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Oral Lesions and Treatment Recommendations for the HIV-infected Patient



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Physicians, physician assistants, pharmacists, nurse practitioners, nurses, dentists, dental hygienists, dental assistants and other interested medical providers

LEARNING OBJECTIVES

After reading this self-study module, you should be able to:

1. Identify clinically relevant oral lesions associated with HIV.
2. Determine when further testing is indicated and which tests should be performed.
3. Discuss medications and treatment options available for candidiasis, human papillomavirus (HPV) and xerostomia.
4. Describe when and how to consult with and refer patients to individuals for more specialized care.

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CARING FOR THE HIV-INFECTED PATIENT: A CME AND DENTAL-ACCREDITED SELF-STUDY MODULE

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A CME AND DENTAL-ACCREDITED SELF-STUDY MODULE

Oral Lesions and Treatment Recommendations for the HIV-infected Patient

Module Abstract

According to the 2008 World Health Organization (WHO) report, close to 33.8 million people worldwide are living with HIV/AIDS. Since the first case of AIDS was reported in 1981, the presence of oral manifestations of HIV infection has had a significant role in the morbidity and mortality of HIV seropositive patients. (1, 2) Oral lesions occur in 30 - 80% of the affected patient population and their presence directly affects patients' quality of life. (3) The presence of oral lesions is strongly associated with a high viral load > 20,000 copies/mL, low CD4 cell count <200 cells/mm³ and treatment failure.

Highly active antiretroviral therapy (HAART) has decreased the incidence, frequency, and severity of most, but not all, HIV-associated oral lesions. The focus of this module is the clinical presentation, diagnostic criteria, current treatment modalities and prognosis of the following HIV-associated oral pathologies: oral candidiasis, human papilloma virus (HPV)-related lesions, salivary gland disease and xerostomia. These oral diseases present diagnostic and therapeutic hurdles, are challenging for both the clinician and the patient, and correlate with significant prognostic impact. Inaccurate diagnosis, lack of treatment or inappropriate treatment may result in considerable patient morbidity and potential mortality.

Introduction

HAART was introduced as a first-line therapy in 1996. HAART is a combination drug regimen that targets and interferes with viral cell (HIV) replication, thereby reducing viral load and increasing the CD4/CD8 ratio. The introduction of HAART has dramatically changed the overall course of HIV infection; patients are living longer, healthier lives with fewer opportunistic infections and AIDS-defining diseases. (3) HAART has decreased the prevalence, rate of recurrence, and severity of most, but not all, systemic HIV-associated disease. (4) HAART has also significantly reduced the overall frequency of oral lesions in HIV seropositive patients. In the pre-HAART era, approximately 10% of HIV seropositive patients developed an oral lesion as the initial clinical sign of immune suppression, and

oral candidiasis and hairy leukoplakia were considered indicators of disease progression to AIDS. (5) Following the introduction of new antiretroviral therapies in the late 1990s, there was a shift in the incidence and prevalence of most HIV-associated oral lesions. Paradoxically, salivary gland disease, xerostomia, and HPV-related lesions are seen in statistically significant increasing frequency in patients on HAART.

Most researchers consider the proliferation of oral HPV-related lesions and salivary gland disease to be a direct result of the efficacy of HAART. These pathologies increase with the patient's ability to mount an inflammatory response. This process, referred to as the immune reconstitution syndrome, may lead to increased frequency and severity of select oral lesions. (6, 7, 8, 9, 10) For individual patients, changes in disease presentation or progression may

also indicate increase in HIV viral resistance, non-adherence with medication or HAART failure.

HIV-Associated Oral Pathology

The oral lesions associated with HIV disease have traditionally been classified by etiology, degree of immune suppression, intensity and clinical features. Over the past thirty years, numerous systems have been developed to recognize, diagnose, manage, organize, classify and categorize the oral manifestations of HIV disease. These classification schemas reflect disparate approaches and differing intent: epidemiologic survey vs. clinical/medical guidelines, etiology vs. degree of association with HIV infection, clinical presentation (staging) vs. definitive biopsy diagnosis, and inclusion of CD4+ T-lymphocyte/viral load vs. exclusion of laboratory data. Conflicting methodology, interests and pedagogy resulted in inconsistent classification systems with often non-comparable data.

In 1989, Pindborg proposed one of the first classification systems for oral lesions associated with HIV infection. (11) The system was based on lesion etiology (pathogenesis) and intended for use in epidemiological studies, not clinical practice. Oral lesions were grouped by type: fungal, viral, bacterial, neoplastic, neurological and other (unknown). At the time of publication, 30 oral lesions, many published as individual case reports, were known to be associated with HIV disease.

The European Community (EC) Clearinghouse/WHO publication "Classification and diagnostic criteria for oral lesions in HIV infection" is

the most widely accepted and utilized epidemiological classification system for oral lesions worldwide. (12, 13) Developed in the early 1990s, the EC-WHO system classifies oral lesions present in HIV positive patients into three groups according to prevalence, relative frequency, intensity and clinical features of the lesion. Group 1 is composed of lesions that are strongly associated with HIV infection; Group 2 lesions are less commonly associated with HIV infection and Group 3 lesions are probably associated with HIV.

Although appropriate for the times, the parameters set forth in the EC-WHO publication are almost twenty years old and may not accurately reflect current diagnostic criteria, therapeutics and knowledge. Review of recent literature calls for revisiting, updating, standardizing and calibrating the classification system to include case-based, medicine-based and laboratory-based evidence. (14, 15, 16, 17) There is a recognized need for a clinically-based classification system for HIV-associated oral disease that incorporates epidemiology, clinical presentation, etiology/pathogenesis, stage of disease progression and therapy.

In 2005 (at the 5th World Workshop on Oral Health and Diseases in AIDS), the *ODHIS Workshop Group, Dental Alliance for AIDS/HIV Care, proposed a classification system for HIV-associated oral lesions based upon degree of immune suppression. (18) Group 1 lesions are associated with severe immune suppression $CD4 < 200$ cells/mm³, Group 2 lesions are associated with immune suppression $CD4 < 500$ cells/mm³ and Group 3 lesions are assumed to be associated with immune suppression. The classification system also includes two groups not previously identified in the EC-WHO classification system; Group 4 includes therapeutically-induced oral disease and Group 5 includes emerging oral diseases. Although not absolute, as oral lesions can present at different levels of immune suppression, the ODHIS classification system recognizes the prognostic significance of oral disease by correlating specific oral lesions to degree

of immunosuppression and decreasing CD4 counts. This is a clinical, not epidemiological, approach to classifying HIV-associated oral disease.

The Oral HIV/AIDS Research Alliance (OHARA), as part of the AIDS Clinical Trial Group, recently published (2009) updated case definitions of oral disease endpoints based upon modification of the 1992 and 1993 EC-WHO criteria. (19) Oral lesions are presented by etiology (pathogenesis), clinical descriptors including color, character, extent and location, patient-reported symptoms and duration of clinical findings, and whether definitive diagnosis by biopsy is required.

Oral lesions are also included in the Centers for Disease Control (CDC) and WHO classification systems for HIV/AIDS systemic disease. Oral candidiasis and oral hairy leukoplakia are considered HIV-associated symptomatic diseases in HIV seropositive patients and have been included in the clinical classification of HIV by CDC in category B. (20) The WHO developed a staging system for HIV disease intended for use in epidemiological studies of the oral conditions associated with HIV infection. Oral lesions were organized by clinical presentation and symptoms rather than CD4 count and viral load test results. (21)

Oral Candidiasis

Oral candidiasis, colloquially referred to as 'thrush', is a common fungal infection that may present in both immunocompetent and immunocompromised patients. It is associated with numerous local and systemic conditions including immunosuppression, HIV infection, chemotherapy, poorly controlled diabetes, xerostomia, and denture stomatitis. Oral candidiasis may result in pain on swallowing, oral discomfort, localized swelling, bitter or sour taste and loss of function. Oral candidiasis is most often due to the yeast *Candida albicans*, although non-*albicans*

species have also been reported. Since *Candida albicans* is a normal component of the oral flora, oral candidiasis is more of a 'super-infection' resulting from an overgrowth of the fungal organisms rather than a true infection. Oral candidiasis presents in both acute and chronic forms and occurs as a result of alterations in oral flora.

Immune compromised patients lack the systemic and local immunity to prevent the conversion of yeast from a harmless colonizer to opportunistic or invasive pathogen. (22) In HIV seropositive patients, the incidence of candidal carriage may increase and patients with asymptomatic oral candidiasis may demonstrate a rapid conversion to symptomatic infection. (23) Historically, pre-HAART oral candidiasis was present in up to 90% of HIV seropositive patients. (24) It is one of the most common fungal infections observed in the initial manifestation of symptomatic HIV infection.

Oral candidiasis may be an indicator of early HIV infection and may predict advancing immunodeficiency. Without appropriate treatment, candidiasis may spread to the esophagus resulting in invasive esophageal candidiasis, an AIDS-defining disease. (25) Although the incidence of oral candidiasis has significantly declined in patients with access to antiretroviral therapy, it remains a problem for patients with limited access to medication and may be seen in patients with a poor response to HAART. (14)

Oral candidiasis is typically observed as CD4 counts fall below 500/μl. The presence of oral candidiasis in HIV seropositive patients can be a useful clinical marker for high viral load and low CD4 percentage. (26) It has been suggested that co-infection with HIV and candida may affect both the severity and rate of HIV disease progression in HIV seropositive individuals. (27) Some authors have suggested that an HIV viral load greater than 10,000 copies/mL is the most predictive factor in the development of oral candidiasis. (28)

*Oral diseases of HIV-associated immune suppression (ODHIS)

Clinical Presentation of Oral Candidiasis

1. Acute Pseudomembranous

Candidiasis (Thrush): Presents as white, curd-like plaques that easily wipe away leaving a raw, red or bleeding surface. May occur throughout the oral cavity and pharynx and is frequently asymptomatic (Figure 1)



FIGURE 1: Acute Pseudomembranous Candidiasis (Thrush)

2. Acute Atrophic Candidiasis:

Presents as flat/slightly raised erythematous macules, often seen first on the soft palate. Often precedes the development of pseudomembranous candidiasis. (Figure 2)



FIGURE 2: Acute Atrophic Candidiasis

3. Chronic Denture Stomatitis:

Presents in older adults and is typically located under dentures as edematous erythematous tissue immediately subjacent to denture base. May also present with papillary hyperplasia of the palate. (Figure 3)



FIGURE 3 : Chronic Denture Stomatitis

4. Chronic Median Rhomboid Glossitis:

Presents as flat/slightly raised erythematous depapillated rhomboid shaped lesion on the middle third/ midline dorsal surface of the tongue. (Figure 4)



FIGURE 4: Chronic Median Rhomboid Glossitis

5. Chronic Angular Cheilitis: Presents as perioral erythema and/or cracking, fissuring and superficial ulceration at the corners/commissures of the mouth. (Figure 5)



FIGURE 5: Chronic Angular Cheilitis

There are four frequently observed presentations of oral candidiasis in HIV seropositive patients: 1) acute pseudomembranous candidiasis (thrush), 2) acute atrophic candidiasis, 3) angular cheilitis, and 4) chronic atrophic candidiasis in the forms of denture stomatitis, papillary hyperplasia of the palate, and median rhomboid glossitis. The fifth clinical presentation of oral candidal infection, hyperplastic candidiasis, occurs less often and is a form of chronic candidiasis. Typically a diagnosis of candidiasis can be made on clinical presentation alone or by therapeutic diagnosis whereby the lesions resolve following appropriate drug management.

All photographs were taken by the author, Dr. Gwen Cohen Brown, courtesy of the Department of Dental Hygiene, New York City College of Technology.

Laboratory Tests

Candidiasis

Laboratory tests can be used to confirm the clinical diagnosis of candidiasis, however, they are rarely done unless the lesion does not resolve following appropriate treatment. If lab tests are required, a potassium hydroxide stained cytologic preparation that demonstrates the fungal pseudohyphae penetrating the epithelial cells can be used for confirmation. Confirmation by biopsy and a periodic acid Schiff stain (PAS) is also possible, as the stain will turn the spores and pseudohyphae bright magenta, making them easily visible by light microscope. Fungal cultures are not typically used to confirm the diagnosis of oral candidiasis, as candida albicans is a normal component of the oral flora. (24)

If oral lesions fail to improve following appropriate therapy, a definitive diagnosis is indicated utilizing the above laboratory tests, and the possibility of a resistant strain of candida should be explored. (29) Prior antifungal drug treatment in either prophylactic or suppressive doses of fluconazole (50-100 mg/day) has contributed to the development of fluconazole-resistant candida albicans. (30) Since HAART for the treatment of HIV is widely available and utilized in the United States, routine primary prophylaxis of candidiasis is not indicated. (29) Chronic, suppressive therapy for patients with human immunodeficiency virus (HIV) is not always necessary. If suppressive therapy is required, fluconazole is recommended. (31)

Treatment

Candidiasis

Oral candidiasis is treated with either systemic or topical antifungal medicine. The delivery format is relevant, as different therapeutic modalities are more successful in treating specific clinical manifestations of this disease. To determine which vehicle to use, both the clinical presentation and extent of the infection must be taken into account, as different agents may have preferential activity for each clinical appearance. (32) Topical therapies are indicated for limited and easily accessible, mild to moderate disease and superficial candidal infections. Systemic therapy is appropriate and effective for patients with moderate to severe candidiasis and/or invasive fungal infections.

Current recommendations from the Infectious Diseases Society of America (IDSA) 2009 (31) guidelines on the treatment of oropharyngeal candidiasis in adults state that topical agents are the drugs of choice for initial therapy in patients with a CD4 count greater than 200 cells/mm³. (33) When using topical agents, the level of drug concentration and contact time must be taken into consideration in order to allow the drug to penetrate the oral biofilm. (29) The efficacy of the antifungal medications depends upon a multitude of oral and systemic conditions. Coexisting factors such as xerostomia, salivary gland hypofunction, periodontitis, high HIV viral load and low CD4 counts can decrease the efficacy of the medication and can affect clinical outcomes. (34)

Systemic therapy with fluconazole, ketoconazole, or itraconazole may be considered for the initial treatment of moderate to severe disease oropharyngeal candidiasis. (30) For fluconazole-resistant disease, itraconazole solution or posaconazole suspension (Noxafi®), voriconazole (Vfend®) or amphotericin B oral suspension may be administered.

See Table 1: Antifungal Agents
Topical Creams and Ointments

See Table 2: Antifungal Agents
Topical Troches, Pastilles, Tablets,
Suspensions, Powders

See Table 3: Antifungal Agents
Systemic

All tables are the creation of the author, Dr. Gwen Cohen Brown. Drug information was adapted from the PDR.

Considerations and Concerns- Candidiasis

One consideration in the selection of an antifungal medication is the likelihood of a drug-drug interaction, as a large percentage of HIV seropositive patients are taking concomitant medications. Patients should not take antacids within two-hours of systemic oral azole therapy, as this will interfere with the absorption of the azole and decrease the antifungal properties. Chlorhexidine Gluconate 0.12% oral rinse has been reported to demonstrate antifungal properties. However, it cannot be used at the same time as topical Nystatin since the combination creates a nystatin-chlorhexidine salt precipitate. If both drugs must be used, they should be administered at least one-hour apart. (35)

It is important to remember that prolonged use of topical antifungal agents containing fermentable carbohydrate substrates may result in rapid tooth decay. Patients should be told to rinse their mouth with water after use of any topical antifungal medication containing sucrose. Patients with severe xerostomia or diabetes should be treated with vaginal Nystatin tablets, as they do not contain sucrose. (36)

Human Papilloma Virus (HPV) Related Lesions

HPV is one of the most prevalent viral infections worldwide, with several million new cases diagnosed every year. Currently there are more than 120 identified HPV subtypes, 30 of which have been detected in the oral cavity. (37) HIV seropositive individuals are more likely to carry HPV in the mouth than immune competent individuals and are more likely to be infected by more than one HPV genotype. (38) Oral HPV infection occurs at a higher rate among HIV-infected people than among the general population. The most common genotypes found in the mouth of patients with HIV infection are 2, 6, 11, 13, 16, and 32. (39)

Surveys comparing the incidence of oral and cutaneous HPV-related lesions in HIV seropositive patients (pre- and post-HAART eras) underscore the complexity of this issue. One report found that oral warts were six times more common in patients on HAART. (40) Other studies have linked the presence of oral warts with reductions in viral load. (41) Most researchers currently believe that this phenomenon is related to the Immune Reconstitution-associated Disease (IRAD) process. (42) The concept of IRAD seems counterintuitive in that more HPV lesions have been observed in HIV seropositive patients on HAART, in other words after restoration of the immune system.

The longer survival of HIV seropositive patients on HAART has also led to a high incidence and steady increase in HPV-related malignancies both in women

and men. (43) Recent literature supports the role that high risk HPV subtypes such as 16 and 18 play in the etiology of oral and oropharyngeal squamous cell cancer (SCC). Although the association of oral cancer with HPV is clear, the epidemiology of oral HPV infection remains elusive, and it is still unknown how much of the data from cervical HPV infection can be extrapolated to oral HPV infection. (44) Long-term follow-up is needed to determine the risk of SCC developing from oral dysplastic warts. (45)

The data on emerging incidence and appropriate treatment modalities for oral HPV lesions in HIV seropositive individuals on HAART is still largely unknown. To this end, a large multicenter clinical study has been initiated through the National Institute of Allergy and Infectious Diseases (NIAID). The purpose of this study is to evaluate the frequency of oral HPV DNA shedding and oral warts in HIV-infected people prior to HAART initiation and at regular time points after HAART initiation. This study, ClinicalTrials.gov identifier: NCT01029249, is currently recruiting participants.

Clinical Presentation of Oral HPV-Related Lesions

Oral HPV-related lesions appear papillary with either a pedunculated or sessile stalk, and are often found on the palate, buccal mucosa, and labial commissures. (46) Condyloma may present as a solitary lesion, or more likely with multiple, florid, exophytic papillary lesions throughout the oral cavity and peri-oral tissues.

Clinical Presentation of Oral HPV

HPV/Condyloma Acuminatum: Multiple, papillary projections on the inner aspect of the lower labial mucosa. (Figure 6)

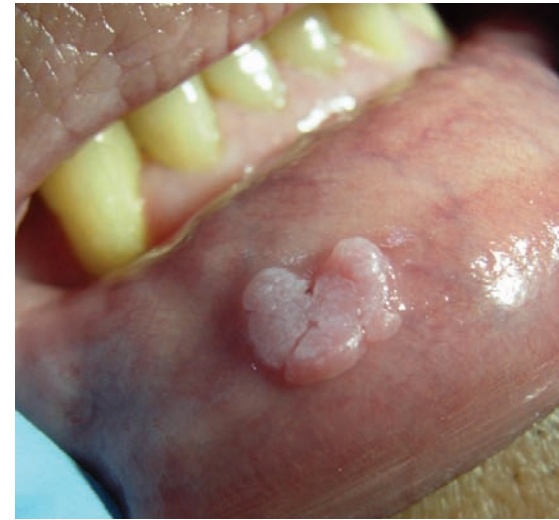


FIGURE 6 : Oral HPV

Treatment of HPV-Related Lesions

Treating oral HPV-related lesions in HIV seropositive patients can be a challenge, as there are no standardized treatment guidelines, nor is there a consensus on the efficacy of available current treatment modalities. There are few published reports on the treatment of oral HPV lesions and most have been case reports. None of the publications has been double-blinded, placebo-controlled or randomized. (47) The treatment of oral condyloma is difficult because of the number and distribution of the lesions, as well as their high recurrence rate.

Traditional treatments aim at the removal or desiccation of HPV lesions.

Although these procedures visually excise the lesion, they tend to recur due to persistence of the virus in clinically normal surrounding mucosal tissue. (48) Most treatment regimens have targeted extra-oral warts, and it is still unknown if these treatment regimens are transferable for the treatment of intraoral warts. Topical application of caustic or acid agents including cantharidin, podophyllin resin, tretinoin, topical 5-fluorouracil have been used with mixed results. Intralesional bleomycin, interferon-alfa, imiquimod, etretinate, cimetidine, and zinc sulfate have all shown varying success as well. (46)

Considerations and Concerns HPV Related Lesions

Cryosurgery, electrocautery or electrosurgery, YAG laser and CO2 laser come with their own set of problems. Although pain and bleeding are reduced with use of a laser or cautery, a smoke plume is produced which may contain HPV virions capable of infecting the patient and the surgeon. (49, 50) Ideally, all visible HPV lesions should be removed at the same time. If they are not, the likelihood is great that the open wounds will be re-seeded with virus and new lesions will develop at the surgical site.

Salivary Gland Disease, Hyposalivation and Xerostomia

Salivary glands are affected in 2–10% of HIV seropositive patients. Clinical manifestations include hyposalivation and dry mouth, or xerostomia. It occurs either because of a reduction in the quantity of saliva produced or as a qualitative change. (51) Caries and periodontal disease reduce and alter the flow, composition and PH of saliva, while xerostomia increases the incidence of bacterial plaque, gingival bleeding and candidal organisms. (52)

Salivary gland disease (SGD) in HIV seropositive patients is characterized by two clinical presentations, major salivary gland enlargement and xerostomia. SGD typically presents as bilateral enlargement of the Parotid glands, due to either the development of lymphoepithelial cysts or a lymphocytic infiltrate within the parenchyma of the glands. (53, 54) Xerostomia is the subjective feeling, perception, of oral dryness. True xerostomia, or dry mouth, occurs when there is a decrease in salivary flow or reduced output from the salivary glands. Xerostomia is a common finding in adults, associated with different systemic and local factors, and can be a side

effect of over-the-counter and prescription medication, smoking, alcohol consumption and dehydration. It is not exclusively identified in the HIV positive population. (53) Xerostomia can be difficult to diagnose and quantify, as dry mouth is often a subjective finding. Patients may present with the feeling of oral dryness yet demonstrate adequate salivary flow clinically. Conversely, they may present with visible findings of xerostomia and objective evidence of hyposalivation, yet feel as if their mouth is amply lubricated. (55) Measurement of the salivary flow rate is indicated and may help to distinguish between subjective xerostomia and objective hyposalivation. The average unstimulated whole salivary flow rate is 0.3 to 0.4 milliliters per minute. An unstimulated rate of 0.1 mL/minute or less indicates hyposalivation. (56)

Saliva aids in the chewing, swallowing and digesting of food. Salivary hypofunction may lead to changes in food and fluid selection that potentially may result in a compromised nutritional status. Saliva dilutes and washes away food debris, sugars and the acids produced by oral bacteria. Without saliva, the oral cavity is not 'buffered'. Reduced salivary flow results in a lower, more acidic intraoral pH level that in turn increases the likelihood of tooth decay, periodontal disease and oral infections. For edentulous patients, saliva creates the vacuum pressure that is critical for the retention, adhesion and comfort of removable dentures. (57)

Clinical Presentation of Xerostomia



FIGURE 7 : Xerostomia

Patients with xerostomia present with dry, cracked and peeling lips, a bald or depapillated red tongue, erythematous candidiasis, difficulty chewing, swallowing, and speaking as well as mucosal burning, soreness, ulceration and halitosis. Often patients will complain of dysgeusia, a bad, bitter or metallic taste. Tooth decay is often rampant and found in unusual locations like the occlusal (biting) surface of the anterior incisor teeth and the cervical root near the gingival margin. (36)

Treatment of Xerostomia

There seems to be little correlation between the patient's subjective findings of dry mouth and objective testing of salivary flow rate, therefore clinical management can be difficult and primarily based on patient symptoms. The salivary flow rate will distinguish between the subjective feelings of xerostomia and the objective clinical presentation of hyposalivation.

If there is a decrease in the salivary flow rate, i.e. the glands are not working properly but still retain secretory function, sialogogues may be indicated. If the glands exhibit adequate salivary flow and the patient is feeling oral dryness, palliative care is indicated. (58, 59)

Lubricating agents in the form of gels, mouthwashes, sugarless gum and lozenges have been used, with varying degrees of success, to relieve the symptoms of xerostomia by increasing salivary output.

(60) Salivary substitutes available by prescription also may alleviate the discomfort. Increasing fluoride percentage in mouth rinses and toothpastes can help prevent tooth decay in patients with hyposalivation.

Summary

HAART has significantly changed the clinical presentation of oral disease in HIV seropositive patients. Overall, patients are living healthier, longer lives with fewer complications from oral disease. However, oral HPV lesions, salivary gland disease, hyposalivation and xerostomia are on the rise and are proving to be complex and difficult to treat. Oral candidiasis remains a problem especially when coupled with decreased salivary flow. Oral HPV lesions do not yet have definitive treatment guidelines, and the association of oral squamous cell carcinoma with certain high-risk HPV subtypes found in oral warts will change the clinical paradigm and treatment methodology in the near future.

All photographs were taken by the author, Dr. Gwen Cohen Brown, courtesy of the Department of Dental Hygiene, New York City College of Technology.

TABLE 1: Antifungal Agents-Topical Creams and Ointments

ANTIFUNGAL AGENT	INDICATION	DISPENSE (DISP)	DIRECTIONS (SIG)	CONTRAINDICATION CAUTION	DRUG INTERACTIONS	ADVERSE REACTIONS	BRAND NAME
Clotrimazole 1% Cream (OTC)	Imidazole Antifungal, Mild to Moderate Cutaneous Candidiasis, Acute Angular Cheilitis	1 tube 15 gm 30 gm	Apply to clean dry affected area 4x/day for 2-4 weeks	None	No significant interactions known or found.	Irritation Erythema Burning Stinging	Various Generic Manufacturers
Miconazole 2% Cream (OTC)	Imidazole Antifungal, Mild to Moderate Cutaneous Candidiasis, Acute Angular Cheilitis	1 tube 15 gm 30 gm	Apply to clean dry affected area 2x/day for 2-4 weeks	None	No significant interactions known or found.	Irritation Erythema Burning Stinging	Various Generic Manufacturers
Ketoconazole 2% Cream; contains Sulfites (RX)	Imidazole Antifungal, Mild to Moderate Cutaneous Candidiasis, Acute Angular Cheilitis	1 tube 15 gm 30 gm 60 gm	Apply 1x/day to affected and adjacent area. Treat for at least 2 weeks	Asthma	No significant interactions known or found.	Irritation Pruritus Stinging Allergic Reaction	Nizoral® Various Generic Manufacturers
Nystatin Cream or Ointment 100,000 U/1mL (gm) (RX)	Polyene Antifungal, Cutaneous or Mucocutaneous Candidiasis, Acute Angular Cheilitis, Denture Stomatitis	1 tube 15 gm 30 gm	Apply liberally to corners of mouth or apply to the denture base before insertion 4x/day for 2-4 weeks	None Patients must remove dentures to allow medication to contact mucosa.	No significant interactions known or found.	Irritation (rare)	Mycostatin®
Triamcinolone Acetonide 0.1%, Nystatin 100,000 U/1mL (gm) Ointment or Cream (RX)	Steroid + Polyene, Antifungal Mild to Moderate Cutaneous Candidiasis, Chronic Angular Cheilitis	1 tube ointment 15 gm Cream 15 gm 30 gm 60 gm	Apply sparingly 2x/day Maximum 25 days treatment	Varicella Avoid prolonged use + large areas. Ointment: high/medium strength corticosteroid potency Cream: medium strength corticosteroid potency	No significant interactions known or found.	Burning Itching Irritation	Various Generic Manufacturers Mycolog II® Discontinued in US
Betamethasone as Dipropionate 0.05%, Clotrimazole 1% Cream (RX)	Steroid + Imidazole, Antifungal Mild to Moderate Cutaneous Candidiasis, Chronic Angular Cheilitis	1 tube 15 gm 45 gm	Apply sparingly 2x/day	Varicella Do not occlude. 45 gm per week maximum; Cream: medium strength corticosteroid potency	Anthralin Topical Combination may increase symptoms of psoriasis	Skin Atrophy Hypo-pigmentation Irritation Burning Paresthesia	Lotrisone®
Hydrocortisone 1%, Iodoquinol 1%; Cream (RX)	Steroid + Antifungal + Antibacterial, Short-term, Steroid-responsive skin infection with mild bacterial or fungal infection, Chronic Angular Cheilitis	1 tube 30 gm	Apply to affected area 3-4 x/day	Steroid + Antibiotic. Low strength corticosteroid potency	Sabril (vigabatrin)	Burning Itching Irritation	Vytone®

TABLE 2: Antifungal Agents-Topical Troches, Pastilles, Tablets, Suspensions, Powders

ANTIFUNGAL AGENT	INDICATION	DISPENSE (DISP)	DIRECTIONS (SIG)	CONTRAINDICATION CAUTION	DRUG INTERACTIONS	ADVERSE REACTIONS	BRAND NAME
Miconazole Buccal Tablet 50 mg (RX)	Imidazole Antifungal Mild to Moderate Oropharyngeal Candidiasis	Buccal Tabs 14 count	1 tab daily in the morning for 14 days. Do not crush, chew or swallow.	Apply the tablet directly maxillary gingiva into the small depression above incisor. Tab will slowly dissolve during the day.	Warfarin, Monitor INR, Combination may increase risk of bleeding disturbance.	Local irritation, Nausea Diarrhea Taste	Oravig™
Nystatin Lozenge (Pastilles) 200,000 U/1mL (gm) (RX)	Polyene Antifungal, Mild to Moderate Oropharyngeal Candidiasis	Pastilles 70 count 14 day supply	1 pastille 4-5x/day for 14 days. Continue for at least 2 days after all symptoms have gone. Slowly dissolve in mouth; do not crush, chew or swallow whole.	Aniseed licorice flavored. Patients must remove dentures to allow medication to contact mucosa. Requires adequate saliva to dissolve. Contains Sucrose + Glucose. Caution: Diabetes Mellitus patients. Cariogenic so adjunctive topical fluoride therapy may be needed. Do not eat for 30 min after use.	No significant interactions known or found.	May cause mucosal irritation, Nausea	Mycostatin® Pastilles
Nystatin Vaginal Tablet 100,000 U/1mL (gm) (RX)	Polyene Antifungal, Mild to Moderate Oropharyngeal Candidiasis	Tablet 70 count 14 day supply	1 tablet 4-5x/day for 14 days. Continue for at least 2 days after all symptoms have gone. Slowly dissolve in mouth; do not crush, chew or swallow whole.	Patients must remove dentures to allow medication to contact mucosa. For use with Caries active Patients, Diabetes Mellitus patients	No significant interactions known or found.	May cause mucosal irritation, Nausea	Mycostatin® Tablet
Clotrimazole Troches 10 mg (RX)	Imidazole Prophylaxis + Treatment of Mild to Moderate Oropharyngeal Candidiasis	Troches 70 count 14 day supply	Treatment: 1 troche 5x/day for 14 days. Prophylaxis: 1 troche 3x/day Slowly dissolve in mouth; do not crush, chew or swallow whole.	Requires adequate saliva to dissolve. Contains Dextrose Caution: Diabetes Mellitus patients. Cariogenic so adjunctive topical fluoride therapy may be needed Do not eat for 30 min after use.	No significant interactions known or found for this drug.	Vomiting Nausea May cause altered taste	Various Generic Manufacturers Mycelex® Discontinued in US
Clotrimazole Vaginal Tablet 100 mg (RX)	Imidazole Prophylaxis + Treatment of Mild to Moderate Oropharyngeal Candidiasis	Tablet	Tablet to be cut in half 2x/day for 14 days. One-half slowly dissolve in mouth; do not crush, chew or swallow whole.	Requires adequate saliva to dissolve. Patients must remove dentures to allow medication to contact mucosa. For use with Caries active Patients, Diabetes Mellitus patients	N/A	N/A	N/A
Nystatin Oral Suspension 100,000 U/1mL (gm) (RX)	Polyene Antifungal, Mild to Moderate Oropharyngeal Candidiasis	60 mL with dropper, 473 mL (1 pint) bottle 14 day supply	Swish 1 tsp or 5 mL in mouth, hold 5 minutes 4x/day, or 1 tsp or 5 mL on gauze pad, hold in mouth for 5 minutes 4x/day	Shake well before using. Patients must remove dentures to allow medication to contact mucosa. Contains Sucrose + Glucose. Caution: Diabetes Mellitus patients. Cariogenic so adjunctive topical fluoride therapy may be needed Do not eat for 30 min after use.	No significant interactions known or found.	Vomiting Nausea Abdominal pain	Mycostatin® Suspension
Nystatin Topical Powder 100,000 U/1mL (gm) (RX)	Polyene Antifungal, Denture Stomatitis	15 gm	Apply thin film to the denture base after meals before insertion 4x/day for 2-4 weeks	None Patients must remove dentures to allow medication to contact mucosa.	No significant interactions known or found.	Irritation (rare)	Mycostatin®

TABLE 3: Antifungal Agents-Systemic

ANTIFUNGAL AGENT	INDICATION	DISPENSE (DISP)	DIRECTIONS (SIG)	CONTRAINDICATION CAUTION	DRUG INTERACTIONS	ADVERSE REACTIONS	BRAND NAME
Fluconazole Tablets 100 mg	Triazole Antifungal Oropharyngeal and Esophageal Candidiasis	15 Tablets	2 tablets loading dose then 1, 100 mg/day tablet with food for 7-14 days	Documented hypersensitivity. Monitor liver function.	Hydrochlorothiazide Rifampin Warfarin Phenytoin Cyclosporine Zidovudine Theophylline Tacrolimus Cisapride Erythromycin	Photosensitivity Nausea Vomiting Diarrhea Allergic Reactions	Diflucan®
Fluconazole Solution 10 mg/mL	Triazole Antifungal Oropharyngeal and Esophageal Candidiasis	350 mg per bottle 1400 mg per bottle	10 mL 1x/day	Documented hypersensitivity. Monitor liver function.	Hydrochlorothiazide Rifampin Warfarin Phenytoin Cyclosporine Zidovudine Theophylline Tacrolimus Cisapride Erythromycin	Photosensitivity Nausea Vomiting Diarrhea Allergic Reactions	Diflucan®
Itraconazole Capsules 100 mg	Imidazole Antifungal Oropharyngeal and Esophageal Candidiasis	15 Capsules 30 Capsules	1 capsule 100 mg/day with food. Tablet with food for 15 days Increase dose to 200 mg/day for 15 days in AIDS patients if impaired absorption.	Documented hypersensitivity. Monitor liver function. Antacids may reduce absorption of itraconazole. Pregnancy + congestive heart failure contraindicated.	Astemizole Bepidil Cisapride Dofetilide Levacetylmethadol Mizolastine Pimozide Quinidine Sertindole Terfenadine Ergot alkaloids Triazolam Eletriptan Nisoldipine	Nausea Vomiting Stomach Upset	Sporanox®
Itraconazole Solution 10 mg/mL	Imidazole Antifungal Oropharyngeal and Esophageal Candidiasis	150 mL 10 mL measuring cup	Swish 100 mg, 1 measuring cup, in mouth for 20 seconds 1x/day for 7 days. Take without food; refrain from eating for at least 1 hour after use.	Documented hypersensitivity. Monitor liver function. Antacids may reduce absorption of itraconazole. Pregnancy + congestive heart failure contraindicated.	Astemizole Bepidil Cisapride Dofetilide Levacetylmethadol Mizolastine Pimozide Quinidine Sertindole Terfenadine Ergot alkaloids Triazolam Eletriptan Nisoldipine	Headache Abdominal pain Vomiting Nausea Diarrhea Dysgeusia	Sporanox®
Ketoconazole Tablets 200 mg	Imidazole Antifungal Oropharyngeal and Esophageal Candidiasis	15 Tablets	2 tablets Loading dose then 1 200 mg/day tablet with food or fruit juice for 7-14 days	Documented hypersensitivity. Monitor liver function. Absorption of Ketoconazole is dependant on gastric acidity.	Triazolam Terfenadine Astemizole Cisapride Cyclosporine Tacrolimus Methyl-prednisolone Rifampin	Nausea Vomiting Diarrhea Edema Hypokalemia	Nizora® Various Generic Manufacturers
Posaconazole Suspension 100 mg/2.5 mL	Antifungal Oropharyngeal and Esophageal Candidiasis	4-ounce (123 mL) A measured dosing spoon is provided, marked for doses of 2.5 mL and 5 mL.	2 tsp daily Loading dose of 100 mg (2.5 mL) twice a day on the first day, then 100 mg (2.5 mL) once a day for 13 days.	Shake well before use.	Ergot alkaloids Terfenadine Astemizole Cisapride Pimozide Halofantrine Quinidine Cimetidine Rifabutin Phenytoin Efavirenz	Nausea Vomiting Diarrhea	Noxafil®

References

1. Greenspan JS, Greenspan D. Oral Complications of HIV Infection. In: Sande MA, Volberding PA, eds. *Medical Management of AIDS*, 6th ed. Philadelphia: WB Saunders; 1999: 157-169.
2. Ceballos-Salobreña A, Gaitán-Cepeda LA, Ceballos-García L, Lezama-Del Valle D. Oral lesions in HIV/AIDS patients undergoing highly active antiretroviral treatment including protease inhibitors: A new face of oral AIDS? *AIDS Patient Care STDS* 2000; 14:627-35.
3. Ives NJ, Gazzard BG, Easterbrook PJ. The changing pattern of AIDS-defining illnesses with the introduction of highly active antiretroviral therapy (HAART) in a London clinic. *J Infect* 2001; 42(2):134-9
4. Birnbaum W, Hodgson TA, Reichart PA, Sherson W, Nittayannanta SW, Axell TE: Prognostic significance of HIV-associated oral lesions and their relation to therapy. *Oral Dis* 2002 , 8:110-4
5. Itin PH, Lautenschlager S, Fluckiger R, Ruffi T. Oral manifestations in HIV-infected patients: diagnosis and management. *Journal of the American Academy of Dermatology* - November 1993 (Vol. 29, Issue 5, Pages 749-760)
6. Chattopadhyay A, Caplan DJ, Slade GD, Shugars DC, Tien HC, Patton LL. Incidence of oral candidiasis and oral hairy leukoplakia in HIV-infected adults in North Carolina. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2005;99(1):39-47.
7. Greenspan D, Komaroff E, Redford M, Phelan JA, Navazesh M, Alves ME, et al. Oral mucosal lesions and HIV viral load in the Women's Interagency HIV Study (WIHS). *J Acquir Immune Defic Syndr* 2000;25(1):44-50.
8. Greenspan D, Gange SJ, Phelan JA, Navazesh M, Alves ME, MacPhail LA, et al. Incidence of oral lesions in HIV-1-infected women: reduction with HAART. *J Dent Res* 2004;83(2): 145-50.
9. Greenspan D, Canchola AJ, MacPhail LA, Cheikh B, Greenspan JS. Effect of highly active antiretroviral therapy on frequency of oral warts. *Lancet* 2001;357:1411-2.
10. Patton LL, McKaig R, Strauss R, Rogers D, Eron JJ. Changing prevalence of oral manifestations of human immunodeficiency virus in the era of protease inhibitor therapy. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2000 Mar;89(3):299-304.
11. Pindborg J. Classification of oral lesions associated with HIV infection. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 1989;67:292-).
12. 1991), An update of the classification and diagnostic criteria of oral lesions in HIV infection. *Journal of Oral Pathology & Medicine*, 20: 97-100. doi: 10.1111/j.1600-0714.1991.tb00900.x
13. (1993), Classification and diagnostic criteria for oral lesions in HIV infection. *Journal of Oral Pathology & Medicine*, 22: 289-291. doi: 10.1111/j.1600-0714.1993.tb01074.x
14. Hood S, Bonington A, Evans J, Denning D. Reduction in oropharyngeal candidiasis following introduction of protease inhibitors. *AIDS* 1998;12:447-8
15. Chapple ILC, Hamburger J. The significance of oral health in *HIV disease Sex Transm Infect* 2000;76:236-243
16. D Greenspan, JS Greenspan. Oral manifestations of HIV infection *AIDS Clin Care* 1997;9:29-33
17. Weinert M, Grimes RM, Lynch DP. Oral Manifestations of HIV Infection *Ann Intern Med* September 15, 1996 125:485-496
18. Glick M, Abel SN, Flaitz CM, Migliorati CA, Patton LL, Phelan JA, Resnick DA. (A-7) Classification of Oral Disease of HIV-Associated Immune Suppression, 5th World Workshop on Oral Health and Disease in AIDS. ODHIS Workshop Group – USA
19. Shiboski CH, Patton LL, Webster-Cyriaque J Y, Greenspan D, Traboulsi RS, Ghannoum M, Jurevic R, Phelan JA, Reznik D, Greenspan JS. The Oral HIV/AIDS Research Alliance: updated case definitions of oral disease endpoints. *J Oral Pathol Med* (2009) 38: 481-488
20. 1993 Revised Classification System for HIV Infection and Expanded Surveillance Case Definition for AIDS Among Adolescents and Adults. <http://www.cdc.gov/mmwr/preview/mmwrhtml/00018871.htm>
21. Melnick SL, Nowjack-Raymer R, Kleinman DV, Swango PA. A Guide for Epidemiological Studies of Oral Manifestations of HIV Infection. Geneva: WHO, 1993
22. Fidel PL Jr. Distinct protective host defenses against oral and vaginal candidiasis. *Med Mycol* 2002;40: 359-75.
23. Klein RS, Harris CA, Small CB, Moll B, Lesser M, Friedland GH. Oral candidiasis in high-risk patients as the initial manifestation of the acquired immunodeficiency syndrome. *N Engl J Med* 1984;311:354-8
24. Thompson GR, Patel PK, Kirkpatrick WR, Westbrook SD, Berg D, Erlandsen J, Redding SW, Patterson TF. Oropharyngeal candidiasis in the era of antiretroviral therapy Oral Surgery. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* April 2010 (Vol. 109, Issue 4, Pages 488-495
25. Coogan MM., Greenspan J, Challacombe SJ. Oral lesions in infection with human immunodeficiency virus. *Bull World Health Organ* [serial on the Internet]. 2005 Sep [cited 2010 Oct 10]; 83(9): 700-706.
26. Campo J, Del Romero J, Castilla J, García S, Rodríguez C, Bascones A. Oral candidiasis as a clinical marker related to viral load, CD4 lymphocyte count and CD4 lymphocyte percentage in HIV-infected patients *Journal of Oral Pathology & Medicine* Volume 31, Issue 1, January 2002, Pages: 5-10

27. Campisi G, Pizzo G, Milici ME, Mancuso S, Margiotta V. Candidal carriage in the oral cavity of human immunodeficiency virus-infected subjects *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* March 2002 Vol. 93, Issue 3, Pages 281-286
28. Mercante DE, Leigh JE, Lilly EA, McNulty K, Fidel PL, Jr. Assessment of the association between HIV viral load and CD4 cell count on the occurrence of oropharyngeal candidiasis in HIV-infected patients. *J Acquir Immune Defic Syndr* 2006;42:578-83. Keith D Hunter, John Gibson, Peter Lockhart, Alan
29. Ship JA, Vissink A, Challacombe SJ. Use of prophylactic antifungals in the immunocompromised host. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* March 2007 (Vol. 103 Supplement, Pages S6.e1-S6.e14, DOI: 10.1016/j.tripleo.2006.11.003)
30. Hunter KD, Gibson J, Lockhart P, Pithie A, Bagg J. Fluconazole-resistant *Candida* species in the oral flora of fluconazole-exposed HIV-positive patients. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* May 1998 (Vol. 85, Issue 5, Pages 558-564)
31. Pappas PG, Kauffman CA, Andes D, Benjamin DK Jr., Calandra TF, Edwards JE Jr., Filler SG, Fisher JF, Kullberg BJ, Ostrosky-Zeichner L, Reboli AC, Rex JH, Walsh TJ, Sobel JD. Clinical Practice Guidelines for the Management of Candidiasis: 2009 Update by the Infectious Diseases Society of America
32. Leão JC, Ribeiro CMB, Carvalho AAT, Frezzini C, Porter S. Oral complications of HIV disease. *Clinics.* 2009;64(5):459-70.
33. Mofenson LM, Brady MT, Danner SP, et al. Centers for Disease Control and Prevention, National Institutes of Health, HIV Medicine Association of the Infectious Diseases Society of America, Pediatric Infectious Diseases Society, American Academy of Pediatrics. Fungal infections. In: Guidelines for the prevention and treatment of opportunistic infections among HIV-exposed and HIV-infected children: recommendations from CDC, the National Institutes of Health, the HIV Medicine Association. *MMWR Recomm Rep.* 2009; 58(RR-11):28-50.
34. Baccaglioni L, Atkinson JC, Patton LL, Glick M, Ficarra G, Peterson DE. Management of oral lesions in HIV-positive patients *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* March 2007 (Vol. 103 Supplement, Pages S50.e1-S50.e23, DOI: 10.1016/j.tripleo.2006.11.002)
35. Barkvoll P, Attramadal A. Effect of nystatin and chlorhexidine digluconate on *Candida albicans*. *Oral Surg Oral Med Oral Pathol* 1989;67(3):279-81
36. Cohen-Brown G, Ship JA. Diagnosis and treatment of salivary gland disorders. *Quintessence Int* February 2004 (Vol. 35, Issue 2, Pages 108-23)
37. Felefi, S, Flaitz, C M Oral warts in HIV-infected individuals Research initiative, treatment action: RITA 2000 Vol 6 issue 3 pgs 19-22
38. Fiumara, N. The Management of Warts of the Oral Cavity Sexually Transmitted Diseases. 11(4):267-270, October/December 1984.
39. Bajpai S, Pazare AR. Oral manifestations of HIV. *Contemp Clin Dent* 2010;1:1-5
40. Greenspan D, Canchola AJ, MacPhail LA, Cheikh B, Greenspan JS. Effect of highly active antiretroviral therapy on frequency of oral warts. *Lancet.* 2001;357:1411-1412.
41. Meys R, Gotch FM, Bunker C. Human papillomavirus in the era of highly active antiretroviral therapy for human immunodeficiency virus: an immune reconstitution-associated disease? *British Journal of Dermatology.* 162(1):6-11, January 2010.
42. King MD, Reznik DA, O'Daniels CM, Larsen NM, Osterholt D, Blumberg HM. Human papillomavirus-associated oral warts among human immunodeficiency virus-seropositive patients in the era of highly active antiretroviral therapy: an emerging infection. *Clin Infect Dis.* 2002;34:641-648
43. Sjoerd H van der Burg, Joel M Palefsky Human immunodeficiency virus and human papilloma virus-why HPV-induced lesions do not spontaneously resolve and why therapeutic vaccination can be successful. *Journal of Translational Medicine* 2009 7:108 doi:10.1186/1479-5876-7-108
44. Fakhry C, D'souza G, Sugar E, Weber K, Goshu E, Minkoff H, Wright R, Seaberg E, Gillison M. Relationship between Prevalent Oral and Cervical Human Papillomavirus Infections in Human Immunodeficiency Virus Positive and Negative Women *J. Clin. Microbiol.* 2006 44: 4479-4485
45. Regezi JA, Dekker NP, Ramos DM, Li X, Macabeo-Ong M, Jordan RC. Proliferation and invasion factors in HIV-associated dysplastic and nondysplastic oral warts and in oral squamous cell carcinoma: an immunohistochemical and RT-PCR evaluation. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2002 Dec 94(6) 724-31
46. Moyle, G.J. Outbreaks of Oral Warts Coinciding With HAART? *Medscape HIV/AIDS* 2002 Vol 8 Issue 2 Pgs 7-8
47. Baccaglioni L, Atkinson JC, Patton LL, Glick M, Ficarra G, Peterson DE. Management of oral lesions in HIV-positive patients *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2007;103(suppl 1):S50.e1-S50.e
48. Bernard HU. Established and potential strategies against papillomavirus infections *J. Antimicrob. Chemother.* (2004) 53(2): 137-139 first published online January 7, 2004 doi:10.1093/jac/dkh023
49. Gloster HM Jr, Roenigk RK. Risk of acquiring human papillomavirus from the plume produced by the carbon dioxide laser in the treatment of warts *J Am Acad Dermatol.* 1995 Mar;32(3):436-41.
50. Alpa E, Bijlc D, Bleichrodt RP, Hansson B, Vossa A. Surgical smoke and infection control *Journal of Hospital Infection* (2006) 62, 1-5

51. Kaplan I, Zuk-Paz L, Wolff A. Association between salivary flow rates, oral symptoms, and oral mucosal status *Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;106:235-41
52. César J. Filho C, Giovani EM. Xerostomy, Dental Caries and Periodontal Disease in HIV+ Patients The Brazilian Journal of Infectious Diseases 2009;13(1):13-17.
53. Schiødt M. HIV-associated salivary gland disease: A review *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. Volume 73, Issue 2, February 1992, Pages 164-167
54. Mulligan R, Navazesh M, Komaroff E, Greenspan D, Redford M, Alves M, Phelan JA. Salivary gland disease in human immunodeficiency virus-positive women from the WIHS study. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. June 2000 (Vol. 89, Issue 6, Pages 702-709)
55. Guggenheimer J, Moore PD. ADA Continuing Education Xerostomia Etiology, recognition and treatment *J Am Dent Assoc*, Vol 134, No 1, 61-69. © 2003
56. Wiener RC, Wu B, Crout R, Wiener M, Plassman B, Kao E, McNeil D. Hyposalivation and xerostomia in dentate older adults *JADA* 2010;141(3):279-284.
57. Turner M, Jahangiri L, Ship JA. Continuing Education Hyposalivation, xerostomia and the complete denture A systematic review *J Am Dent Assoc*, Vol 139, No 2, 146-150. © 2008
58. Von BultzingsloÅNwen I, Sollecito TP, Fox PC, Daniels T, Jonsson R, DMD, Lockhart B, Wray D, Brennan MT, Carrozzo M, Gandera BI, Fujibayashi T, Navazesh M, Rhodus NL, Schiødt M. Salivary dysfunction associated with systemic diseases: systematic review and clinical management *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007;103(suppl 1):S57.e1- S57.e15
59. V. Visvanathan, P. Nix Managing the Patient Presenting with Xerostomia: A Review *Int J Clin Pract*. 2010;64(3):404-407. © 2010
60. Shetty K. Implications and management of xerostomia in the HIV-infected patient *HIV Clinician Special Dental Issue* March 2005 pgs 1-4

SELF-ASSESSMENT TEST

DIRECTIONS: Referring to the module text, please select the BEST answer by circling your response directly on this test. To obtain education credit, a minimum of 70% of the questions must be answered correctly. **This learning activity is awarded 1.0 contact hour until June 30, 2011.**

Oral Lesions and Treatment Recommendations for the HIV-infected Patient

1. **Since HAART therapy was introduced, the overall incidence of oral lesions has *increased*.**
 - A. True
 - B. False
2. **Oral lesions associated with HIV disease have traditionally been classified by the following:**
 - A. Etiology
 - B. Degree of immune suppression
 - C. Intensity
 - D. Clinical features
 - E. All of the above
3. ***Candida albicans* is a normal component of the oral flora.**
 - A. True
 - B. False
4. **Oral candidiasis may be:**
 - A. An indicator of HIV infection
 - B. Found when CD4 is high
 - C. Found when viral load is low
 - D. Diagnosed only with certain laboratory tests
5. **Patients should *not* take antacids within 2 hours of systemic oral azole therapy.**
 - A. True
 - B. False
6. **Candidiasis can be treated with:**
 - A. Topical therapy
 - B. Systemic therapy
 - C. Antibiotics
 - D. All of the above
 - E. A and B
7. **There are no standardized treatment guidelines for the treatment of HPV.**
 - A. True
 - B. False
8. **Treatment for HPV lesions includes all of the below *except*:**
 - A. Desiccation of the lesion(s)
 - B. Caustic or acid agents
 - C. Intralesional bleomycin
 - D. Antifungal therapy
 - E. Cryosurgery
9. **Xerostomia can be a side effect of:**
 - A. Over-the-counter medications
 - B. Smoking
 - C. Prescription medications
 - D. Alcohol consumption
 - E. Dehydration
 - F. All of the above
10. **Reduced salivary flow can lead to a *decrease* in tooth decay.**
 - A. True
 - B. False

(OVER)

To assure your receipt of education credit, please mail your completed self assessment test, program evaluation/reader information form and HRSA participant information form.

(3 pages) to: **Jim Ybarra**
Albany Medical College
47 New Scotland Avenue, Mail Code 158
Albany, NY 12208

Oral Lesions and Treatment Recommendations for the HIV-infected Patient

EVALUATION

1. Please select the type of education credit you are seeking:
- CME* (proceed to question 3)
 - Dental Credit (go to question 2)

*By selecting CME, you will receive a CME certificate. Disciplines with other continuing education requirements (e.g. nurses etc.) are encouraged to submit this CME certificate as evidence of participation for reciprocity of credits.

2. If you are a member of the American Dental Association (ADA), please cite your ADA number here for education credit tracking: _____

If you do not have an ADA number, please check here**

**You are still eligible for dental credit, but will need to submit your dental attendance certificate to your credentialing board for credit.

3. Please rate the feature article with respect to:
- | | | | | | |
|---------------------------------------|---|---|---|---|---|
| EDUCATIONAL VALUE (circle one) | 5 | 4 | 3 | 2 | 1 |
| CLARITY (circle one) | 5 | 4 | 3 | 2 | 1 |
- (5 = excellent 4 = very good 3 = good 2 = fair 1 = poor)

Comments: _____

4. Did this resource meet its stated learning objectives?
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5. Do you think that this resource will help you in your work?
 Yes No Why/why not: _____

6. What future HIV topics should this resource address?

7. Did you notice any commercial bias in this resource?
 Yes No

I completed the above activity and am claiming _____ (hour) of credit (number of hours you actually participated). If you completed the entire activity, please write 1.0 hour in the space provided.

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Organization Name: _____

Organization Address: _____

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PLEASE PROCEED TO THE NEXT PAGE AND COMPLETE THE HRSA PARTICIPANT INFORMATION FORM.

CME CREDIT/CERTIFICATE QUESTIONS:

Contact Jim Ybarra at 518.262.4674 or ybarraj@mail.amc.edu

DENTAL CREDIT/CERTIFICATE QUESTIONS:

Contact Howard Lavigne at 315.477-8479 or hel01@health.state.ny.us

Please allow 6-8 weeks for your attendance certificate.

