



Dental Practice-Based Research Network
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DPBRN 5: Reasons for replacement or repair of dental restorations

Results: Overall and by Region

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Table 1: Distribution of DPBRN practitioner-investigators, participating patients and restorations according to DPBRN region¹

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		TOTAL	
	N	% ²	N	%	N	%	N	%	N	%	N	%
Dentists	39	19.8	44	22.3	36	18.3	40	20.3	38	19.3	197	100
Patients	1565	21.0	1683	22.5	1470	19.7	1374	18.4	1371	18.4	7463	100
Restorations	2117	21.5	2258	23.0	1899	19.3	1845	18.8	1709	17.4	9828	100

¹AL/MS: Alabama/Mississippi; FL/GA: Florida/Georgia; MN/HP: HealthPartners and private practitioners in Minnesota; KP/PDA: Permanente Dental Associates and Kaiser Permanente's Center for Health Research; and SK: Scandinavia countries of Denmark, Norway and Sweden.

²Percentages for this table only are within rows for each variable.

Results that follow are of 9,828 restorations among 7,463 participating patients from 197 practitioners.

Note: Numbers not totaling to 9,828 restorations or 7,463 patients are due to missing data.

1. Patient Gender

- a Male
 b Female

2. Patient age in years

Table 2A: Characteristics of patients with restorations by DPBRN region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Gender												
Male	686	43.8	689	40.9	586	40.3	600	43.7	628	45.8	3,189	42.8
Female	879	56.2	994	59.1	868	59.7	774	56.3	743	54.2	4,258	57.2
Age in years												
Mean	49.9		52.1		52.3		51.0		51.9		51.4	
(SD)	16.1		15.9		18.5		14.6		14.7		16.1	
(range)	13-91		6-97		11-102		13-95		8-95		6-102	
6 - 18 years	50	3.2	32	1.9	34	2.3	16	1.2	17	1.2	149	2.0
19 - 44 years	487	31.1	484	28.8	449	30.6	406	29.6	416	30.3	2242	30.1
45 - 64 years	749	47.8	804	47.9	629	42.9	731	53.2	659	48.1	3572	47.9
>= 65 years	279	17.8	363	21.6	358	24.4	220	16.0	279	20.4	1499	20.1

- About 43% of the patients were male.
- Mean age was 51.4 ± 16 years (range: 6 to 102).

3. Patient Ethnicity

- a Hispanic or Latino
 b Not Hispanic or Latino

Table 2B: Characteristics of patients with restorations by DPBRN region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Hispanic/Latino Ethnicity												
Yes	19	1.2	173	10.3	32	2.2	45	3.3	8	0.6	277	3.7
No/Unknown	1546	98.8	1510	89.7	1438	97.8	1329	96.7	1363	99.4	7186	96.3

- About 4% of patients were of Hispanic/Latino ethnicity; higher in FL/GA, 10%.

4. Patient Race

- a White
- b Black or African-American
- c American Indian or Alaska Native
- d Asian
- e Native Hawaiian or Other Pacific Islander
- f Other

5. Does the patient have any dental insurance or third party coverage?

- a Yes
- b No

Table 2C: Characteristics of patients with restorations by DPBRN region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Race												
White	1340	85.6	1453	86.3	1231	83.7	1249	90.9	1349	98.4	6622	88.7
African-Am	172	11.0	172	10.2	68	4.6	38	2.8	0	0.0	450	6.0
Am. Ind/Alaska	41	2.6	6	0.4	8	0.5	7	0.5	0	0.0	62	0.8
Asian	4	0.3	13	0.8	43	2.9	36	2.6	9	0.7	105	1.4
HA/Islander	0	0.0	1	0.1	0	0.0	8	0.6	0	0.0	9	0.1
Other	7	0.5	33	2.0	19	1.3	27	2.0	12	0.9	98	1.3
Missing	1	0.1	5	0.3	101	6.9	9	0.7	1	0.1	117	1.6
Insurance												
Yes	1220	78.0	1077	64.1	1338	91.1	1362	99.1	892	65.1	5889	79.0
No	345	22.0	603	35.9	131	8.9	12	0.9	478	34.9	1570	21.1

- About 89% of patients were White and 6% were African-American; differed by region with SK being 98% White and FL/GA, AL/MS being 10–11% African-American.
- Overall, 79% of the patients had some type of dental insurance, ranged from 64% (FL/GA) to 99% (KP/PDA).

6. Which tooth was treated **today**?
(Not included in individual reports)

Table 3: Tooth Position by DPBRN region

	AL/MS		FL/GA		MN		KP/PDA		SK		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%
Incisor/canine	491	23.2	422	18.7	381	20.1	341	18.5	320	18.7	1955	19.9
Premolar	570	26.9	558	24.7	500	26.3	452	24.5	448	26.2	2528	25.7
Molar	1056	49.9	1278	56.6	1018	53.6	1052	57.0	941	55.1	5345	54.4

- Overall, about 20% of the restorations were on incisors/canines, about 26% were on premolars, and 54% on molars.

7. **Before** your treatment today, which tooth surface(s) did the restoration include? (Mark all that apply)

- a Occlusal or Incisal
- b Mesial
- c Distal
- d Buccal or Facial
- e Lingual or Palatal

Table 4: Tooth Surface Included in Restoration by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Before your treatment today, which tooth surface(s) did the restoration include?												
Occlusal or Incisal	1679	79.3	1878	83.2	1362	76.0	1545	83.8	1421	83.2	7885	81.1
Mesial	1012	47.8	930	41.2	758	42.4	1043	56.6	960	56.2	4703	48.4
Distal	1051	49.7	1030	45.7	867	48.5	1057	57.4	955	55.9	4960	51.1
Buccal or Facial	762	36.0	761	33.7	398	22.3	745	40.4	438	25.6	3104	31.9
Lingual or Palatal	725	34.3	678	30.1	421	23.5	779	42.3	386	22.6	2989	30.8

- 81% of tooth surfaces which were occlusal or incisal before today's treatment.
- 48% were mesial, ranged from 41% (FL/GA) to 57% (KP/PDA).
- 51% were distal with SK and KP/PDA being higher at 56% and 57%, respectively.
- 32% were buccal or facial, ranged from 22% (HP/MN) to 40% (KP/PDA).
- 31% were lingual or palatal, ranged from 23% (SK) to 42% (KP/PDA).

8. What material was in the restoration **before** you repaired or replaced it today? (Mark all that apply)

- a Amalgam
- b Composite resin directly placed, including compomer
- c Indirect composite resin
- d Glass ionomer, resin-modified glass ionomer
- e Ceramic or porcelain
- f Cast gold or any other cast metallic restoration
- g Combined metal/ceramic restoration
- h Unknown

Table 5: Restoration Material before Restoration was Replaced by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
What material was in the restoration before you repaired or replaced it today?												
Amalgam	1160	54.8	1177	52.1	998	56.9	1195	64.8	832	48.7	5362	55.4
Direct comp. resin	773	36.5	811	36.0	518	29.5	457	24.8	827	48.4	3386	35.0
Indirect comp. resin	3	0.1	9	0.4	0	0.0	2	0.1	2	0.1	16	0.2
Glass ionomer	18	0.9	17	0.8	64	3.7	57	3.1	39	2.3	195	2.0
Ceramic/porcelain	19	0.9	28	1.2	16	0.9	9	0.5	14	0.8	86	0.9
Cast gold	28	1.3	54	2.4	60	3.4	79	4.3	21	1.2	242	2.5
Metal/ceramic rest.	116	5.5	168	7.5	53	3.0	64	3.5	33	1.9	434	4.5
Unknown	36	1.7	43	1.9	21	1.2	42	2.3	28	1.6	170	1.8

- The most common material found in the restoration before treatment was amalgam at 55%, ranged from 49% (SK) to 65% (KP/PDA).

9. What treatment did you do on this tooth today?

- a Repaired a defective part of the restoration
- b Replaced the entire restoration
- c Placed a temporary restoration

Table 6: Treatment done today by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
What treatment did you do on this tooth today?												
Rep. def. part	446	21.1	420	18.8	480	26.7	532	28.9	510	29.9	2388	24.6
Replaced rest.	1644	77.8	1780	79.5	1281	71.1	1179	64.0	1181	69.1	7065	72.8
Temporary rest.	24	1.1	40	1.8	41	2.3	132	7.2	18	1.1	255	2.6

- 73% of the patients received entire restorations, ranged from 64% (KP/PDA) to 79% (FL/GA).

10. Which restoration or tooth surface(s) did you repair or replace **today**? (Mark all that apply)

- a Occlusal or Incisal
- b Mesial
- c Distal
- d Buccal or Facial
- e Lingual or Palatal

Table 7: Tooth Surface Repaired or Restored today by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Which restoration or tooth surface(s) did you repair or replace today?												
Occlusal/Incisal	1639	77.4	1831	81.1	1434	75.5	1436	77.9	1367	80.1	7707	78.4
Mesial	1205	56.9	1163	51.5	830	43.8	980	53.2	824	48.2	5002	50.9
Distal	1165	55.1	1182	52.4	950	50.0	1035	56.2	844	49.4	5176	52.7
Buccal/Facial	1086	51.3	1074	47.6	572	30.1	891	48.3	497	29.1	4120	41.9
Lingual/Palatal	1045	49.4	936	41.5	545	28.7	901	48.9	428	25.1	3855	39.2

- 78% involved occlusal or incisal.
- 51% involved mesial, ranged from 44% (HP/MN) to 57% (AL/MS).
- 53% involved distal tooth surfaces.
- 42% involved buccal or facial, ranged from 29% (SK) to 51% (AL/MS).
- 39% involved lingual or palatal, ranged from 25% (SK) to 49% (AL/MS and KP/PDA).

11. What material did you use for the restoration or repair **today**? (Mark all that apply)

- a Amalgam
- b Composite resin directly placed, including compomer
- c Indirect composite resin
- d Glass ionomer, resin-modified glass ionomer
- e Ceramic or porcelain
- f Cast gold or any other cast metallic restoration
- g Combined metal/ceramic restoration
- h Temporary restorative material

Table 8: Restoration Material Used Today DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
What material did you use for the restoration or repair today?												
Amalgam	491	23.2	274	12.1	912	48.1	1099	59.6	12	0.7	2788	28.4
Direct comp. resin	1034	48.8	1396	61.8	576	30.4	405	22.0	1500	87.8	4911	50.0
Indirect comp. resin	4	0.2	9	0.4	5	0.3	1	0.1	0	0.0	19	0.2
Glass ionomer	81	3.8	83	3.7	114	6.0	87	4.7	46	2.7	411	4.2
Ceramic/porcelain	88	4.2	196	8.7	27	1.4	25	1.4	32	1.9	368	3.8
Cast gold	47	2.2	43	1.9	49	2.6	91	4.9	19	1.1	249	2.5
Comb. metal	382	18.0	285	12.6	128	6.8	144	7.8	89	5.2	1028	10.5
Temp. material	15	0.7	65	2.9	87	4.6	18	1.0	16	0.9	201	2.1

- Composite resin directly placed was the most common material used in today's treatment at 50%, ranged from 22% (KP/PDA) to 88% (SK).
- Amalgam was used in 28%, ranged from 1% (SK) to 60% (KP/PDA).
- 10% of treatments used a combined metal and ceramic restoration, ranged from 5% (SK) to 18% (AL/MS).

12. Did you use a base, lining or bonding material to place or repair the restoration today? **(Mark all that apply)**

- a None
- b Resin-based bonding material
- c Glass ionomer, resin-modified glass ionomer
- d Calcium hydroxide-based cement/liner
- e Varnish (e.g. Copalite)
- f Other

Table 9: Base, Lining or Bonding Material Used Today by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Did you use a base, lining, or bonding material to place or repair the restoration today?												
None	811	38.3	624	27.7	1042	54.9	954	51.7	140	8.2	3571	36.4
Resin-based	863	40.8	1161	51.4	526	27.7	333	18.1	1509	88.4	4392	44.7
Glass ionomer	307	14.5	237	10.5	275	14.5	217	11.8	80	4.7	1116	11.4
Calc./hydr. cem.	105	5.0	110	4.9	23	1.2	29	1.6	77	4.5	344	3.5
Varnish	31	1.5	95	4.2	14	0.7	140	7.6	2	0.1	282	2.9
Other	146	6.9	152	6.8	121	6.4	206	11.2	55	3.2	680	6.9

- 36% used no type of base, lining, or bonding material, ranged from 8% (SK) to 55% (HP/MN).
- The most common type of material used was resin-based, about 45% of all restorations, ranged from 28% (HP/MN) to 88% (SK).
- Varnish and calcium hydroxide-based cement/liner were used infrequently, each in less than 4% of restorations.

13. Did you use a rubber dam during the restorative procedure?

- a Yes
- b No

Table 10: Use of Rubber Dam by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Did you use a rubber dam during the restorative procedure?												
Yes	39	1.9	112	5.0	60	3.2	661	36.0	18	1.1	890	9.1
No	2074	98.2	2140	95.0	1837	96.8	1174	64.0	1690	99.0	8915	90.9

- Overall, 9% of restorative procedures used a rubber dam, notably higher in KP/PDA at 36%.

14. Did you, or a different dentist, place the original restoration that was replaced or repaired today?

- a I did the original restoration
 b A different dentist did the original restoration

Table 11: Who placed the original restoration by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Did you, or a different dentist, place the original restoration that was replaced or repaired today?												
I did	657	31.2	391	17.4	887	53.2	187	10.2	343	20.1	2465	25.8
Different dentist	1451	68.8	1857	82.6	781	46.8	1645	89.8	1361	79.9	7095	74.2

- 74% of the restorations were done by other dentists, ranged from 47% (HP/MN) to 90% (KP/PDA).

15. What was the main reason for repair or replacement of the restoration today? (**Choose only one**)

- a Secondary/recurrent caries
 b Entire restoration was discolored
 c Restoration margins were discolored
 d Restoration margins were degraded or ditched
 e Bulk fracture of restoration
 f Restoration was missing
 g Tooth was fractured
 h Pain or sensitivity
 i Patient request
 j Other reason

Table 12: Main Reason for Repair or Replacement by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
What was the main reason for repair or replacement of the restoration today?												
Sec./recurrent	915	43.3	981	43.5	879	49.0	806	43.9	611	35.9	4192	43.2
Ent. rest. Disc.	33	1.6	42	1.9	14	0.8	5	0.3	30	1.8	124	1.3
Margin disc.	46	2.2	72	3.2	6	0.3	13	0.7	19	1.1	156	1.6
Mar degraded	184	8.7	237	10.5	78	4.4	119	6.5	101	5.9	719	7.4
Bulk fx of rest.	303	14.4	290	12.9	289	16.1	319	17.4	343	20.1	1544	15.9
Rest. missing	178	8.4	121	5.4	101	5.6	118	6.4	178	10.4	696	7.2
Tooth fx	266	12.6	249	11.1	272	15.2	269	14.6	188	11.0	1244	12.8
Pain/sens.	13	0.6	42	1.9	17	1.0	5	0.3	35	2.1	112	1.2
Pt. request	42	2.0	63	2.8	12	0.7	17	0.9	59	3.5	193	2.0
Other	132	6.3	157	7.0	128	7.1	167	9.1	141	8.3	725	7.5

- The most common reason for repair or replacement of the restoration was a secondary/recurrent caries at 43%, ranged from 36% (SK) to 49% (HP/MN).

ANSWER QUESTIONS 16-17 ONLY IF "SECONDARY CARIES" WAS MARKED IN QUESTION 15

16. What technique or observation led you to the diagnosis of secondary caries? (Mark all that apply)

- a Probing with a dental explorer
- b Radiographs
- c Intuition or experience based on clinical appearance
- d Discolored margin of the restoration
- e Frank or definite caries cavitation
- f Presence of soft, discolored dentin or enamel
- g An exploratory preparation to inspect the lesion

Table 13: Technique used to Diagnose Secondary Caries by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
What technique or observation led you to the diagnosis of secondary caries?												
Dent Expl	564	27.7	594	27.9	563	29.9	492	26.9	438	26.9	2651	27.9
Radiographs	547	26.9	554	26.0	545	28.9	526	28.7	315	19.3	2487	26.1
Intuition/Exp.	194	9.5	175	8.2	81	4.3	104	5.7	82	5.0	636	6.7
Discol margin	224	11.0	206	9.7	170	9.0	137	7.5	82	5.0	819	8.6
Def cavity	283	13.9	220	10.3	241	12.8	203	11.1	108	6.6	1055	11.1
Dis den enam	214	10.5	142	6.7	159	8.4	179	9.8	108	6.6	802	8.4
Insp. lesion	13	0.6	3	0.1	8	0.4	11	0.6	7	0.4	42	0.4

- The most common diagnostic techniques for secondary caries were the dental explorer at 28% and radiographs at 26%, and the least common was inspection of the lesion at 0.4%.
- These were similar across regions.

17. Where was the clinically diagnosed secondary caries relative to the existing restoration? (Choose only one)

- a Gingival/apical to the restoration in enamel
- b Gingival/apical to the restoration in dentin or cementum
- c Other location

Table 14: Location of Secondary Caries relative to Existing Restoration by DPBRN Region

	AL/MS		FL/GA		MN/HP		KP/PDA		SK		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Where was the clinically diagnosed secondary caries relative to the existing restoration?												
Ging/enam	185	20.2	218	22.1	150	17.1	176	22.9	112	18.2	841	20.2
Ging/dent	576	63.0	567	57.5	579	66.2	498	64.8	378	61.6	2598	62.5
Oth.Location	153	16.7	202	20.5	147	16.8	94	12.2	124	20.2	720	17.3

- The most common location of the restoration was gingival/apical to the restoration in dentin or cementum at 62%.