

# Use of ICDAS-II, Visual, Radiography, Activity Assessments in Dental Caries Treatment Decision



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## Introduction

Of several methods used today for caries diagnosis, few studies report the using of visual/radiographic examination and caries activity assessment in treatment decision-making.

## Material and Methods

Observational, cross-sectional trial, approved by Ethics Committee. Random sample: 45 individuals attended voluntarily FHS-UFP dentistry appointments (Set. 2013 - Mar. 2014). Caries activity (Table 1), ICDAS-II visual and bitewing radiographs (collect from files) examinations (Table 2) were performed by five examiners trained/calibrated (ICC=0.970) to detect mesial/distal/occlusal carious lesions in 900 posterior teeth (2700 surfaces). Descriptive statistical analysis/inference by caries activity (active/inactive) and ICDAS (visual/bitewing examinations) for prevalence. Visual/bitewing records compared by Z-test ( $\alpha=0.05$ ) and prevalence for treatment (Figure 1) decision (surgical/non-Surgical treatments and/or therapeutic monitoring-TM) through 95%CI.

**Table 1** – Description of the method for lesion activity assessment proposed to be used with ICDAS evaluation.

Clinical Parameter	Decay Activity Assessment (Active caries) <sup>(1)</sup>
1=Visual appearance ICDAS score 1, 2, 3, 4, 5, 6	Brown/white lesions
2=Plaque stagnation area (PSA)	Plaque stagnation area (PSA) along the gingival, below or above the contact area on proximal surfaces, entrance to the pits and fissures and cavities with irregular borders
3=Surface texture	Rough or soft surface on gentle probing Smooth or hard surface on gentle probing

<sup>(1)</sup> Ekstrand KR, Martignon S, Ricketts DJ, et al., 2007.

## Objectives

To calculate caries prevalence (caries activity, visual (ICDAS-II)/bitewing examinations) and caries treatment decision-making.

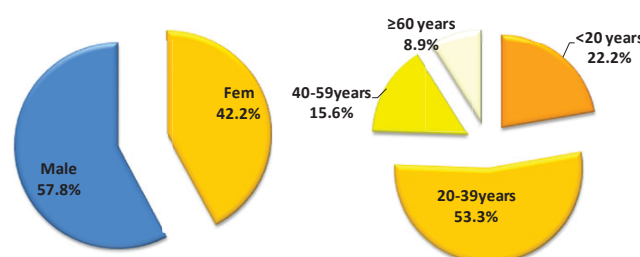
**Table 2** – Visual inspection according to ICDAS-II criteria (fillings/caries) and corresponding radiolucency of enamel and dentin by visual bitewing radiograph examinations.

Visual Inspection (ICDAS-II scores) <sup>(2)</sup>	Corresponding bitewing radiograph examination <sup>(3)</sup>
0 = sound (00, 10, 20, 30, 40, 50, 60, 70, 80)	0 = no radiolucency,
1= first visible sign of non-cavitated lesion seen only when the tooth is dried, and/or associated with sealants or fillings (01, 11, 21, 31, 41, 51, 61, 71, 81)	1= radiolucency in the outer half of enamel
2= visible non-cavitated lesion seen when wet and dry; and/or associated with sealants or fillings (02, 12, 22, 32, 42, 52, 62, 72, 82)	2= radiolucency in the inner half of enamel, up to the enamel-dentin junction
3= microcavitation in enamel and/or associated with sealants or fillings (03, 13, 23, 33, 43, 53, 63, 73, 83)	3= radiolucency in the outer half of dentin
4= noncavitated lesion extending into dentin seen as an undermining shadow; and/or associated with sealants or fillings (04, 14, 24, 34, 44, 54, 64, 74, 84)	4= radiolucency in the inner half of dentin
5= small cavitated lesion with visible dentin: less than 50% of surface and/or associated with sealants or fillings (05, 15, 25, 35, 45, 55, 65, 75, 85)	
6= large cavitated lesions with visible dentin in more than 50% of the surface and/or associated with sealants or fillings (06, 16, 26, 36, 46, 56, 66, 76, 86)	

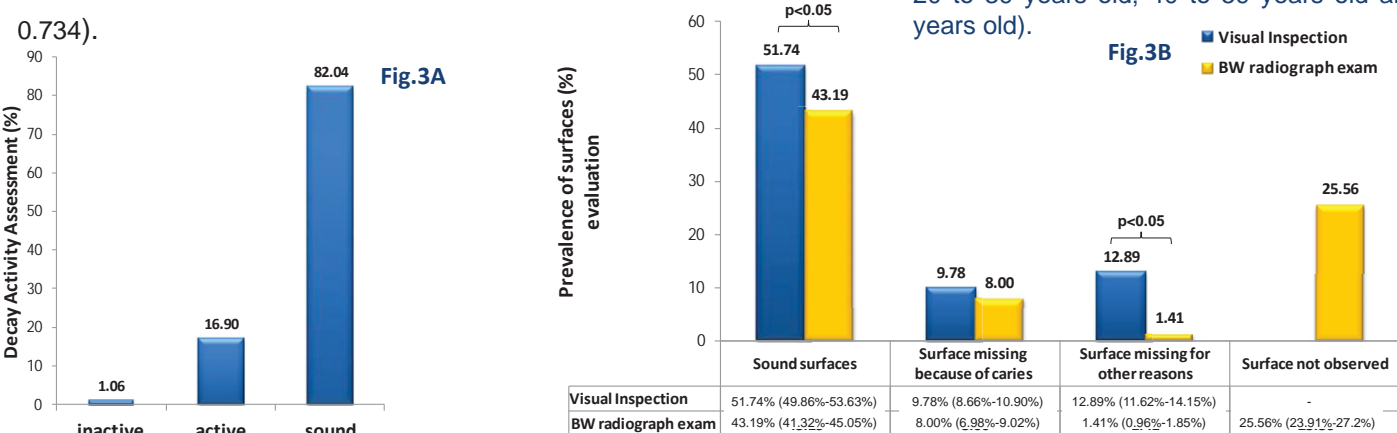
<sup>(2)</sup> Pitts N, 2004. <sup>(3)</sup> Diniz MB, Lima LM, G. Eckert G, et al., 2011

## RESULTS

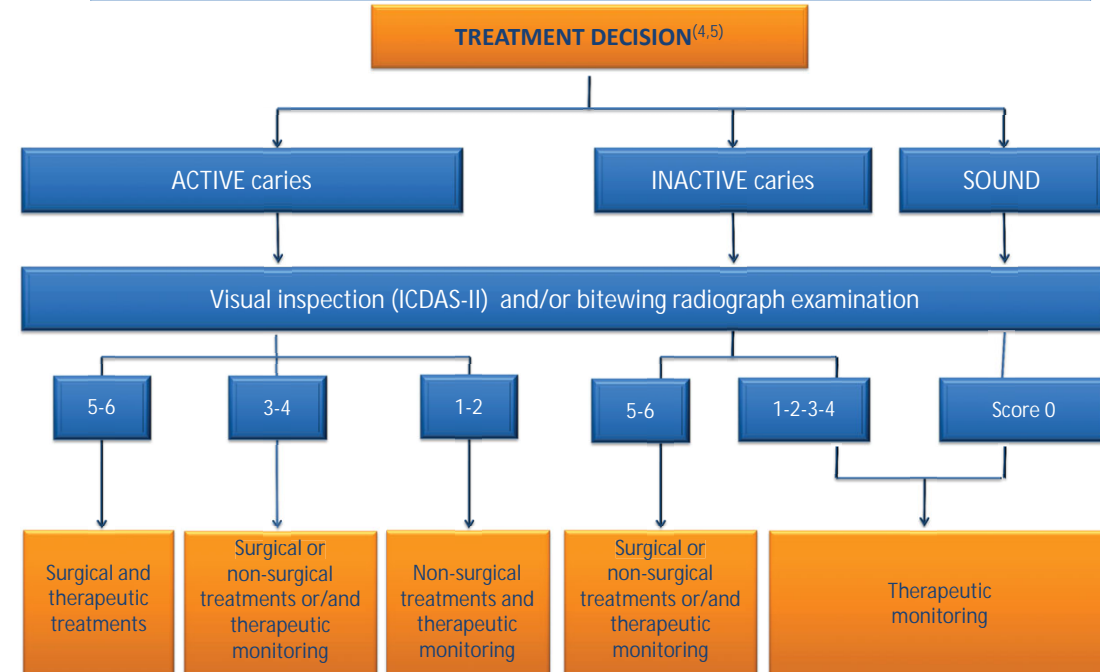
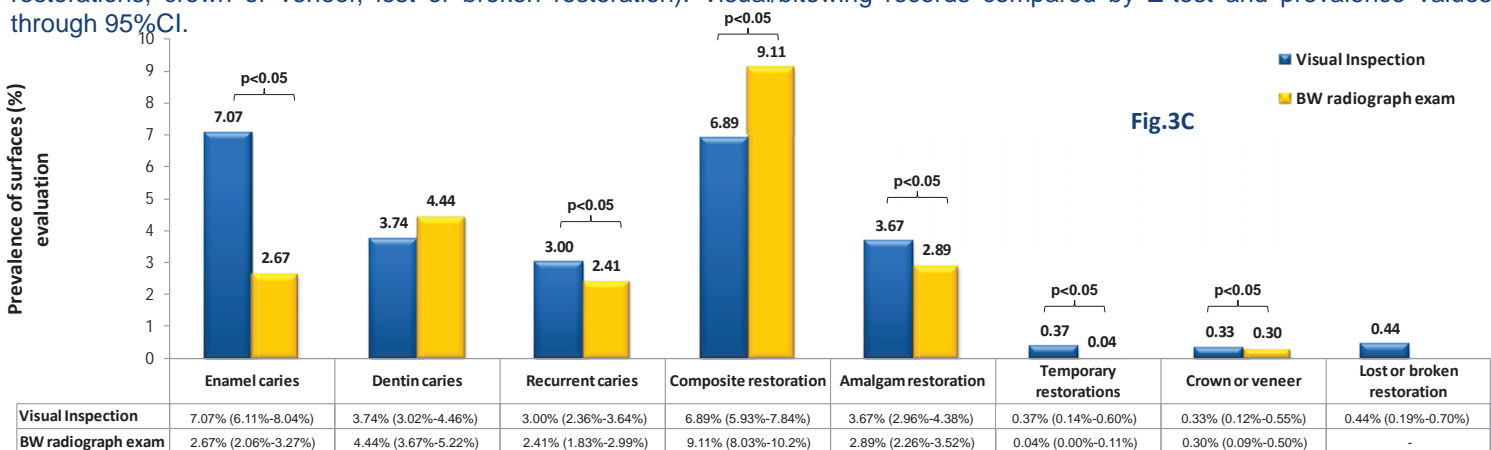
Sample: 57.8% male patients (Figure 2) 14-71 years old (age/gender; Mann-Whitney T,  $p=0.408$ ); Prevalence of caries activity: 82.04% sound, 1.06% inactive and 16.90% active lesions. ICDAS (Visual and bitewing): enamel (7.07% and 2.67%), dentine (3.74% and 4.44%) and recurrent (3% and 2.41 %) caries. Visual/bitewing (Figure 3) examination ICC=0.674 (95%CI: 0.594-



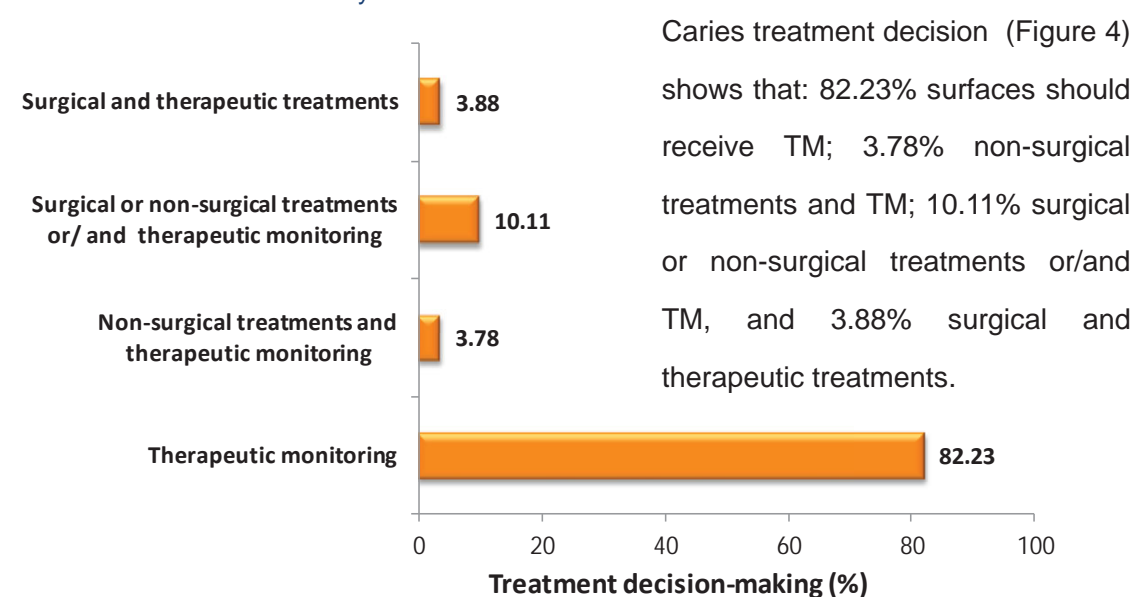
**Figure 2** – Sample distribution (%) by gender (male, female patients) and age (< 20 years old; 20 to 39 years old; 40 to 59 years old and > 60 years old).



**Figure 3** – (A) Descriptive statistical analysis (%) by caries activity (active/inactive); Surface Prevalence (%) for ICDAS (visual/bitewing examinations); (B) of Sound surfaces, Missing due to caries, Missing for other reasons, and not observed in bitewing radiographs; (C) of Carious surfaces (Enamel, Dentin, Recurrent Caries), Fillings (composite, amalgam, temporary restorations, crown or veneer, lost or broken restoration). Visual/bitewing records compared by Z-test and prevalence values through 95%CI.



**Figure 1** - Decision-making tree for dental caries lesions to be used after examination using ICDAS and lesions activity assessment



**Figure 4** – Descriptive statistical analysis (%) by Caries treatment decisions: surgical/non-Surgical treatments and/or therapeutic monitoring, according to decision making tree for dental caries, used after ICDAS (visual/radiographs analysis) and lesions activity assessment; Z-test and prevalence values through 95%CI.

## Conclusions

Use of ICDAS-II, by visual and radiography examinations and caries activity, enables a more accurate diagnosis and guidance in surgical/non-surgical/therapeutic decision-making. Correlation between visual/radiography examinations is reasonable to good.

## Clinical Implications

ICDAS-II may have high potential for caries detection and treatment planning, and other diagnosis devices can add more substantial information to visual examinations.

**Keywords** Caries Intra-oral radiography diagnosis; caries diagnosis, caries detection, caries prevalence, caries treatment decision, caries activity assessment, ICDAS-II, visual inspection

**References** <sup>(1)</sup>Ekstrand KR, Martignon S, Ricketts DJ, et al. Detection and activity assessment of primary coronal caries lesions: a methodologic study. Oper Dent 2007;32(3):225–35; <sup>(2)</sup>Pitts N. "ICDAS—an international system for caries detection and assessment being developed to facilitate caries epidemiology, research and appropriate clinical management"; Community Dental Health, vol. 21, no. 3, pp193–198, 2004. <sup>(3)</sup>Diniz MB, Lima LM, Eckert G, et al. "In vitro evaluation of icdas and radiographic examination of occlusal surfaces and their association with treatment decisions," Operative Dentistry, vol. 36, no. 2, pp. 133–142, 2011. <sup>(4)</sup>Jablonski-Momeni A, Stucke J, et al. Use of ICDAS-II, Fluorescence-Based Methods, and Radiography in Detection and Treatment Decision of Occlusal Caries Lesions: An In Vitro Study. Int J Dent. 2012;doi: 10.1155/2012/371595. <sup>(5)</sup>Braga MM, Mendes FM, Ekstrand KR. Detection Activity Assessment and Diagnosis of Dental Caries Lesions. Dent Clin N Am 54 (2010) 479–493. doi:10.1016/j.cden.2010.03.006.

