

Bijlage 2. Beschrijvende tabellen met studiekarakteristieken uitgangsvraag 1

<p>1.Boye, 2013 <u>Study population:</u> 240 Five-year-old and 250 10-/11-year-old children attending state primary schools in Rochdale an area in the North West of England, <u>Country:</u> UK</p>	<p><u>Aim:</u> To compare caries diagnosis with visual inspection vs intra-oral photos</p>	<p><u>Age of patient:</u> 5 & 10-11 years old</p> <p><u>Primary/permanent:</u> primary & permanent dentition</p> <p><u>High or low risk group</u> dmft 2,08 (5y) DMFT 0,95 (12y)</p> <p><u>Type of lesions:</u> All surfaces</p> <p><u>Inclusion criteria:</u> both visual examination and intra-oral photos</p> <p><u>Exclusion criteria:</u> no informed consent form</p> <p><u>N analysis:</u> 201 5-y-olds, 231 10/11-y-olds</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. intra-oral photos <p><u>Reference method :</u> No</p>	<p><u>Outcome measures:</u> kappa / 95% limits of agreement</p>	<p><u>Results:</u> intra-rater: 5y: kappa 0,81-0,94, mediaan 0,93. 95% limits of agreement 5y (visual inspection vs photos -8, 6 and 4 intra-oral photographs) were -1.997 to 1.967, -2.375 to 2.735 and -2.250 to 2.921. 95% limits of agreement 10/11y (visual inspection vs photos -8, 6 and 4 intra-oral photographs -2.614 to 2.027, -2.179 to 3.887 and -2.594 to 2.163. 10/11y: kappa 0,90-0,97, mediaan 0,92</p> <p><u>Conclusion:</u> The photographic assessment method, particularly assessment of 8 intra-oral digital photographs is comparable to the visual examination method in the primary dentition.</p>
<p>2.Bussaneli, 2015</p> <p><u>Study population:</u> 45 children of both genders, aged between 5 and 9 years, who sought the Pediatric Dentistry Clinic of the Araraquara Dental School—UNESP</p> <p><u>Country:</u> Brazil</p>	<p><u>Aim:</u> to evaluate and compare the performance of visual exam with use of the Nyvad criteria (visual examination - (VE)), interproximal radiography (BW), laser fluorescence device, and their association in the diagnosis of proximal lesions in primary teeth</p>	<p><u>Age of patient:</u> 5-9 years old</p> <p><u>Primary/permanent:</u> primary molars professional cleaning</p> <p><u>High or low risk group</u> High risk group</p> <p><u>Type of lesions:</u> approximal</p> <p><u>Inclusion criteria:</u> sound or caries primary molars in proximal contact</p> <p><u>Exclusion criteria:</u> teeth with restorations, occlusal caries, hypoplasias, advanced stage of rhizolysis</p> <p><u>N analysis:</u> 59 surfaces 45 children</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. laser-induced fluorescence device DIAGNOdent pen 2190 3. radiographic BW <p><u>Reference method :</u> orthodontic rubber rings with a thickness of 4 mm were placed around the selected contact surfaces for 7 days and after this period, the teeth were examined under the same conditions as visual examination.</p>	<p><u>Outcome measures:</u></p> <ul style="list-style-type: none"> - sensitivity - specificity - Accuracy - area under the ROC curve (Az) - Comparison of the sensitivity and specificity values between the methods 	<p><u>Results:</u> Visual examination: Sens:0,94, spec:0,96, acc:0,95, ROC:0,95 BWs: Sens:0,78, spec:0,93, acc:0,86, ROC:0,85 LF : Sens:0,97, spec:0,70, acc:0,85, ROC:0,84</p> <p><u>Conclusion:</u> the use of the visual exam with the Nyvad criteria was shown to be sufficient for the diagnosis of interproximal caries lesions in primary teeth.</p>

<p>3. Chen, 2012</p> <p><u>Study population:</u> Children who sought dental help at university of Beijing</p> <p><u>Country:</u> China</p>	<p><u>Aim:</u> To evaluate the diagnostic efficacy of LF examination for the detection of approximal caries in primary molars in vivo</p>	<p><u>Age of patient:</u> 5 - 9 years old</p> <p><u>Primary/permanent:</u> primary Professional cleaning</p> <p><u>High or low risk group:</u> not stated</p> <p><u>Type of lesions:</u> Approximal</p> <p><u>Inclusion criteria:</u> informed consent, suspected approximal surface</p> <p><u>Exclusion criteria:</u> *the presence of obvious carious lesions on approximal or occlusal surfaces, * the presence of approximal restorations, *the presence of pigmentation, *and blood or *hypoplastic pits.</p> <p><u>N analysis:</u> 256 surfaces in 216 primary molars in 96 children</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. radiographic BW 3. laser-induced fluorescence device DIAGNOdent pen <p><u>Reference method :</u> Cavity preparation and rating other proximal surface.</p>	<p><u>Outcome measures:</u></p> <ul style="list-style-type: none"> - sensitivity - specificity - Accuracy 	<p><u>Results:</u> Visual examination: Sens:0,71, spec:0,96, acc:0,83 BWs: Sens:0,98, spec:0,93, acc:0,96 LF : Sens:0,92, spec:0,98, acc:0,95</p> <p><u>Conclusion:</u> Both LF and BW can detect cavitations on approximal surfaces of primary molars. LF could be an alternative to radiographs in detecting approximal caries in primary molars.</p>
<p>4 Clark 2004</p> <p><u>Study population:</u> Children who sought dental help at university of Leeds</p> <p><u>Country:</u> United Kingdom</p>	<p><u>Aim:</u> To compare the findings of a clinical examination with those from Bitewing (BW), panoramic (Pan) and panoramic plus Bitewing (PanBW) radiographs for dental caries in children.</p>	<p><u>Age of patient:</u> 3,8 to 11,9 years old</p> <p><u>Primary/permanent:</u> Primary and permanent</p> <p><u>High or low risk group:</u> high</p> <p><u>Type of lesions:</u> Occlusal and approximal</p> <p><u>Inclusion criteria:</u> Children aged to up to 12 years and who had not been seen or treated before</p> <p><u>Exclusion criteria:</u> *Children with any learning or physical disability that prevented any clinical or radiographic examination. *Any children who were unable to cooperate for clinical and radiographic examination or *whose parents did not consent to participate in the study.</p> <p><u>N analysis:</u> 39 children.</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. BW 3. PAN 4. PAN BW <p><u>Reference method :</u> no</p>	<p><u>Outcome measures:</u> kappa</p>	<p><u>Results:</u> The kappa scores for the inter- and intra-examiner radiographic readings were for the interexaminer: BW 0.86, Pan 0.67 and PanBW 0.76. The kappa scores for the intra-examiner assessment were: BW 0.88, Pan 0.92 and PanBW 0.79. The results show that the clinical examination identified more total carious surfaces than each radiographic view or combination of views (pan P<0.001, BW and PanBW P>0.005). However, when the occlusal and approximal surfaces were compared separately the BW and PanBW identified significantly more carious approximal surfaces than the clinical examination (P<0.001).</p> <p><u>Conclusion:</u> The use of a clinical examination with PanBW provided the maximum information on dental caries in the primary and mixed dentitions, particularly for approximal surfaces. This is important in planning comprehensive dental care for children.</p>

		The total number of tooth surfaces available for clinical diagnosis was 1,838 on 394 primary teeth, of which 297 (16.2%) were carious. In the permanent teeth there were 166 teeth with 811 surfaces of which 72 (8.9%) were carious.			
5 Cortes, 2017 <u>Study population:</u> Children 2, 4, 6, years from kindergartens and schools in municipalities in Bogota (Colombia) <u>Country:</u> Colombia	<u>Aim:</u> To report (1) the caries experience prevalence and mean, and the caries severity and distribution patterns, expressed clinically and combined with radiographs with the conventional and ICCMSTM systems in young children from Bogota, Colombia; (2) the contribution of including radiographs	<u>Age of patient:</u> 2, 4, 6 years <u>Primary/permanent:</u> primary <u>High or low risk group</u> high <u>Type of lesions:</u> Occlusal, approximal, smooth <u>Inclusion criteria:</u> Children from kindergartens and schools in municipalities in Bogota <u>Exclusion criteria:</u> *children whose teachers informed that were not going to remain in Bogota for the following three years *children with non-collaborative behavior on the examination day 600 children	<u>Methods</u> 1: visual examination 2. Bitewing <u>Reference method :</u> No	<u>Outcome measures:</u> Descriptive, Chi-square test, T-test	<u>Results:</u> The prevalence of CdMEms was: Cohort A: 32%; Cohort B: 59%; Cohort C: 67.5%, increasing to 73.5%, 99.8% and 100%, respectively, with the CbR depiMEms. The CdMEms means doubled when initial caries lesions (Cdepi) and radiographs (R) were included. Findings on the radiographs significantly raised caries experience prevalence and means (p<.02), detecting primarily approximal lesions. <u>Conclusion:</u> Participants' caries experience was high. The radiographic assessment significantly contributed to caries experience.
6. Coutinho, 2014 <u>Study population:</u> Children, selected at random from patients attending the FFUPDC <u>Country:</u> Brazil	<u>Aim:</u> to compare clinical examination and Bitewing radiographs for detection of pre-cavitated and cavitated approximal lesions in primary molars with validation after temporary separation and direct visual examination of the approximal surfaces, in order	<u>Age of patient:</u> 4-8 years old <u>Primary/permanent:</u> primary Professional cleaning <u>High or low risk group:</u> not stated <u>Type of lesions:</u> approximal <u>Inclusion criteria:</u> Presence of approximal bilateral contact in primary molars in both arches and no cavitation or restoration clinically detectable. <u>Exclusion criteria:</u>	<u>Methods</u> 1: visual examination 2. radiographic BW <u>Reference method :</u> Temporary separation (with orthodontic rubber bands) and direct visual examination of the approximal surfaces	<u>Outcome measures:</u> Sensitivity, specificity	<u>Results:</u> Visual examination: Sensitivity: 14% Specificity: 80% Radiographic examination: Sensitivity: 43% Specificity: 75% <u>Conclusion:</u> 1: Clinical examination after separation identified a greater number of precavitated lesions and cavities than conventional clinical examination and Bitewing radiographs. 2. The radiographs were perfectly capable of diagnosing decayed surfaces, but with low specificity for diagnosing sound surfaces, while the clinical examination alone was not able to detect which areas were sound or decayed.

	to select the most effective method among those included in the study for early diagnosis of approximal dental caries in the primary dentition through assessment of sensitivity and specificity values.	<u>N analysis:</u> 30 children, 355 surfaces			3. The probability of a radiolucency in the Bitewing radiograph corresponds to a cavitated lesion was higher according to the depth of this image. 4. The combination of methods was effective in obtaining an accurate diagnosis of caries in the primary dentition, and the use of orthodontic rubber rings to obtain a temporary separation in case of questionable carious lesions may be an important adjunct to increase the diagnosis of early approximal caries in children.
7 Donker, 2002 <u>Study</u> <u>population:</u> 161 children, BMT patients <u>Country:</u> The Netherlands	<u>Aim:</u> To assess the additional value of an orthopantomogram (OPT), in addition to clinical examination in paediatric Bone Marrow Transplant (BMT) recipients, we evaluated the results of radiographic dental examination in 161 paediatric BMT candidates.	<u>Age of patient:</u> 5-17 y <u>Primary/permanent:</u> Primary & permanent <u>High or low risk group</u> low <u>Type of lesions:</u> Dental foci <u>Inclusion criteria:</u> BMT-patients <u>Exclusion criteria:</u> children younger than 5y <u>N analysis:</u> 161	<u>Methods</u> 1: visual examination 2. OPT (PAN) <u>Reference method :</u> No	<u>Outcome measures:</u> Descriptive statistics	<u>Results:</u> A total of 11 children had at least one dental focus that required treatment before the transplantation. In seven of these children the foci were detectable both radiographically and clinically. In two children the foci were only visible clinically while the OPT revealed no pathology. In two children (aged 16 and 17 years) the foci consisted of erupting third molars that were only detectable by means of radiographs <u>Conclusion:</u> In conclusion, in our opinion, an OPT as a standard procedure in addition to clinical examination, has no additional value in paediatric pre-bone marrow transplantation oral evaluation.
8 Duruturk, 2011 <u>Study</u> <u>population:</u> Cariesactive children attending pedodontic department <u>Country:</u> Turkey	<u>Aim:</u> The aim of this study was to compare the in vivo diagnostic ability of a laserfluorescence system with that of visual inspection in the early detection of occlusal caries in newly erupted noncavitated first permanent molars	<u>Age of patient:</u> 6-7 y <u>Primary/permanent:</u> permanent <u>High or low risk group</u> high <u>Type of lesions:</u> occlusal <u>Inclusion criteria:</u> 1) fully erupted mandibular permanent first molars (crowns completely visible), 2) no visible macroscopic cavitation on occlusal, buccal, lingual,	<u>Methods</u> 1: visual examination 2. laserfluorescence (diagnodent) 3. bitewings <u>Reference method :</u> No	<u>Outcome measures:</u> <u>Cohens kappa</u>	<u>Results:</u> Agreement between visual examination and DIAGNOdent measurements was "poor" (k 0.231) when the manufacturer's recommended cutoff points were used, and "poor" when the cutoff limit was lowered (k 0.175) and raised (k 0.263). <u>Conclusion:</u> DIAGNOdent is not suitable for detection of occlusal caries in newly erupted first permanent molars

	among caries-active children.	or proximal surfaces, 3) no enamel hypoplasia/ hypomineralization defects or fluorosis, and 4) no orthodontic bands on teeth. <u>Exclusion criteria:</u> <u>N analysis:</u> 505 First permanent molars 307 children			
9 Ferreira Zandoná, 2011 <u>Study population:</u> Children from kindergarten to 9 th grade <u>Country:</u> Puerto Rico	<u>Aim:</u> The purpose of this study was to combine a standardized visually based system, the International Caries Detection and Assessment System (ICDAS), with a sensitive fluorescence-based system, quantitative light-induced fluorescence (QLF), to determine the ability to monitor caries lesion progression.	<u>Age of patient:</u> 5-13 y <u>Primary/permanent:</u> Permanent <u>High or low risk group</u> high <u>Type of lesions:</u> Occlusal & smooth <u>Inclusion criteria:</u> For inclusion in the study, children had to be between 5 and 13 years of age, have at least 1 permanent molar with at least 1 unrestored surface, have no medical problem that contraindicated participation, and allow examination of the oral cavity, including radiographs and digital photographs. <u>Exclusion criteria:</u> <u>N analysis:</u> A total of 569 children completed the baseline examination, 484 children completed the 8-month examination and 460 children completed the 12-month examination.	<u>Methods</u> 1: visual examination 2. laserfluorescence <u>Reference method :</u> No	<u>Outcome measures:</u> The association between ICDAS and QLF-I scores was evaluated using two-way contingency tables and Kendall's tau-b correlation coefficients.	<u>Results:</u> The correlations between ICDAS and QLF-I examinations were 0.79, 0.74 and 0.77 for occlusal/buccal pit/lingual groove surfaces, smooth surfaces and combined surfaces, respectively <u>Conclusion:</u> In conclusion, the combined methodology has the clinical potential to allow earlier detection of lesions, which on occlusal surfaces are likely to progress.

<p>10 Fracaro, 2001 <u>Study population:</u> School based dental clinic <u>Country:</u> Australia</p>	<p><u>Aim:</u> <i>This prospective, cross-sectional study examined the sensitivity and specificity of clinical assessment compared to bitewing radiographs in the detection of occlusal dentin caries in permanent molars.</i></p>	<p><u>Age of patient:</u> 5-12 y <u>Primary/permanent:</u> permanent <u>High or low risk group</u></p> <p><u>Type of lesions:</u> occlusal <u>Inclusion criteria:</u> parental consent Only the molars without a history of operative intervention were included in the study. Furthermore, teeth were also excluded from the study if they showed caries on non-occlusal surfaces (such as buccal, lingual, and interproximal) and restorations, as well as enamel hypoplasia. <u>Exclusion criteria:</u> <u>N analysis:</u> 1833 teeth</p>	<p><u>Methods</u></p> <p>1: visual examination 2. bitewings</p> <p><u>Reference method :</u> no</p>	<p><u>Outcome measures:</u> <u>Sensitivity, specificity</u></p>	<p><u>Results:</u> Of the 1833 teeth scored as clinically sound in the study, only 72 (4%) demonstrated a dentin radiolucency on bitewings, and 1761 (96%) were scored as sound. The sensitivity of the clinical examination was determined to be 0.96. In the teeth clinically scored as showing dentin caries, only 56/96 (58%) were found to have dentin radiolucencies on the radiographs. The specificity of the technique was determined to be 0.58.</p> <p><u>Conclusion:</u> Clinical examination of cleaned and dried, sealed, and unsealed teeth has a sensitivity of 0.96 and a specificity of 0.58 in the detection of dentin radiolucencies in bitewing radiographs.</p>
<p>11 Goswami, 2015 <u>Study population:</u> Children attending Department of Pedodontics at Maulana Azad College of Dental Sciences, New Delhi <u>Country:</u> India</p>	<p><u>Aim:</u> -</p> <p>This study was aimed to compare the diagnostic outcome of the WHO criteria, ICDAS-II criteria and laser fluorescence measurements in measuring the caries ratings of children</p>	<p><u>Age of patient:</u> 3-14 y <u>Primary/permanent:</u> Primary and permanent <u>High or low risk group</u></p> <p><u>Type of lesions:</u> occlusal <u>Inclusion criteria:</u></p> <p><u>Exclusion criteria:</u></p> <p><u>N analysis:</u> 31</p>	<p><u>Methods</u></p> <p>1: visual examination 2. diagnodent</p> <p><u>Reference method :</u> No</p>	<p><u>Outcome measures:</u> -</p> <p>The data were analysed with ezANOVA and Excel 2000</p>	<p><u>Results:</u> The mean ICDAS-II values amounted to 8.76 ± 0.72. The mean values for DMFS/def were 7.67 ± 0.91, whereas for DIAGNOdent it amounted to 4.00 ± 0.62.</p> <p><u>Conclusion:</u> In conclusion, this study showed the diagnostic potential of the ICDAS-II criteria in comparison to the traditional WHO criteria by means of the non-cavitated caries lesions additionally detected. The DIAGNOdent use in field studies that already apply detailed visual criteria seems to bring limited additional information.</p>
<p>12 Katge, 2016 <u>Study population:</u></p>	<p><u>Aim:</u> to compare the accuracy and repeatability of three diagnostic systems: visual examination/</p>	<p><u>Age of patient:</u> 6-9 years old <u>Primary/permanent:</u> primary Cleaning</p>	<p><u>Methods</u></p> <p>1: visual examination 2. radiographic BW</p>	<p><u>Outcome measures:</u> Index of sensitivity, specificity, likelihood ratio (LR), positive predictive values (PPVs), and</p>	<p><u>Results:</u> Visual examination Sensitivity: 60% Specificity: 93% PPV: 0,93 NPV: 0,60</p>

<p>Patients from the Department of Pedodontics and Preventive Dentistry</p> <p><u>Country:</u> India</p>	<p>Bitewing radiography/CarieScan PRO for occlusal caries diagnosis in primary molars</p>	<p><u>High or low risk group:</u> not stated</p> <p><u>Type of lesions:</u> occlusal</p> <p><u>Inclusion criteria:</u></p> <p><u>Exclusion criteria:</u> healthy molars. Molars that were not considered to need invasive treatment by both examiners</p> <p><u>N analysis:</u> 104 primary molars</p>	<p>3. CarieScan PRO</p> <p><u>Reference method :</u> Opening surface (with bur)</p>	<p>negative predictive values (NPVs) and were calculated for all diagnostic methods.</p>	<p>LR: 8,57 BWs: Sensitivity:37% Specificity: 91% PPV:0,87 NPV:0,50 LR:6,06 CarieScan PRO Sensitivity:97% Specificity: 82% PPV:0,85 NPV: 0,95 LR:4,11</p> <p><u>Conclusion:</u> Low sensitivity but substantial specificity with visual inspection, Bitewing radiography can be excluded from this comparison as it performed poorly overall when compared with the other two systems The CarieScan PRO technique gave the highest overall combination of sensitivity and specificity</p>																																				
<p>13 Kavvadia, 2008</p> <p><u>Study population:</u> Children treated at pediatric dentistry department</p> <p><u>Country:</u> Greece</p>	<p><u>Aim:</u> (i) to correlate the DIAGNOdent TM readings with the results of DV, indirect visual (IDV) and radiographic examinations, and pit and fissure opening regarding the estimation of the depth of occlusal carious sites in primary teeth; (ii) to determine the validity of this device using as reference visual evaluation of lesion depth after pit and fissure opening; and (iii) to evaluate the reliability of the readings obtained by DIAGNOdent TM</p>	<p><u>Age of patient:</u> 3-13 years old</p> <p><u>Primary/permanent:</u> primary Professional cleaning</p> <p><u>High or low risk group:</u> not stated</p> <p><u>Type of lesions:</u> occlusal</p> <p><u>Inclusion criteria:</u> occlusal caries with no obvious cavitation</p> <p><u>Exclusion criteria:</u> healthy molars; restoration; approximal caries.</p> <p><u>N analysis:</u> 155 surfaces</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. indirect visual examination (color photographs) 3. radiographic BW 4. laserfluorescence device Diagnodent <p><u>Reference method :</u> Pit & fissure opening (with bur)</p>	<p><u>Outcome measures:</u> Sensitivity, specificity, Spearman correlation coefficient</p>	<p><u>Results:</u></p> <table border="1"> <tr> <td>Visual examination:</td> <td>Enamel</td> <td>Dentin</td> </tr> <tr> <td>Sensitivity:</td> <td>76%</td> <td>51%</td> </tr> <tr> <td>Specificity:</td> <td>51%</td> <td>87%</td> </tr> <tr> <td>Indirect visual examination</td> <td>Enamel</td> <td>Dentin</td> </tr> <tr> <td>Sensitivity:</td> <td>70%</td> <td>54%</td> </tr> <tr> <td>Specificity:</td> <td>54%</td> <td>82%</td> </tr> <tr> <td>BiteWing</td> <td>Enamel</td> <td>Dentin</td> </tr> <tr> <td>Sensitivity:</td> <td>20%</td> <td>42%</td> </tr> <tr> <td>Specificity:</td> <td>78%</td> <td>98%</td> </tr> <tr> <td>Laser fluorescence</td> <td>Enamel</td> <td>Dentin</td> </tr> <tr> <td>Sensitivity:</td> <td>43%</td> <td>78%</td> </tr> <tr> <td>Specificity:</td> <td>88%</td> <td>63%</td> </tr> </table> <p><u>Correlation coefficient:</u> The best correlation was found between DV and IDV ($\rho = 0.84$), while the best correlation between PFO and the other methods was found with the LF ($\rho = 0.48$).</p> <p><u>Conclusion:</u> The LF device presented high reliability in the detection of occlusal caries in primary teeth and its performance was similar to that of DV and radiographic examination.</p>	Visual examination:	Enamel	Dentin	Sensitivity:	76%	51%	Specificity:	51%	87%	Indirect visual examination	Enamel	Dentin	Sensitivity:	70%	54%	Specificity:	54%	82%	BiteWing	Enamel	Dentin	Sensitivity:	20%	42%	Specificity:	78%	98%	Laser fluorescence	Enamel	Dentin	Sensitivity:	43%	78%	Specificity:	88%	63%
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<p>14 Mendes, 2012</p> <p><u>Study population:</u> The participants were randomly selected from a pool of enrolment forms of children who had sought dental treatment at school.</p> <p><u>Country:</u> Brazil</p>	<p><u>Aim:</u> The performance of the methods was only investigated for the detection of non-evident caries lesions indicated for operative treatment at both approximal and occlusal surfaces.</p>	<p><u>Age of patient:</u> 4-12 years old</p> <p><u>Primary/permanent:</u> primary Professional cleaning <u>High or low risk group:</u> not stated</p> <p><u>Type of lesions:</u> occlusal & primary</p> <p><u>Inclusion criteria:</u> Approximal study: Non-evident lesions with an intact marginal ridge. Occlusal study: No cavitation or obvious decay</p> <p><u>Exclusion criteria:</u> Approximal study: evident lesions and approximal restoration. Occlusal study: cavitation, restoration, large lesions on other surfaces.</p> <p><u>N analysis:</u> Approximal study: 1213 surfaces Occlusal study: 407 surfaces</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. radiographic BW 3. laserfluorescence device Diagnodent <p><u>Reference method :</u> Approximal study: orthodontic rubber rings and direct visual examination of the approximal surfaces</p>	<p><u>Outcome measures:</u> Sensitivity, specificity, accuracy, utility</p>	<p><u>Results:</u></p> <table border="0"> <tr> <td>Visual examination</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Approx</td> <td>Occl</td> </tr> <tr> <td>Sensitivity: 24%</td> <td></td> <td>86%</td> </tr> <tr> <td>Specificity: 99%</td> <td></td> <td>98%</td> </tr> <tr> <td>Accuracy: 96%</td> <td></td> <td>98%</td> </tr> <tr> <td>Utility: 98</td> <td></td> <td>98</td> </tr> <tr> <td>BW</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Approx</td> <td>Occl</td> </tr> <tr> <td>Sensitivity: 58%</td> <td></td> <td>76%</td> </tr> <tr> <td>Specificity: 98%</td> <td></td> <td>96%</td> </tr> <tr> <td>Accuracy: 97%</td> <td></td> <td>95%</td> </tr> <tr> <td>Utility 97</td> <td></td> <td>96</td> </tr> <tr> <td>LF</td> <td></td> <td></td> </tr> <tr> <td></td> <td>Approx</td> <td>Occl</td> </tr> <tr> <td>Sensitivity: 51%</td> <td></td> <td>98%</td> </tr> <tr> <td>Specificity: 97%</td> <td></td> <td>87%</td> </tr> <tr> <td>Accuracy: 95%</td> <td></td> <td>87%</td> </tr> <tr> <td>Utility 96</td> <td></td> <td>89</td> </tr> </table> <p><u>Conclusion:</u> This investigation is the first study to have demonstrated that adjunct methods do not actually offer any benefits in detecting approximal and occlusal caries lesions in primary molars in comparison to only the visual inspection being performed.</p>	Visual examination				Approx	Occl	Sensitivity: 24%		86%	Specificity: 99%		98%	Accuracy: 96%		98%	Utility: 98		98	BW				Approx	Occl	Sensitivity: 58%		76%	Specificity: 98%		96%	Accuracy: 97%		95%	Utility 97		96	LF				Approx	Occl	Sensitivity: 51%		98%	Specificity: 97%		87%	Accuracy: 95%		87%	Utility 96		89
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Specificity: 98%		96%																																																									
Accuracy: 97%		95%																																																									
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Specificity: 97%		87%																																																									
Accuracy: 95%		87%																																																									
Utility 96		89																																																									
<p>15 Newman 2009</p> <p><u>Study population:</u> schoolchildren</p> <p><u>Country:</u> Australia</p>	<p><u>Aim:</u></p>	<p><u>Age of patient:</u> 6.4 ± 0.5 yrs to 12.1 ± 0.8 yrs</p> <p><u>Primary/permanent:</u> primary</p> <p><u>High or low risk group</u></p> <p><u>Type of lesions:</u> Occlusal, approximal</p> <p><u>Inclusion criteria:</u></p> <p><u>Exclusion criteria:</u></p> <p><u>N analysis:</u> 611 children</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. Bitewing <p><u>Reference method :</u> no</p>	<p><u>Outcome measures:</u> Descriptive statistics Sensitivity and specificity were determined at the C3/R3 level which is considered the level at which restorative work is generally indicated for the community under study (restorative threshold). For comparison purposes, specificity and sensitivity were also determined at C2/R2 level. Data were recorded in comprehensive</p>	<p><u>Results:</u> Overall, at the restorative threshold, the visual-tactile technique could detect 62 per cent of occlusal caries compared to 74 per cent for bitewing radiography (p < 0.001). The prevalence of "hidden" occlusal caries was 12 per cent. In contrast, for primary molar proximal surface caries, the visual-tactile technique could detect only 43 per cent of caries compared with 91 per cent for bitewing radiography (p < 0.001).</p> <p><u>Conclusion:</u> In the primary dentition, use of bitewing radiography increases the detection rate of proximal surface caries substantially. It is recommended that bitewing radiography be included as part of the routine examination of children with proximal surfaces that cannot be visualized.</p>																																																						

				data charts and analysed using the Chi-square, student's t-test and ANOVA tests. A level of 0.05 was employed to determine statistical significance.	
<p>16 Novaes 2009 <u>Study</u> <u>population:</u> children seeking dental treatment at the School of Dentistry of the University of São Paulo <u>Country:</u> Brasil</p>	<p><u>Aim:</u> to compare the performance of visual inspection, radiography and the LFpen in detecting approximal caries lesions in primary molars.</p>	<p><u>Age of patient:</u> 5-12 y <u>Primary/permanent:</u> primary <u>High or low risk group</u> high <u>Type of lesions:</u> Approximal</p> <p><u>Inclusion criteria:</u></p> <p><u>Exclusion criteria:</u> Exclusion criteria for surfaces were the presence of approximal restorations, hypoplastic pits, frank approximal cavitation (absence of a marginal ridge), the presence of large carious lesions on smooth or occlusal surfaces and absence of the adjacent tooth.</p> <p><u>N analysis:</u> 50 children, 621 surfaces</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. Bitewings 3. Diagnodent (laserfluorescence) <p><u>Reference method :</u> no</p>	<p><u>Outcome measures:</u> The sensitivity, specificity and accuracy values and the 95% confidence interval were calculated for each method. The accuracy is defined as the percentage of correct diagnosis in all samples (sound and decayed surfaces).</p>	<p><u>Results:</u> At white-spot threshold: Examiner 1 VI: Sen 0.21, Spec 0.95, Acc 0.64 BW: Sen 0.23, Spec 0.99, Acc 0.67 LF: Sen 0.16, Spec 0.96, Acc 0.63</p> <p>Examiner 2 VI: Sen 0.20, Spec 0.95, Acc 0.64 BW: Sen 0.16, Spec 1.00, Acc 0.65 LF: Sen 0.16, Spec 0.94, Acc 0.62</p> <p>At cavitation threshold Examiner 1 VI: Sen 0.30, Spec 1.00, Acc 0.98 BW: Sen 0.70, Spec 0.99, Acc 0.98 LF: Sen 0.65, Spec 1.00, Acc 0.99</p> <p>Examiner 2 VI: Sen 0.30, Spec 1.00, Acc 0.98 BW: Sen 0.65, Spec 0.99, Acc 0.98 LF: Sen 0.55, Spec 1.00, Acc 0.98</p> <p><u>ICC VI: 0.72</u> <u>ICC BW: 0.77</u> <u>ICC LF: 0.75</u></p> <p>The kappa value for LFpen at white-spot threshold was lower (0.44). Conclusion: Both LFpen and radiographic methods present similar performance in detecting the presence of cavitations on approximal surfaces of primary molars.</p>
<p>17 Novaes, 2010 <u>Study</u> <u>population:</u> Children seeking treatment at</p>	<p><u>Aim:</u> the performance of methods of approximal caries detection in primary molars and to assess the</p>	<p><u>Age of patient:</u> 4-12 y <u>Primary/permanent:</u> Primary & permanent <u>High or low risk group</u> high <u>Type of lesions:</u></p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. bitewings 3. laserfluorescence (diagnodent) 	<p><u>Outcome measures:</u> Sensitivity, specificity, accuracy</p>	<p><u>Results:</u> The interexaminer ICC value (95% CI) for direct visual inspection after temporary separation was 0.924 (0.912-0.935). NC Threshold (Sens/Spec/Accuracy) Examiner 1 : VI: 0.657/0.728/0.371 RW: 0.201/0.965/0.348 LFpen: 0.295/0.816/0.395 Examiner 2:</p>

<p>university of Sao Paulo <u>Country:</u> Brazil</p>	<p>influence of the discomfort caused by these methods on their performance.</p>	<p>approximal <u>Inclusion criteria:</u> The recruited subjects had at least one primary molar in contact with the adjacent tooth. The exams were performed on the distal face of first primary molars, the mesial face of second primary molars and also the distal face of second primary molars, when the first permanent molar was present. <u>Exclusion criteria:</u> Teeth with large carious lesions on smooth or occlusal surfaces, with frank approximal cavitations (absence of marginal ridge), approximal restorations or hypoplastic pits were excluded. <u>N analysis:</u> 76 children, 592 approximal surfaces</p>	<p><u>Reference method :</u> No</p>		<p>VI: 0.684/0.658/0.679 RW:0.224/0.965/0.367 LFpen: 0.243/0.833/0.357 Cav Threshold (Sens/Spec/Accuracy) Examiner 1 VI: 0.226/0.996/0.956 RW: 0.516/0.977/0.953 LFpen: 0.516/0.952/0.929 Examiner 2: VI: 0.194/0.993/0.951 RW: 0.516/0.979/0.955 LFpen: 0.419/0.952/0.924</p> <p><u>Conclusion:</u> In conclusion, radiography and LFpen achieved similar performance in detecting approximal caries lesions in primary teeth and the discomfort caused by visual inspection and LFpen can influence the performance of these methods, since a higher number of false-positive or false-negative results occurred in children who reported discomfort.</p>
<p>18 Novaes, Matos, Celiberti, 2012 <u>Study population:</u> Children seeking dental treatment at School of Dentistry of University of São Paulo <u>Country:</u> Brazil</p>	<p><u>Aim:</u> to investigate the influence of interdental spacing on the performance of proximal caries detection methods in primary molars.</p>	<p><u>Age of patient:</u> 4-12 years <u>Primary/permanent:</u> Primary & permanent <u>High or low risk group</u> high <u>Type of lesions:</u> Approximal <u>Inclusion criteria:</u> The recruited subjects had at least one primary molar in contact with the adjacent tooth. The contact points of interest were on the distal surfaces of the first primary molars, the mesial surfaces of the second primary molars and the distal surfaces of second primary molars, only if the first permanent molar was present. <u>Exclusion criteria:</u> The mesial surfaces of the first primary molars were excluded because of the common</p>	<p><u>Methods</u></p> <ol style="list-style-type: none"> 1: visual examination 2. bitewings 3. laserfluorescence (diagnodent) <p><u>Reference method :</u> Tooth separation</p>	<p><u>Outcome measures:</u> Sensitivity, specificity</p>	<p><u>Results:</u> The false positive and false negative rates obtained with visual inspection were 25.5% and 33.3%, respectively. With the LFpen method, the false positive rate was 17.6%, and the false negative rate was 70.8%, for the radiographic method, the false positive and false negative rates were 2% and 80.4%, respectively. <u>Conclusion:</u> The biological interdental spacing does not influence the performance of methods of detecting proximal caries lesions in primary molars. Furthermore, temporary tooth separation provides a spacing narrower than 1.0 mm.</p>

		<p>presence of space in these sites. Teeth with frank proximal cavitations or restorations (absence of marginal ridge) and hypoplastic defects were also excluded.</p> <p><u>N analysis:</u> 76 children, 344 approximal surfaces</p>			
<p>19 Pitts, 1992 <u>Study</u> <u>population:</u> Children treated in general dental practices in Scotland <u>Country:</u> United Kingdom</p>	<p><u>Aim:</u> (1) to compare conventional radiographic assessments of lesion depth with clinical assessment by direct visual inspection of approximal surfaces following elective temporary separation of permanent teeth, (2) to compare this relationship with that found for primary teeth, and (3) to determine whether or not the initial presence of an anatomical contact between approximal surfaces was related to caries status.</p>	<p><u>Age of patient:</u> 5-15 years <u>Primary/permanent:</u> Primary & permanent <u>High or low risk group</u> high <u>Type of lesions:</u> approximal <u>Inclusion criteria:</u> <u>Exclusion criteria:</u> <u>N analysis:</u> 211 children, 1,468 mesial and distal permanent approximal surfaces, and 756 mesial and distal primary approximal surfaces</p>	<p><u>Methods</u> 1: visual examination 2. bitewings <u>Reference method :</u> No</p>	<p><u>Outcome measures:</u> Degree of correspondence between the clinical and radiographic codes of a grading system</p>	<p><u>Results:</u> Primary surfaces: 49.7% were graded sound at the D1 diagnostic threshold by both techniques. 44.4% contained radiolucencies. There were more radiolucencies involving dentine (Code R3/R4) in these teeth compared to the permanent teeth. 22 white-spot and 21 brown-spot lesions in sound radiographically graded surfaces <u>Conclusion:</u> Correlation between BW and clinical exam were not as good as expected. Approximal surfaces who were previously in contact more likely to exhibit lesions</p>
<p>20 Pontes, 2017 <u>Study</u> <u>population:</u> children who sought dental treatment in dental school <u>Country:</u> Brasil</p>	<p><u>Aim:</u> to investigate the performance of fluorescencebased methods (FBMs), compared to visual inspection after histological validation, in detecting and assessing the</p>	<p><u>Age of patient:</u> 8-12 years <u>Primary/permanent:</u> Primary & permanent <u>High or low risk group</u> high <u>Type of lesions:</u> occlusal</p>	<p><u>Methods</u> 1: visual examination 2. QLF 3. laserfluorescenc (diagnodent) <u>Reference method :</u> Histological</p>	<p><u>Outcome measures:</u> Sensitivity, specificity, accuracy, Az</p>	<p><u>Results:</u> Initial enamel caries lesions (D1) VI: 0.87/0.5/0.84/0.766 LFpen: 0.848/0.5/0.82/0.649 QLF-Red: 0.717/0.75/0.72/0.668 QLF-Green loss: 0.565/0.75/0.58/0.59 QLF-Green loss x lesion size: 0.826/0.5/0.8/0.571 Dentin caries lesions (D3) VI: 0.6/0.95/0.88/0.871 LFpen: 0.6/0.825/0.672/0.674 QLF-Red: 0.9/0.825/0.84/0.87 QLF-Green loss: 0.7/0.875/0.84/0.78</p>

	activity status of occlusal carious lesions in primary teeth.	<p><u>Inclusion criteria:</u> Children participating in this previous study who had at least one primary molar close to exfoliation were selected to participate in the present study. Moreover, those eligible primary molars should not have enamel defects, restorations, sealants, or frankly cavitated lesions</p> <p><u>Exclusion criteria:</u> <u>N analysis:</u> 24 children, 50 teeth (close to exfoliation)</p>			<p>QLF-Green loss x lesion size: 0.7/0.775/0.76/0.745</p> <p><u>Conclusion:</u> When we compared the methods regarding caries activity assessment, there were no statistically significant differences among them. Therefore, we can conclude that the FBMs do not present advantages over visual inspection for detecting and assessing the activity status of occlusal carious lesions in primary molars.</p>
21 Poorterman, 2010 <u>Study population:</u> 6-year-old (regular) patients of two general dental practices with affinity for paediatric dentistry in several large communities in the Netherlands. <u>Country:</u> The Netherlands	<p><u>Aim:</u> To determine the additional diagnostic value of bitewing radiographs in 6-year-old children and to detect approximal dentin caries in the primary dentition.</p>	<p><u>Age of patient:</u> 6 years</p> <p><u>Primary/permanent:</u> primary</p> <p><u>High or low risk group</u> low</p> <p><u>Type of lesions:</u> approximal</p> <p><u>Inclusion criteria:</u> <u>Exclusion criteria:</u> radiographs taken at 5 years of age.</p> <p><u>N analysis:</u> Clinical: n=50 Radiography: n=41</p>	<p><u>Methods</u></p> <p>1: visual examination</p> <p>2. Bitewings</p> <p><u>Reference method :</u> No</p>	<p><u>Outcome measures:</u> Cohens kappa</p>	<p><u>Results:</u> Half of the carious lesions into dentin (49.3%) were discovered by radiographs only, 44.8% were discovered both clinically and radiographically and 6.0% were discovered only clinically and were assessed as caries-free radiographically. Of the 59 restored surfaces, two (3.4%) were clinically and radiographically scored as inadequately restored. With the use of radiographs, 23.7% of all restored surfaces were considered to be inadequately restored. Interobserver agreement was calculated using Cohen's kappa and proved to be very good ($\kappa = 0.94$), according to a standard interpretation of Cohen's kappa.</p> <p><u>Conclusion:</u> Although not possible to achieve in all 6-year-old children, bitewing radiographs can reveal a considerable amount of carious surfaces and inadequate restorations, which appear clinically sound or adequate.</p>
22 Townsend 2000 <u>Study population:</u> Patients attending an orthodontic assessment clinic <u>Country:</u> United Kingdom	<p><u>Aim:</u> To evaluate the level of agreement between BWs & oblique lateral radiographs for diagnosis of dentin-caries and to see which view is most useful</p>	<p><u>Age of patient:</u> 6-18 years</p> <p><u>Primary/permanent:</u> Primary & permanent</p> <p><u>High or low risk group</u></p> <p><u>Type of lesions:</u> approximal</p> <p><u>Inclusion criteria:</u> ns</p> <p><u>Exclusion criteria:</u> ns</p> <p><u>N analysis:</u> 53 children, 105 BWs, 105 oblique lateral radiographs; 969 approximal surfaces, 530 occlusal surfaces</p>	<p><u>Methods</u></p> <p>1: visual examination</p> <p>2. Bitewings</p> <p>3. oblique lateral x-ray</p> <p><u>Reference method :</u> No</p>	<p><u>Outcome measures:</u> kappa</p>	<p><u>Results:</u> The agreement between the oblique lateral and the bitewing radiographs for the presence of approximal caries expressed in the form of Cohen Kappa gave values of 0.64 for observer 1 and 0.53 for observer 2. Kappa values for the level of agreement between observers and for the same observer on different occasions were within the range 0.5-0.95 for both types of film.</p> <p><u>Conclusion:</u> The kappa values for the agreement between the two views as well as the intra- and inter-observer agreement and reproducibility of the oblique lateral view all fall in the range $K = 0,5 - 0,75$. Results suggested a fair to good agreement in diagnosis made using the two types of film. However, levels were lower than estimates of reproducibility reported for bitewing films alone.</p>

<p>23 Araujo 1996 <u>Study</u> <u>population:</u> Patients at the department of paediatric dentistry of federal university of Rio Grande do Sul school of dentistry <u>Country:</u> Brazil</p>	<p><u>Aim:</u> To compare the accuracy of clinical examination performed with bitewing radiographs or clinical examination using tooth separation to identify carious lesion activity</p>	<p><u>Age of patient:</u> 3-10 years <u>Primary/permanent:</u> Primary & permanent <u>High or low risk group:</u> high <u>Type of lesions:</u> approximal <u>Inclusion criteria:</u> ns <u>Exclusion criteria:</u> ns <u>N analysis:</u> 20 children 40 bitewings 320 surfaces</p>	<p><u>Methods</u></p> <p>1: visual examination 2. bitewings</p> <p><u>Reference method :</u> Separation of the teeth</p>	<p><u>Outcome measures:</u></p>	<p><u>Results:</u> The correlation between the extension of interproximal radiolucent lesions in the primary dentition and their clinical diagnosis following separation of the teeth, was similar to findings on literature evaluating the permanent dentition. On radiographic findings for enamel lesions, white spots predominated both in the inner (100%) and outer (94%) half of the enamel upon clinical examination with separation of the teeth. For radiolucent lesions in dentin, on the other hand, cavities predominated over white spot lesions (84%). In groups 1 and 2 (young primary), white spots occurred in cases where the radiolucent lesions reached the dentin (15% and 25%), similar to findings for young permanent teeth. Clinical diagnosis performed with the mechanical separation of teeth cannot be considered conclusive for the primary dentition. <u>Conclusion:</u> Quantitatively, the bitewing radiographic examination was the most effective method for diagnosis of approximal dental caries</p>
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