EPIDEMIOLOGY and DENTAL INDICES

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DDM 3
Epidemiology

- Gk, “epidemios” meaning prevalence
  - terms *epi* = upon, among
  - *demos* = people, district
  - *logos* = study, word, discourse
- Study of distribution and determinants of disease
  - factors affecting the health and illness of populations, and serves as the foundation and logic of interventions made in the interest of public health and preventive medicine.
PREVALENCE

• Indicate what proportion of a given population is affected by a condition at a given point in time
• Expressed as percentage of population (0-100%)
• Ex:
  ▫ 1000 students in Sept. 1992, 200 of which had gingivitis
  ▫ \( P = \frac{\text{cases}}{\text{population}} \times 100\% \)
    \[ = \frac{200}{1000} \times 100\% = 20\% \]
INCIDENCE

• Number of cases that will occur within a population during a specified time period
• Expressed as a rate (cases per population per time)
• Ex:
  ▫ Annual death rate: 60 people in a city of 300,000 died of oral cancer on 1992
  ▫ IR = cases/person-time (2 deaths per 10,000 in year 1992)
MORTALITY

• the condition of being mortal, or susceptible to death
• Mortality rate
  ▫ a measure of the number of deaths in a given population
MORBIDITY

• Can refer to:
  ▫ the state of poor health (from Latin *morbidus*: sick, unhealthy)
  ▫ the degree or severity of a health condition
  ▫ the prevalence of a health condition: the *total* number of cases in a particular population at a particular point in time
  ▫ the incidence of a disease: the number of *new* cases in a particular population during a particular period
Types of Epidemiology

1. Observational
   1. Descriptive epidemiology
   2. Analytical epidemiology
      1. Prospective cohort studies
      2. Case control studies
      3. Retrospective follow-up studies
2. Experimental epidemiology
Descriptive Epidemiology

- Data only describe the distribution of a condition in a population and no specific hypothesis is tested.
- Used to aid in conceptualization and quantification of disease status of community.
Analytical Epidemiology

- Data collection and analysis are designed to answer a particular question
- Most often used in studies to determine the etiology of a disease
- May attempt to establish that a causal relationship exists between a factor and a disease
- 3 types:
  - Prospective cohort studies
  - Case control studies
  - Retrospective follow-up studies
3 types of Analytical epidemiology:

1. **Prospective cohort studies**
   - Closest to experimental research
   - Conducted on general population followed through time to see w/c members develop the diseases/outcomes

1. **Case control studies**
   - Conducted using population that has a disease & a matching population that does not

1. **Retrospective follow-up studies**
   - Used to evaluate the effect that specific exposure has on a population
Experimental Epidemiology

- Clinical trial to test efficacy of a preventive-control agent or treatment procedure in humans
- Used primarily in intervention studies
Uses of Epidemiology

1. Describing the normal biologic process
2. Understanding actual history of diseases
3. Revealing distribution of disease
4. Identifying determinants of disease
5. Testing hypotheses for disease prevention and control
6. Planning and evaluating health care services
**Dental Indices**

**INDEX**

- numerical value describing the relative status of a population, on a graduated scale, with a definite upper and lower limits, designed to permit and facilitate comparison with other population, classified by the same criteria and methods
DENTAL INDICES

- Objective mathematical description of a dental disease or condition based on carefully determined criteria under specified circumstances
- Calibration – method of bringing examiners to unified diagnostic technique & product
Ideal properties of an index:

- Clarity, simplicity & objectivity
- Reliability (give same result each time it is applied)
- Quantification
- Sensitivity
- Acceptability
- Validity (accurately reflects extent/degree of disease present)

2 types of index:

- Reversible Index – measures cumulative conditions that can be reversed from diseases to healthy
  
  Eg: Gingivitis Index

- Irreversible Index – measures cumulative conditions that cannot be reversed
  
  Eg: Caries index
Types of Dental Indices

1. Dental Caries
   1) DMFT (Decayed, missing, filled teeth)
   1) DMFS (Decayed, missing, filled surfaces)

2. Periodontal diseases
   1) CPITN (Community periodontal index of treatment needs)
   2) PI (Periodontal index)
   3) PDI (Periodontal disease index)
   4) PMA (Papillary, marginal, attached gingiva index)
   5) GI (Gingival index)

3. Oral hygiene
   1) OHI-S (Oral hygiene index - simplified)
   2) PHP (Personal hygiene performance)

4. Malocclusion
   1) Angles’s classification
   2) Malalignment index
   3) HLD (Handicapping labio-lingual deviations)
   4) TPI (Treatment priority index)
   5) OI (occlusal index)
   6) IOTN (Index of orthodontic treatment need)
   7) PAR (Peer assessment rating)
   8) ICON (Index of complexity, outcome & need)
   9) DAI (Dental aesthetic index)

4. Fluorosis
   1) Dean’s fluorois index
   2) TSIF (Tooth surface index of fluorosis)
   3) TF (Thylstrup-Fejerskov index)
   4) FRI (Fluorosis rick index)
   5) DDE (Developmental defects of dental enamel index)
DENTAL CARIES INDEX

CARIES – progressive microbial disease of the calcified tissues of the erupted teeth, characterized by dimineralization of inorganic portions & destruction of organic subs. of tooth

• CARIES INDICES:
 1. DMF Index : by Klien, Palmer & Knutson (1938)
 3. Deciduous Caries Index : by Grubbel (1944)
Dental Caries

1. DMFT (Decayed, missing, filled teeth)
   - Used to measure number of teeth affected by caries in adult population
   - ADMINISTRATION: intraoral exam with mirror & explorer
   - DMF score for one individual range from 0 – 32.
   - Mean DMF for a group can be fractional values.

2. DMFS (Decayed, missing, filled surfaces)
   - Used to measure surfaces affected by dental caries in adult population

* In primary dentition:
1. defs (Decayed, extracted, filled surfaces)
2. deft (Decayed, extracted, filled teeth)
Diagnostic Criteria for Caries

- Caries is recorded as present when a lesion in a pit & fissure, or on smooth tooth surface, has a detectably softened floor, undermined enamel or softened wall.
- Anglo-Saxon: when explorer catches after insertion, softness at base of area, opacity adjacent to area, softened enamel adjacent to area scraped away by explorer.
- European:
  - Class 1 - minute black line at base of fissure
  - Class 2 – white zone along margins of fissure dark in transmitted light
  - Class 3 – smallest perceptible break in continuity of enamel
  - Class 4 - large cavity more than 3mm wide
Limitations of DMF / dmf index:

- Exact intensity of caries is not known.
- In mixed dentition, there is doubt between mutual exfoliation & exfoliation due to caries.
- This index does not tell about root caries.
- In cases of filling, it may be due to prophylactic odontotomy or due to caries.
Root Caries Index

- First described by Banting & colleagues (1980)
- Given by Katz (1980) only used in Canada
- **CRITERIA:**
  - Discrete, well-defined & discolored soft area
  - Explorer enters easily & displays some resistance to withdrawal.
  - Lesion located either at CEJ or wholly on root surface.
  - Restored root lesions are contoured only if it is obvious that lesion originated at CEJ or confined to root caries completely.
- **Formula:**
  \[
  \text{Root Caries Index} = \frac{\text{Root surfaces} = \text{decayed+filled teeth}}{\text{Root surfaces} = \text{decayed+filled} + \text{sound teeth}} \times 100
  \]
PERIODONTAL INDICES

Types:
1. Priodontal Disease Index : by Ramfjord (1959)
2. Periodontal Index : by Russell (1956)
PDI (Periodontal Disease Index)

- Purpose: to assess prevalence & severity of gingivitis & periodontitis & show periodontal status of an individual or a group
- can be used as a guide in assessing the need for treatment and for evaluation of the results following treatment
- Teeth examined: 

<table>
<thead>
<tr>
<th></th>
<th>6</th>
<th>1</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
0 – no gingival inflammation
1 – mild to moderate inflammation, not extending to tooth surface
2 – mild to moderate inflammation, extending to all surfaces
3 – severe type of gingivitis, swelling, edema, ulceration & spontaneous bleeding
4 – presence of periodontal pocket less than 3 mm depth CEJ to base of pocket
5 - presence of periodontal pocket (3-6 mm)
6 - presence of periodontal pocket deeper than 6mm cemento enamel

$$PDI = \text{sum of scores of all 6 teeth} \div \text{number of teeth examined}$$
PI (Russell’s Periodontal index)

- **Purpose:**
  - To assess & score periodontal status of population in epidemiologic studies
  - Best known for diagnosis & recording of periodontal diseases (gingival tissues around each tooth is scored numerically acc. to clinical condition)
- Composite index bec. it records both reversible changes due to gingivitis & more destructive & presumably irreversible changes brought by deeper periodontal diseases
- **ADMINISTRATION:** all teeth present are examined with periodontal probe & scored; an average score is obtained
<table>
<thead>
<tr>
<th>Scores &amp; Criteria</th>
<th>Negative</th>
<th>1 Very mild</th>
<th>2 Mild</th>
<th>6 Early</th>
<th>8 Advanced</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Neither overt nor inflammation in investing tissues nor loss of fxn due to destruction of supporting tissues</td>
<td>Overt area of inflammation in free gingiva, but does not circumscribe the tooth</td>
<td>Gingivitis inflammation completely circumscribes tooth but no apparent break in epithelial attachment</td>
<td>With pocket formation; broken epithelial attachment; No interference w/ normal mastication, tooth id firm &amp; has not drifted</td>
<td>Destruction with loss of masticatory fxn; Loose tooth, drifted, may sound dull on percussion or may be deppressible in its socket</td>
</tr>
<tr>
<td></td>
<td>Radiographic appearance is essentially normal</td>
<td></td>
<td></td>
<td>Horizontal periodontal bone loss involving up to ½ the length of root</td>
<td>Advanced bone loss more than ½ length of root or definite infrabony pocket w/ widening PL; root resorption or rarefaction at apex</td>
</tr>
</tbody>
</table>
### GRADING

<table>
<thead>
<tr>
<th>Scores (1956)</th>
<th>Modified (1967)</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 0.2</td>
<td>0.0 – 0.2</td>
<td>Clinically normal tissue</td>
<td>Reversible</td>
</tr>
<tr>
<td>0.1 – 1.0</td>
<td>0.3 – 0.9</td>
<td>Gingivitis</td>
<td>Reversible</td>
</tr>
<tr>
<td>0.5 – 1.6</td>
<td>1.0 – 1.6</td>
<td>Incipient destructive periodontal disease</td>
<td>Reversible</td>
</tr>
<tr>
<td>1.6 – 5.0</td>
<td>1.6 – 5.0</td>
<td>Established destructive disease</td>
<td>Irreversible</td>
</tr>
<tr>
<td>4.0 – 8.0</td>
<td>5.0 – 8.0</td>
<td>Terminal periodontal disease</td>
<td>Irreversible</td>
</tr>
</tbody>
</table>

**Periodontal Index = \[
\frac{\text{Total Scores}}{\text{No. of teeth examined}}
\]**
CPITN (Community periodontal index of treatment needs)

- Developed by joint FDI/WHO working group
- ADMINISTRATION: CPITN-E probe used to examine 10 index teeth in 6 segments of mouth; graded scored converted to 4-point tx needs scale
- Probing pressure: 20 gsm

2 types of CPITN Probes:
1. Epidemiological Probe
   - Probe with black band markings from 3.5 – 5.5 mm & 0.5 mm diameter ball at its tip
1. Clinical Probe
   - Probe with black band marking 3.5 – 5.5 mm to 8.5 - 11.5 mm
   - Ball assists in feeling subgingival calculus & prevent it from being pushed through inflammatory tissue at base of pocket
CPITN – E Probe

Periodontal probe
## CPITN Indicators

1. Presence or absence of gingival bleeding
2. Supra or subgingival calculus
3. Periodontal pockets
   1. Shallow (4 – 5mm)
   2. Deep (6mm or more)

## INDEX TEETH

- Adults (over 20 y/o)
  - 17, 16, 11, 26, 27, 37, 36, 31, 46, 47
- Young (up to 19 y/o)
  - 16, 11, 26, 36, 31, 46

<table>
<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Healthy gingiva</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Bleeding on probing</td>
<td>Improvement of personal oral hygiene</td>
</tr>
<tr>
<td>2</td>
<td>Calculus felt during probing but all black area of probe visible</td>
<td>Improvement of personal oral hygiene + Scaling</td>
</tr>
<tr>
<td>3</td>
<td>Periodontal pocket 4 – 5mm</td>
<td>Improvement of personal oral hygiene + Scaling</td>
</tr>
<tr>
<td>4</td>
<td>Periodontal pocket 6mm or more</td>
<td>Improvement of personal oral hygiene + Scaling + complex treatment</td>
</tr>
</tbody>
</table>
GINGIVAL INDICES

1. PMA Index : by Schour & Massler (1948)
2. Gingival Component of PDI : by Ramfjord (1959)
3. Gingival Index : by Loe & Silness (1963)

Gingival Bleeding Indices:

1. Sulcus Bleeding Index : by Mazor (1958)
2. Papillary Bleeding Index : by Muhlemann (1977)
3. Bleeding Point Index : by Lenox & Kopezyk (1973)
5. Gingival Bleeding Index : by Ainamo & Bay (1975)
PMA (Papillary, Margical, Attached Gingiva) Index

- Based on concept that extent of inflammation serves as an indicator of severity of condition
- An index used for recording the prevalence and severity of gingivitis in schoolchildren by noting and scoring three areas:
  - gingival papillae (P)
  - buccal or labial gingival margin (M)
  - attached gingiva (A)
Criteria & Scoring

0 – Absence of gingival inflammation
1 – Presence of gingival inflammation

Teeth recorded: 10 anterior teeth (max & mand)

<table>
<thead>
<tr>
<th>Papillary</th>
<th>Marginal</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 4</td>
<td>1- 2</td>
<td>Mild</td>
</tr>
<tr>
<td>4 – 8</td>
<td>2 -4</td>
<td>Moderate</td>
</tr>
<tr>
<td>More than 9</td>
<td>More than 4</td>
<td>Severe</td>
</tr>
</tbody>
</table>
Gingival Component of PDI Ramfjord

- Teeth examined: 6 1 4
  - Criteria:
    - 0 – Absence of inflammation
    - 1 – mild to moderate inflammatory gingival changes not extending all around the tooth
    - 2 – mild to moderate severe gingivitis extending all around the tooth
    - 3 – severe gingivitis characterized by marked redness tendency to bleed & ulceration
- PDI = sum of scores of all 6 teeth
  number of teeth examined
Gingival Index

- Most frequently used index of gingivitis at present time
- Scoring surfaces: mesiofacial, marginal, distofacial, lingual
- Teeth considered:

<table>
<thead>
<tr>
<th>6</th>
<th>2</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
Disadvantages

• Distinguished clearly between those with little or no gingivitis
• Difficult to tell whether it discriminates adequately between middle ranges of condition
• Difference between score of 0 and 1, 1 and 2 often difficult to judge
• Insufficiently sensitive in determining initial stages of gingivitis

CRITERIA:

0 – normal gingiva
1 – mild inflammation: slight changes in color, slight edema, no bleeding on probing
2 – moderate inflammation: redness, edema, glazing, bleeding on probing
3 – severe inflammation: marked redness, edema, ulceration, tendency to spontaneous bleeding

SCORING:

0.1 – 1.0 = mild gingivitis
1.0 – 2.0 = moderate gingivitis
2.0 – 3.0 = severe gingivitis
Gingival Bleeding Indices

SULCUS BLEEDING INDEX

- Assess papillae & marginal gingival units & added bleeding on probing as indication of gingivitis
- SBI = average of all scores
- Criteria:
  0 – no inflam, no bleeding on probing
  1 – bleeding from gingival sulcus on gentle probing, tissue otherwise appears normal
  2 – bleeding on probing, change in color due to inflam
  3 – bleeding on probing, change in color & slight edema
  4 – bleeding on probing, change in color & obvious edema
  5 – bleeding on probing & spontaneous bleeding color change & marked edema w/ or w/o ulceration
Gingival Bleeding Indices

PAPILLARY BLEEDING INDEX

- CRITERIA:
  0 – no bleeding
  1 – bleeding some seconds after probing
  2 – bleeding immediately after probing
  3 – bleeding on probing spreading towards marginal gingiva

BLEEDING POINT INDEX

- Assess px oral hygiene performance, presence or absence of gingival bleeding interproximally and on facial & lingual surfaces of each tooth
- Periodontal probe is drawn horizontally through gingival crevice & examined for bleeding after 30 secs
Gingival Bleeding Indices

INTERDENTAL BLEEDING INDEX

- Diamond shaped toothpick made of soft pliable wood to stimulate interproximal gingival tissue
- Wooden cleaner is inserted in interdental area 4x & bleeding w/in 15 secs

GINGIVAL BLEEDING INDEX

- Used to assess px’s progress in plaque control
- Presence or absence of gingival bleeding determined by gentle probing of gingival crevice w/ perio probe
- POSITIVE: Appearance of bleeding w/in 10 secs
ORAL HYGIENE INDICES

TYPES:

1. Epidemiological studies (prevalence)
   a. OHI (S) : by Green & Vermillion (1964)
   b. Ramfjord Calculus Index (Calculus component of PDI)

2. Incidence Studies
   a. Calculus Surface Index (CSI) : by Ennever (1961)
   b. Volpe & Manhold Index (VMI) or probe method of calculus assessment (1961)
   c. Marginal Line Calculus Index (MCLI): by Muhlemann & Villa (1967)
Oral Hygiene

1) OHI-S (Oral hygiene index – simplified)
   ▫ Popular index by Greene & Vermillion (1960), simplified (1964)
   ▫ Set forth a simple method for quantifying amount of plaque (Debris Index) & calculus (calculus index), which are added to obtain a single score
   ▫ Well-defined criteria for both tooth selection & scoring make it an index determined fairly rapidly & consistently

INDEX TEETH:

\[
\begin{array}{c|c|c}
6 & 1 & 6 \\
6 & 1 & 6 \\
\end{array}
\]
DEBRIS INDEX

DEBRIS - soft foreign matter loosely attached to teeth, consist of mucin, bacteria & food, varies in color from greyish white to green or orange.

Scores & Criteria:
0 – no soft debris
1 – soft debris covering less than 1/3 of exposed tooth surface or presence of extrinsic stains regardless of tooth surface covered or both
2 – soft debris covering more than 1/3 & less than 2/3 of exposed tooth surface
3 – soft debris covering more than 2/3 of exposed tooth surface

Debris Index
= Total debris scores of all surfaces
no. of surfaces examined

Interpretation of Debris Index:
0.0 - 0.6 Good
0.7 – 1.8 Fair
1.9 – 3.0 Poor
**CALCULUS INDEX**

**CALCULUS** - adherent calcified mass, consist of mineralized bacterial plaque

- **Types of Calculus:**
  - **SUPRAGINGIVAL CALCULUS**
    - WHITE TO YELLOWISH BROWN IN COLOR
    - CORONAL TO FREE GINGIVAL MARGIN
  - **SUBGINGIVAL CALCULUS**
    - LIGHT BROWN TO BLACK IN COLOR
    - APICAL TO FREE GINGIVAL MARGIN

- **Scores & Criteria:**
  0 – no calculus
  1 – supragingival calculus covering less than 1/3 of exposed tooth surface
  2 – supragingival calculus covering more than 1/3 but less than 2/3 of exposed tooth surface or individual isolated flakes of subgingival calculus or both
  3 – supragingival calculus covering more than 2/3 of exposed tooth surface; subgingival continuous band of calculus around neck of tooth or both
Calculus Index = Total scores no. of surfaces

OHIS = Debris Index + calculus Index

Oral Hygiene Status:

<table>
<thead>
<tr>
<th>Status</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good</td>
<td>0.0 - 1.2</td>
</tr>
<tr>
<td>Fair</td>
<td>1.3 – 3.0</td>
</tr>
<tr>
<td>Poor</td>
<td>3.1 – 6.0</td>
</tr>
</tbody>
</table>
Ramfjord Calculus Index / Calculus Component

- One component of PDI of Ramfjord index
- Teeth recorded:

```
  6  1  4
  4  1  6
```

- Scores & Criteria
  0 – no calculus
  1 – supragingival calculus approximately 1mm in width at cervical area
  2 – moderate supragingival calculus and/or subgingival calculus
  3 – abundant supra & subgingival calculus
- Calculus score per person = total score
  no. of teeth examined
Incidence Studies

• Calculus surface index
  ▫ 4 surfaces of anterior teeth (0 – absence, 1 – presence)

• VMI / probe method of calculus assessment
  ▫ Evaluation of supragingival calculus using graduated probe to measure vertical extent of deposition of calculus on lingual surfaces of 6 mand ant teeth in mm in 3 planes (gingival, distal, mesial)

• MCL Index
  ▫ Used for determination of calculus accumulation w/in period of 1-2 weeks; scoring is given in percent
  ▫ Lingual surface of 4 mand incisor teeth
Malocclusion

• Difficult entity to define because individuals & cultures vary widely in perceptions of what constitutes a malocclusion problem

• Angles’s classification
  ▫ Use of tx planning but of no use in epidemiology

1) Malalignment index
2) HLD (Handicapping labio-lingual deviations)
3) TPI (Treatment priority index)
4) OI (occlusal index)
5) IOTN (Index of orthodontic treatment need)
6) PAR (Peer assessment rating)
7) ICON (Index of complexity, outcome and need)
8) DAI (Dental aesthetic index)
The Basis of Angle’s classification are:

- most indicative irregularity
- maxillary first permanent molar as the key to occlusion as it seldom varies from its position.
- curvatures and the size of the line of occlusion is unique in each individual.

Drawbacks of Angle’s classification are:

- 1st permanent molars are not fixed points in skull anatomy
- Skeletal & dental malocclusion are not differentiated from each other
- Classification of malocclusion is based on anteroposterior relationship only
- Classification does not give an idea of vertical & transverse plane malposition
- Individual tooth malposition cannot be visualized
- When 1st molars are extracted, this cannot be applied
- Severity of malocclusion cannot be judged
- Classification does not differentiate true & pseudo Class 3
Classes of Malocclusion acc. to E.H Angle:

Class 1:
- Lower dental arch is in normal relation to upper arch
- Mesiobuccal cusp of upper 1\textsuperscript{st} permanent molar occludes w/ mesiobuccal groove of lower 1\textsuperscript{st} permanent molar
- Cases of irregularity of individual teeth & does not involve malrelation of dental arches
- 60 – 70% of malocclusion
Classes of Malocclusion acc. to E.H Angle:

Class 2:

- distobuccal cusp of upper 1st permanent molar occludes w/ mesiobuccal groove of lower 1st permanent molar

- Division 1: all upper incisors are proclined (35-30%)
- Division 2: upper central incisors show lingual inclination & lateral incisors overlap central incisors (5-10%)

- SUBDIVISIONS: when class 2 is present on one side only & class 1 is present on the other side
Classes of Malocclusion acc. to E.H Angle:

Class 3:

- lower 1\textsuperscript{st} permanent molar lies mesial to upper 1\textsuperscript{st} permanent molar by a premolar width or cuspal width

- 5 – 10% incidence

- SUBDIVISIONS: unilateral class 3 & opposite side is class 1
(A), Normal occlusion; (B), Class I malocclusion; (C), Class II malocclusion; (D), Class III malocclusion. Note the position of the mesial cusp of the maxillary molar relative to the mandibular molar in each type of occlusion.
Modification of Angle’s Classification

- **LISCHER’S CLASSIFICATION**
  - Neutro-occlusion – normal relation of dental arches; synonymous to Angle’s Class 1
  - Disto-occlusion – used to describe all cases of post normal occlusion; synonymous Angle’s Class 2
  - Mesio-occlusion – used to describe all cases of pre normal occlusion; synonymous to Angle’s Class 3

- Use of suffix “VERSION” to describe wrong position of individual teeth: linguoverversion, labioversion, mesioversion, distoverversion, infraverversion, supraverversion, torsiverversion (twisted), perversion (impacted), transiverversion (wrong sequential order)
Dewey’s Classification

- Dewey’s modified Angle’s Class 1:
  - Type I – crowded anterior teeth
  - Type II – maxillary incisors in labioversion
  - Type III – anterior cross bite
  - Type IV – posterior cross bite
  - Type V – molars are in mesioversion due to shifting following loss of tooth anterior to 1st molars, all other teeth are in normal relationship

- No modification on Angle’s Class 2

- Modifications for Class 3:
  - Type I – normal incisal overlapping present
  - Type II – edge to edge incisor relationship
  - Type III - incisors are in cross bite
Simon’s Classification

- Based on 3-dimensional relationship of dental arches to 3 anthropological planes:
  - FRANKFORT HORIZONTAL PLANE
  - MEDIAN SAGITTAL PLANE
  - ORBITAL PLANE

- Drawbacks:
  - maxillary cuspid does not usually coincide with orbital plane
  - Its application to clinical situation is not practical
• FRANKFORT HORIZONTAL PLANE
  ▫ Imaginary plane passing from lower most border of bony orbit to upper border of ext. auditory meatus
  ▫ ATTRACTION - teeth placed closer to this plane
  ▫ ABSTRACTION – teeth placed away from this plane

• MEDIAN SAGITTAL PLANE
  ▫ Perpendicular to Frankfort plane
  ▫ CONTRACTION – teeth placed closer to this plane
  ▫ DISTRACTION – teeth placed away from this plane

• ORBITAL PLANE
  ▫ Perpendicular plane dropped at right angle to Frankfort plane from lowermost border of bony orbit
  ▫ Used to describe anteroposterior relationship of teeth
  ▫ PROTRACTION – teeth placed forward to this plane
  ▫ RETRACTION – teeth placed behind this plane
Ackermann - Profit Classification System

• Most recent of all classification based on Venn diagrams w/c has 9 groups
• Readily adaptable to computer processing & would require only numerical scale in programming for automated data retrieval
Ackermann - Profit Classification of Malocclusion

Group 1 INTRA-ARCH ALIGNMENT (symmetry, ideal, crowding, spacing)

Group 2 PROFILE (convex, straight, concave, ant/post divergent)

Group 3 Transverse crossbite (buccal, palatal, unilateral, bilateral, dental, skeletal)

Group 4 Sagittal (Class 1, class 2 div. 1 & 2, class 3, dental, skeletal)

Group 5 Vertical
- Deep bite < comp., incomp
- Openbite < ant, posterior
- Collapsed bite, skeletal, dental

Group 6 Trans sagittal

Group 7 Sagitto

Group 8 Vertico transverse
<table>
<thead>
<tr>
<th><strong>Incisor Classification</strong></th>
<th><strong>Bennet’s Classification</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• British standard classification of incisor relationship</td>
<td>• Introduced by Sir Norman Bennet</td>
</tr>
<tr>
<td>• Class 1 – lower incisal edges occludes with or lie immediately below cingulum plateau of upper incisor</td>
<td>• Classification of abnormalities of occlusion based on their etiology</td>
</tr>
<tr>
<td>• Class 2 – lower incisal edges lie posterior to cingulum plateau of upper incisor</td>
<td>• Class 1 – abnormal position of one or more teeth due to local causes</td>
</tr>
<tr>
<td>• Class 3 – lower incisal edges lie anterior to cingulum plateau of upper incisors; overjet is reduced or reversed</td>
<td>• Class 2 – abnormal formation of a part or a whole of either arch due to developmental defects of bone</td>
</tr>
<tr>
<td></td>
<td>• Class 3 – abnormal relationship bet upper &amp; lower arches &amp; bet either arches &amp; facial contours &amp; correlate abnormal formulation of either arch</td>
</tr>
</tbody>
</table>
Ballard’s Classification

- Used to know various skeletal relationships
- Used more accurately at chair side

- **Skeletal Class 1**
  - Normal inclination of teeth & dental base relationship
  - Upward projections of axis of lower incisors would pass through crowns of upper incisors

- **Skeletal Class 2**
  - Lower apical base is relatively too far back
  - Lower incisor axis would pass palatal to upper incisors crowns

- **Skeletal Class 3**
  - Lower apical base is placed relatively too forward
  - Projections of lower incisors axis would pass labial to upper incisors
Other malocclusion index:

1) Malalignment index
   ▫ Assess rotation & tooth displacement

2) HLD (Handicapping labio-lingual deviations)
   ▫ Assess tx needs for a public orthodontic program in New York State

2) TPI (Treatment priority index)
   ▫ Assess tx needs, once used in a national study of orthodontic needs of children

4) OI (occlusal index)
   ▫ Measures 9 characteristics: dental age, molar relation, overbite, overjet, post. crossbite, post. open bite, tooth displacement, midline relations & missing permanent max. incisors
5) **IOTN (Index of orthodontic treatment need)**
   - Combines both functional (5-graded) & esthetic (10-point ordinal scale) measure

5) **PAR (Peer assessment rating)**
   - Designed to capture all occlusal anomalies found in malocclusion in a single score

5) **ICON (Index of complexity, outcome and need)**
   - Correlate well with px’s perceptions of esthetics, speech, function & need for tx

5) **DAI (Dental aesthetic index)**
   - Makes objective measurements of esthetic acceptability according to social norm, with esthetic component measured on a 10-point ordinal scale
Fluorosis

- Hypomineralization of dental enamel caused by excessive ingestion of fluoride during tooth development
- Appear as ugly brown stain with pitting and flaking of friable enamel

1) Dean’s fluorosis index
2) TSIF (Tooth surface index of fluorosis)
3) TF (Thylstrup-Fejerskov index)
4) FRI (Fluorosis rick index)
5) DDE (Developmental defects of dental enamel index)
Normal: 0.7 - 1.2 ppm fluoride in water

<table>
<thead>
<tr>
<th>Consumption</th>
<th>Duration</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 ppm – 6 ppm</td>
<td>5 – 10 years</td>
<td>Mild fluorosis</td>
</tr>
<tr>
<td>4 ppm – 6 ppm</td>
<td>More than 10 years</td>
<td>Severe dental fluorosis &amp; mild skeletal fluorosis</td>
</tr>
<tr>
<td>More than 8 ppm</td>
<td>5 – 10 years</td>
<td>Severe dental &amp; skeletal fluorosis</td>
</tr>
</tbody>
</table>
1) Dean’s fluorosis index

- Set criteria for categorizing dental fluorosis on a 7-point ordinal scale (normal to severe)

**CRITERIA:**

0 – normal, white, smooth, shiny, translucent colored enamel
1 – questionable, not normal
2 – very mild or faint white lesions on enamel w/c are extending not more than ¼ of tooth surface
3 – mild more than ¼ or not more than ½ of tooth surface
4 – moderate along w/ white lesions, brown stains, simple line
5 – severe, extensive brown stains on all teeth, slight pitting on enamel surface; severe hypoplastic tooth, brown pitting
• Statistical weight are:
  0 – normal 0
  1 – questionable 0.5
  2 – very mild 1.0
  3 – mild 2.0
  4 – moderate 3.0
  5 – severe 4.0

• Community Fluorosis Index
  = no. of individuals X statistical weights
  total no. of individuals examined

PUBLIC HEALTH SIGNIFICANCE

0.0 – 0.4    Negative
0.4 – 0.6    Borderline
0.6 – 1.0    Slight
1.2 – 2.0    Medium
2.0 – 3.0    Marked
3.0 – 4.0    Very marked
Fluorosis

2) TSIF (Tooth surface index of fluorosis)
   ▫ Ascribes a score on a scale of 0-7 to each tooth surface in the mouth

3) TF (Thylstrup-Fejerskov Index)
   ▫ Relate index scores to histologic features of affected enamel
   ▫ Most sensitive of existing indexes
   ▫ Requires only one surface per tooth because fluorosis affects all tooth surfaces equally
4) **FRI (Fluorosis risk index)**
   - Designed for use in analytic studies that seek to identify risk factors for fluorosis
   - Recognizes that the risk of fluorosis is related to fluoride exposure at particular stages of dentition development

4) **DDE (Developmental defects of dental enamel index)**
   - Avoid need to diagnose fluorosis before recording enamel opacities
   - Characteristics of enamel opacities: area affected, shape of lesion, demarcation, color, teeth affected, gross hypoplasia & detection
References:

- Jong’s Community Dentistry, pp. 141 – 155.
- Textbook of Community Dentistry, pp. 146-186.
- en.wikipedia.org/epidemiology
- www.medal.org
- Answer.com
- Images.google.com