ORTHODONTIC TREATMENT COMPLEXITY, NEED AND OUTCOME

Introduction

The assessment of clinical performance is important at the individual, office, institutional and national level. It is a challenge not only to deliver high standards of care but also to deliver this care at the lowest unit cost. The cost of treatment varies according to the health care system in place e.g. private practice, fee for item, salaried services etc. In addition, treatment duration has a major influence on cost: for example upper and lower fixed appliances treatments range from16 to 36 months across Europe. However, it is also important to establish the outcome of treatment and whether the completed treatment is acceptable or not.

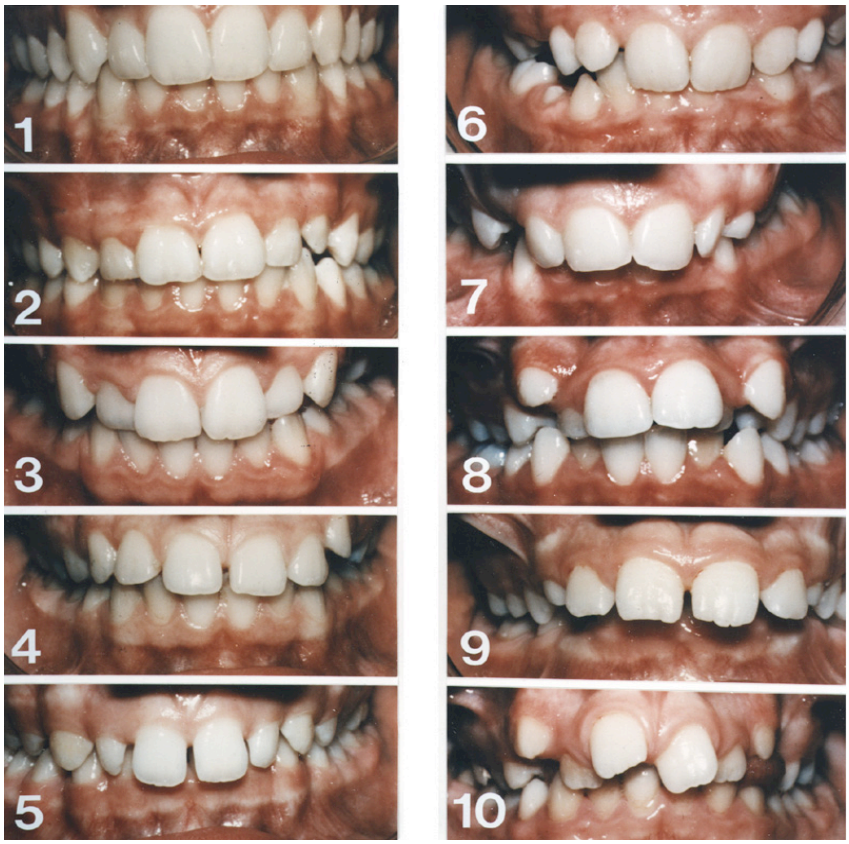
The use of occlusal indices ensures uniform interpretation and application of criteria. It is important before applying indices to confirm that they are valid and reliable.

Requirements of an index

- Clinically valid and reliable
- Objective
- Quick easy and meaningful
- Sensitivity – identify people with a need
- Specificity – identify people not needing treatment
- Acceptable to public and profession
- Acceptable to cultural norms
- Adaptable to available resources

INDEX OF ORTHODONTIC TREATMENT NEED

Aesthetic Component of IOTN (AC) *(10 – point scale)*



The Aesthetic Component was originally described as "SCAN", Evans R and Shaw WC (1987. A preliminary evaluation of an illustrated scale for rating dental attractiveness European Journal of Orthodontics 9:314-318.

Aesthetic Component (AC)
Presentation to patient - "This sheet show a series of photographs in order of dental attractiveness. Number 1 shows the most attractive and 10 the least attractive arrangement of teeth. Where would you put your teeth on this scale?"

Below are 4 examples to score.

Dental Health Component(DHC) *(5 – point scale)*
Method of Measurement

Dental Health Component
To ensure consistency in assessing malocclusions, the dentition must be assessed in a systematic way as follows;

M Missing teeth
O Overjet
C Crossbite
D Displacement of contact points
O Overbite

How to measure treatment need
A ruler is used to record the DHC.

Dental Health Component of IOTN (Treatment need from a dental health perspective)		
Grade 5 (very great)	a	Increased overjet > 9 mm
	h	Extensive hypodontia with restorative implications (more than one tooth missing in any quadrant) requiring pre-restorative orthodontics
	i	Impeded eruption of teeth (with the exception of third molars) due to crowding, displacement, the presence of supernumerary teeth, retained deciduous teeth and any pathological cause
	m	Reverse overjet greater than 3.5 mm with reported masticatory and speech difficulties
	p	Defects of cleft lip and palate
	s	Submerged deciduous teeth
Grade 4 (great)	a	Increased overjet > 6 mm but ≤ 9 mm
	b	Reverse overjet > 3.5 mm with no masticatory or speech difficulties
	c	Anterior or posterior crossbites with > 2 mm discrepancy between retruded contact position and intercuspal position
	d	Severe displacements of teeth > 4 mm
	e	Extreme lateral or anterior open bites > 4 mm
	f	Increased and complete overbite with gingival or palatal trauma
	h	Less extensive hypodontia requiring pre-restorative orthodontics or orthodontic space closure to obviate the need for a prosthesis
	l	Posterior lingual crossbite with no functional occlusal contact in one or both buccal segments
	m	Reverse overjet greater than 1 mm but ≤ 3.5 mm with recorded masticatory and speech difficulties
	t	Partially erupted teeth, tipped and impacted against adjacent teeth.
	x	Supplemental teeth.
Grade 3 (moderate)	a	Increased overjet > 3.5 mm but ≤ 6 mm with incompetent lips.
	b	Reverse overjet greater than 1 mm but ≤ 3.5 mm
	c	Anterior or posterior crossbites with > 1 mm but ≤ 2 mm discrepancy between retruded contact position and intercuspal position.
	d	Displacement of teeth > 2 mm but to ≤ 4 mm.
	e	Lateral or anterior open bite greater than 2 mm but ≤ 4 mm.
	f	Increased and complete overbite without gingival or palatal trauma.
Grade 2 (little)	a	Increased overjet > 3.5 mm ≤ 6mm with competent lips.
	b	Reverse overjet > 0 mm but ≤ 1mm
	c	Anterior or posterior crossbite with ≤ 1 mm discrepancy between retruded contact position and intercuspal position.
	d	Displacement of teeth >1 mm but ≤ 2 mm
	e	Anterior or posterior open bite > 1 mm but ≤ 2mm
	f	Increased overbite ≥ 3.5 mm without gingival contact
	g	Prenormal or postnormal occlusions with no other anomalies. Includes up to half a unit discrepancy
Grade 1 (none)		Extremely minor malocclusions including displacements <1 mm

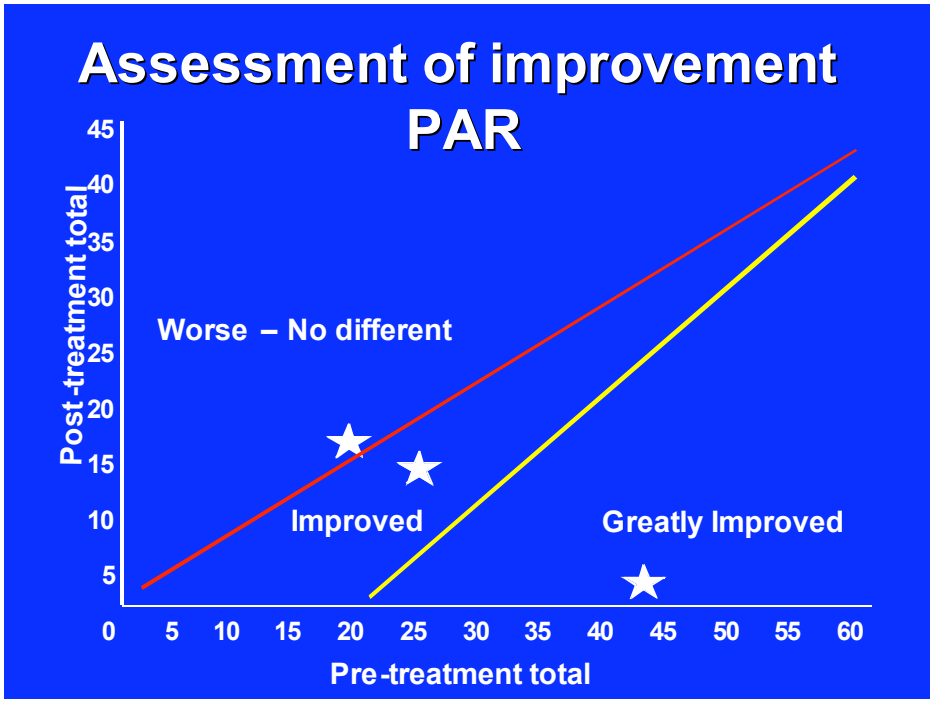
THE PEER ASSESSMENT RATING (PAR INDEX)

The PAR Index records the degree of improvement in malocclusion as a result of orthodontic intervention. It is used to record the degree of deviation of dental casts from normal pre and post treatment. There are 5 components.

THE PAR INDEX					
	Component	**Scoring system**			**Weighting**
1	Upper and lower anterior segments *(Crowding and spacing 3-3)*	Score Displacement 0 0mm to 1mm 1 1.1mm to 2mm 2 2.1mm to 4mm 3 4.1mm to 8mm 4 greater than 8mm 5 impacted teeth			**1**
2	Left and right buccal occlusion *(Fit of the teeth in the 3 planes of space 4-8 and 3 A-P only)*	Ant-post 0 None 1 < ½ unit dis 2 = ½ unit dis	Transverse 0 None 1 Xbite tend>=1t 2 1 tooth in xb 3 > 1 tooth in xb 4 > 1 tooth in sb	Vertical 0 None 1 open bite 2t >2mm	**1**
3	Overjet *(Positive and number of teeth in crossbite 3-3)*.	Overjet 0 0 to 3 mm 1 3.1 to 5mm 2 5.1 to 7mm 3 7.1 to 9mm 4 Greater than 9mm		Reverse overjet 5 No teeth in xbite 6 Edge to edge 7 1 tooth in xbite 8 2 teeth in xbite 9 >2 teeth in xbite	**6**
4	Overbite *(Overbite and open bite relative to lower incisor 2-2)*	Overbite 0 0–1/3 1 1/3–2/3 2 > 2/3 3 >= Full Tooth Coverage		Open bite	**2**
5	*Centreline (Relative to lower incisor)*	Centreline 0 <= ¼ 1 ¼ - ½ 2 > ½			**4**

How to measure the PAR index

A PAR ruler is used to record the various deviant occlusal traits. All the scores are weighted and summed to produce an overall total. Start scores are usually in the region of 26-30. Excellent occlusions usually have a score of less than 5 PAR points. Finished treatments with scores greater than 10 are usually regarded as unacceptable. Another way of assessing success of treatment is to plot pre and post treatment scores on the graph to determine improvement. A clinician should have only a few cases in the Worse/No improvement category.


Assessment of improvement
PAR
Post-treatment total
45
40
35
30
25
20
15
10
5
0
5
10
15
20
25
30
35
40
45
50
55
60
Pre-treatment total
Worse – No different
Improved
Greatly Improved

THE INDEX OF COMPLEXITY, OUTCOME AND NEED (ICON)

The ICON is an index essentially combines various features of IOTN and PAR. The only new measurement is the assessment of crowding and spacing in the upper arch. You can either score spacing or crowding but not both.

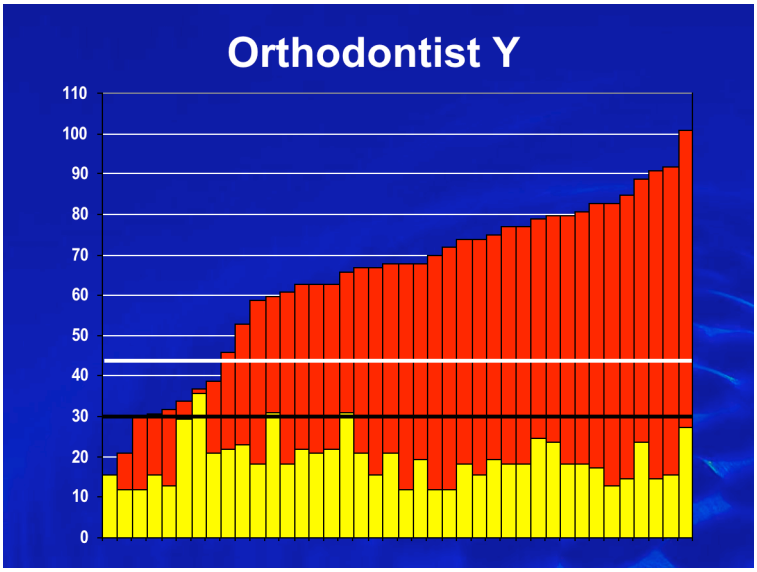
Component	0	1	2	3	4	5	WEIGHT
Aesthetic component	1 2	3 4	5	6 7	8 9	10	7 x 9 = 63 7 x 2 = 14
Upper arch crowding	<2mm	2.1 - 5mm	5.1 - 9mm	9.1 – 13mm	13.1 - 17mm	>17mm and / or Impacted teeth	5 x 3 = 15 5 x 0 = 0
Upper arch spacing	< 2mm	2.1 - 5mm	5.1 - 9mm	>9mm			
Crossbite	None	Yes					5 x 1 = 5 5 x 0 = 0
Incisor open bite	Edge to edge	< 1mm	1.1 – 2mm	2.1 – 4mm	> 4mm		
Incisor overbite	< 1/3 lower incisal coverage	1/3 – 2/3 coverage	2/3 to full tooth coverage	Fully covered			4 x 2 = 12 4 x 0 = 0
Buccal segment A -P	Cusp in embrasure	Any other cusp relation	Cusp to cusp				L 3 x 2 = 6 R 3 x 2 = 6 L 3 x 1 = 3 R 3 x 1 = 3

How to measure the ICON score

The various deviant occlusal traits are scored and then the weighted scores are summed to produce an overall total. A score of 44 or greater indicates that the individual needs treatment. A score of 30 or less indicates that the occlusion is acceptable. A typical average start score is 68 and finish score around 28. In the example above the pre-treatment total is 107 (green) and the post-treatment total 20 (red).

The figure on the right shows the pre- and post-treatment ICON scores for orthodontist Y for 40 cases. The pre-treatment cases have been ranked in ascending order (red).

The white line (43 ICON points) indicates treatment need and the black line (30 ICON points) indicates a level below which is an acceptable finish (completed ICON scores in yellow).



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