

Prophylaxis of Infective Endocarditis for Congenital Heart Disease

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Guidelines of Prophylaxis

- American Heart Association (AHA)
- European Society of Cardiology (ESC)
- The National Institute for Health and Care Excellence (NICE)

History of AHA-Recommended Antibiotic Prophylaxis

Year	
1955	Aqueous PC and procaine PC IM 30 minutes before the op
1957	For 2 days before surgery, PC On day of surgery, PC Aqueous PC with procaine PC 30 to 60 minutes before surgery. For 2 days after, PC by mouth
1960	Step I: 2 days before surgery with procaine PC IM on each day Step II: day of surgery: procaine PC IM 1 hour before surgical procedure Step III: for 2 days after surgery: procaine PC IM
1965	Day of procedure: procaine PC IM 1 to 2 hours before the procedure For 2 days after procedure: procaine PC IM
1972	Procaine PC mixed with crystalline PC IM 1 hour before procedure and once daily for the 2 days after the procedure
1977	Aqueous PC IM mixed with procaine PC IM 30 minutes to 1 hour before procedure and then PC orally every 6 hours for 8 doses
1984	PC V 2 g orally 1 hour before, then 1 g 6 hours after initial dose
1990	Amoxicillin 3 g orally 1 hour before procedure, then 1.5 g 6 hours after initial dose
1997	Amoxicillin 2 g orally 1 hour before procedure

Revision rationale

- Repeated low-grade bacteremia during daily routine activity
- Risk of IE related more to low-grade bacteremia than high-grade sporadic bacteremia
- No association between invasive dental procedure and occurrence of IE

- Estimated risk of IE is very low after dental procedure
(1/150,000 vs 1/46,000)
- The risk of antibiotic-associated adverse events exceeds the benefit
- Antibiotic prophylaxis proven only animal models
- Optimal oral health and hygiene >> prophylactic antibiotics

Antibiotic prophylaxis
should be considered
at **highest risk** for IE

Recommendations 1

(AHA-2007)

- (1) Prosthetic valve or material for cardiac valve repair
- (2) Previous IE
- (3) Congenital heart disease (CHD)
 - (a) Unrepaired c-CHD (palliative shunts and conduits)
 - (b) Completely repaired CHD with prosthetic material or device, during the first 6 Mo after procedure
 - (c) Repaired CHD with residual defects (which inhibit endothelialization)
- (4) Cardiac transplantation recipients who develop cardiac valvulopathy

Recommendations-2

(ESC-2009, 2015)

Recommendations	Class ^a	Level ^b
<p>Antibiotic prophylaxis should be considered for patients at highest risk for IE:</p> <p>(1) Patients with any prosthetic valve, including a transcatheter valve, or those in whom any prosthetic material was used for cardiac valve repair.</p> <p>(2) Patients with a previous episode of IE.</p> <p>(3) Patients with CHD:</p> <p>(a) Any type of cyanotic CHD.</p> <p>(b) Any type of CHD repaired with a prosthetic material, whether placed surgically or by percutaneous techniques, up to 6 months after the procedure or lifelong if residual shunt or valvular regurgitation remains.</p>	IIa	C
<p>Antibiotic prophylaxis is not recommended in other forms of valvular or CHD.</p>	III	C

Recommendations-3 (NICE-2008)

No antibiotic prophylaxis
for prevention of IE

Nonspecific 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 the 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 infection control measures for any at-risk procedure.
- Discourage piercing and tattooing.
- Limit the use of infusion catheters and invasive procedure 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.

Recommendations for prophylaxis of IE according to type of risk procedure

Recommendations	Class ^a	Level ^b
A. Dental procedures		
<ul style="list-style-type: none"> Antibiotic prophylaxis should only be considered for dental procedures requiring manipulation of the <u>gingival or periapical region of the teeth or perforation of the oral mucosa</u> 	IIa	C
<ul style="list-style-type: none"> Antibiotic prophylaxis is <u>not recommended</u> for <u>local anaesthetic injections</u> in non-infected tissues, treatment of <u>superficial caries</u>, 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 	III	C

Recommendations	Class ^a	Level ^b
B. Respiratory tract procedures^c		
<ul style="list-style-type: none"> Antibiotic prophylaxis is not recommended for respiratory tract procedures, including <u>bronchoscopy or laryngoscopy</u>, or transnasal or endotracheal intubation 	III	C
C. Gastrointestinal or urogenital procedures or TOE^c		
<ul style="list-style-type: none"> Antibiotic prophylaxis is not recommended for <u>gastroscopy, colonoscopy, cystoscopy</u>, vaginal or caesarean delivery or TOE 	III	C
D. Skin and soft tissue procedures^c		
<ul style="list-style-type: none"> Antibiotic prophylaxis is not recommended for any procedure 	III	C

Regimens for Dental Procedure

Situation	Agent	Regimen for Children (30 to 60 min before procedure)
Oral	Amoxicillin	50 mg/kg
Unable to oral	Ampicillin OR Cefazolin or ceftriaxone	50 mg/kg IM or IV 50 mg/kg IM or IV
Allergy to PC or Amp-oral	Cephalexin*† OR Clindamycin OR Azithromycin or clarithromycin	50 mg/kg 20 mg/kg 15 mg/kg
Allergic to PC or Amp and unable oral	Cefazolin or ceftriaxone† OR Clindamycin	50 mg/kg IM or IV 20 mg/kg IM or IV

Prophylaxis for **Non-dental** procedures

- **RT procedures** ; established infection
(i.e. drainage of an abscess)
- **GI or GU procedures** ; wound infection or sepsis
- **Derma or musculoskeletal procedures**
; infected skin (including oral abscesses)
- **Body piercing and tattooing**
; case reports of IE after piercing and tattooing
; piercing involves the tongue
- **Cardiac or vascular interventions**

Cardiac or vascular interventions

Recommendations	Class ^a	Level ^b	Ref. ^c
Preoperative screening of nasal carriage of <u>Staphylococcus aureus</u> is recommended before elective cardiac surgery in order to treat carriers	I	A	46,47
Perioperative prophylaxis is recommended before placement of a <u>pacemaker or implantable cardioverter defibrillator</u>	I	B	45
Potential sources of sepsis should be eliminated ≥ 2 weeks before implantation of a prosthetic valve or other intracardiac or intravascular foreign material, except in urgent procedures	IIa	C	
Perioperative antibiotic prophylaxis should be considered in patients undergoing surgical or transcatheter implantation of a prosthetic valve, intravascular prosthetic or other foreign material	IIa	C	
Systematic local treatment without screening of <i>S. aureus</i> is not recommended	III	C	

Summary

- Antibiotic prophylaxis should be restricted to the highest-risk patients
- Preventive measures should be maintained or extended to all patients with cardiac disease

Changes after New Guidelines

Valvular and Congenital Heart Disease

The impact of 2007 infective endocarditis prophylaxis guidelines on the practice of congenital heart disease specialists

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Use of IE prophylaxis for **dental** procedures before vs after the 2007 AHA guidelines

	Total [n (%)]	
	Before	After
PMVSD s/p surgical patch closure with small residual shunt (n = 227)	227 (100)	157 (69)
PMVSD s/p patch closure with no residual shunt 3 mo postop (n = 226)	169 (75)	122 (54)
Small muscular VSD, no previous endocarditis (n = 225)	207 (92)	27 (12)
Small muscular VSD, previous endocarditis (n = 224)	220 (98)	210 (94)
TOF, s/p transannular patch with free pulmonary regurgitation (n = 227)	214 (94)	86 (38)
TOF, s/p aortic or pulmonary homograft, without obstruction (n = 225)	214 (95)	144 (64)
TOF with branch pulmonary artery stenosis and stent, with moderate residual gradient (n = 221)	212 (96)	134 (61)
Rheumatic mitral stenosis of moderate severity (n = 224)	222 (99)	101 (45)
Small audible PDA (n = 225)	219 (97)	33 (15)
Valvar aortic stenosis, no previous intervention (n = 226)	225 (100)	55 (24)
S/p Fontan, no valvar regurgitation, no outflow obstruction (n = 227)	178 (78)	92 (41)

Use of IE prophylaxis for **nondental** procedures before vs after the 2007 AHA guidelines

	Total [n (%)]	
	Before	After
S/p Fontan receiving a tattoo (n = 223)	102 (46)	52 (23)
S/p Fontan undergoing rigid bronchoscopy (n = 225)	171 (76)	76 (34)
Pregnant woman with a small PMVSD, no history of endocarditis, before vaginal delivery (n = 226)	168 (74)	106 (47)
Patient with a PMVSD, s/p surgical patch repair and a small residual leak, requiring colonoscopy(n = 223)	203 (91)	112 (50)
Patient with a mechanical mitral valve requiring cystoscopy (n = 225)	204 (91)	156 (69)

Cardiol Young 2015 Dec 30:1-7

Infective endocarditis prophylaxis: current practice trend among paediatric cardiologists: are we following the 2007 guidelines?

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- **BACKGROUND:**

Our objective was to evaluate current practice for IE prophylaxis among paediatric cardiologists

- **METHODS:**

A web-based survey focussing on current practice, the use of antibiotics for IE prophylaxis in various congenital and acquired heart diseases

- **RESULTS:**

Data from 253 participants were analysed.

Most paediatric cardiologists discontinued IE prophylaxis in simple lesions

However, significant disagreement persists

Rheumatic heart disease, Fontan palliation without fenestration, Ross procedure

Use of current guidelines

Only 44% follow the current guidelines exclusively,

34% regularly discuss the importance of oral hygiene

- **CONCLUSION:**

Significant heterogeneity still persists



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Trends in Endocarditis Hospitalizations at US Childrens Hospitals: Impact of the 2007 American Heart Association Antibiotic Prophylaxis Guidelines

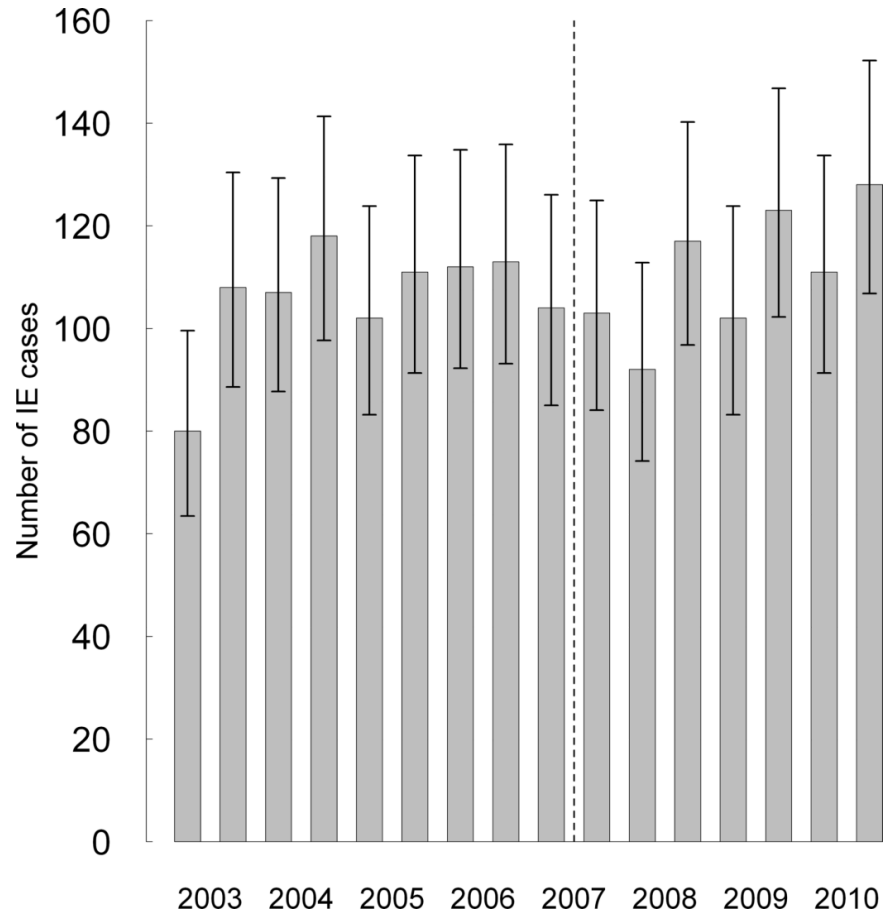
Sara K. Pasquali, MD MHS^{1,2}, Xia He, MS¹, Zeinab Mohamad, MS³, Brian W. McCrindle, MD MPH⁴, Jane W. Newburger, MD MPH⁵, Jennifer S. Li, MD MHS^{1,2}, and Samir S. Shah, MD MSCE⁶

Methods : Children <18yrs hospitalized from 2003–2010 with IE at 37 centers

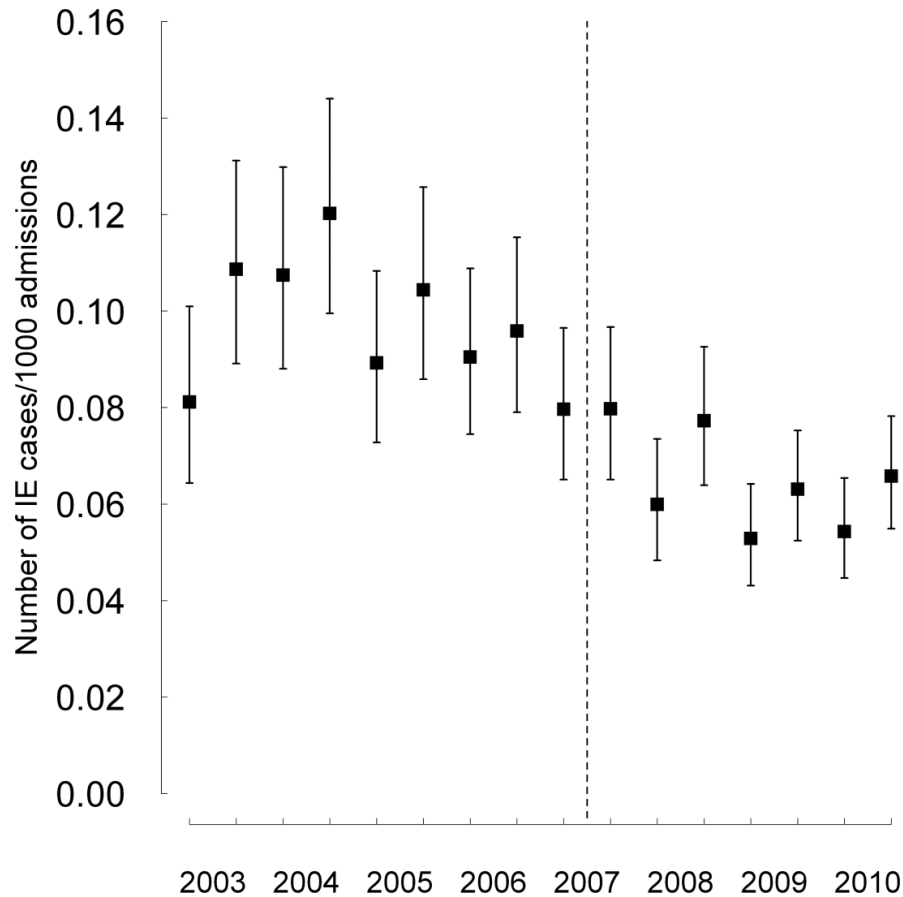
Results : A total of 1157 IE cases were identified; 68% had CHD

Conclusions : No evidence that release of new antibiotic prophylaxis guidelines was associated with a significant change in IE admissions across 37 US children's hospitals

No of IE case



Number of IE indexed to total hospital admissions

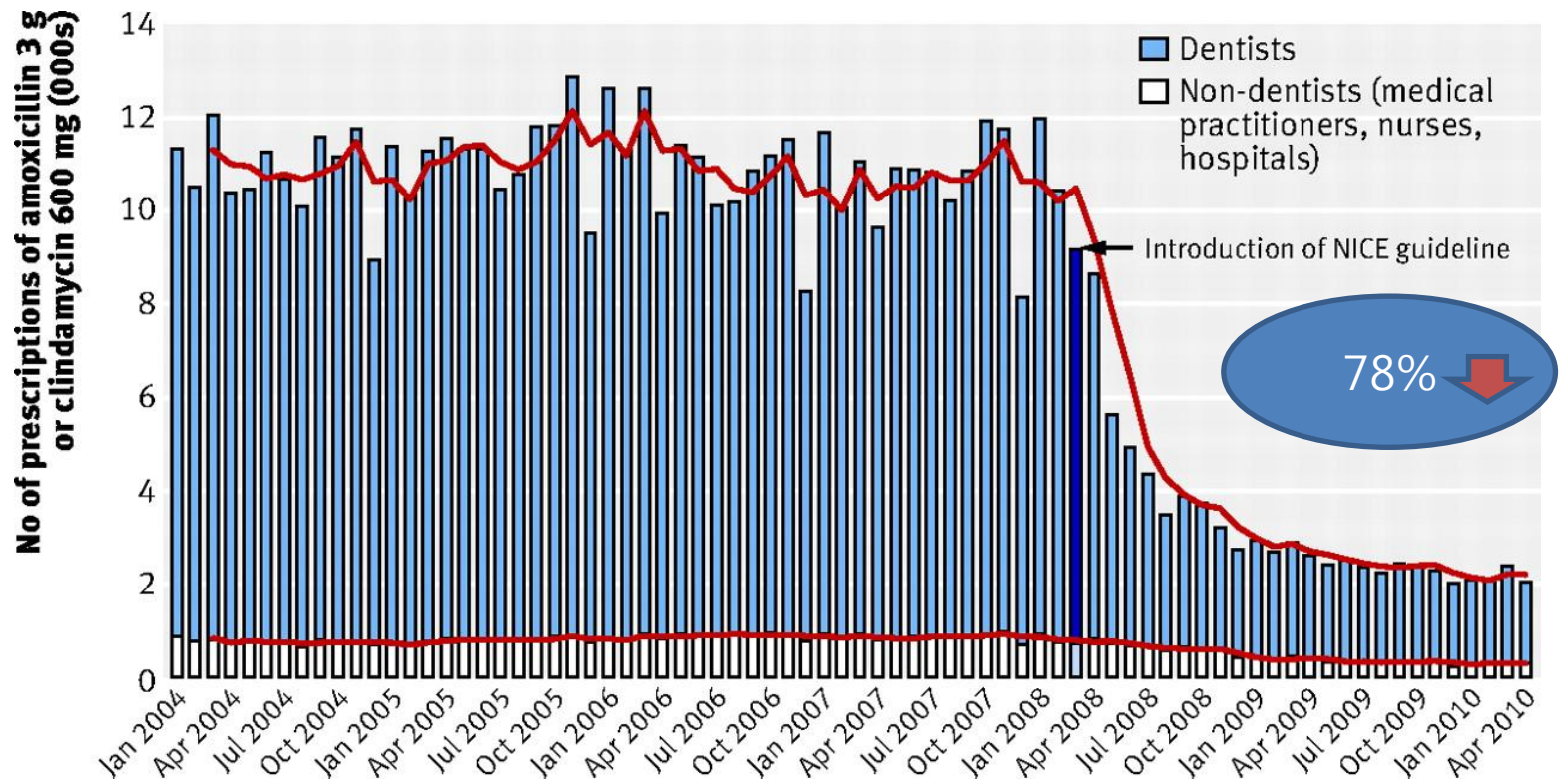


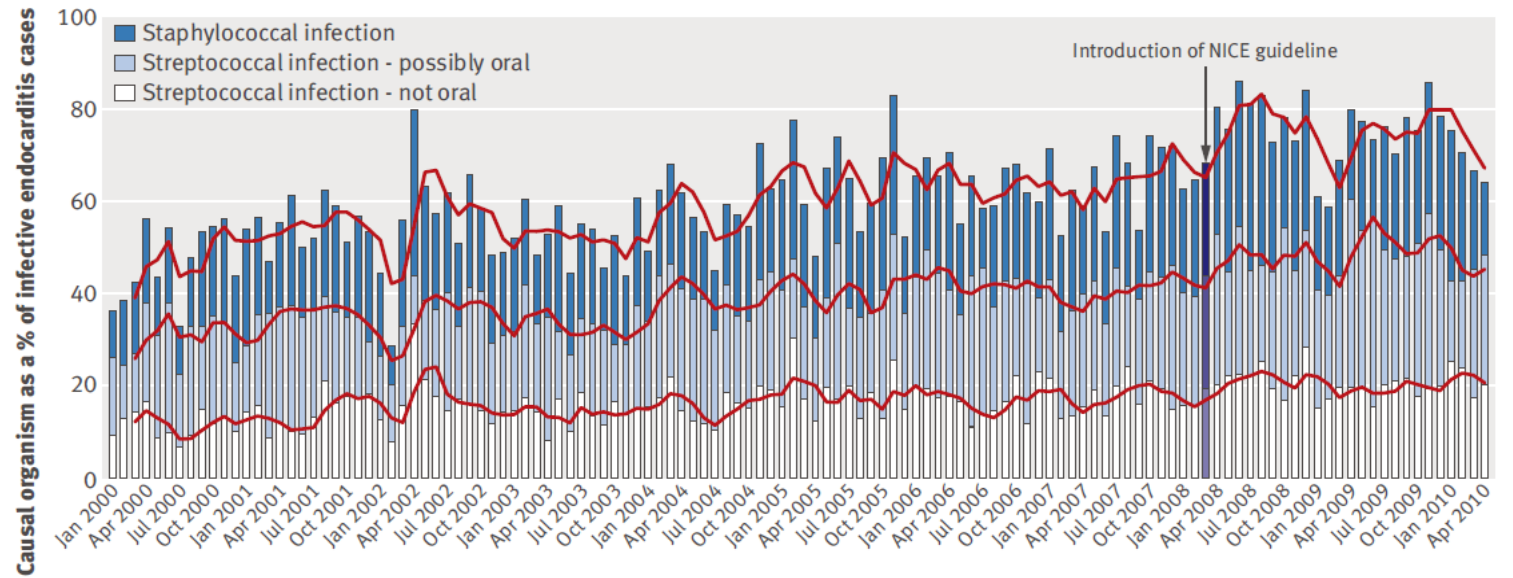
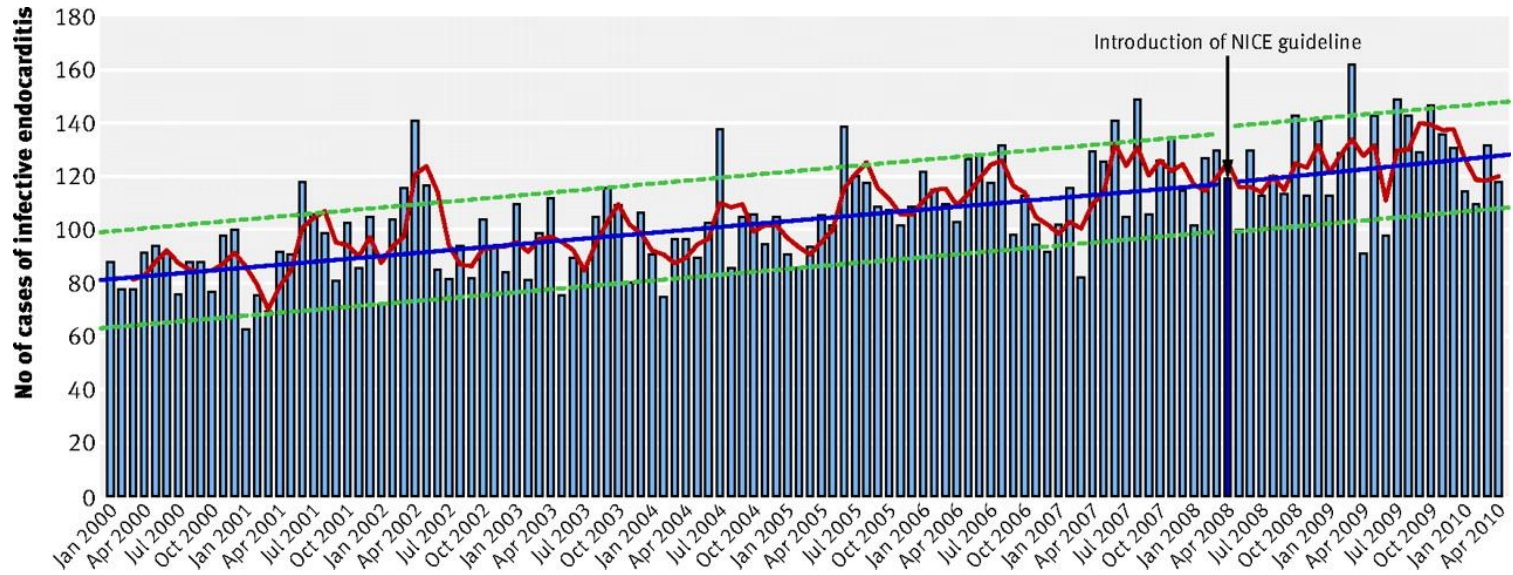
Prophylaxis or Not

Impact of the NICE guideline recommending cessation of antibiotic prophylaxis for prevention of infective endocarditis: before and after study

Martin H Thornhill, professor of oral medicine,¹ Mark J Dayer, consultant cardiologist,² Jamie M Forde, information analyst,³ G Ralph Corey, Gary Hock professor in global health,⁴ Vivian H Chu, assistant professor,⁴ David J Couper, deputy director,⁵ Peter B Lockhart, chair⁶

Impact of the cessation of antibiotic prophylaxis for prevention of IE



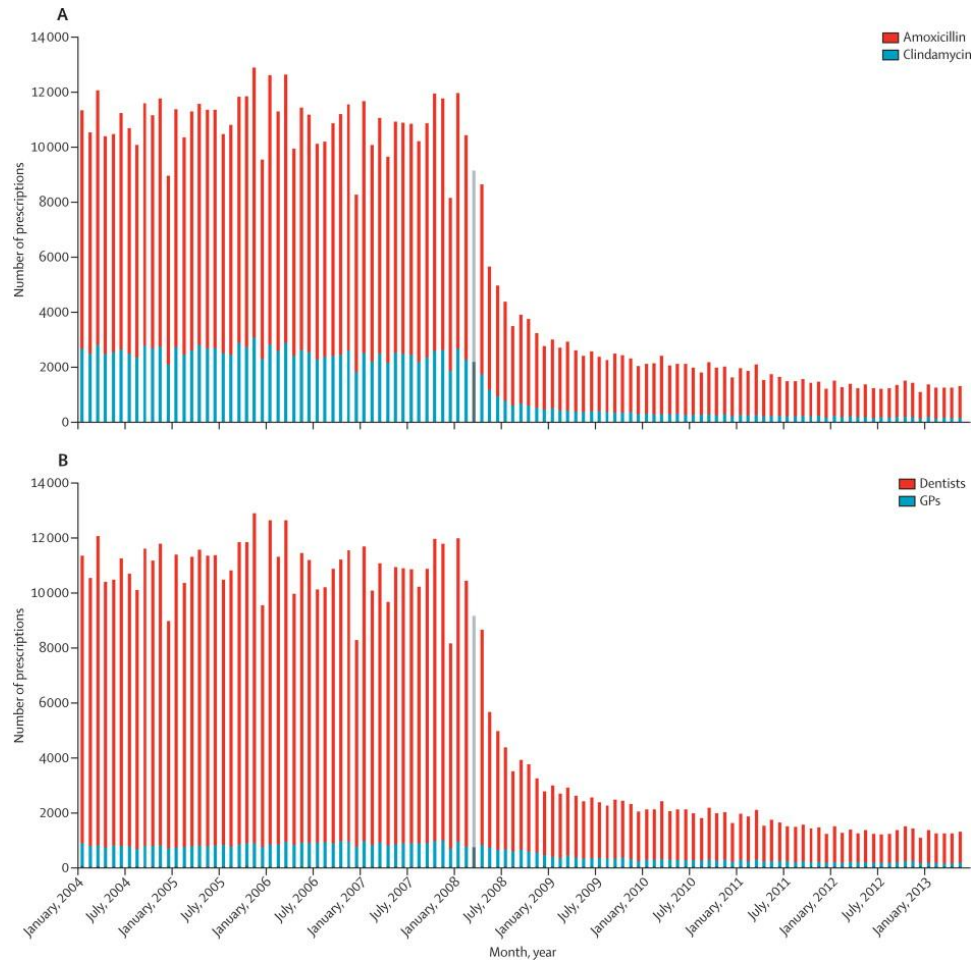


Incidence of infective endocarditis in England, 2000–13: a secular trend, interrupted time-series analysis

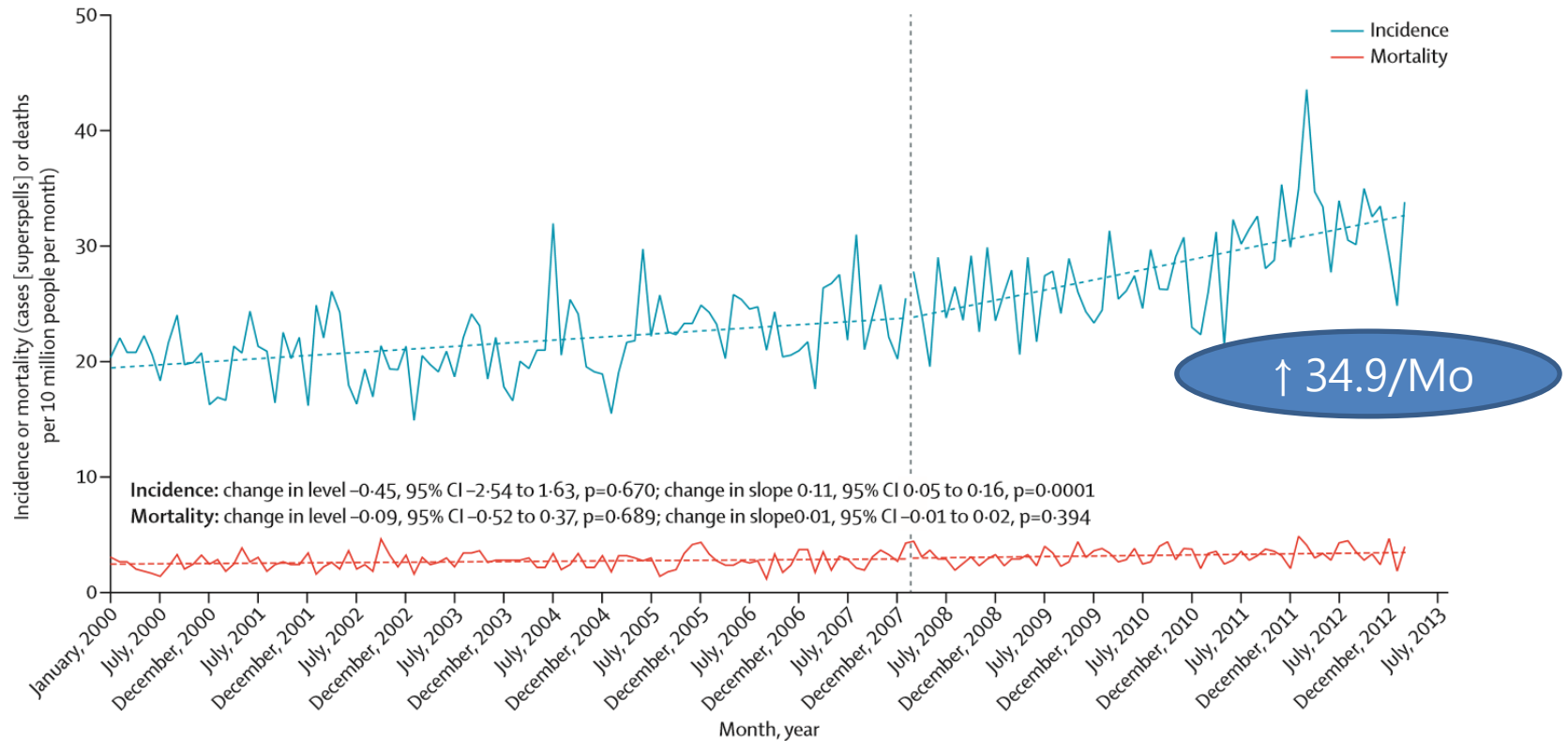
Mark J Dayer, Simon Jones, Bernard Prendergast, Larry M Baddour, Peter B Lockhart, Martin H Thornhill

Lancet 2015; 385: 1219–28

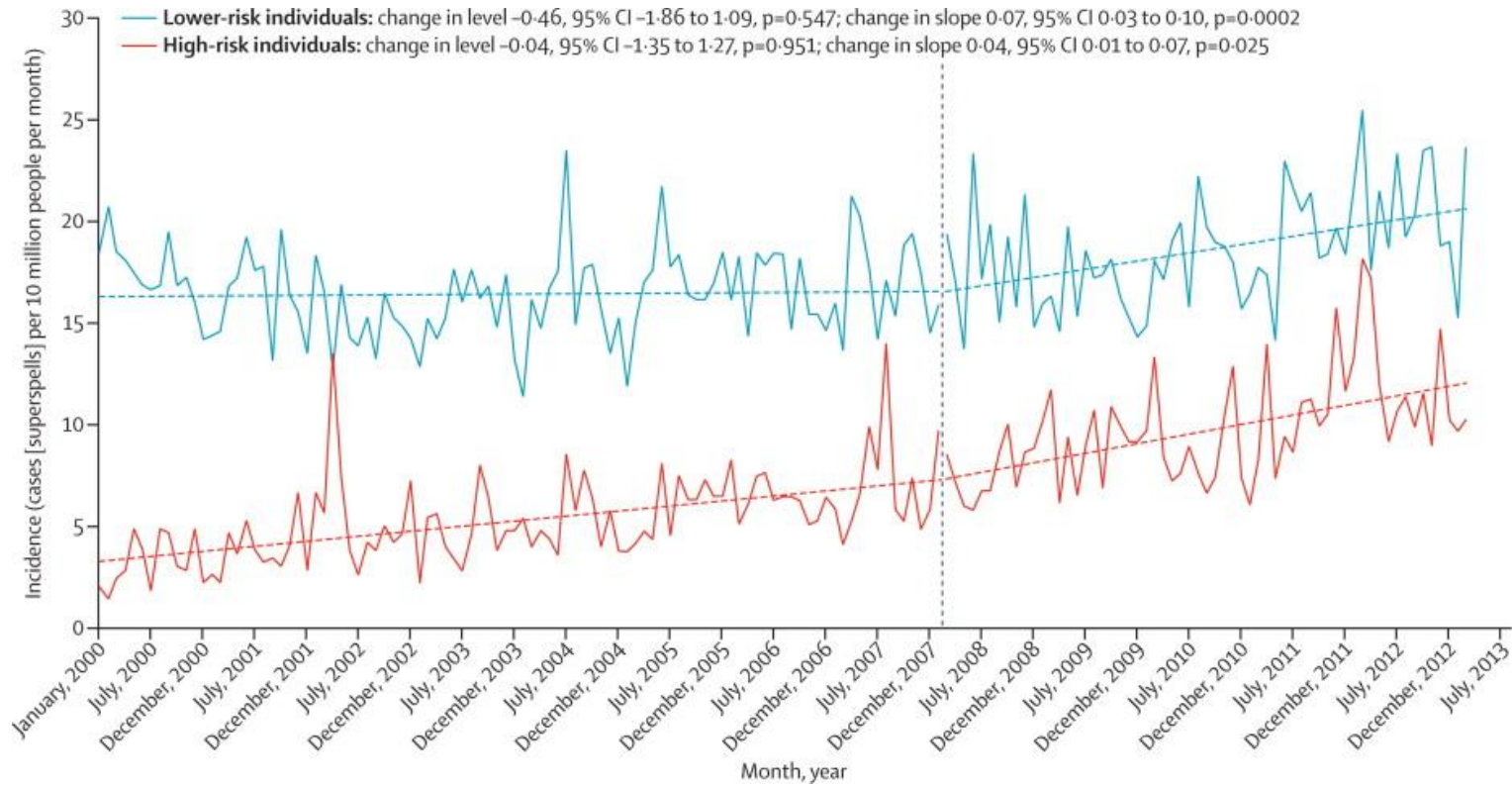
No of antibiotic prophylaxis, by drug and prescriber



Incidence of IE and mortality



Incidence of IE by risk group



ESC guidance recommending AP

- Could result in an extra 7 adverse drug reactions a year
- Including 1 death every 3 years
- But if AP was restricted to amoxicillin or an alternative to clindamycin was used there would be only 2 reactions and no deaths per annum¹

NICE guidance recommending no AP

- Could result in an extra 419 IE cases a year
- Including 66 deaths

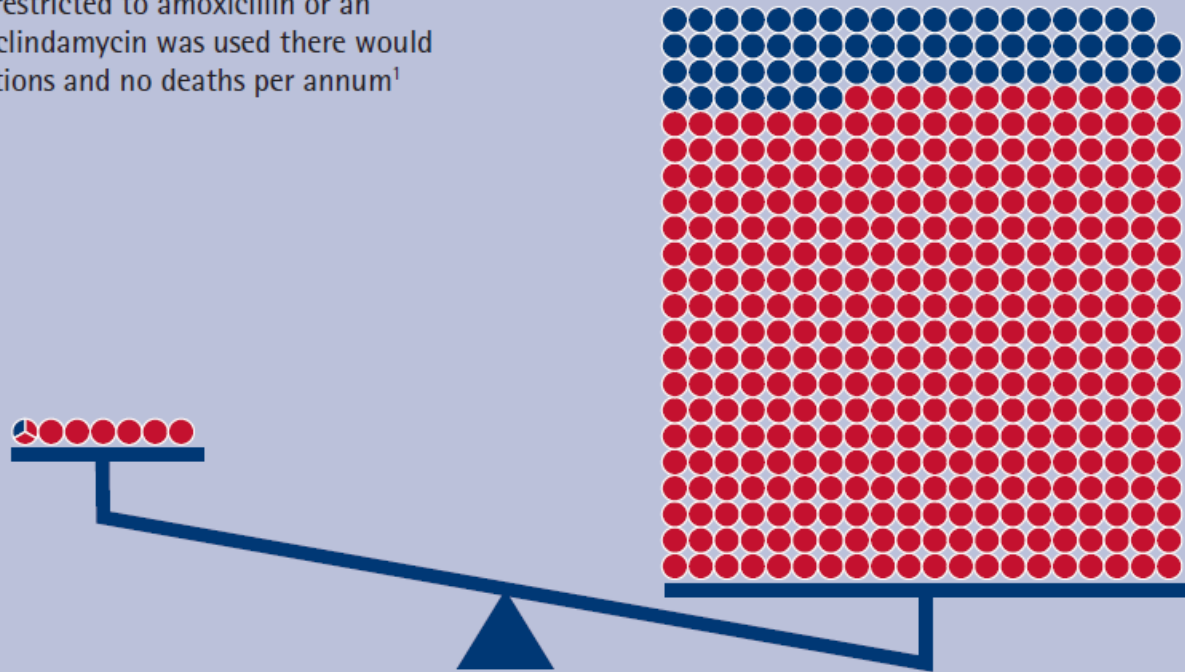


Fig. 1 Risks of recommending antibiotic prophylaxis (AP) or no AP. Based on data discussed in references 6 and 13

**Thank you
for your attention!!**