Disclaimer

Head and Neck Infections

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Outline

- Normal flora
- Antibiotic spectra
- Peri-orbital cellulitis
- Bite wounds
- Extension of dental infections
- Peri-operative prophylaxis
- Auricular perichondritis
- Antibacterial sutures and intra-oral antiseptics
- Conclusions

Normal flora

- Saliva contains 10^8 bacteria/mL
- Skin contains has 10^5 bacteria/cm^2

- Most infections arise from this endogenous flora

- Infections often polymicrobial
  - synergistic and so don't necessarily need to cover all pathogens with antibiotic Rx

- Often difficult to culture pathogens
  - eg anaerobes
  - ie don't just focus on the culture result

- Oral flora

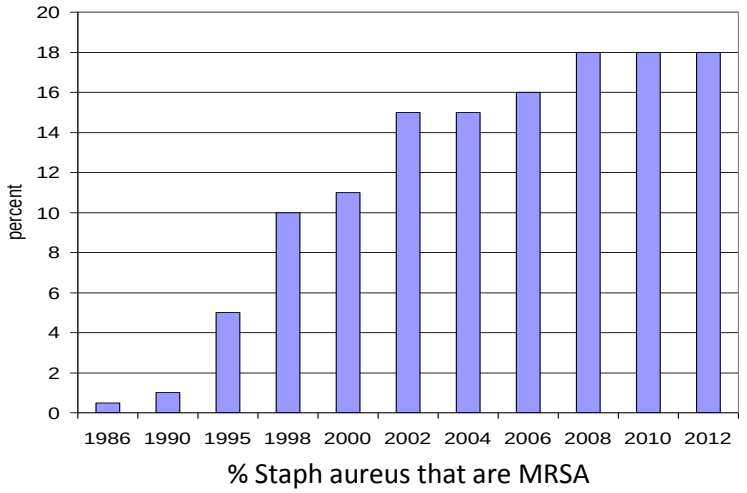
Bacteria Responsible for Odontogenic Infections

Aerobic Bacteria	Frequency	Anaerobic Bacteria	Frequency
Gram-positive cocci		**Gram-positive cocci**	
Streptococcus		*Streptococcus*	Common
Viridans	Very common		
β-Hemolytic	Unusual		
Group D	Rare		
Staphylococcus	Rare		
Gram-negative bacilli		**Gram-negative bacilli**	
Haemophilus influenzae	Rare	*Porphyromonas (Bacteroides)*	Rare
Escherichia coli	Rare	*Prevotella (Bacteroides)*	Very common
Klebsiella	Rare	*Fusobacterium*	Common
Eikenella corrodens	Unusual	*Bacteroides fragilis*	Rare

- Skin flora
  - *Staphylococcus aureus, Group A streptococcus*
  - MRSA increasingly prevalent

MRSA

- **M**ethicillin **R**esistant **S**taphylococcus **A**uerus
  - resistant to all beta-lactams (eg cephazolin)
- Increasing prevalence
- Clonal expansion
  - hence hand hygiene is critical
- Presence determines prophylaxis and treatment regimes

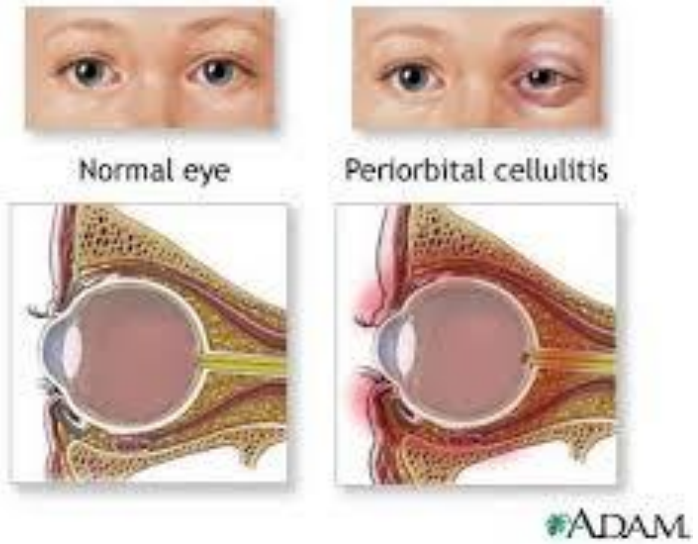


Antibiotic spectra

	Skin flora			Gastro-intestinal flora			
	MRSA	“Normal” staph aureus (MSSA)	Streptococci	“Coliforms” (Gram negatives rods)	Pseudo-monas	Anaerobes (oral)	Anaerobes (bowel)
Amoxicillin			yes			yes	
Flucloxacillin		yes	yes			yes	
Cephazolin		yes	yes			yes	
Augmentin		yes	yes	yes		yes	yes
Clindamycin	variable	yes	yes			yes	yes
Ciprofloxacin				yes	yes		
Vancomycin	yes	yes	yes				
Metronidazole						yes	yes

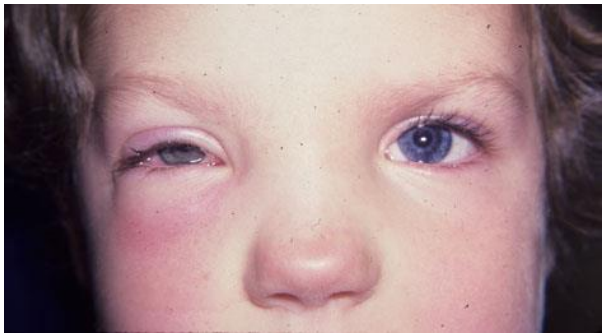
Peri-orbital cellulitis

- Classified relative to orbital septum
  - Pre-septal
  - Post-septal (orbital)



- Pre-septal more frequent, but post-septal more serious
- Examination and CT scan distinguishes between them

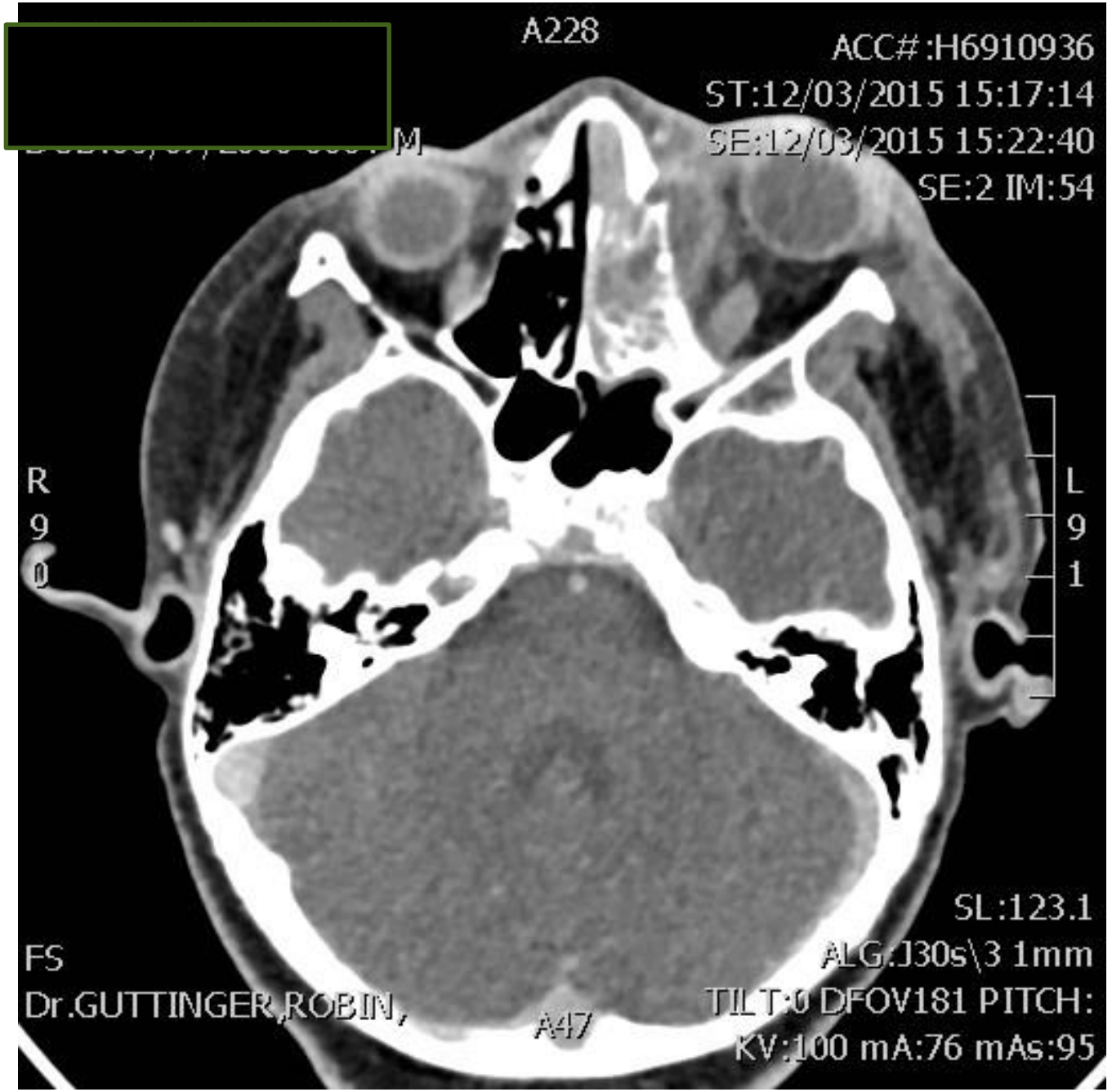
Pre-septal cellulitis



- Due to trauma, bite, herpes zoster
- Pathogens are skin flora
  - *Staphylococcus aureus, Group A strep*
- Visual acuity normal, no proptosis, no opthalmoplegia
- Rarely (if ever) is complicated by posterior extension
- Rx: Flucloxacillin (PO/IV)

Post-septal cellulitis

- Due to sinusitis, post trauma, surgery
- Pathogens are sinus flora
  - *Staphylococcus aureus, Streptococci, Haemophilus, anaerobes*
  - Fungi (eg *zygomycosis*) in immunocompromised/diabetics
- Visual acuity reduced, proptosis, painful opthalmoplegia
- Potentially complicated by posterior extension
  - eg cavernous sinus thrombosis
- Rx: Surgical drainage, Ceftriaxone or Tazosin (IV)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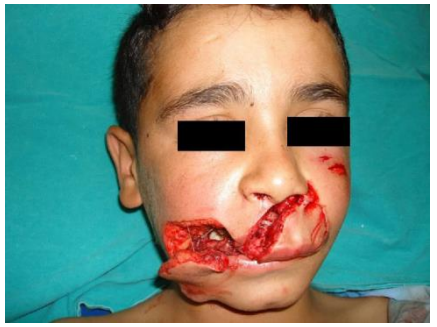
Bite wounds



- Often mistakenly considered inocuous
- 2-30% risk of becoming infected (cats>dogs)
  - Risk factors: extent/depth of tissue damage, delayed presentation, immuno-compromised host
- Pathogens are oral flora
  - Usually polymicrobial
- Deeper punctures from cats increases risk of abscesses/ septic arthritis/osteomyelitis

TABLE 318-1 Common Bacterial Isolates from Dog and Cat Bite Wounds

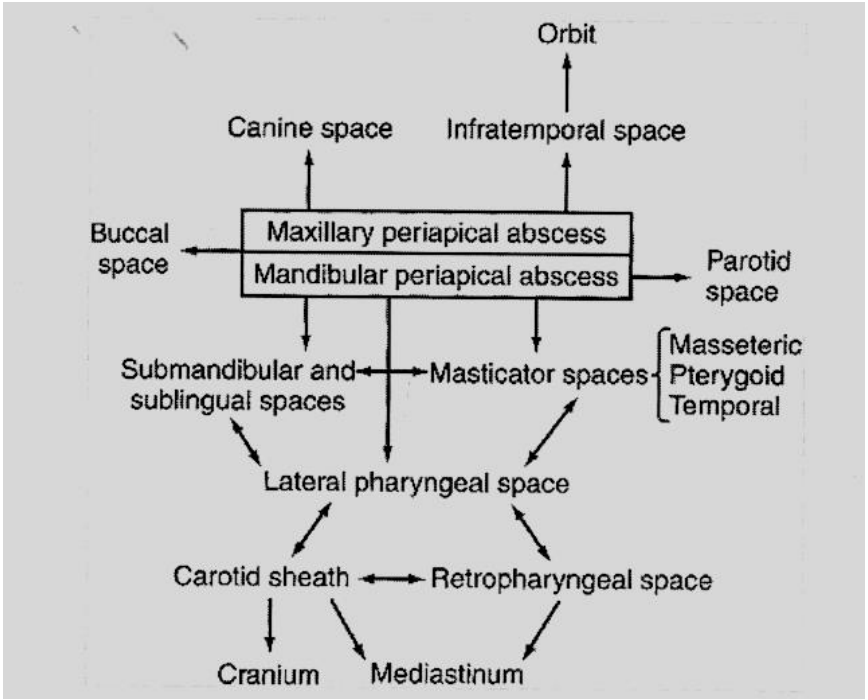
Acinetobacter spp.	*Pasteurella multocida* subsp. *septica*
Actinobacillus actinomycetemcomitans	*Pasteurella dagmatis*
Bacteroides tectus	*Pasteurella canis*
Burgeyella (Weeksella) zoohelcum	*Pasteurella stomatis*
Capnocytophaga canimorsus	*Peptostreptococci*
Capnocytophaga cynodegmi	*Porphyromonas asaccharolytica*
Corynebacterium minutissimum	*Porphyromonas gulae (gingivalis)*
Eikenella corrodens	*Porphyromonas canoris*
Enterococcus spp.	*Prevotella bivia*
Fusobacterium nucleatum	*Prevotella heparinolytica*
Fusobacterium russii	*Prevotella melaninogenica*
Haemophilus aphrophilus	*Prevotella intermedia*
Leifsonia (Corynebacterium) aquaticum	*Prevotella zoogleoformans*
Leptotrichia buccalis	*Staphylococcus aureus*
Micrococcus luteus	*Staphylococcus intermedius*
Moraxella spp.	*Staphylococcus epidermidis*
Neisseria canis	*Streptococci*, α-hemolytic, β-hemolytic
Neisseria weaveri	Veillonella parvula
Pasteurella multocida subsp. *multocida*	

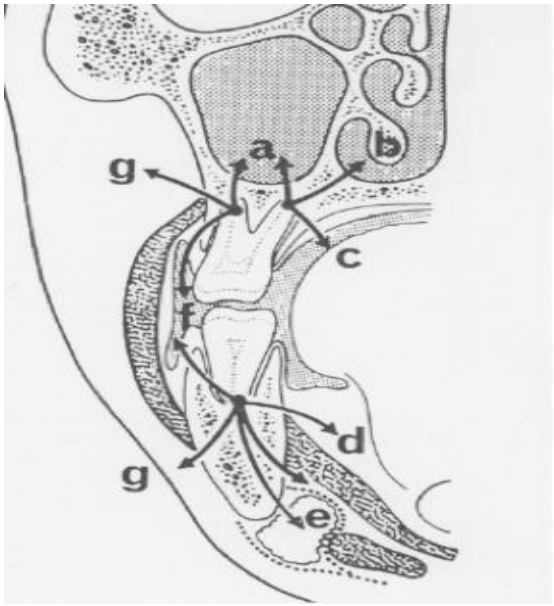
Bite wound management

- Irrigation/Debridement
- Wound closure
  - Usually primary closure on face, unless established infection
- Antibiotics
  - Prophylaxis
    - Required for all facial bites
    - Augmentin (ADF) 1 BD for 5 days
  - Treatment: Tazosin or ADF for 7-14 days
- Immunisations as per Australian Therapeutic Guidelines
  - Tetanus (vaccine)
    - Tetanus spores exist in environment
    - Depends on vaccination history
  - Rabies (vaccine, immunoglobulin)
    - Not endemic in Australia (?bat reservoir)
    - Dogs> other mammals
    - Depends on vaccination history, timing of exposure
    - Advice from specialist/Public Health Unit

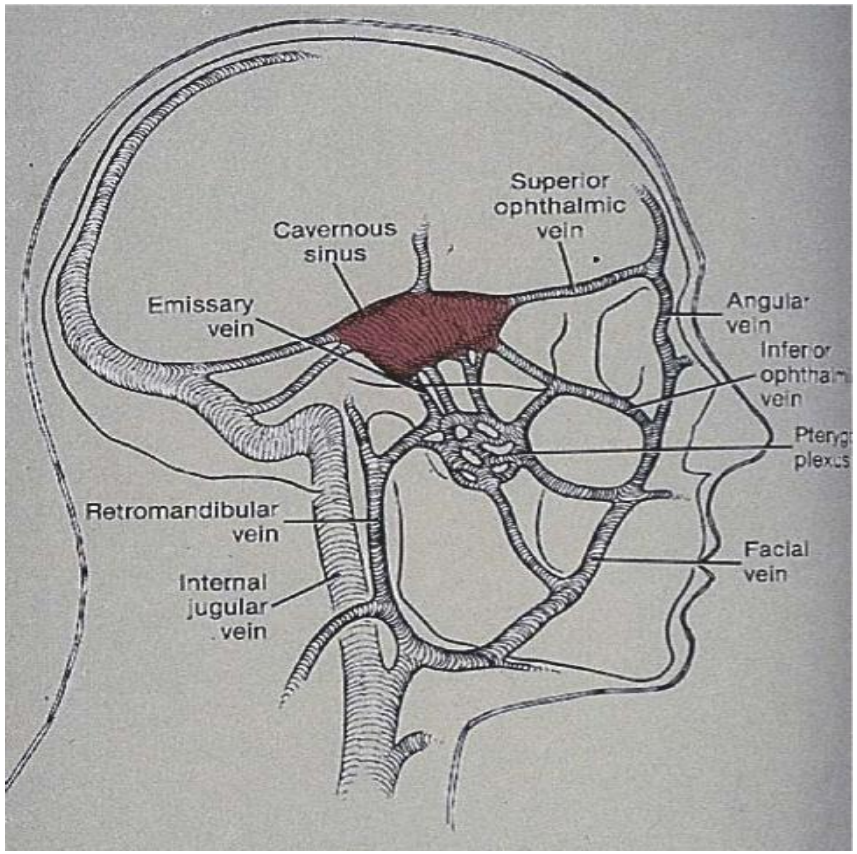
Extension of dental infections

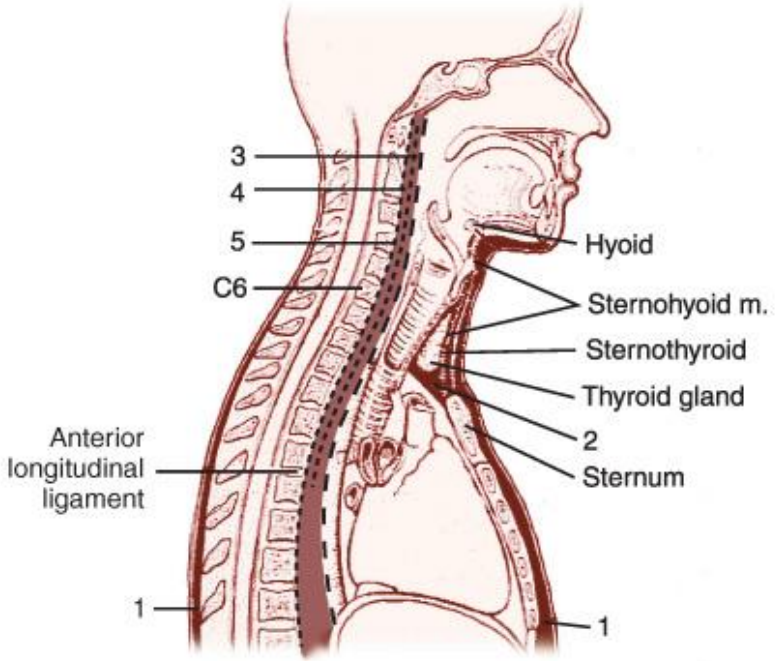
- Occurs along deep tissue planes
  - eg retropharngeal space, prevertebral space, internal jugular vein (Lemierre Syndrome), cavernous sinus, mediastinum, orbit, cranium
  - Systemically unwell, trismus, neck swelling , SOB, dysphagia, dysphonia, etc
  - Importance of surgical drainage





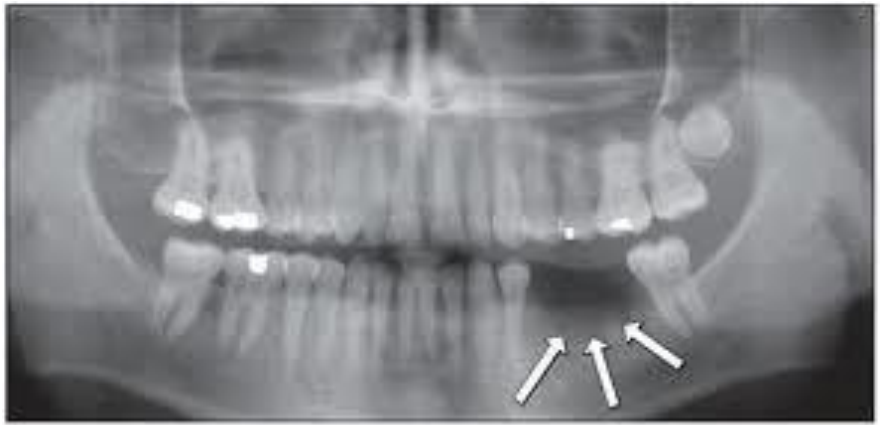
a. Sinus b. Nasal cavity c. Palate d. Sublingual e. Submandibular f. Vestibular g. Buccal h. Canine i. Submental j. Body of mandible





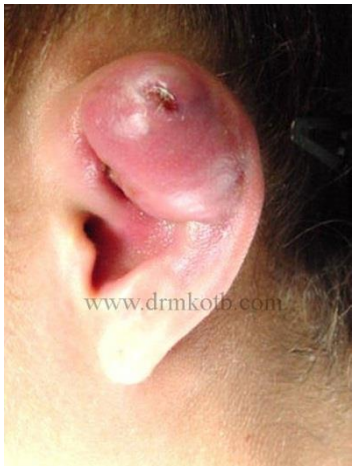
A

Osteomyelitis of jaw



- Risk factors
  - dental disease
  - #/trauma
  - radiotherapy
  - osteo-radionecrosis
  - steroids
  - diabetes
- Mandible more susceptible than maxilla due to thin cortex and poor vascular supply
- Sequestrum (avascular bone) not uncommon
- Prolonged antibiotics required (consider IV)
- Hyperbaric oxygen controversial

Auricular perichrondritis



- Post ear piercing, trauma and surgery
- More common in summer (water exposure)
- More common in upper cartilage (relatively avascular) than lobe
- Risk of cartilage necrosis/deformity
- Usually due to *Pseudomomas aeruginosa* or *Staphylococcus aureus*
- Requires anti-pseudomonal therapy
  - ie tazosin (IV) or ciprofloxacin (po)

Perioperative prophylaxis

- Reduces/eliminates micro-organisms that gain access to surgical site during incision
- The need for prophylaxis depends on risk of wound infection
  - Clean (<5% risk of infection)
  - Clean-contaminated (5-15%)
  - Contaminated (15-30%)
- Widespread use in clean surgery which is inconsistent with guidelines

Table 1

Classification of surgical procedures according to infection risk [6]

Type of surgery	Definition	Examples	Indication for surgical antibiotic prophylaxis
Clean surgery	Healthy skin incised Mucosa of respiratory, alimentary, genitourinary tract and oropharyngeal cavity not traversed	Herniorrhaphy, mastectomy, cosmetic surgery	Not recommended
	Insertion of prosthesis or artificial device	Hip replacement, heart valve	Recommended
Clean-contaminated	Respiratory, alimentary or genitourinary tract is penetrated under controlled conditions without unusual contamination	Laryngectomy, uncomplicated appendicectomy, cholecystectomy, transurethral resection of prostate gland	Recommended
Contaminated	Macroscopic soiling of operative field	Large bowel resection, biliary or genitourinary tract surgery with infected bile or urine	Strongly recommended

Indication for H & N peri-operative prophylaxis

- Incision through oral, nasal, pharyngeal mucosa
- Insertion of prosthetic material
- Surgery for head and neck cancer
  - as increased risk of infection

- NOT for nasal septoplasty or cosmetic/superficial head and neck surgery

What is the evidence?

- Largest RCT examining prophylaxis in plastic surgery
- 1400 patients randomised to placebo or IV amoxicillin/sulbactam (=tazosin)

Diagnosis
Group 1
Facial bone fractures
Facial bone tumors
TMJ dysfunction
Congenital anomalies
Facial lacerations
Radical neck dissection
Cleft lip and palate
Tumor excision and reconstruction
Contractures
Total*
Group 2
Rhinoplasty
Blepharoplasty
Face lift
Abdominoplasty
Liposuction
Reduction mammaplasty
Total†
Group 3
Traumas of upper extremity
Traumas of lower extremity
Congenital defects of hand
Hypospadias, epispadias
Pressure sores
Tumor excision and reconstruction
Total‡
Group 4
Application of implants to head and neck
Application of implants to body and extremity
Total§

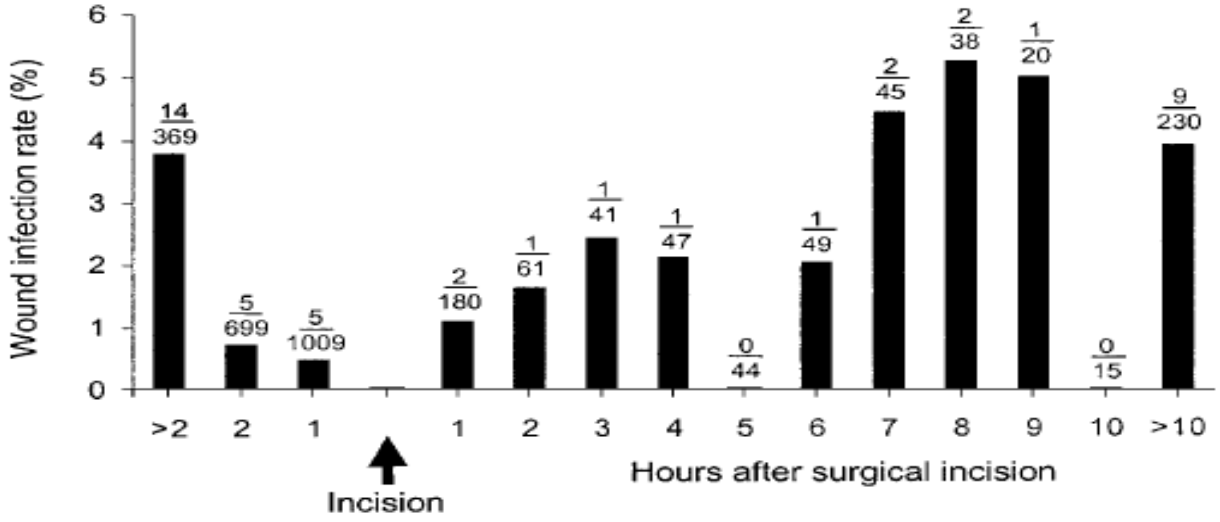
	Infection	
	Placebo Group	PA Group
Group 1	14 (7%)	13 (6.5%)
Group 2	3 (2%)	2 (1.3%)
Group 3	10 (5%)	12 (6%)
Group 4	11 (7.3%)	8 (5.3%)
Total	38 (5.4%)	35 (5.0%)

ie no significant difference
in infection rates

(*Plast. Reconstr. Surg.* 103: 1561, 1999.)

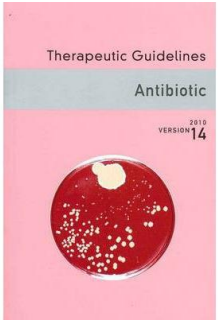
Timing is critical

- Finish the administration within 1 hr prior to incision
  - ideally within 30 minutes
- Logistical issues, esp if infusion (eg vancomycin)



THE NEW ENGLAND JOURNAL OF MEDICINE Jan. 30, 1992

Choice of antibiotic for prophylaxis



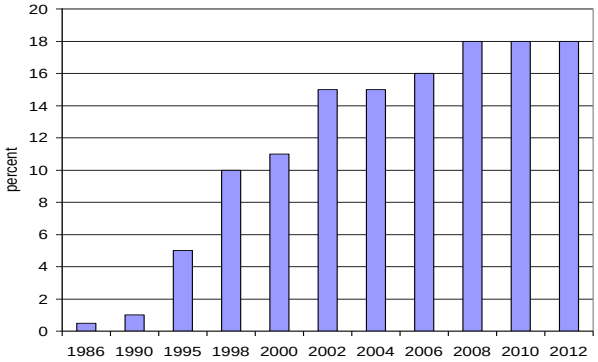
- Follow the guidelines
- *Single dose is adequate*
  - re-dose if surgery is >3hrs
  - continuation for >24 hrs is harmful to the patient
- No incision through oral mucosa
  - Cephazolin 2gm IV
- Incision through oral mucosa
  - Cephazolin 2gm IV plus Metronidazole 500mg IV
- Clindamycin 600mg IV if penicillin allergic
- These regimes do not cover MRSA

Antibiotic spectra

	Skin flora			Gastro-intestinal flora			
	MRSA	“Normal” staph aureus (MSSA)	Streptococci	“Coliforms” (Gram negatives rods)	Pseudo-monas	Anaerobes (oral)	Anaerobes (bowel)
Amoxicillin			yes			yes	
Flucloxacillin		yes	yes			yes	
Cephazolin		yes	yes			yes	
Augmentin		yes	yes	yes		yes	yes
Clindamycin	variable	yes	yes			yes	yes
Ciprofloxacin				yes	yes		
Vancomycin	yes	yes	yes				
Metronidazole						yes	yes

When to add vancomycin?

- Required for patients with risk factors for, or known MRSA carriage
  - Known MRSA carriage (overall 1-2% of population)
    - Micro-alert or pre-operative screening (eg as done in orthopedics)
  - Risk factors for MRSA
    - Residents of aged care facilities
    - Repeated prior antibiotic use
    - Some minority groups (eg ATSI, IVDU)
    - Repeated exposure to health care system (eg renal dialysis)
    - Health care workers

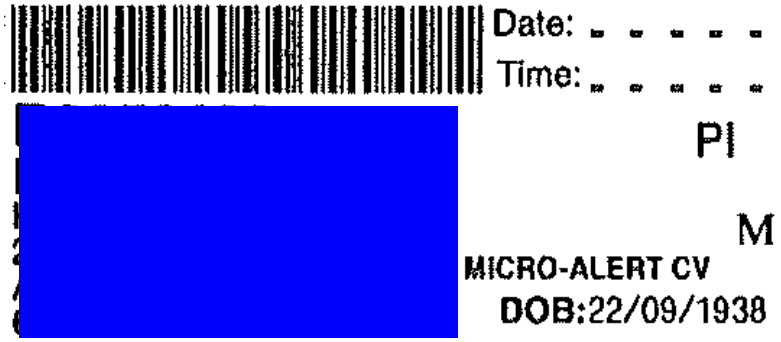


% Staph aureus than are MRSA

- Logistical considerations as is a 1gm infusion *over 1hr*
- With/without pre-op decolonisation with mupirocin nasal ointment and triclosan body wash

Micro alerts

- An electronic tag applied to alert staff of prior colonisation/infection with a resistant organism



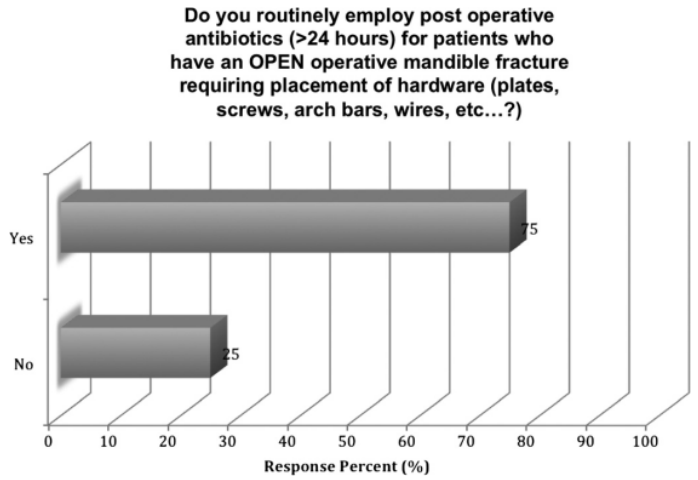
Micro-alert	Site of carriage	Definition
B/C	Skin	MRSA
V	Bowels	VRE (vancomycin resistant enterococcus)
G	Bowels	CRE (meropenem resistant gram negative bacteria)

Prophylaxis for H &N trauma

- NOT required for simple facial lacerations
- IS required for:
  - Bites
  - Grossly contaminated wounds
  - Injuries penetrating buccal mucosa
  - Exposed ear/nose cartilage
  - Open fractures
- Cephazolin is appropriate

Prophylaxis for mandibular fractures

- 10-15% risk of infection
  - Higher risk if ORIF/open #
- Prophylaxis reduces the risk of infection by 3 fold
- Cephazolin 2gm IV
- Either single dose of maximum 24 hrs therapy
- Prolonged post operative prophylaxis is common in practice



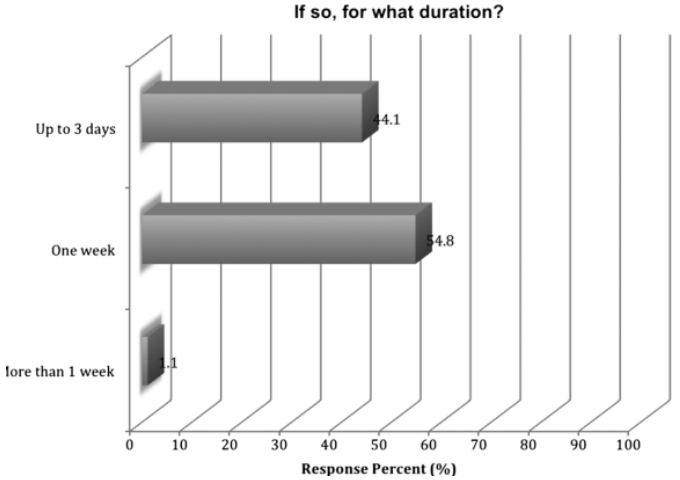


Table 2. COMPARISON OF POSTOPERATIVE INFECTION RATES RELATED TO THE USE OR NOT OF ANTIBIOTICS

Study	Administration	Control Group: No Antibiotics No.	x	%	Test Group: Antibiotics No.	x	%	Probability Level
Zallen and Curry,[12] 1975		30	16	53	32	2	6	0.001
Aderhold et al,[13] 1983	Control	40	8	20				
	≤48hours				40	2	5	0.06
	>48hours				40	4	10	
Gerlach and Pape,[14] 1988	Control	49	11	22				
	1 day				50	1	2	0.001
	1 shot				50	3	6	
	3 days				51	4	8	
Chole and Yee,[8] 1987		42	18	62	37	5	14	0.01

Abbreviation: x, Number of infections.

Andreasen et al. Antibiotics for Maxillofacial Fractures. J Oral Maxillofac Surg 2006.

Ie antibiotic prophyalxis is beneficial (esp for mandibular #) but prolonged administration may be harmful

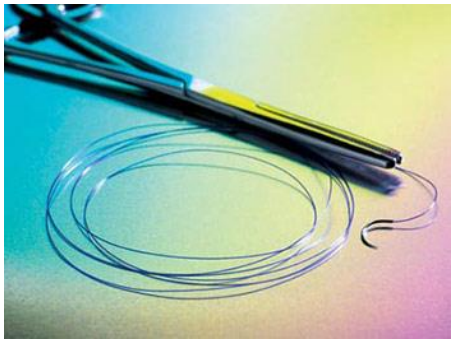
Table 3. COMPARISON OF POSTOPERATIVE INFECTION RATES ACCORDING TO FRACTURE LOCATION

	n	Infection (%)
Zygoma	18	0 (0)
Maxilla	6	0 (0)
Condyle	23	0 (0)
Mandible	79	23 (29)

Data from Chole and Yee 1987.[8]

Andreasen et al. Antibiotics for Maxillofacial Fractures. J Oral Maxillofac Surg 2006.

Antibacterial sutures



- Contain antiseptics (eg triclosan)
- *No* evidence for use on head and neck surgery

Do antibacterial-coated sutures reduce wound infection in head and neck cancer reconstruction?

S.Y. Chen, T.M. Chen, N.T. Dai, J.P. Fu, S.C. Chang, S.C. Deng, S.G. Chen*

Table 1
Patient characteristics for the Triclosan group and the control group.

	Triclosan group	Control group	*P*-value
Patient number	112	129	
Sex			1.000
Male	105	120	
Female	7	9	
Age	53.6 ± 9.8	51.1 ± 11.3	0.081
Stage			0.119
T1 + T2	58	80	
T3 + T4	54	49	
Patients with previous head and neck reconstruction	29	38	0.322
Patients with preoperative radiotherapy	46	45	0.136
Patients with diabetes	30	25	0.218
Patients undergoing free flap transfer	102	117	1.000
Flap size (cm^2)	81.0 ± 57.9	72.7 ± 56.4	0.262
Length of stay	35.3 ± 14.3	35.9 ± 21.0	0.775
Patients with neck infection	17	19	1.000

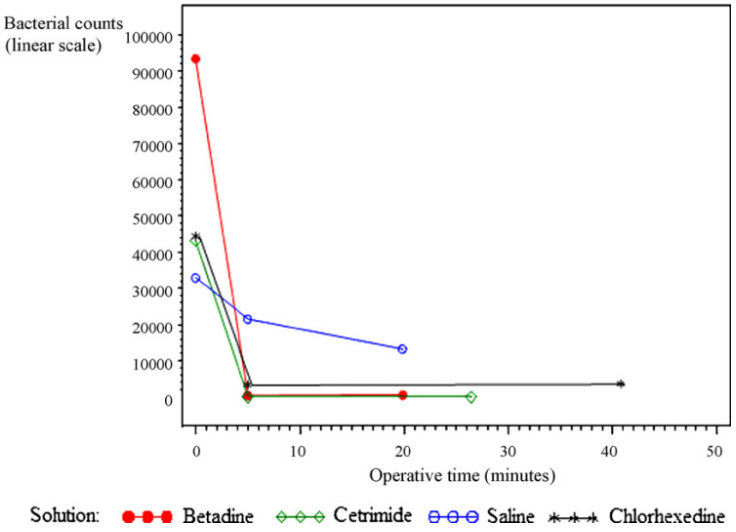
S.Y. Chen et al. / EJSO 37 (2011) 300–304

Intra-oral antispetics

- eg chlorhexidine mouth wash
- Pre +/- post operative
- Reduces oral bacterial burden

- Controversial role in surgery oral surgery
  - Limited evidence it reduces infection rates

- Suggest risk based use
  - eg prosthetic material, poor oral hygiene, head & neck cancer, etc.



Int. J. Oral Maxillofac. Surg. 2009; 38: 160–165

ASMS Survey Results: Prophylactic Preoperative Oral Preparation

	Practice (%)	
	Private	Academic
Prophylaxis: intraoral preparation	68	66
Reduces colonization		
Yes	52	40
No	35	54
Unknown	13	6
Reduces infection		
Yes	42	28
No	44	58
Unknown	14	14

PLASTIC AND RECONSTRUCTIVE SURGERY, *September 2000*

Topical antiseptic mouthwash in oncological surgery of the oral cavity and oropharynx

Abstract

A multivariant analysis of the value of the use of a pre-operative topical antiseptic mouthwash to reduce the incidence of post-operative wound complications in 106 consecutive patients undergoing head and neck surgery involving the oral cavity or oropharynx was carried out at the University of Iowa, Department of Otolaryngology–Head and Neck Surgery. An oral presentation employing povidone–iodine solution was used

TABLE V

CORRELATION OF RISK FACTORS TO WOUND OUTCOME (PREVIOUS RADIOTHERAPY/SURGERY, STAGE, AND NO MOUTHWASH PREPARATION ARE UNEVENLY DISTRIBUTED TO THE POORER WOUND OUTCOMES)

Factor	*p*-value	Significance
Sex	0.40	Nonsignificant
Age in years	0.64	Nonsignificant
Dentition	0.53	Nonsignificant
Pre-existing illness	0.35	Nonsignificant
Previous radiotherapy/surgery	<0.01	Significant
Stage	<0.01	Significant
Closure	<0.01	Significant
Mouthwash preparation	<0.01	Significant

The Journal of Laryngology and Otology
November 1994, Vol. **108,** pp. 973–979

Conclusions

- Knowledge of local flora and antibiotic spectra enables appropriate antibiotic treatment and prophylaxis
- Be conscious of local complications of dental infections
  - Peri-orbital cellulitis
  - Deep tissue planes
- Avoid unnecessary or prolonged prophylaxis

- From here on is extra slides….

	Skin flora			Bowel flora	
	MRSA	“Normal” staph aureus (MSSA)	Streptococci	“Coliforms” (Gram negatives rods)	Anaerobes
vancomycin	yes	yes	yes		
flucloxacillin		yes	yes		
cephazolin		yes	yes	limited	
cefoxitin		yes	yes	limited	yes
gentamicin				yes	
tazosin (=timentin)		yes	yes	yes	yes

Antibiotic spectra

	Skin flora			Respiratory flora		Bowel flora		Hospital flora	
	MRSA	"Normal" staph aureus (MSSA)	Beta-haem Streptococci	Strep. pneumoniae	Haem. influenzae	"Coliforms" (Gram neg rods)	Anaerobes	Pseudomonas	Acinetobacter
Flucloxacillin		✓	✓						
Cephazolin		✓	✓			Limited			
Amoxicillin			✓	✓	✓				
Ceftriaxone		✓	✓	✓	✓	✓			
Vancomycin	✓	✓	✓	✓	✓				
Tazocin		✓	✓	✓	✓	✓	✓	✓	✓
Gentamicin						✓		✓	✓
Meropenem		✓	✓	✓	✓	✓	✓	✓	✓

?split anaerobes in above/below diagraphm

Table I. Measures commonly used to reduce the risk of surgical site infection

Preoperative showers, bathing with disinfectant soap
Skin disinfection
Theatre environment (e.g. clean air, laminar air flow)
Gloving techniques, hand-washing
Elimination of nasal carriage of *Staphylococcus aureus*
Topical antimicrobial drugs in the operative field
Preoperative oral antimicrobial drugs
Perioperative systemic antimicrobial drugs
Wound infection surveillance feedback

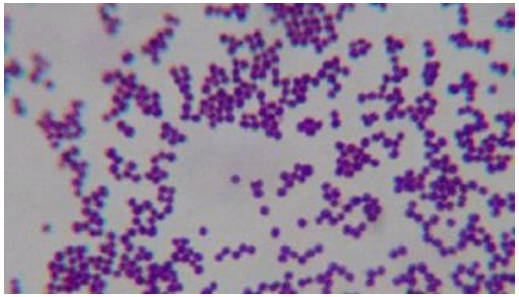
Who needs prophylaxis?

- Contaminated operations
- Clean-contaminated operations
- Clean operations involving
  - prosthetic material
  - important sites (eg CNS, eye, aorta, sternotomy)

Swab technique

- Glass slide should be prepared by collector
- Clean the wound and debride devitalised material before swabbing
- Clinical notes on form are important
  - eg bite, fresh water exposure, travel

Microscopy, **C**ulture and **S**usceptibilities



- Microscopy=Gram stain
  - Give clues to preliminary identification
    - Specific but not sensitive
    - eg staph are gram positive cocci in clusters
- Culture and susceptibilities
  - Result is semi-quantitative
    - light/moderate/heavy growth
  - Takes 48-72 hrs for a result
    - thus usually prescribe empiric antibiotics initially

Treatment

- As with all infectious diseases:
  - Establish clinical syndrome
  - Know likely pathogens
  - Understand their probable susceptibilities
  - Select an antibiotic with adequate coverage

- Treatment is usually empiric
  - ie no culture/susceptibility results available

eTG complete - Windows Internet Explorer provided by Department of Health

http://online.tg.org.au.rplibresources.health.wa.gov.au/ip/desktop/index.htm

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Index Contents Text Find

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Type in the keyword to find:

cellulitis

- cellulitis
  - endocarditis prophylaxis
  - orbital (postseptal)
  - pelvic
  - perianal
  - periorbital (preseptal)
  - preventive measures
  - severe sepsis (skin source)
- cementum (definition)
- central nervous system infections
  - tuberculosis
- central retinal artery occlusion
- central retinal vein occlusion
- central sleep apnoea (CSA)
  - children
- central venous line infections
  - severe sepsis
- cephalexin
- cephalosporins
  - use in dentistry
- cephalothin
- cephazolin
- cercarial dermatitis
- cerebral oedema
  - diabetic ketoacidosis (children)
- cerebral palsy
  - palliative care
- cerebral stimulation
- cerebral tumours
  - palliative care
    - cerebral metastases
    - headache
- cerebral venous thrombosis
- certification of death
- certolizumab
- cervical dystonia
- cervical lymphadenitis
- cervicitis
  - chlamydial or other nongonococcal
  - gonococcal

Mild early cellulitis and erysipelas

To cover *Staphylococcus aureus* and *Streptococcus pyogenes*, use:

di/flucloxacillin 500 mg (child: 12.5 mg/kg up to 500 mg) orally, 6-hourly for 7 to 10 days.

If *S. pyogenes* is confirmed, or suspected due to clinical presentation (see above) or local disease patterns (eg in Indigenous communities in central and northern Australia), use:

1 **phenoxymethylpenicillin 500 mg (child: 10 mg/kg up to 500 mg) orally, 6-hourly for 10 days**

OR

1 **procaine penicillin 1.5 g (child: 50 mg/kg up to 1.5 g) IM, daily for at least 3 days.**

Cephalexin can be used for patients with penicillin hypersensitivity (excluding immediate hypersensitivity, see Table 2.2), and is a useful alternative to di/flucloxacillin in children due to better tolerability, and palatability of the liquid formulation. Use:

cephalexin 500 mg (child: 12.5 mg/kg up to 500 mg) orally, 6-hourly for 7 to 10 days.

For patients with immediate penicillin hypersensitivity (see Table 2.2), use:

clindamycin 450 mg (child: 10 mg/kg up to 450 mg) orally, 8-hourly for 7 to 10 days.

Severe cellulitis

If patient has significant systemic features or is not responding to oral therapy after 48 hours, commence IV therapy.

To treat infection with either streptococci or staphylococci, use initially:

flucloxacillin 2 g (child: 50 mg/kg up to 2 g) IV, 6-hourly.

For patients hypersensitive to penicillin (excluding immediate hypersensitivity, see Table 2.2), use initially:

cephazolin 2 g (child: 50 mg/kg up to 2 g) IV, 8-hourly.

For patients with immediate penicillin hypersensitivity (see Table 2.2), use initially:

1 **clindamycin 450 mg (child: 10 mg/kg up to 450 mg) IV or orally, 8-hourly**

OR

1 **lincomycin 600 mg (child: 15 mg/kg up to 600 mg) IV, 8-hourly**

OR

2 **vancomycin 1.5 g (child less than 12 years: 30 mg/kg up to 1.5 g) IV, 12-hourly (adjust initial dosage for renal function and monitor blood concentrations, see Dosing and monitoring of vancomycin; slow infusion required).**

Where home-based intravenous antimicrobial therapy is practical, for initial therapy in carefully selected patients, use:

1 **cephazolin 2 g IV, 12-hourly**

Microsoft PowerPoint - [Antibiotics Seminar.ppt]

Local intranet 100%

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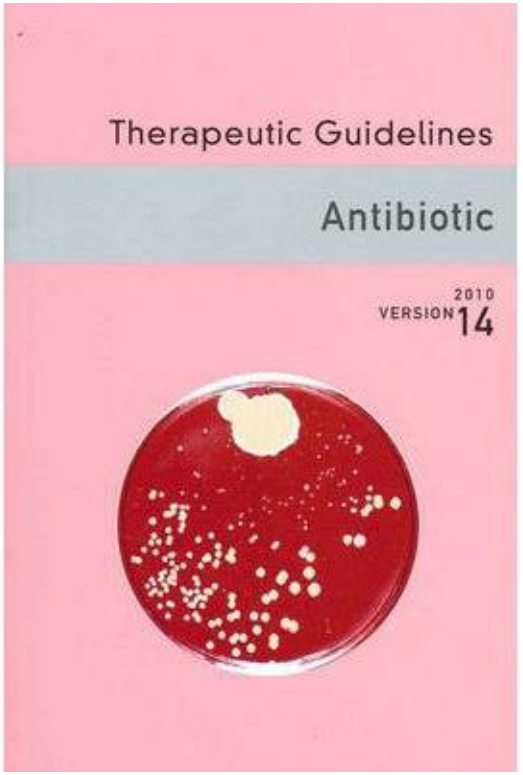

Local susceptibility rates

	Penicillin	Flucloxacillin	Cephalexin	Erythromycin	Clindamycin	Doxycycyline	Cotrimoxazole	Vancomycin
Staph aureus (All)	**6**	**85**	**85**	**86**	**86**	**97**	**99**	**100**
Staph aureus (MSSA)	**6**	**100**	**100**	**89**	**89**	**98**	**99**	**100**
Staph aureus (MRSA)	**0**	**0**	**0**	**64**	**64**	**94**	**99**	**100**
Group A strep.	**100**	**100**	**100**	**96**	**96**	**98**	**100**	**100**

Antibiograms provides cumulative antibiotic susceptibility results over the whole year

Hospitalisation during travel overseas is a risk factor for more resistant pathogens

?Cervico-facial actonimycosis

- ?add something (and pic) from up to date

Predominant genus or family	Mouth (saliva, tooth surface)[a]	Oropharynx[a]	Nose, nasopharynx[a]
Facultative			
Gram-positive cocci			
Streptococci (viridans group)	4[a]	4	3
Streptococcus mutans	4	3	-
Streptococcus sanguis	4	4	-
Streptococcus mitior	4	4	-
Streptococcus salivarius	4	4	-
Streptococcus pneumoniae	-	2	2
Streptococcus pyogenes	-	1	1
Streptococcus faecalis	1	-	-
Staphylococcus aureus	-	-	2
Staphylococcus epidermidis	4	3	4
Gram-positive bacilli			
Corynebacterium	2	4	4
Gram-negative cocci			
Moraxella	1	2	3
Neisseria spp	2	3	1
Neisseria meningitidis	-	-	1
Gram-negative bacilli			
Eikenella	1	-	-
Enterobacteriaceae	1	±	±
Haemophilus influenzae	-	2	2
Haemophilus parainfluenzae	-	3	3
Anaerobic			
Gram-positive cocci			
Peptostreptococcus	4	4	-
Gram-positive bacilli			
Actinomyces	4	-	-
Lactobacillus	4	-	-
Propionibacterium	-	-	-
Gram-negative cocci			
Veillonella	4	-	-
Gram-negative bacilli			
Fusobacterium	3	4	-
Bacteroides, Porphyromonas, Prevotella	4	4	-