

“Oral Health Index: a new evaluation index for the oral health and the compliance of patients.”

Ahrens A. GSM*, Bressi T.**

* D.D. Studio Dentistico Dr. Ahrens Alessandro, Nocciano (Pe) – Italy, ahrens1@tin.it

** M.D. ENT Department, University hospital, Perugia, Italy

Abstract

The aim of this work is to present to all the Dental Practitioner the *Oral Health Index*, that we have introduced in our evaluation protocol, to better classify the patients, not relating to age or social position, but considering their compliance to oral health.

In the last five years we have classified with the Oral Health Index (OHI) 431 patient (which come to our attention for restaurative and prosthetic treatment) of both sexes with an age range between 18 and 78, and relating to the value of OHI we evaluated the treatment to onset for each category of patients.

Material and Methods

In the last five years 431 patients of both sexes, and aged between 18 and 78, underwent oral examination in our dental clinic to onset a dental restaurative and prosthetic treatment.

For each patient we recorded the anamnesis data and also if there was a history of addictions or systemic diseases.

For each patient we also recorded the DMF-T index and introduced three new indexes to evaluate the oral health.

THI: Teeth Health Index – it expresses the value between Decayed + Missed teeth/ Healthy + Filled Teeth

PeHI: Periodontal Health Index – it expresses the value between sockets deeper then 3 mm / number of teeth

OHI: Oral Health Index – it expresses the value of THI + PeHI. This value helps us to evaluate how much the patients take care of his mouth and of its hygiene and obviously of the compliance we can expect from him. The perfect value of those indexes is 0 and it means a perfect oral health.

The recording of the depth of the sockets was done each time from the same clinician to be sure that they were taken, as much as possible, with the same testing pressure (20-25 g) using Michigan Probes (Williams degrees).

For each category we reported the values of our three indexes to better evaluate the degree of compliance we could expect from the patient relating to the treatment we were going to onset.

All the results are presented in tab 1 to 6.

In Tab 1 we report the age range of the patients, the sex, the social position, the presence of addictions and of systemic diseases.

Age group	Males / females	Social position	addiction	Systemic diseases
18-27	18 / 23	7 L / 31 M / 3 H	23 T / 3 A / 1 D	2
28-37	29 / 40	11 L / 50 M / 8 H	45 T / 5 A / 2 D	5
38-47	38 / 47	18 L / 53 M / 14 H	59 T / 6 A / 1 D	6
48-57	48 / 55	23 L / 59 M / 21 H	71 T / 8 A / 0 D	12
58-67	31 / 44	29 L / 35 M / 11 H	52 T / 9 A / 0 D	21
68-78	24 / 34	35 M / 20 M / 3 H	35 T / 9 A / 0 D	29

Legenda: social position: Low (< 900 € / month)

Middle (< 2500 € / month)

High (> 2500 € / month)

Addiction: Tobacco (> 20 cigarettes /day)

Alcohol (75 g / day)

Drugs

In **Tab 2** we report the systemic diseases we recorded for our patients.

Disease / age	18-27	28-37	38-47	48-57	58-67	68-78
Diabetes	0	0	1	5	8	11
HBV /HCV	2	2	2	1	0	0
HIV	0	1	0	0	0	0
Cancer	0	0	0	1	2	1
Hearth disease	0	0	1	2	5	7
Pressure Disease	0	0	1	3	6	10
Psychic disorders		2	1	0	0	0

In **Tab 3** we report the mean value of our three indexes relating to age group, social group not addicted

category	Mean Teeth value	Mean THI	Mean PeHI	Mean OHI
18 -27	30	0.25	0.13	0.38
28 -37	28	0.42	0.17	0.59
38 -47	26	0.60	0.22	0.82
48 -57	25	0.77	0.25	1.02
58 -67	20	1.71	0.28	1.99
68 -78	12	2.88	0.29	3.17
Lower	20	2.20	0.35	2.55
Middle	26	0.60	0.23	0.83
high	28	0.23	0.14	0.37

In **Tab 4** we report the mean value of our three indexes relating to sex not addicted

Sex and age range	Number of subjects	Mean Teeth Value	Mean THI	Mean PeHI	Mean OHI
18-27	18	29	0.28	0.13	0.41
28-37	29	27	0.52	0.22	0.74
38-47	38	26	0.52	0.26	0.78
48-57	48	26	0.77	0.30	1.07
58-67	31	16	2.55	0.31	2.86
68-78	24	9	4.3	0.33	4.63
18-27	23	31	0.23	0.13	0.36
28-37	40	29	0.33	0.13	0.46
38-47	47	26	0.68	0.19	0.87
48-57	55	24	0.77	0.20	0.97
58-67	44	24	0.88	0.25	1.13
68-78	34	15	1.46	0.26	1.72

In Tab 5 we report the mean values of our indexes relating to addiction

Addiction - age	Number of subjects	Mean teeth value	Mean THI	Mean PeHI	Mean OHI
Tabacco	285				
18-27	23	27	0.68	0.25	0.93
28-37	45	26	0.88	0.26	1.14
38-47	59	24	1	0.33	1.33
48-57	71	24	1.13	0.33	1.46
58-67	52	13	1.66	0.30	1.96
68-78	35	6	5.4	0.5	5.90
Alcohol	40				
18-27	3	26	0.77	0.30	1.07
28-37	5	24	1.00	0.37	1.37
38-47	6	21	1.13	0.28	1.41
48-57	8	17	1.66	0.29	1.95
58-67	9	11	2.55	0.45	3.00
68-78	9	5	5.40	0.4	5.80
drugs	4				
18-27	1	23	1.28	0.34	1.62
28-37	2	17	1.46	0.29	1.75
38-47	1	11	2.20	0.45	2.65

In Tab 6 we report the mean value of our three indexes relating people affected by systemic disease and sex

Disease/ sex	Number of subjects	Mean Teeth value	Mean THI	Mean PeHI	Mean OHI
Diabetes					
Males	13	22	0.77	0.45	1.22
Females	12	20	1.13	0.40	1.53
HBV /HCV					
Males	4	21	1	0.52	1.52
Females	3	21	0.88	0.57	1.45
HIV					
Males	1	18	0.68	0.66	1.34
Females	0		0	0	0
Cancer					
Males	3	15	1.90	0.33	2.23
Females	1	18	3.00	0.38	3.38
Hearth disease					
Males	9	15	1.66	0.40	2.06
Females	6	17	1.46	0.35	1.81
Pressure Disease					
Males	8	16	1.66	0.43	2.09
Females	12	17	2.2	0.52	2.72
Psychic disorders					
Males	1	16	3.57	0.75	4.32
Females	2	15	5.4	0.80	6.20

From the data reported in **Tab 3** we can observe that the perception of oral health shows a constant decreasing during the increasing of the age range of the subjects we analyzed. Particular attention has to be put on the age range 68-78 where the high values of THI, PeHi and OHI are surely strictly related to the loss of the main percentage of teeth, condition related to the age, but at the same time we have to consider that this loss of teeth is related to a decrease of oral health due to the action of decays and periodontal sockets.

These high values suggest us to consider as preferred treatment the mobile prosthetics more than restorative or fixed prosthetic treatment. In fact we reported in our experience a very low degree of compliance in oral hygiene and oral care in these patients.

At the same time **Tab 3** put in evidence the strict relation between oral health and social position of the subjects we analyzed.

Surely it depends from the lower economic opportunity of the subjects; people included in the lower class have other primary priorities than the one of taking care of oral health. We can observe how the mean OHI value of this class is 2.55, three times higher than the OHI value related to the middle class. This suggest 2 hypothesis:

- 1) people of lower class has not the opportunity to onset easily a dental treatment due to the low money income;
- 2) people of lower class, probably has also a lower cultural background that let them not completely appreciate the importance of oral health.

Observing the values related to the other two social classes we are fully supported in the concept that social position plays an important rule in the perception of oral health.

Higher are the money income and the cultural level higher is the perception of oral health and at the same time the compliance we can expect from the subjects.

At the same time the mean values referred to older people, without class distinction, confirm the decrease of the perception of oral health related, as we suppose, to the choice to a prosthetic approach more than to a preservation of the natural denture.

In **Tab 4** we can appreciate how females have an higher perception of oral health than males, as shown by the mean values; the only exception is in the age range group 38-47, probably related to social or biological aspects, like a "crisis" for the 4th decade of life or the onset of hormonal alterations.

In **tab 5** we can appreciate the great increase of OHI values in the subjects addicted to tobacco, alcohol and drugs. It is obviously related to the effects of those substances on oral structures and on the psyche of subjects, as demonstrated in literature by many authors.

This table shows that addicted subjects perceive less than not addicted the importance of health.

In **Tab 6** we can observe that the presence of systemic diseases is strictly related to the decrease of oral health and to its compliance. It is interesting the inversion between the two sexes we can observe in this table. In fact affected women show a higher decrease of oral health than men in the most of the pathologies we investigated.

Discussion

Starting from those results we have elaborated different approaches to the subjects, relating each approach to the range of OHI value and also studying a specific operative protocol to get the better possible compliance.

We grouped the OHI values in three ranges.

- 1) **0<OHI<1**: we consider these subjects as those which can give us the better compliance in dental treatment and in oral hygiene and oral health.
- 2) **1<OHI<2**: we consider these subject as a medium value for compliance, hygiene and health
- 3) **OHI>2**: we consider these subjects as the lower values for compliance, hygiene and health.

The approach to **group 1** is based on the following steps:

- a) onset of high degree of oral hygiene;
- b) restorative treatment for decayed teeth and periodontal treatment of the sockets (with scaling-root planing or subgingival administration with chlorhexidine gel);
- c) implantological treatment for the missed teeth, if required by the patient and relating to the compliance to oral hygiene, or fixed prosthetics. This step only after the end of restorative and periodontal treatment, to better evaluate the degree of compliance in hygiene we get from the patient;
- d) check ups each 2 months after the end of dental treatment for the first six months and then each four months;

The approach to **group 2** is based on the following steps:

- a) onset of an optimal degree of oral hygiene which allows us to proceed with the treatment;

- b) restorative treatment for decayed teeth and periodontal treatment of the sockets (with scaling-root planing or subgingival admistration with clorhexidyne gel);
- c) fixed prosthetics for the missed teeth, if required by the patient and relating to the compliance to oral hygiene, or mobile prosthetics. This step only after the end of restorative and periodontal treatment, to better evaluate the degree of compliance in hygiene we get from the patient;
- d) check ups each month after the end of dental treatment for the first six months and then each three months;

The approach to **group 3** is based on the following steps:

- a) Onset of an optimal degree of oral hygiene which allows us to proceed with the treatment;
- b) restorative treatment for the decayed teeth we consider helpful for the prosthetic approach and for the ones with a low o middle degree of decay (ivory and enamel). Teeth that requires endodontics, in accordance with the patients, are extracted, if not important for prosthetic approach. Periodontal treatment of the sockets with a depth < 6 mm (with scaling-root planing or subgingival admistration with clorhexidyne gel) and extraction of the teeth with sockets deeper the 6-7 mm, in accordance with the patient;
- c) mobile prosthetics for the missed teeth as election approach; fixed prosthetics only if required by the patient and only if we report and increasing of the compliance in oral hygiene. This step only after the end of restorative and periodontal treatment, to better evaluate the degree of compliance in hygiene we get from the patient;
- d) check ups each 15 days after the end of dental treatment for the first six months and then each two months;

During the treatment we try also to reduce the degree of addiction in the addicted people and with the help of other specialists to get a better compliance in those patients with psychic or systemic diseases.

At the same time we prepared some depliants for our patients to better illustrate which are the oral diseases that could onset in people with low oral hygiene (high OHI value) and which are the steps to follow to get a better oral hygiene; we also organize some meetings with our patients (grouping them for class of age and sex, not for social or addiction) to give them some practical lessons and to speak all together about the importance of oral health for the single and for the community.

After a one year follow up we recorded the new OHI values for the three groups, addicted and not addicted. The lower OHI values, which means a better oral health, is strictly connected to the prosthetic treatment. Prosthetic teeth were considered as healthy teeth in the THI and PeHI indexes and that results obviously in a lower OHI. But is important to consider that there was also a lower PeHI mean value for each group, meaning that we get a higher compliance in oral hygiene.

After a three years follows we recorded again the OHI values for the groups. It is interesting to see how group 1 shows an higher percent increase of OHI then the other groups. This condition is related to the higher number of natural teeth that underwent decays or periodontal disease respect the other groups which have an higher percentage of prosthetic teeth, but it also means that patients show a decreasing of attention to oral hygiene. Although the mean OHI value after three years of all three groups is lower then the one before the treatment we think it is important to consider the opportunity to start a new round of meetings with the patients to update their perception of oral health.

In Tab 7 we report the starting mean value of OHI and the follow up after one year from the end of treatment for each group of not addicted subjects. In THI we report the prosthetic teeth as a filled teeth and PeHI we report the prosthetic teeth as not missed teeth to obtain the OHI value

Group	OHI	OHI (1)	Variation of %
1	0.59	0.20	-66 %
2	1.50	0.31	-79 %
3	3.17	0.35	-89 %

In Tab 7a we report the starting mean value of OHI and the follow up after three years from the end of treatment for each group of not addicted subjects. In THI we report the prosthetic teeth as a filled teeth and PeHI we report the prosthetic teeth as not missed teeth to obtain the OHI value

Group	OHI(1)	OHI (3)	Variation of %
1	0.20	0.26	23 %
2	0.31	0.34	10 %
3	0.35	0.39	11 %

In Tab 8 we report the starting mean value of OHI and the follow up after one year from the end of treatment for each group of addicted subjects. In THI we report the prosthetic teeth as a filled teeth and PeHI we report the prosthetic teeth as not missed teeth to obtain the OHI value

Group	OHI	OHI (1)	Variation of %
1	0.93	0.35	-62 %
2	1.51	0.42	-72 %
3	3.59	0.49	-86 %

In Tab 8a we report the starting mean value of OHI and the follow up after three years from the end of treatment for each group of addicted subjects. In THI we report the prosthetic teeth as a filled teeth and PeHI we report the prosthetic teeth as not missed teeth to obtain the OHI value

Group	OHI(1)	OHI (1)	Variation of %
1	0.35	0.55	37 %
2	0.42	0.58	28 %
3	0.49	0.61	20 %

Conclusion

It is clear, as shown from the results of our study, that a low degree of perception of the importance of oral health is strictly related to the effective oral health. It is also clear that addictions or systemic/local diseases play an important rule in the decreasing of this perception.

Addicted people has a risk of severe damages at the oral structure much more higher then not addicted due to the action of tobacco and alcohol. It has been well demonstrated the strict relationship between smoke and loss of periodontal attachment and also between smoke and precancerous lesions. The same relationship has also been demonstrated to have alcohol due to the effects of ethanol on bone and periodontal structures. These two addictions, put together, have a super multiplicative effect for mouth, additive effect for larynx and multiplicative effect for oesophagus for the developing of squamous cell carcinomas.(1-14).

At the same time it is clear from our study that age, sex and social class play also a primary role in the perception of oral health and in the compliance to oral hygiene.

From the result of our study we can deduce that the onset of a well defined operative protocol in the treatment of these subjects is helpful and has also a predictive value of the effects of the treatment.

The contemporary sensibilization of the patients with meetings, lessons and depliants is helpful to obtain an higher compliance in oral health and hygiene which will also result in a better outcome.

Bibliography

1. Johnson N: "Tobacco use and oral cancer: a global perspective". J Dent Educ. 2001 Apr; 65(4): 328-339.
2. Reibel J: " Tobacco and oral diseases. Update on the evidence, with recommendation." Med Princ Pract. 2003; 12 Suppl 1:22-32.

3. Neville BW, Damm DD, Allen CM, et al.: "Oral & maxillo-facial pathology. 2nd ed. Phila., PA. Saunder; 2002; 337-369.
4. Mashberg A, Boffetta P, Winkelman R, et al.: "Tobacco smoking, alcohol drinking, and cancer of the oral cavity and oropharynx among U.S. veterans". *Cancer* 1993;72:1369-1375.
5. Jovanovic A, Schulten EA, Kostense PJ, et al.: "Tobacco and alcohol related to the anatomical site of oral squamous cell carcinoma". *J Oral Pathol Med.* 1993; 22:459-462.
6. Andre K, Schraub S, Mercier M et al.: "Role of alcohol and tobacco in the aetiology of head and neck cancer: A case-control study in the Doubs region of France". *Oral Oncol, Eur J Cancer* 1995; 31B:301-309.
7. Blot WJ, McLaughlin JK, Winn Dm et al.: "Smoking and drinking in relation to oral and pharyngeal cancer". *Cancer Res* 1988; 48:3282-3287.
8. Lewin F, Norell SE, Johansson H et al.: "Smoking tobacco, oral snuff, and alcohol in the aetiology of squamous cell carcinoma of the head and neck. A population-based case-referent study in Sweden". *Cancer* 1998; 82:1367.1375.
9. Harris C, Warnakulasuriya K, Johnson N et al.: "Oral health in alcohol misusers". *Community Dent Health.* 1996 Dec; 13(4): 199-203.
10. Farley JR, Fitzsimmons R, Taylor AK et al.: "Direct effects of ethanol on bone resorption and formation in vitro". *Arch Biochem Biophys.* 1985 Apr; 238(1): 305-314.
11. Friday KE, Howard GA: "Ethanol inhibits human bone cell proliferation and function in vitro". *Metabolism* 1993; 40:562-565.
12. Holbrook TL, Barrett-Connor E: "A prospective study of alcohol consumption and bone density". *BMJ* 1993 Jun 5; 306(6891): 1506-1509
13. Moniz C: "Alcohol and bone". *Br Med Bull.* 1994 Jan; 50(1): 67-75. Review.
14. Pierce Ro, Perry A: "The effect of ethanol on bone mineral". *J Nat Med Assoc.* 1991 Jun; 83(6): 505-508.

Dr. Ahrens Alessandro
Odontoiatra e Protesista dentale

Via Roma 46
65010 Nocciano (PE)
Italy
P: +39 0858470042
F: +39 0858470042

Community Dentistry and Oral Epidemiology

OBJECT: cover letter

Dr. Ahrens Alessandro and Dr. Bressi Tamara state with this letter that the material related to the article “Oral Health Index: a new evaluation index for the oral health and the compliance of patients” is original and it is has not been published elsewhere, and is being submitted to **Community Dentistry and Oral Epidemiology**

Nocciano, 10/10/2004

Dr. Ahrens Alessandro

Dr. Bressi Tamara

Age group	Males / females	Social position	addiction	Systemic diseases
18-27	18 / 23	7 L / 31 M / 3 H	23 T / 3 A / 1 D	2
28-37	29 / 40	11 L / 50 M / 8 H	45 T / 5 A / 2 D	5
38-47	38 / 47	18 L / 53 M / 14 H	59 T / 6 A / 1 D	6
48-57	48 / 55	23 L / 59 M / 21 H	71 T / 8 A / 0 D	12
58-67	31 / 44	29 L / 35 M / 11 H	52 T / 9 A / 0 D	21
68-78	24 / 34	35 M / 20 M / 3 H	35 T / 9 A / 0 D	29

Disease / age	18-27	28-37	38-47	48-57	58-67	68-78
Diabetes	0	0	1	5	8	11
HBV /HCV	2	2	2	1	0	0
HIV	0	1	0	0	0	0
Cancer	0	0	0	1	2	1
Hearth disease	0	0	1	2	5	7
Pressure Disease	0	0	1	3	6	10
Psychic disorders		2	1	0	0	0

category	Mean Teeth value	Mean THI	Mean PeHI	Mean OHI
18 -27	30	0.25	0.13	0.38
28 -37	28	0.42	0.17	0.59
38 -47	26	0.60	0.22	0.82
48 -57	25	0.77	0.25	1.02
58 -67	20	1.71	0.28	1.99
68 -78	12	2.88	0.29	3.17
Lower	20	2.20	0.35	2.55
Middle	26	0.60	0.23	0.83
high	28	0.23	0.14	0.37

Sex and age range	Number of subjects	Mean Teeth Value	Mean THI	Mean PeHI	Mean OHI
18-27	18	29	0.28	0.13	0.41
28-37	29	27	0.52	0.22	0.74
38-47	38	26	0.52	0.26	0.78
48-57	48	26	0.77	0.30	1.07
58-67	31	16	2.55	0.31	2.86
68-78	24	9	4.3	0.33	4.63
18-27	23	31	0.23	0.13	0.36
28-37	40	29	0.33	0.13	0.46
38-47	47	26	0.68	0.19	0.87
48-57	55	24	0.77	0.20	0.97
58-67	44	24	0.88	0.25	1.13
68-78	34	15	1.46	0.26	1.72

Addiction - age	Number of subjects	Mean teeth value	Mean THI	Mean PeHI	Mean OHI
Tabacco	285				
18-27	23	27	0.68	0.25	0.93
28-37	45	26	0.88	0.26	1.14
38-47	59	24	1	0.33	1.33
48-57	71	24	1.13	0.33	1.46
58-67	52	13	1.66	0.30	1.96
68-78	35	6	5.4	0.5	5.90
Alcohol	40				
18-27	3	26	0.77	0.30	1.07
28-37	5	24	1.00	0.37	1.37
38-47	6	21	1.13	0.28	1.41
48-57	8	17	1.66	0.29	1.95
58-67	9	11	2.55	0.45	3.00
68-78	9	5	5.40	0.4	5.80
drugs	4				
18-27	1	23	1.28	0.34	1.62
28-37	2	17	1.46	0.29	1.75
38-47	1	11	2.20	0.45	2.65

Disease/ sex	Number of subjects	Mean Teeth value	Mean THI	Mean PeHI	Mean OHI
Diabetes					
Males	13	22	0.77	0.45	1.22
Females	12	20	1.13	0.40	1.53
HBV /HCV					
Males	4	21	1	0.52	1.52
Females	3	21	0.88	0.57	1.45
HIV					
Males	1	18	0.68	0.66	1.34
Females	0		0	0	0
Cancer					
Males	3	15	1.90	0.33	2.23
Females	1	18	3.00	0.38	3.38
Hearth disease					
Males	9	15	1.66	0.40	2.06
Females	6	17	1.46	0.35	1.81
Pressure Disease					
Males	8	16	1.66	0.43	2.09
Females	12	17	2.2	0.52	2.72
Psychic disorders					
Males	1	16	3.57	0.75	4.32
Females	2	15	5.4	0.80	6.20

Group	OHI	OHI (1)	Variation of %
1	0.59	0.20	-66 %
2	1.50	0.31	-79 %
3	3.17	0.35	-89 %

Group	OHI(1)	OHI (3)	Variation of %
1	0.20	0.26	23 %
2	0.31	0.34	10 %
3	0.35	0.39	11 %

Group	OHI	OHI (1)	Variation of %
1	0.93	0.35	-62 %
2	1.51	0.42	-72 %
3	3.59	0.49	-86 %

Group	OHI(1)	OHI (1)	Variation of %
1	0.35	0.55	37 %
2	0.42	0.58	28 %
3	0.49	0.61	20 %