Defining and Differentiating Inlays and Onlays

Position Statement

Introduction

The availability of new technology continues to advance the practice of dentistry and provides dentists with opportunities to practice more efficiently with improved treatment outcomes. However, as more dentists incorporate new technology into their practices, there are also signs of associated changes in treatment and billing patterns.

Recent trends show an increase in the number of inlays being charged as onlays. This may be directly related to increased use of CAD-CAM technology by dentists and fostered by company sales representatives and trainers who may be advising dentists to alter their billing practices as a means of bypassing potential benefit limitations from dental insurers on inlays. Under most dental benefit plans inlays are often assigned an alternative benefit to minor restorations (amalgams or composites) but onlays are covered at the benefit level for major services. Another factor contributing to this trend may be related to the significant acquisition costs associated with CAD-CAM technology and the need to generate the additional income to improve the dentist's return on investment.

Dentists are now also being advised that an inlay restoration that includes 1/2 to 2/3 of the cuspal incline of a tooth qualifies as an onlay. However, this interpretation is problematic and inconsistent with the current definition found in CDT 2007-2008 which clearly defines an onlay as an indirect restoration that overlays a cusp or cusps of a tooth.

Inlays that are billed as onlays have direct cost impact on insurers, dentists, purchasers and patients. The cost impact for all insurers may not be significant today due to the low overall utilization of inlays and onlays relative to other types of restorations. However, many dental benefit plans are starting to feel the cost impact and utilization of these services is expected to increase as more dentists introduce CAD-CAM technology into their practices. This trend could potentially place all insurers at risk for increased claims cost. Increases in the cost of care may subsequently be passed on to purchasers in the form of premium increases. Dentists are also negatively impacted particularly if they are given potentially misleading information by CAD-CAM company representatives that may cause them to adopt suspect billing patterns. In addition to the possible cost impact to dentists are issues regarding quality concerns related to overtreatment. Ultimately though, patients may be the ones at highest risk for cost impact as they may be left to pay for procedures that have been upcoded, not covered because of benefit exclusions, or not necessary in the first place to restore the tooth to an appropriate level of function.

In addition to insurers, dentists, purchasers and patients, other key stakeholders include the ADA, whose CDT dictates the definition of procedures, others in organized dentistry such as the Boards of Dental Examiners, regulators, purchasers, fraud and abuse investigators and, of course, groups such as the AADC. Improved communication is needed between all the key stakeholders as well as agreement on definitions and concepts in order to establish consistency in the interpretation of the definitions of inlays and onlays.

Background- Summary of the Evidence

A survey of the scientific literature did not provide any articles that focused on the definitions of inlays and onlays. The majority of the literature on inlays and onlays primarily focused on success rates and looked at performance relative to alternative methods of restoration. There were no articles identified regarding inlays versus onlays and there were no articles identified that focused specifically on onlays. Most of the articles looked only at inlays or inlays and crowns. Below is a summary of the key findings and conclusions of the available scientific literature:

- CAD-CAM inlays were more cost effective than laboratory made ceramic inlays
- Overall the success rates of machinable ceramics was satisfactory, although instances of submargination and hypersensitivity noted
- No evidence found to support superiority of ceramic inlays over treatment alternatives (gold inlays, gold foil, amalgam, posterior composites)
- When compared with other forms of esthetic intracoronal restorations, ceramic inlays perform well. However, due to their cost and being technique sensitive, ceramic inlays should be restricted to certain clinical situations
- According to the limited studies available in the United States, failure rates of ceramic inlays are comparable to other alternatives. However, the results of one Scandinavian article contradict these findings citing high failure rate of ceramic inlays and recommending that these restorations be limited to esthetic indications.

With no evidence based literature available on the definition of inlays and onlays, the evidence for establishing our position shifted towards a review of the basic principles being taught in dental schools today and referenced in operative and prosthodontic textbooks. Operative Dentistry and Prosthodontics faculty affiliated with the University of Pittsburgh, Columbia University, University of Iowa, University of Washington, Case Western University and Boston University were consulted for the definitions and preparation designs of inlays and onlays being taught to dental students today. The responses consistently stated that an onlay must cover one or more cusps of the tooth while inlays are placed entirely within the occlusal surface of the tooth without any cuspal coverage. These definitions are consistent with those found in Dorland's Illustrated Medical Dictionary which defines an onlay as "a cast metal restoration that overlays cusps, thus lending strength to the restored tooth" and defines an inlay as "a dental restoration made outside of a tooth to correspond with the form of a prepared cavity and then cemented into the tooth." Dorland's definition of an inlay describes a restoration that fits...
within a prepared cavity further supporting the concept of a wholly intracoronal restoration (within the crown portion of a tooth) exclusive of cusp coverage.

A review of several operative dentistry and prosthetics textbooks offers further support for the aforementioned definitions of inlays and onlays. The following information defining onlays is from Summitt’s Fundamentals of Operative Dentistry: A Contemporary Approach:

The onlay is essentially an inlay that covers one or more cusps. A complete onlay covers the entire occlusal surface; a partial onlay covers only a portion of the occlusal surface. The onlay incorporates the principles of both extra-coronal and intra-coronal restorations. Although it is generally more conservative than a partial or complete coverage crown, it provides the same protection of the remaining tooth structure.

Additional information comes from Shillingburg's Fundamentals of Fixed Prosthodontics which describes the MOD onlay as follows:

This design can be used for restoring moderately large lesions on premolars and molars with intact facial and lingual surfaces. It will accommodate a wide isthmus and up to one missing cusp on a molar. If a cast metal restoration is needed on a premolar with both marginal ridges compromised, it should include occlusal coverage to protect the remaining tooth structure. This restoration also can be considered an extra-coronal restoration because of the occlusal coverage that overlays and protects tooth cusps.

Other evidence defining inlays and onlays comes from the opinions and publications of nationally known dental practice management and dental insurance consultants. The publication Dental Insurance and Reimbursement - Coding and Claim Submission (Atlanta Dental Consultants) states the following:

An inlay is an indirect restoration constructed of cast metal, porcelain/ceramic, or composite/resin that neither supports nor replaces a cusp or cusps of a tooth. The inlay restoration is nothing more than a centric stop in that it provides no protection for the cusp tip as concerns lateral and/or protrusive masticatory excursionary forces. The onlay component replaces the cusp tip or tips. The onlay most often entirely replaces the cusp tip so as to maintain and/or restore the vertical dimension in the preparation. When the cusp tips are sound, the original vertical dimension is not altered.

In addition, the September 2006 issue of Dental Insurance Today (Atlanta Dental Consultants) states the following important points:

An inlay/onlay differs from an inlay in that it offers cuspal protection similar to a crown during excursions of the mandible involved in the dynamics of occlusion.

Since an inlay is a centric stop restoration only, any involvement with the dynamics of occlusion must not be classified as an inlay unless the clinician also addresses the onlay component beyond the basic inlay outline form. Since it is necessary to cover a cusp to involve the tooth in the dynamics of occlusion, the onlay component must be classified accordingly. An onlay does have to involve full coverage of a cusp or cusps.

According to the Dental Insurance Coding Handbook, (Stepping Stones To Success), an inlay is “an intracoronal restoration made outside the mouth to correspond to the form of the prepared cavity that is then cemented or light-cured into the tooth. An inlay restores portions of the tooth that might also be restored using amalgam or composites”. Author Carol Tekavec notes an onlay as “a restoration made outside the mouth that replaces the cusp or cusps of a tooth and is cemented or light-cured onto the tooth. An onlay incorporates portions of a tooth (within the cusps of a tooth) that might correspond to areas also commonly restored using amalgam or composites or by using an inlay, with the addition of a cusp or cusps”. The Handbook further describes criteria that may be considered by insurance companies in determining benefits for onlays by stating the following:

Depending on the cusp involvement, onlays may be a paid benefit, typically at a major benefit percentage (commonly 50% of the insurance carrier's fee schedule). Carriers may require that two or more cusps of a tooth be involved in the onlay, and may specify how much of the cusp incline must be involved. (Usually 80% or more involvement is required)

Dentists may be interpreting the involvement of 80% or more of the cuspal incline as the benchmark for fulfilling the criteria for an onlay. This interpretation appears to be in conflict with the requirement for overlaying of a cusp or cusps in an onlay, as noted in all other sources consulted, and may be contributing to the recent trend in upcoding of inlays to onlays.

**Position Statement**

The AADC Positions Committee strongly advocates that the definitions for inlays and onlays as currently described in the CDT 2007-2008 are not altered in such a manner to allow for procedures currently covered as inlays to be paid as onlays. The Committee also strongly recommends that consideration should be given to updating and revising the current CDT 2007-2008 definition of an onlay to more clearly differentiate the restoration from an inlay. Language that has been proposed and supported by the Committee that may serve to fulfill this criterion is as follows:

An onlay is an indirect restoration (fabricated outside the oral cavity) that covers one or more cusps, extending through and beyond the cusp tip to the facial/lingual and proximal slopes of the covered cusps. It may be fabricated from any of the materials used for inlay restorations, and incorporates the principles and advantages of both intracoronal and extracoronal indirect restorations. It is implicit in this type of restoration that occlusion in all functional positions is supported by restorative material rather than tooth structure of the covered cusps.
Recommended Next Steps

The next steps to support the Committee's position include the following:

- Present the proposed Position Paper to the AADC Board of Directors for revisions and legal review, as needed, and final approval.
- Collaborate with organizations including the ADA, NADP and AHIP to garner their support and acceptance of our position and work to ensure that current accepted definitions of inlays and onlays are not altered to allow procedures currently covered as inlays to be paid as onlays.
- Explore the option of developing a revised definition for the onlay that more clearly differentiates the restoration from an inlay (i.e. cusp overlayment extending onto the buccal/lingual surface).
- Communicate any clarification and/or revisions to the definitions of inlays and onlays and provide guidance to targeted audiences regarding the appropriate application of the CDT codes. Targeted audiences include dentists, insurance carriers, continuing education lecturers, educators, practice management consultants, and marketing/sales reps for the CAD-CAM manufacturers.

References

1. American Dental Association-Current Dental Terminology 2007-2008
2. National Association of Dental Plans
3. Consultation with operative and prosthodontic faculty and course directors at the following dental schools:
6. Carol D. Tekavec, Stepping Stones To Success, Dental Insurance Coding Handbook
   a. University of Washington
   b. University of Iowa
   c. University of Pittsburgh
   d. Columbia University
   e. Boston University
   f. Case Western University
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