONS IN PATIENTS HOSPITALISED WITH COMMUNITY-ACQUIRED PNEUMONIA: A COMPETING RISK ANALYSIS

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Objective: Patients with community-acquired pneumonia (CAP) have an increased risk of cardiac complications during hospital stay, for which several risk factors have been identified. However, the chance to develop and to observe in-hospital cardiac complications may be influenced by other 'competing' events such as discharge or in-hospital mortality. Therefore, we determined risk factors in a competing risk analysis.

Methods: A complete case analysis was performed using data from the prospective multi-centre CAP-START study, which included patients with a working diagnosis of CAP initially admitted to a non-ICU ward. The first occurrence of cardiac complications (new or worsening arrhythmia, heart failure, or myocardial ischemia), defined by pre-specified clinical criteria, were registered through chart review of all included patients. Patients with cardiac complications on presentation were excluded. We developed a competing risk model consisting of one admission state and three absorbing states: new cardiac complications, in-hospital mortality, and discharge alive. In the model, individual patients start in the admission state. After the occurrence of any first event, they go over and remain in the corresponding absorbing state. Patients transferred to another hospital before occurrence of a cardiac event, were censored at the date of transfer. We assessed cause-specific hazard ratios (CSHR) and sub-distribution hazard ratios (SDHR) for all states through the 'coxph' and 'cmprsk' packages for R Statistical software.

Results: We analysed 1737 patients, of which 1317 (75%) had X-ray confirmed CAP. 116 (6,7%) patients had 135 new or worsening cardiac complications: 83 (4,8%) patients developed new heart failure, 41 (2,4%) arrhythmia, 11 (0,6%) myocardial ischemia. 56 (3,2%) patients died during hospital stay, of which 45 (2,6%) without prior cardiac complications, 1568 (90,3%) patients were discharged alive, and 8 patients were censored. Age, female gender, cardiac comorbidities, and diabetes mellitus (DM) had CSHR and SDHR for new cardiac complications above 1, indicating an increased rate and subsequent risk of developing cardiac complications (see Table). Age and the CURB-score had SDHR above 1 for in-hospital mortality, indicating that they predicted a higher risk of mortality. Age, CURB-score, and a history of heart failure had a SDHR for discharge below 1, indicating that these were associated with a longer length of stay. A history of hypertension or COPD seemed to be associated with both a lower rate and risk of in-hospital mortality. There were no large discrepancies between CSHR and SDHR, suggesting mostly similar effects of covariates on rates and risks to each state in the model.
Conclusion: The presence of cardiac co-morbidities were more predictive of new cardiac complications than measures of acute severity such as the CURB-score or arterial pH on presentation. This model provides insight into the variables that truly predict new cardiac complications during admission.

Table with cause-specific and sub-distribution hazard ratios

	Cardiac complications		In-hospital mortality		Discharge	
Covariate	CSHR	SDHR	CSHR	SDHR	CSHR	SDHR
Age	**1.03 (1.01-1.05)**	**1.03 (1.01-1.05)**	**1.02 (0.99-1.05)**	**1.03 (1.00-1.06)**	**0.99 (0.98-0.99)**	**0.98 (0.98-0.99)**
Male sex	**0.58 (0.38-0.87)**	**0.57 (0.37-0.86)**	0.81 (0.41-1.60)	1.11 (0.57-2.15)	0.96 (0.85-1.07)	**1.09 (0.98-1.22)**
Heart failure	**1.91 (1.16-3.17)**	**1.92 (1.16-3.19)**	1.55 (0.56-4.23)	1.17 (0.43-3.18)	0.98 (0.90-1.22)	**0.82 (0.67-1.01)**
Other cardiac*	**1.91 (1.21-3.04)**	**1.87 (1.17-3.01)**	1.09 (0.52-2.30)	0.92 (0.44-1.92)	1.02 (0.88-1.16)	0.92 (0.81-1.04)
Hypertension	0.96 (0.62-1.47)	0.98 (0.63-1.50)	**0.48 (0.21-1.08)**	0.55 (0.25-1.22)	0.95 (0.84-1.09)	1.03 (0.92-1.16)
COPD	0.71 (0.47-1.07)	0.73 (0.48-1.10)	0.59 (0.29-1.22)	**0.53 (0.26-1.07)**	1.00 (0.89-1.13)	1.09 (0.98-1.16)
DM	1.45 (0.91-2.30)	**1.48 (0.93-2.35)**	1.35(0.61-3.01)	1.22 (0.56-2.66)	0.98 (0.84-1.15)	0.92 (0.80-1.06)
CURB-score	1.03 (0.80-1.32)	1.06 (0.83-1.36)	1.31 (0.91-1.89)	**1.63 (1.08-2.45)**	**0.88 (0.81-0.94)**	**0.88 (0.83-0.94)**
pH < 7.35	0.49 (0.15-1.60)	0.54 (0.16-1.83)	1.31 (0.39-4.36)	1.94 (0.64-5.90)	**0.79 (0.59-1.04)**	0.85 (0.68-1.04)

* History of other cardiac events; Hazard ratio's in **bold** have p-values < 0.1

Legend: CSHR Cause-specific Hazard-ratio; SDHR Sub-distribution Hazard-ratio; COPD Chronic Obstructive Pulmonary Disease; DM Diabetes Mellitus; CURB adjusted CURB65-score without age.