



Knowledge of Primary Health Care Providers in Nairobi East District, Kenya, Regarding HIV-related Oral Facial and Other Common Oral Diseases and Conditions

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Authors' contributions

This work was carried out in collaboration between all authors. Authors LNK, WJMvdS, JM, JEF designed the study. Authors LNK, WJMvdS, EOD, JM, AJAMvdV, MAWM, JEF wrote the protocol, and wrote the first draft of the manuscript. Author JM analysed the study results. All authors read and approved the final manuscript.

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ABSTRACT

Background: In the Kenya primary health care (PHC) setting where most patients, including nearly 1.4 million HIV-infected people, seek medical care, PHC providers are expected to identify and manage HIV-related oral diseases during general consultations. This study aimed to assess the

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current knowledge of clinical officers and nurses in Nairobi East district of Kenya regarding HIV-related oral diseases and conditions.

Design and Methods: A 40-item questionnaire was used in interviewing all 57 PHC providers in 2 administrative divisions in the district in a cross-sectional survey. Assessed categories were: knowledge about HIV-related oral lesions, clinical appearance of HIV-suspected conditions, knowledge about oro-pharyngeal candidiasis (OPC), general dental knowledge, common appearances of OPC, knowledge about periodontitis, causes of dental caries, frequency of general oral examinations and past training in oral health topics. The first 4 categories were confirmed as sub domains, with Cronbach's alpha of 0.57, 0.54, 0.59 and 0.45 respectively.

Results: All 57 PHC providers (15 clinical officers and 42 nurses) completed the questionnaire (response rate 100%). PHC providers did not routinely perform oral examinations. Their knowledge about HIV-related oral health topics and general oral health was found to be generally inadequate.

Recommendations: A training module on HIV-related oro-facial lesions for Nairobi PHC providers, incorporating a practical session covering oral examinations, is recommended; especially in this high HIV-prevalence environment.

Keywords: HIV; public health; knowledge Kenya.

1. INTRODUCTION

Nearly 90% of individuals infected with human immunodeficiency virus (HIV) develop visible signs of oral diseases in the course of their illness [1]. The more common HIV-related oral lesions include oro-pharyngeal candidiasis (OPC), oral hairy leukoplakia, oral Kaposi's sarcoma, necrotising gingivitis and enlargement of the parotid glands [2-7]. Some lesions appear soon after HIV infection, allowing early identification of this infection [3]. The presence of these lesions may also serve as an early warning sign of non-response to treatment in patients already receiving highly active antiretroviral therapy (HAART), and of lowered immunological functions [8-11]. Early identification and management of the lesions may eventually improve quality of care for these patients, as well as their quality of life.

In Kenya most patients, including an estimated 1.4 million HIV-infected ones [12], seek medical care in primary healthcare (PHC) settings [13,14]. Clinical officers and nurses, the main service providers in PHC establishments, are trained to perform general medical examinations, make diagnoses and treat or refer patients to higher levels of care. As first-line service providers they are also expected to perform oral health tasks during consultations and record the results daily on government tally sheets [15]. They need competences and skills to perform the expected oral healthcare tasks. However, these are assumed to be inadequate. To investigate their adequacy, the present study aimed to identify gaps in the knowledge of clinical officers

and nurses regarding HIV-related oral lesions and other common oral conditions. It was conducted in the Nairobi East district.

2. DESIGN AND METHODS

Approval for this study was obtained from the Kenyatta National Hospital/University of Nairobi Ethics and Research Committee (approval number KNH-ERC/A/474) and from the Ministry of Public Health and Sanitation (Ref. NO. MPHS/IB/1/14 Vol. III). Written consent for the study to be conducted in Nairobi East district was received from the provincial and district heads of the department. This trial was registered in the Netherlands Trial Register (<http://www.trialregister.nl>, NTR2627).

2.1 Selection of Participants

Nairobi province as a capital city, has the largest number of clinical staff (medical doctors, dentists, nurses and clinical officers) in the country, with highly accessible public HFs, in comparison to other regions in the country [16,17,18,19]. The proportions of these clinical staff nationally and in Nairobi East district are comparable [20], as shown in (Table 1). Of the total 466 clinical officers and nurses, 270 work in 54 public health facilities. The study was conducted among all 57 PHC providers in 4 health facilities (HFs) in Njiru (n=32) and 4 HFs in Makadara (n=25) divisions in the Nairobi East district. These were test and control divisions, as described in our earlier publication [21].

Table 1. Comparison of proportions of clinical staff (medical doctors, dentists, nurses and clinical officers) Kenya: countrywide and in Nairobi east district in 2009

Profession	Nationally* (n, %)		Nairobi east district** (n, %)	
Doctors	6,897.00	11%	69	13%
Dentists	1,004.00	2%	4	1%
Nurses(BSc, enrolled, registered)	48,643.00	78%	405	77%
Clinical officers	5,888.00	9%	51	10%
Total number of	2,432.00	100%	529	100%

Source: * [16;17], **[20]

All clinical officers and nurses offering clinical services were included. A 4-year diploma course in clinical medicine provides basic training for clinical officers. Registered and enrolled nurses complete 3.5 and 2 years of training at diploma and certificate levels, respectively.

2.2 Questionnaire and Codebook Development

LNK, WVS and JE developed initial questionnaires under two domains: a) Knowledge on/about HIV-related oro-facial diseases; b) Knowledge on general oral diseases and conditions. A panel of 4 PHC providers and 6 dental researchers evaluated the appropriateness of the questionnaire. Questions were checked for simplicity and clarity and modified in accordance with their comments. The final questionnaire contained forty items (Fig. 1). The domain with questions pertaining to PHC provider knowledge concerning HIV-related oro-facial lesions comprised seventeen items. The domain covering questions on knowledge about general oral conditions comprised fifteen open-ended items. Three items at the beginning of the questionnaire were related to background characteristics (age, gender and qualification). The last five items were contained in questions related to training, clinical experience and performance regarding oral examinations. This questionnaire is also discussed in our earlier publication [21]. In generating an initial codebook the panel held a discussion in order to reach consensus on all possible correct and incorrect responses to open-ended questions with multiple responses. (Figs. 2 - 22) show examples of several oral facial and other common oral diseases and conditions.

2.3 Implementation

The questionnaire was presented on the same day to all (n=57) PHC providers. All participants were given a brief spoken introduction to the confidentially coded questionnaire before they answered it. Participants were allowed to seek clarification regarding the questions. Each filled questionnaire was checked for completion before it was collected.

2.4 Statistical Analysis

Trained data clerks entered raw data into an Excel file. A random check on the entered data was done by LNK. Two experienced dentists (LNK and ED) coded all answers to open-ended questions. The codebook was improved through use of selected questionnaire responses [22]. The coders identified and discussed unsatisfactory responses, partially answered questionnaires, ambiguous statements and wording of correct responses. Codes were assigned to correct responses, wrong responses and unanswered questions. Open-ended questionnaires with no right or wrong answer, such as those that needed 'further explanation' were noted, as were 'I do not know' responses. After coding of all scripts, results were checked for agreements and differences. Disagreements were discussed until consensus was reached.

SAS software (SAS institute, Cary, NC, USA) was used for statistical analysis. The two aforementioned domains (knowledge about HIV-related oro-facial lesions and knowledge about general oral health) contained 7 categories of questions. For each category mean values and standard deviations were calculated. Cronbach's alpha coefficients were used for checking internal consistency.

3. RESULTS

3.1 Characteristics of Participants

All 57 PHC providers (15 clinical officers and 42 nurses; response rate 100%) completed the questionnaire. There were more female nurses (n=32) and female COs (n=15) than male ones. Sixty percent of the participants were 40 to 52 years old and 40% were 23 to 39 years old.

Cronbach's alpha identified four sub-domains (from the 7 categories of questions), i.e., knowledge of symptoms of HIV-related oral

lesions; knowledge of clinical appearance of HIV-suspected conditions; knowledge of OPC; knowledge about common appearances of OPC, and general dental knowledge (Table 2).

3.2 Knowledge of/about Symptoms of HIV-related Oro-facial Lesions

The mean domain score for PHC providers, relating to knowledge of common HIV-related oro-facial lesions; angular cheilitis, OPC, necrotising gingivitis/periodontitis, herpes zoster and Kaposi's sarcoma, was 4.6 (from maximum 7). This was higher than scores for the other three domains. The most highly scored item was related to the knowledge of herpes zoster as an HIV-related oro-facial lesion (0.94 out of maximum 1).

3.3 Knowledge of Clinical Appearance of HIV-suspected Conditions

Knowledge of three lesions – herpes simplex, herpes zoster and angular cheilitis was assessed. The mean score, 1.74 out of maximum possible 3, was considered moderate. Again, PHC providers were more familiar with herpes zoster than with the other two lesions.

3.4 Knowledge of OPC

Knowledge of signs and symptoms of pseudomebraneous OPC and reasons why this lesion was of significance in HAART patients was assessed. The moderate domain mean score of 1.84 out of maximum 3 was mainly derived from

the PHC knowledge about clinical signs of pseudomebraneous OPC and associated symptoms such as pain experienced in eating and swallowing (0.78 and 0.68 respectively, out of maximum 1). The score on the clinical significance of this lesion as a marker of HAART failure was low (0.4 out of maximum 1).

3.5 Knowledge about Common Appearances of OPC, and General Dental Knowledge

Responses regarding three visual clinical aspects of OPC resulted in a mean score of 1.05 out of maximum 3. Knowledge about the pseudomebraneous type mainly contributed to the score. Eighteen percent knew 2 types: the second most-mentioned type of OPC being the erythematous type, while 12% of the respondents knew nothing about the clinical appearance of OPC. None of the PHC providers knew all three common clinical features.

Items in this domain related to questions commonly asked by community members regarding their oral health; such as those covering xerostomia, dental fluorosis and oral ulcerations and unusual patches in the mouth. The mean domain score of the PHCs was 2.66 out of maximum 6. Responses to causes of dental caries and signs and symptoms of periodontitis showed the lowest scores in the entire questionnaire (1.18 and 1.42, out of maximum 3, respectively).

Table 2. Cronbach's alpha, mean, standard deviation, minimum and maximum scores by domains retrieved from the questionnaire on PHC providers' knowledge of HIV-related oral facial lesions and other common oral lesions and conditions

Domain/ Categories of questions	Cronbach's alpha	Mean	Std dev	Minimum	Maximum
Knowledge on HIV-related oro-facial diseases					
Symptoms of HIV-related oral lesions*	0.57	4.63	1.70	0	7
Clinical appearance of HIV-suspected conditions*	0.54	1.74	0.95	0	3
Knowledge of OPC*	0.59	1.84	1.01	0	3
Common appearances of OPC		1.05	0.55	0	2
Knowledge on general oral diseases and conditions					
General dental knowledge*	0.45	2.66	1.44	0	6
Knowledge of periodontitis		1.42	1.16	0	3
Causes of dental caries		1.18	0.76	0	3

*sub domain

Most (79%), of the PHC providers knew of one or two factors that cause dental caries: mainly sugary foods and poor oral hygiene. Nearly 30% of the PHC providers did not know any of the three signs and/or symptoms of periodontal disease.

3.6 Frequency of Doing an Oral Examination

It was found that 41% of the PHC providers would perform an oral examination for a maximum of 10 out of any 50 patients who presented with an oral problem. Another 37% would examine between 10 and 40 of 50 patients. A minority, 22%, would examine more than 40 of 50 patients.

4. DISCUSSION

This study examined the knowledge of PHC providers, the main healthcare providers in the Nairobi PHC facilities, regarding common signs of HIV-related oro-facial lesions and other general oral conditions.

4.1 Knowledge of HIV-related Oro-facial Lesions

The results indicated that PHC providers had only moderate knowledge about HIV-related oro-facial lesions. This was unexpected, as the current prevalence of HIV infection is high in Kenya [13]. Moreover, the in-service training packages on management of HIV patients [23-25], routinely delivered to PHC providers, should have enhanced their skills. An expectation was that PHC providers would also know that OPC is not always a sign of HIV infection, since they handle patients with OPC in various clinics; such as child welfare and diabetes clinics. Contrary to this expectation, a large number of PHC providers (39%) still thought that OPC was always a sign of HIV infection, probably because this lesion is the one most frequently detected in HIV patients.

OPC is of great clinical significance, both in patients of unknown HIV status and in those already receiving HAART treatment. This lesion clinically presents as pseudomembraneous or erythematous types or as angular cheilitis, usually resulting in complaints of pain and difficulty in eating and swallowing [26]. However, only a minority (22%) of the PHC providers routinely examined mouths of their patients. This percentage is lower than that of 32.2% observed among nurses in South Africa [27]. Even in the

intensive care unit setting, where oral care is part of the protocol for critical patient care, 21% of the nurses did not assess mouths of patients (28).

In similarity to other studies among nurses and dental students [27,29,30,31], PHC providers were more knowledgeable about OPC than about other (less frequent) HIV-related oral lesions. In this study it was noted that PHC providers were more familiar with the pseudomembraneous type than the other two types of OPC. Although the question read 'oro-pharyngeal candidiasis', the tongue was the most common site mentioned. It is possible that the PHC providers frequently examine the tongue when they routinely check for pallor. This agrees with the response of PHC providers: that in their routine practice they mainly examine teeth and swollen gums and sometimes, the tongue. It is evident that on the few occasions when the PHC providers examine the mouth, they miss out on the diagnosis of OPC when it is present in other parts of the mouth, such as the pharynx and the buccal mucosa, and when it is an erythematous type or angular cheilitis. Patients with HAART drug resistance often develop any type of OPC. This lesion may be common in this population, where inadequate patient access to HAART and nutritional support, as well tuberculosis (TB)/HIV co-infection, contribute to non-adherence and HAART drug resistance [32,33]. Although this lesion is often managed in the HIV comprehensive care clinics as an opportunistic infection, PHC providers lacked knowledge about its clinical significance as a marker of HAART treatment failure. They mainly attributed its presence to side-effects of HAART. PHC providers in this setting miss opportunities to recognize HAART failure among their patients who develop OPC.

PHC providers did not suspect HIV infection in a child with enlarged parotid glands (diffuse bilateral non-painful swelling), even when the clinical history was suggestive of HIV exposure. Most associated it either with mumps or with a dental abscess. This gap between knowledge of HIV-related lesions and knowledge of the association of the lesions with HIV infection was also observed among dental students and oral hygienists [34]. However, knowledge about the lesions and about association of the lesions with HIV infection was noted as being generally higher among dental students than among nurses [29,34-36]. Given the high prevalence of HIV infection in this community, HIV-related lesions that were assessed were likely to have

been identified in the consulting rooms of the PC providers. Agbelusi and Wright, 2005 [37] showed that laboratory tests confirmed that nearly all (92%) patients identified in a dental clinic as having HIV-related oral lesions were HIV-infected. Moderate, and in some aspects low, knowledge of PHC providers in identifying these lesions, and lack of association of the lesions with HIV infection, indicates missed opportunities for HIV testing and early detection and treatment in this setting. Moreover, nearly all PHC providers said that they never performed an extra-oral examination in routine practice.

4.2 Knowledge of General Oral Health

Assessment in this domain was related to questions that patients and community members commonly ask health personnel regarding their oral health. These included dental caries; periodontal diseases, mouth ulcerations and dental fluorosis, which PHC providers are expected to record in the outpatient tally sheet. In similarity to others [27,36,38,39], this study indicated that PHC providers in this setting lacked sufficient knowledge on oral health topics. Their knowledge regarding general oral health was much lower than for HIV-related oral lesions. However, it was noted that the majority, 80%, knew that sugar and poor oral hygiene contribute to dental caries. Information on the importance of good oral health could be integrated into daily health talks in PHC facilities, especially in antenatal care and child welfare clinics, to prevent dental decay in children.

Although all patients who seek general consultations with the PHC providers should ideally be orally examined, the choice of patients was narrowed down to those presenting complaints that warranted an oral examination, e.g., pain experience when chewing and swallowing, skin rashes and febrile conditions. The low scores suggested that extra-oral examinations were rarely performed. PHC providers reported that when they occasionally did intra-oral examinations, they generally looked at the condition of teeth and gums and were therefore likely to miss other oral pathologies. In personal communication with LNK, the PHC stated that they examined the throat only when the patient had a suggestive history, such as 'upper respiratory tract infection' and tonsillitis. In an earlier study [40], PHC providers indicated that they were willing to do oral examinations but failed to do so, owing to lack of basic tools such as spatulas, mouth masks and torches. Results of the present study show that they also lacked

knowledge about performing expected oral healthcare tasks.

The PHC providers reported that oral health topics were scantily covered in their pre-service training (some of the short in-service courses that they regularly receive, such as the integrated management of adulthood illnesses [25], include an oral health module on HIV care). Apparently, the training modules do not adequately cover the practical skills aspects that the PHC providers need for identifying and managing HIV-related oral lesions. This is partially understandable, as recognition of dental diseases needs much experience and training. PHC providers cannot be expected to gain sufficient knowledge and insight regarding dental diseases in short training courses. A training module for the PHC providers, incorporating a practical session on how to perform a basic oral examination and recognise (HIV-related) oral lesions is recommended, to build their skills and competences.

4.3 Significance for Public Health

Immunological impairment in HIV patients often predisposes them to HIV-related oral lesions. Therefore, comprehensive care of these patients needs healthcare workers to include oral healthcare of the patients, at all levels of care. Targeted health personnel at PHC level are in many cases non-dental professionals who are expected to integrate diagnosis and management of oral lesions into their routine practice. These health workers need much training and sufficient skills to perform the expected tasks.

Integrating oral health care into PHC is a global and a national oral policy objective, which calls for development of a 'special curriculum for existing training programs for special groups'. As no questionnaire was available in the literature, assessment of knowledge gaps was the first important step in tailor-making a training program for PHC providers. The questionnaire that was used can be adapted in different settings.

5. CONCLUSION

Knowledge of primary health care providers in Nairobi East District, Kenya, regarding HIV-related oral facial and other common oral diseases and conditions was found to be generally inadequate.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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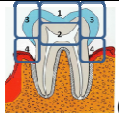
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APPENDIX

1	Circle true or false to each of the following responses
a	T Angular cheilitis is a clinical presentation of viral warts F
b	T Occurrence of oro pharyngeal candidiasis in the mouth is always a sign of HIV F infection
c	T Halitosis is a common oral HIV lesion F
d	T Necrotizing ulcerative gingivitis is associated with HIV infection F
e	T Necrotizing ulcerative periodontitis is associated with HIV infection F
f	T Herpes zoster may occur in the facial region F
g	T Aphthous ulcers are associated with HIV infection F
h	T Oral hairy leukoplakia is a form of oro pharyngeal candidiasis. F
i	T Kaposi's sarcoma (in the mouth) is a viral infection associated with early stages of HIV F infection
2	In your health talk, how would you advise antenatal mothers about when they should start to brush the teeth of their children?
3	Lillian, a community health worker who is actively involved in home based care, would like to know how oro-pharyngeal candidiasis presents in the oral cavity so that she can refer the patients to you. Briefly describe to her 3 common clinical appearances of oro pharyngeal candidiasis a. _____ b. _____ c. _____ d. Why do you think this lesion should be identified early? _____
4	Injuries are common among school going children. A 12 year old boy is rushed to the outpatient department with a mouth injury and holding a tooth wrapped in a piece of cloth. The 'whole' upper front tooth (incisor) was knocked out by a ball 15 minutes earlier while playing. What would you do with the tooth?
5	Mrs Kuria brings a restless 3 year old child with a swelling and with history of pain and fever in the right jaw for three days. As she calms the child with a feeding bottle, half filled with coca cola, she tells you she learnt from her neighbour that tooth brushing damages gums and brushing her child's gum could probably have caused the swelling. a. What is the oral risk factor the child is subjected to? Please explain more. b. On examining, you notice the child has cavities in most of her teeth. In the boxes below (A, B, C), please fill in the 3 major factors that cause dental caries that you would assess: A _____ B. _____ C. _____ What would you advise Mrs. Kuria on the dangers of tooth cavities to her child? (i) _____
6	Janet, a 23 year old single lady on antiretroviral therapy, has come to the CCC after missing her last two appointments. She has not been eating well in the past two weeks because she experiences pain in eating and swallowing. You notice she has lost 3 kg in the past 2 months. On examination you notice creamy white patches at the dorsum of the tongue which are removable with a spatula and very tender. a What lesion do you think Janet could have on her tongue? b What do you think is the relationship between this lesion and the drugs she takes? c What do you think could be the cause of pain when swallowing? Please identify the following 4 lesions
7	This condition appears as fissures and reddening at the angles of the mouth. It is often associated with itching and burning. Often there is bleeding from the angles of the mouth and crusting in this area. This lesion is called:

- 8 This lesion may appear on the lower lip, in the hard palate or the gums. The patient may report a history of itching or pain, followed by the appearance of small vesicles that rupture and ulcerate. This lesion is called:
- 9 This is usually of sudden onset when the patient notices spontaneous bleeding from the gums. The gum becomes red, inflamed and oedematous. There is rapid loss of soft tissue and ulcers appear at the tips of the interdental papilla and margins of the gum. The condition is associated with severe pain. Ulcers heal with crater formation. Teeth become loose and may exfoliate. There is usually loss of soft tissue and bone. This lesion is called:
- 10 The first symptom was sensation of pain, burning and itching followed by the appearance of the characteristic skin rash on one side of the face. Later blisters broke to form ulcers. The lesion is called:
- 11 Dental fluorosis, also referred to as 'Brown teeth', is common in Kenya in people who reside in Rift valley and those who use borehole water. What advice do you give to your patient with fluorosis regarding dental caries?
- 12 Wanjiru, a 2 year orphan, is brought to your clinic by her aunt. Her mother, who has been ailing, died two weeks before. The child now reports with a painless diffuse soft swelling on both sides of the face. You also notice the child's oral hygiene is very poor with several cavities.
How would you advise the aunt: a. Regarding the swelling? b. Regarding the teeth with cavities?
- 13 Indicate in the following diagram 2 tooth surfaces where you are likely to find cavities in an oral examination in a 6 year old child and in a 61 year old with advanced gum disease.
- 

(a) 6 year old child



(b) 61 year old with advanced gum disease
- 14 Wahome, a 48 year old diabetic patient who smokes heavily, tested HIV negative in your clinic a month before but comes back to your clinic very worried. His neighbour, who attended your health talk the previous week, informed him that the white lesion in the inner side of his cheek shows that he has full HIV infection and he needs to enrol for antiretroviral therapy. What would you advise the patient the lesion could be?
- 15 HIV patients sometimes develop dry mouth (xerostomia) as a result of decreased salivary flow. What do you think are the consequences of dry mouth?
a. _____ b. _____
- 16 Advanced gum disease (periodontitis) refers to a number of inflammatory diseases that affect the tissues that surround and support the teeth. What would you commonly find in the oral cavity of a patient with advanced gum disease? a. _____
b. _____ c. _____
d. How do you advise your patients on prevention of gum disease? _____
- 17 Out of 50 patients in your consultation room, who come with febrile conditions pain in chewing or swallowing and skin rashes, how many oral examinations did you normally do? (Circle one) a. 0 - 10 patients b. 10 - 20 patients c. 20 - 30 patients d. 30 - 40 patients e. 40 - 50 patients
- 18 If an oral examination is carried out, what do you personally look for?
- 19 Did you receive any training on oral health care during your in-service course? (i) Yes No (ii) If yes, please explain
- 20 Have you ever received any training / update on oral health care of patients since you graduated? (i) Yes No (ii) If yes, please explain

Fig. 1. PHC providers' written questionnaire



Fig. 2. Dental abscess with cellulitis



Fig. 3. Pseudomembraneous candidiasis



Fig. 4. Enlarged parotid glands



Fig. 5. Angular cheilitis



Fig. 6. Kaposi's sarcoma



Fig. 7. Varicella zoster virus



Fig. 8. Dental fluorosis



Fig. 9. Hairy leukoplakia





Fig. 10. Linear gingival erythema

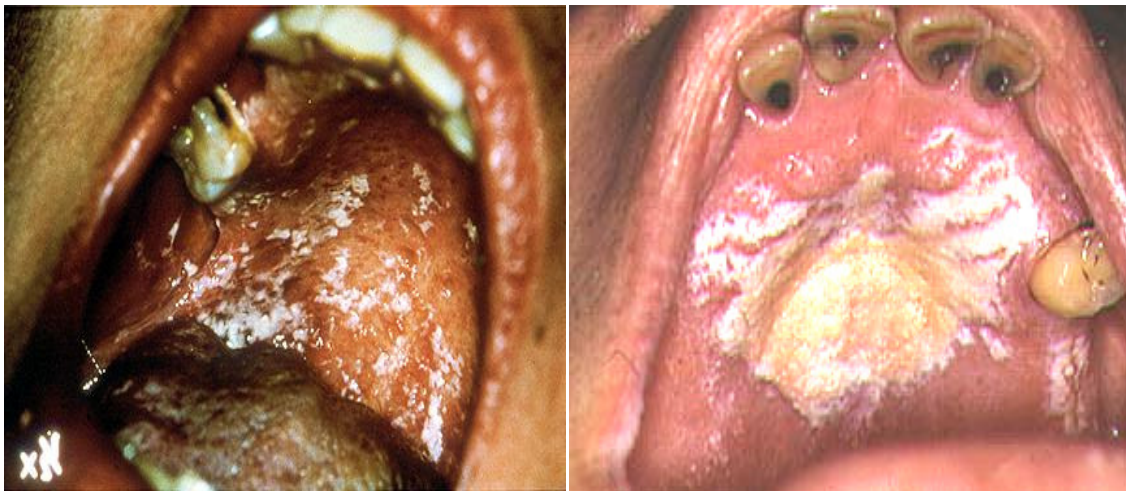


Fig. 11. Pseudomembranous candidiasis



Fig. 12. Human papilloma virus

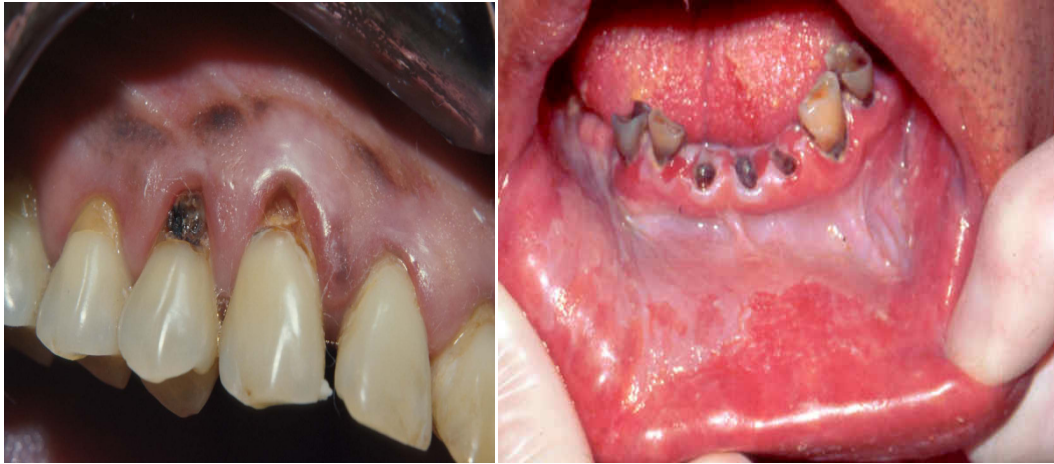


Fig. 13. Root cavities

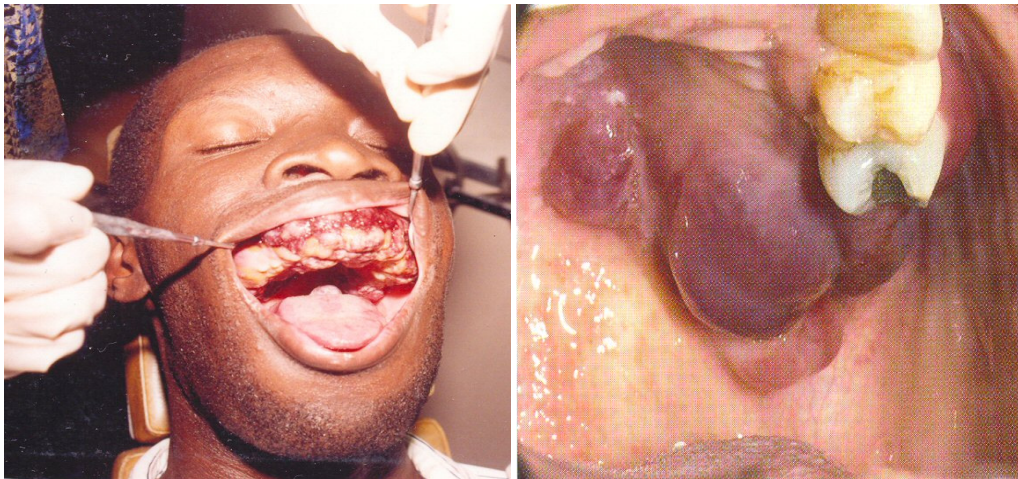


Fig. 14. Kaposi's sarcoma



Fig. 15. Advanced gum disease (periodontitis)



Fig. 16. Herpetic stomatitis



Fig. 17. Atrophic/erythematous candidiasis



Fig. 18. Dental decay



Fig. 19. Varicella zoster virus



Fig. 20. Noma



Fig. 21. Varicella zoster virus



Fig. 22. Pseudomembranous candidiasis

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