

# Infections bactériémiques à *Staphylococcus aureus* : de la bactériémie à l'endocardite

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# SA IE : current epidemiologic patterns

- > 30% of IE are SA IE
- > 30% of SA IE are healthcare associated
- > 30% of PV IE are healthcare associated
- > 30% of HCA SA IE die

# *Staphylococcus aureus* endocarditis a consequence of medical progress

- ICE: 1779 definite IE cases collected prospectively between Jun '00 and Dec '03

	No. (%)
Staphylococcus	
<i>S aureus</i>	558 (31.6)
Coagulase-negative staphylococci	186 (10.5)
Streptococcus	
Viridans group streptococci	319 (18.0)
<i>Streptococcus bovis</i>	114 (6.5)
Other streptococci	91 (5.1)
Enterococci	188 (10.6)
HACEK	30 (1.7)
Non-HACEK gram-negative bacteria	38 (2.1)
Fungi	32 (1.8)
Polymicrobial	23 (1.3)
Other*	56 (3.1)
Culture negative	144 (8.1)

# *Staphylococcus aureus* endocarditis

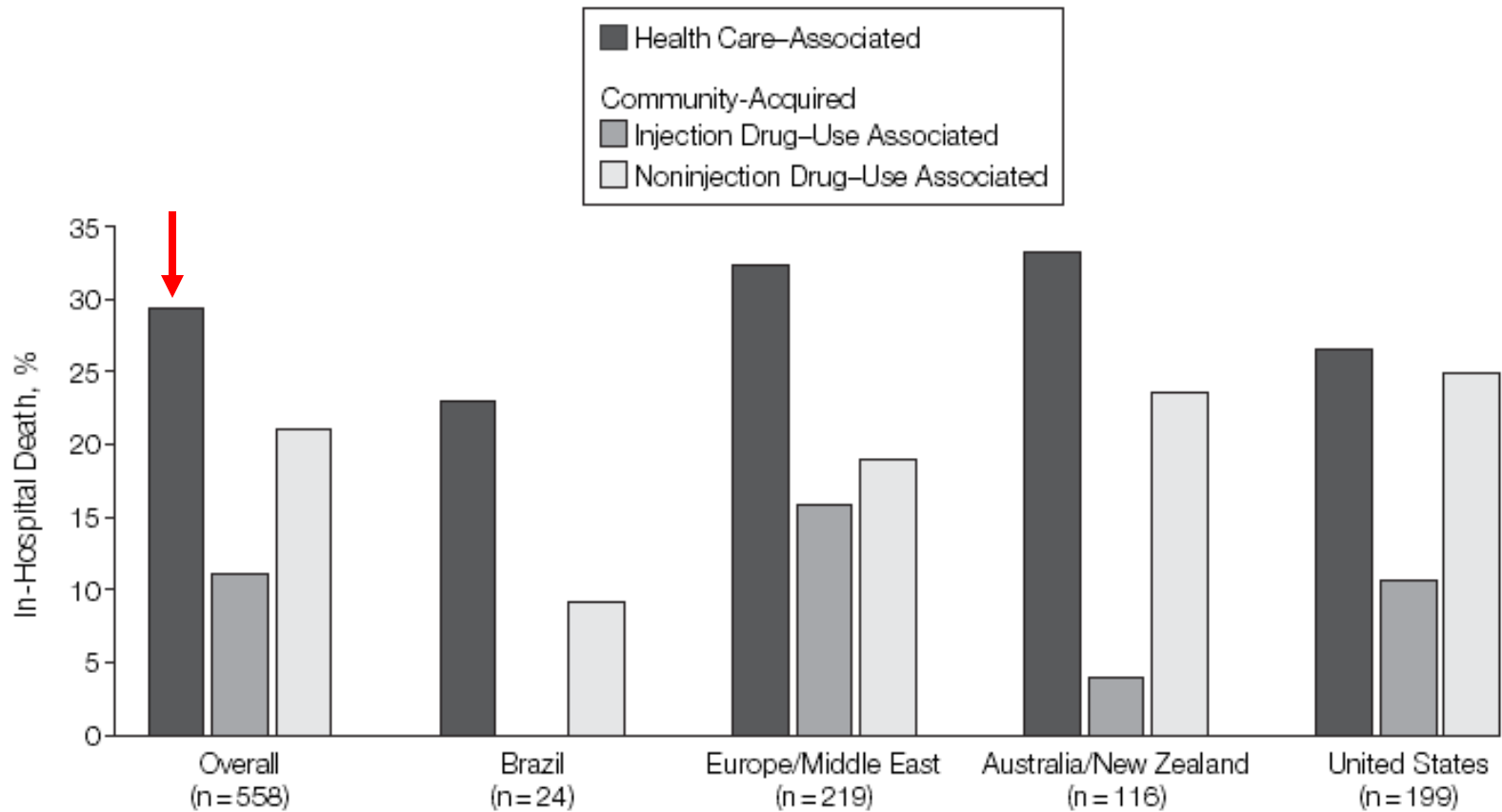
## a consequence of medical progress

- ICE: 1779 definite IE cases collected prospectively between Jun '00 and Dec '03

Characteristics	No. (%)		P Value
	Non- <i>S aureus</i> (n = 1221)	<i>S aureus</i> (n = 558)	
Male sex	868 (71.1)	341 (61.1)	<.001
Age, median (25th-75th percentiles), y	59.3 (45.2-72.2)	56.6 (41.1-70.5)	.007
Type of IE			
Prosthetic valve	276 (22.6)	86 (15.4)	23.7% <.001
Native valve	846 (69.3)	401 (71.9)	32.1% .27
Other and unknown	99 (8.1)	71 (12.7)	.002

# *Staphylococcus aureus* endocarditis

## a consequence of medical progress



# *Staphylococcus aureus* endocarditis a consequence of medical progress

## Clinical characteristics of S.a IE vs. Non S.a IE

	Non S.a IE N = 1221	S.a IE N = 558	Multivariate OR (95% CI)
1 <sup>st</sup> presentation < 1 mo from 1 <sup>st</sup> symptom	67.8%	92.7%	5.1 (3.2 – 8.2)
Diabetes mellitus	14.8%	19.7%	1.3 (1.1 – 1.8)
Intravascular device source	9.1%	28.4%	1.7 (1.2 – 2.6)
Health-care associated	17.3%	39.1%	2.9 (2.1 – 3.8)
IVDU associated	4.1%	21.0%	9.3 (6.3 – 13.7)

# Contemporary Clinical Profile and Outcome of Prosthetic Valve Endocarditis

- From 06/00 to 08/05, 3250 patients, 61 centers, 28 countries.
- PVE: 556 (20.1%) of 2670 patients with definite IE.

	PVE (n=556)	NVE (n=1895)	p value
Age, mean, years	65.0	56.3	<0.001
Hemodialysis dependent	25 (4.5)	173 (9.1)	<0.001
Current IVDU	10 (1.8)	235 (12.4)	<0.001
Previous IE	112 (20.1)	91 (4.8)	<0.001
Health-care associated infection	203 (36.5)	587 (31.0)	0.01
Echocardiographic findings			
- Vegetation	406 (73.0)	1703 (89.9)	<0.001
- New regurgitation	257 (46.2)	1346 (71.0)	<0.001
- Abscess	165 (29.7)	222 (11.7)	<0.001
Valve surgery during admission	272 (48.9)	879 (46.4)	0.30
In-hospital death	127 (22.8)	310 (16.4)	<0.001

Results are expressed as n (%)

A. Wang, JAMA. 2007;297:1354-1361



# Contemporary Clinical Profile and Outcome of Prosthetic Valve Endocarditis

Causative organism (%)	PV IE n = 556	NV IE n = 1895	p
<i>Staphylococcus aureus</i>	23.0	32.9	<0.001
Coag-neg. staphylococci	16.9	8.3	<0.001

Causative Organism	Total, No. (%) (n = 556)	Early PVE, No. (%) (n = 53)	Late PVE, No. (%) (n = 331)
<i>Staphylococcus aureus</i>	128 (23.0)	19 (35.9)	61 (18.4)
Methicillin-sensitive <i>S aureus</i>	82 (14.7)	8 (15.1)	43 (13.0)
Methicillin-resistant <i>S aureus</i>	36 (6.5)	10 (18.9)	11 (3.3)
Coagulase-negative staphylococci	94 (16.9)	9 (17.0)	66 (19.9)
<i>Enterococcus</i> spp	71 (12.8)	4 (7.5)	42 (12.7)
<i>Viridans streptococci</i>	67 (12.1)	1 (1.9)	34 (10.3)
Culture negative	62 (11.2)	9 (17.0)	41 (12.4)
<i>Streptococcus bovis</i>	29 (5.2)	1 (1.9)	22 (6.7)
Fungal	23 (4.1)	5 (9.4)	11 (3.3)



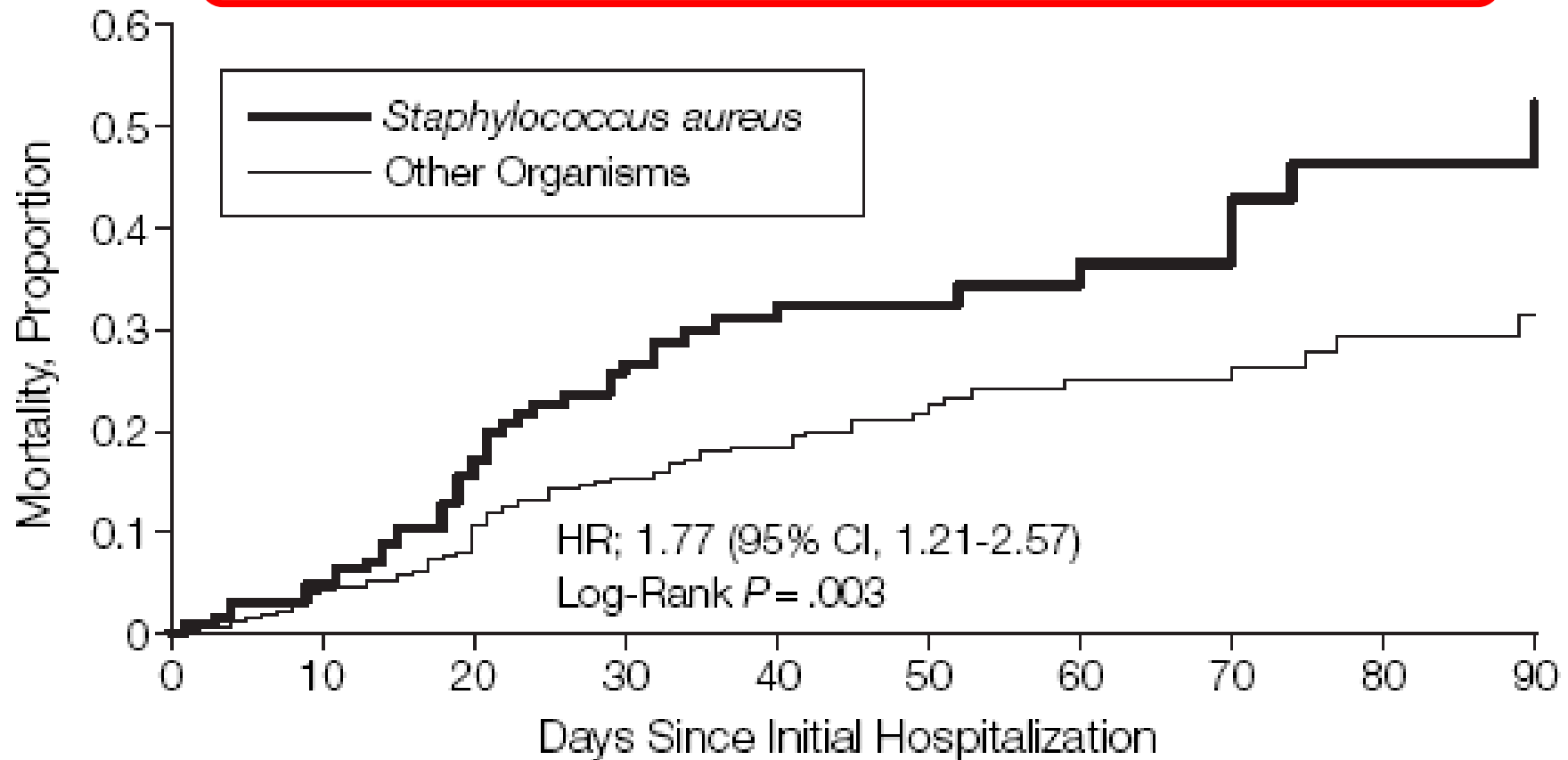
# Contemporary Clinical Profile and Outcome of Prosthetic Valve Endocarditis

## Prognostic factors (in-hospital mortality) of PVE

Variable	N	Mortality N (%)	Adjusted OR (95% CI)
Age (years)			
< 65	277	42 (15.2)	1 (reference)
65 – 75	151	38 (25.2)	1.82 (1.09 – 3.03)
> 75	128	47 (36.7)	3.73 (2.10 – 6.61)
Health-care associated	203	62 (30.5)	1.62 (1.08 – 2.44)
<i>S. aureus</i> IE	128	44 (34.4)	1.73 (1.01 – 2.95)
Persistent bacteremia	49	27 (55.1)	4.29 (1.99 – 9.22)
Congestive heart failure	183	60 (32.8)	2.33 (1.62 – 3.34)
Intracardiac abscess	144	47 (32.6)	1.86 (1.10 – 3.15)
Stroke	101	34 (33.7)	2.25 (1.25 – 4.03)

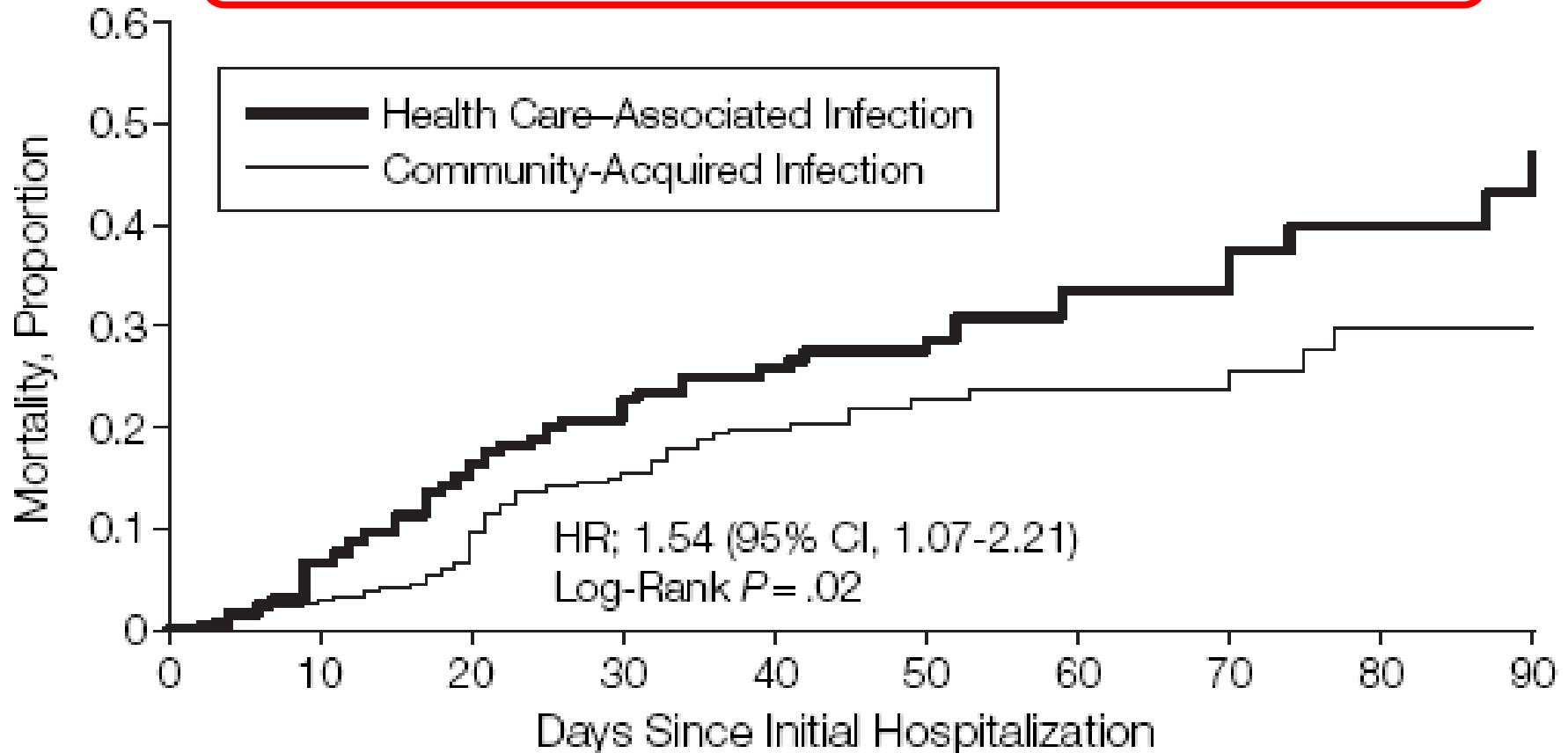
# Contemporary Clinical Profile and Outcome of Prosthetic Valve Endocarditis

PVE Caused by *Staphylococcus aureus* or Other Organisms



# Contemporary Clinical Profile and Outcome of Prosthetic Valve Endocarditis

Health Care–Associated or Community-Acquired PVE



- Fem m e **33** ans
  - G **2P2**, pas d'antécédents nide terrain particulier
  - Opératrice sur machine industrielle
- Chronologie des événements
  - 7-9 mai 2004, asthénie, fièvre, céphalées
  - 10 mai: CRP **240** mg/L, **53 000** plaquettes/mm<sup>3</sup> – hospitalisation
  - 11 mai: **3** hémocultures + à SAMS
    - Porte d'entrée : micro-coupures des doigts
    - Pas d'arguments pour des localisations secondaires
    - Antibiothérapie par C bxacilline + Gentamicine
    - Inclusion dans essai thérapeutique (DAP -E -01 -02)
  - 14 mai: échocardiographie
    - Volumineuses (15 à 30 mm) végétations mobiles mitrale et aortique
  - 15 mai: chirurgie en urgence
    - Végetectomies, plastie aortique et mitrale. Pas d'insertion de prothèse

# Role of echocardiography in evaluation of patients with SAB

Our results suggest that IE is common among patients admitted to the hospital with SAB and is associated with an increased risk of death due to sepsis. TEE is essential to establish the diagnosis and to detect associated complications.

Therefore, the test should be considered part of the early evaluation of patients with SAB.

□ TTE

■ TEE

TEE

Negative  
77

Positive  
26

# of patients

ant

# *S. aureus* bacteremia in patients with prosthetic devices: Costs and outcomes

- 298 hospitalized, prospectively identified patients with a prosthetic device and *S. aureus* bacteremia
- 96-month study period
- Clinical data collected at the time of hospitalization.

Event, n (%)	Orthopedic n = 73	Cardiovascular n = 122	Long-term catheter n = 71
Complications			
- Any	36 (49)	54 (44)	25 (35)
- Endocarditis	4 (6)	31 (25)	8 (11)
- osteomyelitis	11 (15)	3 (2)	2 (3)
- arthritis	17 (23)	4 (3)	2 (3)
12-week mortality	18 (25)	43 (35)	12 (17)
Death due to <i>S. aureus</i>	11 (15)	32 (26)	7 (10)

# Risk of endocarditis among patients with prosthetic valves and *S. aureus* bacteremia

- 12-week prospective evaluation of all patients with a PV or ring who were treated for *S. aureus* bacteremia at Duke University Medical Center.
- Overall rate of definite PV IE : 26/51 (51%).
- The risk of endocarditis was similar in patients with
  - late (>12 months after valve implantation) vs. early *S. aureus* bacteremia (50% vs. 52%, NS),
  - mitral vs. aortic prostheses (62% vs. 48%, NS),
  - mechanical vs. bioprosthetic valves (62% vs. 44%, NS).
- All patients with a prosthetic valve who develop *S. aureus* bacteremia should be aggressively screened for the diagnosis of endocarditis.



# Complications and outcome of SA BSI in HD patients

- Prospective cohort study: Duke University MC
  - 210 hemodialysis-dependent adults with SA BSI
  - Source of bacteremia = vascular access in 185 patients
  - 117 patients (55.7%) had tunneled dialysis catheters

Complications/outcome	Total (n=210)
Any complication	31.0%
Infective endocarditis	17.1%
Osteomyelitis/arthritis	10.5%
Abscess	5.7%
Septic emboli	4.8%
Mortality at 12 weeks	19.0%

# Risk of IE in SAB: MSSA vs. MRSA

- 104 consecutive patients
  - With SAB (2 positive blood cultures)
  - Referred to echo lab for evaluation of IE
- 33 patients (31.7%) had confirmed IE
  - MSSA IE were mostly community-acquired
  - MRSA IE were mostly nosocomial.
  - 23 patients (43.4%) in the MSSA group
  - 10 patients (19.6%) in the MRSA group

P=0.009

# Outcomes and costs of MSSA vs MRSA BSI in HD patients

- Prospective cohort study: Duke University MC
  - 153 hemodialysis-dependent adults with SA BSI
  - July 1996 – August 2001

	MSSA (n=99)	MRSA (n=54)	P
HD via tunneled catheter, %	50.6%	70.4%	0.02
Hospitalized for another reason, %	12.4%	27.8%	0.02
Length of stay, days (mean)	9.3	16.6	< 0.0001
Cost of hospitalization, \$ (mean)	16,066	28,297	< 0.0001
Total cost during 12 wk, \$ (mean)	18,803	32,655	< 0.0001
Mortality at 12 weeks, %	12.4%	35.2%	0.005

# Cost-effectiveness of TEE to Determine the duration of therapy for C–A SAB

- Possible strategies: catheter removal +
  - Short-course Rx (2 wks)
  - Long-course Rx (4 wks)
  - TEE- guided: TEE neg 2 wks - TEE pos 4 weeks

Management Strategy	Total		Incremental		
	Cost	Effectiveness	Cost	Effectiveness	Cost-Effectiveness Ratio
	\$	QALY	\$	QALY	\$/QALY
Discounted at 3% (base case)					
Short-course therapy	9830	5.424	–	–	–
TEE	10 051	5.469	219	0.0447	4938
Long-course therapy	14 136	5.471	4085	0.0024	1 667 971

# En conclusion

- Une infection bactériémique "non compliquée" se complique d'une EI dans 10 à 30% des cas
- L'existence d'une IE aggrave le pronostic et modifie la prise en charge thérapeutique
- Quand faire une échocardiographie ?
  - Dans les bactériémies sur prothèse, en raison de l'augmentation du risque d'EI
  - Dans les bactériémies sur KT, pour optimiser la durée de traitement
- ETO vs ETT
  - ETO plus invasif et plus coûteux
  - mais coût-efficace.