

Sustainable Development in Orthodontics: Orthodontic Archwire Waste

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Abstract : Introduction: Researchers suggest that within 50 years or less, the available supply of a range of metals will be exhausted, potentially leading to increases in resource conflict and largescale production shortages. The healthcare, dental and orthodontic sectors will undoubtedly be affected as stainless steel instruments are generally heavily relied on. Although changing orthodontic archwires are unavoidable and necessary to allow orthodontic tooth movement through the progression of an archwire sequence with fixed appliances, they are thought to be manufactured in excess of what is needed. Furthermore, orthodontic archwires require trimming extraorally to allow safe intraoral insertion, thus contributing to unnecessary waste of natural resources. Currently, there is no evidence to support the optimisation of archwire length according to orthodontic fixed appliance stage. As such, this study aims to quantify archwire excess (extraoral archwire trimmings) for different stages of orthodontic fixed appliance treatment. Methodology: This prospective, observational, quantitative study observed trimmings made extraorally against pre-treatment study models by clinicians over a 3-month period. Archwires were categorised into one of three categories (initial aligning, sequence, working/finishing arcwhires) within the orthodontic fixed appliance archwire sequence. Data collection included archwire material composition and the corresponding length and weight of excess archwire. Data was entered using a Microsoft Excel spreadsheet and imported into statistical software to obtain simple descriptive statistics. Results: Measurements were obtained for a total of 144 archwires. Archwire materials included nickel titanium and stainless steel. All archwires observed required extraorally trimming to allow safe intraoral insertion. The manufactured lengths of orthodontic initial aligning, sequence, and working/finishing arcwhires were at least 31%, 26%, and 39% in excess, respectively. Conclusions: Orthodontic archwires are manufactured to be excessively long at all orthodontic archwire sequence stages. To conserve natural resources, this study's findings support the optimisation of orthodontic archwire lengths by manufacturers according to the typical stages of an orthodontic archwire sequence.

Keywords : archwire, orthodontics, sustainability, waste

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