Pearls of the ESC/ERS Guidelines 2015: Infective Endocarditis

Bernard Iung
Bichat Hospital, Paris, France
Disclosures

Bernard Iung, MD, 2016

Consultancy:
  • Boehringer Ingelheim

Speaker’s fee
  • Edwards Lifesciences
Incidence of infective endocarditis in the study population, by age and by microorganism

Incidence 34 / million / year
In-hospital mortality 23%

2015 ESC Guidelines for the management of infective endocarditis

The Task Force for the Management of Infective Endocarditis of the European Society of Cardiology (ESC)

Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM)

Authors/Task Force Members: Gilbert Habib* (Chairperson) (France), Patrizio Lancellotti* (co-Chairperson) (Belgium), Manuel J. Antunes (Portugal), Maria Grazia Bongiorni (Italy), Jean-Paul Casalta (France), Francesco Del Zotti (Italy), Raluca Dulgheru (Belgium), Gebrine El Khoury (Belgium), Paola Anna Erbaa (Italy), Bernard Iung (France), Jose M. Mirob (Spain), Barbara J. Mulder (The Netherlands), Edyta Plonska-Gosciniak (Poland), Susanna Price (UK), Jolien Roos-Hesselink (The Netherlands), Ulrika Snygg-Martin (Sweden), Franck Thuny (France), Pilar Tornos Mas (Spain), Isidre Vilacosta (Spain), and Jose Luis Zamorano (Spain)
Antibiotic Prophylaxis in IE

- Expert guidelines & consensus conferences
  - Switzerland: 1984, 2000
  - ESC: 2004
  - France: 1992, 2002

- All types of procedure in any patient at risk
- All types of procedure optional in intermediate-risk patients

(Duval and Leport
Lancet Infect Dis 2008;8:225-32)

www.escardio.org
Continuous low-grade vs. transient high-grade bacteraemia

Adapted from P. Moreillon

(Duval and Leport
Lancet Infect Dis 2008;8:225-32)
Continuous low-grade vs. transient high-grade bacteremia

- Rats inoculated with the same Strep intermedii inoculum: either by **bolus** 1ml in 1 min or by **continuous** infusion over 10 h

- Continuous low-grade bacteremia induces experimental IE
- Bacteremia levels required to infect vegetation after bolus are much higher than those required after continuous infusion

Estimated Risk of IE with or without Antibiotic Prophylaxis

- Estimation of the number of cases of IE occurring after at-risk dental care, with or without antibiotic prophylaxis from 559 definite IE in the French survey on IE 1999
- Estimation of the number of at-risk dental care procedures in patients with known prediposing heart disease from 2,805 patients of the Paquid and Canevas cohorts


<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Adults</th>
<th>Total</th>
<th>Protected procedures</th>
<th>Unprotected procedures</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (%) of patients or yearly procedures</td>
<td>1,287,296</td>
<td>2,746,384</td>
<td>1,042,189 (38)</td>
<td>1,704,195 (62)</td>
</tr>
<tr>
<td>95% CI</td>
<td>999,196–1,575,396</td>
<td>2,304,094–3,188,674</td>
<td>748,978–1,335,399</td>
<td>1,373,064–2,035,327</td>
</tr>
</tbody>
</table>

7 IE 1/150,000
37 IE 1/46,000
Native 1/54,000
Prosth. 1/10,700
Risk-benefit analysis
Intermediate risk of IE

- **Risk of IE**
  - Occurrence of IE after unprotected dental procedure: 1/50,000
  - In-hospital death due to IE (20% mortality): 1/250,000

- **Risk of antibiotic prophylaxis**
  - Death/anaphylaxis due to amoxicillin: 1/75,000

1 death / 250,000

1 death / 75,000

No AB prophylaxis  AB prophylaxis
Risk-benefit analysis
High risk of IE

- Risk of IE
  - Occurrence of IE after unprotected dental procedure: 1/10,000
  - In-hospital death due to IE (20% mortality): 1/50,000

- Risk of antibiotic prophylaxis
  - Death/anaphylaxis due to amoxicillin: 1/75,000

Diagram:
- No AB prophylaxis: 1 death /50,000
- AB prophylaxis: 1 death /75,000
Antibiotic Prophylaxis in IE: 2009 ESC Guidelines

- Expert guidelines & consensus conferences
  - Switzerland: 1984, 2000
  - ESC: 2004, 2009
  - France: 1992, 2002

All types of procedure in any patient at risk
All types of procedure, optional in intermediate-risk patients
All types of dental care in any patient at high risk
Only certain dental care procedures in any patient at high risk
No AB prophylaxis
Cardiac conditions at highest risk of endocarditis

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibiotic prophylaxis should only be considered for patients at highest risk of IE:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Patients with a prosthetic valve, including transcatheter valve, or a prosthetic material used for cardiac valve repair.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>2. Patients with previous IE.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Patients with congenital heart disease.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. any cyanotic congenital heart disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. congenital heart disease repaired with prosthetic material whether placed surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if there remains residual shunt or valvular regurgitation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antibiotic prophylaxis is not recommended in other forms of valvular or congenital heart disease.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>
### Prophylaxis in highest-risk patients according to the type of procedure at risk

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Dental procedures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Antibiotic prophylaxis should only be considered for dental procedures requiring manipulation of the gingival or periapical region of the teeth or perforation of the oral mucosa.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>• Antibiotic prophylaxis is not recommended for local anaesthetic injections in non-infected tissues, treatment of superficial caries, removal of sutures, dental X-rays, placement or adjustment of removable prosthodontic or orthodontic appliances or braces, or following the shedding of deciduous teeth or trauma to the lips and oral mucosa.</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td><strong>B. Respiratory tract procedures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Antibiotic prophylaxis is not recommended for respiratory tract procedures, including bronchoscopy or laryngoscopy, transnasal or endotracheal intubation.</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td><strong>C. Gastrointestinal or urogenital procedures or TOE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Antibiotic prophylaxis is not recommended for gastroscopy, colonoscopy, cystoscopy, vaginal or caesarean delivery or TOE.</td>
<td>III</td>
<td>C</td>
</tr>
<tr>
<td><strong>D. Skin and soft tissues procedures</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Antibiotic prophylaxis is not recommended for any procedure.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>
## Prophylaxis for dental procedures at risk

<table>
<thead>
<tr>
<th>Situation</th>
<th>Antibiotic</th>
<th>Single-dose 30-60 minutes before procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Adults</td>
</tr>
<tr>
<td>No allergy to penicillin or ampicillin</td>
<td>Amoxicillin or Ampicillin(^a)</td>
<td>2 g orally or i.v.</td>
</tr>
<tr>
<td>Allergy to penicillin or ampicillin</td>
<td>Clindamycin</td>
<td>600 mg orally or i.v.</td>
</tr>
</tbody>
</table>

\(^a\)Alternatively, cephalexin 2 g i.v. for adults or 50 mg/kg i.v. for children, cefazolin or ceftriaxone 1 g i.v. for adults or 50 mg/kg i.v. for children.

“Cephalosporins should not be used in patients with anaphylaxis, angio-oedema, or urticaria after intake of penicillin or ampicillin due to cross-sensitivity.”
Non-specific prevention measures

These measures should ideally be applied to the general population and particularly reinforced in high-risk patients.

- **Strict dental and cutaneous hygiene.** Dental follow-up should be performed twice a year in high-risk patients and yearly in others.

- **Disinfection of wounds.**

- **Eradication or decrease of chronic bacterial carriage: skin, urine.**

- **Curative antibiotics for any focus of bacterial infection.**

- **No self-medication with antibiotics.**

- **Strict asepsis control measures for any at-risk procedure.**

- **Discourage piercing and tattooing.**

- **Limit the use of infusion catheters and invasive procedures when possible.** Favour peripheral over central catheters, and systematic replacement of the peripheral catheter every 3–4 days. Strict adherence to care bundles for central and peripheral cannulae should be performed.
Guidelines changes and incidence of IE

3 prospective nationwide surveys on IE with individual case validation

• 323 IE cases in 1991
• 331 IE cases in 1999
• 339 IE cases in 2008

(Duval et al. J Am Coll Cardiol 2012;59:1968-76)
Guidelines changes and incidence of IE

No increase in the incidence of IE due to oral streptococci between 1999 and 2008

(Duval et al. J Am Coll Cardiol 2012; 59: 1968-76)
Guidelines changes and incidence of IE US

No change in hospital discharges with and ICD code of IE due to viridans streptococci in the Nationwide Inpatient Sample database

1999-2010

1999-2011

(DeSimone et al. Circulation 2012;126:60-4)

Guidelines changes and incidence of IE
Incidence of IE in England

Analysis of ICD discharge codes with a primary diagnosis of IE in 19,804 patients (UK, 2000-2013): increased incidence after 2008

(Dayer et al. Lancet 2015;385:1219-28)
Incidence of IE in England
Temporal Relationship

Statistical testing for slope change was significant (p<0.0001) at all time points between April 2003 and May 2010

(Iung, Tubiana, Alla, Lavielle Lancet 2015;386:529 (correspondence))
Guidelines changes and incidence of IE
Temporal trends in the US: contrasting findings

NIS database 2000–2011
Trends in incidence (per 100,000)

Medicare 1999–2010
262,658 hospitalisations for IE ≥ 65 yrs

(Bikdeli et al. J Am Coll Cardiol 2013;62:2217-26)

NIS database 2000–2011


(Pant et al. J Am Coll Cardiol 2015;65:2070-6)
Temporal trends in Canada

Canadian Institute for Health Information Discharge Abstract Database (2002-2013)
9431 hospitalisations for IE in 8055 patients

(Mackie et al. Can J Cardiol. 2016 Online Feb 9)
Diagnostic features of infective endocarditis

- Persistent bacteremia
- Active endocardial pathology
- Predisposing heart disease
- Vascular phenomena
Echocardiography for suspected infective endocarditis

Clinical suspicion of IE

TTE

Prosthetic valve
Intracardiac device

Non-diagnosis
TTE

Positive
TTE

Negative
TTE

Clinical suspicion of IE

High
Low

TOE*

Stop

If initial TOE is negative but high suspicion for IE remains, repeat TTE and/or TOE within 5–7 days

IE = infective endocarditis; TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography.
*TOE is not mandatory in isolated right-sided native valve IE with good quality TTE examination and unequivocal echocardiographic findings.
Modified diagnostic criteria for infective endocarditis

**Major criteria**

1. **Blood cultures positive for IE**
   a. Typical microorganisms consistent with IE from 2 separate blood cultures:
      - *Viridans streptococci, Streptococcus galolyticus (Streptococcus bovis), HACEK group, Staphylococcus aureus*; or
      - Community-acquired enterococci, in the absence of a primary focus; or
   b. Microorganisms consistent with IE from persistently positive blood cultures:
      - ≥2 positive blood cultures of blood samples drawn >12 h apart; or
      - All of 3 or a majority of ≥4 separate cultures of blood (with first and last samples drawn ≥1 h apart); or
   c. Single positive blood culture for Coxiella burnetii or phase 1 IgG antibody titre >1:800

2. **Imaging positive for IE**
   a. Echocardiogram positive for IE:
      - Vegetation;
      - Abscess, pseudoaneurysm, intracardiac fistula;
      - Valvular perforation or aneurysm;
      - New partial dehiscence of prosthetic valve.
   b. Abnormal activity around the site of prosthetic valve implantation detected by 18F-FDG PET/CT (only if the prosthesis was implanted for >3 months) or radiolabelled leukocytes SPECT/CT.
   c. Definite paravalvular lesions by cardiac CT.

**Minor criteria**

1. Predisposition such as predisposing heart condition, or injection drug use.
2. Fever defined as temperature >38°C.
3. Vascular phenomena (including those detected by imaging only): major arterial emboli, septic pulmonary infarcts, infectious (mycotic) aneurysm, intracranial haemorrhage, conjunctival haemorrhages, and Janeway’s lesions.
4. Immunological phenomena: glomerulonephritis, Osler’s nodes, Roth’s spots, and rheumatoid factor.
5. Microbiological evidence: positive blood culture but does not meet a major criterion as noted above or serological evidence of active infection with organism consistent with IE.
Algorithm for the diagnosis of infective endocarditis
Algorithm for the microbiologic diagnosis of infective endocarditis

![Algorithm diagram](image-url)

- **Suspected IE**
  - **Blood cultures**
    - **Identification by mass spectrometry**
      - **Antibiotic resistance and agar culture**
      - **Antimicrobial susceptibility testing**
    - **Agar culture**
    - **Microbiological identification or Routine identification**
      - **Mass spectrometry**
      - **Antimicrobial susceptibility testing**
  - **Serologies**
    - **Blood PCR**
      - **Staphylococcus aureus, Tropheryma whipplei, Fungi, Escherichia coli, Streptococcus gnavus, Streptococcus mitis, Enterococci**
    - **Antinuclear antibodies, Anti phospholipid antibodies, Anti-Pork antibodies**
  - **Specific PCR**
  - **BCNIE**

**Abbreviations**
- BCNIE = blood culture-negative infective endocarditis
- IE = infective endocarditis
- PCR = polymerase chain reaction

**Notes**
- *Qualified microbiological laboratory
- *Immunological laboratory
Complications of Endocarditis

- Haemodynamic complications
  Heart failure due to acute valvular regurgitation

- Embolism
  Due to vegetation migration

- Infectious complications
  Persistence of sepsis

  - Mortality
    20% in hospital
    40% at 5 years
Heart Failure

- Mechanism: acute regurgitation
- 4075 pts of ICE cohort
  - 1359 (33%) HF, 67% in NYHA class III/IV
- Higher mortality if HF
  - 30% vs 13%, OR=2.8 [2.4–3.3], p<0.001
- 62% operated on
  - Decreased in-hospital and 1-yr mortality
    - 21% / 29% if surgery
    - 45% / 58% if no surgery

(Kiefer et al. JAMA 2011;306:2239)
# Symptomatic and Asymptomatic Neurologic Events

Prospective Series with Systematic Imaging

<table>
<thead>
<tr>
<th>Study</th>
<th>n</th>
<th>Imaging</th>
<th>Symptomatic Events (%)</th>
<th>Asymptomatic Embolism (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thuny et al.</td>
<td>453</td>
<td>CT</td>
<td>22</td>
<td>4</td>
</tr>
<tr>
<td>Snygg-Martin et al.</td>
<td>49</td>
<td>MRI</td>
<td>35</td>
<td>48</td>
</tr>
<tr>
<td>Cooper et al.</td>
<td>40</td>
<td>MRI</td>
<td>32</td>
<td>37</td>
</tr>
<tr>
<td>Duval et al.</td>
<td>130</td>
<td>MRI</td>
<td>12</td>
<td>47</td>
</tr>
</tbody>
</table>

*Thuny et al. Eur Heart J 2007;28:1155-61*
*Cooper et al. Circulation 2009;120:585-91*
Evaluation of Embolic Risk

- Predictive model of symptomatic embolic events
  - Age
  - Diabetes
  - Previous embolism
  - Atrial fibrillation
  - Vegetation > 10 mm
  - *Staphylococcus aureus*

- Time distribution of embolism

- Vegetations > 15 mm and mortality
  *(Thuny et al. Circulation 2005;112:69-75)*

### Table 5. Predictors of 1-Year Mortality (Cox Multivariable Analysis)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Adjusted RR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>1.02</td>
<td>1.01–1.04</td>
<td>0.007</td>
</tr>
<tr>
<td>Female sex</td>
<td>1.6</td>
<td>1.01–2.58</td>
<td>0.048</td>
</tr>
<tr>
<td>Comorbidity index &gt;2</td>
<td>1.6</td>
<td>0.92–2.64</td>
<td>0.1</td>
</tr>
<tr>
<td>Serum creatinine &gt;2 mg/L</td>
<td>1.9</td>
<td>1.16–3.23</td>
<td>0.01</td>
</tr>
<tr>
<td>Prosthetic valve</td>
<td>1.6</td>
<td>0.99–2.68</td>
<td>0.053</td>
</tr>
<tr>
<td><em>S aureus</em> IE</td>
<td>2</td>
<td>1.19–3.24</td>
<td>0.001</td>
</tr>
<tr>
<td>Moderate or severe CHF</td>
<td>1.6</td>
<td>1.02–1.54</td>
<td>0.04</td>
</tr>
<tr>
<td>Vegetation length &gt;15 mm</td>
<td>1.8</td>
<td>1.10–2.82</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Infectious Complications

• 10 à 20% of patients

• Favoured by microorganism virulence (*staphylococcus aureus*…)

• Extension of perivalvular lesions (abscesses)
  • complications (AV block)
  • ↑ complexity of surgery
  • ↑ operative mortality
  • ↑ late reinterventions
## Indications and timing of surgery in left-sided valve infective endocarditis (native /prosthetic valve endocarditis)

<table>
<thead>
<tr>
<th>Indications for surgery</th>
<th>Timing</th>
<th>Class</th>
<th>Level</th>
<th>Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Heart failure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with severe acute regurgitation, obstruction or fistula</td>
<td>Emergency</td>
<td>I</td>
<td>B</td>
<td>111,115,</td>
</tr>
<tr>
<td>causing refractory pulmonary oedema or cardiogenic shock</td>
<td></td>
<td></td>
<td></td>
<td>213,216</td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with severe regurgitation or obstruction causing symptoms</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
<td>37,115,</td>
</tr>
<tr>
<td>of HF or echocardiographic signs of poor haemodynamic tolerance</td>
<td></td>
<td></td>
<td></td>
<td>209,216,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>220,221</td>
</tr>
<tr>
<td><strong>2. Uncontrolled infection</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation)</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
<td>37,209,</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>216</td>
</tr>
<tr>
<td>Infection caused by fungi or multiresistant organisms</td>
<td>Urgent/elective</td>
<td>I</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Persisting positive blood cultures despite appropriate antibiotic therapy and adequate</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
<td>123</td>
</tr>
<tr>
<td>control of septic metastatic foci</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PVE caused by staphylococci or non-HACEK gram-negative bacteria</td>
<td>Urgent/elective</td>
<td>Ila</td>
<td>B</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3. Prevention of embolism</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with persistent vegetations (&gt;10) \text{mm} after one or</td>
<td>Urgent</td>
<td>I</td>
<td>B</td>
<td>9,58,72,</td>
</tr>
<tr>
<td>more embolic episode despite appropriate antibiotic therapy</td>
<td></td>
<td></td>
<td></td>
<td>113,222</td>
</tr>
<tr>
<td>Aortic or mitral NVE with vegetations (&gt;10) \text{mm}, associated with severe valve</td>
<td>Urgent</td>
<td>Ila</td>
<td>B</td>
<td>9</td>
</tr>
<tr>
<td>stenosis or regurgitation, and low operative risk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with isolated very large vegetations ((\geq 30)) mm</td>
<td>Urgent</td>
<td>Ila</td>
<td>B</td>
<td>113</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aortic or mitral NVE or PVE with isolated large vegetations ((\geq 15)) mm and no</td>
<td>Urgent</td>
<td>Ilb</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>other indication for surgery(^{e})</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Guidelines vs. Practice in Native IE

Native valve left-sided Endocarditis n=303 pts

INDICATION for surgery according to guidelines n=221 (73%)

Surgery PERFORMED n=131 (43%)

Indication for surgery recognised n= 42 (14%)

Surgery NOT PERFORMED n=90 (30%)

Indication for surgery not recognised n=48 (16%)

NO INDICATION for surgery according to guidelines n=82 (27%)

Surgery PERFORMED n=8 (3%)

Surgery NOT PERFORMED n=74 (24%)

(Iung et al. Eur Heart J 2016;37:840-8)
Conclusions

- ESC Guidelines recommend continuing antibiotic prophylaxis in high-risk patients undergoing the highest risk dental procedures.
- Oral and cutaneous hygiene measures are likely to be the most effective approach for preventing IE and should be applied in intermediate- and high-risk patients.
- Non-specific infection control measures are mandatory in routine practice to reduce healthcare-associated IE.
- Incorporation of multimodality imaging in diagnostic criteria for IE is an important achievement in 2015 ESC Guidelines.
- Indications for surgery are based on complications of IE.
- Specific prospective surveys are needed to better ascertain the implementation of guidelines.
### Underlying heart disease

<table>
<thead>
<tr>
<th>Condition</th>
<th>n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Native valve disease</td>
<td>92 (19%)</td>
</tr>
<tr>
<td>Pacemaker or ICD</td>
<td>66 (13%)</td>
</tr>
<tr>
<td>Prosthetic valve</td>
<td>104 (21%)</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>34 (7%)</td>
</tr>
<tr>
<td>Previous IE</td>
<td>32 (6%)</td>
</tr>
<tr>
<td>No previously known underlying heart disease</td>
<td>262 (53%)</td>
</tr>
</tbody>
</table>
Heart diseases at risk for IE

- **Risk of IE (incidence)**

  - Heart valve prosthesis
  - Cyanotic CHD
  - Previous IE

- **Risk from IE (mortality/morbidity)**
Guidelines changes and incidence of IE
Incidence of IE in England

High and intermediate-risk patients

(Dayer et al. Lancet 2015;385:1219-28)

Incidence of IE in England
Limitations of the analysis

• Concerns about the true incidence of IE:
  • Coding quality (diagnosis, high vs. lower risk)
  • No data on causative microorganisms

• Confounding factors:
  • Number of hospital admissions
  • Number of patients with intracardiac devices
  • Number of invasive procedures
  • Population ageing

• Temporal relationship.

(Potential ↑ number of high-risk pts)

(Dayer et al. Lancet 2015;385:1219-28)
(Duval and Hoen Lancet 2015;385:1164-5)
Impact of Early Surgery on Outcome

Conflicting Data from Recent Series

Vikram 2003

Wang 2005

Cabell 2005

Aksoy 2007

Tleyjeh 2007

449 left-sided definite endocarditis
240 (54% operated on) – 5-year follow-up

(Bannay et al.
Antibiotic prophylaxis for the prevention of local and systemic infections before cardiac or vascular interventions

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Class</th>
<th>Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-operative screening of nasal carriage of <em>Staphylococcus aureus</em> is recommended before elective cardiac surgery in order to treat carriers.</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Peri-operative prophylaxis is recommended before pacemaker or implantable cardioverter defibrillator implantation.</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Elimination of potential sources of dental sepsis is recommended &gt;2 weeks before implantation of a prosthetic valve or other intracardiac or intravascular foreign material, except in urgent procedures.</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Peri-operative antibiotic prophylaxis should be considered in patients undergoing surgical or transcatheter implantation of a prosthetic valve, intravascular prosthetic, or other foreign material.</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Systematic local treatment without screening for <em>Staphylococcus aureus</em> is not recommended.</td>
<td>III</td>
<td>C</td>
</tr>
</tbody>
</table>