



# Therapy of infective endocarditis - a retrospective single center study 2005 – 2014

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## Background and Introduction

Infective endocarditis (IE) has an incidence of approximately 1.7-6.2 cases per 100,000 patient years in Western Europe and the U.S.. Rates are higher in at-risk cohorts such as intravenous drug users, Incidence has remained constant for 50 years, however antibiotic therapy and cardiac surgery substantially improved the outcome in the last century.

## The aim of the study

Triggered by emergence of post-surgical IE caused by *M. chimerae* a retrospective study has been conducted to determine the epidemiology, etiology, outcome and treatment of IE.

## Methods

All patients diagnosed with IE at the University Hospital of Vienna from January 2005 to December 2014 were enrolled. Cases were identified using all ICD-10 codes coding endocarditis or valve disease. Medical charts were reviewed retrospectively and all medical data about the patient, details about the symptoms, diagnosis and antimicrobial therapy were entered into a scientific database (Research Data Analysis, CEMSIIS) integrated within the hospital patient information system. Thus all data available can be linked together, allowing a multi-dimensional approach. To assess the association between therapy and outcome, the Kruskal-Wallis rank-sum test was performed and the chi-squared test was calculated. A  $p < 0.05$  was considered as statistically significant.

## Results

Overall, 204 patients (153 males, 55 females, median age 62 years, range 0.3–88 years) with 208 endocarditis episodes were identified. Blood cultures were performed in 95% of the patients.

Clinical and echocardiographic characteristics of 208 patients	Number
Age – years (range)	62 (0.3-88)
Sex (male/female)	153/55
Endocarditis (acute/subacute-chronic)	193/12
Blood culture (positive/negative)	164/44
Valve replacement within 6 weeks after the diagnosis of EC	78 (38%) patients (57 acute/21 planned surgery)
Septic spreading	33 (16%)
Positive echocardiography	160 (77%)
Valve involved	
Mitral	71 (34%)
Aortic	84 (40%)
Tricuspid	15 (7%)
Pulmonary	8 (4%)
At least 2 valves	40 (19%)
Blood microorganism	
<i>Staphylococcus aureus</i>	51 (25%)
Alpha-hemolytic streptococci	47 (23%)
Enterococcus	25 (12%)
Coagulase-negative staph.	21 (10%)
Other (fungal, G+/-)	20 (10%)
Negative culture	44 (21%)

Therapy duration by pathogen	Days median (range)
<i>Staphylococcus aureus</i>	33 (2-147)
Coagulase-negative staphylococcus	35 (23-134)
Enterococcus	42 (4-255)
Alpha-hemolytic streptococci	41 (5-199)
Negative culture	7 (3-109)

Overall, 175 patients had a favorable outcome of therapy +/- surgery, 31 patients died from IE. IE caused by *S.aureus* had a significantly worse outcome than IE by any other microorganism (Favorable response: 75% vs. 89,75%,  $p < 0.05$ ).

Outcome by microorganism	Response N (%)	Death N (%)
<i>Staphylococcus aureus</i>	38 (75%)	13 (25%)
Coagulase-negative staphylococcus	21 (100%)	0 (0%)
Enterococcus	22 (88%)	3 (12%)
Alpha-hemolytic streptococci	41 (89%)	5 (11%)
Negative blood culture	35 (80%)	9 (20%)

Thirty-eight of the patients received treatment according to the international guidelines consisting of a beta-lactam or vancomycin plus/minus aminoglycoside. However, most patients received a therapy including teicoplanin allowing an outpatients' therapy. The response rate to teicoplanin monotherapy, to sequential treatment with betalactams and teicoplanin (for outpatients' treatment) and to standard therapy plus any kind of combination therapy was 96% (25/26), 92% (22/23) and 82.5% (130/156), respectively (not significant).

Therapy-Outcome	Cure % (N)	Death % (N)
Teicoplanin monotherapy	96% (25)	4% (1)
Sequential treatment 14 days betalactam (PenG/ampicillin/cef.) and teicoplanin (for outpatient treatment)	92% (22)	8% (1)
Teicoplanin-combination	85% (60)	15% (9)
Other	78% (70)	22% (20)

## Conclusions

- The outcome of IE is favorable when treated in a comprehensive multimodal approach including sonography, blood cultures, early antimicrobial treatment and timely cardiac surgery.
- Staphylococci have replaced alpha-hemolytic streptococci as leading pathogens of IE.
- Teicoplanin may be an option for the inpatient and outpatient parenteral antibiotic therapy (OPAT) of IE.