PEDIATRICS 430 STUDY REVIEW

Restorative Dentistry for Primary Teeth

Class II Prep and Resto

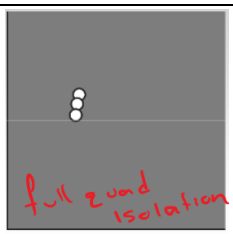
Rubber Dam

- Ensure floss ligature is around the retainer (of course)

Clamps for *E's/2nd primary molars*
- 8A, 1A, 2, 2A, 27

Clamps for *Permanent 6's*
- 14A, 14 -> Need prongs for retention on partially erupted teeth

Punching Holes
- Collect all 3 holes in a straight line to make a "slit" in the rubber dam (no individual holes)
- Isolate **from E-C or from 6-C**



Instrumentation

High Speed **330 Bur**
- Outline Form, Convenience Form, Retentive Form, Resistance Form

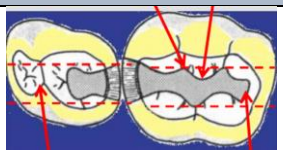
Slow Speed Round #4, or Inverted cone #34
- Caries Removal + Internal bevel of PA line angle

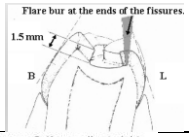
Straight Fissure #169 or Diamond
- Straighten walls of prep

Carvers, Pluggers, Burnishers

Prep

Occlusal Slot



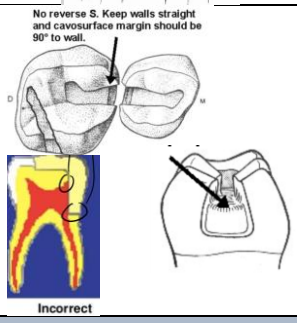


- Extend into pits and fissures and keep in the center of tooth
- 1mm Deep pulpal floor
- **NO reverse S** when extending into the proximal box -> Makes resto prone to fracture

****DON'T cross transverse ridge in *Man*. D's (1st primary molar) -> There is a pulp horn there****
- There is *no transverse ridge for Max D's, so extend across the entire occlusal*

- **Walls should be convergent for amalgam retention and caries removal, except at the end of the fissures -> Lean bur outwards to not leave unsupported enamel**

Proximal Box



- Ensure contact is broken (B, L, G) using tip of the explorer
  - Extend Occlusal slot through the marginal ridge and drop the bur gingivally until the gingival contact is broken
- ~1.5mm deep box, with a 1mm axial depth
- Bevel the pulpal axial line angle to ↑ amalgam bulk

- Prep Gingival Floor JUST below the contact -> If it's too deep the axial depth will be too thin, and if you go too deep axially = pulpal exposure

Resto

Matrix band placement

Tofflemire bands don't work for 1° teeth -> Poor adaptation = ↑ amalgam to carve
- Use gold T-bands:
  1. Pull band as tight as you can and bend the tab to mark the spot
  2. Remove band -> tighten 0.5mm further and replace on tooth snugly
  3. Ensure band extends 1mm above marginal ridge and just below gingival floor
  4. Ensure good adaptation w/ wedges

Packing + Carving Amalgam

- Pack proximal box first -> No voids! Use small packer into the corners
- 3 Increments
- For back to back Class II's Fill the preps simultaneously -> Avoids 1 side bulging into the adjacent box
- Ensure Contact is restored
- Carve w/ Hollenback, T3 and Discoid carvers
- 1° teeth have ↓ anatomy, so you don't have to carve lots in
- Remove Matrix 1st then Wedge

Common reasons for Amalgam Failure

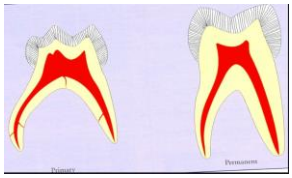
- Occlusal slot too narrow. ↓ bulk
- Marginal failure in proximal box from excess flare of cavosurface
- Recurrent caries if prep is not extended adequately -> Typically gingival floor of proximal box
- Shallow prep and no bevel on pulpal axial line angle = fracture
- Over-extended prep beyond line angles

Differences between Amalgam and Composite

Amalgam	Composite
- 0.5mm into dentin	- 0.5mm into Dentin
- No cavo-surface bevel	- Cavo-surface bevel
- 0.5mm Proximal clearance	- 0.5mm proximal clearance
- No gingival bevel	- Gingival bevel
- Occlusal dovetail	- No occlusal dovetail needed

Anatomic Differences btwn Primary and Permanent Teeth (in relation to Class II's)

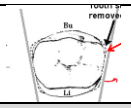
Clinical Characteristics	Difference in Prep compared with permanent teeth	

Thinner enamel + Dentin	- Shallower occlusal and axial preps - Must bevel pulpal axial (PA) line angle for ↑ amalgam bulk/strength	
Pulp Horns closer to DEJ	- Preps must stay shallow -> Risk pulp exposure if too deep	
Large Cervical Bulge	- Prepping the box below the bulge = very narrow gingival floor and possible pulpal exposure -> Keep it above the bulge - Flare of proximal box directly related to narrow occlusal table and is much wider in the cervical region	
Enamel Rods slope occlusally rather than gingivally	- No need to bevel gingival floor (no unsupported enamel rods)	
Broad Proximal Contact	- Proximal box must flare to include the entire contact area and the entire lesion	
D's (1st primary molar) have narrow occlusal table	- Must keep occlusal prep narrow to maintain Buccal Lingual wall thickness -> still needs to be 1/2 - 1/3rd the intercuspal width -> MOD amalgam's typically fail b/c too narrow	
Gingival comes up to proximal contact	- Proximal preps will pretty much all be subgingival -> protect with rubber dam and wedge	

Stainless Steel Crowns

** SSC can be used in permanent teeth that are coming in with developmental abnormalities (Hypocalcification etc)**

- Used as a temp while the tooth becomes fully erupted and gains maximum occlusion -> Then permanent crown can be placed

Indications for SSC	- Gross Rampant caries (interprox caries extending beyond line angles) - Fractured teeth - Failed amalgam Resto's - Hypoplastic enamel (Especially in permanent molars) and other developmental defects - Poor OHE - Difficult behavior management - Following pulpotomy/pulpectomy - Act as abutment for space maintenance - Interim Resto for compromised permanent molars until traditional crown prep can be accomplished
Instrumentation	Tapered Diamond #5858 - Interprox Reduction Football Diamond #5378 - Occlusal Reduction Contouring Pliers - Im sure they do something Crimping Pliers (137 Gordon) - Crimping crown Howe Pliers - Squeezing crown Bite Stick 
Prep	
Occlusal Reduction	- 1.5mm reduction w/ football diamond - Bevel B and L line angles - Round off all line angles
Interproximal Reduction	- Feather Margin > Don't create a ledge! - Taper inwards towards the lingual to create trapezoidal shape - NO B or L prepping! Want to maintain the cervical bulge for retention 
Restoration	
Crown Adaptation	- Choose smallest crown that will fit (and in the appropriate quad) -> Mesial is longer than Distal - Seat from L to B -> Should be 1-1.5mm subg. - Should not rock or displace easily -> an Instrument should be needed to remove - Appropriate occlusal contacts with opposing arch - Can crimp gingival 0.5mm for better adaptation -> Convex side of the crimper inside the crown
Cementation	**Use GIC Luting Cement** - Ensure cement covers all margins - Use bite stick to fully seat crown - Clean excess cement with water spray + Knotted floss interprox.
Reasons for SSC Failure	1. Crown too large for tooth -> May trap 1st perm. Molar from erupting (impaction) - If dentition is crowded, Max. 1st molars are mesially angulated = causes resorption of distal root of 2nd primary molar (Ectopic Eruption)

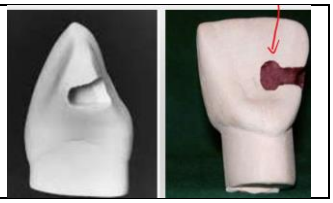
	2. Pulpal necrosis (Over reduction = pulp exposure -> Especially MB on Mandibular D's) 3. Space loss b/c crown was too small and contact not restored 4. Crown worn through from high occlusion -> Can patch small perforations with thick GIC or amalgam 5. Localized gingivitis from excess cement remaining or crown length too long 6. Recurrent caries under crown 7. Loss of SSC from ↓ mechanical retention (ie reducing the MB Bulge)

Modifications to SSC Prep vs Standard Crown Prep

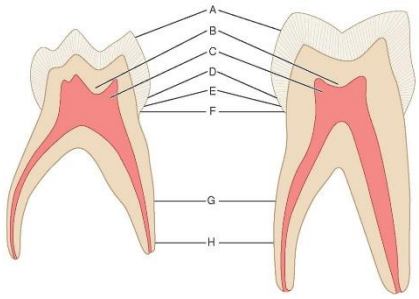
Clinical Characteristics	Differences in Prep compared with Permanent Teeth
Large MB Bulge on Mand. D	- Main source of retention for 3M Stainless Steel Crown -> Don't touch the bulge! - Unitek SSC can be crimped and shaped to ↑ retention around the bulge
Occlusal Height of molars shorter than permanents	- Don't over reduce occlusal -> Crown will extend too far sub-g. - Reduction must maintain occlusal anatomy
Anatomy of Primary Molars = Trapezoid.	Lingual Narrower than buccal - Maintain morphology of tooth by angling proximal cuts towards the lingual
Prefab SSC contact tooth surface w/ feather edge margin	- No finish line! Shoulder or chamfer margins creates a ledge that prevents SSC from fully seating
1st primary molars (D's) have narrow occlusal table	- MOD Amalgams always fail on these -> SSC is way more successful in treating M Caries - Bevel occlusal table after reducing to ensure cusp tips tip back towards center of tooth
Gingival contact comes up to the proximal contacts	- SSC will be slightly sub.g -> Protect with rubber dam and wedges

Class III Canine

Prep	- Parallel Incisive and gingival walls - Extend walls incisal and gingival to the contact point - Axial depth 1-1.5mm - Labial and lingual floors 1.5mm deep - Add dovetail for amalgam (don't need for composite though) - Metal Matrix band + Wedge for composite, or fill as class II for amalgam



Main difference between primary and permanent teeth



A	The enamel cap of primary molars is thinner and has a more consistent depth
B	↑ thickness of dentin is over the pulpal wall at the occlusal fossa of primary molars.
C	The pulpal horns are higher in primary molars, especially the mesial horns, and pulp chambers are proportionately larger.
D	The cervical ridges are more pronounced, especially on the buccal aspect of the first primary molars
E	The enamel rods at the cervical slope occlusally instead of gingivally as in the permanent teeth
F	The primary molars have a markedly constricted neck compared with the permanent molars
G	The roots of the primary teeth are longer and more slender in comparison with crown size than those of the permanent teeth
H	The roots of the primary molars flare out nearer the cervix than do those of the permanent teeth.

Behaviour Management and LA

Behaviour is dependent on 4 things:

1. **Temperament**
2. **Attachment**
3. **Fears**
   a. Dental Fear specifically is influenced by: Past Experience, Parental Fear and Anxiety, Being a red head (Genetic Predisposition)
4. **Cognitive Development**

Behaviour Management Techniques

Tell- Show-Do	Effective for most children (even < 3 years old) to remove anxiety -> stems from not knowing what will happen - Explain actions -> Show a demonstration on someone or something (Puppet or sibling) -> Demonstrate on the child without actually doing it -> Then do it for real

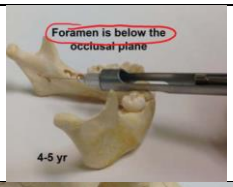
	- Let child touch instruments, triplex, suction, chair controls etc
Voice Control	Alter voice to direct behaviour -> Tone and Volume - Give positive instructions, it doesn't work to tell them "DON'T do that" - Talk gently into the ear of a crying child so they can hear you - Stay calm always
Non-Verbal	ALWAYS make eye contact when facing the patient -> Kneel down and get on the kids level when introducing - Introduce yourself without loupes or a mask on (show the "funny" glasses) - No sudden or unexpected movements - Smile and be happy
Distraction	This is the most common method - Ipads, movies, songs, questions etc - Distraction alters the perception of sensations (↓ pain and discomfort etc)
Positive Reinforcement	Give rewards immediately after good behavior - Thumbs up, smile, stickers, stamps, prizes etc - Be consistent with rewards
Silent Chair Parent	Having the parent in the room can be good or bad - Good middle ground is to have them there but keep them silent (or coach them on what to say or not say)
Restraint	Pedi-Wrap, Papoose Board, or Blanket - Don't really want to use these (traumatic, and kids can still move head and squirm) - If you need these ensure you get parental informed consent first! 
Intra-oral Aids	Mouth Props will be used pretty much all the time for resto's - McKesson bite block - Molt (less bulk and more control over position)  
Pharmacological Aids	Nitrous Oxide/Oxygen Analgesia - Inhalational - Provides mild CNS depression and analgesia  -> Dis kid been blazzzzzzinnnn

Local Anesthesia

Recommended Max Doses

Drug	Max Dose	Max for 15kg Child
Lidocaine 2%	7mg/kg (up to 500mg)	2.9 Cartridges Max
Articaine 4%	7mg/kg (up to 500mg) - Children : 5mg/kg (up to 200mg)	1.04 cartridges
Mepivacaine 3%	6.6mg/kg (up to 400mg)	1.83 Cartridges
Prilocaine 4%	8mg/kg (up to 500mg)	3.75 Cartridges

For children <5 years old:

IAN Block	Lingula is more prominent in children - Insert needle BELOW the occlusal plane to reach the foramen 
Maxillary Infiltrations	Apices of molars are relatively high in the Vestibule -> Probably need to aim higher 

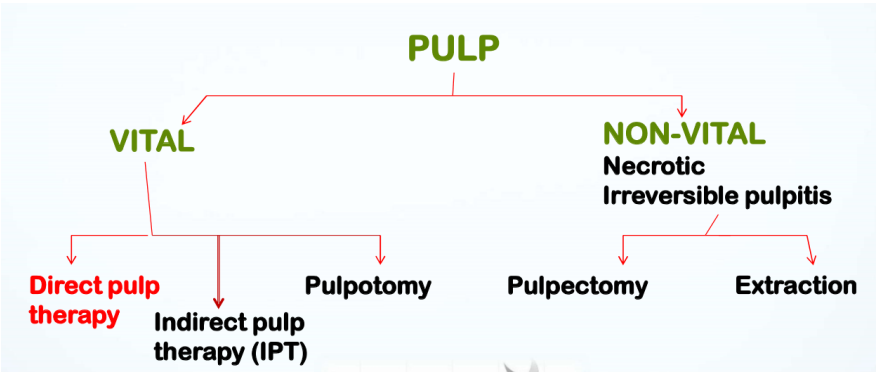
Pediatric Pulp Therapy

Assessing Vitality of the pulp

Assessments	Vitality

	Vital	Non-Vital
Patient/Parent reported S/S	*Pain/Sensitivity* - Solicited: Thermal, Chemical, Mechanical "Only when She eats Ice cream" - Intermittent: Complains on and off	Pain - Spontaneous - Prolonged, Continuous - Nocturnal, "Wakes them up at night" Fever Malaise ↓ appetite
Clinical Signs	Cavity Food gets stuck No Sinus Tract or soft tissue changes	Cavity Food Gets Stuck Mobility (abnormal amounts) Pulp Polyp -> Pulpal hyperplasia grows through cavitated enamel Swelling - Gum Boils, Pimples = Abscess - Cellulitis outside mouth - Possible Sinus Tract **If Abscess is contained -> Antibiotics indicated **If Abscess is draining (sinus tract) -> No Antibiotics indicated 
Diagnostic Tests	*Radiographs*: - Caries into dentin & near pulp - Large Restorations - Intact PDL - Normal Bone at furcation and periapical *Percussion*: - Normal *EPT* - Normal *Thermal Tests* - Normal (< 30 sec) but hypersensitive	*Radiographs*: - Well into dentin/Pulp - Restorations close to pulp - Widened PDL space - Furcation and/or Periapical RL - External Root Resorption - Internal Root Resorption *Percussion*: - Painful *EPT*: - Negative *Thermal Tests*: - > 30sec
Operative Inspection	No excessive bleeding	Excessive bleeding from pulp chamber

So you have figured out the vitality of the pulp…now what?



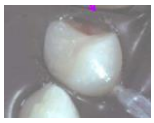
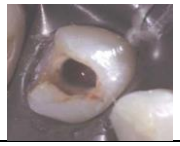
Vital Pulp Therapies

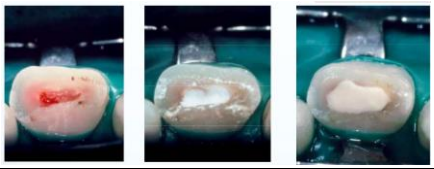
Vital Pulp	
Direct Pulp Capping (primary dentition) ****DON'T DO****	*Indication*: - Healthy pulp exposed during operative procedure (Pinpoint exposure, no bleeding) *What to do*: - Place Calcium Hydroxide over the exposure site and restore the tooth normally? NO! CaOH causes internal root resorption in 1º teeth
Indirect Pulp Treatment (IPT)	*Indications*: - ***Reversible*** Pulp Pathology *What to do*: - Leave a thin layer of stained or soft dentin at the deepest site on the pulpal floor - Remove all carious structure on the lateral walls (ensure complete sealing of tooth) - Place GI liner on the bottom of the prep (Fluoride release helps arrest caries) - Place well sealed resto (SSC if caries extent was large) ***Strong indications to do this instead of pulpotomy -> great success w/ good seal + GI Liner + Contact w/ decay and clean margins*** - *More conservative approach*
Pulpotomy	Looking to maintain tooth in asymptomatic state + Keep supporting bone and tissue healthy *Indications*: - Carious/Iatrogenic pulp exposure

	- Coronal Pulp affected/Infected - *Vital Radicular Pulp Tissue -> <u>This is the main difference from Pulpectomy</u>* *<u>Contraindications</u>*: - Cardiac Conditions requiring endocarditis prophylaxis - Immunosuppressed patients ➔ Be definitive w/ treatment. Don't place anything with an iffy or guarded prognosis with these Pt's

<u>Ideal Material for Pulpotomy</u>:

- Bactericidal
- Harmless to radicular pulp + Surroundings
- Promotes healing of Radicular Pulp
- No interference with physiologic root resorption (as 1^0 teeth exfoliate)
- No Post-op sensitivity
- Completed in 1 visit
- Inexpensive
- Non-toxic to patient and operator
- Stable
- Odorless

Pulpotomy Procedure	
1. Caries Removal	  Clear all remaining caries before removing the caries by the pulp
2. Remove Roof of Pulp Chamber	  Using a fissured bur, remove the pulp chamber roof -> Watch the radiograph so you don't perf! **Make sure you extend your walls to expose all the chamber** 
3. Remove coronal pulp	 Use Spoon excavator
4. Hemostasis	*<u>Is the Blood gushing?</u>* - **Yes**: This is a non-vital tooth….you now need to move to pulpectomy or extraction - **No**: You have vital roots! Apply pressure with a cotton pellet until bleeding stops *<u>Cannot achieve hemostasis? Here are some reasons why:</u>* - Inadequate access -> Inadequate pulp removal, there is still some hiding under overhangs - Insufficient "pressure" - Entire pulp is irreversibly inflamed -> Pulpectomy or extraction - Perforation ☹ ***<u>Ferric Sulphate (Astringodent) can be used in pulpotomy instead of MTA</u>*** - When contacts blood -> Ferric ion-protein complex forms and seals the cut vessels mechanically = Hemostasis 😊 - Be warned though, the hemostatic action might disguise inflammation and make you think its not there
5. Place MTA and seal with IRM	*<u>MTA (Mineral Trioxide Aggregate)</u>* - Stimulates cytokine release from bone cells - Induces Hard Tissue regeneration - Has dentinogenic effect on the pulp (Dentin bridge formation) 

	- Antimicrobial - Superior Sealing Ability 
6. Place Filling/SSC	

A little history lesson about Formocresol

- Used to "fix" the tissues by holding a soaked cotton pellet on pulp stumps for 5 minutes

- When the tissues are fixed, they will appear black

STOP IT'S A TRAP! -> Its potentially toxic and mutagenic (both Pt and Dentist) AND causes Root Resorption

Non-Vital Pulp Therapies

Non-Vital Pulp	
Pulpectomy	Most common on: - 2nd molar (before eruption of 6) -> Want to save tooth before 6's erupt to hold the space - Primary Incisors *Challenges*: - Ribbon-like anatomy of canals in primary molars are tricky to navigate - Must use resorbable material to fill the canal -> has to resorb with tooth as it naturally resorbs over the erupting permanents *Contraindications* - Non-restorable tooth (for after the procedure) - Perforation of pulp chamber - Pathologic root resorption > 1/3rd of the root - Internal Root Resorption *Filler Materials* **a. ZOE (IRM)** - Resistant to foreign body giant cell reactions - Sometimes retained post exfoliation - *NOT* Antimicrobial **b. Iodoform Paste (Kri Paste)** c. **Iodoform and CaOH Paste** (**Vitapex paste**) d. **Endoflas** -> US only
Extraction	NEVER plan an extraction without a space management plan

…Speaking of Space Management

Space Management

Eruption Timing

Sequence is really more important than when the teeth erupt

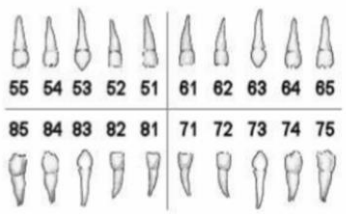
The Basics

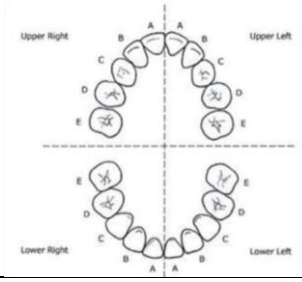
20 Teeth -> 10 Man, 10 Max
- 4 Incisors, 2 Canines, 4 Molars in each arch

1º formation begins 14 Weeks in utero
- Enamel formation is complete on all primary teeth by 12 months

Eruption: Begins at 6ish months -> All completely erupted by 24ish months -> Complete occlusion by 3 years

Numbering/Lettering





Incisor: A
Lateral: B
Canine: C
1st Molar: D
2nd Molar: E

Primary Eruption Sequence

Month	Man. Teeth
6	Centrals
10	Laterals
14	1st Molars
18	Canines
22	2nd Molars

4x4 Rule:
- Every 4 months 4 new teeth erupt (on average) -> This is the quick an easy estimate. See the MI method for an accurate way

Mandibular Teeth usually erupt a few months before the Maxillary

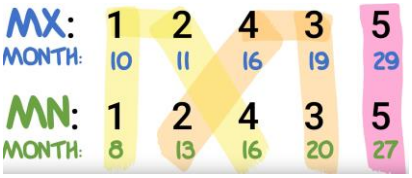
Exfoliation Sequence

Years	Teeth
6-7	Centrals
7-8	Laterals
9-11	1st Molar
9-12	Canine
10-12	2nd Molar

Permanent Teeth

Mandible	Maxilla
6-7yr: 1st molar (6)	6-7yr: 1st molar (6)
6-7 yr: Central (1)	7-8 yr: Central (1)
7-8yr: Lateral (2)	8-9yr: Lateral (2)
9-10yr: Canine (3)	10-11yr: 1st Premolar (4)
10-12yr: 1st Premolar (4)	11-12yr: Canine (3)
11-12yr: 2nd Premolar (5)	10-12yr: 2nd Premolar (5)
11-13 2nd molar (7)	12-13 2nd molar (7)
17-21yr: 3rd Molar (8)	17-21yr: 3rd Molar (8)

MI Method for determining accurate eruption sequence: (not the quick and dirty estimation)



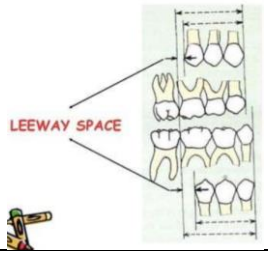
1. Write the sequence of eruption for Mx and Mn, with their corresponding months (Max 10, 11, 16, 19, 29 ; Man 8, 13, 16, 20, 27)
2. Draw your "MI" with 3 colours. Each color is going to represent a "range" to add to your month number (Yellow = +/- 2 ; Orange = +/-3 ; Red = +/-4)
3. Adding the range to each tooth gives us an accurate month range of eruption

MI Explaination Video - https://www.youtube.com/watch?v=zsGDXxJSBJM

Developing Occlusion

Permanent Incisors are way larger than primary ones -> How on earth is there space for this to happen!?

- Primary Dentition is more spaced to begin with (Primate Spacing)
- ↑ Inter-canine distance
- Permanent teeth setting in a more labial location vs primary -> But they erupt lingual to 1º teeth and drift forward

Primate Spacing (Classic Test Q)	↑ interdental space found: - Mesial of Max. Canines - Distal of Mand. Canines  
Leeway Space	Permanent 3-4-5 space is narrower than the 1º C-D-E that they are replacing - This creates ↑ space in the permanent dentition -> Just because 1º might be crowded, doesn't mean permanent will be **Maxillary**: *0.9-1.1mm* per quad **Mandibular**: *1.7-2.4mm* per quad 
Maxillary Diastema Closure	When Permanent Centrals erupt there is usually a diastema (Ugly Duckling phase of early mixed dentition) - When Canines erupt they come in at a different angle from Centrals and Laterals -> Pushes them to upright more and close the diastema - Important to maintain laterals or not do ortho or this correction might get screwed up!

Causes and Consequences of Space Loss

Causes of Space Loss	1. Dental Caries 2. Poorly contoured/inadequate restorations 3. Premature loss of 1º tooth a. Systemic Conditions b. Ectopic eruption (Max. 1st perm. Molar is most commonly ectopic eruption) c. Severe ankylosis (Idiopathic, or Trauma related)
Consequence of Space Loss	1. ↓ arch length and circumference for Permanent teeth 2. Crowding from lost "E" space 3. Ectopic eruption of permanent teeth 4. Alteration of eruption times of underlying teeth - If Primary is lost early = Late eruption of permanent (has more bone to go through) - If Primary lost late = early eruption of permanent ***Speech and Chewing are usually fine***

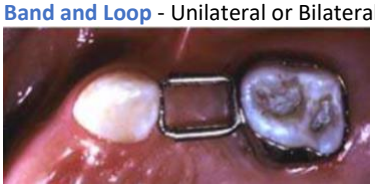
Space Maintainers

When Do we need them?	
Primary Incisors (A, B)	Space loss unlikely -> Especially with Canines present No Maintainer indicated
Primary Canines (C)	Space loss + Midline shift can happen w/ ectopic eruption of lateral incisors (Especially in mandible) - Beyond use of simple space maintainers
Primary 1st Molars (D)	Space Maintainer important -> Especially if 6's have not fully erupted - Unilateral fixed appliance from the E (2nd molar)
Primary 2nd Molar (E)	Space Loss most prominent before Permanent 6's erupt - After Eruption of 6's can get tipping and movement of 6's w/o E's in place **Before Eruption of 6's**: - Distal Shoe - Reverse band and loop - Removeable appliance **After Eruption of 6's**: - Band and Loop - Bilateral space maintainer (Lower Lingual Arch, LLA) -> These need anterior Permanents erupted 1st AND 6's ^ Classic Test Question

Types of Space Maintainers

Unilateral

Band and Loop - Unilateral or Bilateral

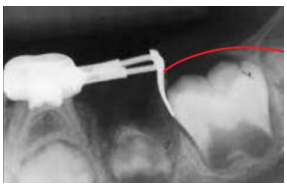


-> Bilateral used until Permanent Incisors erupt, then switch to LLA

Crown and Loop – Unilateral

Occlusal rest is included to prevent tipping or teeth and to prevent wire from impinging on gingiva

Distal Shoe – Unilateral

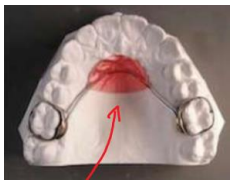


-> Usually applied in the OR
- Careful! Can shift overtime and damage the crown of the erupting permanent.
- Follow ups are required. Cannot rely on bad patients in this procedure

Bilateral

Lower Lingual Holding Arch (LLHA)

Nance Appliance



Transpalatal Arch (TPA)

Indications	Contraindications
- Bilateral loss of D's -> Use E's as abutments (only after all incisors are erupted) - Bilateral loss of E's - Unilateral loss of 1 E (after incisors have erupted)	- Successor teeth erupting w/I 6 months (Root 2/3rds developed, <1mm bone covering) - Inadequate space for successor + Ortho needed anyways - Significant time lapse - Adequate space - Poor compliance

Sequence of Tx (Exam Q)

1. Restore Abutments if needed
2. Fit band to tooth -> Take impression
3. Send to lap to fabricate
4. Extract tooth indicated for removal
5. Cement Appliance in it's place
6. Procedure code in preventative Tx's

Design and Prescription

Please Fabricate LLHA from 36 to 46, Teeth ___ to be extracted

- Use 0.036" (0.9mm) wire. Wire to contact cingula of teeth 31, 41, 42 as drawn on model
- Band sizes #35 (on 36) & #34 (on 46)

Clinical Case 1:

4 Year old with an abscess on 74 requires extraction -> What is the space maintainer of choice?

- Band & Loop from E – C

Clinical Case 2:

5 year old has decay on 54 and the 64 both needing extracting -> What is the space maintainer to use?

- Nance (band on the E)
- OR 2x Band and Loop

Clinical Case 3:

8 year old has bilateral band and loops. At next recall you note that all incisors are present. What do you do next?

- Replace Band and Loops with Lower Lingual Holding Arch (LLHA)

Traumatic Injuries to Primary Teeth

So a child comes in with a traumatic injury… what do you do?

A useful link:

https://dentaltraumaguide.org/dtg-members-frontpage/
Login: Library.orders@ubc.ca
Password: 3gRhpTg2

Take a Hx	***Did the Patient become unconscious?*** - We are concerned here if they are concussed - Signs of concussion: Loss of bladder function, Vomiting *When, where and how did the incident take place?* ***(Big Test Q)*** - Concerned with possible child abuse - If they broke skin on a metal surface, get tested for tetanus *Is there a disturbance in bite?* - Possible jaw fractures *Any other injuries?* - TMJ, Jaw, Head, etc
Clinical Exam	**Examine all soft tissues (Intra and Extra oral):** - Check for any tooth fragments that might be lodged in lips or check **Examine Hard tissues (Skeleton):** - Looking for asymmetries, broken bones etc **Examine Teeth:** - Displacement, Fracture, Mobility **Specific Investigations** - Radiographs (Usually > 1 view) - Endo Testing (Cold Test and Percussion) - Photographic Recordings
Treatment Planning	**Immediate Treatments Needed** - Head Injuries and Lacerations - Avulsions (Sooner you replace the tooth the better) - Alveolar Fractures - Extrusive or Lateral luxations **Treatment needed w/i several hours** - Concussion - Intrusion - Subluxation - Root Fracture - Crown Fracture w/ pulp exposure (w/I 24hrs) **Treatment within a few days** - Crown Fracture w/o pulp exposure

Dental Injuries

Concussion

Injury to tooth supporting structures -> No ↑ mobility though!
- No gingival bleeding


Etiology: A simple bash to the tooth
- Neurovascular supply remains intact
- Most areas the PDL is not damaged
- No Damage to the follicle or permanent tooth bud

Dx:
- Tender to palpation/Percussion
- Pulp Test Normal
- Radiographs normal
- Mobility normal

Tx:
- Nothing

Subluxation

Injury to supporting structures -> ↑ mobility

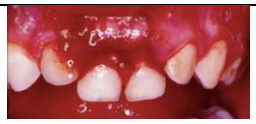
Etiology: A hefty bash to the tooth
- Damage possible to the neurovascular supply
- PDL damage/separation in many areas
- Interstitial bleeding and edema
- No damage to the follicle or permanent tooth bud

Dx:
- ↑ Mobility, but with no displacement of the tooth
- Pain on percussion
- Normal radiographs
- Characteristic bleeding from gingival sulcus

Tx:
- No Tx

Lateral Luxation

Displacement of the tooth in any direction (Other than axially)
- Possibly with fracture of alveolar bone
- Possibly occlusal interference (needs to be reduced properly!)
- Can damage the developing tooth germ

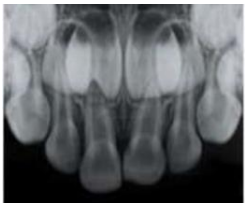



Etiology: A mega bash, the worse bash, terrible bash
- Complete rupture of the PDL and Neurovascular bundle
- Possible damage to the Developing tooth bud (worse with buccal displacement of the crown)

Dx:
- Visually displaced in Palatal or Labial direction
- Non-mobile
- Metallic ankylotic sound on percussion
- ↑ PDL space in radiograph

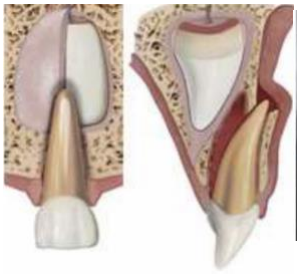
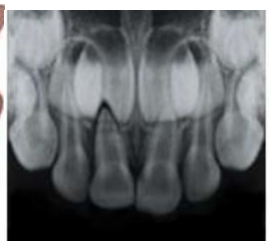
*Permanent tooth typically develops lingual to the Primary tooth -> If the 1° crown is luxated buccally, the apex will be pushed lingually and it will interfere with the permanent tooth bud. BOOOO (This doesn't happen if the crown is luxated lingually though 😊)

Collision with Permanent Tooth Bud

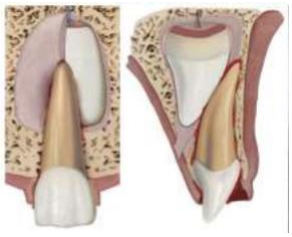



Notice the lack of darkening around the root apex

No Collusion

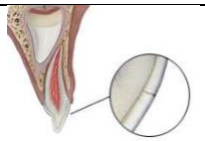



Notice the darkening around the apex

	Tx: ***(Retrusion) = Spontaneous Repositioning:*** if no occlusal interference - Clean the area and let it drift back into place. Follow up: 2-3 weeks, 6-8 weeks, 1 year (***Retrusion) = Reposition:*** Severe occlusal interference, push it back into place ***(Protruded tooth) = Extraction:*** When the displacement is too severe or when crown is dislocated Labially (collision with tooth bud)
Extrusion	Partial Displacement of the tooth from the socket  **Etiology**: A really hefty bash (usually in a more downward direction) - Complete severance of the Neruovascular supply - Severe separation of the PDL - Usually no damage to follicle or permanent tooth bud - Alveolar socket is still intact (May have protrusive or retrusive orientation as well) **Dx**: - Appears elongated - Percussion sensitivity - No response to cold air - ↑ Mobility - ↑ PDL space in radiograph  **Tx**: ***Reposition***: If <3mm Extruded - Clean w/ saline and push back in line (possible splinting) -> Follow – ups: 1-2 weeks, 6-8 weeks, 1 yr ***Extract***: If > 3mm extruded and too mobile, or Patient is not compliant - Give LA, extract w/ foreceps
Intrusion	Displacement of tooth into the alveolar socket - Involves a fracture of the socket (otherwise the tooth would not intrude!) - Can cause damage to the permenent tooth bud (might collide, might not)  **Etiology**: A harsh upward bash - Contusion of the PDL (Squish) and fracture of labial plate at apex - Rupture of neruvascular bundle - Frequent damage to developing follicle **Dx**: - Tooth is visually shorter, might be able to feel the broken labial plate - Non-mobile - When displaced toward the tooth follicle: Apical tip cannot be seen on radiograph, tooth looks elongated - When through labial plate: Apical tip is visualised and tooth appears shorter on radiograph **Tx:** ***Mild Intrusion*** = no Tx, it will re-erupt on its own (Spontaneous reposition) ***Severe Intrusion*** = Affects the perm. Tooth bud -> Extract this bish - Look for color change: Grey, Yellow, Red = non-vital
Avulsion	Tooth is completely displaced out of its socket, SHE GONE  **Dx**: - Tooth is out of the face, this one is easy to Dx **Tx**: - Ideally stick the tooth in “Hanks” medium, but no one has that kicking around…Milk works as a decent alternative - Some people say to keep the tooth in the buccal space, but risk aspiration or swallowing it…which is super not ideal Make sure the tooth is accounted for…if not (or not completely) -> Take a radiograph to see if it is in a soft tissue space

Permament	Primary
Always re-implant!	Never re-implant! - Get Ankylosis of the roots, which prevents the permanent tooth from erupting (or it will erupt in a weird place)

<table>
<tr><td>Enamel Infraction</td><td>Incomplete fracture of the enamel
- No loss of tooth structure

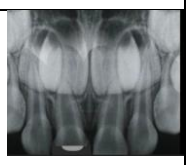
<u>Tx</u>:
- No Tx, she good
    </td></tr>
<tr><td>Enamel Fracture (Uncomplicated)</td><td>Loss of tooth structure -> Restricted to enamel only

<u>Tx</u>:
- Look for the fragment radiographically If there is a soft tissue lesion
- Smooth shart edges
   </td></tr>
<tr><td>Enamel-dentine Fracture (Uncomplicated)</td><td>Loss of tooth structure -> Restricted to enamel and dentin
- No Pulp involved
- No percussion tenderness

<u>Tx</u>:
- Temporary: GIC to seal off the dentin
- Definitive: Remove the GIC and do a nice composite
  </td></tr>
<tr><td>Enamel-Dentin-Pulp Fracture (Complicated)</td><td>Loss of tooth structure -> Involving enamel, dentin, AND pulp ☹
- Must do a pulpotomy or a pulpectomy

<u>Tx</u>:
Pulp Capping- > (pinpoint exposure)
- Clean with CHX/Saline, Disinfect w/ NaOCl, Cover pulp with MTA, apply GIC and restore w/ Composite

Partial Pulpotomy (Cvek Pulpotomy) -> >2mm exposure
- Clean w/ CHX or Saline, Disinfect w/ NaOCl, Pulpotomy 1-2mm deep w/ round diamond, pressure w/ moist cotton pellet until bleeding stops, Seal w/ MTA, Restore w/ GIC and Composite

Extraction
- If the kid is a FRANKL score: Brutal (AKA 1, or 2)
   </td></tr>
<tr><td>Crown-root Fracture w/ or w/o pulp</td><td>Loss of tooth structure -> Including the crown and root of tooth
- Sometimes exposes the pulp

<u>Dx</u>:
- Visible fracture extending SubG.
- Percussion tenderness
- 1 fragment mobile

Tx:
Remove the mobile fragment only, restore if you can (if you can’t you will be extracting)
Extraction
   </td></tr>
<tr><td>Root Fracture</td><td>Fracture of the tooth -> Involves cementum, dentin and pulp
- Confined to the root only (Crown is fine, or can be luxated)

<u>Dx</u>:
- Crown is mobile (or can be removed) and is discolored
- Tender to percussion
- Fracture is radiographically visible in the mid-root or beyond area

<u>Tx</u>:
 
<table><tr><th>Permanent</th><th>Primary</th></tr><tr><td>Splint the tooth (Flexible Splint)</td><td>No Splinting -> This will cause ankylosis = Extraction

If crown is not displaced, can reposition and let it sit</td></tr></table></td></tr>
<tr><td>Alveolar Fracture</td><td>Fracture of alveolar process -> May or may not involve the socket
- Characterized by mobility of several teeth as 1 absolute unit
- Frequently see occlusal intererences

<u>Tx</u>:
Extract teeth
Manual repositioning and flexible splinting for 4 weeks
  </td></tr>
</table>

Traumatic Injury to Permanent Teeth

Take the same Hx's and clinical examinations that you would for primary teeth

Concussion	Injury to tooth supporting structures -> No ↑ mobility though! - No gingival bleeding **Etiology**: A simple bash to the tooth - Neurovascular supply remains intact - Most areas the PDL is not damaged **Dx**: - Tender to palpation/Percussion - Pulp Test Normal Radiographs normal - Mobility normal **Tx**: - Nothing 
Subluxation	Injury to supporting structures -> ↑ mobility **Etiology**: A hefty bash to the tooth - Damage possible to the neurovascular supply - PDL damage/separation in many areas - Interstitial bleeding and edema **Dx**: - ↑ Mobility, but with no displacement of the tooth - Pain on percussion - Normal radiographs - Characteristic bleeding from gingival sulcus  **Tx**: - Flexible splint for 2 weeks, Soft Diet, good OHE (important), Monitor 2, weeks, 4, weeks, 6, months, 1 yr - Splint removal at 2 weeks - Repeat Rads at 6 weeks **Rigid splints used for implants and alveolar fractures -> They cause ankylosis**
Lateral Luxation	Displacement of the tooth in any direction (Other than axially) - Possibly with fraction of alveolar bone - Possibly occlusal interference (needs to be reduced properly!) **Etiology**: A mega bash, the worse bash - Compression of the PDL and rupture of the Neurovascular bundle **Dx**: - Visually displaced in Palatal or Labial direction - Non-mobile - Metallic ankylotic sound on percussion - ↑ PDL space in radiograph  **Tx**: ***Flexible Wire or acrylic splint*** - Splint for 2 weeks, Soft Diet, good OHE (important), Monitor 2, weeks, 4, weeks, 6, months, 1 yr - Splint removal at 2 weeks - Repeat Rads at 6 weeks
Intrusive Luxation	Displacement of tooth into the alveolar socket - Involves a fracture of the socket (otherwise the tooth would not intrude!) **Etiology**: A harsh upward bash - Contusion of the PDL (Squish) and fracture of labial plate at apex - Rupture of neruvascular bundle **Dx**: - Tooth is visually shorter, might be able to feel the broken labial plate - Non-mobile 

Tx:

Orthodontic Extrusion

	Degree of intrusion	Repositioning		
		Spontaneous	Orthodontic	Surgical
OPEN APEX	Up to 7 mm	x		
	More than 7 mm		x	x
CLOSED APEX	Up to 3 mm	x		
	3-7 mm		x	x
	More than 7 mm			x

Extrusive Luxation

Partial Displacement of the tooth from the socket

Etiology: A really hefty bash (usually in a more downard direction)

- Complete severance of the Neruovascular supply
- Severe separation of the PDL
- Alveolar socket is still intact (May have protrusive or retrusive orientation as well)

Dx:

- Appears elongated
- Percussion sensitivity
- No response to cold air
- ↑ Mobility
- ↑ PDL space in radiograph

Tx:

Reposition: If <3mm Extruded

- Clean w/ saline and push back in line with flexible splint possible splinting
- Splint for 2 weeks, Soft Diet, good OHE (important), Monitor 2, weeks, 4, weeks, 6, months, 1 yr
- Splint removal at 2 weeks
- Repeat Rads at 6 weeks

Avulsion

Tooth is completely displaced out of its socket,

Tx:

When in doubt, reimplant tooth and splint

- Bond 2 teeth on either side of reimplanted tooth for ↑ support, and attach using packable composite with flowable ontop

Tooth status	EO dry time	Treatment rendered
IMMATURE TOOTH (open apex)	<60mins	• Replant tooth ASAP • Splint for 2wks • Monitor for Inflam resorption/Ankylosis • Remove nerve, CaOH, if no vascularization • Regen-endo+RCT
IMMATURE TOOTH (open apex)	>60mins	• Remove PDL and nerve • Place CaOH or RCT-replnt • Splint for 4wks • Will ankylose
MATURE TOOTH (closed apex)	<60mins	• Poor prognosis • Can clean tooth and soak in 2%NaF and replant • Flexible splint for 2wks • RCT in 7to10days • Likely ankylosis, replacement resorption OR
MATURE TOOTH (closed apex)	>60mins	• Poor prog • Remove PDL, nerve; place in NaF% • Splint for 4wks • Ankylosis likely

**Prognosis is always guarded. Even if things are looking good, it might fail long term ☹ **

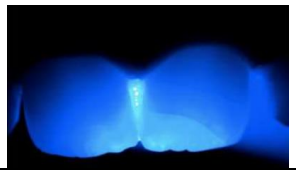
If doing RCT:

- Start with Pulpectomy and place CaOH -> Gives us time to assess how to tooth is going to respond to reimplantation. Do RCT 1-2 months afterwards.

Crazing

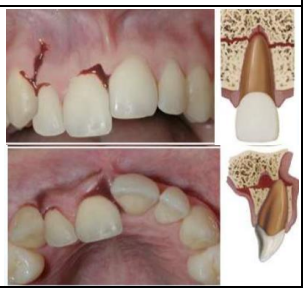
Incomplete fracture of the enamel

- No loss of tooth structure



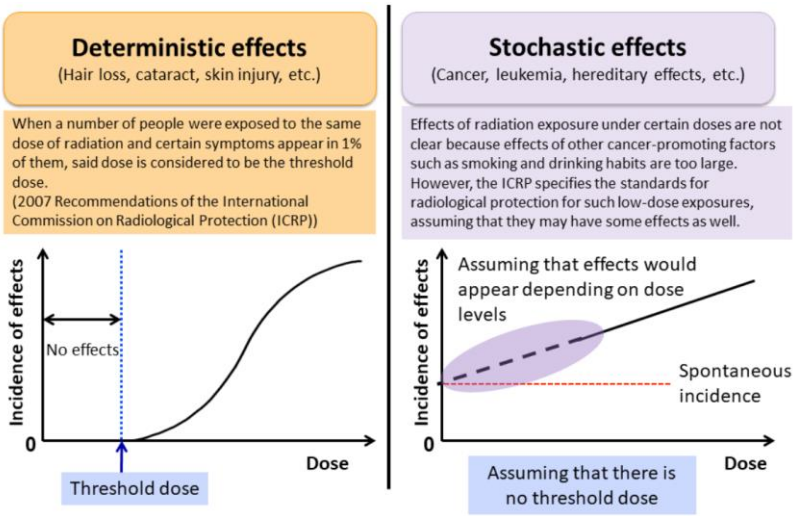
Tx:

- No Tx, she good

Fracture (Uncomplicated)	Loss of tooth structure -> Restricted to enamel +/- Dentin only - Most common in Class II Div 1 cases Tx: ***Enamel Only*** - Look for the fragment radiographically If there is a soft tissue lesion - Smooth shart edges - Resto's frequently pop off enamel only (dentin provides better retention) ***Dentin Involvment*** - If the fragment is found -> Reattach - GIC to seal the Dentin + normal composite buildup ☺ Dentin has better bonding strength vs only enamel 
Fracture (Complicated)	Pulp is exposed ☹  Tx: ***RCT*** ☹ ***Pulp Cap -> if <2mm*** ***If immature (open apex)*** ***Partial Pulpotomy (Cvek Pulpotomy) -> if >2mm*** - Clean w/ CHX or Saline, Disinfect w/ NaOCl, Pulpotomy 1-2mm deep w/ round diamond, pressure w/t moist cotton pellet until bleeding stops, Seal w/ MTA, Restore w/ GIC and Composite - Clinical and radiographic follow-up at 6-8 weeks and 1 year.
Crown-root Fracture	Loss of tooth structure -> Enamel, Dentin, Cementum - Sometimes exposes the pulp  ***Tx***: ***GIC*** for exposed dentin, smooth sharp edges-> Splint loose fragments until later (Possibility for ortho extrusion, gingivectomy, surgical extrustion or decoronation) ***Extraction*** if prognosis is hopeless ***If pulp is exposed***: RCT
Intra-alveolar Fracture (Root Fracture)	Fracture of the Root only -> Involves cementum, dentin and pulp - Further classified as coronal, mid, and apical based on location  Dx: - Crown is mobile (or can be removed) and is dyscolored - Tender to percussion - Fracture is radiographically visible in the mid-root or beyond area Tx: Flexible wire or acrylic splint -> 4weeks (longer for more cervical fractures) - Confirm with radiographs that tooth is repositioned well Monitor pulp status for 1 year -> If necrosis = RCT up to the fracture line
Alveolar Fracture	Fracture of alveolar process -> +/- the socket - Characterized by mobility of several teeth as 1 absolute unitttt - Frequently see occlusal intererences  Tx: Refer to Oral Surgery

Pediatric Radiology

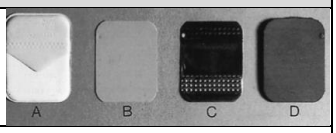
X-Rays cause a Stochastic effect, not a deterministic effect



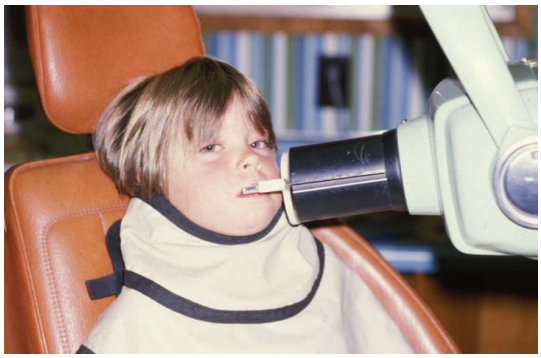
➔ The younger the patient = ↑ risk of potential damage, because the effects are additive over the patients lifetime

Stats for sketchy Parents

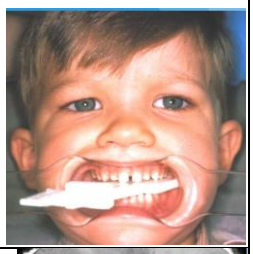
- 2 Dental radiographs = 1/2,000,000 risk of cancer at 50kV D speed and circular collimation -> This is the old way
- 2 Dental Radiographs = 1/20,000,000 risk of cancer with 70kV F speed and rectangular collimation -> This is closer to now

Equipment		
Analog Radiographs (The Past)	Should be at least E speed films -> F would be better - D is too slow and should be avoided Rare earth screen films used for Pans and Ceph to ↓ radiation absorption	
Digital (The Present + Future)	Comparable to F speed films or faster *CCD (Charge Coupled Device)* - Small box like sensory that enables instant images *Complementary Metal Oxide Semiconductors* - Small box like sensors as well that enable instant images *PSP (Phosphor Storage Plates)* - Film like sensor, needs to be scanned to view the image - This is mostly what we use at UBC	

Minimizing Exposure



- Thyroid Collar
- Rectangular Collimation
- Film Holding Devices (RINN)
- ↓ number of exposures by being good
- Fast films or Digital techniques
- QA to ensure equipment is operating up to standard

Common Radiographic Views	
Periapical	*Need 2mm beyond the apex of the tooth visible* **<u>Techniques</u>**: - Paralleling with RINN - Bisecting with Snap-Array (More comfortable for kids, but trickier to setup correct angles)  
Bitewings	*No Overlaps of the teeth* - Want M of the last molar (we can assess the D clinically) to the D of the Canine - Can also use Snap-Array for these to ↑ patient comfort (again we see less tooth because of the bulky bite area preventing the teeth from occluding as closely as the paper way *<u>Permanent Teeth</u>*: #2 film *<u>Mixed</u>*: #1 Film *<u>Primary Teeth</u>*: #0 Film 
Occlusal	#4 film used for these - Orienting the film in a vertical orientation makes it easier to see the mesiodens!   
Panoramic	NOT for diagnosing caries or abnormal development of Perm. Incisors (Agenesis, Supernumerary) NOT indicated for kids <8yrs
Cephalometric	Mostly used by Ortho

Conditions that require Radiographs for Dx and Tx Planning

- Caries
- Large Resto's
- Swelling
- Sinus Tracts
- Trauma
- Non-physiologic Mobility
- Growth and Development
- Unusual tooth color
- Missing Teeth
- Developmental Abnormalities
- Foreign Objects

Table. RECOMMENDATIONS FOR PRESCRIBING DENTAL RADIOGRAPHS[6]

	Patient Age and Dental Developmental Stage			
Type of Encounter	**Child with Primary Dentition** (prior to eruption of first permanent tooth)	**Child with Transitional Dentition** (after eruption of first permanent tooth)	**Adolescent with Permanent Dentition** (prior to eruption of third molars)	**Adult, Dentate or Partially Edentulous**
New Patient* being evaluated for oral diseases.	Individualized radiographic exam consisting of selected periapical/occlusal views and/or posterior bitewings if proximal surfaces cannot be visualized or probed. Patients without evidence of disease and with open proximal contacts may not require a radiographic exam at this time.	Individualized radiographic exam consisting of posterior bitewings with panoramic exam or posterior bitewings and selected periapical images.	Individualized radiographic exam consisting of posterior bitewings with panoramic exam or posterior bitewings and selected periapical images. A full mouth intraoral radiographic exam is preferred when the patient has clinical evidence of generalized oral disease or a history of extensive dental treatment.	
Recall Patient* with clinical caries or at increased risk for caries.**	Posterior bitewing exam at 6-12 month intervals if proximal surfaces cannot be examined visually or with a probe.			Posterior bitewing exam at 6-18 month intervals.
Recall Patient* with no clinical caries and not at increased risk for caries.**	Posterior bitewing exam at 12-24 month intervals if proximal surfaces cannot be examined visually or with a probe.		Posterior bitewing exam at 18-36 month intervals.	Posterior bitewing exam at 24-36 month intervals.
Patient (New and Recall) for monitoring of dentofacial growth and development, and/or assessment of dental/skeletal relationships.	Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring of dentofacial growth and development or assessmentof dental and skeletal relationships.		Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring of dentofacial growth and development, or assessment of dental and skeletal relationships. Panoramic or periapical exam to assess developing third molars.	Usually not indicated for monitoring of growth and development. Clinical judgment as to the need for and type of radiographic image for evaluation of dental and skeletal relationships.
Patient with other circumstances including, but not limited to, proposed or existing implants, other dental and craniofacial pathoses, restorative/endodontic needs, treated periodontal disease and caries remineralization.	Clinical judgment as to need for and type of radiographic images for evaluation and/or monitoring in these conditions.			

- Every 12 months evaluate if they need updated BW's or not generally
    - This can be 6 months if they are high caries risk, or 18 months if they are low and you are chill
- Take a Pan when the 1st permanent molars come in