Background:
Within the NHS there is a requirement for Health Care Professionals, including orthodontic care providers, to show that resources are being used appropriately and that there is a demonstrable benefit to those who have undergone treatment.

An audit in 2008 identified that 95% of cases treated in Dundee Dental Hospital were IOTN DHC grades 4 and 5, whilst the remaining 5% were exclusively DHC grade 3. In this investigation, the average PAR score reduction was 68%, with 56% of the cases having a PAR score reduction of >70%. 4% of cases had a PAR score reduction <30%.

It would be useful to determine the impact of the introduction in 2008 of the Damon self-ligating system and Vector temporary anchorage devices on the quality of orthodontic care in DDH. As electronic patient records are not available, the unit has recorded IOTN DHC scores along with the PAR score for each set of models and these have been stored in the Orthodontic laboratory database since 2008.

Aims:
- To identify the appropriateness of cases treated in the Orthodontic Department in DDH using the IOTN DHC
- To determine the outcome of orthodontic treatment with fixed appliances carried out in DDH using the PAR index

Standards:
IOTN: 90% or more of cases should score IOTN 4 or 5, with 10% or less having a DHC score of 3.
PAR: ‘75% of cases should exhibit a reduction in PAR score greater than 70%, with 3%, or fewer, cases having a reduction in PAR lower than 30%’.

Process:
The pre-treatment IOTN scores and the pre- and end-treatment PAR scores for patients completing fixed appliance treatment August 2008-February 2011 (excluding patients undergoing orthognathic surgery or with craniofacial abnormalities) were extracted from the DDH Orthodontic laboratory database and analysed using Excel (Microsoft, Redmond, California). The change in the PAR score is expressed as a percentage and improvement demonstrated using a nomogram.

Results:
- From 120 potentially suitable cases identified and cross-checked from clinical notes, 65 had complete data entered into the database.
- 90% of cases had a start IOTN DHC of 4 or 5 and 10% had a score of 3 at the beginning of treatment. The IOTN standard was therefore met.

- The average change in PAR score for all patients was 20.2 points with an average percentage reduction in PAR score of 64%. 65% of cases improved by 70% PAR score or more, falling short of the recommended 75%.

By 30% or less meaning they were ‘worse/no different’. Of these 5 were cases involving localisation of space for prostheses were excluded. 65% of cases had an improvement in PAR score of 75% improvement where hypodontia/missing teeth and 12% of cases (n=8) were only improved by 50-69%. 3 cases were deliberately left to allow prosthetic replacement, and the other 3 were clearly documented as compromised treatment.

When cases involving localisation of space for prostheses were removed from the results the average change in PAR score was 22.9 points with an average percentage reduction in PAR score of 75%. The PAR standard was therefore met when these cases were excluded.

Discussion:
Ninety percent of cases had a start IOTN DHC of 4 or above meeting the audit standard. The proportion of grade 3 cases has increased since the previous audit and this is thought to be due to a greater number of undergraduate teaching cases being treated in the department. This is higher than the results of the UK audit by McMullan et al (2003) however with 60% of our cases being grade 5, the overall majority of cases being treated in Dundee Dental Hospital are more severe malocclusions.

The standard of 75% cases improving by 70% reduction in PAR score was met when cases requiring space opening for prostheses were excluded. This is similar to the results of Hand et al (2010). Whilst the average PAR score has decreased marginally when compared to the 2008 investigation, the proportion of cases exceeding 70% reduction in PAR score has increased from 56% to 65% (including cases requiring Restorative input). This indicates that the quality of care has increased since the introduction of self-ligating appliances and TADs.

Conclusions and recommendations:
- At the start of treatment 60% had an IOTN DHC of 5, 30% had a score of 4 and 10% a score of 3 meeting the standard for acceptance for treatment in Dundee Dental Hospital.
- The mean PAR score change was 64%, with 75% improvement where hypodonta/compromise cases where excluded. 65% of cases had an improvement in PAR score of 70% or more.
- The laboratory database has areas of incompleteness and this should be improved to facilitate ongoing quality assurance using the IOTN and PAR indices.

References:
Hand D P, Khalaf K, Mattick C R. Assessment of orthodontic treatment outcome using PAR score for patients treated at the orthodontic department of a teaching hospital. BOS Clinical Effectiveness Bulletin, August 2010