**\*Periodontology \* Dr. Nichola \* Lecture #4**  
🡪**What’s the definition of Epidemiology ?!:**it is a Greek word, which means observations upon people .   
  
🡪**How we can utilize epidemiology ?:**Last lecture we talked about Epidemiology of Periodontal Diseases, and knew the meaning of Epidemiology , and its importance. Also we talked about methods of collecting data and type of studies (cross sectional, longitudinal …).

Today we are going to learn and study the **tools** used to collect the data (examine   
 subjects), and the criteria of these **tools = (Indices)**.   
 We have tools to study:  
 1. simple diseases and  
 2. much complicated diseases ☺  
  
**\*\*Example:**

The device or (tool) that is used to measure the normal value of blood pressure called “**probe وحدة قياس**” .   
A patient with **normal** blood pressure his reading is (130/80) :  
 🡪 if it were 135 or even 70 it will be normal (within acceptable ranges)  
 🡪 if diastolic were 70 its normal, and some people can live with that.   
 🡪 The minimum is 80 and maximum is 130 as readings.   
  
🡪But, **how do we know the normal blood pressure?**   
On this scale, if the blood pressure was > 130, the patient is **prone** to hypertension and needs a medical attention.  
less than 60 and below is a hypotensive patient .  
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\*Note: **Russell** (1966), who is one of the pioneers in Periodontitis

* **Definition of index by Russel in 1966**, is:  
  - numerical value(1,2,3…), describing the relative status of a population on graduated scale **with definite upper and lower limits**, which is designed to permit and facilitate comparisons with other populations classified by same criteria and methods.   
  In other meaning, it’s used to measure the disease with it’s **stage** . And we use the same indices (same principle=scales) to check **gingivitis** and **periodontitis**.
* **Gingivitis** is the **simplest** form of periodontal diseases, If left untreated, it will transfer from gingivitis to periodontitis.
* **Periodontitis:** two stages:  
   1. one with bone resorption and   
   2. one without bone resorption☺
* **Can we start with gingivitis on scale ?** NO we should start with ZERO ☺
* **What zero indicate in any disease ?!:**- HEALTH   
  - determine the existence of disease “absence and presence of disease”☺ .
* Then we let the bacteria to be deposited on teeth and gingiva that can be indicated by sign and symptoms that will initiatethe disease **before** it reaches the oral manifestations .

for example: sign and symptom of Gingivitis :   
1. Bleeding   
2. redness   
3. swelling ☺  
 **so the first one of signs and symptom is bleeding** ☺

1: **bleeding**   
2: present or absence of **etiological factor**(plaque)   
\*\* if number 1 is present with etiological factor will give the **disease “gingivitis”** but if   
 ***left untreated*** will transfer to periodontitis   
3: **periodontitis**   
4: if 3 ***left untreated*** , deeper sulcus, then there will be **bone resorption scores** ranges   
 from 0 to 4 .   
  
\*\*So indices have lower and upper limits reflect the stages of the disease between   
 population, and in case of gingivitis, the scale is 0 “loweat limit” – 4 “highest limit”

AGAIN ☺: translate those meanings by the **probe**:   
 🡪0 : health,   
 🡪1 : simple gingivitis,   
 🡪2: **established** gingivitis (gingivitis without calculus, ineffective restorations and so   
 on): simplest form  
 🡪3: periodontitis without bone resorption,   
 🡪4:  periodontitis with bone resorption.

\*\*Based upon the direction in which the scores can **fluctuate**, Indices are classified as   
 either: - **Reversible** or **Irreversible**

* **Caries are reversible or irreversible ?!** irreversible ,when the decays on enamel and little pit on dentine we can’t say its reversible

Also The Dr. talked about (DMFT) 🡪 Decayed Missing Filled Teeth index in order to clarify this classification. So, caries + missing in teeth are Irreversible changes.

* But in **Reversible**:   
  - everything will come to normal after treatment or removing the cause.   
  - Like in Acute Exacerbation of Bronchitis, after taking the proper medications and   
   after few weeks everything will be back to normal.  
  - in relation to Periodontology: Gingivitis is caused by bacterial **plaque**.   
   # So, when the patient has these deposits of plaque, he will have **slight bleeding**   
   and **redness** after 3-4 days.   
   # Then **slight swelling** will be observed after one week.   
   # After 2 weeks the patient will have **marked** bleeding, marked redness, and   
   marked swelling.
* After giving the patient the oral hygiene instructions and doing a professional scaling, all these conditions (redness/swelling/bleeding) won’t be seen after 3-4 days.
* So reversible indices 🡪 to reverse the disease back into healthy status, such as **gingivitis**.
* Example for the Irreversible: Bone loss on Maxilla or Mandible won’t be reversed even if we made a good scaling.

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🡪 **Depending on the *extent* to which areas of oral cavity are measured, indices can   
 be classified as either:**

1. **full mouth scoring**:   
   - measure entire patient periodontium and dentition.   
   - Example: In relation to dentistry; our **batch** is 147 students, the dr. can examine the   
    whole batch teeth and check the present of plaque for each tooth 32 with 4   
    surfaces ( mesial , distal , labial and lingual ) but this is so tiring and time   
    consuming

In relation to whole **university** students (35,000),  we have another way to examine   
 the whole students; by examination a **representative sample** of their teeth. Which called   
 as:

1. **simplified (partial mouth scoring)**:   
    - only a representative sample of dental apparatus (6 teeth only) and examine the   
    plaque on them to give us an **idea** about the patient’s **oral hygiene status**.   
    - Since we can’t do full mouth always, then they used a simplified Index.

🡪 the scientists used representative teeth which are:   
 - 2,4,6 (upper)  
 - 6,4,2 (lower)

And they are called **Ramfjord teeth.**

* **why these teeth specifically?:**The 6 teeth represent (one upper ,one lower ,anterior , posterior ,Single rooted/ multi rooted + located near Stensen’s duct and Wharton’s duct and exposed to light).   
  SO These 6 teeth represent the anatomical and chronological variations.
* **N OTE**6 teeth with 4 surfaces will give a **general** picture and reflect the status of patient oral hygiene not as a full mouth scoring which give a **copy paste** detailed picture of a patient case ☺

Everything has its own criteria; beauty, intelligence, good student and his grades,…  The same thing is applied on periodontal indices  
  
  
**🡪 Ideally an index including its scoring criteria should possess the following   
 properties: (V.important)**

1. **Clarity , simplicity & objectivity ,the examiner should be reasonably easy to apply so as not to lose time in examination field:**

Meanings by the probe: 0 à health, 1 à simple gingivitis, 2à established gingivitis (gingivitis without calculus, ineffective restorations and so on), 3à periodontitis without bone resorption, 4à  periodontitis with bone resorption.

The **criteria** of any index is been red from 0 – 1 or 0 – 5 or 0 – 10 must be easy to remember (for any scale) and easy to apply. If it was complicated it will be time wasting, looking to the papers and what each number mean. The criteria should correspond the level of **simplicity** of the object.

1. **Acceptiblity, the use of index shouldn’t be painful or demeaning. The subject respects the integrity of patient.**

When I would examine the patient, I shouldn’t insult his integrity, he is a human, despite that he is illiterate, dirty clothed, this should not mean anything to the doctor, you should respect his integrity, the index should be acceptable to the patient and to me. ( الاداه المستخدمه يجب ان لا تسبب تحقير للاخر )

1. **Validity, the index must measure what it is intended for it to be used or to measure, it should correspond with clinical stages of disease under at each point (reflect true disease situation).**

The index to be used in periodontitis and gingivitis examination can be used everywhere. I can’t give you a perio. Probe and let you examine the gingiva of the patient and give me the result, sure there are certain calibration criteria to validate this examination. You hear about the term (bleeding on probing); if you take the probe and force it toward the gingiva and bleeding occurs, the reason behind this bleeding is the applied force not a rupture in the gingival cells. If you take the probe and just make gentle touches on the gingiva not provoke, not rupture because the use of under power. There are compromise between the excessive and under pressure this is called **calibration** : what I intend to measure, and any one measure results almost be the same. That is what we call probability in statistics.

1. **Quantifiability,(تحويل الحاله برقم ) Should be amenable to statistical analysis. So as the status of a group can be expressed by a distribution, Mean & Median, or the other statistical measures.  Anything else is a waste of time** ☺

Example : **Tooth** score from 0 to 3, we examine the **plaque** formation labial:  
 🡪 no plaque so stage 0   
 🡪 mesial littlepit so stage 1   
 🡪 distally more 2   
 🡪 Palataly abundant plaque 3   
**\*\*total 6 upon 4 = 1.5** ☺

**for single tooth**= Total scores / 4 (no. of surfaces)  
**for individual**= Total scores / 24 (no. of surfaces since we have 6 Ramfjord teeth \* 4 surfaces=24) ☺

* **We have two ways to measure:**   
  1. **descriptive**;   
   - the index use is amenable to statistical analysis,   
   - if we get 90% of the class have carries

1. **mean and median**; when the doctor put our marks at the end of the year he takes the highest 5 marks and the lowest 5 ones and divide them by the sum à giving the mean (2/3 of the must class take).

The same is applied on our indices, they must have numerical order, when they get summed, then divided by the overall sum , the mean and percentage.

5- **Realability : the index should be able to measure consistently at different   
 subjects and at different times**

-intra examiner

-**interexaminer:**In order the result of examination to be correct, CALIBERATION must be achieved   
🡪 Calibration is what assures that the scale and certain programmed measurements of the tool (ex: blood pressure device) is accurate and there is no change in lowest and highest values  
  
🡪 inter-caliberation: in case if examination will be done by 2 students, they must decide   
 between themselves that the percent of compatibility of results among certain group of   
 people must be 90% or 100%, **before** examination is done **universally** ,this is known   
 as inter-Calibration

6**- Sensitivity: the index must be able to eddicts small shifts reasonable at each   
 side:**   
 if the result of the index rises from 0 🡪 1 = Bleeding, from 1🡪2 = redness  
 if we treat the patient from 1 to 0, this is simple shift at either side  
   
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**🡪 Classification and Characteristics of Indices:**

**1) Gingival Index (GI):** Papillary, Marginal, Attached gingiva.  
**2) Periodontal Index:** Subgingival. Note: pocketing can occur without bone loss.  
**3) Oral Hygiene Index:** The amount of debris and plaque deposited on teeth.  
**4) Mobility Index:   
 -** When we wake up in the morning our teeth are having **physiological** movement.  
 - This is examined by two instruments one on labial and the other on lingual and we do   
 subjective measure; 0= no movement, 1= Class 1 mobility 1 mm at either direction   
 anteriorly or posteriorly.  
 2= up to 2 mm at either direction anteriorly or posteriorly and we can compress the tooth   
 in socket.

When Gingiva is lost and the gingival margin is **retracted labially** (Anteriors) we call it: **Gingival Recession**. But posteriorly we call it **Furcation defect** (Multi rooted teeth).

Again, The Gingival Index (GI) ,which was introduced by Silness and Loe in 1963, is the first to evaluate every single tooth surface (not entire teeth). And the surfaces are 4 in number (Buccal, Lingual, Mesial and Distal). Here we are not concerned with the occlusal surface because we just care about gingival related surfaces.

* **So this Index (GI) is divided into 4 scoring units**:   
   0= Normal Healthy gingiva (no bleeding on probing)  
   1= Mild bleeding on probing  
   2= Bleeding + Slight redness and swelling  
   3= Spontaneous Bleeding + Marked redness and swelling
* **Again**:  
  GI for single tooth= Total scores / 4 (no. of surfaces)  
  GI for individual= Total scores / 24 (no. of surfaces since we have 6 Ramfjord teeth \* 4 surfaces=24)

And this is partial scoring.  
Ex. After examining a tooth we found these scores: Buccal= 1, Palatal= 2, Mesial= 2, Distal=1.  
Then the total scoring= 6 and no. of surfaces= 4 (Single tooth)  
  
🡪 GI (tooth)= 6/4=1.5  
And we do this examination of all 6 teeth (24 surfaces).

**🡪 Now, what does the 1.5 mean?**It means the GI rating. GI ratings are: 0= Normal Gingiva.   
 Between 0-1= Mild Gingivitis  
 Between 1-2= Moderate Gingivitis  
 Between 2-3= Severe Gingivitis

\*\***Note**: we just examine superficial structures not pockets.

🡪 **How can we get the true reading and not a false one?**We must calibrate our hands and forces. Intra examiner Calibration can be done by examining a group of patients with the same circumstances in two different times, which the results should fade away from examiner memory and at the same time the condition should not be changed, so maybe after 30 minutes or the next day. If the consistency is about 95% then it is calibrated.  
Inter examiner calibration can be done by having another examiner to examine the same group to check for the results and consistency should be about 95%.

\*Proper force used in probing= 20 grams.  
-As beginners when we do probing the first time it may reach 5 kg and penetrates the tissues.  
The scientific way of reducing the force is using a certain scale. But the simplest way of calibration the force is by touching the skin under nails with the probe, blanching must occur without causing discomfort.

Or using the probe in the examiner’s sulcus without causing discomfort. (This can be used with the patient and inspect his facial expressions; no discomfort should occur).

* **Plaque Index:** By Silness and Loe.  
  -It is used for Epidemiological studies.  
  -It provides a quick and representative picture of level of oral Hygiene in a population.  
  -In private practice it is not intended to determine the average plaque accumulation, but to   
   record the **distribution** of plaque in the oral cavity.  
  -Six teeth are examined.   
  -Scores between 0 and 3. (0= No Plaque at all)  
  -We are looking for plaque deposits.  
  -**Blunt** probe is used and we look at the tip of probe;  
   🡪 if there is plaque this is collectable but not visible🡪 score 1  
   🡪 Score 2: We don’t use probe and we inspect Index tooth if there is moderate   
   accumulation of plaque seen by naked eyes.  
   🡪 Score 3: If heavy plaque found which reflects certain facial expressions on our faces   
   (And this is a wrong thing to do with the patient; we should not show these expressions).  
  **SO:**0🡪no plaque

1🡪mild plaque

2🡪moderate plaque

3🡪severe plaque.  
  
🡪 **very important note:**- Remind in gingival assessment GI we use only probe to look for bleeding ,redness or swelling, but here it’s quite different that we are looking at plaque deposited on teeth which represents the oral hygiene status of the patient. We care about the plaque on the dentogingival area ; where host parasite interrelationship /antigen antibody rxn takes place , so plaque that causes sensitivity to the tissues is the plaque present on the **marginal gingiva** of the dentition.

**-** the only use of probe in **plaque assessment** is only 0 and 1 (presence or absence of   
 plaque).

* **Example for getting the PI for a tooth :**
* Facial surface; no collection of plaque 🡪0
* Mesial surface ; collectable but not visible plaque🡪 1
* Distal surface ; plaque seen easily 🡪2
* Palatal surface; abundant plaque🡪3

PI=(0+1+2+3)/4 = 6/4 = 1.5 ; this gives an indication of a **moderate** oral hygiene .

**As a rule :**

Between 0 and 1 🡪good oral hygiene.

Between 1 and 2 🡪moderate oral hygiene.

Between 2 and 3 🡪poor oral hygiene.

**RULES**

* Suppose: If one /or more of the teeth which should be examined is/are missing : **we do not substitute for the missing tooth or teeth.** Since PI determines the **oral health status** of the patient proportionally not tooth by tooth , so we do not need to substitute.مهم
* We said that we take 6 teeth only and examine them to get the PI , since there are 6 teeth , we have 24 (6\*4) surfaces to be examined , but If 1 tooth is missing 🡪total surfaces =20 and if 2 teeth are missing 🡪total surfaces =16.
* If one of the teeth which should be examined is an abutment : examine it normally; because there is still a normal tooth structure that can collect food debris with Ag-Ab reaction.
* If one of the teeth which should be examined is pontic: not a normal tooth and no Ag-Ab reaction, so no need to be examined 🡪 five teeth are enough,,, but some authors say if the missing tooth is 6 or 2 , then examine the adjacent tooth ,,this last idea is very wrong , even if five of the six teeth are missing , one is enough without substitution.
* It’s preferable to ***dry*** teeth that you will examine with minute amounts of air(indirect evaporation of water content) , because 70 % of plaque content is water; that is why the plaque is a glossy material that may not be visualized with the light we use clinically ( 3000 LUX ). Plaque after water removal becomes a matt-easily seen- material.

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* **PSR(periodontal screening and recording system).  
  -** “screening” means: Give general but not detailed charting about the periodontium. -- With PSR, I can know number of patients who are normal and patients with   
   gingivitis, periodontitis without pocketing and periodontitis with pocketing.  
  - **PSR is not a diagnostic index.**

**\*\*NOTE:  
GI and PI are *proportional* index; PI or GI could not be more than 3 or less than 0.**

**In 1982 group of dentists met and devise index (CPITN) - Community Periodontal Index of Treatment Needs-. They devise probe weighs 20gms with force needed of 20gms.**

* **Code scores of CPITN:**

0🡪no disease, healthy (doesn’t require treatment).  
1🡪slight bleeding or plaque (examine gingivitis), treatment: brushing teeth  
2🡪calculus (examine calculus or defective restoration or any plaque retentive factor collecting calculus = etiology), Treatment: scaling and polishing and correction for defective restorations and oral hygiene instructions  
3🡪plaque, swelling, redness and **pocketing up to 5 mms without bone resorption** (examine periodontitis), Treatment : scaling and polishing and oral hygiene instructions and **root planning**  
4🡪pocketing more than 5mms , that means with bone resorption (examine periodontitis), Treatment: complex treatment. scaling and polishing and oral hygiene instructions , and surgical intervention if needed.

\*\* **NOTE:**Under age of 20 , we don’t examine the entire dentition, we take index need (PSR or CPITN index need); due to mixed dentition, false pocketing and young patients are less likely to have diseases.

* **PSR system divides oral cavity into 6 units (six sextants):  
  1.** Upper canine to canine sextant “central sextant”

1. Upper right 4 to the most distal sextant
2. Upper left 4 to the most distal sextant
3. Lower canine to canine sextant “central sextant”
4. Lower right 4 to the most distal sextant
5. Lower left 4 to the most distal sextant

* **NOTE**: wisdom teeth are not examined at all, they ready for extraction.  
    
  MOST IMPORTANT THING IN THIS SYSTEM IS THE PROBE  
  ------------------------------------------------------------------------------------------------------------  
  **Periodontal probe**
* Radius of the ball = 0.5 mm
* It is spherical rounded in order to;  
    
  1- Resist penetration.  
    
  2-By pass the calculus.

In case of gingival enlargement, **how to differentiate if it is true or false pocketing?**

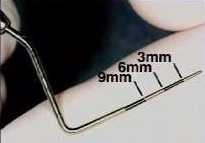
By using the probe and insert it at cemento-enamel junction and take the reading, then insert the probe at the maximum depth until I meet resistant at base of the sulcus, then calculate the difference between the 2 readings.

* black band height = 2 mm
* 1stly : examine presence of bleeding, observing 3 possibilities :  
   1.forceful pressure with bleeding : false results  
   2.extra gentle probing : no bleeding with false results  
   3.gentle probing : bleeding in case of gingivitis , no bleeding in healthy gingiva.
* **How to measure the appropriate force (20-25 grams) should be applied ?**1. I put probe in gingival sulcus , if patient feels pain or even discomfort , then there is   
   extra force.

2. Another scientific way : put probe under your nail , blanching nail without   
 discomfort is a good force .

* **using the probe gives us information about:**

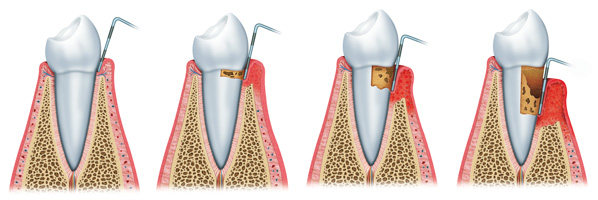
1-examine bleeding with gentle probing 🡪gingivitis  
2-calculus and overhang or defective restoration.  
3-pathological pocketing.  
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* **Path of insertion :**

Always you should insert the probe parallel to the clinical crown then follow the configuration of the root.

From 1-3 mm 🡪 normal sulcus depth  
From 4.5-5mm pocketing without bone resorption  
More than 5 mm pocketing with bone resorption  
  
  
  
🡪 **According to black band:**

If black band still out of sulcus : normal sulcus depth( from 1 to 3mm)  
If black band still out of sulcus with calculus : normal sulcus depth with code score 2  
If half of black band inside sulcus : pocket less than 5 mms 🡪periodontitis with code  
score 3  
If all black band inside sulcus : pocket more than 5 mms 🡪periodontitis without bone resorpion.   
If all black band inside sulcus with some of the other band 🡪pocket with bone resorption. with code score 4  
  
  
🡪 **Notes: very important**  
- Clinical pocketing depth of Minimum of 1 and max of 3 🡪 healthy tissue ;(no zero at   
 clinical)  
- Pathological pocketing depth(on the slide) give min of 0 mm.   
- Any sextant with 2 teeth or less: considered missing and **no examination is made**.  
- When examining a sextant and finding many code scores, I record the **highest** one.  
- **Any examined sextant with mobile tooth(teeth) , recession, furcation , or any   
 mucogingival defect we put asterisk(\*)**  
- **As a RULE; if you find 2 sextant of the 6 having score of 3 or 4(3and 3 or 3and 4   
 or 4and 4) 🡪 this means it needs a comprehensive charting.**

  
  
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Done by: - Razan Zuhir  
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This sheet was written with a help from the last year ones to make it more understood.