Have fun, will brush: Improving orthodontic outcomes with effective home care

By Dr Dana Van Elslande, Canada

Getting braces is a time of both excitement and dread. For kids and teens, braces can be a rite of passage. For adults, it is an opportunity to invest in an improved appearance and more attractive smile. With this excitement comes a bit of worry for patients (and parents) though – how will I (or how will my child) manage oral hygiene with all this apparatus in the way?

The orthodontic provider feels the same concern. Once the braces go on, brushing becomes much more challenging, and poor brushing leaves patients at risk for gingivitis, white scars and tooth decay. Ensuring adequate home care is one of the biggest challenges in most orthodontic offices. Unless patients adopt some of the oral hygiene practices we recommend, they are not going to attain the incredible results that are possible.

Like many practices, we are seeing more adult patients every year – currently about 25% of our patients are adults. Often, they are parents of our younger patients, through their child's experience, parents can see how the technology has changed since they were kids. Brains are generally easier to manage, and often have shorter treatment time. Contemporary oral hygiene products also make it easier to get from braces on to the end goal of 'beautiful smile'.

A comprehensive programme

Our practice adopted Crest Oral-B Ortho Essentials because we wanted a comprehensive programme to help encourage and motivate patients with their oral hygiene. Programme elements include an Office Oral Hygiene Visual Analogue Scale (Fig. 1), commitment letter, communication letters for patients and parents, a 'how to care for your braces at home' video, and a regimen of advanced home care products: an oscillating-rotating power toothbrush, stannous fluoride toothpaste, fluoride mouth rinse; and an orthodontic specific dental floss. These four products work together to help reduce plaque build-up and protect teeth from gingivitis, white scars and cavities.

One unique aspect of this programme is that the Office Oral Hygiene Visual Analogue Scale interacts with our management software, allowing us to graph patients' scores over time so we can show our patients (and mom and dad) how well they are doing with self-care. Together with patients, at each appointment we score their oral hygiene on a scale from 1-5. A score of 7 indicates very poor oral care, whereas a 5 indicates excellent care. These scores are entered into our software programme, which has the ability to generate a graph where we can monitor how the oral care is progressing throughout the patient's treatment. It is a wonderful tool to use with children and adults alike, as it provides us with a visual representation of how performance has either improved (meaning we need to celebrate) or declined (meaning we need to make changes before irreversible damage). In addition, we incentivise patients by giving tokens at each visit if they receive scores over a '3'. These tokens can be cashed in for merchandise or gift cards to their favorite stores or on-site sites.

Noticeable outcomes

The Ortho Essentials kit contains four key products that work together to help achieve the outcomes we want.

The Oral-B PRO 9000 Smart Series Power Toothbrush with bluetooth technology with ortho brush head is a cornerstone of the kit. The ortho brush head is specifically designed to clean around brackets and wires, which can be very challenging to maintain without additional tools. Patients begin using the toothbrush and technology enhances compliance with good brushing habits. Patients begin by downloading a free app onto their mobile device (usually a phone), then sync their power brush to the app. Every time the patient brushes, the app receives brushing data, and the patient gets immediate feedback on the mobile device screen. Using the built-in 2-minute timer, patients can see how long they have been brushing, and a red light 'alerts' them to know if they are using excessive force. On the mobile screen, the app provides information about the brushing mode, battery status, and a reminder to change the toothbrush head.

To keep the user experience fresh – and to keep kids checking in – the app also incorporates news, weather, and oral care tips. Additionally, the Focused Care feature can be customised to show areas of the mouth that need special attention, so the patient can brush those areas again after the regular 2-minute brushing is complete.

Crest Pro-Health toothpaste contains stannous fluoride – an active ingredient well-known to protect against plaque, gingivitis, cavities, dietary acid erosion, and sensitivity. Regular use of this paste has been clinically shown to inhibit plaque build-up between brushings. The Crest Pro-Health Advanced with Extra Deep Clean Rinse offers additional anti-cavity fluoride protection. Oral-B SuperFloss is a strengthened end floss threader that helps patients (particularly kids) easily thread floss under the braces wires.

The four components of the Ortho Essentials kit work together to keep the teeth and gums protected and healthy. Through our programme, patients brush in the morning, after lunch if possible, and then thoroughly before bed. The most important session is a very careful brushing right before bed (with, of course, no food or drinks afterwards). The combination of mechanical brushing and flossing plus chemical paste and rinse action helps to reduce plaque build-up and protect against cavities. This regimen of oral hygiene provides excellent care for patients without braces as well.

Enabling compliance

A proven compliance oral care regimen is essential to successful orthodontic outcomes. If a patient is not able or willing to use the above products, the braces may have to be removed and treatment delayed until he or she is able to comply. So we do everything possible to set patients up for success. Technique is very important, we show our patients from the very beginning how to use each component in the kit, and we review their technique whenever we see that oral hygiene is slipping.

If a patient has certain areas they are struggling with, we can use the built-in technology to programme these areas into a diagram on their mobile device app. By working with a cell phone and the Bluetooth-enabled toothbrush, the app provides immediate feedback during home care. With these tools, the patient can continue to work on trouble areas between scheduled appointments or receive feedback on their progress.

Supported by clinical evidence

As a practitioner, I am very evidence-based, so I feel comfortable recommending proven products to my patients that involve the most cutting-edge technology available. Some patients appreciate knowing about the clinical data behind the products we recommend. For patients who are not ‘wowed’ by clinical evidence, they usually just want to know what products I use at home. I would not recommend the programme if I did not personally believe in it.

Conclusion

In the end, orthodontic treatment is not just about positioning the teeth and improving looks, it is also about better functioning and oral health. Patients are expecting a certain ‘look’; when their braces are removed – beautiful, white, shiny teeth and a beautiful smile. Unfortunately, that oral hygiene directly affects that outcome. We know that kids and adults are busy – so we have implemented a programme that fits into the busy schedules of our patients. The Ortho Essentials programme has been a game-changer for our practice, directly leading to better outcomes for our patients.

Editorial note: a list of references is available from the publisher.

Fig. 2: Ortho brush head

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As an orthodontist, Dr Van Elslande has studied a variety of orthodontics. She currently practices in her practice, directly leading to better outcomes for our patients.

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Archwire Sequence for Insignia®, a Custom Bracket System with a Bright Future

Abstract
Insignia® system is a reverse-engineered production of custom brackets, based on the desired final alignment. The Insignia® system is well-designed for segmental determinant mechanize, to decrease PDL compressive stress. Segmental mechanics, with extra-alveolar bone screw anchorage, to enhance outcomes and decrease treatment time by increasing the extra-alveolar bone screw anchrage.

Introduction
Insignia® (Ormco, Glendora, CA), introduced by Dr. Craig Andreiko in 1987 (Fig. 1), involves two components: (i) customized brackets, placement, gauges, and archwires, and (ii) three-dimensional (3D) real-time virtual treatment planning software. A bracket set is precisely designed for ideal anchorage of an entire arch on a full dimension rectangular archwire. The process begins by digitizing the patient’s skeletal and dental anatomy: scanning PVS impressions or direct dental scanning (Fig. 2a). The teeth are aligned into an ideal position (Fig. 2b) with a digital 3D positioning algorithm that assists in tooth alignment consistent with the underlying skeletal support (Fig. 3c). According to the desired tooth alignment (Fig. 2b), the system produces custom brackets (Fig. 2c), archwires (Fig. 2e) by a reverse engineering process. Bracket positioning (Fig. 6a) are fabricated to assist the clinician in accurately bonding a customized bracket on each tooth (Fig. 5f). The precise placement of each patient is critical for producing a 3D alignment (Fig. 2b) to accommodate the final rectangular finishing wire (Fig. 2e).

The Insignia® system is a reverse-engineered production of custom brackets, based on the desired final alignment. The Insignia® system is well-designed for segmental determinant mechanize, to decrease PDL compressive stress. Segmental mechanics, with extra-alveolar bone screw anchorage, to enhance outcomes and decrease treatment time by increasing the extra-alveolar bone screw anchrage.

Fig. 1: Dr. Craig Andreiko (1950-2013) in Insignia® progressive archwire sequence for each stage of Insignia® progressive archwire treatment, utilizing passive self-ligating (PSL) brackets. All products described are of treatment is not to combination, Glendora CA, except where specified. Phase I: Straight archwire segments. The objectives for the first phase of treatment are: (i) level and align, (ii) initiate arch development as needed, and (iii) resolve 90% of the rotations. A straight 0.016-inch (cuNiTi) archwire is used as an initial archwire to resolve intermaxillary discrepancies and level the arches. The small dimension of the initial round archwire minimizes friction and binding between the wire and the tube-like tunnels of the PSL brackets (Fig. 3). With this mechanism the teeth can slide freely along the wire as they are leveled and aligned. To manage severe crowding, narrow arch forms and/or compensated periodontal support, a stock 0.016- or 0.018-inch Damos® CuNiTi archwire can be used as an alternative second archwire to further align the posterior segments. The purpose of these round CuNiTi archwires in the Phase I (initial stage) is to decompress the anatomic arch form to accommodate the final rectangular finishing wire (Fig. 2e).

Phase II: Insignia® Rectangular CuNiTi wire
The objectives of the second phase are: (i) start resolving torque and root angulation problems, (ii) complete leveling and alignment, (iii) finish rotation corrections, and (iv) continue arch form development, as needed. The recommended Insignia® CuNiTi rectangular archwire sequence is 0.018x0.025-in, 0.019x0.025-in, and 0.022x0.025-in. Each archwire must be inserted with minimal archwire engagement, or the arch is not ready to progress. Minor spacing in the anterior segments is consolidated with elastomeric chains. The full-sized CuNiTi archwire is used to prepare for retention of the custom stainless steel (SS) wire in the next phase.

Phase III: Major mechanics
The objectives of the third phase are to close any remaining spaces as well as to correct anteroposterior and intermaxillary relationships. All teeth in the anterior segments of each arch are retracted in masse (altogether). Consistent with a straight wire approach, a stock 0.018x0.025-in SS archwire is used for sliding mechanics. A relatively rigid SS archwire (0.018-in or 0.020-in SS) is recommended for maintaining the integrity of the arch during space closure, either by chains of elastic or closing loops, rigidity across edentulous segment is particularly important for large extraction spaces.

The SS archwire is adjusted to fit the patient’s specific arch form before insertion. Moreover, reduction of the SS archwire in the posterior segments is recommended to control bracket friction and binding when closing spaces with elastomeric chains.

In addition, if intermaxillary correction is required, OrthoNolsteRarchs® (Ortho cereal, Hsinchu City, Taiwan) are an ideal source of anchorage for the Insignia® system. CBCT analysis has been placed buccal to the molars in each arch to provide skeletal anchorage that does not interfere with the path of tooth movement. Each arch can be retracted, intruded or rotated to achieve necessary malocclusions conservatively.

Phase IV: Finishing
The objectives of the fourth phase of treatment are to complete torque expression and final detailing to achieve ideal intra-arch and intermaxillary alignment. An Insignia® 0.025-in CuNiTi archwire is recommended for the final archwire to achieve the full expression of the digital set up. If needed, final finishing is achieved with an Insignia® 0.022x0.025-in TMA archwire. It is important to order the final TMA archwire as a backup, because uncontrollable anatomical variables can result in minor alignment discrepancies, that are easily managed with routine finishing adjustments.

Discussion
The key to efficient management of a malocclusion with passive archwire therapy is directed toward a specific objective, consistent with ensuring patient comfort, maximizing the potential of each step in treatment, and achieving alignment to place the final archwire as soon as possible. There are four phases in Insignia® progressive archwire therapy: (i) stock straight wire rounds, (ii) custom rectangular copper-nickel-titanium (CuNiTi) wires, (iii) major mechanics as needed, and (iv) finishing. This article recommends archwire sequencing, based on clinical experience with the Insignia® bracket system. In addition to traditional progressive archwire therapy, the Insignia® system is well-designed for segmental determinant mechanize, to decrease PDL compressive stress. Segmental mechanics, with extra-alveolar bone screw anchorage, to enhance outcomes and decrease treatment time by increasing the extra-alveolar bone screw anchorage.

Fig. 2c: Dr. Andreiko's oral anatomy is digitized in 3D.
Fig. 2d: Based on the practitioner's treatment plan, all the teeth are digitally aligned in 3D to an ideal position via an algorithm for automatic leveling-alignment.
Fig. 2f: Any tooth can be adjusted in 3D as specified by the clinician.
Fig. 2g: According to an ideal tooth position approved by the clinician, the Insignia® system reverse-engineers the production of a custom bracket system.
Fig. 2h: Straight archwires are constructed as specified by the ideal set up.
Fig. 3a: Bracket positioning ligs are fabricated to provide accurate bonding of each bracket.

Fig. 3: Small dimension rounds wire mini-fractional bonding between the tube-like tunnels of the PSL bracket and the archwire arch form development, as needed. In addition to traditional progressive archwire therapy requires an extended period of time (3-5 years) because of the orthodontic irregularity of root and bone surfaces.
tooth movement is relatively slow. Controlling PDL compressive stress is a high priority for advanced mechanics to enhance the rate of tooth movement, and decrease the incidence of root resorption. The Insignia® system is an ideal platform for accomplishing initial alignment and leveling in a relativelyatraumatic manner. Small-dimension, round CuNiTi archwires are effective for correcting rotations and aligning marginal ridges, but may lack the buccal stiffness to level the arch. New materials, manufacturing processes, and/or clinical methods are needed to gently accomplish optimal initial alignment, leveling and torque control with a single archwire. A single archwire approach eliminates the repetitive lag phases in tooth movement due to multiple archwires with progressive stiffness. In addition, the efficiency of relatively atraumatic alignment can be improved by three currently available clinical methods: 1. differential enamel stripping of well-aligned teeth to make space to align crowded teeth; 2. retraction of cuspines with OBs, placed buccal to the molars; and 3. anterior bite turbot constructed on the palatal (lingual) surfaces of anterior teeth to open the vertical dimension of occlusion (VDO), as needed. The objective for initial alignment and leveling is to atraumatically align each arch to receive a full-size rectangular archwire as soon as possible. A reverse engineered bracket system such as Insignia® is ideal for mechanics that minimize PDL compressive stress. The archwire and months of treatment are shown at the top and bottom of each photo. The archwire sequence is summarized in Fig. 6. This current challenge is to develop materials and methods for relativelyatraumatic initial alignment in preparation for major mechanics, with innovative methods, to resolve the skeletal malocclusion with segmental treatment.

Conclusion
1. Progressive archwire therapy with the Insignia® system “begins with the end in sight” and all mechanics are a direct progression toward the desired final alignment along a straight wire. The recommended archwire sequence is summarized in Table 1. Clinicians select archwire sizes and materials according to the treatment plan. It is important to allow each archwire adequate time to provide the prescribed degree of alignment in preparation for the next archwire.

Acknowledgment
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Insignia Archwire Sequencing

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<tr>
<th>Archwire Sequence</th>
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<th>Stock Damon CuNiTi</th>
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<tr>
<td>I</td>
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<td>II</td>
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Table 1: The recommended archwire sequence is summarized for progressive archwire therapy utilizing the Insignia® bracket system.
References


