Predictors and Outcomes of Infection-related Hospital Admissions of Heart Failure Patients

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Conflict of Interest

All authors state they have no conflict of interest to declare

Introduction

- Heart failure is a leading cause of hospitalization among elderly patients

- Infections, predominantly respiratory, are among the main precipitating factors of heart failure hospitalizations

- Little is known regarding infection types, their prevalence, predictors and outcome in heart failure patients

Aim

We sought to explore the ***prevalence, clinical impact***

and predictors for major infections related to

hospitalizations among heart failure patients.

Methods

- Retrospective cohort study

- All consecutive hospitalizations of heart failure patients admitted to RMC, Jan 2000 – Dec 2009

- >50 years old, w/o valvular surgery

- At least one echocardiography available

- Clinical and demographic data extracted from electronic medical records

Types of Infections Investigated

- Respiratory infections: Pneumonia and COPD exacerbation

- Sepsis \ bacteremia

- Urinary tract infection

- Skin and soft tissue infection

Data based on main discharge diagnosis

Results

- 9,335 patients included in the study

- Mean age 76±10 years

- 92% of the patients had cardiovascular diseases and risk factors

- 72% had non-cardiovascular co-morbidities

- 3,530 (38%) patients experienced at least one infection-related hospitalization
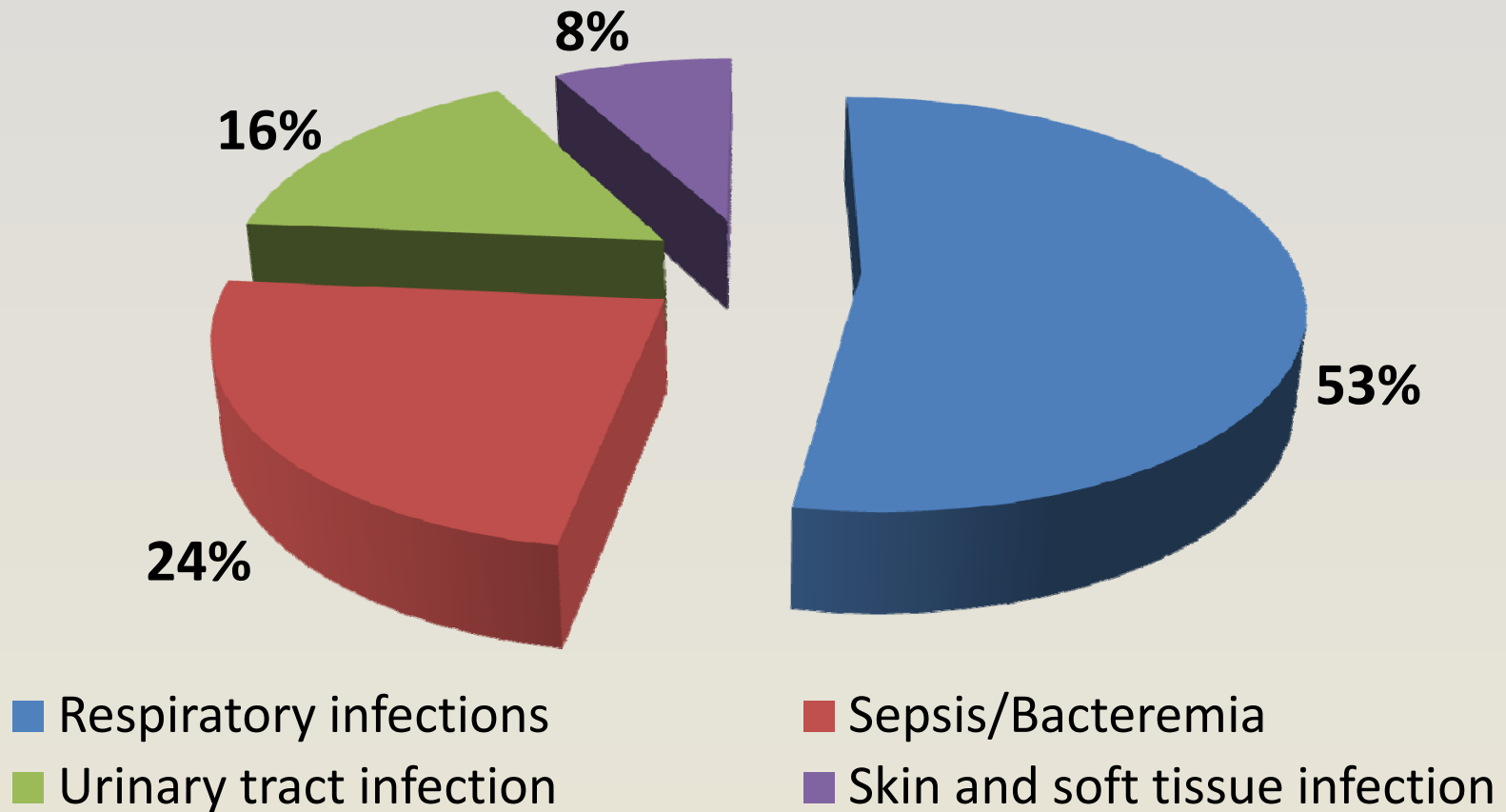
Patients' characteristics

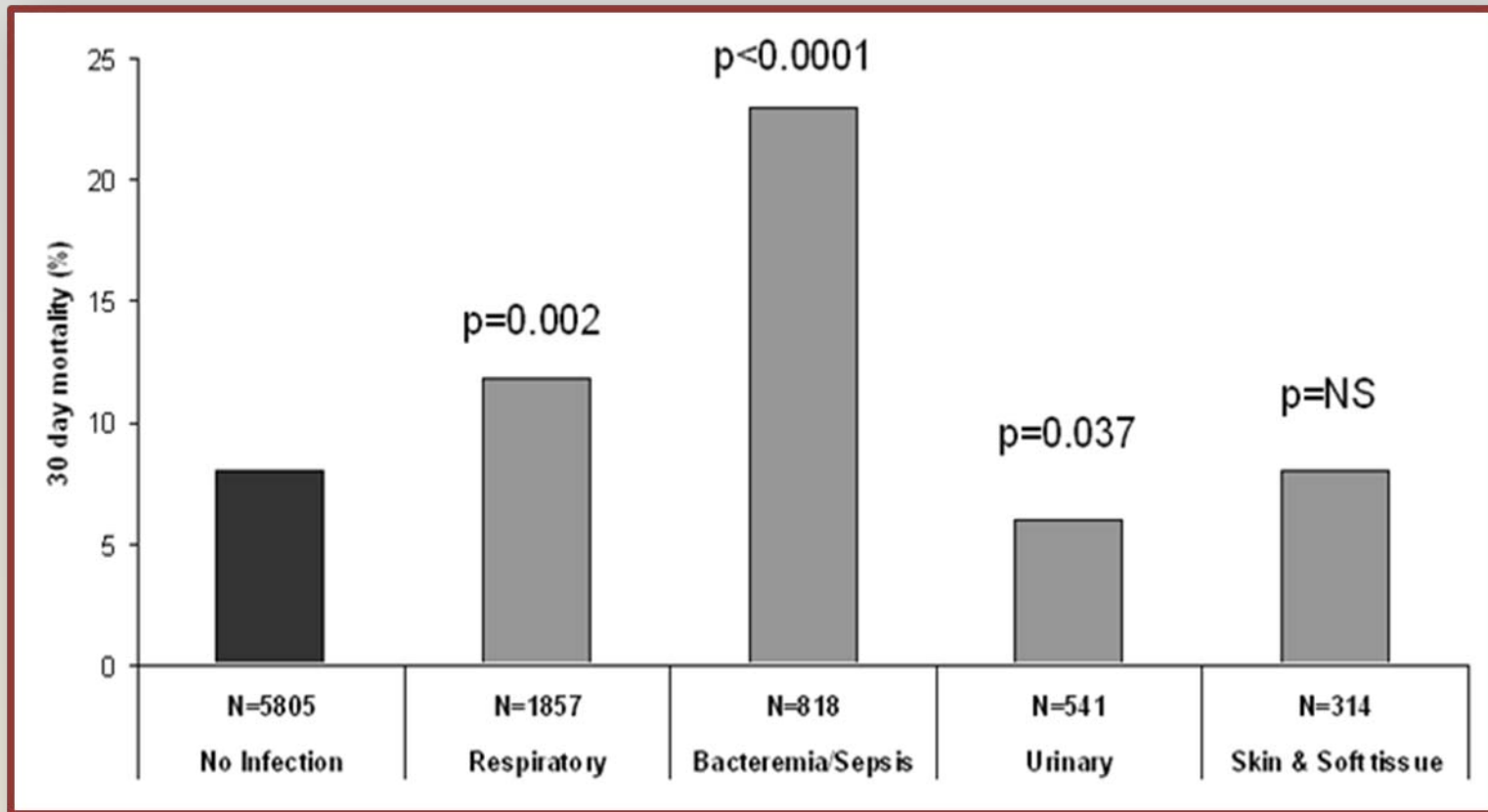| Parameter	No Infection (N=5805)	Any Infection (N=3530)	p
Age (avg±stdev)	75±10	77±10	<0.0001
Male (%)	57	55	NS
Diabetes (%)	41	44	0.004
CRF (%)	30	45	<0.0001
Malignancy (%)	14	16	NS
AFIB (%)	38	47	<0.0001
Obesity (%)	11	13	0.007
IHD (%)	67	69	NS
Past CVA (%)	13	20	<0.0001
COPD (%)	13	31	<0.0001

Thirty Day Mortality

Infection related hospitalizations resulted in a significantly higher 30 day and one year mortality rates (13% vs 8%, p<0.0001, and 69% vs 37%, p<0.0001, respectively)

Recurrent Admissions

- Infection related hospitalizations accounted for 24% of all admissions

- Patients admitted for infection related causes had a significantly increased re-admission rate at six months (65% vs 33%, $p<0.0001$)

- Patients admitted due to infections had a higher rate of annualized heart failure admissions (0.97 ± 1.14 vs 0.61 ± 0.71, $p<0.0001$)

Differences in Echocardiographic Measures by Infection Type

Parameter	No Infection (N=5805)	Respiratory infections (N=1857)	p	Bacteremia / Sepsis (N=818)	p	Urinary tract infections (N=541)	p	Skin & Soft tissue infections (N=314)	p
Severe Heart failure (%)									
Systolic	40	40	NS	45	0.007	37	NS	36	NS
Diastolic	18	19	NS	30	0.0004	9	0.024	13	NS
Right	**18**	**22**	**0.004**	**25**	**<0.0001**	**19**	**NS**	**23**	**0.037**
Significant valvular abnormalities (%)									
Aortic stenosis	3	3	NS	1	0.021	2	NS	3	NS
Mitral regurgitation	19	20	NS	24	0.001	20	NS	21	NS
Tricuspid regurgitation	16	18	NS	23	<0.0001	17	NS	19	NS
Left ventricular hypertrophy (%)	31	33	NS	35	NS	36	0.032	30	NS
Pulmonary hypertension (%)	28	32	0.016	29	NS	29	NS	30	NS

Predictors for Severe Infection (Respiratory infections and sepsis\bacteremia) Related Hospitalizations

Parameter	OR (CI 95%)	p
Age	1.02 (1.01, 1.03)	0.004
Male gender	0.77 (0.61, 0.96)	0.022
Chronic renal failure	1.49 (1.18, 1.87)	0.001
Malignancy	1.58 (1.19, 2.1)	0.001
Atrial fibrillation	1.67 (1.32, 2.12)	<0.0001
Past Myocardial Infarction	1.95 (1.5, 2.54)	<0.0001
Past CVA	1.52 (1.14, 2.02)	0.004
COPD	**4.87 (3.83, 6.2)**	**<0.0001**
Anemia	1.64 (1.31, 2.06)	<0.0001
Significant RV dysfunction	**1.41 (1.05, 1.89)**	**0.022**

Conclusions - 1

- Infections represent a substantial burden of heart failure related hospitalizations

- Respiratory infections and bacteremia\sepsis are associated with increased mortality rates

- Female gender, COPD and multiple co-morbidities pose an increased infection risk

- RV failure may identify patients at risk for severe infections

Conclusions - 2

- Infection related admissions are associated with a 60% increase in short-term mortality compared with admissions due to other causes

- Infections cause a high burden of admissions and contribute directly to mortality

Summary

- Clinical and echocardiographic characteristics of heart failure patients can identify those at increased risk for major infections

- These should enable better risk stratification, concentrated prevention efforts and appropriate acute hospital care