



**SOCIÉTÉ TUNISIENNE
DE PATHOLOGIE
INFECTIEUSE**

Worldwide Variations in the Epidemiology of Infective Endocarditis: A View from the Middle East

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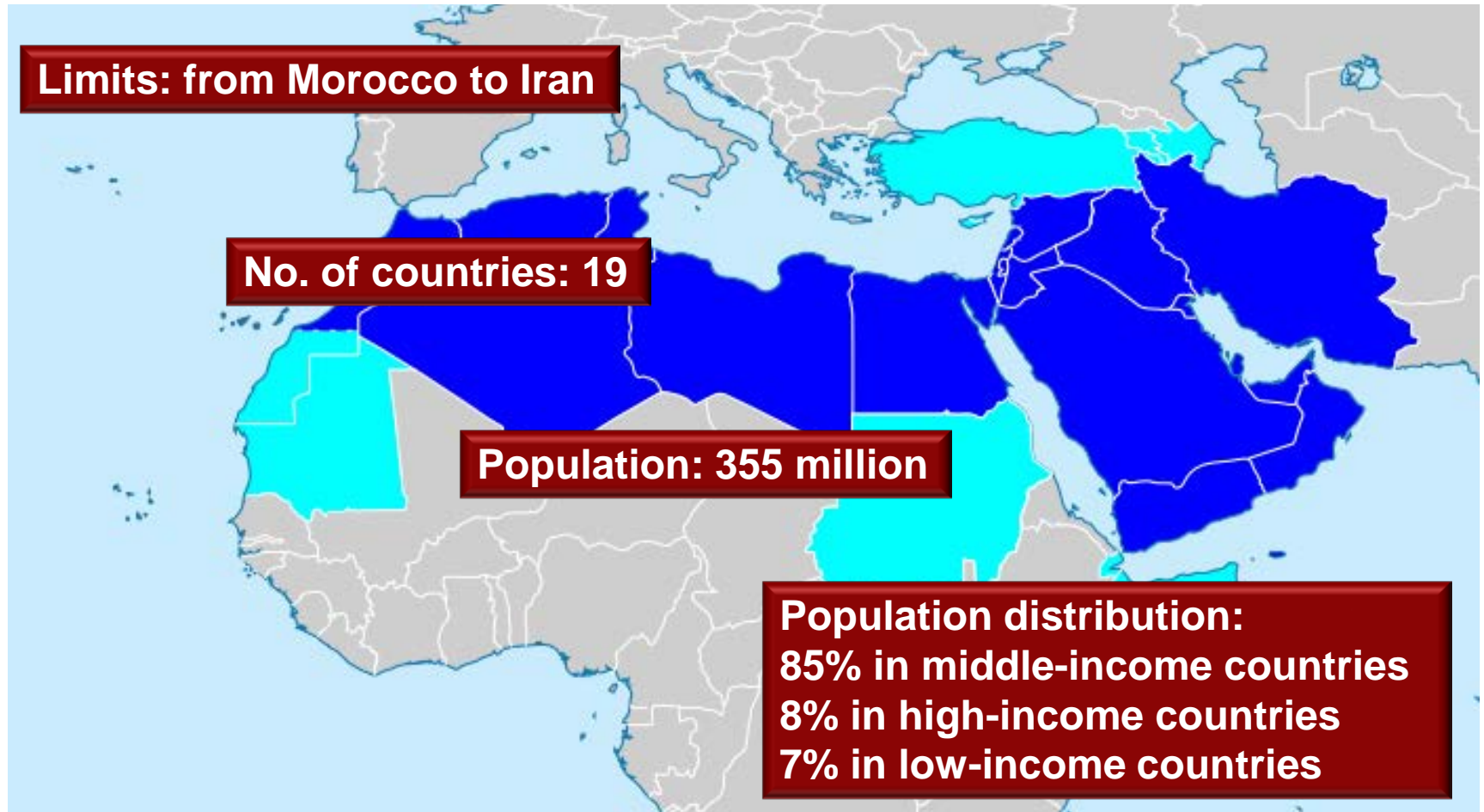
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Middle East and North Africa Region (MENA): FACTS!



Endocarditis in the MENA Region

- Single center case-series
- Case reports
- No national or global epidemiological studies
- No population-based studies
- Variability in access to care, diagnostic methods (mainly TEE), antibiotic therapy, and surgical intervention
- Variability in quality of care



Endocarditis in the MENA Region: No. of Hits on PubMed

- Saudi Arabia: 31
- Tunisia: 19
- Iran: 14
- Morocco: 7
- Oman: 7
- Kuwait: 6
- Lebanon: 6

- Qatar: 4
- Algeria: 3
- Jordan: 2
- Egypt: 2
- UAE: 2
- Bahrain: 1
- Yemen: 1

Turkey: 304

Epidemiology of IE in MENA



- Retrospective analysis of IE from 1995 to 2008
- 54 cases of definite endocarditis (male to female ratio 2.6:1)
- Mean age 59.7 ± 18.2 years
- Microbiology:
 - *S. aureus* (n = 23)
 - *Enterococcus faecalis* (n = 12)
 - viridans streptococci (n = 9)
- In-hospital mortality 29.4%

Epidemiology of IE in MENA



- Tertiary hospital in Riyadh, Saudi Arabia
- Retrospective review between 1993-2003
- N = 47 patients (37 NVE, 10 PVE)
- Predisposing cardiac conditions in 27 patients (RHD, CHD)
- Microbiology:
 - Staphylococci (n = 20); 12 *S. aureus*, 8 CoNS
 - Enterococci (n = 6)
- In-hospital mortality rate: 8.5%

Epidemiology of IE in MENA



- Nosocomial infective endocarditis (NIE) is increasingly described
- 3 cases of NIE at a tertiary care hospital over 2 years
 - ▣ Burn patient
 - ▣ Liver transplant recipient
 - ▣ Renal transplant recipient
- All had indications for surgery but was only performed in 2:
 - ▣ Burn patient → underwent surgery → survived
 - ▣ Liver transplant recipient → poor surgical candidate → died
 - ▣ Renal transplant recipient → underwent surgery → died post-op

Epidemiology of IE in MENA



- Multicenter retrospective study in Tunisia from 1991 to 2000
- 440 IE in 435 patients (242 males, 193 females)
- Mean age 32.4 (range 1-78) years)
- RHD most common predisposing heart disease (45.2%)
- Blood cultures negative in 53.6%
- Microbiology:
 - Staphylococci (17.9%)
 - Streptococci (17.3%)
 - Enterococci (3.9%)
- Early valve surgery performed in 51.2% of patients
- In-hospital mortality 20.6%

Epidemiology of IE in MENA



- High-volume tertiary care center in Tunisia
- 134 patients with endocarditis between 1997 and 2006
- Mean age 34.22 years.
- RHD predominant underlying heart condition (45%).
- In 66 cases (49%), blood cultures were negative
- Microbiology:
 - Staphylococci (N = 30); 24 *S. aureus*, 6 CoNS
 - Streptococci (N = 32)
- Overall mortality 19%; predictors:
 - CHF (HR = 5.34, 95% CI 1.67-17.15, p = 0.005)
 - Vegetations >15 mm (HR = 5.78, 95% CI 1.84-18.32, p = 0.002)

Epidemiology of IE in MENA



- To study the effect of type of treatment on outcome of PVE in a tertiary care center in Tunisia between 1997 and 2006
- 48 PVE episodes (30 men and 18 women), mean age 37.93 years
 - 28 patients (58.33%) treated medically
 - 20 (41.66%) treated by a combined surgical and medical strategy
- Indications for surgery: hemodynamic deterioration (n = 8), annular abscess (n = 6), persisting sepsis (n = 6)
- Operated patients had longer delay to diagnosis, more heart failure and early complications, and more prosthetic dehiscence, annular abscesses and vegetations >10 mm
- Mortality: 14% in medical group, 35% in surgical group (p=0.09)

Epidemiology of IE in MENA



- To determine the frequency, clinical features and etiological factors of culture-negative endocarditis
- Retrospective review of 98 cases of IE from 1991 to 2000 in Sousse, (Tunisia)
- 48 patients (48.9%) had negative blood cultures:
 - Org identified in 7 cases by other techniques
 - 41 cases cause of IE not determined
- Factors associated with negative blood cultures:
 - Higher incidence of previous antibiotic therapy
 - Extracardiac signs of IE
 - Cardiac failure
- Early surgical indications and mortality were the same in both groups

Epidemiology of IE in MENA



- Blood culture-negative endocarditis is common in Algeria
- To describe the etiology of IE in this country
- 77 cases of definite IE and 33 cases of possible IE
- Blood cultures negative in 62 cases
 - 34 cases unidentified
 - 28 cases identified by other means, 18 caused by zoonotic and arthropod-borne bacteria: *Bartonella quintana* (14 cases), *Brucella melitensis* (2 cases), and *Coxiella burnetii* (2 cases)

Epidemiology of IE in MENA

- 72 patients with suspected IE in a teaching hospital in Sana'a, Yemen between 2005 and 2007
- Mean age was 28.56 ± 14.5 years; 30 men and 42 women
- RHD in 53.3% of patients
- Blood cultures positive in only 7 cases (9.6%)
- Addition of high ESR as minor criteria improved the diagnostic possibility
- In hospital mortality 12.5 %

Unusual Presentations of IE in MENA

- IE presenting as isolated splenomegaly (Iran)

Rohani A. Cardiovasc Dis Res 2011;2:71-3



- IE causing acquired aorto-ventricular tunnel (Iran)

Moaref A. Echocardiography 2009;26:82-3



- Tricuspid valve IE in an intravenous drug abuser masquerading as pulmonary tuberculosis (Oman)

Panduranga P. Heart Views 2010;11:121-4



Unusual Organisms Causing IE in MENA

- *Salmonella* species (KSA) Al-Sherbeeni NM. Saudi Med J. 2009;30:1091
- *Granulicatella elegans* (KSA) Al-Tawfiq JA. Diagn Microbiol Infect Dis 2007;57:439
- *Kytococcus schroeteri* (Tunisia) Mnif B. J Clin Microbiol 2006;44:1187
- *Mycobacterium abscessus* (Kuwait) Al-Benwan K. Ann Saudi Med 2010;30:408
- *Chryseomonas luteola* (Morocco) Chihab W. J Clin Microbiol 2004;42:1837
- *Pasteurella multocida* (Lebanon) Naba MR. Int J Infect Dis 2009;13:e267
- *Trichosporon beigelii* (Lebanon) Mooty MY. Eur J Clin Microbiol Infect Dis 2001;20:139
- *Gemella morbillorum* (Qatar) Al Soub H. Saudi Med J 2003;24:1135-7



Brucella IE in MENA

- Single reports or short series from Iran, KSA, Qatar, and Jordan
- Large series from Turkey:
 - Medical and surgical treatment are needed simultaneously
 - Perioperative antibiotic therapy combined with surgical treatment increases the quality of life in the long-term follow-up
 - Continue antibiotics for at least 6 months after surgery
 - Medical therapy alone can be an alternative in stable patients (combination of three antibiotics)

Amirghofran AA. *Ann Thorac Surg* 2011;92:e77

Esmailpour N. *Trop Doct* 2010;40:47

Al-Majid FM. *Saudi Med J* 2010;31:448

Al-Khuwaitir TS. *Saudi Med J* 2002;23:99

Alsoub H. *Clin Microbiol Infect* 2001;7:382

Alhyari AR. *Saudi Med J* 2005;26:473

Fedakar A. *Trop Doct* 2011;41:227

Sasmazel A. *Ann Thorac Surg* 2010;89:1432

Inan MB. *Clin Cardiol* 2010;33:E20

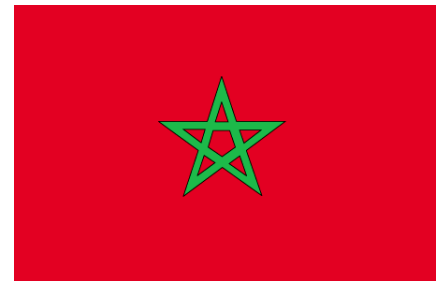
Cay S. *Kardiol Pol* 2009;67:274

Tasdemir K. *Eur J Cardiothorac Surg* 2010;37:1021

IE in the Hemodialysis Population

- Tunisian series:
 - ▣ Mostly staphylococci (68.7%)
 - ▣ Frequent complications
 - ▣ High mortality (43.7%)

- Moroccan series:
 - ▣ Staphylococci and enterococci
 - ▣ Recent history of infected vascular access
 - ▣ Median survival after surgery: 10.3 months



Rekik S. Clin Exp Nephrol 2009;13:350-4

Montasser D. Saudi J Kidney Dis Transpl 2011;22:160-6

IE in the Transplant Population



- Kidney transplant recipients:
 - 4 patients with IE in Iran
 - All 4 patients were treated successfully
 - Early diagnosis and medical/surgical management can preserve the patient and the kidney allograft
 - Testing for concurrent infections such as CMV is warranted
- Does CMV increase risk of IE in renal transplant?
 - Retrospective study in Iran
 - Presentation time of IE in CMV-positive patients was earlier than in CMV-negative patients

Surgical Treatment of IE in MENA



- Short-term and long-term outcome of surgery in Tunisia
- 88 cases of IE requiring surgery (70 NVE and 18 PVE)
- Mean age 34.9 years, 54 (61.4%) were men
- *Streptococcus* species were most common
- Most frequent indication for operation was congestive heart failure
- Early mortality: 27.27%
- 5- and 10-year survivals free from the combined endpoint of recurrent IE, cardiovascular death and late surgery in survivors were 69.5% and 63.7%, respectively
- Surgery for IE remains challenging and yields high mortality rates
- Severe heart failure is most powerful predictor of mortality
- Long-term outcome is satisfactory

Complications and Outcome of IE in MENA



- Predictors of bad prognosis of IE in a Tunisian series:
 - Vegetation > 10 mm (OR 1.97, 1-4.1, $p = 0.05$)
 - Presence of a neurological accident (OR:2.76, 1.32-5.76, $p = 0.007$)
 - Absence of surgical treatment (OR: 5.03, 2-11.4, $p < 0.001$)

Complications and Outcome of IE in MENA



- Moroccan series looking at vascular complications in 12 patients with IE and 26 vascular complications:
 - 11 neurological
 - 10 arterial involving the limbs including 5 mycotic aneurysms
 - 2 acute myocardial infarcts
 - 2 splenic infarcts
 - 1 recurrent septic pulmonary embolism
- Vascular disease initial manifestation in 9 patients
- 54% occurred before end of 2nd week of antibiotic treatment
- 4 deaths; 3 directly related to the vascular complication

Awareness About IE in MENA



- Parents of 205 children in several cardiology clinics in KSA were interviewed
- Patients' mean age was 5 years and 8 months (range 1 month-15 years)
- 50% of parents were high school graduates
- 25% of parents correctly defined endocarditis
- 64% of parents with at risk children were aware of measures to prevent endocarditis
- Parental knowledge of endocarditis was limited
- Intensified education and awareness programs are needed

Data from Lebanon



Endocarditis in Pediatric Age Group

41 children between
1977 and 1995
Age: 11.3 ± 2.8 y
24 female, 17 male

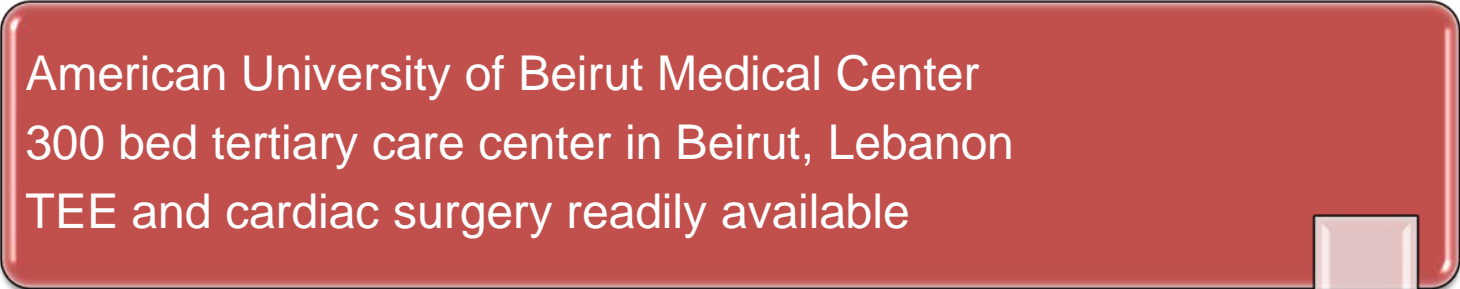
- viridans streptococci and *S. aureus* most common

46% congenital heart
disease (tetralogy,
pulmonic stenosis)
39% rheumatic heart
disease

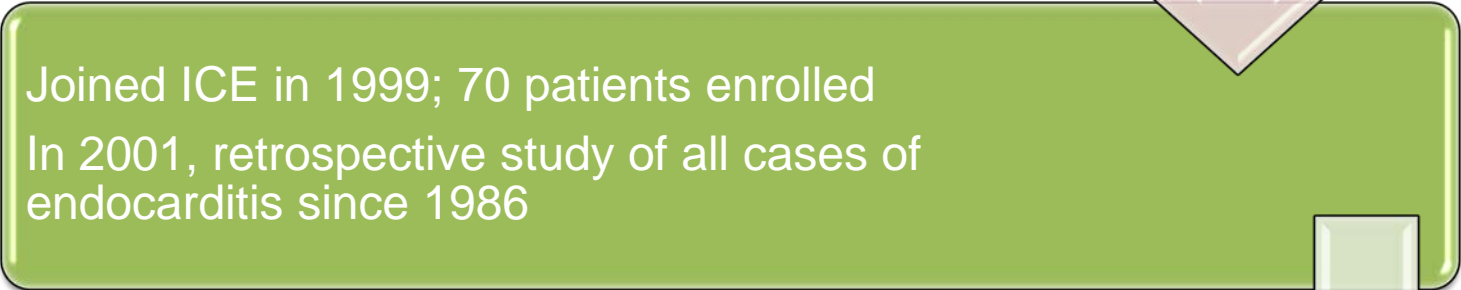
- Overall mortality 29%

ICE in Lebanon

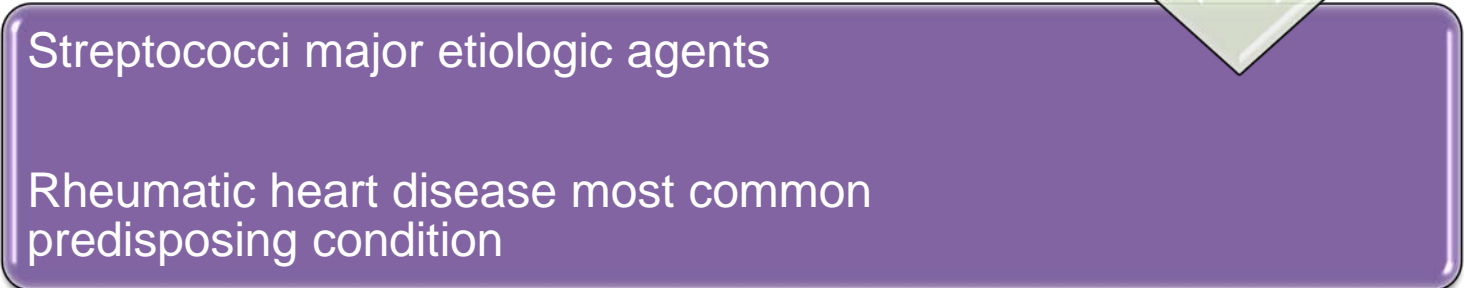
American University of Beirut Medical Center
300 bed tertiary care center in Beirut, Lebanon
TEE and cardiac surgery readily available



Joined ICE in 1999; 70 patients enrolled
In 2001, retrospective study of all cases of
endocarditis since 1986



Streptococci major etiologic agents
Rheumatic heart disease most common
predisposing condition



Baseline Characteristics

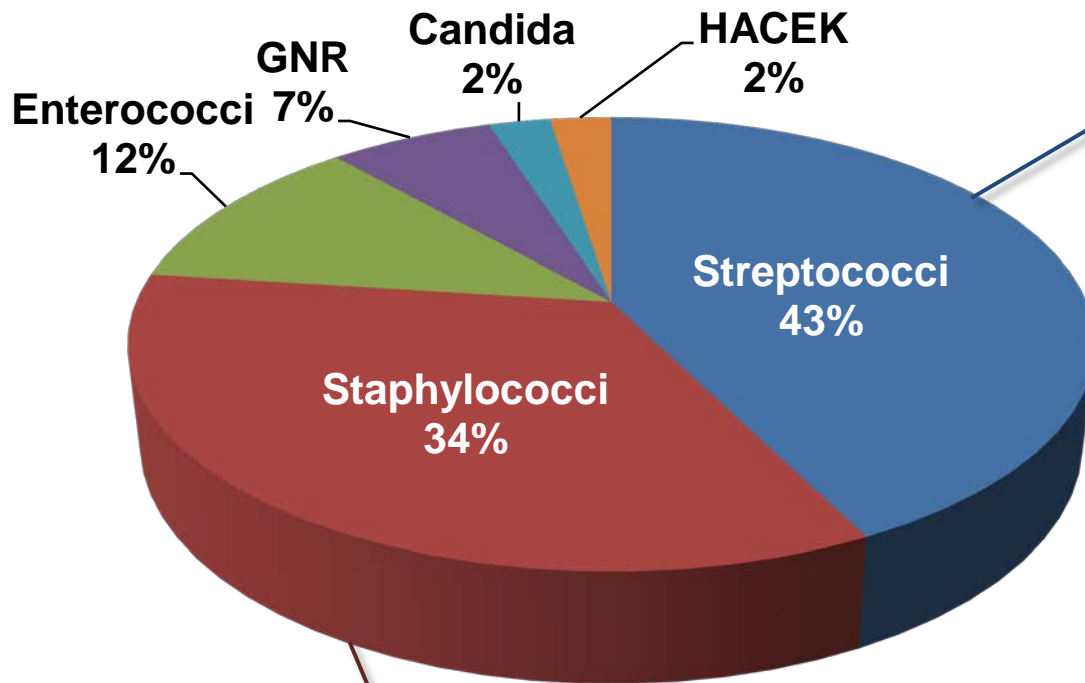
No. of patients	n = 155
Age in years, mean (range)	52 (13-89)
Male gender, n (%)	105 (67.7)
Comorbidities, n (%)	
Diabetes	21 (13.5)
Hypertension	22 (14.2)
CAD/CHF	16 (10.3)
Malignancy	11 (7.1)
Immunosuppression	7 (4.5)
Hemodialysis	6 (3.9)

Risk Factors for Endocarditis

Risk Factor	n (%)
Invasive procedures	
Dental procedures	21 (13.5)
Other procedures	18 (11.6)
Devices	
Pacemaker/ICD	8 (5.2)
Short-term central catheter	7 (4.5)
Chronic central catheter	2 (1.3)
Predisposing cardiac conditions	
Congenital heart disease	13 (8.4)
Rheumatic heart disease	26 (16.8)
Prosthetic valve	36 (23.2)
History of IE	17 (11.0)

**Nosocomial acquisition:
17/155 = 11.0%**

Microbiology



N = 52
viridans strep (n = 40)
β-hemolytic strep (n = 4)
S. bovis group (n = 8)

N = 42
MSSA (n = 21)
MRSA (n = 7)
CoNS (n = 14)

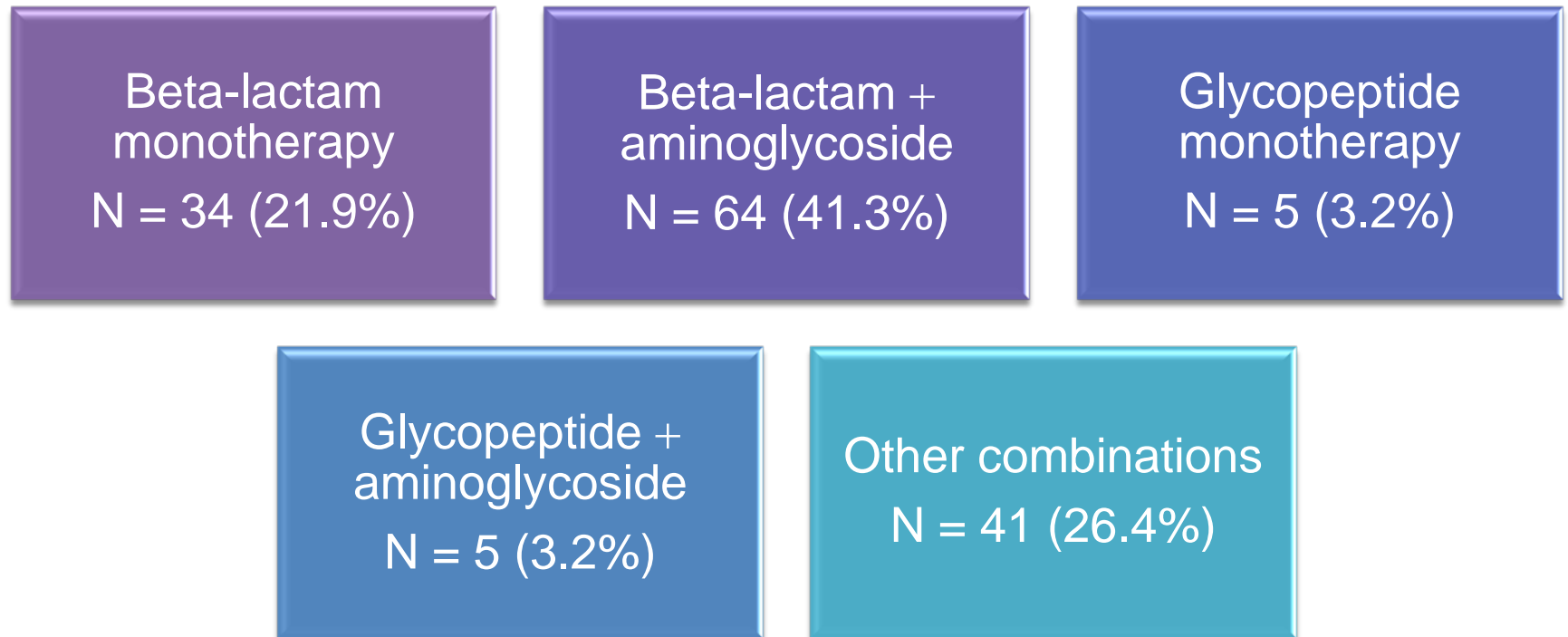
Culture-negative endocarditis:
30/152 = 20%

Echocardiography

Valve	n (%)
Mitral	80 (52.6)
Aortic	50 (32.9)
Tricuspid	17 (11.4)
Pulmonary	1 (0.7)
Concomitant left and right-sided IE	8 (5.2)

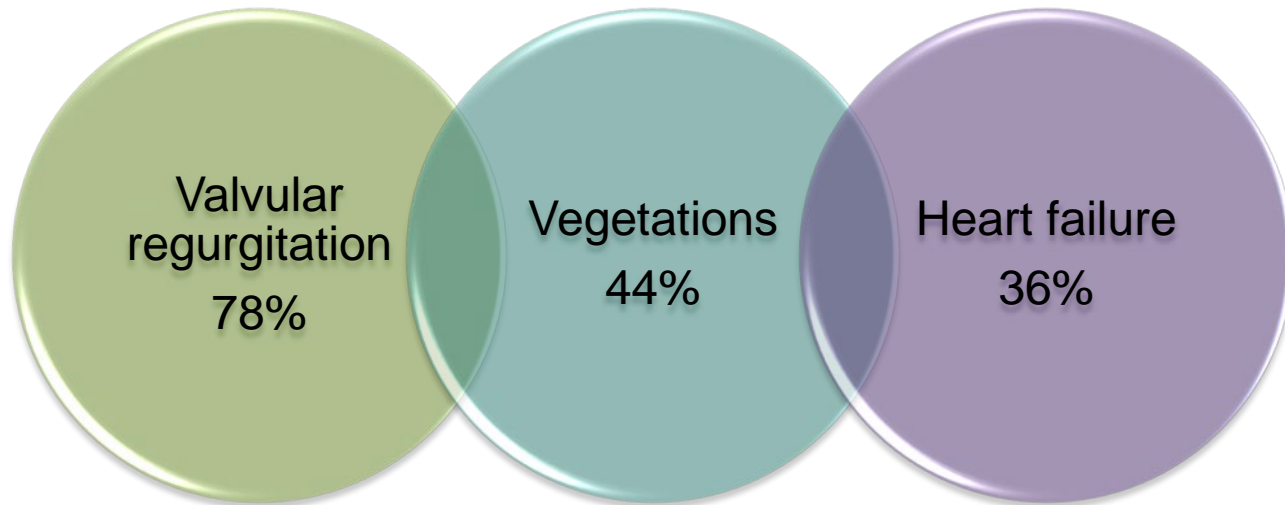
**Evidence of IE on TTE/TEE:
123/152 = 81%**

Medical Therapy



Surgical Treatment

- Surgery performed in 50 patients (32%)
- Mean time to surgery: 14 d (range 1-60 d)
- 56 valve replacements: 82% mechanical, 18% bioprosthetic
- Indications:



Outcomes

Complication	N (%)
Death	24 (15.5)
Other complications	
Congestive heart failure	32 (20.6)
Systemic embolization	28 (18.1)
Stroke (embolic and hemorrhagic)	17 (11.0)
Intracardiac abscess	12 (7.7)

Conclusions

- Epidemiology of IE in the ME is largely based on single-center studies
- More global studies are warranted
- Variation in microbiology
- Significant rates of culture-negative endocarditis
- Outcome is still poor in most cases

