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Instrument Cassettes: Effective and Safe

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A primary infection control goal for health care is to provide sterile instruments for patient treatment. At the same time it is important to remember that the basic tenet of the 1991 Occupational Safety and Health Administration's (OSHA) Bloodborne Pathogens Standard also remains applicable, that is, employers should provide a safe working environment to reduce the risk of occupational injury by their employees. While instrument sterilization remains the end point, consideration should be given to technologies and products that minimize risk during the multiple steps involved in instrument reprocessing. Fortunately, today's clinicians have a variety of acceptable options from which to choose.

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The introduction of cassettes into dental clinics in the 1980's signaled an important shift from earlier instrument cleaning practices by offering an alternative approach for reprocessing instruments. A major reason for incorporating these instrument containers into clinical practice was that they allowed personnel to handle contaminated items much less frequently, thereby preventing many of the sharps exposures encountered during hand scrubbing, drying, sorting, and packaging of instruments. A number of other inherent advantages have also been observed with cassette use (Table 1). In brief, cassettes provide benefits of efficiency and organization. As a result, their presence in clinical settings has expanded rapidly and cassettes are now routinely found within most dental academic programs, as well as in a rapidly increasing number of practices.

The structure, design, and appearance of cassettes have continued to evolve. While the role of a cassette is still centers around efficient, safe instrument reprocessing, recent modifications have attempted to further improve function by considering additional "ideal" design characteristics (Table 2). The latest generation of dental instrument cassettes *(**IMS Infinity Series™ Cassettes**, Hu-Friedy® Mfg. Co., LLC)* has incorporated a number of these cutting edge design features in order to maximize infection control performance (Fig. 1). Some are immediately noticeable, such as an increased vented pattern area. Increasing the size of these open access portals can allow for enhanced instrument cleaning and rinsing in preparation for sterilization. This feature has even been extended to the narrow sides of the cassette, in contrast to earlier resin and stainless steel models which contained few vents for cleaning solution access to soiled instruments (Figure 2). Inspection of the silicone rails where instruments are seated also reveals subtle changes. They are smaller than previous holders, thus lessening the contact area with instruments. In addition to holding instruments firmly in place during cleaning cycles, rails should have minimal contact with instruments to allow detergents and water optimal access to surfaces.

The main function of cassettes remains augmenting the effectiveness of instrument reprocessing and studies were therefore undertaken to evaluate ***Infinity Series Cassettes***. An Artificial Test Soil (ATS) *(Healthmark Industries Company, Inc.)* formulation was used as the test organic debris.

Table 1. Instrument Cassette Advantages

Time Savings	One cassette holds all instruments for a specific procedure together from chairside procedure through reprocessing while eliminating certain manual steps from the process
Improved Safety	Minimized handling of contaminated instruments during processing for re-use, which decreases chances of sharps injuries
Better Organization	Standardized procedures that are color coded for easy identification and organization
Decreased Contamination Potential	Proper spacing of instruments during reprocessing provides optimal environment for cleaning and sterilization
Streamlined Workflow	Promotes proper flow of dirty to clean during instrument reprocessing. Easy break down after patient appointment and simple patient prep.
Increased Instrument Longevity	Protects instruments from damage during reprocessing while keeping them in place from chairside to storage to reduce the possibility of misplaced instruments.

Figure 1. Infinity Series Cassette

This proteinaceous material is routinely used as a standard challenge for cleaning heat-stable items prior to sterilization. The protein content of the ATS was further enhanced by adding whole blood (4:1 ATS:blood ratio) to the suspension before instruments were coated. This mixture therefore provided an experimental "worst case" scenario for removal of biological debris.

Representative dental instruments were selected to evaluate the performance of the cassettes during removal of dried organic debris in a ***Midmark 250*** *(Midmark)* ultrasonic unit using a 10 minute cycle. Freshly prepared solutions of ***Enzymax® Ultrasonic Detergent*** *(Hu-Friedy Mfg. Co., LLC)* were used as the cleaning agent. Thirty (30) dental scalers and twenty (20) periodontal probes *(Hu-Friedy Mfg, Inc.)* were immersed in and coated with modified ATS prior to loading into ***Infinity Series Cassettes***. It is important to note here that the amount of dried debris on instrument and cassettes surfaces was far greater than what would be encountered in clinical settings. Soiled instruments and cassettes were subsequently placed in a 60 C laboratory oven and allowed to dry for 2 hours (Figure 3). Ultrasonic cleaning tests were performed in duplicate. At the conclusion of each cycle instruments, rails, and other cassette components were visually inspected for the presence of remaining organic debris. As shown in Figure 4, biological debris was not found on any of the previously contaminated scalers and probes. Visual observation of rails and other cassette surfaces also revealed an absence of debris (Figures 5 and 6).

SUMMARY

Incorporation of cassettes into an infection control program should provide the benefits of enhanced and safer cleaning of contaminated items during instrument reprocessing. The findings described above indicate that the design of ***Infinity Series*** *cassettes can facilitate removal of heavy soil on instrument surfaces. Their integration into a dental facility can serve as a valuable addition to an infection control program.* +

Table 2. Representative "Ideal" Features for Instrument Cassettes

Characteristic	Function
1. Large vented surface areas	Maximize instrument cleaning, rinsing, and drainage in ultrasonic units and washers/disinfectors
2. Compatible with today's cleaning equipment, including automated washers	Better drainage and access to hard to reach areas of the instruments.
3. Rail design with minimum contact but holds instruments in place	Maximize cleaning, rinsing and drainage of instrument surfaces seated on cassette rails
4. Soft, sturdy material for rails	Prevent instrument damage during processing
5. Light weight construction	Easier to handle when full; increases safety and ease of use; Decreased opportunity to overload reprocessing equipment.
6. High quality stainless steel for metal cassettes	Minimize corrosion over time; extends cassette life
7. Accessory area for additional treatment items (i.e. bur blocks, syringes, hemostats)	Allows for complete procedure set-up in one place
8. Ergonomic, user-intuitive latch design	Provides secure single-handed opening and visual indication that cassette is in locked position

Figure 2. Side view of closed Infinity Series cassette. Note the presence of numerous holes designed to enhance instrument cleaning.

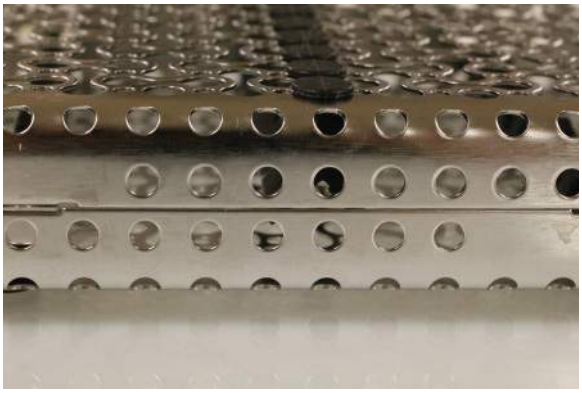

Figure 3. Dental scalers and periodontal probes with dried organic debris in an Infinity Series cassette before ultrasonic cleaning.

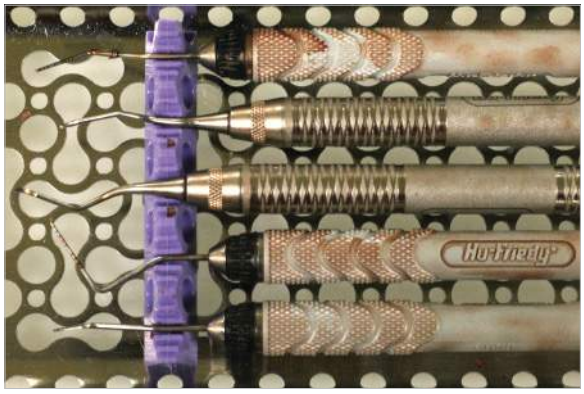

Figure 4. Cleaned instruments after a single 10 minute ultrasonic cycle.

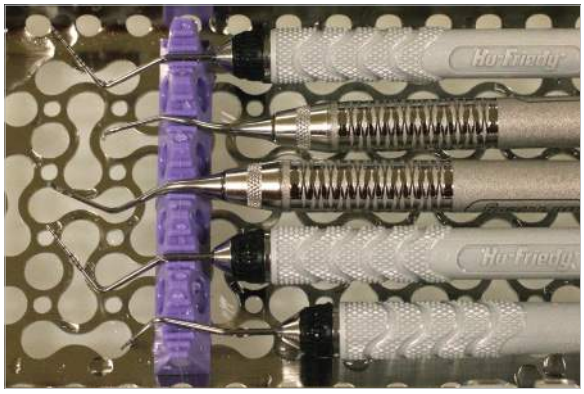

Figure 5. Appearance of Infinity cassette rails after cleaning of heavily soiled instruments. No evidence of any residual soil could be detected.

Figure 6. Cleaned instruments in an Infinity cassette. Note the complete absences of any visible soil on instrument and cassette surfaces.