

Gloucestershire Independent Dentists

Current controversies in patient management in oral surgery

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Mistakes

- ◆ In order to prevent most operative complications we need to ask 4 simple questions
 - Correct diagnosis?
 - Correct treatment plan?
 - Correct and informed patient?
 - Correct Training?

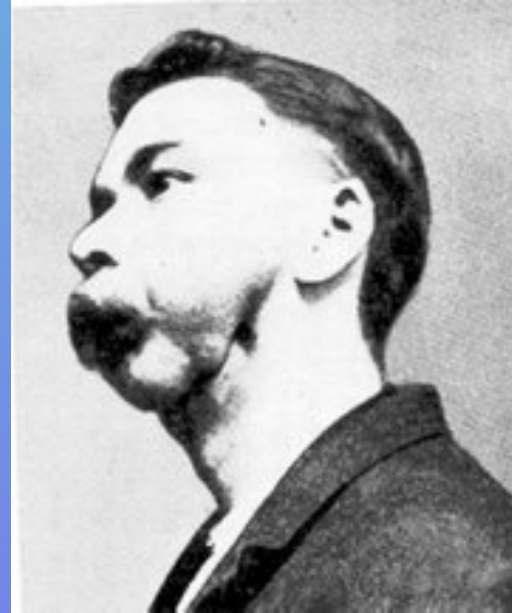


Outline

- ◆ Bisphosphonate osteonecrosis of the jaws BONJ
- ◆ CBCT

BONJ

- ◆ Phossy jaw
- ◆ 1940s
- ◆ Watch factories
- ◆ Fluorescent phosphonates



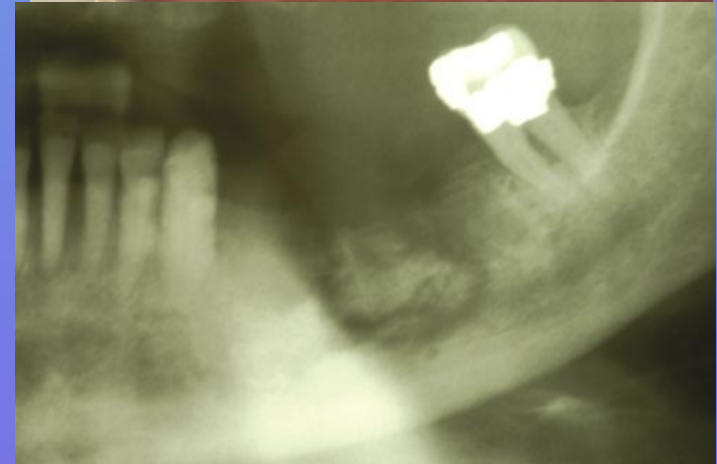
BONJ

– Bisphosphonates

- » Osteoclast inhibiting drugs
- » Inhibit intracellular vesicular transport
- » May inhibit angiogenesis
- » Cause osteosclerosis

– Types

- » IV
 - » Amino Pamidronate (Aredia)
Zoledronic acid (Zometa)
 - » Non amino Alendronate (Fosamax)
- » Oral
 - Risendronate (Actonel)
 - Etidronate (Didronel)
 - Tiludronate (Skelide)



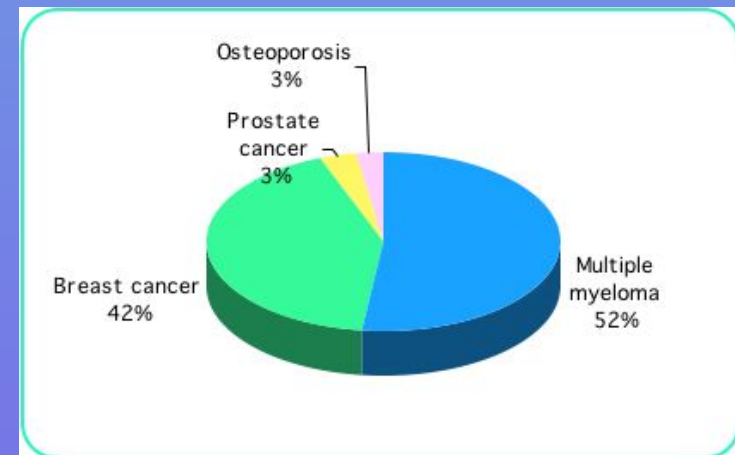
Relative Potency

- ◆ Not associated with BONJ
 - Etidronate (Didronel) 1
 - Tiludronate (Skelide) 10
- ◆ BONJ associated
 - Pamidronate (Aredia) 100
 - Alendronate (Fosamax) 1,000
 - Risedronate (Actonel) 10,000
 - Ibandronate (Boniva) 10,000
 - Zoledronic acid (Zometa) >100,000



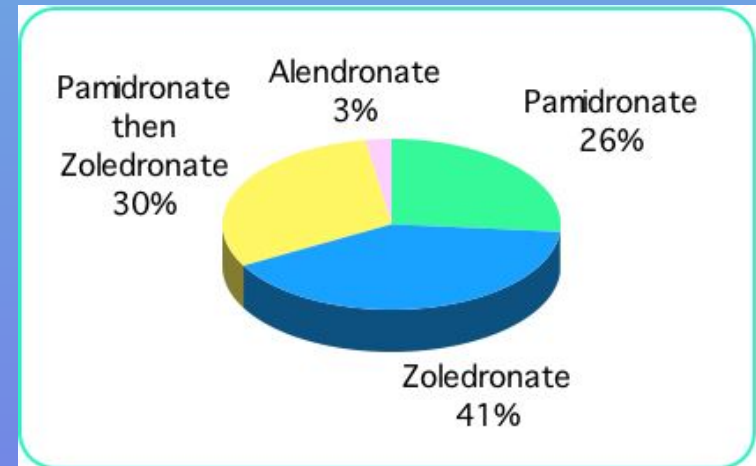
Indications for bisphosphonates

- ◆ Bone pain disease progression
 - Metastatic bone disease (breast / prostatic)
 - Multiple myeloma
 - Hypercalcaemia of malignancy
- ◆ Skeletal disorders
 - Osteoporosis
 - Pagets disease



Risk factors BONJ

- ◆ 95% occurred in people being treated for cancer (increased intravenous BP doses)
- ◆ only 5% cases occurred in people treated for osteoporosis (lower oral doses).
- ◆ Dento-alveolar surgery-60% of cases due to removal of molars!
- ◆ Periodontitis / denture trauma
- ◆ Corticosteroids
- ◆ Smoking
- ◆ Age
- ◆ Immuno-compromised pts



BONJ

◆ Patients at risk

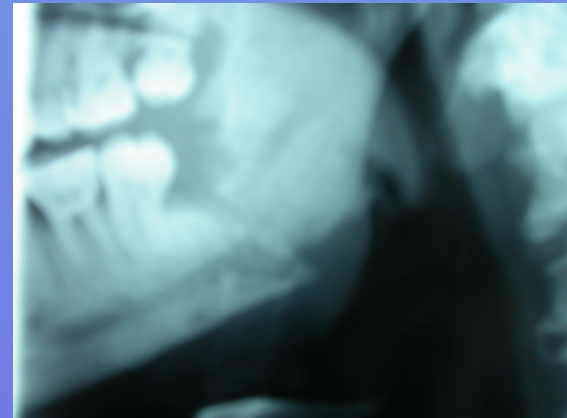
- MH Metastatic bone malignancy / MM
- 64% mandible
- 73% extraction
- Potent IV bisphosphonates >1year
- Incidence of ON Weekly Alendronate

» Osteoporosis	0.01-4%	Extraction	0.09-0.34%
» Pagets	0.26-1.8%		2.1-13.5%
» Bone mets	0.88-1.15%		6.6-9.1%



Risk BONJ

- 62 yr old male
- Bone mets Prostatic Ca
- IV Alendronate 1 yr Jn 06-07
- XLA LL8 July 2006
- Present ‘dry socket’ Dec 06
- Reviewed Jan and April 07



BP's Mechanism of action

1) Tissue level

- a. reduction of bone turnover

2) Cellular level

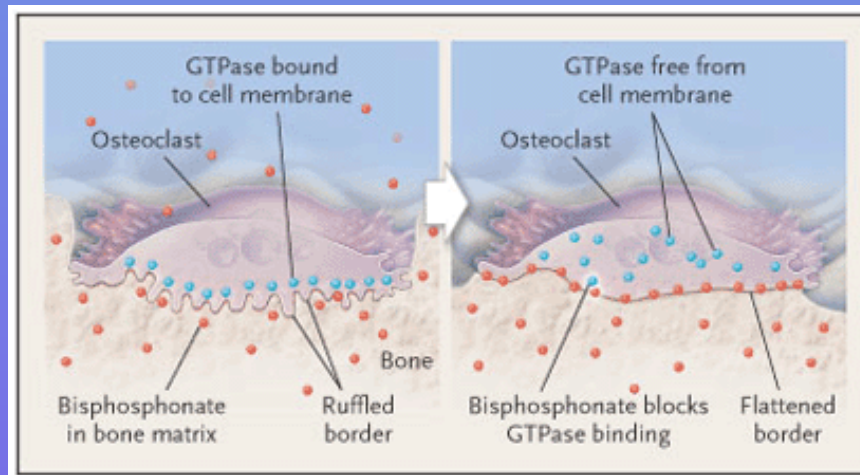
- a. inhibition of osteoclastic activity on the bone surface (Rodan et al., Strewler)
- b. inhibition of osteoclast recruitment on the bone surface (Rodan et al., Vitte et al.)
- c. osteoclast apoptosis (Hughes et al., Rogers et al.)

BP's Mechanism of action

3) Molecular level

Interferes with osteoclast intercellular biochemical pathways

- » Inhibition of farnesyl diphosphate synthase
- » Metabolized to toxic analogue of ATP (non-nitrogen containing BP's)



Strewler GJ. N Engl J Med 2004;350:1174

Bisphosphonates

- ◆ Pharmacologic action:

- Inhibition of bone resorption

- ◆ Pharmacokinetics:

- Distribution:

- Rapid accumulation in sites of increased bone deposition and resorption,

- Low plasma levels, *½ life of “10 years +”*

- Metabolism:

- Not** metabolized (nitrogen containing)

- Excretion: Renal

Staging

Stage 1

- ◆ Characterized by exposed bone that is asymptomatic with no evidence of significant soft tissue infection



Staging

Stage 2

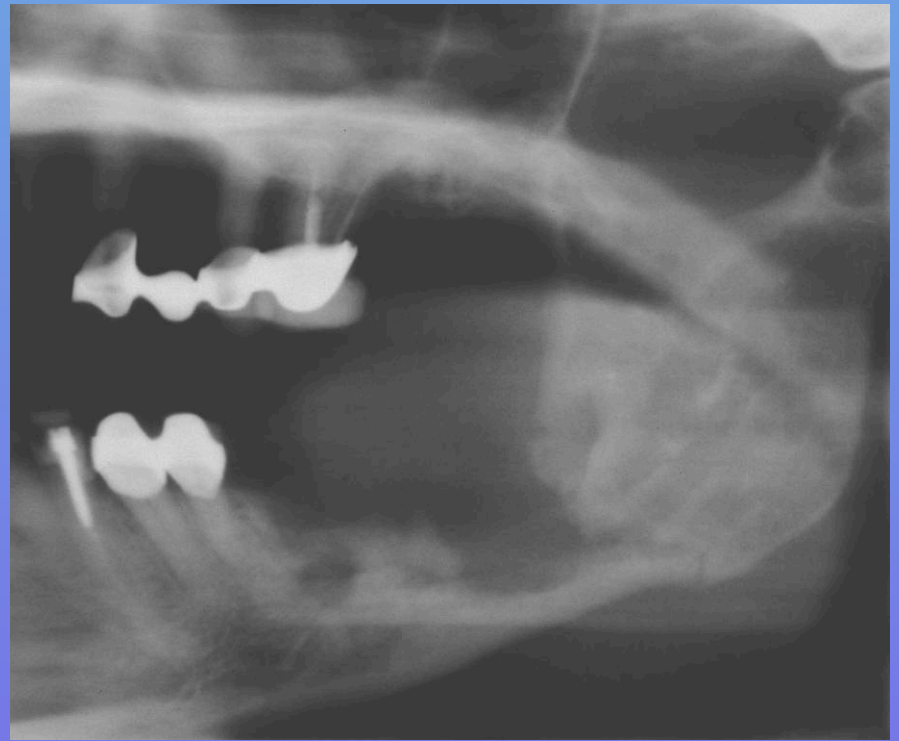
- ◆ Exposed bone associated with pain, soft tissue and/or bone infection



Staging

Stage 3

- ◆ Pathologic fracture
- ◆ Exposed bone associated with soft tissue infection or pain that is not manageable with antibiotics due to the large volume of necrotic bone.



Suggested protocol for PREVENTION

- ◆ Oral hygiene preoperatively
- ◆ Regular dental check up
- ◆ Complete invasive procedures prior to IV bisphosphonates
(? Short arch therapy)
- ◆ Avoid surgery during treatment
- ◆ ? Chlorhexidine mouth wash

- ◆ Preoperative CTX?

Marks et al 2007

www.ada.org/prof/resources/topics/osteonecrosis.asp

Suggested protocol for MANAGEMENT

- ◆ ?Stop bisphosphonates if possible but stopping BPs is ineffective due to long T1/2 (>10years)
- ◆ Remove dentures
- ◆ **AVOID extractions RCT/extrusion orthodontics**
- ◆ Debridement may worsen
- ◆ If surgery required (spreading infection, debilitating pain)
 - Antibiotics
 - » Clindamycin and Metronidazole
 - » Pentoxifyline 400mg BD Vitamin E 1000IU
 - Antiseptic mouth wash Corsodyl 10 mls QDS
 - Analgesia paracetamol +/- opioid
 - Hyperbaric O2 ineffective? Hyperbaric O2 (1 study)
 - **Ultrasound** no evidence
 - » Mehrotra & Ruggiero 2006
 - » Rogers S BDJ March 2007 Mavrokokki et al JOMS 2006, Cheng et al ADJ 2005
 - www.ada.org/prof/resources/topics/osteonecrosis.asp

Recommendations

The Cancer Research UK website November
2005 Journal of Clinical Oncology

EB review Bandolier UK 2007

American Society for bone and mineral research
Task Force **ASBMR 2007**

American Academy of Oral and Maxillofacial
Surgeons **AAOMS 2006**

American College of Rheumatology **ACR 2006**

American Association of Endodontists **AAE 2006**

American Dental Association **ADA 2006**

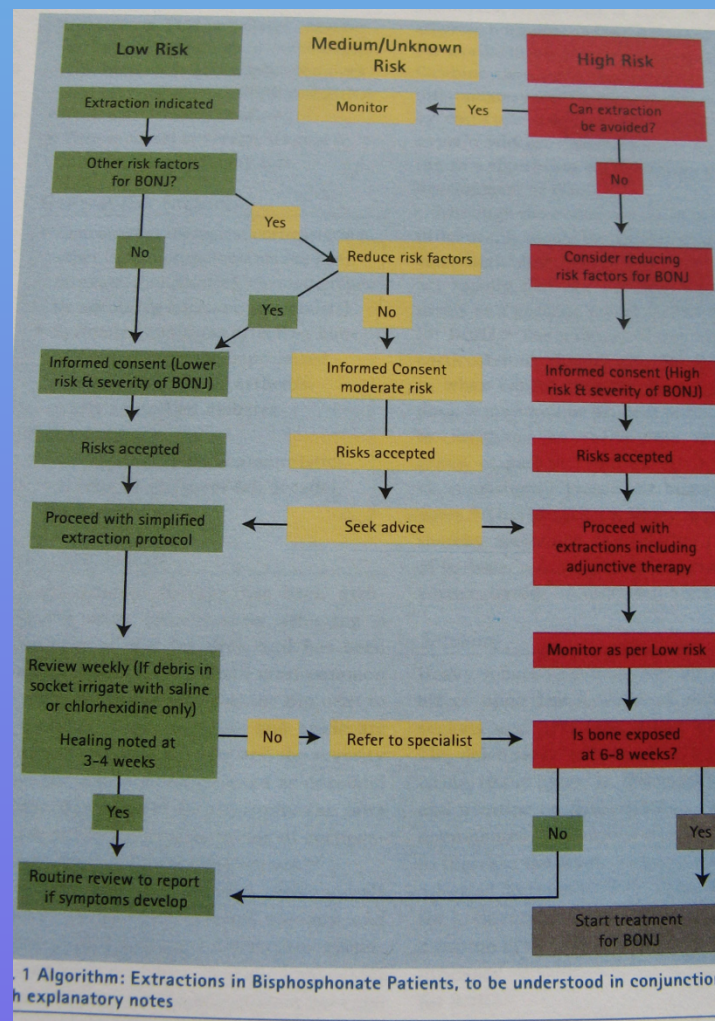
Multidisciplinary Panel 2006

Canadian Consensus Practice guidelines for
bisphosphonate associated osteonecrosis of the
jaw. J Rheumatol 2008;35:1391-7

Good articles

Silverman S and Landesberg R. Osteonecrosis
of the jaw and the role of bisphosphonates: A
critical review **Am J Med 2009;122:S33-S45**

Malden N, Beltes, Lopes V. Dental Extractions
and Bisphosphonates: assessment, consent
and management a proposed algorithm **BDJ**
2008



BPs and orthodontics

2 reported cases of orthodontic treatment post BP

Rinchuse D et al 2007 AAO

Case 1 35yr F Oral Fosamax > 1 year

30 months ortho RX Class II Div. Extraction spaces difficult to close in both maxilla and mandible

Case 2 78yr M close mandibular incisor spaces post XLA of LR2

IV Zoledronic acid monthly for 12 months Ortho RX took 13 months (ideal < 6 months)

Zahrowski recommendations AAO 2006

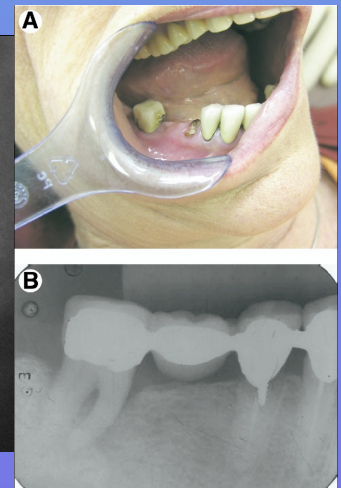
BPs and orthodontic extrusion

◆ Orthodontic extrusion of teeth to avoid ON

- Bennani A et al. Non traumatic tooth extraction in patients treated by bisphosphonate Rev Stomatol Chir Maxillofac. 2008 Dec; 109(6):405-7
- Eran Regev et al. Atraumatic Teeth Extraction in Bisphosphonate-Treated Patients J OMS 2008; 66;Issue 6

◆ Table

- ◆ 1 6 mo Zoledronate Breast cancer F 47
- ◆ 2 2.5 yr Pamidronate Breast cancer F 55
- ◆ 3 10 yr Risedronate Osteoporosis F 70
- ◆ 4 22 mo Pamidronate Multiple myeloma M 47
- ◆ 5 N/A Zoledronate Multiple myeloma F 42
- ◆ 6 2 yr Zoledronate Breast cancer F 69
- ◆ 7 N/A Zoledronate Breast cancer F 67
- ◆ 8 9 mo Zoledronate Breast cancer F 57
- ◆ 9 2 yr Zoledronate Breast cancer F 72
- ◆ 10 10 yr Alendronate Osteoporosis F 73



BPs and implants

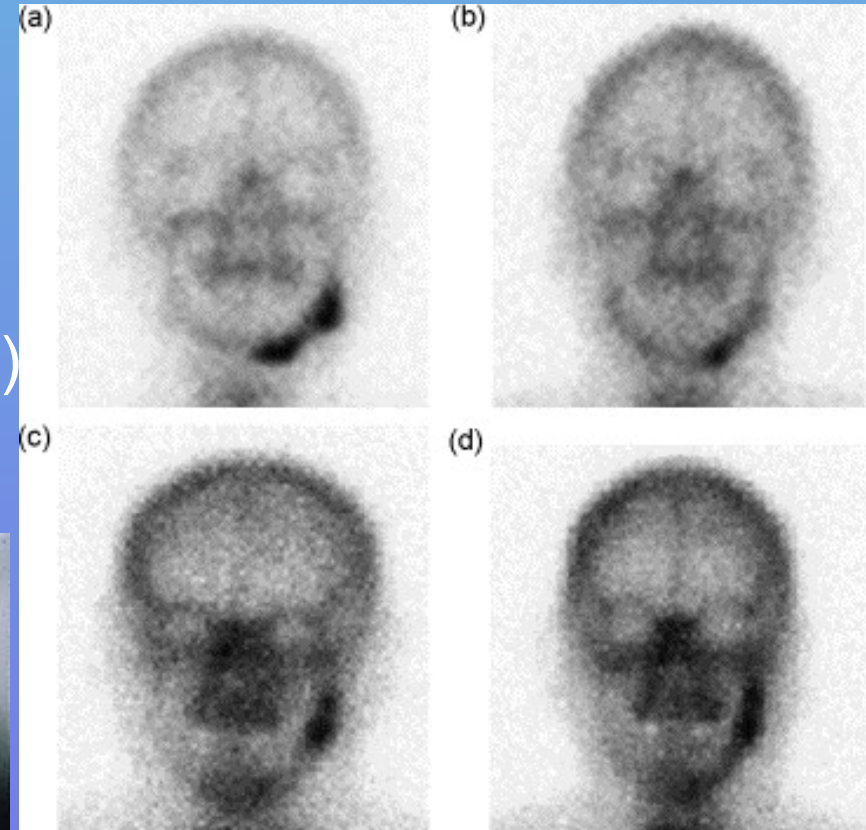
- ◆ 115 cases using 468 implants
- ◆ Retrospective study
- ◆ All oral BPs
- ◆ 2 implants failed
- ◆ No BONJ
- ◆ Avoid implants in pts on BPs > 3 years, concomitant corticosteroids
- ◆ Grant B et al JOMS 2008;66:223-230

Diagnosis and monitoring of osteomyelitis

- ◆ Leukocyte counts and
- ◆ c-reactive protein levels

Other Markers

- ◆ Hydroxylysylpyridinoline (HP)
- ◆ Lysylpyridinoline (LP)



Treatment of Osteomyelitis

- ◆ Diagnosis
- ◆ Patient /local factors
- ◆ Antibiotic
 - Metronidazole 200mg TDS
 - Penicillin V 250mg QDS (Clindamycin)
 - 6 weeks
- ◆ Surgical
 - Local debridement
- ◆ Review



Osteomyelitis

- ◆ New method for monitoring
 - Springer et al 2007
 - Urinary lysylpyridinolone (LP) and hydroxylysylpyridinolone (HP)
 - Useful tool @\$5 as marker of disease activity
- ◆ No evidence for hyperbaric oxygen therapy
- ◆ Limited evidence for Antibiotic protocols
 - Pentoxifylline 400mg BD and vitamin E 1000IU
- ◆ UK survey of current practice
- ◆ Early surgical intervention

Recent cases Osteomyelitis

- ◆ Post extraction in mandible
- ◆ Healthy patients
- ◆ ‘recurrent’ dry sockets
- ◆ Repeated short AB therapy
- ◆ Persistent local mandibular pain
- ◆ +/- lymphadenopathy
- ◆ +/- IAN neuropathy
- ◆ BEWARE!



Mx Osteoradionecrosis

- ◆ Osteoradionecrosis
 - No evidence that antibiotics improve outcome
 - Pentoxifyline 400mg BD Vitamin E 1000IU
Corsodyl 10 mls QDS
 - Hyperbaric oxygen -no evidence base
 - ?ultrasound therapy no evidence
 - PREVENTION Short arch prior to radiotherapy
 - Oral fluoride supplements before, during
radiotherapy and afterwards

CBCT

- ◆ Be careful of artefacts!

Cone Beam CT

- ◆ Relative dose change due to tissue weighting (salivary gland tissue)
- ◆ Limitation with soft tissue –require medical CT for neoplasia
- ◆ Medicolegal issues
 - Health protection agency HPA
 - AAOMFR
 - » Standards for training, machinery and criteria

CBCCT relative doses

X-ray technique	Effective dose (μSv)	Risk of fatal cancer (per million)
Intraoral radiograph (bitewing/periapical)	1 - 8.3	0.02 - 0.6
Anterior maxillary occlusal	8	0.4
Panoramic	3.85 - 30	0.21 - 1.9
Lateral cephalometric radiograph	2-3	0.34 [#]
Cross-sectional tomography (single slice)	1 - 189	1 - 14

- ◆ Dental Panoramic Radiograph = approx 2-5 days background radiation
- ◆ 2 Bitewings = approx 16 hours background radiation

Dose as Multiple of Panoramic Exposures

Technique	Dose as multiple of Panoramic - ICRP ₁₉₉₀	Dose as multiple of Panoramic - ICRP ₂₀₀₅
NewTom3G - Full FOV	7	4
Mercuray - Full FOV 10-100	77	43
Mercuray - Full FOV 15-120	138	80
Mercuray - 9" FOV	44	32
Mercuray - 6" FOV (maxillary)	26	21
I-CAT - Full FOV	11	8
Panoramic*	1	1
maxillo-mandibular CT scan†	333	
maxillary CT scan†	222	

* Ludlow JB, et al. Dentomaxillofacial Radiology 2003;32:229-34

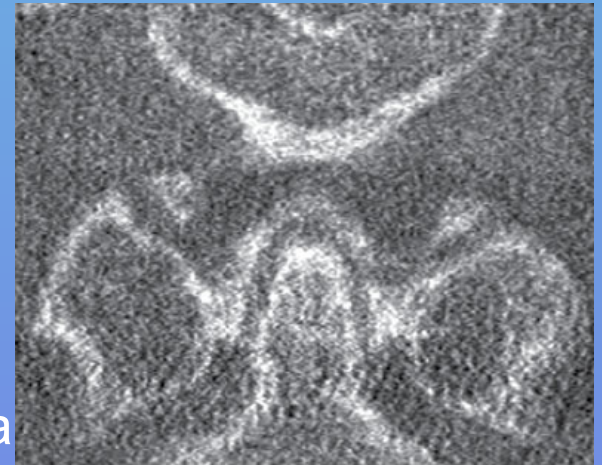
† Ngan DC, et al. Aust Orthod J. 2003;19:67-75

Dosimetry of Cone Beam CT Limited Fields of View

Technique	Effective Dose in $\mu\text{Sv} - \text{ICRP}_{1990} W_t$	Effective Dose in $\mu\text{Sv} - \text{ICRP}_{2007} W_t$	Approximate Dose as multiple of Panoramic - ICRP_{2007}
Full FOV	93	182	9
6 cm Mandible	24	75	4
6 cm Maxilla	10	37	2
6 cm Mandible (HR)	47	149	8
6 cm Maxilla (HR)	19	68	3.5
13 cm Man & Max	40	111	6

CBCT & The Law

- ◆ Large volume Dental Cone Beam CT covers areas outside of the jaws including:
 - posterior and middle cranial fossa
 - orbits
 - middle and inner ear
 - upper and middle cervical vertebrae cervical vertebrae
 - base of skull
- ◆ Dentists have little/no training in interpretation of these areas
- ◆ This imposes a duty upon those who interpret these images to evaluate and report any pathology within the imaged region and take appropriate action



A coronal CT section through the odontoid process, displaying a osteophytic 'cap' that arose from the anterior arch of the atlas (1st cervical vertebra).

CBCT & Incidentalomas

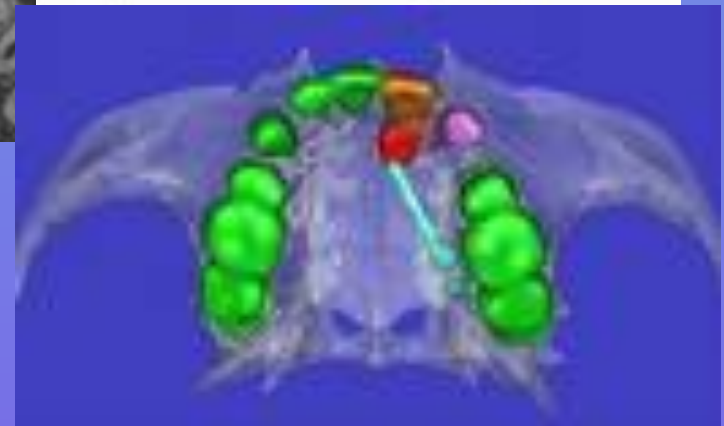
- ◆ Arthritic changes to the cervical vertebrae
- ◆ High jugular bulbs
- ◆ Vascular, salivary and lymphatic calcifications
- ◆ Sinus pathology

CBCT & The Law

- ◆ The most effective way for dentists to minimize their liability is to use the smallest Field of View
- ◆ Reduces the radiation dose to the patient
- ◆ The established standard of care is to use the Field of View that adequately encompasses the area of interest

CBCT canines

- ◆ 60-80% palatal
- ◆ 2x more common females
- ◆ CBCT better at observing resorption in adjacent teeth?



CBCT teeth proximal to IAN canal

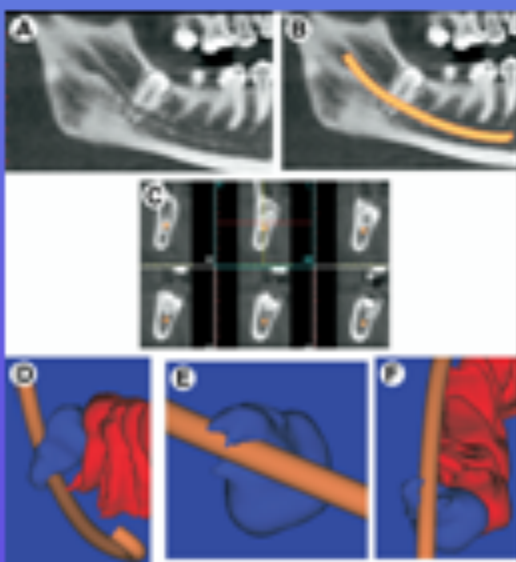
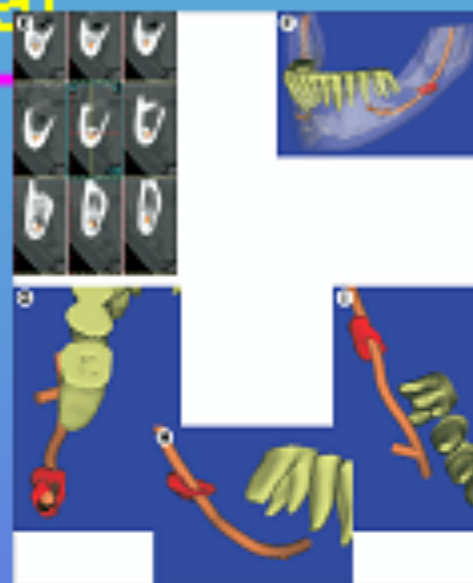
- ◆ Tantanapornkul et al 2007 (161 teeth)
- ◆ Sensitivity Specificity
- ◆ CBCT 93% 77%
- ◆ Panoramic 70% 63%



CBCT teeth proximal to IAN canal

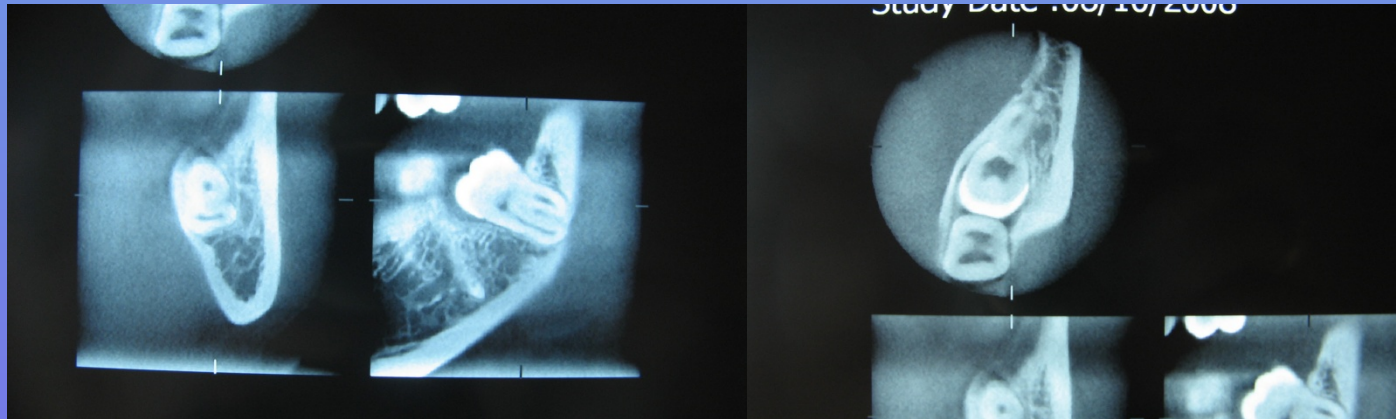
- Tantanapomkul et al 2007 (161 teeth)

	Sensitivity	Specificity
• CBCT	93%	77%
• Panoramic	70%	63%
- Jhamb et al 2009
 - Spiral CT > panoramic but not sig (31)
 - 45% buccal, 39% in line, 10% lingual, 6.4% interradicular
 - 20% more than 6mm from nerve
 - 3% 0-1mm
 - 48% 0 mm with cortication
 - 29% 0 mm with cortical break
- No difference in specificity and sensitivity between panoral and CBCT!
- Ghaeminia H et al Position of the impacted third molar in relation to the mandibular canal. Diagnostic accuracy of cone beam computed tomography compared with panoramic radiography. Int J Oral Maxillofac Surg. 2009 Sep;38(9):964-7



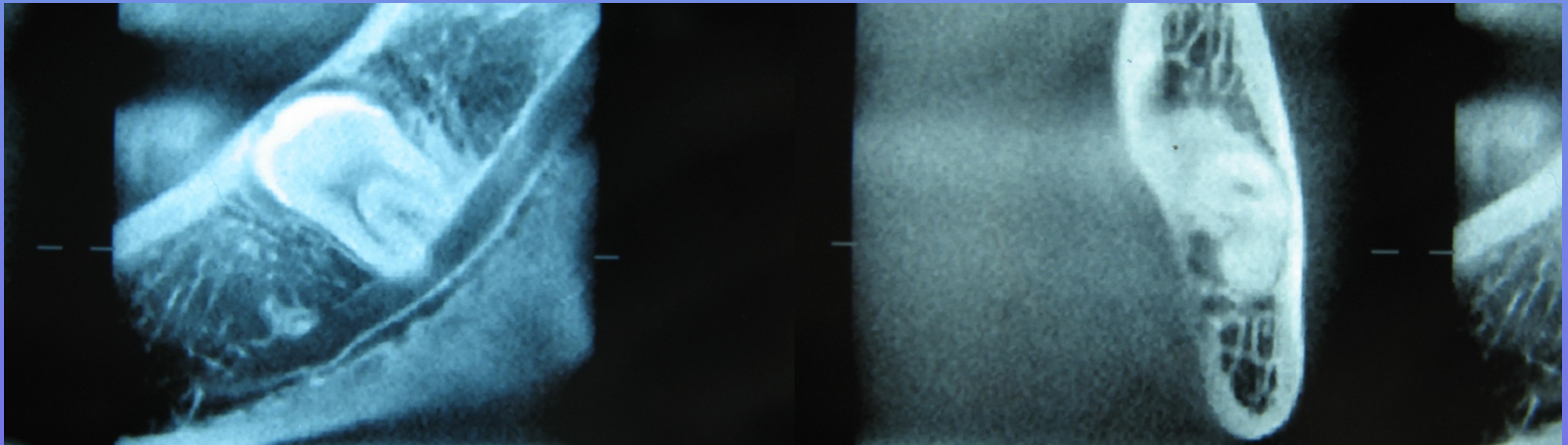
Radiographically localising IAN

- ◆ Localising IAN proximal to lower teeth
- ◆ distant



Radiographically localising IAN

- ◆ Localising IAN proximal to lower teeth
- ◆ Proximal



CBCT

- ◆ May not be more useful than Panoramic radiographs for lower molars

Patient Collapse

- » Diabetics
- » Epileptics
- » Steroids
- » Pts at risk MI
- » HIV
- » Sedation
- » Resus



Diabetics

- ◆ Type 1 insulin dependant
- ◆ Type 2 dietary controlled
 - Record pts last meal
 - Glucometer $>0.4\text{mmol}$
 - If $<0.4\text{mmol}$ glucose drink (50g)
 - If $>10\text{mmol}$ carry in Rx but notify pt -GMP



Epileptics

- ◆ Unlikely to fit when stressed
 - Petit or grand mal?
- ◆ In general no contraindication to Rx
- ◆ Status epilepticus
 - >20mins persistent fits
 - » 100% oxygen
 - » IV access
 - » 10mg diazepam/PR

Prevention MI

- ◆ Pt at risk
- ◆ Unstable angina
- ◆ MI last 6 months
- ◆ Preoperative GTN sublingual spray



HIV Infection

- ◆ Recent diagnosis
- ◆ Viral load HIV RNA 50k/ml high infectivity
- ◆ CD4 count
 - >200cells/ml Rx as normal
 - If < 200cells/ml Rx check blood profile
 - Neutropenia
 - Thrombocytopenia
 - Liver function
 - Coagulation screen

Contraindications to Sedation

PO₂ <95%

- ◆ Liver function decreased
- ◆ Muscle weakness (myaesthesia gravis)
- ◆ Renal failure
- ◆ Drug alcohol abuse / dependancy?
- ◆ Pregnancy
- ◆ Sickle cell trait OK
- ◆ Sickle cell D
 - » 100% O₂ nasal canuli
 - » Lidocaine 2%
 - » Post op abs
 - » Post op paracetamol (not NSAIDS)
 - » Avoid Flumazenil

Steroid cover

- ◆ Normally 24-30mg Cortisol is released every day. In the stress this may increase to 300mg
 - Glucose metabolism
 - Fluid and electrolyte balance
 - Stress response
 - » mobilisation of glucose and fat stores
 - » Maintenance of BP
 - » Permissive effects on pressor amines

Degree of suppression

- ◆ Dose of steroid
- ◆ Duration of treatment
- ◆ The response to stress does not seem to be significantly effected
- ◆ Steroid crisis

Steroid cover

- ◆ Previous recommendations
- ◆ Minimise risk of Hypotensive Collapse
OR Hypoadrenal Crisis
- ◆ Daily dose of prednisolone
- ◆ $\leq 15\text{mg}$ medication taken no extra
- ◆ $>15\text{mg}$ usual medication
 - +25mg hydrocortisone IV or IM at start of surgery

Steroid Crisis

- ◆ Stress of GA / surgery may induce a steroid crisis in patients not able to respond in normal manner
- ◆ Only two cases reported in Maxillofacial literature both under GA
- ◆ No reported cases under LA

Steroid cover

- ◆ No evidence for cover for routine dental procedures or minor oral surgery.
- ◆ Patients should take their normal dose
- ◆ Cover may be required for surgery under taken under GA or if patient has missed their routine steroid dose

Treatment of anticoagulated patients



Anti-platelet drugs

- ◆ Commonly used to prevent morbidity from arterio-vascular disease IHD, PVD and CVA
- ◆ Aspirin (75mg-300mg)
- ◆ Dipyridole
- ◆ Clopidogril 75mg
- ◆ SSRIs also impair platelet aggregation
- ◆ Sodium valproate, an anticonvulsant used in patients with bipolar disorders - high incidence of thrombocytopenia

Bleeding - anticoagulants

- ◆ Coagulation clinic card
- ◆ INR normally maintained between 2-3
- ◆ Check on day of surgery
- ◆ If ≤ 4 routine extractions OK
- ◆ If > 4 no extraction
- ◆ If extensive extractions required ≤ 2
- ◆ If urgent + > 4 need Haematologist referral



Aspirin

- ◆ Irreversible inhibition of cyclooxygenase at 80mg
- ◆ Prevents formation of Thromboxane A₂
- ◆ Action within 1 hour of ingestion
- ◆ Nine days duration for one dose
- ◆ No evidence of significant increased bleeding after oral surgery
- ◆ Do not stop aspirin pre surgery

Other anti-platelet agents

- ◆ Do not alter any anti-platelet drug pre surgery



Anticoagulants

- ◆ Warfarin / Coumadin commonest anticoagulant world wide
- ◆ Vitamin K antagonist reducing the synthesis of factors II VII IX and X of the coagulation cascade

Warfarin / Coumadin

- ◆ 48 hours to take effect
- ◆ 98% protein bound in plasma
 - Metronidazole, erythromycin, miconazole all potentiate
- ◆ Monitored by INR
- ◆ Target range of INR depend on disease
- ◆ Anticoagulation record book

Target international normalised ratios

- ◆ Prevention of thromboembolic disease
- ◆ Indication Target INR range
- ◆ DVT 2-3
- ◆ PE 2-3
- ◆ AF 1.5-2.5
- ◆ Prosthetic heart valve 2.5-4
- ◆ None above INR of 4 if > 4 refer back to haematologist

Complications of Coumarins

- ◆ INR >1-4 increased risk of minor bleeding after surgery
- ◆ Risk of alteration of the INR (clotting) outweighs the risk of bleeding
- ◆ INR should be checked within 72 hours of the procedure

Warfarin does not need to be stopped before primary care dental surgical procedures

- The consensus from reviews on the management of dental patients taking warfarin is that patients requiring dental surgical procedures in primary care and who have an International Normalised Ratio (INR) below 4.0 should continue warfarin therapy without dose adjustment.
- Continuing warfarin during dental surgical procedures may increase the risk of postoperative bleeding requiring intervention.
- Most cases of postoperative bleeding are easily treated with local measures such as packing with a haemostatic dressing, suturing and pressure.
- Stopping warfarin increases the risk of thromboembolic events; the risk of thromboembolism after withdrawal of warfarin therapy outweighs the risk of oral bleeding as bleeding complications, while inconvenient, do not carry the same risks as thromboembolic complications.
- Stopping warfarin is no guarantee that the risk of postoperative bleeding requiring intervention will be eliminated as serious bleeding can occur in non-anticoagulated patients.

Local measures

- ◆ INR<4 continue routine minor oral surgery
- ◆ Adrenaline containing local analgesia
- ◆ Infiltration preferred to ID block
- ◆ Pack with Haemacel / surgical
- ◆ Suture sockets
- ◆ Check for haemostasis
- ◆ Postoperative advice



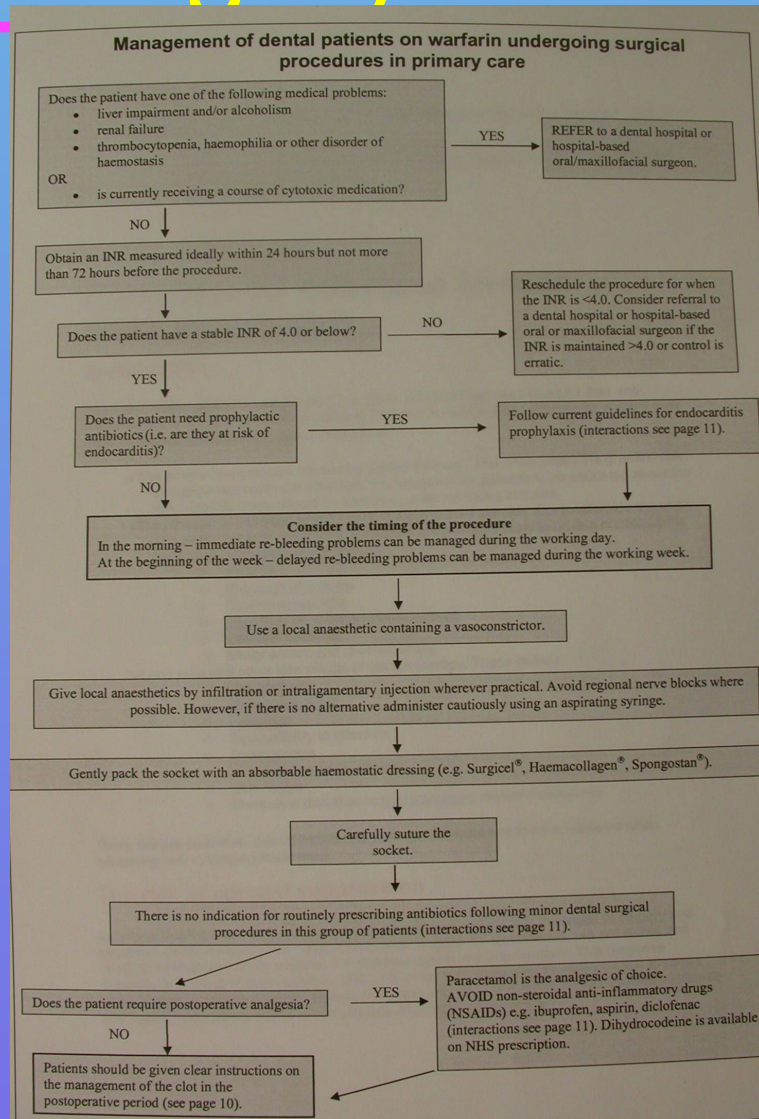
Tranexamic acid mouthwash should not be used routinely in primary dental care

- Tranexamic acid mouthwash in primary dental practice is expensive, difficult to obtain and of no more benefit than other local haemostatic measures.
- When used alone with no local haemostatic dressing, tranexamic acid mouthwash reduces postoperative bleeding compared to placebo mouthwash.
- When used in combination with local haemostatic measures and suturing, tranexamic acid mouthwash provides little additional reduction in postoperative bleeding.

General measures

- ◆ Treat Monday morning
- ◆ Stage multiple extractions
- ◆ Avoid ID blocks
- ◆ Caution on patients with fluctuating INR
- ◆ Do not prescribe NSAIDS

New NICE algorithm



FDA offers warfarin guidelines

- ◆ **By Associated Press | August 17, 2007**
- ◆ WASHINGTON -- Federal health officials are stopping short of recommending genetic tests for patients on the blood-thinner warfarin, even though they have said such screenings could prevent thousands of complications each year.
- ◆ Genetic testing can reveal which patients may require less of the drug and lead doctors to recommend doses closer to the lower end of the scale

Endocarditis Prophylaxis Guidelines

- ◆ NICE draft 2007
- ◆ British Society for antimicrobial Chemotherapy (BSAC 2006)
- ◆ British Cardiac Society (2004)
- ◆ European Cardiac Society
- ◆ American Heart Society (1997)

What is endocarditis?

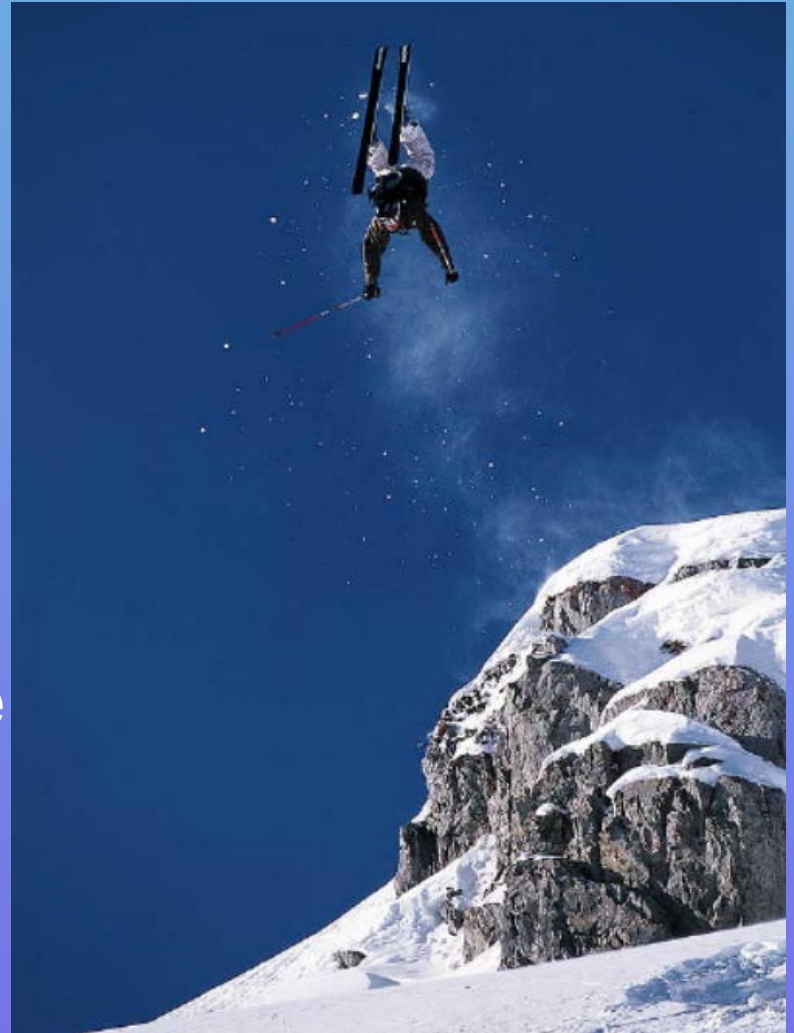
- ◆ Usually bacterial infection
- ◆ 50% of cases are due to streptococcus viridans
- ◆ Lesions consist of clumps of organisms, fibrin and platelets
- ◆ Causing local damage, embolic phenomena and immune complex damage

Endocarditis facts

- ◆ Incidence 10 per 100,000
- ◆ Mortality 20%
- ◆ Incidence after dental Rx 20/million
- ◆ Incidence PenV anaphylaxis 20/million

Symptoms

- ◆ Flu like symptoms
 - Cough
 - Difficulty breathing
 - Headache
 - Arthralgia
 - Oslers nodes
 - Petechial haemorrhage
 - Splinter haemorrhage
 - Finger clubbing



Dental relevance

- ◆ IE occurs despite prophylaxis
- ◆ More likely due to low grade chronic bacteraemia as a result of possessing teeth
- ◆ Bacteraemia during eating and brushing teeth
- ◆ Antibiotic prophylaxis does not eliminate bacteraemia
- ◆ More pts die from anaphylaxis to AB cover than IE (risk PenV anaphylaxis 20/million)
- ◆ No proven link to dental Rx

Current Guidelines NICE

- ◆ AB cover for dental treatment not recommended
- ◆ Patients at risk of IE should maintain high standard of oral health
- ◆ Chlorhexidine mouth wash is not recommended
- ◆ Dentists must warn patients re IE symptoms
- ◆ No AB cover for ENT or O&G

Prevention of patient collapse

- ◆ Cardiopulmonary resuscitation
 - UK 30:2
 - Belgium 15:2
 - USA continuous chest compressions
 - France?



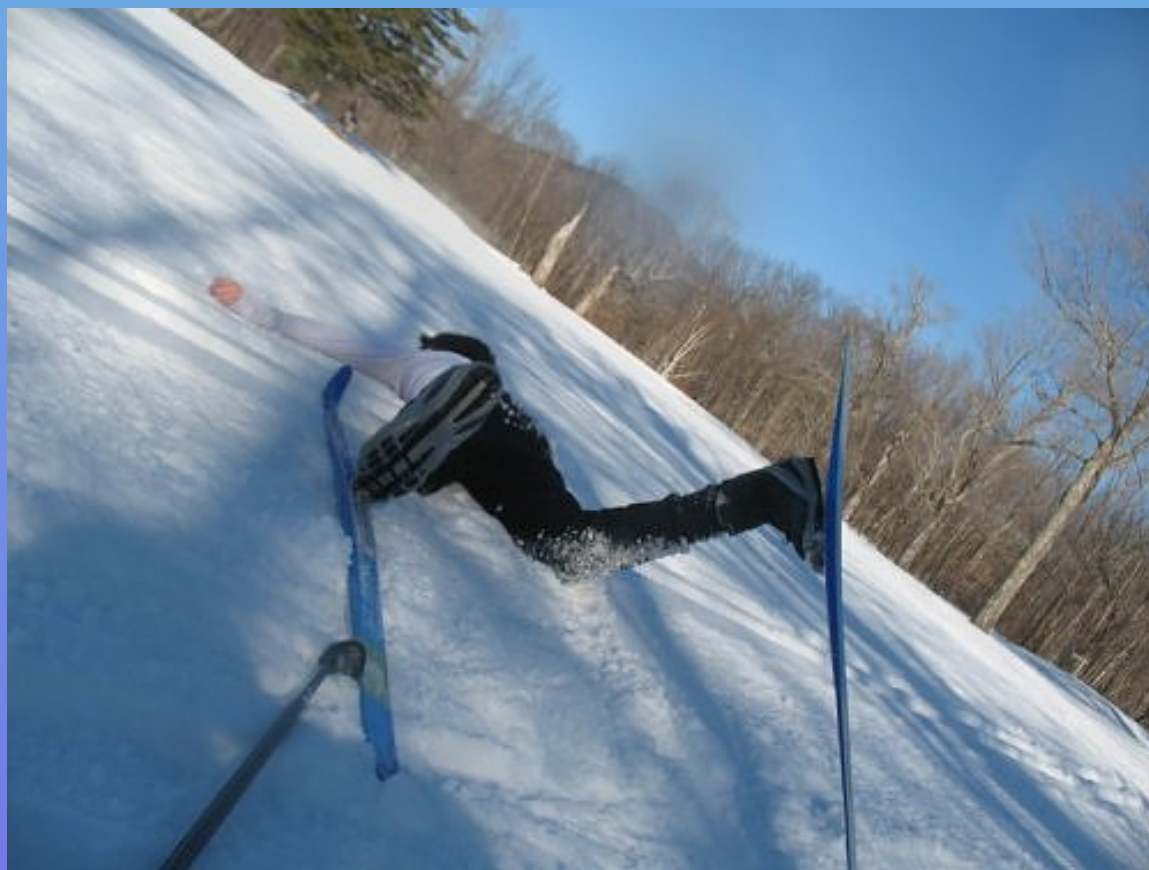
Most efficient?

- ◆ Get the defibrillator there ASAP!
- ◆ Every minute delay = increase 7% mortality

- ◆ Know your boundaries



Thank you



References

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- ◆ J One day surgery 1997
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Le fornet avalanche

- ◆ When you don't stand a chance