

S3-Leitlinie (Evidenzbericht)

Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich

AWMF-Registernummer: 083-028

Stand: Januar 2024

Gültig bis: Januar 2029

Federführende Fachgesellschaften:

Deutsche Gesellschaft für Zahnerhaltung (DGZ)

Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK)

Beteiligung weiterer AWMF-Fachgesellschaften:

Deutsche Gesellschaft für Kinderzahnheilkunde (DGKiZ)

Deutsche Gesellschaft für Parodontologie (DG PARO)

Deutsche Gesellschaft für Prothetische Zahnmedizin und Biomaterialien (DGPro)

Deutsches Netzwerk Evidenzbasierte Medizin e.V. (DNEbM)

Beteiligung weiterer Fachgesellschaften/ Organisationen:

Arbeitsgemeinschaft für Oral- und Kieferchirurgie der DGZMK (AGOKi)

Bundesverband der Kinderzahnärzte (BUKiZ)

Bundesverband der Zahnärztinnen und Zahnärzte im Öffentlichen Gesundheitsdienst (BZÖG)

Bundeszahnärztekammer (BZÄK)

Deutsche Gesellschaft für Umwelt-ZahnMedizin (DEGUZ)

Deutsche Gesellschaft für ästhetische Zahnmedizin (DGÄZ)

Deutsche Gesellschaft für Computergestützte Zahnheilkunde (DGCZ)

Deutsche Gesellschaft für Endodontologie und zahnärztliche Traumatologie (DGET)

Deutsche Gesellschaft für Laserzahnheilkunde (DGL)

Deutsche Gesellschaft für Orale Epidemiologie und Versorgungsforschung (DGoEV)

Deutsche Gesellschaft für Präventivzahnmedizin (DGPZM)

Deutsche Gesellschaft für Restaurative und Regenerative Zahnerhaltung (DGR²Z)

Freier Verband Deutscher Zahnärzte (FVDZ)

Kassenzahnärztliche Bundesvereinigung (KZBV)

Verband Deutscher Zertifizierter Endodontologen (VDZE)

publiziert bei:



Koordination / Ko-Koordination: Prof. Dr. Diana Wolff (DGZ) / PD Dr. Dietmar Weng (AGOKi)

Mandatsträger und Stellvertreter (Fachgesellschaften in alphabetischer Reihenfolge):

AGOKi, PD Dr. Dietmar Weng
BuKiz, drs Johanna Maria Kant
BuKiz, Dr. Monika Prinz-Kattinger (Stellvertreterin)
BZÄK, Prof. Dr. Christoph Benz
BZÖG, Dr. Uwe Niekusch
DEGUZ, ZA Lutz Höhne
DEGUZ, Dr. Stefan Dietsche (Stellvertreter)
DG Paro, Dr. Inga Harks
DG Paro, Prof. Dr. Bettina Dannewitz (Stellvertreterin)
DGÄZ, ZA Wolfgang Boer
DGCZ, Prof. Dr. Sven Reich
DGET, Prof. Dr. Gabriel Krastl
DGKiZ, Prof. Dr. Norbert Krämer
DGL, Prof. Dr. Andreas Braun
DGL, Prof. Dr. Felix Krause (Stellvertreter)
DGoEV, Prof. Dr. Falk Schwendicke,
DNEBM, Prof. Dr. Falk Schwendicke,
DGPro, PD Dr. Angelika Rauch
DGPZM, Prof. Dr. Cornelia Frese
DGR²Z, Prof. Dr. Rainer Haak,
DGZ, Prof. Dr. Diana Wolff
FVDZ, PD Dr. Thomas Wolf
KZBV, ZA Martin Hendges
KZBV, Dr. Jörg Beck (Stellvertreter)
KZBV, Dr. Rugzan Jameel Hussein (beratend)
VDZE, Dr. Martin Eggert
Geladener Experte, Prof. Dr. Roland Frankenberger

Co-Autoren der Arbeitsgruppe IV:

Dr. Julia Winter

Dr. Stefanie Amend

Methodik:

PD Dr. Caroline Sekundo (systematische Literatursuche und Evidenzbewertung)
Dr. Esra Kosan (Evidenzbewertung)
Dr. Eva Langowski (systematische Literatursuche)
Dr. Cathleen Muche-Borowski (zertifizierte Leitlinienberaterin (AWMF))
Dr. Anke Weber, M.Sc. (DGZMK, Leitlinienbeauftragte)
Dr. Birgit Marré (DGZMK, Leitlinienbeauftragte)

Jahr der Erstellung: Oktober 2016
vorliegende Aktualisierung/ Stand: 26.01. 2024, **Version:** 2.0
gültig bis: 25.01.2029

DIE "LEITLINIEN" DER WISSENSCHAFTLICHEN MEDIZINISCHEN FACHGESELLSCHAFTEN SIND SYSTEMATISCH ENTWICKELTE HILFEN FÜR ÄRZTE/ ZAHNÄRZTE ZUR ENTSCHEIDUNGSFINDUNG IN SPEZIFISCHEN SITUATIONEN. SIE BERUHEN AUF AKTUELLEN WISSENSCHAFTLICHEN ERKENNTNISSEN UND IN DER PRAXIS BEWÄHRTEN VERFAHREN UND SORGEN FÜR MEHR SICHERHEIT IN DER MEDIZIN, SOLLEN ABER AUCH ÖKONOMISCHE ASPEKTE BERÜCKSICHTIGEN. DIE "LEITLINIEN" SIND FÜR ÄRZTE/ ZAHNÄRZTE RECHTLICH NICHT BINDEND UND HABEN DAHER WEDER HAFTUNGSBEGRÜNDENDE NOCH HAFTUNGSBEFREIENDE WIRKUNG.

LEITLINIEN UNTERLIEGEN EINER STÄNDIGEN QUALITÄTSKONTROLLE, SPÄTESTENS ALLE 5 JAHRE IST EIN ABGLEICH DER NEUEN ERKENNTNISSE MIT DEN FORMULIERTEN HANDLUNGSEMPFEHLUNGEN

INHALTSVERZEICHNIS

Einführung	5
An der Leitlinie beteiligte Fachgesellschaften.....	5
Inhalt	5
Hintergrund	6
Abkürzungsverzeichnis.....	6
Schlüsselfragen	7
PICO Frage 1 - Direkte Kompositrestaurationen in den Restaurationsklassen I und II	7
PICO Frage 2 - Direkte Kompositrestaurationen mit Höckerersatz in der Seitenzahnversorgung.....	8
PICO Frage 3 - Direkte Kompositrestaurationen in den Restaurationsklassen III und IV	9
PICO Frage 4 - Direkte Kompositrestaurationen für ästhetische Korrekturen im Frontzahnbereich.....	10
PICO Frage 5 - Direkte Kompositrestaurationen in der Restaurationsklasse V	11
PICO Frage 6 - Kariesexkavation.....	12
PICO Frage 7 - Kontaminationskontrolle.....	13
PICO Frage 8 - Matrizentechnik.....	14
PICO Frage 9 - Adhäsivtechnik	15
PICO Frage 10 - Lichtpolymerisation	16
PICO Frage 11 – Politur und Ausarbeitung.....	17
Systematische Recherche und Auswahl der Evidenz.....	18
PICO Frage 1 - Direkte Kompositrestaurationen in den Restaurationsklassen I und II	18
MEDLINE Suchterm via OVID.....	18
PRISMA Flow Diagramm	20
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	21
PICO Frage 2 - Direkte Kompositrestaurationen mit Höckerersatz in der Seitenzahnversorgung.....	21
MEDLINE Suchterm via OVID.....	21
PRISMA Flow Diagramm	23
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	24
PICO Frage 3 - Direkte Kompositrestaurationen in den Restaurationsklassen III und IV	24
MEDLINE Suchterm via OVID.....	24
PRISMA Flow Diagramm	26
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	27
PICO Frage 4 - Direkte Kompositrestaurationen für ästhetische Korrekturen im Frontzahnbereich.....	27
MEDLINE Suchterm via OVID.....	27
PRISMA Flow Diagramm	29
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	30
PICO Frage 5 - Direkte Kompositrestaurationen in der Restaurationsklasse V	30
MEDLINE Suchterm via OVID.....	30

PRISMA Flow Diagramm	32
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	33
PICO Frage 6 - Kariesexkavation.....	34
MEDLINE Suchterm via OVID	34
PRISMA Flow Diagramm	35
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	36
Eingeschlossene Publikationen.....	36
PICO Frage 7 - Kontaminationskontrolle.....	37
MEDLINE Suchterm via OVID	37
PRISMA Flow Diagramm	38
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	39
Eingeschlossene Publikationen.....	39
PICO Frage 8 - Matrizentechnik.....	40
MEDLINE Suchterm via OVID	40
PRISMA Flow Diagramm	41
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	42
Eingeschlossene Publikationen.....	43
PICO Frage 9 - Adhäsivtechnik	44
MEDLINE Suchterm via OVID	44
PRISMA Flow Diagramm	45
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	46
Eingeschlossene Publikationen.....	46
PICO Frage 10 - Lichtpolymerisation	48
MEDLINE Suchterm via OVID	48
PRISMA Flow Diagramm	49
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	50
Eingeschlossene Publikationen.....	50
PICO Frage 11 – Politur und Ausarbeitung.....	51
MEDLINE Suchterm via OVID	51
PRISMA Flow Diagramm	52
Ausgeschlossene Publikationen der Volltextsuche mit Angabe von Gründen	53
Eingeschlossene Publikationen.....	53
Kritische Bewertung der Evidenz	55
Evidenzgraduierung nach GRADE	55
PICO Frage 1 - Direkte Kompositrestaurationen in den Restaurationsklassen I und II	57
Evidenztabelle der eingeschlossenen Studien.....	57
Afrashtehfar et al. 2017.....	57
Alcaraz et al. 2014	59

Antony et al. 2008	60
Ástvaldsdóttir et al. 2015.....	62
Beck et al. 2015 and Brunthaler et al. 2003.....	63
Da Veiga et al. 2016.....	66
Demarco et al. 2012	67
Downer et al. 1999	68
El Mowafy et al. 1994	69
Heintze et al. 2012.....	70
Hickel et al. 2001	72
Kodzaeva et al. 2019.....	75
Magno et al. 2016.....	76
Manhart et al. 2004	78
Moraschini et al. 2015	83
Opdam et al. 2014	84
Schwendicke et al. 2016	85
Van de Sande et al. 2016	87
Vetromilla et al 2020	88
Worthington et al. 2021	90
Summary of Evidence Table: Composite vs. Amalgam	92
Summary of Evidence Table: Composite vs. Glass Ionomer Cement	94
Summary of Evidence Table: Composite vs. Ceramic.....	95
Summary of Evidence Table: Direct vs. Indirect Composite.....	96
PICO Frage 2 - Direkte Kompositrestaurationen mit Höckerersatz in der Seitenzahnversorgung.....	97
Evidenztabelle der eingeschlossenen Studien.....	97
Deliperi et al. 2016.....	97
El Aziz et al. 2020	98
Fennis et al. 2014.....	101
Van Nieuwenhuysen et al. 2003	102
Summary of Evidence Table: Composite vs. Amalgam	103
Summary of Evidence Table: Direct vs. Indirect Composite.....	105
PICO Frage 3 - Direkte Kompositrestaurationen in den Restaurationsklassen III und IV	108
Evidenztabelle der eingeschlossenen Studien.....	108
Demarco et al 2015	108
Demirci et al. 2008.....	109
Dietschi et al. 2019	110
Heintze et al. 2015.....	112
Smales et al. 1992.....	115
Summary of Evidence Table: Composite vs. Compomer.....	117

Summary of Evidence Table: Composite vs. Glass Ionomer Cement	119
PICO Frage 4 - Direkte Kompositrestaurationen für ästhetische Korrekturen im Frontzahnbereich.....	121
Evidenztabelle der eingeschlossenen Studien.....	121
Al-Khayatt et al. 2013 and Poyser et al. 2007	121
Alonso et al. 2012	123
Coelho et al. 2015	124
Demarco et al. 2015	126
Demirci et al. 2015.....	127
Frese et al. 2013 and Wolff et al. 2010.....	131
Frese et al. 2020	133
Gresnigt et al. 2012	135
Lempel et al. 2017	136
Meijering et al. 1998.....	137
Peumans et al. 1997 Teil I und II.....	139
Summary of Evidence Table: Composite vs. Ceramic.....	141
PICO Frage 5 - Direkte Kompositrestaurationen in der Restaurationsklasse V	142
Evidenztabelle der eingeschlossenen Studien.....	142
Bezzera et al. 2020.....	142
Boing et al. 2018.....	144
Hayes et al. 2016	146
Heintze et al. 2010.....	147
Mahn et al. 2015.....	149
Meyer-Lueckel et al. 2019	151
Peumans et al. 2005	152
Peumans et al. 2014	155
Santos et al. 2014	158
Schwendicke et al. 2016	159
Summary of Evidence Table: Composite vs. Glass Ionomer Cement	161
Übersichtstabelle der AMSTAR-2 Evaluation systematischer Reviews.....	164
Übersichtstabelle der ROB-2 Evaluation randomisierter kontrollierter klinischer Studien	167
Übersichtstabelle der ROBINS-I Evaluation nicht randomisierter klinischer Studien	168
Referenzen.....	169

EINFÜHRUNG

AN DER LEITLINIE BETEILIGTE FACHGESELLSCHAFTEN

Federführende Fachgesellschaften:

Deutsche Gesellschaft für Zahnerhaltung (DGZ)

Deutsche Gesellschaft für Zahn-, Mund- und Kieferheilkunde (DGZMK)

Beteiligung weiterer AWMF-Fachgesellschaften:

Deutsche Gesellschaft für Kinderzahnheilkunde (DGKiZ)

Deutsche Gesellschaft für Parodontologie (DG PARO)

Deutsche Gesellschaft für Prothetische Zahnmedizin und Biomaterialien (DGPro)

Deutsches Netzwerk Evidenzbasierte Medizin e.V. (DNEbM)

Beteiligung weiterer Fachgesellschaften/ Organisationen:

Arbeitsgemeinschaft für Oral- und Kieferchirurgie der DGZMK (AGOKi)

Bundesverband der Kinderzahnärzte (BUKiZ)

Bundeszahnärztekammer (BZÄK)

Bundesverband der Zahnärztinnen und Zahnärzte im Öffentlichen Gesundheitsdienst (BZÖG)

Deutsche Gesellschaft für Umwelt-ZahnMedizin (DEGUZ)

Deutsche Gesellschaft für ästhetische Zahnmedizin (DGÄZ)

Deutsche Gesellschaft für Computergestützte Zahnheilkunde (DGCZ)

Deutsche Gesellschaft für Endodontologie und zahnärztliche Traumatologie (DGET)

Deutsche Gesellschaft für Laserzahnheilkunde (DGL)

Deutsche Gesellschaft für Orale Epidemiologie und Versorgungsforschung (DGoEV)

Deutsche Gesellschaft für Präventivzahnmedizin (DGPZM)

Deutsche Gesellschaft für Restaurative und Regenerative Zahnerhaltung (DGR²Z)

Freier Verband Deutscher Zahnärzte (FVDZ)

Kassenzahnärztliche Bundesvereinigung (KZBV)

Verband Deutscher Zertifizierter Endodontologen (VDZE)

INHALT

Dieser Evidenzbericht ist Teil der S3-Leitlinie „Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich“. Der Evidenzbericht geht der Frage nach, wie die Haltbarkeit und qualitativen Parameter von Kompositrestaurationen im Vergleich zu direkten und indirekten Alternativen auf Basis der derzeit verfügbaren Evidenz medizinisch zu bewerten sind, sowie den Empfehlungen zu ihrer korrekten Verarbeitung.

HINTERGRUND

Karies ist eine der am häufigsten auftretenden chronischen Krankheiten weltweit. In der Versorgung kariöser Defekte werden neben Amalgam, Zementen und indirekten Restaurationen seit über drei Jahrzehnten zunehmend zahnfarbene Kompositwerkstoffe eingesetzt. Die gesetzliche Krankenversicherung (GKV) trägt die Kosten für Kompositrestaurationen im Frontzahnbereich. Im Seitenzahnbereich übernimmt die GKV die Kosten hierfür anteilig in Höhe der Sachleistung. Die Mehrkosten hat der Patient selbst zu tragen. Ausnahmen stellen hierbei Schwangere, Stillende, Kinder bis zur Vollendung des 15. Lebensjahres oder das Vorliegen einer absoluten Amalgamkontraindikation, wie bspw. einer schweren Niereninsuffizienz, dar. Für diese Patientengruppen werden die Kosten für Kompositrestaurationen auch im Seitenzahnbereich von der GKV übernommen. Weitere Indikationen sind unter anderem die Versorgung von Frakturen, die Reparatur bestehender direkter und indirekter Restaurationen, sowie ästhetische Korrekturen in Form und Farbe.

ABKÜRZUNGSVERZEICHNIS

AFR	Annual Failure Rate
AMSTAR	A MeaSurement Tool to Assess systematic Reviews
AWMF	Arbeitsgemeinschaft der Wissenschaftlichen Medizinischen Fachgesellschaften
CCT	Kontrollierte klinische Studie
CI	Konfidenzintervall
FDI	Fédération Dentaire Internationale
GKV	Gesetzliche Krankenversicherung
GRADE	Grading of Recommendations Assessment, Development and Evaluation
NRSI	Nicht randomisierte Interventionsstudie
OR	Odds Ratio
RCT	Randomisierte kontrollierte klinische Studie
ROB	Risk of Bias
ROBINS-I	Risk of bias tool to assess non-randomized studies of interventions
RR	Risk ratio
RD	Risk Difference
SR	Systematische Übersichtsarbeit
USPHS	United States Public Health Service

SCHLÜSSELFRAGEN

Als Schlüsselfragen für diese Leitlinie wurden wichtige therapeutische Fragen ausgewählt und evidenzbasiert für die unten aufgeführten PICO (Population-Intervention-Vergleichsendpunkt) beantwortet. Die Auswahl erfolgte in Absprache mit der Leitliniengruppe und dem Evidenzvorbereitungsteam unter Berücksichtigung der klinischen Relevanz und der Machbarkeit in einem kurzen Zeitrahmen. Erläuterungen der PICO Aspekte sind im Folgenden für jede Frage tabellarisch aufgelistet.

PICO FRAGE 1 - DIREKTE KOMPOSITRESTAURATIONEN IN DEN RESTAURATIONSKLASSEN I UND II

IN WELCHEN KLINISCHEN SITUATIONEN KÖNNEN DIREKTE KOMPOSITRESTAURATIONEN (KLASSE I UND II) FÜR DIE SEITENZAHNVERSORGUNG AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

GIBT ES UNTERSCHIEDE IN DEN ÜBERLEBENS RATEN UND/ ODER SPEZIFISCHEN VERSAGENS MODI ZWISCHEN AMALGAM- UND KOMPOSITRESTAURATIONEN?

PICO ASPECT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder Trauma (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien, Bisshebungen, Pulpabeteiligung, Ankleben von Zahnfragmenten)
INTERVENTION	Direkte Kompositrestauration Klasse I und II
COMPARISON CONTROL	<ul style="list-style-type: none"> • Andere direkte Restaurationen als Kompositrestaurationen • Inlays; ohne Teilkronen (eingeschränkt, s.u.), Kronen <p>Dabei gilt:</p> <p>Seitenzahnbereich: Teilkronen ausschließen, die alle Höcker ersetzen, bei Ersatz von nicht allen Höckern: Einschließen</p>
OUTCOME (ZIELGRÖÖE)	Überlebensrate Failure Analyse
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns: Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 2 - DIREKTE KOMPOSITRESTAURATIONEN MIT HÖCKERERSATZ IN DER SEITENZAHNVERSORGUNG

IN WELCHEN KLINISCHEN SITUATIONEN KÖNNEN DIREKTE KOMPOSITRESTAURATIONEN (MIT HÖCKERERSATZ) FÜR DIE SEITENZAHNVERSORGUNG AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

GIBT ES UNTERSCHIEDE IN DEN ÜBERLEBENS RATEN UND/ ODER SPEZIFISCHEN VERSAGENS MODI ZWISCHEN AMALGAM- UND KOMPOSITRESTAURATIONEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten oder insuffizienten Restaurationen oder Trauma (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien, Bisshebungen)
INTERVENTION	Ausgedehnte direkte Kompositrestauration mit Höckerersatz
COMPARISON CONTROL	<ul style="list-style-type: none"> • Andere direkte Restaurationen als Kompositrestaurationen, • Inlays, Teilkronen (eingeschränkt, s.u.) <p>Dabei gilt:</p> <p>Seitenzahnbereich: Teilkronen ausschließen, die alle Höcker ersetzen, bei Ersatz von nicht allen Höckern: einschließen</p>
OUTCOME (ZIELGRÖÖE)	Überlebensrate Failure Analyse
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns: CCTs, RCTs Systematic Reviews, Meta-Analysen Prospektive/retrospektive Kohortenstudien • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 3 - DIREKTE KOMPOSITRESTAURATIONEN IN DEN RESTAURATIONSKLASSEN III UND IV

IN WELCHEN KLINISCHEN SITUATIONEN KÖNNEN DIREKTE KOMPOSITRESTAURATIONEN FÜR DIE FRONTZAHNVERSORGUNG (KLASSE III UND IV) AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder Traumata (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien, Bisshebungen)
INTERVENTION	Direkte Kompositrestauration Klasse III und IV
COMPARISON CONTROL	<ul style="list-style-type: none"> • Recherche ohne Angabe von Comparison, Auswahl bei Screening • Veneer einschließen (CAVE: Veneer nur bei gleicher Indikationsstellung, rein ästhetische Veneers nicht einschließen) • Ausschluss: Teilkronen, Vollkronen
OUTCOME (ZIELGRÖßE)	Überlebensrate Failure Analyse
STUDENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns CCTs, RCTs Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 4 - DIREKTE KOMPOSITRESTAURATIONEN FÜR ÄSTHETISCHE KORREKTUREN IM FRONTZAHNBEREICH

IN WELCHEN KLINISCHEN SITUATIONEN KÖNNEN DIREKTE KOMPOSITRESTAURATIONEN FÜR DIE FRONTZAHNVERSORGUNG (FORMKORREKTUREN) AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen, Traumata (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien, Bisshebungen) oder Bedarf an ästhetischen oder funktionellen Korrekturen
INTERVENTION	Direkte Kompositrestauration Formkorrektur
COMPARISON CONTROL	Kronen, Teilkronen, Veneers, Auswahl von Studien mit vergleichbaren Indikationen
OUTCOME (ZIELGRÖßE)	Überlebensrate Failure Analyse
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns CCTs, RCTs Systematic Reviews, Meta-Analysen Prospektive/retrospektive Kohortenstudien • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 5 - DIREKTE KOMPOSITRESTAURATIONEN IN DER RESTAURATIONSKLASSE V

IN WELCHEN KLINISCHEN SITUATIONEN KÖNNEN DIREKTE KOMPOSITRESTAURATIONEN FÜR ZAHNHALSFÜLLUNGEN (KLASSE V) AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	Direkte Kompositrestauration Klasse V
COMPARISON CONTROL	<ul style="list-style-type: none"> • Andere direkte Restaurationen als Kompositrestaurationen • Präventive Behandlung (non-invasiv)
OUTCOME (ZIELGRÖÖE)	Überlebensrate Failure Analyse
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 6 - KARIESEKKAVATION

WELCHE FORM DER KARIESEKKAVATION (NON-SELEKTIV VS SELEKTIV) SOLLTE BEI DIREKTEN KOMPOSITRESTAURATIONEN AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	Kariesexkavation non-selektiv (konventionell) in Kombination mit Kompositrestauration
COMPARISON CONTROL	Kariesexkavation selektiv, in Kombination mit Kompositrestauration
OUTCOME (ZIELGRÖÖE)	Überlebensrate
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 7 - KONTAMINATIONSSTEUERUNG

WELCHE FORM DER KONTAMINATIONSSTEUERUNG (ABSOLUTE VS RELATIVE TROCKENLEGUNG) SOLLTE BEI DIREKTEN KOMPOSITRESTAURATIONEN AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	Absolute Trockenlegung
COMPARISON CONTROL	Relative Trockenlegung
OUTCOME (ZIELGRÖÖE)	Überlebensrate
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns CCTs, RCTs Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 8 - MATRIZENTECHNIK

WELCHE FORM DER MATRIZENTECHNIK SOLLTE BEI DIREKTEN KOMPOSITRESTAURATIONEN AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	<ul style="list-style-type: none"> • Kunststoffmatrize • Teflonbänder • Formteile • Teilmatrizen • Keile
COMPARISON CONTROL	<ul style="list-style-type: none"> • Metallmatrize, Tofflemire • Recherche ohne Kontrollgruppe, händische Auswahl
OUTCOME (ZIELGRÖÖE)	Überlebensrate
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns CCTs, RCTs Systematic Reviews, Meta-Analysen Prospektive/retrospektive Kohortenstudien • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 9 - ADHÄSIVTECHNIK

WELCHE FORM DER ADHÄSIVTECHNIK SOLLTE BEI DIREKTEN KOMPOSITRESTAURATIONEN AN BLEIBENDEN ZÄHNEN ANWENDUNG FINDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	Etch an rinse-Technik, multi bottle
COMPARISON CONTROL	One bottle, universal, selective etching o.ä.
OUTCOME (ZIELGRÖÖE)	Überlebensrate
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 10 - LICHTPOLYMERISATION

WIE SOLLTEN DIREKTE KOMPOSITRESTAURATIONEN AN BLEIBENDEN ZÄHNEN POLYMERISIERT WERDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	Lichthärtung von direkten Kompositrestaurationen (allgemeine Recherche)
COMPARISON CONTROL	-
OUTCOME (ZIELGRÖÖE)	Überlebensrate
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns CCTs, RCTs Prospektive/retrospektive Kohortenstudien Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

PICO FRAGE 11 – POLITUR UND AUSARBEITUNG

WIE SOLLTEN DIREKTE KOMPOSITRESTAURATIONEN AN BLEIBENDEN ZÄHNEN AUSGEARBEITET UND POLIERT WERDEN?

PICO ASPEKT	ERLÄUTERUNG
POPULATION	Patienten mit bleibenden Zähnen und behandlungsbedürftigen kariösen Defekten, insuffizienten Restaurationen oder hypersensible Zähne (ohne endodontisch vorbehandelte Zähne, Aufbaufüllungen, MIH oder andere Strukturanomalien)
INTERVENTION	Ausarbeitung, Politur direkter Kompositrestaurationen (allgemeine Recherche)
COMPARISON CONTROL	-
OUTCOME (ZIELGRÖÖE)	<ul style="list-style-type: none"> • Überlebensrate • Qualitätsindikatoren Oberflächenglanz/ Oberflächenverfärbung
STUDIENTYP/SETTING (UMGEBUNG, ZEIT)	<ul style="list-style-type: none"> • Studiendesigns CCTs, RCTs Systematic Reviews, Meta-Analysen • Mindestens 12 Monate Nachbeobachtung • Mindestens 15 Restaurationen • Publikation ab 1990 • Sprachen: Deutsch, Englisch, Französisch, Russisch

SYSTEMATISCHE RECHERCHE UND AUSWAHL DER EVIDENZ

Für die umfassende Suchstrategie wurden zwei elektronische Datenbanken hinsichtlich der Fragestellungen verwendet. Dies waren die Nationalbibliothek für Medizin, Washington, D. C. (MEDLINE) via OVID sowie die Cochrane Bibliothek (CENTRAL). Die Referenzlisten relevanter Manuskripte wurden zudem händisch durchsucht. Die Suche wurde bis einschließlich Dezember 2021 von zwei unabhängigen Untersuchern (PD Dr. Caroline Sekundo und Dr. Eva Langowski) durchgeführt. Die Suchstrategien, PRISMA Flow-Diagramme (Preferred Reporting Items for Systematic Reviews and MetaAnalyses) der Literatursuche sowie detaillierte Auflistungen ausgeschlossener Manuskripte mit Gründen sind nachfolgend für alle PICO Fragen aufgelistet.

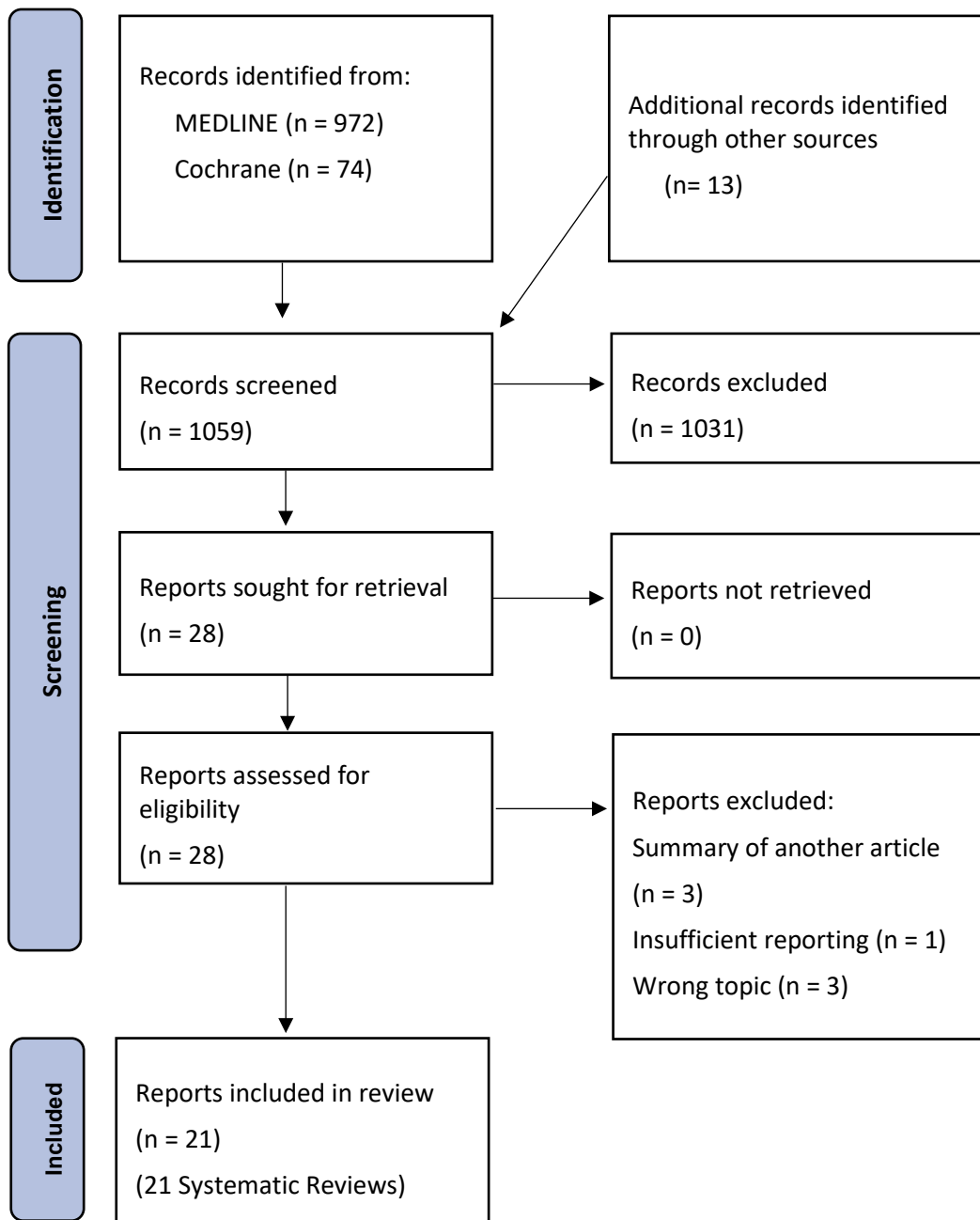
PICO FRAGE 1 - DIREKTE KOMPOSITRESTAURATIONEN IN DEN RESTAURATIONSKLASSEN I UND II

MEDLINE SUCHTERM VIA OVID

- 1 dentition, permanent/ or exp tooth/
- 2 permanent Dentition.mp.
- 3 permanent teeth.mp.
- 4 secondary Dentition.mp.
- 5 secondary teeth.mp.
- 6 adult teeth.mp.
- 7 adult tooth.mp.
- 8 permanent tooth.mp.
- 9 secondary tooth.mp.
- 10 adult Dentition.mp.
- 11 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
- 12 exp Tooth Diseases/
- 13 exp Dental Caries/
- 14 caries.mp.
- 15 dental caries.mp.
- 16 carious lesion*.mp.
- 17 tooth Decay.mp.
- 18 dental Cavit*.mp.
- 19 Cavit*.mp.
- 20 demineralization*.mp.
- 21 dental Trauma.mp.
- 22 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21

- 23 exp bicuspid/ or exp molar/
- 24 molar*.mp.
- 25 bicuspid*.mp.
- 26 premolar*.mp.
- 27 posterior teeth.mp.
- 28 posterior tooth.mp.
- 29 class I.mp.
- 30 class II.mp.
- 31 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30
- 32 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 33 exp Composite Resins/
- 34 dental restoration*.mp.
- 35 filling*.mp.
- 36 restoration*.mp.
- 37 composit*.mp.
- 38 32 or 33 or 34 or 35 or 36 or 37
- 39 Randomized Controlled Trials as Topic/
- 40 exp Controlled Clinical Trial/
- 41 RCT*.mp.
- 42 randomized controlled Trial*.mp.
- 43 randomised controlled Trial*.mp.
- 44 systematic review*.mp.
- 45 meta Analysis.mp.
- 46 controlled clinical Trial.mp.
- 47 randomized.mp.
- 48 randomised.mp.
- 49 controlled clinical Trial*.mp.
- 50 cct*.mp.
- 51 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50
- 52 11 and 22 and 31 and 38 and 51
- 53 limit 52 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
BALEVI 2014 ⁴⁷	Summary of a partial aspect of the study by Opdam et al. 2014.
FARSAI 2017 ²³⁰	Summary of the article by Da Veiga et al. 2016
FRENCKEN 2021 ²⁵²	Results for composite and amalgam vs. GIZ not reported separately
FRON CHABOUIS 2013 ²⁶⁰	Wrong topic , only indirect methods compared
HURST 2014 ³²⁹	Summary of the article by Alcaraz et al. 2014
KIELBASSA 2015 ³⁵³	Wrong topic
SCHENKEL 2019 ⁶⁶⁷	Wrong topic

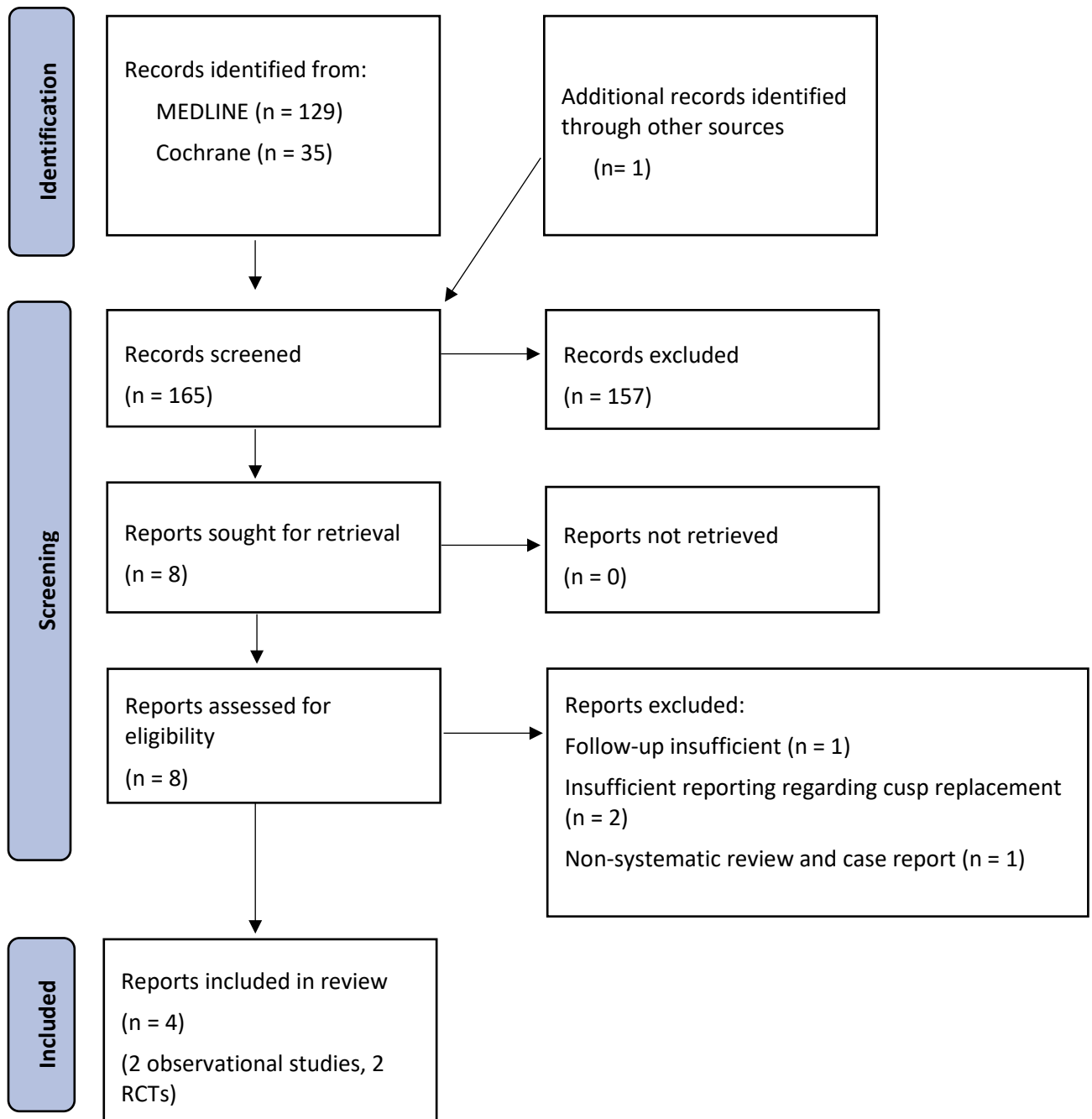
PICO FRAGE 2 - DIREKTE KOMPOSITRESTAURATIONEN MIT HÖCKERERSATZ IN DER SEITENZAHNVERSORGUNG

MEDLINE SUCHTERM VIA OVID

- 1 dentition, permanent/ or exp tooth/
- 2 permanent Dentition.mp.
- 3 permanent teeth.mp.
- 4 secondary Dentition.mp.
- 5 secondary teeth.mp.
- 6 adult teeth.mp.
- 7 adult tooth.mp.
- 8 permanent tooth.mp.
- 9 secondary tooth.mp.
- 10 adult Dentition.mp.
- 11 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
- 12 exp Tooth Diseases/
- 13 exp Dental Caries/
- 14 caries.mp.
- 15 dental caries.mp.
- 16 carious lesion*.mp.
- 17 tooth Decay.mp.
- 18 dental Cavit*.mp.

- 19 Cavit*.mp.
- 20 demineralization*.mp.
- 21 dental Trauma.mp.
- 22 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
- 23 exp bicuspid/ or exp molar/
- 24 molar*.mp.
- 25 bicusp*.mp.
- 26 premolar*.mp.
- 27 posterior teeth.mp.
- 28 posterior tooth.mp.
- 29 23 or 24 or 25 or 26 or 27 or 28
- 30 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 31 exp Composite Resins/
- 32 dental restoration*.mp.
- 33 filling*.mp.
- 34 restoration*.mp.
- 35 composit*.mp.
- 36 30 or 31 or 32 or 33 or 34 or 35
- 37 cusp replac*.mp.
- 38 cuspal restoration*.mp.
- 39 cuspal Coverage*.mp.
- 40 cusp-replac*.mp.
- 41 onlay.mp.
- 42 37 or 38 or 39 or 40 or 41
- 43 11 and 22 and 29 and 36 and 42
- 44 limit 43 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
BEHLE 1997⁶⁰	Non-systematic review and case report
KUJIS 2006³⁸⁶	Follow-up insufficient
SCHWENDICKE 2016⁶⁸⁰	Insufficient reporting regarding cusp replacement
VAN DIJKEN 2000⁷⁷⁸	Insufficient reporting regarding cusp replacement

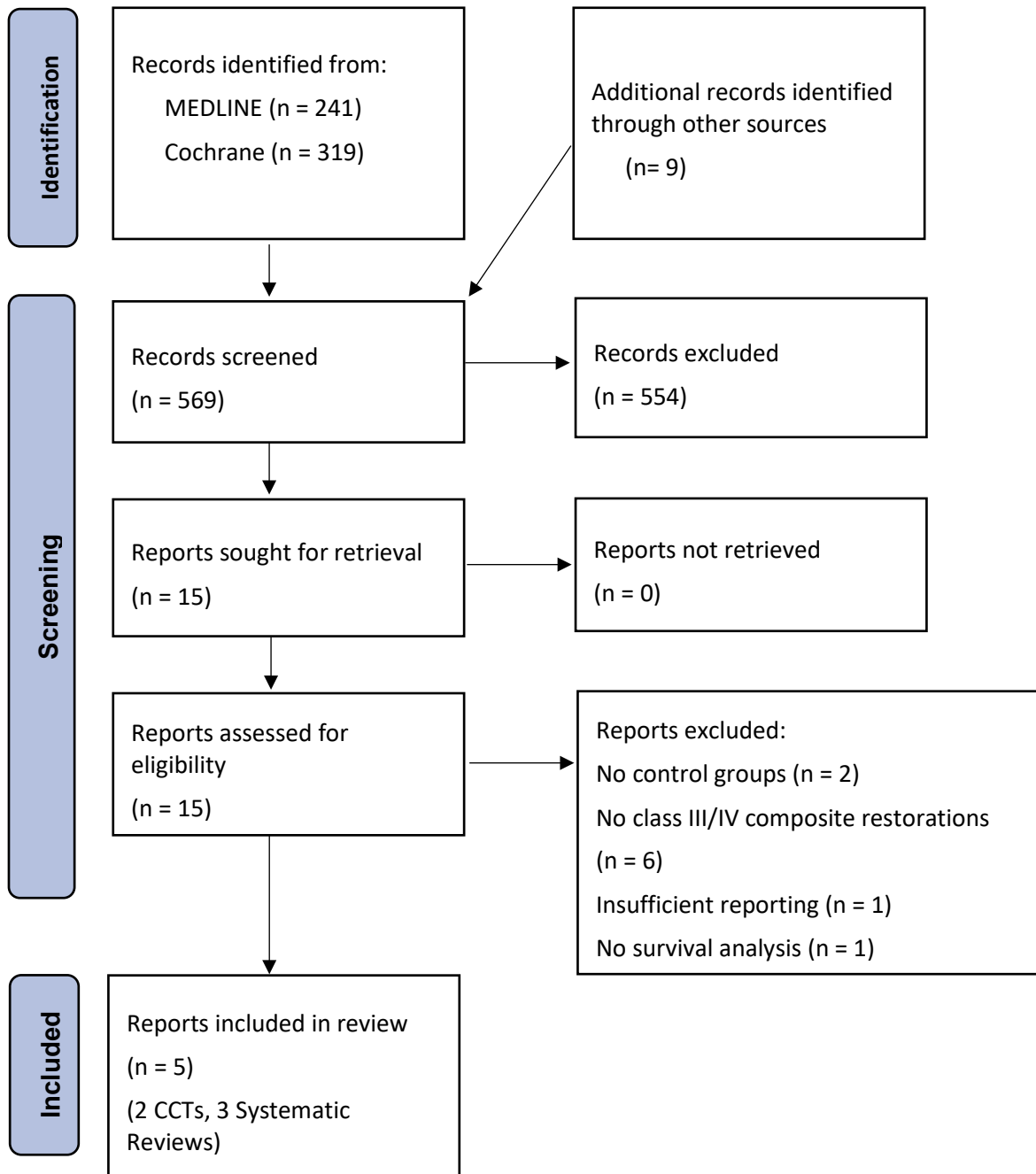
PICO FRAGE 3 - DIREKTE KOMPOSITRESTAURATIONEN IN DEN RESTAURATIONSKLASSEN III UND IV

MEDLINE SUCHTERM VIA OVID

- 1 dentition, permanent/ or exp tooth/
- 2 permanent Dentition.mp.
- 3 permanent teeth.mp.
- 4 secondary Dentition.mp.
- 5 secondary teeth.mp.
- 6 adult teeth.mp.
- 7 adult tooth.mp.
- 8 permanent tooth.mp.
- 9 secondary tooth.mp.
- 10 adult Dentition.mp.
- 11 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
- 12 exp Tooth Diseases/
- 13 exp Dental Caries/
- 14 caries.mp.
- 15 dental caries.mp.
- 16 carious lesion*.mp.
- 17 dental Cavit*.mp.
- 18 Cavit*.mp.
- 19 demineralization*.mp.
- 20 dental Trauma.mp.

- 21 tooth Decay.mp.
- 22 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
- 23 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 24 dental restoration*.mp.
- 25 exp Composite Resins/
- 26 filling*.mp.
- 27 restoration*.mp.
- 28 composit*.mp.
- 29 23 or 24 or 25 or 26 or 27 or 28
- 30 exp cuspid/ or exp incisor/
- 31 anterior tooth.mp.
- 32 anterior teeth.mp.
- 33 anterior*.mp.
- 34 front* teeth.mp.
- 35 front* tooth.mp.
- 36 front*.mp.
- 37 incisor*.mp.
- 38 cuspid*.mp.
- 39 canine*.mp.
- 40 class III.mp.
- 41 class IV.mp.
- 42 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41
- 43 Randomized Controlled Trials as Topic/
- 44 exp Controlled Clinical Trial/
- 45 RCT*.mp.
- 46 randomized controlled Trial*.mp.
- 47 randomised controlled Trial*.mp.
- 48 systematic review*.mp.
- 49 meta Analysis.mp.
- 50 controlled clinical Trial.mp.
- 51 randomized.mp.
- 52 randomised.mp.
- 53 controlled clinical Trial*.mp.
- 54 cct*.mp.
- 55 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54
- 56 11 and 22 and 29 and 42 and 55
- 57 limit 56 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
AL KHAYATT 2013²⁸	No class III/IV composite restorations
ANTONY 2008³⁸	No class III/IV composite restorations
BAILLOD 1994⁴⁵	No other material in the control group (except GIZ liner)
HELBIG 2002³⁰⁸	No other material in the control group
MEIJERING 1998⁴⁸⁶	No class III/IV composite restorations
NARHI 2003⁵²⁴	Insufficient reporting
PRAKKI 2008⁶⁰⁸	No class III/IV composite restorations
SCHWENDICKE 2015⁶⁷⁸	No survival analysis
SCHWENDICKE 2016⁶⁸⁰	No class III/IV composite restorations
VAN DIJKEN ET AL. 1999⁷⁹¹	No class III/IV composite restorations

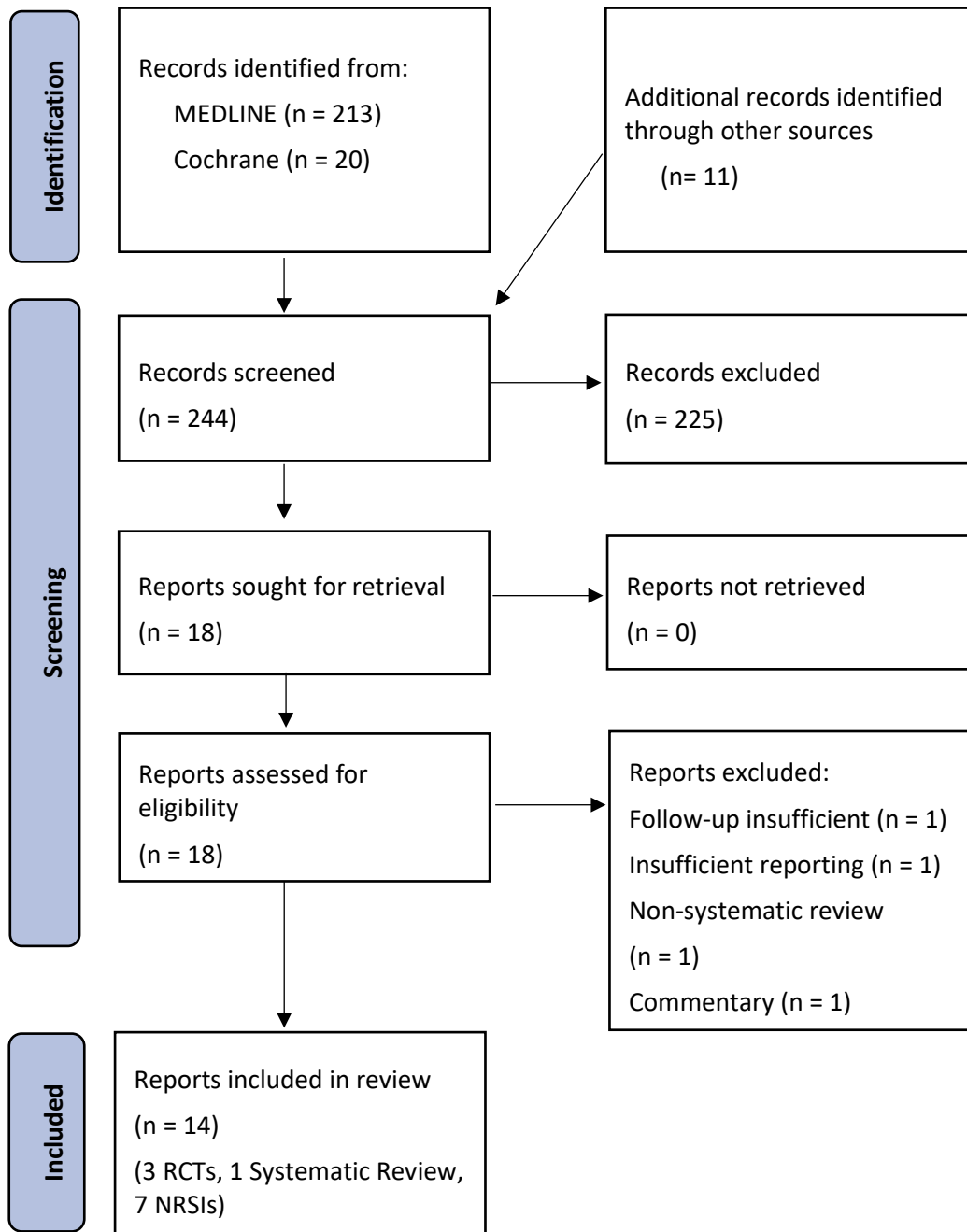
PICO FRAGE 4 - DIREKTE KOMPOSITRESTAURATIONEN FÜR ÄSTHETISCHE KORREKTUREN IM FRONTZAHNBEREICH

MEDLINE SUCHTERM VIA OVID

- 1 dentition, permanent/ or exp tooth/
- 2 permanent Dentition.mp.
- 3 permanent teeth.mp.
- 4 secondary Dentition.mp.
- 5 secondary teeth.mp.
- 6 adult teeth.mp.
- 7 adult tooth.mp.
- 8 permanent tooth.mp.
- 9 secondary tooth.mp.
- 10 adult Dentition.mp.
- 11 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10

- 12 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 13 exp Composite Resins/
- 14 dental restoration*.mp.
- 15 filling*.mp.
- 16 restoration*.mp.
- 17 composit*.mp.
- 18 12 or 13 or 14 or 15 or 16 or 17
- 19 exp cuspid/ or exp incisor/
- 20 anterior tooth.mp.
- 21 anterior teeth.mp.
- 22 anterior*.mp.
- 23 front* teeth.mp.
- 24 front* tooth.mp.
- 25 front*.mp.
- 26 incisor*.mp.
- 27 cuspid*.mp.
- 28 canine*.mp.
- 29 anterior*.mp.
- 30 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29
- 31 Composite buildup*.mp.
- 32 recontour*.mp.
- 33 Diastema*.mp.
- 34 Composite veneer*.mp.
- 35 shape correction*.mp.
- 36 31 or 32 or 33 or 34 or 35
- 37 11 and 18 and 30 and 36
- 38 limit 37 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
AJLOUNI 2006 ²⁴	Commentary
BELCHEVA 2001 ⁶³	Follow-up insufficient
DOSTALOVA 2013 ¹⁹⁶	No separate reporting of the composite restorations
MANGANI 2007 ⁴⁵²	Non-systematic review

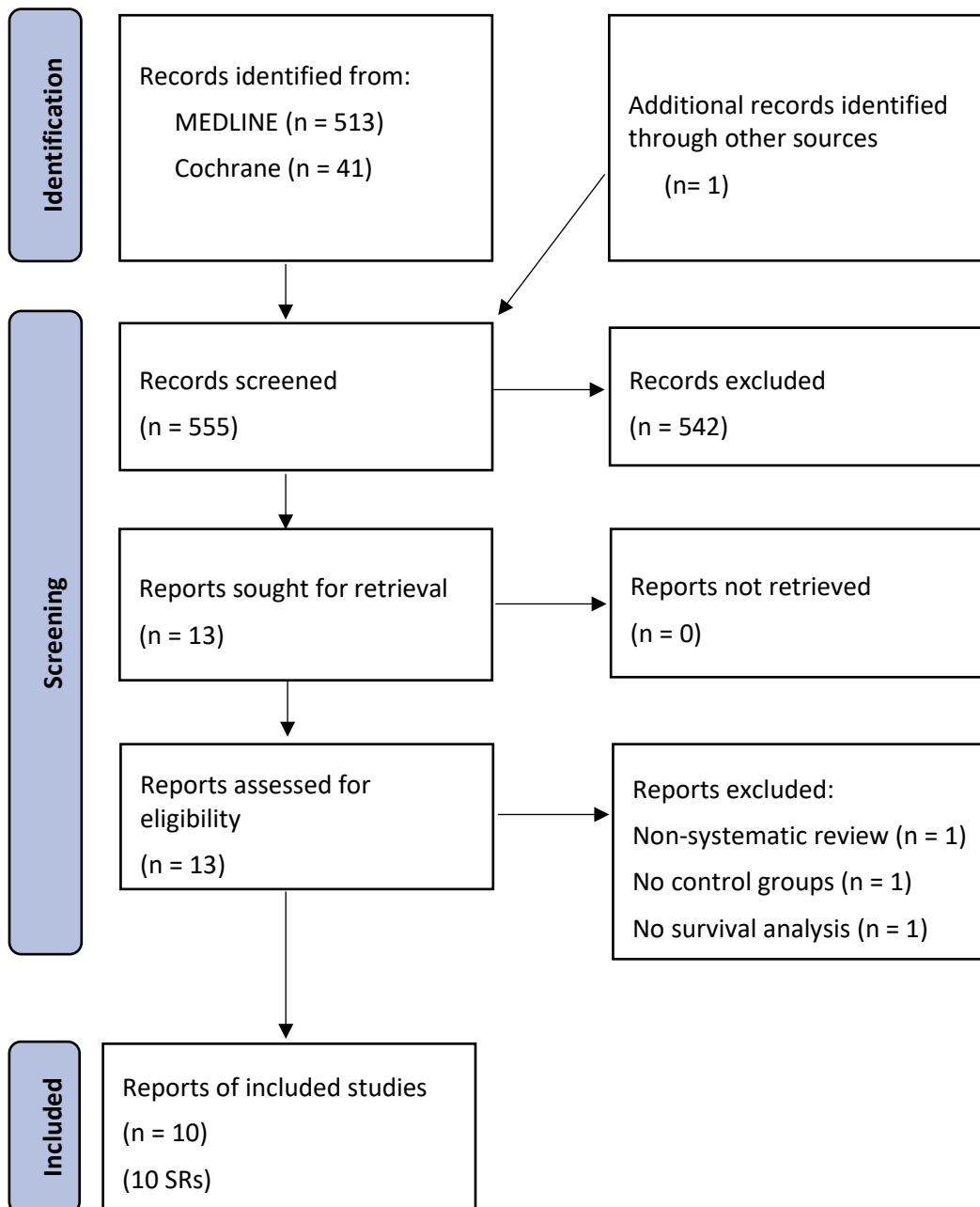
PICO FRAGE 5 - DIREKTE KOMPOSITRESTAURATIONEN IN DER RESTAURATIONSKLASSE V

MEDLINE SUCHTERM VIA OVID

- 1 exp Tooth Diseases/
- 2 exp Dental Caries/
- 3 exp Dentin Sensitivity/
- 4 exp Tooth Wear/
- 5 caries.mp.
- 6 defect*.mp.
- 7 lesion*.mp.
- 8 carious.mp.
- 9 non-carious.mp.
- 10 dental Cavit*.mp.
- 11 Cavit*.mp.
- 12 demineralization*.mp.
- 13 dental Trauma.mp.
- 14 tooth Decay.mp.
- 15 dent* hypersensitivity.mp.
- 16 hypersensitiv*.mp.
- 17 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16
- 18 cervical.mp.
- 19 cervical lesion*.mp.
- 20 wedge-shaped.mp.

- 21 class V.mp.
- 22 18 or 19 or 20 or 21
- 23 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 24 exp Composite Resins/
- 25 dental restoration*.mp.
- 26 filling*.mp.
- 27 restoration*.mp.
- 28 composit*.mp.
- 29 23 or 24 or 25 or 26 or 27 or 28
- 30 Randomized Controlled Trials as Topic/
- 31 exp Controlled Clinical Trial/
- 32 RCT*.mp.
- 33 randomized controlled Trial*.mp.
- 34 randomised controlled Trial*.mp.
- 35 systematic review*.mp.
- 36 meta Analysis.mp.
- 37 controlled clinical Trial.mp.
- 38 randomized.mp.
- 39 randomised.mp.
- 40 controlled clinical Trial*.mp.
- 41 cct*.mp.
- 42 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41
- 43 17 and 22 and 29 and 42
- 44 limit 43 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

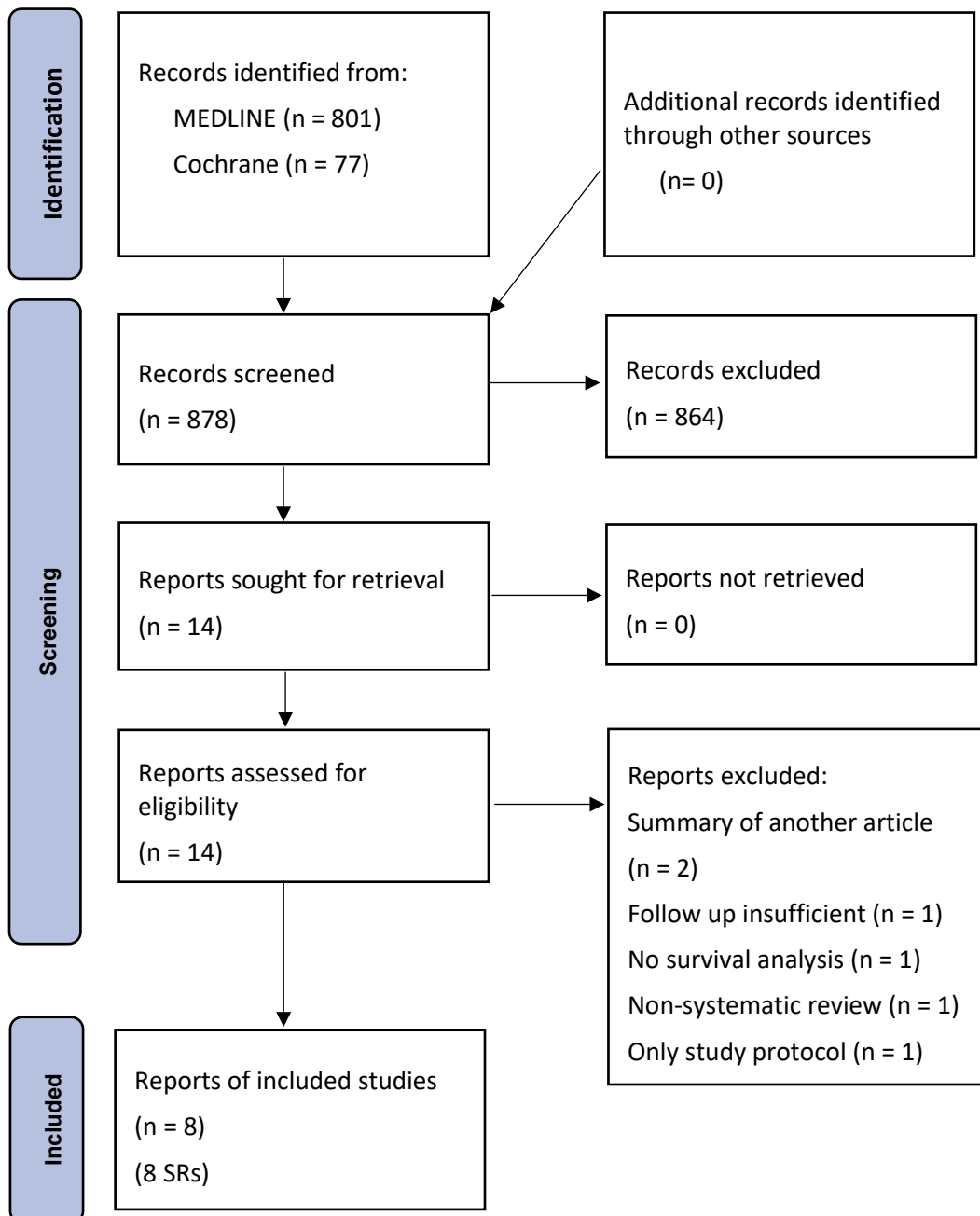
PUBLIKATION	AUSSCHLUSSGRUND
DE PAULA 2019 ⁵⁶⁴	No other material as control group (except GIZ liner)
PECIE 2011 ⁵⁶⁶	Non-systematic review
SCHWENDICKE 2015 ⁶⁷⁸	No survival analysis of class V restorations

PICO FRAGE 6 - KARIESEXKAVATION

MEDLINE SUCHTERM VIA OVID

- 1 exp Tooth Diseases/
- 2 exp Dental Caries/
- 3 caries.mp.
- 4 dental caries.mp.
- 5 carious lesion*.mp.
- 6 tooth Decay.mp.
- 7 dental Cavit*.mp.
- 8 Cavit*.mp.
- 9 demineralization*.mp.
- 10 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9
- 11 Dental Cavity Preparation/
- 12 caries excavat*.mp.
- 13 caries remov*.mp.
- 14 residual caries.mp.
- 15 11 or 12 or 13 or 14
- 16 Randomized Controlled Trials as Topic/
- 17 exp Controlled Clinical Trial/
- 18 RCT*.mp.
- 19 randomized controlled Trial*.mp.
- 20 randomised controlled Trial*.mp.
- 21 systematic review*.mp.
- 22 meta Analysis.mp.
- 23 controlled clinical Trial.mp.
- 24 randomized.mp.
- 25 randomised.mp.
- 26 controlled clinical Trial*.mp.
- 27 cct*.mp.
- 28 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
- 29 10 and 15 and 28
- 30 limit 29 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
BROWNING 2015 ⁹⁷	Summary of Bjorndal et al 2010
CLARKSON 2021 ¹³⁸	Only study protocol
FONTANA 2014 ²⁴³	Summary of Schwendicke et al. 2013
GIACAMAN 2018 ²⁷⁷	Non-systematic review
HAMAMA 2015 ²⁹⁶	No survival analysis
JACOBSEN 2011 ³³⁴	Follow up insufficient

EINGESCHLOSSENE PUBLIKATIONEN

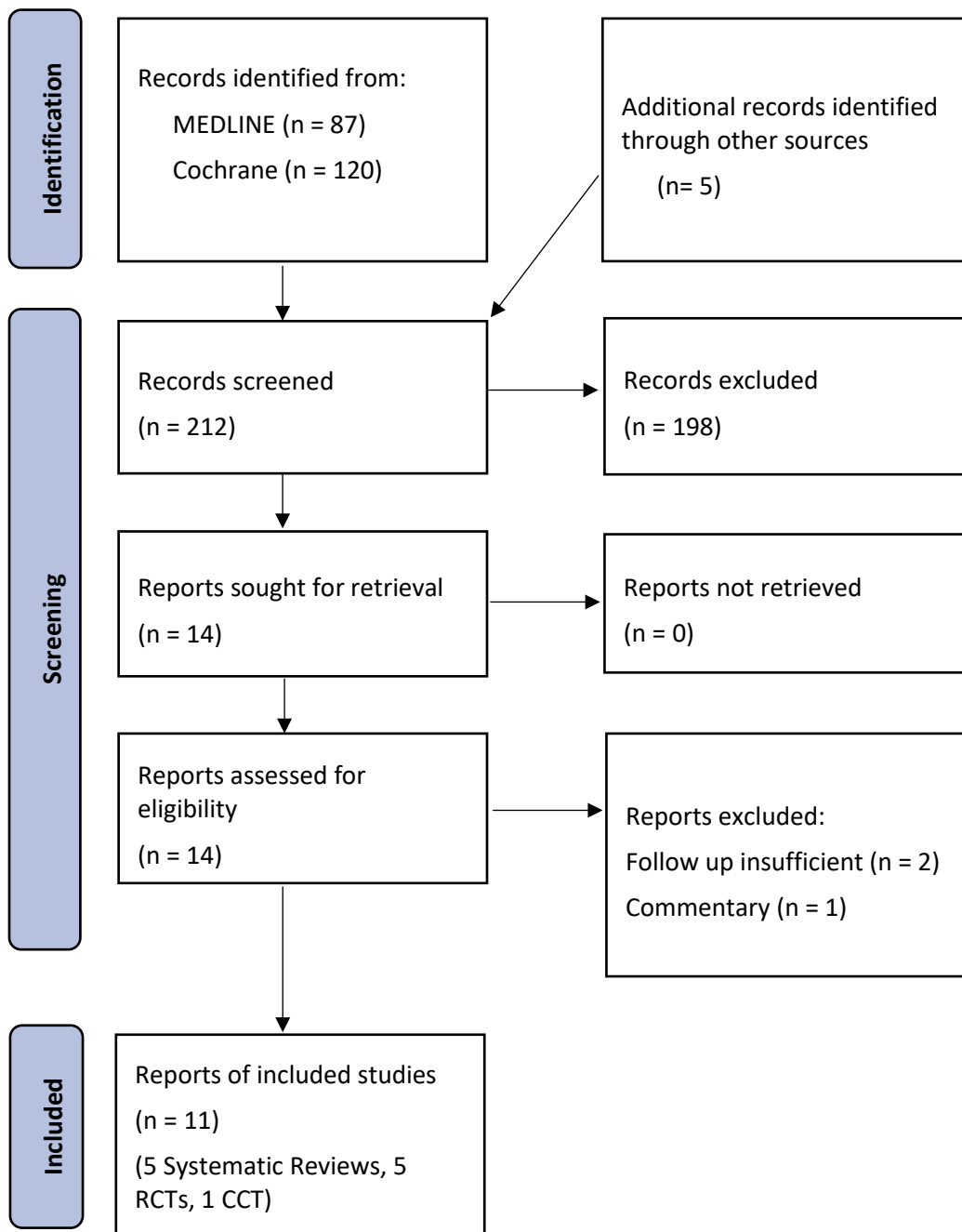
PUBLIKATION
BARROS ET AL. 2020 ⁵⁷
CARDOSO ET AL. 2020 ¹²²
DORRI ET AL. 2017 ¹⁹⁵
HOEFLER ET AL. 2016 ³²²
LI ET AL. 2018 ⁴⁰⁵
SCHWENDICKE ET AL. 2013A ⁶⁷⁹
SCHWENDICKE ET AL. 2013B ⁶⁸¹
SCHWENDICKE ET AL. 2021 ⁶⁸²

PICO FRAGE 7 - KONTAMINATIONSKONTROLLE

MEDLINE SUCHTERM VIA OVID

- 1 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 2 exp Composite Resins/
- 3 dental restoration*.mp.
- 4 filling*.mp.
- 5 restoration*.mp.
- 6 composit*.mp.
- 7 1 or 2 or 3 or 4 or 5 or 6
- 8 Rubber dams/
- 9 ((rubber adj dam*) or (oral adj dam*) or (dental adj dam*) or (latex adj dam*) or Kofferdam).mp.
- 10 ("Optra Dam" or "OptraDam Plus" or OptiDam or FlexiDam or "Hygenic Fiesta").mp.
- 11 operatory field isolation.mp.
- 12 8 or 9 or 10 or 11
- 13 Randomized Controlled Trials as Topic/
- 14 exp Controlled Clinical Trial/
- 15 RCT*.mp.
- 16 randomized controlled Trial*.mp.
- 17 randomised controlled Trial*.mp.
- 18 systematic review*.mp.
- 19 meta Analysis.mp.
- 20 controlled clinical Trial.mp.
- 21 randomized.mp.
- 22 randomised.mp.
- 23 controlled clinical Trial*.mp.
- 24 cct*.mp. 13977
- 25 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 1316840
- 26 7 and 12 and 2588
- 27 limit 26 to (yr="1990 -Current" and (english or french or german or russian)) 87

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
DE LOURDES RODRIGUES 2006 ¹⁶¹	Follow up insufficient
PIGNOLY 1990 ⁵⁹³	Commentary
RAU 2006 ⁶²⁰	Follow up insufficient

EINGESCHLOSSENE PUBLIKATIONEN

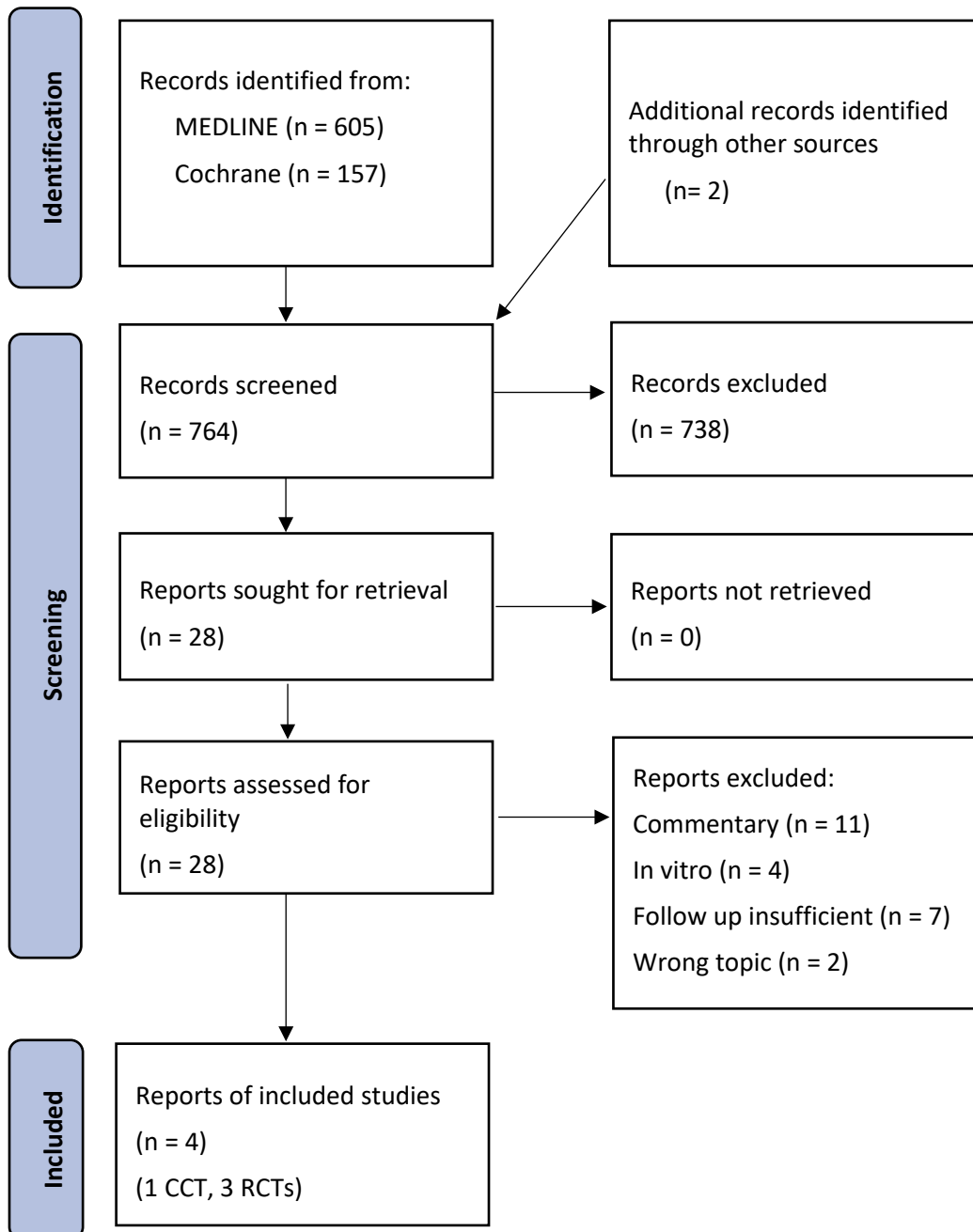
PUBLIKATION
BRUNTHALER ET AL. 2003 ¹⁰⁰
CAJAZEIRA ET AL. 2014 ¹²⁰
DAUDT ET AL. 2013 ¹⁵⁶
FAVETTI ET AL. 2021 ²³¹
LOGUERCIO ET AL. 2015 ⁴¹⁶
MAHN ET AL. 2015 ⁴⁴⁵
MIAO ET AL. 2021 ⁴⁹⁰
RASKIN ET AL. 2000 ⁶¹⁸
SABBAGH ET AL. 2017 ⁶⁵⁴
SMALES ET AL. 1992 ⁶⁹⁸
WANG ET AL. 2016 ⁸²⁷

PICO FRAGE 8 - MATRIZENTECHNIK

MEDLINE SUCHTERM VIA OVID

- 1 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 2 dental restoration*.mp.
- 3 exp Composite Resins/
- 4 filling*.mp.
- 5 restoration*.mp.
- 6 composit*.mp.
- 7 1 or 2 or 3 or 4 or 5 or 6
- 8 (matrix adj1 system*).mp.
- 9 (matrix adj1 band*).mp.
- 10 matrice*.mp.
- 11 (separation adj1 ring*).mp.
- 12 (proximal adj1 contact*).mp.
- 13 8 or 9 or 10 or 11 or 12
- 14 exp dentistry/
- 15 7 and 13 and 14
- 16 limit 15 to (yr="1990-Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
ANDERSSON-WENCKERT 2002³⁵	Follow up insufficient
ANONYM 2014³⁷	Commentary
ARHUN 2013³⁹	In-vitro
BELVEDERE 1994⁶⁸	In-vitro
BELVEDERE 2006⁶⁷	Commentary
BROWNING 2000⁹⁶	Commentary
BURKE 2001¹¹²	Commentary
CENCI 2006¹²⁶	Follow up insufficient
CHO 2010¹³⁴	Commentary
CVITKO 1992¹⁴⁸	In-vitro
DERRICK 2000¹⁸²	Commentary
DIN 1992¹⁸⁷	Commentary
DOUKOUDAKIS 1996¹⁹⁷	Commentary
DURR 2018²⁰⁴	Follow up insufficient
GOMES 2015²⁸⁴	Follow up insufficient
KAPLOWITZ 1997³⁴⁷	Commentary
KWON 2014³⁸⁸	In-vitro
LOOMANS 2006⁴²³	Follow up insufficient
LOOMANS 2007⁴²²	Follow up insufficient
OWENS 2016⁵⁵²	Commentary
ROSIN 2007⁶⁴⁴	No different matrix designs were evaluated
ROSIN 2003⁶⁴⁵	No different matrix designs were evaluated
VAN DER VYVER 2002⁷⁶⁶	Commentary
WIRSCHING 2011⁸⁴⁸	Follow up insufficient

EINGESCHLOSSENE PUBLIKATIONEN

PUBLIKATION

CENCI ET AL. 2007¹²⁵

DEMARCO ET AL. 2007¹⁷¹

DEMARCO ET AL. 2010¹⁷³

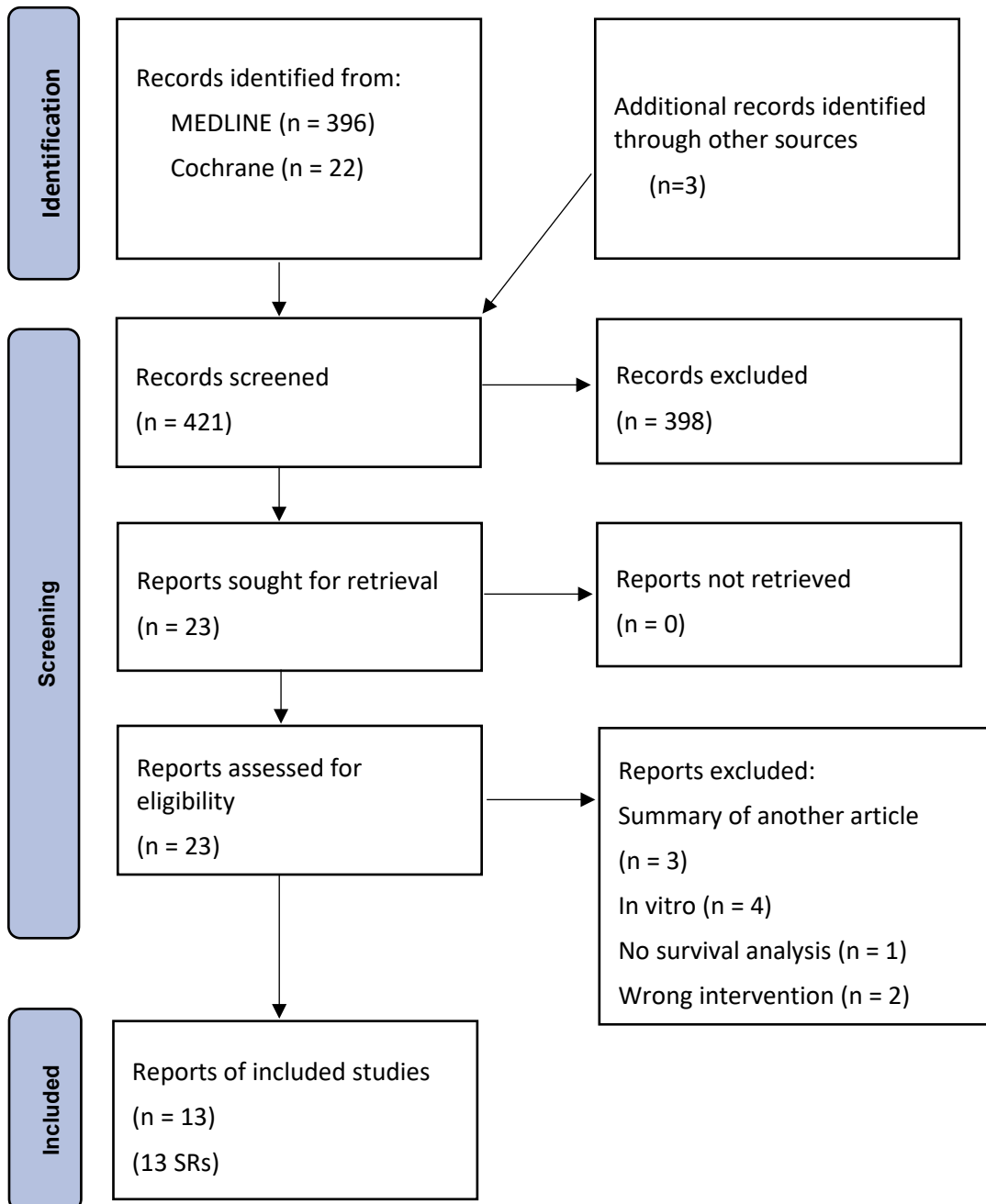
PRAKKI ET AL. 2003⁶⁰⁶

PICO FRAGE 9 - ADHÄSIVTECHNIK

MEDLINE SUCHTERM VIA OVID

- 1 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 2 exp Composite Resins/
- 3 dental restoration*.mp.
- 4 filling*.mp.
- 5 restoration*.mp.
- 6 composit*.mp.
- 7 1 or 2 or 3 or 4 or 5 or 6
- 8 Adhesives/ or Dentin-Bonding Agents/
- 9 Dental Bonding/
- 10 Acid Etching Dental/
- 11 Dental Etching/
- 12 bonding.mp.
- 13 (adhes* adj1 system*).mp.
- 14 adhesive.mp.
- 15 8 or 9 or 10 or 11 or 12 or 13 or 14
- 16 Randomized Controlled Trials as Topic/
- 17 exp Controlled Clinical Trial/
- 18 RCT*.mp.
- 19 randomized controlled Trial*.mp.
- 20 randomised controlled Trial*.mp.
- 21 systematic review*.mp.
- 22 meta Analysis.mp.
- 23 controlled clinical Trial.mp.
- 24 randomized.mp.
- 25 randomised.mp.
- 26 controlled clinical Trial*.mp.
- 27 cct*.mp.
- 28 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27
- 29 7 and 15 and 28
- 30 limit 29 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
COE 2017 ¹³⁹	Summary of Schroeder 2017
FARSAI 2018 ²²⁹	Summary of da Silva 2018
LELOUP 2001 ³⁹⁹	In-vitro
LIMA 2021 ⁴⁰⁷	In-vitro
MADRID TROCONIS 2017 ⁴⁴⁰	In-vitro
REIS 2015 ⁶²¹	No survival analysis
ROCHA 2018 ⁶⁴¹	Wrong intervention
SIA 2018 ⁶⁹¹	Summary of da Silva 2018
ZHANG 2020A ⁸⁶⁴	In-vitro
ZHANG 2020B ⁸⁶⁵	Wrong intervention

INGESCHLOSSENE PUBLIKATIONEN

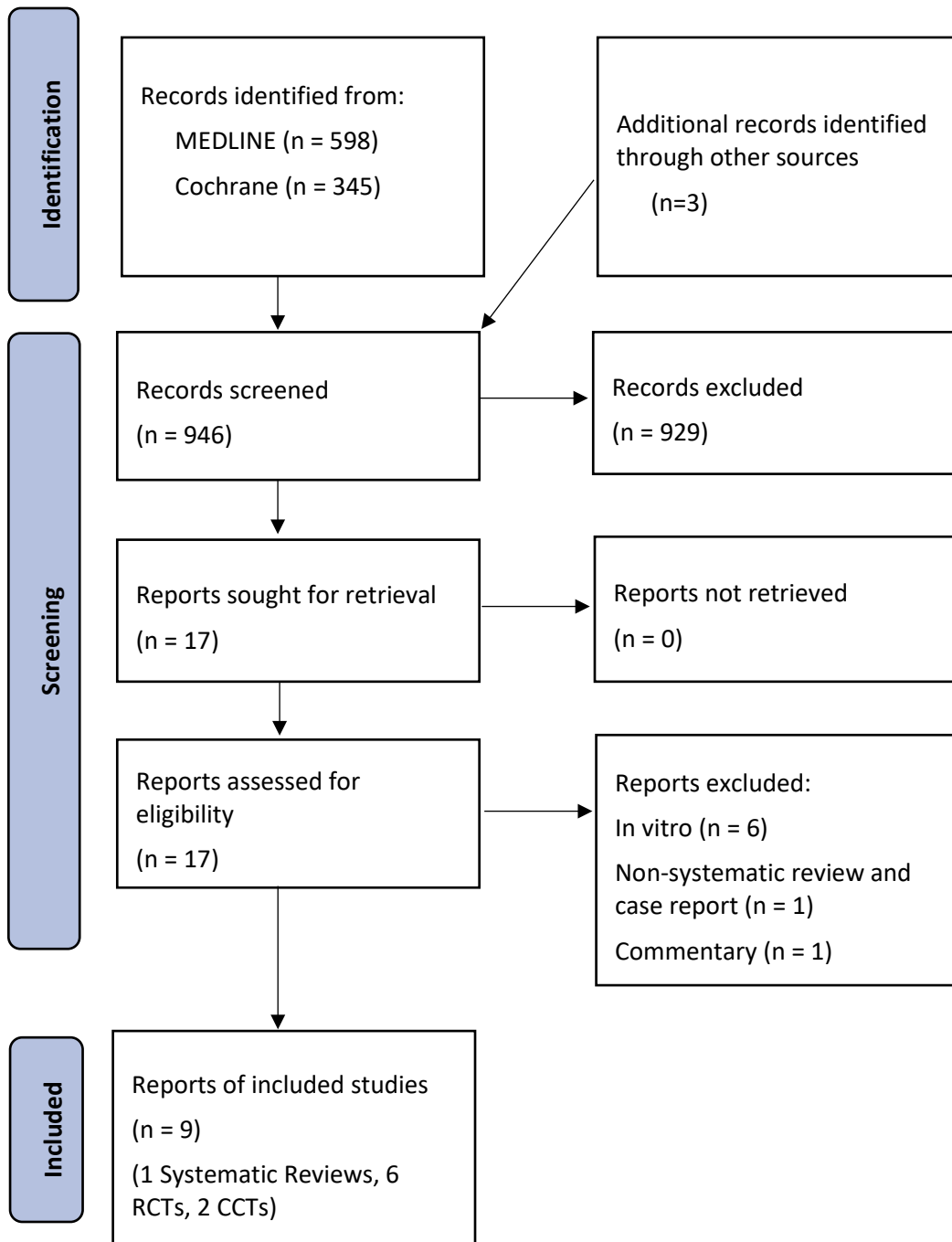
PUBLIKATION
ASKAR ET AL. 2021 ⁴²
CHEE ET AL. 2012 ¹³¹
DA SILVA ET AL. 2018 ¹⁵¹
DE ASSIS ET AL. 2020 ¹⁶⁰
KRITHIKADATTA 2010 ³⁷⁸
LINS ET AL. 2020 ⁴¹¹
MAHN ET AL. 2015 ⁴⁴⁵
PEUMANS ET AL. 2014 ⁵⁷⁹
PEUMANS ET AL. 2005 ⁵⁸⁵
SANTOS ET AL. 2014 ⁶⁶⁰
SCHROEDER ET AL. 2017 ⁶⁷⁵
SCHWENDICKE ET AL. 2016 ⁶⁸⁰
SZESZ ET AL. 2016 ⁷³³

PICO FRAGE 10 - LICHTPOLYMERISATION

MEDLINE SUCHTERM VIA OVID

- 1 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/ or exp diagnosis, oral/
- 2 exp Composite Resins/
- 3 dental restoration*.mp.
- 4 filling*.mp.
- 5 restoration*.mp.
- 6 composit*.mp.
- 7 1 or 2 or 3 or 4 or 5 or 6
- 8 Curing Light, Dental/ or "Light-Curing of Dental Adhesives"/ or Polymerization/
- 9 light cur*.mp.
- 10 polymeri*ation.mp.
- 11 curing protocol.mp.
- 12 3s PowerCure.mp.
- 13 dual cur*.mp.
- 14 8 or 9 or 10 or 11 or 12 or 13
- 15 Randomized Controlled Trials as Topic/
- 16 exp Controlled Clinical Trial/
- 17 RCT*.mp.
- 18 randomized controlled Trial*.mp.
- 19 randomised controlled Trial*.mp.
- 20 systematic review*.mp.
- 21 meta Analysis.mp.
- 22 controlled clinical Trial.mp.
- 23 randomized.mp.
- 24 randomised.mp.
- 25 controlled clinical Trial*.mp.
- 26 cct*.mp.
- 27 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26
- 28 7 and 14 and 27
- 29 limit 28 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
BRAGA 2005⁹⁴	Non-systematic review
CVITKO 1992¹⁴⁸	In-vitro
HARDAN 2009²⁹⁹	In-vitro
KAYS 1991³⁵⁰	In-vitro
MEEREIS 2018⁴⁸⁵	In-vitro
MUNCHOW 2018⁵²¹	In-vitro
REIS 2017⁶²⁶	In-vitro
STRASSLER 2018⁷²¹	Commentary

EINGESCHLOSSENE PUBLIKATIONEN

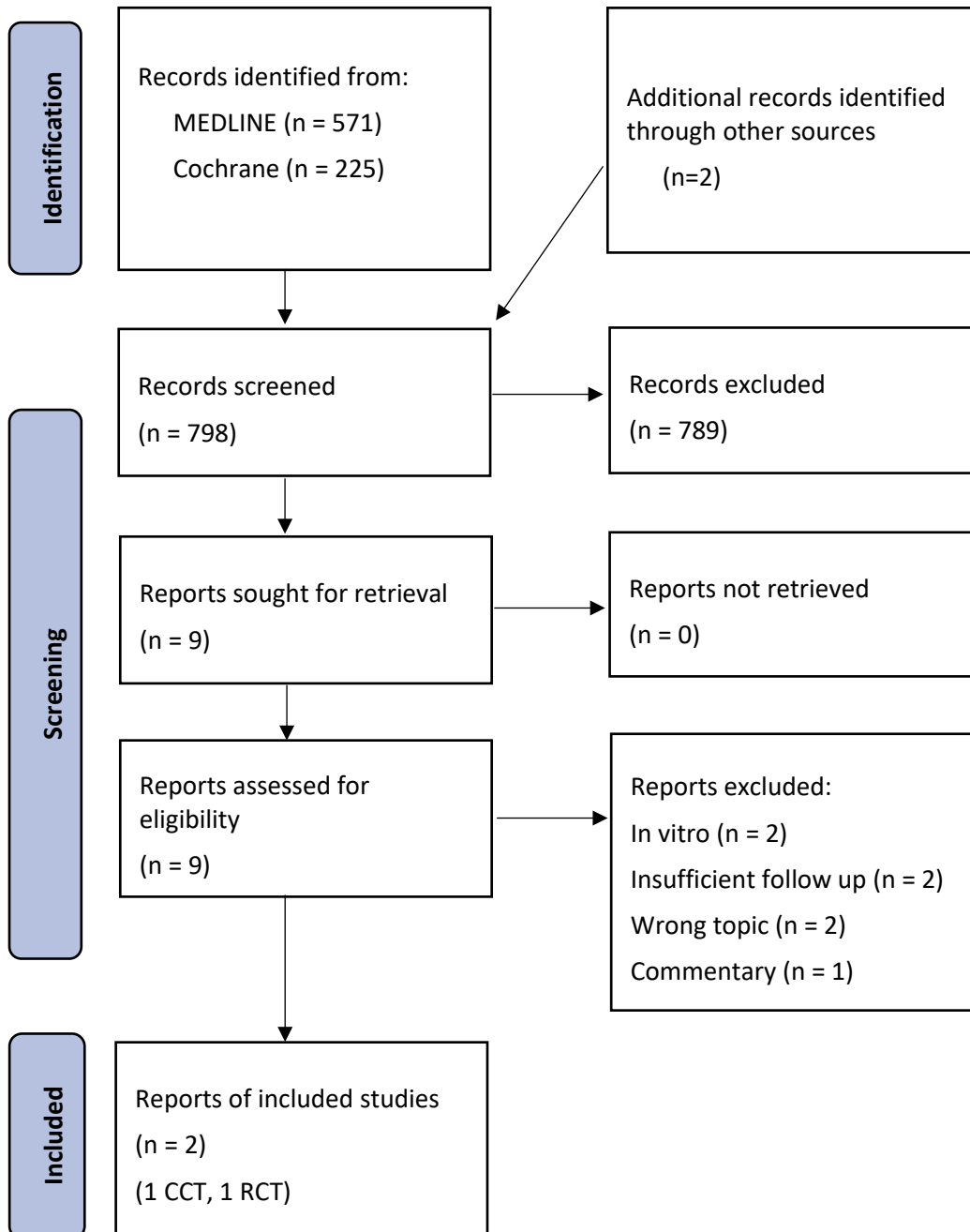
PUBLIKATION
BARABANTI ET AL. 2013⁴⁹
BRACKETT ET AL. 2002⁹¹
CERUTTI ET AL. 2020¹²⁷
CHAN ET AL. 2008¹³⁰
FAHIM ET AL. 2019²²⁸
KOUBI ET AL. 2006³⁶⁶
LIMA ET AL. 2018⁴⁰⁶
VAN DIJKEN ET AL. 2012⁷⁹⁴
WILDER ET AL. 1999⁸³⁸

PICO FRAGE 11 – POLITUR UND AUSARBEITUNG

MEDLINE SUCHTERM VIA OVID

- 1 exp dental restoration failure/ or exp dental restoration, permanent/ or exp dental restoration repair/ or dental marginal adaptation/
- 2 exp Composite Resins/
- 3 dental restoration*.mp.
- 4 filling*.mp.
- 5 restoration*.mp.
- 6 composit*.mp.
- 7 1 or 2 or 3 or 4 or 5 or 6
- 8 finishing.mp.
- 9 polishing.mp.
- 10 contouring.mp.
- 11 8 or 9 or 10
- 12 Randomized Controlled Trials as Topic/
- 13 exp Controlled Clinical Trial/
- 14 RCT*.mp.
- 15 randomi*ed controlled Trial*.mp.
- 16 systematic review*.mp.
- 17 meta Analysis.mp.
- 18 controlled clinical Trial.mp.
- 19 randomi*ed.mp.
- 20 controlled clinical Trial*.mp.
- 21 cct*.mp.
- 22 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21
- 23 7 and 11 and 22
- 24 limit 23 to (yr="1990 -Current" and (english or french or german or russian))

PRISMA FLOW DIAGRAMM



AUSGESCHLOSSENE PUBLIKATIONEN DER VOLLTEXTSUCHE MIT ANGABE VON GRÜNDEN

PUBLIKATION	AUSSCHLUSSGRUND
DUTRA 2018²⁰⁶	In-vitro
HELLAK 2015³⁰⁹	Wrong topic
JARAMILLO-CARTAGENA 2021³³⁶	In-vitro
JUNG 2005³⁴⁴	Insufficient follow-up
LUSSI 1992⁴³⁸	Wrong topic
TEIXEIRA 2019⁷³⁴	Insufficient follow-up
WAKEFIELD 2013⁸²³	Commentary

EINGESCHLOSSENE PUBLIKATIONEN

PUBLIKATION
JANG ET AL. 2017³³⁵
NASSAR ET AL. 2014⁵²⁵

KRITISCHE BEWERTUNG DER EVIDENZ

Die kritische Bewertung der Evidenz wurde für die PICO Fragen 1-5 durch zwei unabhängige Untersucher (PD Dr. Caroline Sekundo und Dr. Esra Kosan) durchgeführt.

Die Evidenz, auf der die Empfehlungen beruhen, wurde systematisch auf Studien- bzw. Meta-Analyseebene bewertet (je nach ausgewähltem Studientyp, siehe PICO Fragen). Auf Studienebene wurde das Cochrane Risk of Bias 2.0 Tool⁷¹⁶ zur Bewertung randomisierter Studien und das ROBINS-I Tool (Risk of bias tool to assess nonrandomized studies of interventions) für nicht randomisierte Studien verwendet⁷¹⁵. Beide Instrumente beinhalten eine endpunktbasierende Bewertung des Verzerrungsrisikos. Für systematische Übersichtsarbeiten wurde das AMSTAR 2 Tool⁶⁸⁵ verwendet. Die Ergebnisse der Bewertungen werden zusammen mit den Patientenmerkmalen und Ergebnissen der Studien in Evidenztabelle zusammengefasst.

Unter Verwendung des international anerkannten GRADE-Systems (Grading of Recommendations Assessment, Development and Evaluation)²⁹² wurde das Vertrauen bzw. die Sicherheit in die Evidenz ermittelt. Das GRADE-System ist ein Ansatz, der die Sicherheit oder das Vertrauen in die identifizierten Effektschätzungen der eingeschlossenen Studien in Bezug auf die ausgewählten Outcomes bewertet. Die Evidenzeinstufung ist in vier Stufen unterteilt (siehe untenstehende Tabelle). Die GRADE-Bewertung bietet eine Grundlage für die Abwägung von Nutzen und Schaden, um die Empfehlung zu formulieren. GRADE Evaluationen der Haupt-Outcomes und Komparatoren finden sich in den Summary of Evidence Tabellen wieder.

EVIDENZGRADUIERUNG NACH GRADE

VERTRAUEN IN DIE EVIDENZ	BESCHREIBUNG	SYMBOL
HOHES VERTRAUEN	Wir sind sehr sicher, dass der wahre Effekt nahe bei dem Effektschätzer liegt.	⊕⊕⊕⊕
MODERATES VERTRAUEN	Wir haben mäßig viel Vertrauen in den Effektschätzer, der wahre Effekt ist wahrscheinlich nahe bei dem Effektschätzer, aber es besteht die Möglichkeit, dass er relevant verschieden ist.	⊕⊕⊕⊖
GERINGES VERTRAUEN	Unser Vertrauen in den Effektschätzer ist begrenzt: Der wahre Effekt kann durchaus relevant verschieden vom Effektschätzer sein.	⊕⊕⊖⊖
SEHR GERINGES VERTRAUEN	Wir haben nur sehr wenig Vertrauen in den Effektschätzer: Der wahre Effekt ist wahrscheinlich relevant verschieden vom Effektschätzer	⊕⊖⊖⊖

PICO FRAGE 1 - DIREKTE KOMPOSITRESTAURATIONEN IN DEN RESTAURATIONSKLASSEN I UND II

EVIDENZTABELLEN DER EINGESCHLOSSENEN STUDIEN

AFRASHTEHFAR ET AL. 2017

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Afrashtehfar et al. 2017</p> <p>Sys. Review</p> <p>PMID: 27765400</p>	<p>Studientyp: RCTs Nonrandomized clinical studies</p> <p>Suchzeitraum: January 1993 – February 2015</p> <p>Datenbanken: MEDLINE, Cochrane Library, EMBASE, additional manual search of 8 journals and references</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 14</p> <p>Population: 4804 composite restorations, 303 582 amalgam restorations Patient number not specifically reported Composite resins had a significantly higher failure rate than amalgams, regardless of the remaining tooth structure ($p < 0.0001$)</p>	<p>Notes: Level of evidence assessed according to the American Association of Critical Care Nurses (ACCN) evidence-leveling system Usage of metaregression model to assess the correlation between the number of remaining tooth walls and the weighted- mean 5-year failure rates No assessment of heterogeneity</p>	<p>Bernardo et al. 2007⁷¹ Kramer et al. 2011³⁶⁹ Manhart et al. 2010⁴⁵⁷ Plasmans and van't Hof 1993⁵⁹⁶ Shi et al. 2010⁶⁸⁹ Akerboom et al. 1993²⁵ Kiremitci et al. 2009³⁵⁷ Kohler et al. 2000³⁶¹ Kolker et al. 2004³⁶³ Kopperud et al. 2012³⁶⁵ Lin et al. 1997⁴⁰⁸ Lucarotti et al. 2005⁴²⁷ Mjor and Jokstad 1993⁴⁹³ Opdam et al. 2004⁵⁴²</p>	<p>The greater the amount of tooth structure, the better the performance of restorative materials. In posterior vital teeth, amalgam restorations seem to perform better than composite resin restorations</p>

	<p>Einschlusskriterien: RCTs, nonrandomized clinical studies</p> <p>Treatment with single complete crowns or direct restorations in posterior vital teeth, followed for at least 3 years</p>				<p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool for RCTs Usage of Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist for observational studies Studies assessed as moderate to high risk of bias, quality of evidence as low to moderate</p> <p>AMSTAR-2 Assessment: Low quality</p>		
--	---	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

ALCARAZ ET AL. 2014

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Alcaraz et al. 2014</p> <p>Sys. Review</p> <p>PMID: 24683067</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: No restriction to publication date – October 2013</p> <p>Datenbanken: MEDLINE, Cochrane Library, EMBASE, LILACs, contacted dental manufacturers for unpublished data</p> <p>Einschlusskriterien: RCTs Treatment with composite resin vs. amalgam in permanent posterior teeth, followed for at least 3 years</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam</p>	<p>Longevity/ retention</p> <p>clinical performance according to USPHS/FDI criteria</p> <p>Secondary caries</p> <p>Fracture of restorations</p>	<p>Studienanzahl: 7 (qualitative analysis), 2 (quantitative analysis)</p> <p>Population: 3010 lesions</p> <p>Failure rate/retention: RR 1.89 (CI 95% 1.52, 2.35) p < 0.001</p> <p>Secondary caries: RR 2.14 (CI 95% 1.67, 2.74) p < 0.001</p> <p>Fracture of restorations: RR 0.87 (CI 95% 0.46, 1.64) p = 0.66</p>	<p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool for RCTs All studies assessed as high risk of bias</p> <p>AMSTAR-2 Assessment: High quality</p>	<p>Casa Pia 2007 (Bernardo et al. 2007⁷¹, DeRouen et al. 2006¹⁸¹, Geier et al. 2012²⁷¹, Geier et al. 2013²⁷³, Geier et al. 2011²⁷⁴, Woods et al. 2013⁸⁵¹)</p> <p>Cunningham et al. 1990¹⁴⁷</p> <p>Hendriks 1986³¹⁰</p> <p>Letzel 1989⁴⁰¹</p> <p>NECAT 2007 (Maserejian et al. 2012a⁴⁷⁹, Maserejian et al. 2012b⁴⁸⁰, Soncini et al. 2007⁷¹⁰)</p> <p>Norman 1990⁵³¹</p> <p>Robinson 1988⁶³⁸</p>	<p>There is low-quality evidence to suggest that resin composites lead to higher failure rates and risk of secondary caries than amalgam restorations.</p>

a. Outcomes listed only as far as relevant to the PICO question

ANTONY ET AL. 2008

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Antony et al. 2008</p> <p>Sys. Review</p> <p>PMID: 21289917</p>	<p>Studientyp: RCTs Nonrandomized clinical studies Surveys</p> <p>Suchzeitraum: No restriction as to publication date- March 2007</p> <p>Datenbanken: CCMed, Cochrane Library, DAHTA- Datenbank, Deutsches Aerzteblatt, gms, Karger- Verlagsdatenbank, Kluwer- Verlagsdatenbank, Krause & Pachernegg Verlagsdatenbank, NHS-CRD-DARE, NHS-CRD-HTA, SOMED, Springer- Verlagsdatenbank PrePrint, Springer- Verlagsdatenbank, Thieme- Verlagsdatenbank,</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 21</p> <p>Narrative Auswertung</p>	<p>Notes: No meta-analysis</p> <p>Risk of Bias Assessment: Qualitätsschemata von Chadwick et al.</p> <p>AMSTAR-2 Assessment: Low quality</p>	<p>Mitchell et al. 2007⁴⁹² Manhart et al. 2004⁴⁵⁴ Brunthaler et al. 2003¹⁰¹ Hickel and Manhart 2001³¹⁸ Chadwicke et al. 2001¹²⁹ Downer et al. 1999¹⁹⁸ Soncini et al. 2007⁷¹⁰ Bernardo et al. 2007⁷¹ Van Nieuwenhuysen et al. 2003⁸¹⁸ Collins et al. 1998¹⁴² Lucarotti et al. 2005⁴²⁹ Opdam et al. 2005⁵⁴¹ Hawthorne and Smales 1997³⁰² Mjör 1997⁴⁹⁹ Mjör and Moorhead 1998⁴⁹⁴ Burke et al. 1999¹⁰⁷ Mjör et al. 2000⁵⁰² Burke et al. 2001¹⁰⁸ Fors and Widström 2001²⁴⁴ Fors and Widström 2004²⁴⁵ Tvas 2005⁷⁵⁴</p>	<p>The medical studies report a longer longevity for amalgam fillings than for composite fillings. However, the results of these studies show a large heterogeneity.</p>

	<p>Cochrane Library – Central, MEDLINE, MEDIKAT, ETHMED, CAB Abstracts, AMED, NHS-EED, GLOBAL Health, BIOSIS Previews, EMBASE, EMBASE Alert, Derwent Drug File, Social SciSearch, SciSearch, RTECS, CCRIS</p> <p>Einschlusskriterien: RCTs Nonrandomized clinical studies Surveys</p> <p>Comparing composite and amalgam fillings in permanent teeth</p>						
--	---	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

ÁSTVALDSDÓTTIR ET AL. 2015

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Ástvaldssdóttir et al. 2015</p> <p>Sys. Review</p> <p>PMID: 26003655</p>	<p>Studientyp: RCTs CCTs NRSIs</p> <p>Suchzeitraum: 1990 – December 2011</p> <p>Datenbanken: PubMed, Cochrane Library, databases of the Centre for Reviews and Dissemination</p> <p>Einschlusskriterien: RCTs CCTs Nonrandomized prospective clinical studies</p> <p>Class I and/or Class II resin composite restorations with follow-up times of 4 years or more, with at least forty restorations per experimental group, in adult patients with dropout rates of less than 5% per year</p>	<p>Intervention: Composite resin</p> <p>Komparator: none</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 8 (qualitative analysis) Population: 910 (420) lesions (patients)</p> <p><i>Survival rates:</i></p> <p>4 years: N= 808 0.93 [95% CI 0.91, 0.95]</p> <p>5 years: N= 511 0.91 [95% CI 0.89, 0.93]</p> <p>6 years: N= 415 0.89 [95% CI 0.85, 0.91]</p> <p>7 Years: N= 298 0.88 [95% CI 0.82, 0.89]</p> <p>9 years: N= 195 0.86 [95% CI 0.82, 0.89]</p> <p>12 years: N= 74 95% CI 0.86 [0.82, 0.89]</p>	<p>Notes: Only rudimentary meta-analysis The quality of the scientific evidence regarding the outcomes was rated on a four-point scale according to GRADE Only studies of moderate or high quality included Risk of Bias Assessment: Assessed according to the Swedish Council on Health Technology Assessment (SBU) standardized checklists AMSTAR-2 Assessment: Low quality</p>	<p>Lindberg et al. 2007⁴¹⁰ Manhart et al. 2010⁴⁵⁷ van Dijken et al. 2005⁸⁰³ van Dijken and Lindberg 2009⁷⁹⁰ van Dijken 2010⁷⁷⁹ van Dijken and Pallesen 2011a⁷⁹⁵ van Dijken and Pallesen 2011b⁷⁹⁷ van Dijken et al. 2013⁷⁸³</p>	<p>In an efficacy setting, the overall survival proportion of posterior resin composite restorations is high. The major reasons for failure are secondary caries and restoration fracture</p>

a. Outcomes listed only as far as relevant to the PICO question

BECK ET AL. 2015 AND BRUNTHALER ET AL. 2003

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Beck et al. 2015 Brunthaler et al. 2003</p> <p>Systematic Review</p> <p>PMID: 26091581 12768463</p>	<p>Studientyp: RCTs, CCTs, NRSIs</p> <p>Suchzeitraum: 1996-2015</p> <p>Datenbanken: Pubmed, Medline and hand search</p> <p>Einschlusskriterien: RCTs, CCTs, nonrandomized clinical studies</p> <p>Survival of posterior composite restorations in Class I and II cavities in permanent teeth</p>	<p>Intervention: Direct composite resin</p> <p>Komparator: None</p>	<p>Longevity/ retention modified USPHS criteria</p>	<p>Studienzahl: 88</p> <p>Population: 3.360 (7.743 restorations)</p> <p><i>Loss of retention:</i> Mean annual failure rate (AFR) >1y: 1.64%±1.68%</p> <p>1-4y: 1.46%±1.74%</p> <p>>5y: 1.97%±1.53%</p> <p>Reasons for failure (UHPHS): 1-17 y (1996-2015):</p> <p>Secondary caries: 21 Fracture of restoration: 22 Marginal defect: 9 Hypersensitivity: 2 Loss of anatomic form: 4 Loss of retention: 6</p>	<p>Notes: 19 studies from Brunthaler et al. 2003 were used for analysis, but not directly named. Main reasons for failure according to USPHS criteria were only recorded per number of studies, not on a restoration level.</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Beck et al. 2015: Dresch et al. 2006²⁰¹ De Souza et al. 2005¹⁶⁵ Burke et al. 2005¹¹³ Bartlett and Sundaram 2006⁵⁸ Brackett et al. 2007⁸⁹ Prakki et al. 2004⁶⁰⁷ Ernst et al. 2006²²⁰ Gallo et al. 2005²⁶⁹ Kinotmoto et al. 2004³⁵⁶ Lopes et al. 2003⁴²⁵ Ernst et al. 2003²²² Deliperi and Bardwell 2006¹⁶⁹ Türkün et al. 2005⁷⁵⁰ Spreafico et al. 2005⁷¹² Poon et al. 2005⁵⁹⁸ Van Dijken and Sunnegardh-Grönberg 2005⁸⁰³ Mannoci et al. 2005⁴⁷⁵ Van Dijken and Sunnegardh-Grönberg 2006⁸⁰² Türkün et al. 2003⁷⁴⁸ Pallesen and Qvist 2003⁵⁵⁸ Van Dijken and Lindberg 2009⁷⁹⁰ Fagundes et al. 2009²²⁷ Kiremitici et al. 2009³⁵⁷ Bottenberg et al. 2009⁸⁴ Mahmoud et al. 2008⁴⁴⁴ Manchorova et al. 2008⁴⁵⁰ Gianordoli et al. 2008²⁷⁸ Schirmeister et al. 2009⁶⁶⁸ Ergücü and Türkün 2007²¹⁴</p>	<p>The failure rate of composite restorations in posterior teeth increases with longer observation periods. In the study period of 1–4 years the most common reasons for failure reported were fracture, followed by marginal defects and secondary caries. For longer study periods (=5 years) secondary caries and fracture turned out to be the predominant reasons and were similarly distributed. The use of different materials/composite brands had no influence on the overall failure rate.</p>

						<p>Swift et al. 2008⁷³¹ Ermis et al. 2009²¹⁶ Sandeghi et al. 2010⁶⁵⁷ Monteiro et al. 2010⁵¹² Arhun et al. 2010⁴⁰ Manhart et al. 2010⁴⁵⁷ Van Dijken 2010⁷⁷⁹ Akimoto et al. 2011²⁶ Burke et al. 2011¹⁰⁹ De Andrade et al. 2014¹⁵⁸ Demarco et al. 2011¹⁷⁴ Frankenberger et al. 2013²⁴⁹ Boeckler et al. 2012⁷⁸ Palaniappan et al. 2009⁵⁵⁶ Van Dijken and Pallesen 2011⁸⁰⁸ Baracco et al. 2012⁵¹ Boeckler et al. 2012⁷⁹ Coelho de Souza et al. 2012¹⁴⁰ Deliperi et al. 2017¹⁷⁰ Laegreid et al. 2012³⁸⁹ Palaniappan et al. 2010⁵⁵⁷ Pazinato et al. 2012⁵⁶⁵ Stefanski et al. 2012⁷¹³ Cetin et al. 2013¹²⁸ Mahmoud et al. 2013⁴⁴³ Van Dijken and Pallesen et al. 2014⁸⁰¹ Van Dijken and Pallesen⁸⁰⁹ Schmidt et al. 2015⁶⁷² Fennis et al. 2014²³⁶ Van Dijken 2013¹⁸⁶ Walter et al. 2014⁸²⁵ Van Dijken and Pallesen 2014⁸¹¹ Mahmoud et al. 2014⁴⁴² Scholtanus and Ozcan 2014⁶⁷⁴</p>
--	--	--	--	--	--	---

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Rocha et al. 2014⁷⁴¹ Van Dijken and Pallesen⁷⁷³ Lindberg et al. 2007⁴¹⁰ Akimoto et al. 2007²⁷ Beck et al. 2014⁵⁹ Dietz et al. 2014¹⁸⁵ <u>Brunthaler et al.2003:</u> Braun et al. 2001⁹⁵ Loguerico et al. 2001⁴²¹ Lopes et al. 2002⁴²⁵ Oberländer et al. 2001⁵³³ Schoch et al. 1999⁶⁷³ Wilson et al. 2002⁸⁴¹ Abdalla and Alhadainy 1996¹⁵ Perry and Kugel 2000⁵⁷⁵ Perry et al. 1997⁵⁷⁶ Türkün and Aktener 2001⁷⁴⁷ Ernst et al. 2001²²³ Hugo et al. 2001³²⁸ Manhart et al. 2000⁴⁷⁰ Köhler et al. 2000³⁶² Wassell et al. 2000⁸³⁰ Busato et al. 2001¹¹⁹ Collins et al. 1998¹⁴² Gängler et al. 2001²⁶⁷ Lundin and Koch 1999⁴³⁴ Mair 1998⁴⁴⁶ Nordbo et al. 1998⁵²⁹ Raskin et al. 1999⁶¹⁶ Van Dijken 2000⁷⁷⁸ Wilder et al. 1999⁸⁴⁰</p>
--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question;

DA VEIGA ET AL. 2016

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Da Veiga et al. 2016</p> <p>Sys. Review</p> <p>PMID: 27523636</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: No restriction to publication date – August 2015</p> <p>Datenbanken: PubMed, Cochrane Library, LILACS, Web of Science, Scopus, BBO, ClinicalTrials.gov, SIGLE</p> <p>Einschlusskriterien: RCTs comparing the longevity of direct and indirect composite restorations in Class I II cavities with or without cusp involvement and with at least two years of follow-up in permanent teeth</p>	<p>Intervention: Direct composite resin</p> <p>Komparator: Indirect composite resin</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 9 (qualitative analysis), 6 (quantitative analysis)</p> <p>Population: 394 indirect restorations, 277 direct composite restorations RR: 1.49 (CI 95% 0.89, 2.50), p= 0.126</p>	<p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool for RCTs 3 studies high risk of bias, five low risk of bias, 1 unclear risk of bias Meta-analysis only performed with low and unclear risk of bias</p> <p>AMSTAR-2 Assessment: Moderate quality</p>	<p>Bartlett and Sundaram 2006⁵⁸ Cetin et al. 2013¹²⁸ Fennis et al. 2014²³⁶ Manhart et al. 2000⁴⁷⁰ Ozakar-Illday et al. 2013⁵⁵³ Pallesen and Qvist 2003⁵⁵⁸ Van Dijken 2000⁷⁷⁸ Wassell et al.2000⁸³⁰ Wendt er al. 1996⁸³⁴</p>	<p>There was no difference in longevity of direct and indirect resin composite restorations regardless of the type of material and the restored tooth</p>

a. Outcomes listed only as far as relevant to the PICO question

DEMARCO ET AL. 2012

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Demarco et al. 2012</p> <p>Sys. Review</p> <p>PMID: 22192253</p>	<p>Studientyp: RCTs CCTs Nonrandomized clinical studies</p> <p>Suchzeitraum: 1996-2011</p> <p>Datenbanken: PubMed</p> <p>Einschlusskriterien: RCTs CCTs Nonrandomized clinical studies with at least 5-year follow-up of posterior composite restorations</p>	<p>Intervention: Direct composite resin</p> <p>Komparator: none</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 34</p> <p>Population: Not reported</p> <p>On average, the annual failure rates (AFR) of Class I and II posterior composite restorations placed in vital teeth varied between 1% and 3%</p> <p>The two main causes of failure identified were fracture (restoration or tooth) and secondary caries</p>	<p>Notes: No meta-analysis Also included studies using secondary data</p> <p>Risk of Bias Assessment: none</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Da Rosa Rodolpho et al. 2011⁶⁴² Opdam et al. 2010⁵³⁹ Fokkinga et al. 2008²³⁹ Bernardo et al. 2007⁷¹ Opdam et al. 2007⁵⁴¹ Soncini et al. 2007⁷¹⁰ Lindberg et al. 2007⁴¹⁰ Gordan et al. 2007²⁸⁷ Da Rosa Rodolpho et al. 2006¹⁴⁹ Burke et al. and Lucarotti et al. 2005^{110, 111, 428, 429} Nagasiri et al. 2005⁵²² Mannocci et al. 2005⁴⁷⁴ Opdam et al. 2004⁵³⁸ Andersson-Wenckert et al. 2004³⁶ Coppola et al. 2003¹⁴³ Hayashi and Wilson 2003³⁰⁵ Pallesen and Qvist 2003⁵⁵⁸ Turkun et al. 2003⁷⁴⁸ Van Nieuwenhuysen et al. 2003⁸¹⁸ Busato et al. 2001¹¹⁹ Gaengler et al. 2001²⁶⁶ Köhler et al. 2000³⁶² Van Dijken et al. 2000⁷⁷⁸ Wassel et al. 2000⁸³⁰ Lundin and Koch 1999⁴³¹ Raskin et al. 1999⁶¹⁶ Wilder et al. 1999⁸⁴⁰ Collins et al. 1998¹⁴² Mair 1998⁴⁴⁶ Nordbo et al. 1998⁵²⁹</p>	<p>Composite restorations have been shown to perform favorably in posterior teeth, with AFRs of 1–3%</p>

a. Outcomes listed only as far as relevant to the PICO question

DOWNER ET AL. 1999

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Downer et al. 1999</p> <p>Sys. Review</p> <p>PMID: 10716002</p>	<p>Studientyp: RCTs CCTs</p> <p>Nonrandomized clinical studies</p> <p>Suchzeitraum: Not reported</p> <p>Datenbanken: MEDLINE, EMBASE, CINAHL, DISSERTATION ABSTRACTS, ERIC, SCISEARCH, Cochrane Library</p> <p>Einschlusskriterien: RCTs CCTs Nonrandomized clinical studies with at least 5-year follow-up of posterior class I and II restorations</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam Glass Ionomer Cast gold restoration</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 8</p> <p>Population: Not reported</p> <p>The studies suggested that 50% of all restorations last 10 to 20 years, although both higher and lower median survival times were reported</p>	<p>Notes: No meta-analysis</p> <p>Risk of Bias Assessment: Usage of checklist developed by the authors</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Bentley and Drake 1986⁶⁹ Drake 1988a¹⁹⁹ Drake 1988b²⁰⁰ Hawthorne and Smales 1997³⁰² Jokstad and Mjör 1991³⁴¹ Letzel et al 1997⁴⁰² Robbins and Summitt 1988⁶³⁵ Wilson and Norman 1991⁸⁴⁵</p>	<p>Many studies were imperfect in design. Those considered to be the most appropriate for analysis were too limited to undertake a formal statistical exploration.</p>

a. Outcomes listed only as far as relevant to the PICO question

EL MOWAFY ET AL. 1994

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>El Mowafy et al. 1994</p> <p>Sys. Review</p> <p>PMID: 8157810</p>	<p>Studientyp: RCTs Nonrandomized clinical studies Case series</p> <p>Suchzeitraum: 1981-1991</p> <p>Datenbanken: MEDLINE</p> <p>Einschlusskriterien: RCTs Nonrandomized clinical studies Case series with at least 3-year follow-up of posterior class I and II restorations</p>	<p>Intervention: Composite resin</p> <p>Komparator: none</p>	<p>Longevity/ retention</p> <p>USPHS criteria</p> <p>Postoperative Sensitivity</p> <p>Tooth/restora tion fracture</p>	<p>Studienanzahl: 16</p> <p>Population: 147-191 restorations at 5- year follow-up depending on outcome Patient number not reported</p> <p>Mean alpha ratings in % (best rating) after five years for the following outcomes:</p> <p>Longevity (non-failure) 89.5% Colour match 86.4% Marginal stain 71.2% Recurrent caries 94.8% Anatomical form 50.8% Marginal adaptation 80.1% Postoperative sensitivity 96.9% Fracture 96.6%</p>	<p>Risk of Bias Assessment: none</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Boksman et al. 1986⁸² Brunson et al. 1989⁹⁹ Cunningham et al. 1990¹⁴⁷ Derkson et al. 1984^{179,} 180 Hendriks et al. 1986³¹⁰ Lundin et al. 1990⁴³³ Oldenburg et al. 1985⁵³⁵ Norman et al. 1990⁵³¹ Prati and Montanari 1988⁶¹⁰ Richardson and Derkson 1987⁶³¹ Robinson et al. 1988⁶³⁸ Setcos et al. 1987⁶⁸³ Shintani et al. 1989⁶⁹⁰ Sturdevant et al. 1989^{724, 725} Tonn and Ryge 1988⁷⁴⁰ Wilson et al. 1988⁸⁴⁷</p>	<p>Considering the limited number of studies of variable length available for meta- analysis, the results indicate generally high clinical performance of the various posterior composites for the number of outcomes analysed</p>

a. Outcomes listed only as far as relevant to the PICO question

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Heintze et al. 2012</p> <p>Sys. Review</p> <p>PMID: 23082310</p>	<p>Studientyp: Clinical Trials</p> <p>Suchzeitraum: 1966-2011</p> <p>Datenbanken: SCOPUS</p> <p>Einschlusskriterien: Prospective Clinical Trials, >2 years follow-up, posterior resin composites (Class 2)</p>	<p>Intervention: Composite resin: macrofiller, microfiller, hybrid, poly-acid modified resin composite (compomer)</p> <p>Komparator: Amalgam</p>	<p>Longevity/ retention</p> <p>fracture color match surface texture anatomical form secondary caries marginal discoloration marginal integrity postoperative sensitivity replacement rate median success rate</p>	<p>Studienzahl: 59 (62 Paper)</p> <p>Population: 132 (not reported) lesions (patients)</p> <p><i>Fracture:</i> Compomers had more chipping than other materials. No statistically significant differences.</p> <p><i>Color match:</i> Macrofillers had the worst deterioration, hybrid composites and compomers the least. No statistically significant differences. (No comparison with amalgam)</p> <p><i>Surface texture:</i> No statistically significant differences between any materials</p> <p><i>Anatomical form:</i> Macrofillers and compomers showed</p>	<p>Notes: -</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low Quality</p>	<p>Philips et al. 1972⁵⁹¹ Eames et al. 1974²⁰⁷ Osborne et al. 1973⁵⁴⁴ Leinfelder et al. 1975³⁹⁷ Morris et al. 1977⁵¹⁸ Roulet et al. 1980a⁶⁴⁹ Roulet et al. 1980b⁶⁵⁰ Mannerberg et al. 1983a-c⁴⁷¹⁻⁴⁷³ Gibson et al. 1982²⁷⁹ Hendriks et al. 1986³¹⁰ Sturdevant et al. 1988⁷²⁶ Barnes et al. 1991⁵⁵ Richardson et al. 1987⁶³¹ Boksman et al. 1986⁸² Wilson et al. 1991⁸⁴² Prati et al. 1988⁶¹⁰ Cunningham et al. 1990¹⁴⁷ Brunson et al. 1989⁹⁹ Wilder et al. 1991⁸³⁷ Collins et al. 1998¹⁴² Gängler et al. 2001²⁶⁷ Dietschi et al. 1990¹⁸⁴ Van Dijken et al. 2000⁷⁷⁸ Johnson et al. 1992³⁴⁰ Freilich et al. 1992²⁵¹ Rasmussen et al. 1995⁶¹⁹ Pallesen et al. 2003⁵⁵⁸ Helbig et al. 1998³⁰⁷ Busato et al. 2001¹¹⁹ Perry et al. 1997⁵⁷⁶ Wassell et al. 1994⁸²⁹ Türkün et al. 2003⁷⁴⁸ Bartieri et al. 2001⁵³ Perry et al. 2000⁵⁷⁵ Lindberg et al. 2007⁴¹⁰ Ernst et al. 2001²²³</p>	<p>The best overall performance (good color match, small amount of fractures) was achieved with restorations based on hybrid and microfilled composites; the overall longevity was similar to that of amalgam restorations. Macrofilled composites and compomers demonstrated more shortcomings (wear, fracture).</p>

				<p>increased loss of anatomical form compared to other composites and amalgam</p> <p><i>Secondary Caries:</i> No statistically significant differences between any materials</p> <p><i>Replacement rate:</i> Was higher for compomers than for composites, but no statistically significant differences (no comparison with amalgam)</p> <p><i>Median success rate after 10 y:</i> Composites (without compomers): 92%; Amalgam: 94% (no statistical difference)</p>		<p>Krämer et al. 2006³⁷⁰ Wucher et al. 2002⁸⁵⁶ Luo et al. 2002⁴³⁶ Lopes et al. 2003⁴²⁵ Fagundes et al. 2001²²⁷ Sachdeo et al. 2004⁶⁵⁶ Türkün et al. 2005⁷⁵⁰ Lundin et al. 2004⁴³⁵ Wilson et al. 2006⁸⁴⁴ Sarrett et al. 2006⁶⁶² Van Dijken et al. 2009⁷⁹⁰ Bottenberg et al. 2009⁸⁴ Ernst et al. 2006²²⁰ Gallo et al. 2005²⁶⁹ Bekes et al. 2007⁶² Krämer et al. 2011³⁶⁹ Demarco et al. 2007¹⁷² Van Dijken et al. 2011⁷⁹⁷ Manhart et al. 2010⁴⁵⁷ Perdigao et al. 2009⁵⁷¹ Ermis et al. 2009²¹⁶ Arhun et al. 2007⁴⁰ Kiremitci et al. 2007³⁵⁷ Monteiro et al. 2007⁵¹²</p>	
--	--	--	--	--	--	---	--

a. Outcomes listed only as far as relevant to the PICO question

HICKEL ET AL. 2001

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Hickel et al. 2001</p> <p>Sys. Review</p> <p>PMID: 11317384</p>	<p>Studientyp: CCTs Non-randomized clinical studies</p> <p>Suchzeitraum: Not described</p> <p>Datenbanken: Not described</p> <p>Einschlusskriterien: CCTs and retrospective studies comparing the longevity of composite to other direct and indirect restorations in permanent teeth with Class 1 or 2 cavities</p>	<p>Intervention: Composite Resin</p> <p>Komparator: Amalgam, Glass-ionomer cements (GIC), inlays and onlays made from Composite, Ceramic, CAD/CAM and Cast Gold</p>	<p>Longevity/ retention</p>	<p>Studienzahl: 124</p> <p>Population: Approx. 30.846 (no certain number) lesions (patients)</p> <p><i>Annual failure rate (%) (MV*):</i> Composite: 0%-9% (MV= 2.2) Amalgam: 0% - 7% (MV= 3.3) GIC: 1.4% - 14.4% (MV: 7.7) Composite Inlay: 0% - 11.8% (MV= 2.0) Ceramic Inlay: 0% - 7.5% (MV= 1.6) CAD/CAM Inlay: 0% - 4.4% (MV= 1.1) Cast Gold Inlay: 0% - 5.9% (MV= 1.2)</p>	<p>Notes: no assessment of heterogeneity</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically Low Quality</p>	<p>Aberg et al. 1994²² Allan et al. 1969³¹ Allan et al. 1977³² Barnes et al. 1991⁵⁵ Bentley and Drake 1986⁶⁹ Berg and Dérand 1997⁷⁰ Bessing and Lundqvist 1991⁷³ Burke and Qualtrough 1994¹⁰⁶ Burke et al. 1999¹⁰⁷ Chen et al. 1999¹³² Cichon and Kerschbaum 1999¹³⁷ Crabb 1981¹⁴⁵ Dahl and Eriksen 1978¹⁵⁴ Donly et al. 1999 El- Mowafy et al. 1994²¹¹ Felden et al. 1998²³⁴ Fradeani et al. 1997²⁴⁶ Freilich et al. 1992²⁵¹ Frencken et al. 1996²⁵⁴ Friedl et al. 1996a²⁵⁸ Friedl et al. 1996b²⁵⁷ Fritz et al. 1992²⁵⁹ Fuzzi and Rappelli 1998²⁶⁴ Füllemann et al. 1992²⁶² Geurtsen and Schoeler 1997²⁷⁶ Haas et al. 1992²⁹⁴ Hasselrot 1993³⁰¹ Hawthorne and Smales 1997³⁰² Hayashi et al. 1998³⁰⁴ Helbig et al. 1998⁵⁷ Heymann et al. 1996³¹² Hickel et al. 1988³²⁰ Hickel 1990³¹⁵ Hickel 1996³¹³ Hickel and Kunzelmann 1997³¹⁷ Hickel et al. 1998³¹⁶ Hickel et al. 2001³¹⁹ Ho et al. 1999³²¹ Höglund et al. 1992³²³ Isidor and Brondum 1995³³³</p>	<p>Longevity of dental restorations is dependent upon many different factors that are related to materials, the patient and the dentist. The principal reasons for failure were secondary caries, fracture, marginal deficiencies, wear, and postoperative sensitivity.</p>

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Jensen 1988³³⁸ Jokstad and Mjör 1991³⁴¹ Jokstad et al. 1994³⁴³ Kamann and Gängler 1999³⁴⁶ Krämer et al. 1994³⁷² Krämer et al. 1996³⁷¹ Krämer et al. 1999³⁶⁸ Krejic and Lutz 1991³⁷⁶ Krejic et al. 1992³⁷⁵ Krejic et al. 1994³⁷⁴ Kreulen et al. 1998³⁷⁷ Lavelle 1976³⁹³ Leempeol et al. 1985³⁹⁴ Lehner et al. 1998³⁹⁵ Letzel et al. 1989⁴⁰³ Letzel 1989⁴⁰¹ Letzel et al. 1997⁴⁰² Lundin and Koch 1997⁴³³ Mahmood and Smales 1994⁴⁴¹ Mair 1998⁴⁴⁶ Mallow et al. 1998⁴⁴⁹ Manhart and Hinkel 1999⁴⁶¹ Manhart et al. 2000⁴⁷⁰ Manhart et al. 2001⁴⁵⁸ Martin and Jedyakiewicz 1999⁴⁷⁷ Maryniuk and Kaplan 1986⁴⁷⁸ Mertz-Faihurst et al. 1998⁴⁸⁸ Mjör 1989⁴⁹⁵ Mjör, Jokstad and Qvist 1990⁵⁰⁵ Mjör and Toffenetti 1992⁵⁰⁷ Mjör 1992a⁴⁹⁷ Mjör 1992b⁴⁹⁸ Mjör and Jokstad 1993⁵⁰³ Mjör and Medina 1993⁵⁰⁶ Mjör 1997⁴⁹⁹ Moffa 1989⁵⁰⁸ Mount 1997⁵¹⁹ Mörmann and Brandestini 1989⁵¹⁶ Mörmann and Krejci 1992⁵¹⁷ Osborne et al. 1991⁵⁴⁶ Otto 1995⁵⁴⁹ Paterson 1984⁵⁶³ Pelka et al. 1996⁵⁶⁷ Peters et al. 1996⁵⁷⁸ Phantumvanit et al. 1996⁵⁹⁰ Pieper et al. 1991⁵⁹² Plasmann et al. 1998</p>	
--	--	--	--	--	--	--	--

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Qualtrough and Wilson 1996⁶¹² Qvist et al. 1990⁶¹³ Raskin et al. 1999⁶¹⁶ Reiss and Walther 1991⁶²⁹ Reiss and Walther 1998⁶²⁸ Reiss and Walther 2000⁶²⁷ Robinson 1971⁶³⁹ Roulet and Herder 1989⁶⁴⁶ Roulet 1997a⁶⁴⁷ Roulet 1997b⁶⁴⁸ Rykke 1992⁶⁵³ Scheibenbogen-Fuchsbrunner et al. 1999⁶⁶⁵ Scheibenbogen et al. 1998⁶⁶⁶ Schlösser et al. 1993⁶⁷¹ Sjögren et al. 1992⁶⁹² Smales et al. 1990⁷⁰³ Smales et al. 1991a⁷⁰⁷ Smales 1991⁶⁹⁹ Smales et al. 1991b⁷⁰⁶ Smales and Hawthorne 1996⁷⁰⁴ Smales and Hawthorne 1997⁷⁰⁵ Stenberg and Matsson 1993⁷¹⁴ Stoll et al. 1999⁷¹⁸ Strand et al. 1996⁷²⁰ Studer et al. 1996⁷²² Svanberg 1992⁷²⁹ Thonemann et al. 1997⁷³⁵ Thordup et al. 1994⁷³⁸ Tidehag and Gunne 1995⁷³⁹ Van Dijken et al. 1994⁷⁶⁷ Van Dijken et al. 1998⁷⁸⁹ Walther et al. 1994⁸²⁶ Wassell et al. 1995⁸²⁹ Welbury et al. 1990⁸³² Wendt and Leinfelder 1992⁸³³ Wiedmer et al. 1997⁸³⁵ Wilder et al. 1999⁸⁴⁰ Wilson et al. 1988⁸⁴⁷ Wilson et al. 1996⁸⁴⁶ Zuelling-Singer and Bryant 1998⁸⁶⁹</p>	
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question; * MV= Median Value.

KODZAEVA ET AL. 2019

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Kodzaeva et al. 2019</p> <p>Sys. Review</p> <p>PMID: 31322607</p>	<p>Studientyp: RCTs, CCTs, Non-randomized clinical studies</p> <p>Suchzeitraum: 2007-2017</p> <p>Datenbanken: eLIBRARY.RU PubMed/MEDLINE and Scopus</p> <p>Einschlusskriterien: RCTs, CCTs and retrospective cohort studies evaluating the longevity of composite and its limiting factors for at least 3 years</p>	<p>Intervention: Composite restoration</p> <p>Komparator: none</p>	<p>Longevity/ retention</p>	<p>Studienzahl: 17</p> <p>Population:</p> <p>lesions (patients)</p> <p><i>Survival rate:</i> 3y: 90.7% 5y: 89.5% 7y: 89.3% 10y: 75.6%</p>	<p>Notes: No assessment of heterogeneity</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment:</p> <p>Critically low quality</p>	<p>Moura et al. 2011⁵²⁰ Yazici et al. 2014⁸⁶⁰ Mahmoud et al. 2014⁴⁴² Yazici 2017⁸⁵⁸ Van Dijken et al. 2017⁷⁷⁴ De Andrade et al. 2014¹⁵⁸ Prabhu et al. 2015⁶⁰⁵ Van Dijken and Pallesen 2011⁷⁹⁵ Van Dijken et al. 2015⁷⁹⁶ Lempel et al. 2017⁴⁰⁰ Akimoto et al. 2007²⁷ Van Dijken et al. 2007⁸⁰⁴ Wilder et al. 2009⁸³⁹ Dietz et al. 2014¹⁸⁵ Alonso et al. 2017³⁴ Da Rosa Rodolpho et al. 2015¹⁵⁰</p>	<p>The highest loss rate was for class II restorations at molars. According to the majority of publications, type of composite resin material and adhesive system do not affect the survival rate of restorations.</p>

a. Outcomes listed only as far as relevant to the PICO question

MAGNO ET AL. 2016

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
Magno et al. 2016 Sys. Review PMID: 27695714	Studientyp: RCTs Suchzeitraum: No restrictions as to publication date - April 2016 Datenbanken: PubMed, Scopus, Bireme, Science Direct, Web of Science, ClinicalTrials.gov and OpenGrey Einschlusskriterien: RCTs comparing the clinical performance of silorane composites to methacrylate composites in Class 1 and 2 cavities of permanent teeth	Intervention: Composite Resin (methacrylate-based) (MBC) Komparator: Composite Resin (Silorane-based) (SBC)	Longevity/ retention Clinical performance: Marginal adaptation, marginal discoloration, secondary caries, postoperative hypersensitivity	Studienzahl: 11 Population: 920 (846) lesions (patients) Initial: <i>retention loss:</i> RD [95% CI]: 0.00 [-0.01, 0.02] <i>marginal adaptation:</i> RD*[95% CI]: 0.00 [-0.02, 0.02] <i>marginal discoloration:</i> RD [95% CI]: -0.00 [-0.01, 0.01] <i>secondary caries:</i> RD [95% CI]: 0.01 [-0.01, 0.02] <i>postoperative hypersensitivity:</i> RD [95% CI]: -0.00 [-0.02, 0.01]	Notes: - Risk of Bias Assessment: Cochrane Collaboration Tool: 6 low RoB, 5 unclear RoB AMSTAR-2 Assessment: Moderate Quality	Attia et al. 2014 ¹ De Castro et al. 2010 ² Walter et al. 2014 ³ Goncalves et al. 2013 ⁴ Efes et al. 2013 ⁵ El-Eraky et al. 2014 ⁶ Baracco et al. 2016 ⁷ Yazici et al. 2014 ⁸ Mahmoud et al. 2014 ⁹ Schmidt et al. 2015 ¹⁰ Santos et al. 2014 ¹¹	Both SBC and MBC have satisfactory and statistically similar clinical performances.

				<p>24 months or more follow-up time: <i>retention loss:</i> RD [95% CI]: 0.00 [-0.02, 0.01]</p> <p><i>marginal adaptation:</i> RD*[95% CI]: 0.00 [-0.02, 0.02]</p> <p><i>marginal discoloration:</i> RD*[95% CI]: -0.00 [-0.02, 0.02]</p> <p><i>secondary caries:</i> RD*[95% CI]: 0.00 [-0.01, 0.02]</p> <p><i>postoperative hypersensitivity:</i> RD*[95% CI]: -0.00 [-0.03, 0.02]</p>			
--	--	--	--	---	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

MANHART ET AL. 2004

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Manhart et al. 2004</p> <p>Sys. Review</p> <p>PMID: 15470871</p>	<p>Studientyp: RCTs, CCTs, Non-randomized clinical studies</p> <p>Suchzeitraum: 1990 - publication date/ not reported</p> <p>Datenbanken: Not reported</p> <p>Einschlusskriterien: RCTs, CCTs and Non- randomized clinical studies comparing the longevity of composite to other direct restorations in class 1 and 2 cavities of permanent teeth for at least 2 years</p>	<p>Intervention: Composite Resin</p> <p>Komparator: Amalgam, compomers, glass- ionomer cements (GIC) and derivative products, direct restorations</p>	<p>Longevity/ retention</p>	<p>Studienzahl: 231</p> <p>Population: >33.000 (no complete data) lesions (patients)</p> <p><i>Mean (SD*) annual failure rates:</i> Composite: 2.2% (2.0) Amalgam: 3.0% (1.9) Composites with inserts: 3.6% (4.2) Compomers: 1.1% (1.2) GIC: 7.2% (5.6) Tunnel GIC: 7.1% (2.8) ART GIC: 6.0% (4.6) Composite Inlays: 2.9% (2.6) Ceramic restorations: 1.9% (1.8)</p>	<p>Notes: No assessment of heterogeneity</p> <p>Risk of Bias: none</p> <p>AMSTAR-2 Assessment: Critically low Quality</p>	<p>Aberg et al. 1994²² Allan 1969³¹ Allan 1977³² Baratierie and Ritter 2001⁵³ Barghi and Berry 2002⁵⁴ Barnes et al. 1991⁵⁵ Bentley and Drake 1986⁶⁹ Berg and Derand 1986⁷⁰ Bessing and Lundqvist 1991⁷³ Bindl and Mörmann 2003⁷⁵ Bjertness & Sonju, 1990⁷⁶ Bogacki et al. 2002⁸⁰ Buchalla et al. 1996¹⁰³ Burke et al. 1999¹⁰⁷ Burke and Qualtrough 1994¹⁰⁶ Busato et al. 2001¹¹⁹ Chen et al. 1999¹³² Cichon & Kerschbaum 1999¹³⁷ Collins et al. 1998¹⁴² Cortes et al. 1993¹⁴⁴ Crabb 1981¹⁴⁵ Dahl et al. 1994¹⁵³ Demirici and Ücok 2002¹⁷⁷ Donly et al. 1999¹⁹⁴ El-Mowafy et al. 1994²¹¹ Ernst et al. 1994²²² Ernst et al. 2001²²³ Erpstein et al. 2001²²⁵ Felden et al. 1998²³⁴ Felden et al. 2000²³⁵ Flessa et al. 2001²³⁸ Fradeani et al. 1997²⁴⁶ Frankenberger et al. 2001²⁴⁸ Frederickson and Setcos 1994²⁵⁰ Freilich et al. 1993²⁵¹ Frencken et al. 1996²⁵⁴ Frencken et al. 1998²⁵³ Frencken et al. 1994²⁵⁵ Friedl et al. 1997²⁵⁷ Friedl et al. 1996²⁵⁸ Fritz et al. 1992²⁵⁹ Fuzzi and Rappelli 1999²⁶³ Fuzzi and Rappelli 1998²⁶⁴ Gaengler et al. 2001²⁶⁶</p>	<p>Indirect restorations exhibited a significantly lower mean annual failure rate than direct techniques (p=0.0031).</p>

				<p>CAD/CAM Ceramic restorations: 1.7% (1.6) Cast Gold inlays / onlays: 1.4% (1.4)</p>		<p>Gao et al. 2003²⁷⁰ Gerhardt et al. 2001²⁷⁵ Geurtsen and Schoeler 1997²⁷⁶ Gladys et al. 1995²⁸² Gordan et al, 2002²⁸⁶ Haas et al. 1996²⁹³ Haas et al. 1992²⁹⁴ Hamm et al. 2003²⁹⁷ Hannig 1996²⁹⁸ Hasselrot 1993³⁰¹ Hasselrot 1998³⁰⁰ Hawthorne and Smales 1997³⁰² Hayashi 2000³⁰³ Hayashi et al. 1998³⁰⁴ Helbig et al. 1998⁵⁷ Heymann et al. 1996³¹² Hickel 1990³¹⁵ Hickel 1996⁶⁰ Hickel 1997³¹⁴ Hickel et al. 1998³¹⁶ Hickel and Kunzelmann 1997³¹⁷ Hickel et al. 1988³²⁰ Ho et al. 1999³²¹ Höglund et al. 1992³²³ Höhnk and Hannig 1998³²⁴ Hugo et al. 2001a³²⁷ Hugo et al. 2001b³²⁸ Huth et al. 2003³³¹ Huth et al. 1999³³² Isidor and Brondum 1995³³³ Jedynakiewicz et al. 2002³³⁷ Jensen 1988³³⁸ Jokstad and Mjör 1991³⁴¹ Jockstad et al. 1994a³⁴² Jokstad et al. 1994b³⁴³ Kamann & Gängler 1999³⁴⁶ Kiremitci & Bolay 2003³⁵⁸ Kiremitci et al. 1998³⁵⁹ Klimm et al. 1999³⁶⁰ Köhler et al. 2000³⁶² Krämer et al. 1999³⁶⁸ Krämer et al. 1996³⁷¹ Krämer et al. 1994⁸²⁸ Krejci et al. 1993³⁷⁵ Krejci and Lutz 1991³⁷⁶ Kreulen et al. 1998³⁷⁷ Lavelle 1976³⁹³ Leempeol et al. 1985³⁹⁴ Lehner et al. 1998³⁹⁵ Leinfelder et al. 1980³⁹⁶ Leirskar et al. 2003³⁹⁸</p>
--	--	--	--	---	--	--

						<p>Letzel 1989⁴⁰¹ Letzel et al. 1997⁴⁰² Letzel et al. 1989⁴⁰³ Lindberg et al. 2003⁴⁰⁹ Lopes et al. 2003⁴²⁵ Lopes et al. 2002⁴²⁴ Lösche 1996⁴²⁶ Lundin and Koch 1989⁴³³ Lundin and Koch 1999⁴³³ Luo et al. 2000⁴³⁷ Luo et al. 2002⁴³⁶ Mahmood & Smales 1994⁴⁴¹ Mair 1998⁴⁴⁶ Malament and Socransky 1999⁴⁴⁷ Mallow et al. 1995⁴⁴⁸ Mallow et al. 1998⁴⁴⁹ Manhart et al. 2002a⁴⁵³ Manhart et al. 1999a⁴⁵⁵ Manhart et al. 2001a⁴⁵⁸ Manhart et al. 2002b⁴⁵⁶ Manhart et al. 2002c⁴⁵⁹ Manhart and Hickel 1999a⁴⁶⁰ Manhart and Hickel 1999b⁴⁶¹ Manhart et al. 1999b⁴⁶² Manhart et al. 2002d⁴⁶³ Manhart et al. 2002e⁴⁶⁴ Manhart et al. 2001b⁴⁶⁵ Manhart et al. 2001c⁴⁶⁶ Manhart et al. 2000a⁴⁶⁷ Manhart et al. 1998⁴⁶⁸ Manhart et al. 1999c⁴⁶⁹ Manhart et al. 2000b⁴⁷⁰ Martin and Bader 1997⁴⁷⁶ Martin and Jedynakiewicz 1999⁴⁷⁷ Maryniuk and Kaplan 1986⁴⁷⁸ Mertz-Fairhurt et al. 1998⁴⁸⁸ Mjör 1989⁴⁹⁵ Mjör 1992a⁴⁹⁷ Mjör 1992b⁴⁹⁸ Mjör 1996⁴⁹⁶ Mjör 1997a⁵⁰¹ Mjör 1997b⁴⁹⁹ Mjör and Jokstad 1993⁵⁰³ Mjör et al. 1990⁵⁰⁵ Mjör and Medina 1993⁵⁰⁶ Mjör and Toffenetti 1992⁵⁰⁷ Mjör 2004⁵⁰⁰ Moffa 1989⁵⁰⁸ Molin and Karlsson 1996⁵⁰⁹</p>
--	--	--	--	--	--	--

						<p>Molin and Karlsson 2000⁵¹⁰ Mjörmann and Brandestini 1989⁵¹⁶ Mörmann and Krejci 1992⁵¹⁷ Nicolaisen et al. 2000⁵²⁸ Nordbo et al. 1998⁵³⁰ O'Neal et al. 1993⁵³² Oberländer et al. 2001⁵³³ Ödmann 2002⁵³⁴ Osborne et al. 1991⁵⁴⁶ Otto 1995⁵⁴⁹ Otto and de Nico 2002⁵⁵⁰ Pallesen and Qvist 2003⁵⁵⁸ Pallesen and van Dijken 2000⁵⁵⁹ Paterson 1984⁵⁶³ Pelka et al. 1996⁵⁶⁷ Peters et al. 1996⁵⁷⁸ Phantumvanit et al. 1996⁵⁹⁰ Pieper et al. 1991⁵⁹² Pielbro and van Dijken 2001⁵⁹⁴ Plasmans et al. 1998⁵⁹⁵ Posselt and Kerschbaum 2003⁶⁰⁰ Powers and Farah 1998⁶⁰⁴ Qualtrough and Wilson 1996⁶¹² Qvist et al. 1990⁶¹³ Raskin et al. 1999⁶¹⁶ Raskin et al. 2000⁶¹⁷ Reiss and Walther 1991⁶²⁹ Reiss and Walther 1998⁶²⁸ Reiss and Walther 2000⁶²⁷ Robinson 1971⁶³⁹ Rosin et al. 2003 Roulet 1997a⁶⁴⁷ Roulet 1997b⁶⁴⁸ Roulet and Herder 1989⁶⁴⁶ Rykke 1992⁶⁵³ Scheibenbogen-Fuchsbrunner et al. 1998⁶⁶⁵ Scheibenbogen-Fuchsbrunner et al. 1999⁶⁶⁵ Schlösser et al. 1993⁶⁷¹ Schulz et al. 2003⁶⁷⁶ Setcos et al. 1999⁶⁸⁴ Sjögren et al. 1992⁶⁹² Sjögren et al. 2000⁶⁹³ Sjögren et al. 1998⁶⁹⁴ Smales 1991⁶⁹⁹ Smales et al. 1990⁷⁰³ Smales and Hwathorne 1996⁷⁰⁴ Smales and Hwathorne 1997⁷⁰⁵ Smales et al. 1991a⁷⁰⁷</p>
--	--	--	--	--	--	---

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Smales et al. 1991^{b706} Stenberg and Matsson 1993⁷¹⁴ Stoll et al. 1999⁷¹⁸ Strand et al. 2000⁷¹⁹ Strand et al. 1996⁷²⁰ Studer et al. 1996⁷²² Studer et al. 2000⁷²³ Summitt et al. 2001⁷²⁸ Svanberg 1992⁷²⁹ Thonemann et al. 1997⁷³⁵ Thordup et al. 1994⁷³⁸ Thordup et al. 1999⁷³⁶ Thordup et al. 2001⁷³⁷ Tidehag and Gunne 1995⁷³⁹ Triolo et al. 1995⁷⁴² Türkün and Aktener 2001⁷⁴⁷ Türkün et al. 2003a⁷⁴⁸ Türkün et al. 2003b⁷⁵¹ Van Dijken 2003a⁷⁷⁵ Van Dijken 2003b⁷⁸⁴ Van Dijken 1994⁷⁶⁷ Van Dijken 2000⁷⁷⁸ Van Dijken 2002⁷⁸⁶ Van Dijken et al. 2001⁷⁸⁸ Van Dijken et al. 1998⁷⁸⁹ Van Dijken et al. 1999⁷⁹² Van Niewenhuysen et al. 2003⁸¹⁸ Wilkins et al. 2000⁸²¹ Wagner et al. 2003⁸²² Walther et al. 1994⁸²⁶ Wassell et al. 1995⁸²⁹ Wassell et al. 2000⁸³⁰ Welbury et al. 1990⁸³² Wendt and Leinfelder 1992⁸³³ Wiedmer et al. 1997⁸³⁵ Wilder et al. 1999⁸⁴⁰ Wilson et al. 2000⁸⁴³ Wilson et al. 1996⁸⁴⁶ Wilson et al. 1988⁸⁴⁷ Wolter et al. 1994⁸⁴⁹ Wucher et al. 2002⁸⁵⁶ Yip et al. 2002⁸⁶¹ Ziraps and Honkala 2002⁸⁶⁸ Zuelling-Singer and Bryant 1998⁸⁶⁹</p>	
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question; * SD = standard deviation

MORASCHINI ET AL. 2015

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Moraschini et al. 2015</p> <p>Systematic Review</p> <p>PMID: 26116767</p>	<p>Studientyp: RCTs, CCT and retrospective cohort studies</p> <p>Suchzeitraum: No restrictions as to publication date- March 2015</p> <p>Datenbanken: PubMed/MEDLINE, Cochrane Central Register of Controlled Trials, and Web of Science</p> <p>Einschlusskriterien: RCTs, CCTs and NRSIs comparing the longevity of composite resin to amalgam in posterior permanent teeth with Class 1 and 2 cavities for at least 12 months</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam</p>	<p>Longevity/ retention</p> <p>Secondary Caries</p> <p>Fracture</p>	<p>Studienzahl: 8</p> <p>Population: 3486 (no data) lesions (patients)</p> <p><i>Restoration failure rate:</i> RR*: 0.46 95% CI: 0.28, 0.78 p= 0.003</p> <p><i>Secondary Caries:</i> RR: 0.23 95% CI: 0.18, 0.30 p>0.00001</p> <p><i>Risk of Fracture:</i> RR: 1.24 95% CI: 0.71, 2.16 p= 0.46</p>	<p>Notes: -</p> <p>Risk of Bias Assessment: Newcastle-Ottawa scale (NOS): All studies had high quality</p> <p>AMSTAR-2 Assessment: Low Quality</p>	<p>Wilson et al. 2002¹ Bernardo et al. 2007⁷¹ Johnson et al. 1992³ Mjör et al. 1993⁴ Collins et al. 1998⁵ Mair et al. 1998⁶ Levin et al. 2007⁷ Kim et al. 2013⁸</p>	<p>The results of this review suggest that posterior composite resin restorations still have less longevity and a greater number of secondary caries when compared to amalgam restorations. With regard to fractures, there was no statistically significant difference between the two restorative materials in relation to the time of follow-up.</p>

a. Outcomes listed only as far as relevant to the PICO question; * RR= Risk Ratio

OPDAM ET AL. 2014

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Opdam et al. 2014</p> <p>Systematic Review</p> <p>PMID: 25048250</p>	<p>Studientyp: RCTs, CCTs, NRSI</p> <p>Suchzeitraum: January 1990 – February 2013</p> <p>Datenbanken: Cochrane library, PubMed, The Web of Science</p> <p>Einschlusskriterien: RCTs, CCTs, nonrandomized clinical studies</p> <p>Survival of direct posterior resin composite class I and II restorations.</p>	<p>Intervention: Composite resin (compact-filled and midway- filled hybrid resin)</p> <p>Komparator: None</p>	<p>Longevity/ retention secondary caries, fracture</p>	<p>Studienzahl: 12</p> <p>Population: Not given (2.816 restorations)</p> <p><i>Loss of retention:</i></p> <p>Annual failure rate (AFR): Overall: 5y: 1.8% 10y: 2.4%</p> <p>Total no of failures: 569/2.816 (20.2%) (6-22y observation)</p> <p>Compact-filled hybrid resin composites: 5y: 1.6% 10y: 2.2%</p> <p>Midway-filled hybrid resin composites: 5y: 1.9% 10y: 2.3%</p> <p>Reasons for failure (6-22y observation): Caries: 221/2.816 (7.8%) Restoration Fracture: 148/ 2.816 (5.3%) Tooth fracture: 77/2.816 (2.7%) Endo/Pain: 52/ 2.816 (2.8%)</p>	<p>Notes:</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Andersson- Wenckert et al. 2004³⁶ Bottenberg et al. 2007⁸⁴ Da Rosa Rodolpho et al. 2011¹⁵⁰ Gängler et a. 2001²⁶⁷ Lindberg et al. 2007⁴¹⁰ Opdam et al. 2010⁵³⁹ Opdam et al. 2007⁵⁴⁰ Pallesen and Qvist 2003⁵⁵⁸ Van Dijken and Sunnegardh- Grönberg 2006⁸⁰² Van Dijken and Pallesen 2011a⁸⁰⁸ Van Dijken and Pallesen 2011b⁷⁹⁷ Van Dijken 2000⁸⁰⁶</p>	<p>The conclusion of the present meta- analysis of 12 clinical studies based on raw data is that caries risk and number of restored surfaces play a significant role in restoration survival, and that, on average, posterior resin composite restorations show a good survival, with annual failure rates of 1.8% at 5 years and 2.4% after 10 years of service.</p>

SCHWENDICKE ET AL. 2016

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Schwendicke et al. 2016</p> <p>Sys. Review</p> <p>PMID: 26912220</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: 2005 onward (end date not specific)</p> <p>Datenbanken: Cochrane Central Register of Controlled Trials, MEDLINE EMBASE</p> <p>Einschlusskriterien: RCTs comparing the longevity of composites to other direct restorations in load-bearing lesions of primary or permanent teeth</p>	<p>Intervention: Conventional Composites (CC)</p> <p>Komparator: Ormocer (OR), Bulk Fill (BF), Siloranes (SI) and polyacid-modified resin composite (compomer)</p> <p>All with etch-and-rinse adhesives (ER) or self-etch adhesives (SE)</p>	<p>Longevity/ retention</p>	<p>Studienzahl: 114 (28 relevant)</p> <p>Population: 11070 (3633) lesions (patients)</p> <p><i>Retention:</i> 2ER/CC vs. 2SE/SI: OR* [95% CI]= 0.33 [0.01, 8.59]</p> <p>2SE/CC vs. 2SE/SI: OR [95% CI]= 0.25 [0.03, 2.38]</p> <p>2ER/CC vs. 2ER/OR: OR [95% CI]= 0.67 [0.27, 1.66]</p> <p>3ER/CC vs. 2ER/OR: OR [95% CI]= 0.66 [0.21, 2.10]</p> <p>3ER/CC vs. 2ER/OR: OR [95% CI]= 0.66 [0.21, 2.10]</p> <p>3ER/CC vs. 2SE/OR:</p>	<p>Notes: No assessment of heterogeneity</p> <p>Risk of Bias Assessment: Cochrane Collaboration's Tool Most studies unclear or high RoB</p> <p>AMSTAR-2 Assessment: Moderate Quality</p>	<p>Baracco et al. 2013⁵⁰ Beck et al. 2014⁵⁹ Boeckler et al. 2012⁷⁸ Bottenberg et al. 2009⁸⁴ Brackett et al. 2007⁸⁹ Celik et al. 2014¹²³ Delbons et al. 2015¹⁶⁷ Deliperi et al. 2012¹⁷⁰ Efes et al. 2006a²⁰⁹ Efes et al. 2006b²⁰⁸ Efes et al. 2013²¹⁰ Fagundes et al. 2009²²⁷ Frankenberger et al. 2014²⁴⁹ Goncalves et al. 2013²⁸⁵ Mahmoud et al. 2008⁴⁴⁴ Mahmoud et al. 2014a⁴⁴² Mahmoud et al. 2014b⁴⁴³</p>	<p>In load-bearing lesions in permanent teeth, restorations of conventional or bulk fill composites placed with 2ER adhesives had highest chances of survival. Conventional or bulk fill composites seem most suitable, while siloranes were found least suitable.</p>

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				<p>OR [95% CI]=1.25 [0.29, 5.29]</p> <p>1SE/CC vs. 2ER/BF: OR [95% CI]= 1.00 [0.24, 4.22]</p> <p>1SE/CC vs. 1SE/BF: OR [95% CI]= 0.50 [0.04, 5.91]</p> <p>3ER/CC vs. 1SE/BF: OR [95% CI]= 0.25 [0.03, 2.35]</p>		<p>Manhart et al. 2010⁴⁵⁷</p> <p>Monteiro et al. 2010⁵¹²</p> <p>Perdigao et al. 2009⁵⁷¹</p> <p>Schirrmeister et al. 2009⁶⁶⁸</p> <p>Schmidt et al. 2015⁶⁷²</p> <p>Shi et al. 2010⁶⁸⁹</p> <p>van Dijken et al. 2013⁷⁸³</p> <p>van Dijken et al. 2014a⁸¹¹</p> <p>van Dijken et al. 2014b⁷⁹⁶</p> <p>van Dijken et al. 2015⁸⁰⁰</p> <p>Yazici et al. 2014⁸⁶⁰</p>	
--	--	--	--	---	--	---	--

a. Outcomes listed only as far as relevant to the PICO question; *OR = Odds Ratio

VAN DE SANDE ET AL. 2016

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Van de Sande et al. 2016</p> <p>Sys. Review</p> <p>PMID: 27689931</p>	<p>Studientyp: RCTs, CCTs, Non-randomized clinical studies</p> <p>Suchzeitraum: No restrictions as to publication date – April 2015</p> <p>Datenbanken: PubMed/ Medline, Scopus, Cochrane Library databases</p> <p>Einschlusskriterien: RCTs, CCTs, NRSIs comparing the longevity of composite to amalgam and indirect restorations (no full crowns) in Class 1 and 2 cavities of permanent teeth for at least 3 years</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam, indirect restorations made from Composite, Ceramic, inlays, onlays, overlays, partial crowns</p>	<p>Longevity/ retention</p>	<p>Studienganzahl: 27</p> <p>Population: 25.859 (5.923) lesions (patients)</p> <p>No meta-analysis with direct comparison of restorative materials.</p>	<p>Notes: No meta-analysis</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically Low Quality</p>	<p>Gilthorpe et al. 2002²⁸⁰ Gruythuysen et al. 1996²⁸⁹ Jokstad and Mjör 1991³⁴¹ Plasmans et al. 1998⁵⁹⁵ Roberts and Sherriff 1990⁶³⁶ Smales 1993⁷⁰⁰ Opdam et al. 2010⁵³⁹ Opdam et al. 2007⁵⁴⁰ Soncini et al. 2007⁷¹⁰ Al-Samhan et al. 2010²⁹ Baldissera et al. 2013⁴⁶ Bottenberg et al. 2009⁸⁴ Köhler et al. 2000³⁶² Kopperud et al. 2012³⁶⁵ Kubo et al. 2011³⁸² Laegreid et al. 2012³⁹⁰ Lundin 1990⁴³² Pallesen et al. 2013⁵⁶² van de Sande et al. 2013⁷⁶⁴ Opdam et al. 2007⁵⁴¹ Andersson-Wenckert et al. 2004³⁶ Beier et al. 2012⁶¹ Otto and Schneider 2008⁵⁵¹ Schulz et al. 2003⁶⁷⁶ Smales and Etemadi 2004⁷⁰¹ van Dijken and Hasselrot 2010⁷⁸⁷ Zimmer et al. 2008⁸⁶⁷</p>	<p>The assessment of patient factors along with other variables should become part of clinical studies investigating restoration survival, since several of these factors were shown to influence the failure of restorations, regardless of the material type.</p>

a. Outcomes listed only as far as relevant to the PICO question

VETROMILLA ET AL 2020

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Vetromilla et al 2020</p> <p>Sys. Review</p> <p>PMID: 32718491</p>	<p>Studientyp: RCTs CCTs non-randomized clinical studies</p> <p>Suchzeitraum: No restrictions as to publication date – October 2019</p> <p>Datenbanken: MEDLINE Scopus Cochrane Library Web of Science</p> <p>Einschlusskriterien: RCTs, CCTs, NRSIs comparing the longevity of Composite to Amalgam and indirect restorations for at least 5 years</p>	<p>Intervention: Composite Resin = Direct Resin (DR)</p> <p>Komparator: Amalgam (AM) Indirect resin (IR) Glass ionomer (GI)</p>	<p>Longevity/ retention</p>	<p>Studienanzahl: 43</p> <p>Population: 260,787 lesions (patient no not reported for all studies) lesions (patients)</p> <p>Retention (survived restorations): RCTs: DR vs AM RR* [95% CI]: 0.86[0.65, 1.15]</p> <p>DR vs IR RR* [95% CI]: 1.11 [0.98, 1.27]</p> <p>CCTs: DR vs AM RR* [95% CI]: 0.99 [0.93, 1.06]</p> <p>DR vs GI RR* [95% CI]: 1.50 [1.06, 2.13]</p> <p>DR vs IR RR* [95% CI]: 1.04 [0.96, 1.14]</p>	<p>Notes: High heterogeneity in between studies</p> <p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool for RCTS All 13 RCTs assessed as low risk</p> <p>Usage of Risk of Bias in Non- randomized Studies-of Interventions tool (ROBINS-I). 24 non-RCTs assessed as high risk, 5 as moderate risk, 1 as low risk</p> <p>AMSTAR-2 Assessment:</p> <p>Low Quality</p>	<p>RCTs: Van Dijken and Pallesen 2016⁸¹⁰ Van Dijken and Pallesen 2014⁸⁰¹ Van Dijken and Lindberg 2015⁸⁰⁷ Skupien et al. 2016⁶⁹⁵ Schmidt et al. 2015⁶⁷² Passia et al. 2013⁵⁶² Fennis et al. 2014²³⁶ Bernardo et al. 2007⁷¹ Pallesen and Van Dijken 2015a⁵⁶⁰ Pallesen and Van Dijken 2015b⁵⁶¹ Monaco et al. 2017⁵¹¹ Guess et al. 2013²⁹⁰ Mannocci et al. 2005⁴⁷⁴</p> <p>Retrospective studies: Rasmusson et al. 1995⁶¹⁹ Felden et al. 1998²³⁴ Wagner et al. 2003⁸²² Arnelund et al. 2004⁴¹ Opdam et al. 2007⁵⁴⁰ Opdam et al. 2010⁵³⁹ Kim et al. 2013³⁵⁴ Skupien et al. 2013⁶⁹⁶ Van de Sande et al. 2015⁷⁶³ Collares et al. 2016¹⁴¹ Laske et al. 2016³⁹¹ Naghipur et al. 2016⁵²³ Rinke et al. 2016⁶³² Olley et al. 2018⁵³⁶ Borgia et al. 2019⁸³</p>	<p>Most of the restorative options have good performance and are suitable for large restorations. Less favorable performances were found for Glass- ionomer cement as direct material.</p>

				<p><i>Retrospective Studies:</i> DR vs AM RR* [95% CI]: 1.12 [0.97, 1.29]</p> <p>DR vs GI RR* [95% CI]: 1.73 [1.68, 1.79]</p>		<p>Prospective Studies: Rowe 1989⁶⁵¹ Norman et al. 1990⁵³¹ Mjör and Jokstad 1993⁵⁰⁴ Lumley and Fisher 1995⁴³⁰ Mair 1998⁴⁴⁶ Erpstein et al. 2000²²⁴ Pallesen and Van Dijken 2000⁵⁵⁹ Van Dijken 2000⁸⁰⁶ Wassel et al. 2000⁸³⁰ Thordup et al. 2001⁷³⁷ Pallesen and Qvist 2003⁵⁵⁸ Mannocci et al. 2005⁴⁷⁴ Bernardo et al. 2007⁷¹ Khairallah and Hokayem 2009³⁵² Federlin et al. 2010²³² Guess et al. 2013²⁹⁰ Passia et al. 2013⁵⁶² Fennis et al. 2014²³⁶ Van Dijken and Pallesen 2014⁸⁰¹ Kramer et al. 2015³⁷³ Pallesen and Van Dijken 2015a⁵⁶⁰ Pallesen and Van Dijken 2015b⁵⁶¹ Schmidt et al. 2015⁶⁷² Van Dijken and Lindberg 2015⁸⁰⁷ Santos et al. 2016⁶⁶¹ Skupien et al. 2016 Van Dijken and Pallesen 2016⁸¹⁰ Monacco et al. 2017¹¹</p>	
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question; *RR= Risk Ratio

WORTHINGTON ET AL. 2021

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Worthington et al. 2021</p> <p>Sys. Review</p> <p>PMID: 34387873</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: No restrictions to publication date – 16th February 2021</p> <p>Datenbanken: Cochrane Oral Health Trials Register CENTRAL in the Cochrane Library MEDLINE Ovid Embase Ovid LILACS BIREME Virtual Health Library PubMed US National Institutes of Health Ongoing Trials Register World Health Organization International Clinical Trials Registry Platform (WHO ICTRP)</p>	<p>Intervention: Composite resin</p> <p>Komparator: Amalgam</p>	<p>Longevity/retention, clinical performance according to USPHS criteria</p> <p>Secondary caries</p> <p>Fracture of restorations</p>	<p>Studienanzahl: 8 (qualitative analysis), 2 (quantitative analysis)</p> <p>Population: 3010 lesion (patients)</p> <p><i>Failure rate:</i> RR* [95% CI]: 1.89 [1.52, 2.35] p<0.001</p> <p><i>Secondary Caries:</i> RR [95% CI]: 2.14 [1.67, 2.74] p<0.001</p> <p><i>Fracture of restorations:</i> RR [95% CI]: 0.87 [0.46, 1.64] p= 0.66</p> <p>All with a follow-up of 5-7 years</p>	<p>Notes: -</p> <p>Risk of Bias Assessment: Cochrane Collaboration Tool, all RCTs were assessed as high risk</p> <p>AMSTAR-2 Assessment: High Quality</p>	<p>Casa Pia 2007^{72, 181, 271-273, 392, 851-854}</p> <p>Cunningham 1990¹⁴⁷</p> <p>Hendriks 1986³¹⁰</p> <p>Kemaloglu 2016³⁵¹</p> <p>Letzel 1989⁴⁰¹</p> <p>NECAT 2007^{56, 64, 65, 479, 480, 686, 710}</p> <p>Norman 1990⁵³¹</p> <p>Robinson 1988²³</p>	<p>Low-certainty evidence suggests that composite resin restorations may have almost double the failure rate of amalgam restorations. The risk of restoration fracture does not seem to be higher with composite resin restorations, but there is a much higher risk of developing secondary caries.</p>

	Einschlusskriterien: RCTs comparing the clinical performance and longevity of composite to amalgam in posterior permanent teeth for at least 3 years						
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question; *RR= Risk Ratio



SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. AMALGAM

Frage: Sollte Komposit statt Amalgam bei Klasse I und II Kavitäten angewandt werden?

№ der Studien	Studiendesign	Certainty assessment					№ der Restaurationen ^e		Wirkung ^f		Certainty	Wichtigkeit
		Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Amalgam	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 1 Jahre bis 20 Jahre; bewertet mit: Überlebensrate/ Restaurationsverlust)												
12 ^h	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias z.T nicht evaluiert	241/1645 (14.7%) ^{g, 615}	103/1365 (7.5%) ^{g, 615}	RR 1.89 ^{615, 855} (1.52 - 2.35)	⊕⊕○○ Niedrig	KRITISCH	
							261/1642 (15.9%) ^{g, 514}	158/1844 (8.6%) ^{g, 514}	RR 0.46 ^{i, 514} (0.28-0.78)			
							163/539 (30.2%) ^{g, 820}	65/527 (12.3%) ^{g, 820}	RR 0.86 ^{i, 820} (0.65-1.15)			
Sekundärkaries (Nachbeobachtung: Bereich 1 Jahre bis 7 Jahre; bewertet mit: FDI/USPHS criteria, Ryge criteria)												
4 ^h	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias z.T nicht evaluiert	208/1645 (12.6%) ^{g, 615}	78/1365 (5.7%) ^{g, 615}	RR 2.14 ^{615, 855} (1.67-2.74)	⊕⊕○○ Niedrig	KRITISCH	
							164/1237 (13.3%) ^{g, 514}	76/1505 (5.0%) ^{g, 514}	RR 0.23 ^{i, 514} (0.18-0.30)			
Fraktur (Nachbeobachtung: Bereich 1 Jahre bis 7 Jahre; bewertet mit: FDI/USPHS criteria, Ryge criteria)												
4 ^h	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias z.T nicht evaluiert	18/1645 (1.1%) ^{g, 615}	19/1365 (1.4%) ^{g, 615}	RR 0.87 ^{615, 855} (0.46-1.64)	⊕⊕○○ Niedrig	KRITISCH	
							25/1289 (1.9%) ^{g, 514}	44/1605 (2.7%) ^{g, 514}	RR 1.24 ^{i, 514} (0.71-2.16)			
Oberflächentextur (Nachbeobachtung: Bereich 2 Jahre bis 6 Jahre; bewertet mit: Ryge criteria)												

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ^e		Wirkung ^f		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Amalgam	Relativ oder Absolut (95% CI)	(95% CI)		
1	Systematic Review (including RCTs + NRSIs)	sehr schwerwiegend ^c	schwerwiegend ^d	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG
Anatomische Form (Nachbeobachtung: Bereich 2 Jahre bis 6 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (including RCTs + NRSIs)	sehr schwerwiegend ^c	schwerwiegend ^d	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG

CI: confidence interval, RR: risk ratio

Explanations

- a. Many systematic reviews showed unclear/high risk of bias of the included studies or did not assess the risk of bias of the included studies at all
- b. High heterogeneity in between the studies included in the reviews
- c. No assessment of risk of bias performed
- d. Heterogeneity of included studies
- e. Number of patients not reported per outcome
- f. Relative or absolute risks so far as reported in the included systematic reviews. For further results, see tables of included studies
- g. Event = failure of the restoration outcome
- h. Studies included in the reviews overlap
- i. RR calculated with amalgam as "exposed" group
- j. RR calculated with event= success of the restoration and composite as "exposed" group

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. GLASS IONOMER CEMENT

Frage: Sollte Komposit statt Glasionomerzement (conventional and resin-modified) bei Klasse I und II Kavitäten angewandt werden?

Certainty assessment							No der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
No der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Glasionomerzement	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 2 Jahre bis 6 Jahre; bewertet mit: Überlebensrate/Retentionsverlust)												
5	Systematic Review (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend	Publikationsbias nicht evaluiert	9/36 (25%) ^{e, 820}	22/44 (50.0%) ^{e, 820}	RR 1.5 ^{f, 820} (1.06-2.13)	⊕○○○ Sehr niedrig	KRITISCH	

CI: confidence interval

Explanations

- a. Many systematic reviews showed unclear/high risk of bias of the included studies or did not assess the risk of bias of the included studies at all
- b. High heterogeneity in between the studies included in the reviews
- c. . Number of patients not reported per outcome
- d. Relative or absolute risks so far as reported in the included systematic reviews. For further results, see tables of included studies
- e. Event = failure of the restoration outcome
- f. RR calculated with event= success of the restoration and composite as "exposed" group

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. CERAMIC

Frage: Sollte Komposit statt Keramik bei Klasse I und II Kavitäten angewandt werden?

Certainty assessment							No der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
No der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Glasionomerzement	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 2 Jahre bis 6 Jahre; bewertet mit: Überlebensrate/Retentionsverlust)												
3	Systematic Review (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported		⊕⊕○○ Niedrig	KRITISCH

CI: confidence interval

Explanations

- a. Many systematic reviews showed unclear/high risk of bias of the included studies or did not assess the risk of bias of the included studies at all
- b. High heterogeneity in between the studies included in the reviews
- c. . Number of patients not reported per outcome
- d. Relative or absolute risks so far as reported in the included systematic reviews. For further results, see tables of included studies

SUMMARY OF EVIDENCE TABLE: DIRECT VS. INDIRECT COMPOSITE

Frage: Sollten direkte Kompositrestaurationen verglichen mit indirekten Kompositrestaurationen bei Klasse I und II Kavitäten angewandt werden?

Certainty assessment							№ der Restaurationen ^b		Wirkung ^c		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	direkte Kompositrestaurationen	indirekten Kompositrestaurationen	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 3 Jahre bis 5 Jahre; bewertet mit: Überlebensrate/Restaurationsverlust)												
3	Systematic Review (including RCTs + NRSIs)	schwerwiegend ^a	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	keine	21/277 (7.6%) ^{d 152} 8/80 (10.0%) ^{d, 820}	39/394 (9.9%) ^{d 152} 15/78 (19.2%) ^{d, 820}	RR 1.49 ^{e 152} (0.89 bis 2.50) RR 1.11 ^{f, 820} (0.98 bis 1.27)	⊕⊕⊕○ Moderat	KRITISCH	

CI: confidence interval; RR: risk ratio

Explanations

- a. Some systematic reviews showed unclear/high risk of bias of the included studies, one systematic review did not assess the risk of bias of the included studies at all
- b. . Number of patients not reported per outcome
- c. Relative or absolute risks so far as reported in the included systematic reviews. For further results, see tables of included studies
- d. Event = failure of the restoration outcome
- e. RR calculated with event= failure of the restoration and indirect composite as "exposed" group
- f. RR calculated with event= success of the restoration and composite as "exposed" group

PICO FRAGE 2 - DIREKTE KOMPOSITRESTAURATIONEN MIT HÖCKERERSATZ IN DER SEITENZAHNVERSORGUNG

EVIDENZTABELLEN DER EINGESCHLOSSENEN STUDIEN

DELIPERI ET AL. 2016

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Deliperi et al. 2016 NRSI PMID: 16987320	Stichprobengröße: N= 20 Einschlusskriterien: Class 2 cuspal coverage direct composite restorations, >18 y old, vital molars, one or two cusps missing, caries or restoration replacement (amalgam, composite resin) Alter: Not reported Follow-up: 30 months	Resin composite N= 25 restorations	None	Modified USPHS criteria (graded A,B,C,D)	All restorations scored grade A	ROBINS-I analysis: Moderate risk	No failures were reported.
				Postoperative hypersensitivity	none		
				Secondary caries	none		
				Gingival inflammation	none		
				Marginal discoloration	none		
				Marginal integrity	sound		
				Anatomic form	sound		
				Surface texture	sound		
				Restoration color stability	no change		

EL AZIZ ET AL. 2020

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren	
El Aziz et al. 2020 RCT PMID: 32434978	Stichprobengröße: N= 76 patients (67 completed trial) Geschlecht: 25 m, 51 f Alter: Intervention 31.13 y (8.83), Comparator 28.13 y (6.06) Einschlusskriterien: Asymptomatic pulp, large proximal carious lesion in molars, need for replacement of direct restorations (amalgam, composite), good oral hygiene Follow-up: 6 months and 12 months	Short-fiber-reinforced resin composite (SFRC) N= 38 restorations, N=34 after loss to follow-up	Indirect nanohybrid resin composite N= 38 restorations N=33 after loss to follow-up	Modified USPHS criteria (graded A,B,C):	% (n) Baseline: SFRC: A=100% (34) Indirect: A=100% (33) 6 months: p=0.489 SFRC: A=97.1% (33) C=2.9% (1) Indirect: A= 93.9% (31), C=6.1% (2) 12 months: SFRC: A=97.1% (33), C=2.9% (1), Indirect: A=93.9% (31), C=6.1% (2)	Notes: No blinding of personnel RoB-2 analysis: Low risk	Both direct SFRC and indirect nanohybrid resin composite complex restorations showed an acceptable successful clinical performance along the 1-year follow-up period. No statistically significant difference was observed between both the tested materials for all USPHS criteria except for marginal integrity favoring the SFRC at 12 months and color match favoring the nanohybrid indirect resin composite restorations was found.	
				Postoperative hypersensitivity				Baseline: SFRC: A=100% (34) Indirect: A=100% (33) 6 months: SFRC: A=100% (34) Indirect: A=100% (33) 12 months: SFRC: A=100% (34) Indirect: A=100% (33)
				Secondary caries				Baseline: SFRC: A=100% (34) Indirect: A=100% (33) 6 months: SFRC: A=100% (34) Indirect: A=100% (33) 12 months: SFRC: A=100% (34) Indirect: A=100% (33)
				Gross fracture				Baseline: SFRC: A=100% (34), Indirect: A=100% (33) 6 months: SFRC: A=100% (34), Indirect: A=100% (33) 12 months: SFRC: A=100% (34), Indirect: A=100% (33)

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				<p>Color match</p> <p>Baseline: $p < 0.001^*$ SFRC: A= 64.7% (22), B= 35.3% (12) Indirect: A= 100% (33)</p> <p>6 months: $p < 0.001^*$ SFRC: A= 64.7% (22), B= 35.3% (12) Indirect: A= 100% (33)</p> <p>12 months: $p < 0.001^*$ SFRC: A= 64.7% (22), B= 35.3% (12) Indirect: A= 100% (33)</p>		
				<p>Marginal discoloration</p> <p>Baseline: SFRC: A=100% (34) Indirect: A=100% (33)</p> <p>6 months: SFRC: A=100% (34) Indirect: A=100% (33)</p> <p>12 months: SFRC: A=94,1% (32), B=5.9% (2) Indirect: A=87.9% (29) B=12.1% (4)</p>		
				<p>Marginal integrity</p> <p>Baseline: SFRC: A=100% (34) Indirect: A=100% (33)</p> <p>6 months: $p = 0.092$ SFRC: A=97.1% (33), B=2.9% (1) Indirect: A=84.8% (28), B=15.2% (5)</p> <p>12 months: $p = 0.01^*$ SFRC: A=88.2% (30), B=11.8% (4)</p>		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

					Indirect: A=60.6% (20), B= 39.4% (13)	
				Anatomic form	Baseline: SFRC: A=100% (34), Indirect: A=100% (33) 6 months: SFRC: A=100% (34), Indirect: A=100% (33) 12 months: SFRC: A=100% (34), Indirect: A=100% (33)	
				Surface texture	Baseline: SFRC: A=100% (34) Indirect: A=100% (33) 6 months: SFRC: A=100% (34) Indirect: A=100% (33) 12 months: SFRC: A=100% (34) Indirect: A=100% (33)	

* $p \leq 0.05$

FENNIS ET AL. 2014

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Fennis et al. 2014 RCT PMID: 24155264	Stichprobengröße: 176 (157) lesions (patients) Einschlusskriterien: Vital upper premolars with fracture of the buccal or palatal cusp (remaining cusp intact) and a class II cavity or restoration on the same tooth. Preparation in dentin and subgingival margins were allowed, as well as signs of bruxism Alter: mean patient age 54.9 years (range, 35.0-81.0 years). Follow-up: direct composite resin: mean 5.6 yrs (SD, 0.9 yrs; range, 4.5-8.8 yrs) Indirect composite resin: mean 6.0 yrs (SD, 1.3 yrs; range, 4.5-8.5 yrs)	Direct composite resin (CR) N (remaining for analysis) = 80 restorations (70 patients)	Indirect CR N (remaining for analysis) = 78 restorations (76 patients)	Longevity/ survival (complete failure and reparable failure)		Notes: No blinding of operators and patients ROB-2 analysis: Some concerns	The results suggest that direct and indirect techniques provide comparable results over the long term
				Reparable failure	5-year survival direct CR: 89.9% (SE 0.34%) 5-year survival indirect CR: 83.2% (SE 0.42%) P = 0.23		
				Complete failure	Direct CR: 8/80 Indirect CR: 15/78 5-year survival direct CR: 91.2% (SE 0.32%) 5-year survival indirect CR: 83.2% (SE 0.42%) P = 0.15		

VAN NIEUWENHUYSEN ET AL. 2003

Referenz/ Studientyp	Untersuchte Population	Intervention ^a	Vergleich ^a	Endpunkte ^a	Ergebnisse per Endpunkt	Risk of Bias	Schlussfolgerungen durch die Autoren der Studie
Van Nieuwenhuysen et al. 2003 NRSI PMID: 12878022	Stichprobengröße: 837 lesions (excluding crowns) Einschlusskriterien: Premolars and molars with previous restorations, both vital and endodontically treated Alter: median patient age 40 years (range, 16-80 years). Follow-up: Median age of failed restorations: 4y, median age of restorations in function: 5y	Composite resin (CR) N = 115 restorations	Amalgam N = 722 restorations	Longevity/ survival	Kaplan-Meier median survival times:	ROBINS-I analysis: Serious concerns	Within the limits of the study the data support the view that extensive amalgam restorations but not composite resin restorations can be used as an appropriate alternative to crowns, with due consideration to the longevity of the restorations.
				All failures:	Amalgam: 12.8 years CR: 7.8 years P = 0.002		
				Excluding reparable failure:	Amalgam: 16 years CR: 11 years P < 0.001		
				Secondary caries:	Amalgam: 48/722 CR: 3/115		
				Fracture of restoration:	Amalgam: 53/722 CR: 21/115		
Fracture of cusp:	Amalgam: 41/722 CR: 3/115 (also includes non-vital teeth!) Teeth with pulpal vitality showed a lower risk of failure compared to an endodontically treated Teeth: RR: 0.70 for absolute failures						

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. AMALGAM

Frage: Sollte Komposit verglichen mit Amalgam bei Kavitäten mit Höckerersatz im Seitenzahnbereich angewandt werden?

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Amalgam	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 1 Jahre bis 17 Jahre; bewertet mit: Überlebensrate/Restaurationsverlust)												
1	Beobachtungsstudie	sehr schwerwiegend ^a	nicht schwerwiegend	schwerwiegend ^b	nicht schwerwiegend	keine	35/115 (30.4%) ^e	203/722 (28.1%) ^e	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Sekundärkaries (Nachbeobachtung: Bereich 1 Jahre bis 17 Jahre)												
1	Beobachtungsstudie	sehr schwerwiegend ^a	nicht schwerwiegend	schwerwiegend ^b	nicht schwerwiegend	keine	3/115 (2.6%) ^e	21/115 (18.3%) ^e	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Fraktur der Restauration (Nachbeobachtung: Bereich 1 Jahre bis 17 Jahre)												
1	Beobachtungsstudie	sehr schwerwiegend ^a	nicht schwerwiegend	schwerwiegend ^b	nicht schwerwiegend	keine	21/115 (18.3%) ^e	53/722 (7.3%) ^e	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Höckerfraktur (Nachbeobachtung: Bereich 1 Jahre bis 17 Jahre)												
1	Beobachtungsstudie	sehr schwerwiegend ^a	nicht schwerwiegend	schwerwiegend ^b	nicht schwerwiegend	keine	3/115 (2.6%) ^e	41/722 (5.7%) ^e	Not reported		⊕○○○ Sehr niedrig	KRITISCH

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

CI: confidence interval

Explanations

- a. serious concerns in ROBINS-I assessment
- b. one operator, substantially more amalgam restorations placed than composite, during a time period where composite restorations were only emerging, large dropout rate with baseline differences
- c. . Number of patients not reported per outcome
- d. Relative or absolute risks so far as reported. For further results, see tables of included studies
- e. Event = failure of the restoration outcome

SUMMARY OF EVIDENCE TABLE: DIRECT VS. INDIRECT COMPOSITE

Frage: Sollten direkte Kompositrestaurationen verglichen mit indirekten Kompositrestaurationen bei Kavitäten mit Höckerersatz im Seitenzahnbereich angewandt werden?

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	direkte Kompositrestaurationen	indirekten Kompositrestaurationen	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 6 Monate bis 6 Jahre; bewertet mit: Überlebensrate/Restaurationsverlust)												
2	randomisierte klinische Studie	schwerwiegend ^a	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	keine	8/80 (10%) ^e	15/78 (19.2%) ^e	Not reported		⊕⊕⊕○ Moderat	KRITISCH
Postoperative Hypersensibilität (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studie	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	1/34 (2.9%) ^e	2/33 (6.1%) ^e	Not reported		⊕⊕⊕○ Moderat	WICHTIG
Sekundärkaries (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studie	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	0/34 (0%) ^e	0/33 (0%) ^e	Not reported		⊕⊕⊕○ Moderat	KRITISCH

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	direkte Kompositrestaurationen	indirekten Kompositrestaurationen	Relativ oder Absolut (95% CI)	(95% CI)		
Fraktur (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studie	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	0/34 (0%) ^e	0/33 (0%) ^e	Not reported		⊕⊕⊕○ Moderat	KRITISCH
Farbe (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studie	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	12/34 (35.3%) ^e	0/33 (0%) ^e	Not reported		⊕⊕⊕○ Moderat	WICHTIG
Marginale Verfärbung (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studie	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	2/34 (5.9%) ^e	4/33 (12.1%) ^e	Not reported		⊕⊕⊕○ Moderat	WICHTIG
Marginale Integrität (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studie	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	4/34 (11.8%) ^e	13/33 (39.4%) ^e	Not reported		⊕⊕⊕○ Moderat	KRITISCH

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	direkte Kompositrestaurationen	indirekten Kompositrestaurationen	Relativ oder Absolut (95% CI)	(95% CI)		
Anatomische Form												
1	randomisierte klinische Studien	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	0/34 (0%) ^e	0/33 (0%) ^e	Not reported		⊕⊕⊕○ Moderat	WICHTIG
Oberflächentextur (Nachbeobachtung: Bereich 6 Monate bis 1 Jahre; bewertet mit: Modified USPHS criteria)												
1	randomisierte klinische Studien	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	0/34 (0%) ^e	0/33 (0%) ^e	Not reported		⊕⊕⊕○ Moderat	WICHTIG

CI: confidence interval

Explanations

- a. one study with some concerns in ROB-2 analysis
- b. small sample size
- c. . Number of patients not reported per outcome
- d. Relative or absolute risks so far as reported. For further results, see tables of included studies
- e. Event = failure of the restoration outcome

PICO FRAGE 3 - DIREKTE KOMPOSITRESTAURATIONEN IN DEN RESTAURATIONSKLASSEN III UND IV

EVIDENZTABELLEN DER EINGESCHLOSSENEN STUDIEN

DEMARCO ET AL 2015

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Demarco et al. 2015</p> <p>Sys. Review</p> <p>PMID: 26303655</p>	<p>Studientyp: RCTs NRSIs</p> <p>Suchzeitraum: No date restriction- December 2014</p> <p>Datenbanken: MEDLINE/PubMed, SciVerse Scopus, Cochrane Central Register of Controlled Trials</p> <p>Einschlusskriterien: Prospective and retrospective clinical Trials, >3 years follow-up, anterior resin composites (Class III,IV, direct veneers, full- coverage buildups)</p>	<p>Intervention: Direct composite restoration Class III/IV</p> <p>Komparator: none</p>	<p>Longevity (AFR)</p>	<p>Studienzahl: 10</p> <p>Population: 1272 restorations</p> <p>AFR between 0-4.1%</p>	<p>Notes: No meta-analysis besides AFR calculation</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Ermis et al. 2010²¹⁷ De Moura et al. 2011⁵²⁰ Deliperi 2008¹⁶⁸ Spinas 2004⁷¹¹ Kubo et al. 2011³⁸² Smales et al. 1996⁷⁰⁴ Baldissera et al. 2013⁴⁶ Van Dijken et al. 1999⁷⁷² Millar et al. 1997⁴⁹¹ Van Dijken et al. 2010⁷⁹⁸</p>	<p>Findings of the present review generally indicate a good clinical performance in the long-term (follow-up 3+ years) for anterior composite resin restorations. Class III restorations generally had lower AFRs than the other restorations.</p>

a. Outcomes listed only as far as relevant to the PICO question

DEMIRCI ET AL. 2008

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte			Risk of Bias	Schlussfolgerungen durch die Autoren
Demirci et al. 2008 CCT PMID: 18335727	Stichprobengröße: N= 32 Drop-out: 3 after 2 y Einschlusskriterien: Each patient received three restorations due to caries in anterior teeth. Good oral hygiene and sound periodontal conditions. Alter: Mean 25.8 y Geschlecht: 12 male, 20 female Follow-up: 2 y	Direct composite resin N= 32 restorations	Compomer with two different adhesive systems N= 64 restorations (32 per group)	Modified Ryge criteria (score: A,B,C,D,E)	Direct composite	Compomer 1	Compomer 2	ROBINS-I-analysis: Serious risk of bias	Statistical analysis showed no significant differences among the three groups in color match, marginal discoloration, wear or loss of anatomical form, marginal adaptation and surface texture after two years. Also, no statistically significant differences were determined for each group with respect to color match, marginal discoloration, wear or loss of anatomical form, marginal adaptation and surface texture at the end of two years.
				Color Match	Baseline: B= 21.9% 1y: B= 21.9% 2y: B= 31%	Baseline: B= 6.3% 1y: B= 6.3% 2y: -	Baseline: B= 3.1% 1y: B= 3.1% 2y: -		
				Marginal discoloration	Baseline: B= 3.1% 1y: B= 6.3% 2y: B= 17.2%	Baseline: - 1y: B= 9.4% 2y: 10.3%	Baseline: B=3.1% 1y: - 2y: B= 17.2%		
				Wear/ anatomic form	2y: B= 10.8%	A= 100%	2y: B= 7.1%		
				Caries	None	None	None		
				Marginals adaptation	A= 100%	A= 100%	A= 100%		
				Surface texture	A= 100%	A= 100%	A= 100%		
				Overall Failure rate after 2 y	3.6%				
				Overall Success rate after 2 y	96.4%				
				Overall Retention rate after 1 and 2 y	100%				

DIETSCHI ET AL. 2019

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Dietschi et al. 2019</p> <p>Systematic Review</p> <p>PMID: 31312812</p>	<p>Studientyp: RCT, CCTs, NRSI</p> <p>Suchzeitraum: 1975 – September 2016</p> <p>Datenbanken: Pubmed, Cochrane central register of controlled trials, Cochrane library, EMBASE, Google search engine, hand search on University of Geneva library.</p> <p>Einschlusskriterien: RCTs, CCTs, nonrandomized clinical studies</p> <p>Longevity of direct anterior composite restorations</p>	<p>Intervention: Composite resin (based on macrofilled, hybrid, microfilled and nanofilled resin)</p> <p>Komparator: None</p>	<p>Longevity/ retention</p>	<p>Studienzahl: 24 studies</p> <p>Population: Not reported</p> <p><i>Annual Failure Rates (AFR) in %:</i></p> <p><i>Overall:</i> <u>Macrofilled:</u> 0.0-3.4% <u>Hybrid:</u> 0.0- 8.8% <u>Microfilled:</u> 0.0-33.5%</p> <p>< 2 y: <u>Macrofilled:</u> RCT: 0.0-3.4% NRSI: - <u>Hybrid:</u> RCT: 0.0-5.0% NRSI: 0.0-6.6% <u>Microfilled:</u> RCT: 0.0-2.5% NRSI: 0.0-3.4% <u>Nanofilled:</u> RCT: 0% NRSI: -</p> <p>2-5 y: <u>Macrofilled:</u> RCT: 2-2.5% NRSI: -</p>	<p>Notes: High heterogeneity among studies. Only two studies were homogenous enough for meta-analysis, but outcomes were too similar.</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Joelson et al. 1981³³⁹ Christensen and Christensen 1982¹³⁵ Schalpbach et al. 1982⁶⁷⁰</p> <p>Weber-Gaud et al. 1982⁸³¹ Van der Veen et al. 1989⁷⁶⁵ Smales and Gerke 1992⁷⁰² Reusens et al. 1999⁶³⁰ Närhi et al. 2003⁵²⁴ Loguerico et al. 2007⁴¹⁵</p> <p>Van Dijken et al. 1986⁷⁷⁶ Van Noort and Davis 1993⁸¹⁹ Jokstad et al. 1994³⁴² De Trey et al. 1977¹⁶⁶ Lutz et al. 1977⁴³⁹ Ferrari et al. 1990²³⁷ Komatsu et al. 1990³⁶⁴ Qvist and Strom 1993⁶¹⁴ Millar et al. 1997⁴⁹¹ Peumans et al. 1997a,b^{587 588}</p> <p>Bachelard et al. 1997⁴⁴ Rule and Elliot 1975⁶⁵² Smales 1975⁶⁹⁷ Lucarotti et al. 2005a-d^{428 111 429 110} Moura et al. 2011⁵²⁰</p>	<p>Overall anterior composite restorations have shown a large heterogeneity.</p>

				<p><u>Hybrid:</u> RCT: 0.0-8.8% NRSI: 2.2-7.4%</p> <p><u>Microfilled:</u> RCT: 0.0-9.2% NRSI: 1.7%</p> <p><u>Nanofilled:</u> RCT: - NRSI: -</p> <p>> 5 y:</p> <p><u>Macrofilled:</u> RCT: 2.3-2.8% NRSI: -</p> <p><u>Hybrid:</u> RCT: 2.5-8.5% NRSI: 33%</p> <p><u>Microfilled:</u> RCT: 0.2-9.1% NRSI: 1.40-1.45%</p> <p><u>Nanofilled:</u> RCT: - NRSI: -</p>			
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

HEINTZE ET AL. 2015

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Heintze et al. 2015</p> <p>Sys. Review</p> <p>PMID: 25773188</p>	<p>Studientyp: Prospective clinical Trials</p> <p>Suchzeitraum: 1966- December 2012</p> <p>Datenbanken: PubMed SCOPUS</p> <p>Einschlusskriterien: Prospective Clinical Trials, >2 years follow-up, anterior resin composites (Class III,IV, Diastema closures), min. 20 restorations at last recall</p>	<p>Intervention: Composite resin (macrofiller, microfiller, hybrid)</p> <p>Komparator: Compomer, Glass Ionomer (GI) for class III restorations, none for class IV restorations</p>	<p>Longevity/ retention</p> <p>Ryge criteria</p> <p>fracture color match surface texture anatomical form secondary caries marginal discoloration marginal integrity</p>	<p>Studienzahl: 21</p> <p>Population: Class III: 1210 composite restorations, 178 compomer restorations, 113 GI restorations</p> <p>Class IV: 798 composite restorations</p> <p>Patient numbers not reported</p> <p><i>Longevity/ Retention:</i> Class III: The replacement rate for GI and microfilled composites was higher compared to macrofilled and hybrid composites (p< 0.05) Class IV: The replacement rate was higher for microfilled composites compared to</p>	<p>Notes: Not all analyses performed for class IV restorations</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low Quality</p>	<p>Class III: Osborne et al. 1990a⁵⁴⁵ Osborne et al. 1990b⁵⁴³ Schlapbach et al. 1982⁶⁶⁹ Van Dijken et al. 1985⁷⁶⁸ Qvist et al. 1993⁶¹⁴ David et al. 1986¹⁵⁷ Crumpler et al. 1988¹⁴⁶ Van Dijken et al. 1999a⁷⁷² Van Dijken et al. 1999b⁷⁷⁰ De Araujo et al. 1998¹⁵⁹ Reusens et al. 1999⁶³⁰ Demirci et al. 2006¹⁷⁵ Demirci et al. 2008¹⁷⁸ Ermis et al. 2010²¹⁷</p> <p>Class IV:</p>	<p>The main reason for the replacement of Class IV restorations was bulk fractures, which occurred more frequently with microfilled composites than with hybrid and macrofilled composites. Caries adjacent to restorations was infrequent irrespective of the cavity class. Class III restorations with glass ionomer derivatives suffered significantly more loss of anatomical form than did fillings with other types of material.</p>

			<p>macrofilled and hybrid composites (p<0.05)</p> <p><i>Estimated median overall success rate after 10 years:</i> Class III: 95% Class IV: 90%</p> <p><i>Fracture</i> Class III: No statistically significant differences in between materials Class IV: More fractures than Class III; hybrid composites performed best (p<0.05)</p> <p><i>color match:</i> Class III: Compomers and hybrid composites performed best, GI had worst deterioration over time, but no statistically significant differences; Class IV: Hybrid composites performed better than micro- and macrofilled composites (p<0.05)</p>		<p>Sheykholeslam et al. 1977⁶⁸⁸ Dogon et al. 1980¹⁸⁸ Roberts et al. 1978⁶³⁷ Shey et al. 1979⁶⁸⁷ Tyas et al. 1990⁷⁵⁷ Peumans et al. 1997^{587, 588} Van Dijken et al. 2010⁷⁹⁸</p>	
--	--	--	---	--	--	--

				<p><i>surface texture</i> Class III: Compomers and hybrid composites performed best, GI had worst deterioration over time ($p < 0.05$)</p> <p><i>anatomical form</i> Class III: Macrofilled and hybrid composites performed best, GI performed worst ($p < 0.05$)</p> <p><i>secondary caries</i> No statistically significant differences in between materials</p> <p><i>marginal discoloration:</i> Class III: Dependent on tooth conditioning, composites performed better than GI</p> <p><i>marginal integrity</i> Class III: Macrofilled composites performed best, GI performed worst</p>			
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

SMALES ET AL. 1992

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Smales et al. 1992 CCT PMID: 1290611	Stichprobengröße: N= 161 patients N= 1626 restorations (50 of interest) Einschlusskriterien: Class III, IV and V cavities. No further information. Alter: No certain number Geschlecht: No information Follow-up: > 6 months	Direct composite resin: Hybrid Bis-GMA/EDMA N= 15 restorations	Direct composite resin: 1) microfilled Bis-GMA/TEGDMA N= 24 restorations 2) small particle Bis-GMA N= 11 restorations	Modified USPHS criteria: Score 0-12 (0= no detection of deterioration, 12= severe deterioration that required treatment)	Mean scores after 4 years* Hybrid: 0.54 Microfilled: 0.75 Small: 0.90 p= 0.002 ¹ Hybrid: 0.34 Microfilled: 0.34 Small: 0.58 p= 0.23 Hybrid: 0.29 Microfilled: 0.30 Small: 0.41 p=0.07 Hybrid: 0.69 Microfilled: 1.16 Small: 1.72 p<0.001 ¹ 48±15.7	Notes: Small particle Bis-GMA restorations were significantly more placed in age group 21-40 compared to over 61 (p<0.05). ROBINS-I-analysis: Serious risk of bias	No clinically significant difference were found between the three materials. No significant failure difference between the three resins.
				Gingivitis			
				Surface staining			
				Marginal staining			
				Color match			
				Cumulative survival of Class IV restorations over 4 years			

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				Cumulative survival of Class II restorations over 4 years	99±0.8		
				Number of failed Class IV restorations over 4 years	7		
				Number of failed Class III restorations over 4 years	1		
				Cumulative restorative failures over 4 years*	Hybrid: 16% Microfilled: 16% Small: 21%		

* results relate to all 1626 restorations!; ¹statistically significant: comparators revealed more gingivitis than intervention & Small particle Bis-GMA revealed significantly more colour mismatch than the other 2 materials.

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. COMPOMER

Frage: Sollte Komposit statt Kompomer bei Klasse III und IV Kavitäten angewandt werden?

№ der Studien	Studiendesign	Certainty assessment					№ der Restaurationen ^e		Wirkung ^d		Certainty	Wichtigkeit
		Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Kompomer	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Überlebensrate/Retention)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported	⊕○○○ Sehr niedrig	KRITISCH	
Sekundärkaries (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported	⊕○○○ Sehr niedrig	KRITISCH	
Fraktur (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported	⊕○○○ Sehr niedrig	KRITISCH	
Marginale Verfärbung (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported	⊕○○○ Sehr niedrig	WICHTIG	
Marginale Integrität (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported	⊕○○○ Sehr niedrig	KRITISCH	

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Kompomer	Relativ oder Absolut (95% CI)	(95% CI)		
Farbe (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG
Oberflächentextur (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG
Anatomische Form (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
2	1 Systematic Review, 1 CCT	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG

CI: confidence interval

Explanations

- a. CCT with serious risk of bias (ROBINS-I) and SR with critically low quality (AMSTAR-2)
- b. heterogeneity in between included studies
- c. . Number of patients not reported per outcome
- d. Relative or absolute risks not reported. For further results, see tables of included studies

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. GLASS IONOMER CEMENT

Frage: Sollte Komposit statt Glasionomercement bei Klasse III und IV Kavitäten angewandt werden?

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Kompomer	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Überlebensrate/Retention)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Sekundärkaries (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Fraktur (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Marginale Verfärbung (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Kompomer	Relativ oder Absolut (95% CI)	(95% CI)		
Marginale Integrität (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	KRITISCH
Farbe (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG
Oberflächentextur (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG
Anatomische Form (Nachbeobachtung: Bereich 2 Jahre bis 12 Jahre; bewertet mit: Ryge criteria)												
1	Systematic Review (Including RCTS and NRSIs)	sehr schwerwiegend ^a	schwerwiegend ^b	nicht schwerwiegend	schwerwiegend ^e	Publikationsbias nicht evaluiert	-	-	Not reported		⊕○○○ Sehr niedrig	WICHTIG

CI: confidence interval

Explanations

- a. CCT with serious risk of bias (ROBINS-I) and SR with critically low quality (AMSTAR-2)
- b. heterogeneity in between included studies
- c. . Number of patients not reported per outcome
- d. Relative or absolute risks not reported. For further results, see tables of included studies
- e. Glass Ionomer cement was only evaluated for class III restorations, not for class IV restorations

PICO FRAGE 4 - DIREKTE KOMPOSITRESTAURATIONEN FÜR ÄSTHETISCHE KORREKTUREN IM FRONTZAHNBEREICH

EVIDENZTABELLEN DER EINGESCHLOSSENEN STUDIEN

AL-KHAYATT ET AL. 2013 AND POYSER ET AL. 2007

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Al-Khayatt et al. 2013 and Poyser et al. 2007 RCT PMID: 23496025 17441877	Stichprobengröße: 106 (18) lesions (patients) 3 patients lost to follow up, 85 (15) remaining at the 7-year follow-up Einschlusskriterien: Tooth surface loss of the mandibular anterior teeth, at least 4 teeth affected, no previous restorations, stable periodontal status Alter: mean patient age 58 years (range, 38-78 years). Follow-up: 7 years	Direct composite resin (CR) with circumferential preparation N= 37 restorations	Direct composite resin (CR) without circumferential preparation N= 48 restorations	Longevity/ survival:	Failure of CR with preparation: 6/37 Failure of CR without preparation: 7/48 Approximate overall survival of restorations: 85%	Notes: - ROB-2 analysis: Some concerns	The direct placement of composite restorations at an increased occlusal vertical dimension is a predictable process with long-standing satisfactory aesthetic benefits, and good long-term survival. Although composite restorations will continue to wear in time, they will often be an aesthetically pleasing and functioning restoration with the benefits of tooth protection/preservation. Pre-operative circumferential preparation did not influence restoration survival, patient satisfaction or other clinical variables
				Restoration staining	Failure of CR with preparation: 0/31 Failure of CR without preparation: 0/41		
				Marginal discoloration	Failure of CR with preparation: 10/28 Failure of CR without preparation: 7/37		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				Color match	<p>Failure of CR with preparation: 1/31</p> <p>Failure of CR without preparation: 0/41</p>		
				Surface texture	<p>Failure of CR with preparation: 1/31</p> <p>Failure of CR without preparation: 1/40</p>		
				Marginal adaptation	<p>Failure of CR with preparation: 0/31</p> <p>Failure of CR without preparation: 2/40</p>		
					No statistically significant differences between the 2 groups for any of the above parameters		

ALONSO ET AL. 2012

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Alonso et al. 2012 NRSI PMID: 22335302	Stichprobengröße: N= 20 patients Einschlusskriterien: None Alter: Mean 22.5y Geschlecht: 14 male, 7 female Follow-up: Mean 27.8 months	Direct composite full-coverage crowns N= 21 restorations	None	Modified USPHS/ Ryge criteria: Clinically (scores 1-4)	N after 12.5 y follow-up	ROBINS-I-analysis: Moderate risk	Except for one case, all the scores obtained on the basis of the USPHS criteria were within the acceptable range. There were no cases of secondary caries. The statistically significant variations were anatomical form, marginal adaptation, marginal discoloration, and surface roughness.
				Anatomical form (2=unacceptable)	0= 15 1= 5 2= 1 3= 0 p= 0.031*		
				Marginal adaptation (3= unacceptable)	1= 12 2= 9 3,4=0 p= 0.004*		
				Color match (3= unacceptable)	1= 20 2= 1 3,4= 0 p= 1.000		
				Marginal discoloration (3= unacceptable)	1= 8 2= 11 3= 2 p= 0.000*		
				Surface roughness (all acceptable)	1= 12 2= 9 3= 0 p= 0.004*		
				Secondary caries (1= unacceptable)	1= 21 2,3= 0 p= 1.000		
				Overall survival after 2y 10y 11y	95.2% 88.9% 75.2%		

COELHO ET AL. 2015

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte			Risk of Bias	Schlussfolgerungen durch die Autoren
					Microfill	Universal	p-value ¹		
Coelho et al. 2015 NRSI PMID: 26318419	Stichproben- größe: N= 86 Einschlusskri- terien: Direct composite veneers placed in vital and avital teeth using either universal hybrid or microfilled composite resins, no smokers, no bruxism, no indirect veneers made of ceramics/ composites. Alter: Adults (mean age 44 y) Geschlecht: 69.8% female, 30.2% male	Direct composite veneers made of microfilled composites N= 96 restorations	Direct composite veneers made of universal compo- sites N= 100 restoration s	FDI criteria Restorations Scores n (1/2/3/4/5)				ROBINS-I- analysis: Serious risk of bias Even though almost all restorations could be classified as clinically acceptable, especially in relation to the esthetic properties, microfilled veneers had a significantly better performance than veneers made with universal composites (p < 0.001). Also, microfilled restorations had better marginal adaptation and patient's acceptance. There was no significant	
				Surface lustre	n= 41 (41/0/0/0/0)	n= 146 (77/63/6/0/0)	0.001		
				Surface staining	n= 41 (34/6/1/0/0)	n= 146 (50/70/26/0/0)	0.001		
				Marginal staining	n= 41 (23/15/3/0/0)	n= 146 (37/77/32/0/0)	0.001		
				Color match	n= 41 (39/2/0/0/0)	n= 146 (109/32/5/0/0)	0.004		
				Fracture and retention	n= 41 (33/0/3/4/1)	n= 146 (75/55/16/0/0)	0.001		
				Anatomic form	n= 41 (37/3/1/0/0)	n= 155 (105/17/8/12/13)	0.150		
				Marginal adaptation	n= 41 (30/11/0/0/0)	n= 146 (45/83/15/1/2)	0.001		
				Patient's view	n= 41 (38/3/0/0/0)	n= 148 (112/23/10/1/2)	0.014		
				Recurrence of caries, erosion and abfraction	n= 41 (37/1/0/3/0)	n= 146 (140/1/1/4/0)	0.156		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

	Follow-up: 6 months - 15 y			Postoperative sensitivity	n= 41 (41/0/0/0/0)	n= 146 (139/4/1/2/0)	0.154		difference between survival curves for microfilled and universal composites veneers (log-rank: p = 0.654).
				Longevity/ annual failure rate (AFR)	6.0%	6.2%	p > 0.05		The AFRs for microfilled veneers and universal veneers revealed no significant differences between materials.

DEMARCO ET AL. 2015

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Demarco et al. 2015</p> <p>Sys. Review</p> <p>PMID: 26303655</p>	<p>Studientyp: RCTs NRSIs</p> <p>Suchzeitraum: No date restriction- December 2014</p> <p>Datenbanken: MEDLINE/PubMed, SciVerse Scopus, Cochrane Central Register of Controlled Trials</p> <p>Einschlusskriterien: Prospective and retrospective clinical Trials, >3 years follow-up, anterior resin composites (Class III,IV, direct veneers, full- coverage buildups)</p>	<p>Intervention: Direct composite veneers</p> <p>Komparator: none</p>	<p>Longevity (AFR)</p>	<p>Studienzahl: 5</p> <p>Population: 380 (117) restorations (patients)</p> <p>AFR between 2.6- 3.7%</p>	<p>Notes: No meta- analysis besides AFR calculation</p> <p>Risk of Bias Assessment: None</p> <p>AMSTAR-2 Assessment: Critically low Quality</p>	<p>Gresnigt et al. 2012²⁸⁸</p> <p>Peumans et al. 1997^{587, 588}</p> <p>Frese et al. 2013²⁵⁶</p> <p>Alonso et al. 2012³³</p>	<p>In general, reasons for failure related to aesthetic qualities of the restorations, such as color match, anatomical form, and surface stain were more frequent reasons for failure in studies where restorations were placed for aesthetic reasons.</p>

a. Outcomes listed only as far as relevant to the PICO question

DEMIRCI ET AL. 2015

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte		Risk of Bias	Schlussfolgerungen durch die Autoren
Demirci et al. 2015 NRSI PMID: 25802222	Stichprobengröße: N= 30 Einschlusskriterien: 2-10 direct composite restorations for diastema closures, good oral hygiene, no active periodontal or pulpal diseases, Bolton discrepancy after orthodontic treatment, malformed teeth, reshaping of canines to lateral incisors (congenitally missing). Alter: Mean age 19.5 y Follow-up: Up to 4 years	Direct nano composite N= 73 restorations	Direct nanohybrid composite N= 74 restorations	Modified Ryge criteria (A,B,C,D,E)	Nano (%)	Nanohybrid (%)	ROBINS-I-analysis: Moderate risk of bias	Statistical analysis revealed no significant differences between the two composite–adhesive combinations with respect to colour match, marginal discoloration, wear/loss of anatomical form, caries formation, marginal adaptation, and surface texture on comparing the five time periods (baseline, 1, 2, 3, and 4 years). The 4-year survival rates in the present study were favourable.
				Retention (A,C= failure)	Baseline: A (100) 1 y: A (100) 2y: A (97.1), C (2.9) 3y: A (95.7), C (4.3) 4y: A (92.8), C (7.2)	Baseline: A (100) 1 y: A (100) 2y: A (97.2), C (2.8) 3y: A (95.8), C (4.2) 4y: A (93.0), C (7.0)		
				Color match (A,B,C= failure)	Baseline: A (100) 1 y: A (98.6), B (1.4) 2y: A (100) 3y: A (100)	Baseline: A (100) 1 y: A (98.6), B (1.4) 2y: A (100) 3y: A (100)		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

					4y: A (100)	4y: A (100)		
				Marginal discoloration (A,B,C= failure)	Baseline: A (100) 1 y: A (98.6), B (1.4) 2y: A (97.1), B (2.9) 3y: A (97.0), B (3.0) 4y: A (93.8), B (6.3)	Baseline: A (100) 1 y: A (97.3), B (2.7) 2y: A (97.1), B (2.9) 3y: A (97.1), B (2.9) 4y: A (95.4), B (4.6)		
				Wear/ anatomic form (A,B,C= failure)	Baseline: A (100) 1 y: A (98.6), B (1.4) 2y: A (95.6), B (4.4) 3y: A (95.5), B (4.5)	Baseline: A (100) 1 y: A (100) 2y: A (100) 3y: A (98.6), B (1.4)		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

					4y: A (96.9), B (3.1)	4y: A (97.0), B (3.0)		
				Caries (A,B= failure)	Baseline: A (100)	Baseline: A (100)		
					1 y: A (100)	1 y: A (100)		
					2y: A (100)	2y: A (100)		
					3y: A (100)	3y: A (100)		
					4y: A (98.5), B (1.5)	4y: A (100),		
				Marginal adaptation (A,B,C,D= failure)	Baseline: A (100)	Baseline: A (100)		
					1 y: A (98.6), B (1.0)	1 y: A (95.9), B (4.1)		
					2y: A (95.7), B (1.4)	2y: A (93.1), B (4.2)		
					3y: A (95.6), B (2.9)	3y: A (92.9), B (5.7)		
					4y: A (90.8), B (7.7)	4y: A (91.2), B (5.9)		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				Surface texture (A,B,C= failure, D= failure)	Baseline: A (100%) 1 y: A (100%) 2y: A (100%) 3y: A (98.5), B (1.5) 4y: A (98.4) B (1.6)	Baseline: A (100%) 1 y: A (98.4), B (1.4) 2y: A (98.6) B (1.4) 3y: A (98.6) B (1.4) 4y: A (98.5) B (1.5)		
				Failure rates: 1y 2y 3y 4y	100 % 97.1 % 95.7 % 92.8 %	100 % 97.2 % 95.8 % 93 %		

FRESE ET AL. 2013 AND WOLFF ET AL. 2010

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Frese et al. 2013 Wolff et al. 2010 NRSI PMID: 23954577	Stichprobengröße: N= 101 After 5 y follow-up N= 58 patients Einschlusskriterien: One to eight direct composite build-ups, no physical restrictions in oral hygiene, 18-85 y old, no pregnancy or nursing, no serious somatic illness. Alter: 31.1 y Geschlecht: 55% of restorations were placed in females, 45% in males (remaining at 5y follow-up) Follow-up: 5y Median (63 months)	Direct composite N= 327; N= 176 restorations remaining at 5 year follow-up Failure = complete loss of restoration Survival= partial damage that was repaired Success= no failure no unfavourable event	None	Modified USPHS/ FDI criteria:	N (%) ¹ A= 84 (57.5%) B= 56 (38.4%) C= 6 (4.1%) A= 71 (48.6%) B= 65 (44.5%) C= 9 (6.2%) D= 1 (0.7%) A= 110 (75.3%) B= 34 (23.3%) C= 2 (1.4%) A= 91 (62.3%) B= 49 (33.6%) C= 6 (4.1%) A= 135 (92.5%) B= 10 (6.9%) C= 1 (0.7%) A= 118 (80.8%) B= 25 (17.1%) C= 2 (1.4%) D= 1 (0.7%)	ROBINS-I-analysis: Serious risk of bias	During the follow-up period, 30 restorations were found to have had unfavourable events or clinical findings. All restorations were repaired, and they remained in situ. No complete loss was recorded. Clinical quality was rated excellent or good for most (>90%) of the restorations examined.
				Clinically Excellent = A			
				Clinically Good = B			
				Clinically Sufficient = C			
				Clinically Unsatisfactory = D			
				Clinically poor = E			
				Surface lustre			
				Surface staining			
Colour stability and translucency							
Anatomic form							
Fracture and retentions							
Marginal adaptation							

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				Wear	A= 113 (77.4%) B= 29 (19.9%) C= 4 (2.7%)		
				Proximal contact	A= 87 (59.6%) B= 41 (28.1%) C= 9 (6.2%) D= 9 (6.2%)		
				Patient's view	A= 109 (74.7%) B= 30 (20.6%) C= 3 (2.1%) D= 4 (2.7%)		
				Postoperative hypersensitivity	A= 137 (93.8%) B= 9 (6.2%)		
				Recurrence of caries, erosion, abfraction	A= 127 (87.0%) B= 18 (12.3%) C= 1 (0.7%)		
				Tooth integrity	A= 128 (87.7%) B= 18 (12.3%)		
				Periodontal response	A= 111 (76.0%) B= 34 (23.3%) C= 1 (0.7%)		
				Adjacent mucosa	A= 125 (85.6%) B= 20 (13.7%) C= 1 (0.7%)		
				Oral and general health	A= 117 (80.1%) B= 29 (19.9%)		
				5 year success rate	84.6% (95% CI: 78.5 and 90.6)		
				Success (S)	n= 146		
				Survival (SR)	n= 30		
				Failure (F)	n= 0		

FRESE ET AL. 2020

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Frese et al. 2020 NRSI PMID: 33491402	Stichprobengröße: N= 198 patients Einschlusskriterien: At least one direct composite buildup, no physical restrictions in oral hygiene, 18-85 y old, no pregnancy or nursing, no serious somatic illness. Alter: Mean 45.9 y Geschlecht: 78 male 120 female Follow-up: Mean 15.5 y	Direct anterior composite buildups N= 667 restorations Failure = complete loss of restoration Survival= partial damage that was repaired Success= no failure no unfavourable event	None	Modified USPHS/ FDI criteria: Clinically Excellent = A; Clinically Good = B; Sufficient = C; Clinically Unsatisfactory = D Clinically poor = E	N (%) ¹	ROBINS-I-analysis: Moderate risk of bias	Clinical quality was rated as excellent or good for most restorations. Direct composite buildups show promising long-term results in the anterior dentition.
				Surface lustre	A= 186 (32.8%) B= 325 (57.3%) C= 55 (9.7%) D= 1 (0.2%)		
				Surface staining	A= 395 (69.7%) B= 147 (25.9%) C= 23 (4.0%) D= 2 (0.4%)		
				Colour stability and translucency	A= 427 (74.3%) B= 124 (21.9%) C= 15 (2.6%) D= 1 (0.2%)		
				Anatomic form	A= 455 (80.2%) B= 83 (14.6%) C= 29 (5.1%)		
				Fracture and retentions	A= 442 (78.0%) B= 87 (15.3%) C= 32 (5.6%) D= 6 (1.1%)		
				Marginal adaptation	A= 336 (59.2%) B= 195 (34.4%) C= 30 (5.3%) D= 6 (1.1%)		
				Wear	A= 404 (71.3%) B= 135 (23.8%) C= 28 (4.9%)		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				Patient's view	A= 505 (89.0%) B= 57 (10.1%) C= 4 (0.7%) D= 1 (0.2%)		
				Postoperative hypersensitivity	A= 554 (97.7%) B= 13 (2.3%)		
				Recurrence of caries, erosion, abfraction	A= 505 (89.1%) B= 39 (6.9%) C= 16 (2.8) D= 7 (1.2%)		
				Periodontal response	A= 279 (49.1%) B= 161(28.4%) C= 101 (17.8%) D= 24 (4.2%) E= 2 (0.4%)		
				Integrity/cleanability	A= 518 (91.4%) B= 34 (6.0%) C= 12 (2.1%) D= 3 (0.5%)		
				<u>Overall survival (success):</u>			
				2 y	98.8 (95% CI: 97.6, 99.4)		
				10 y	91.7% (95% CI: 89.0, 93.8)		
				15 y	77.6 (95% CI: 72.2, 82.2)		
				<u>Functional survival</u>			
				2 y	100.0%		
				10 y	98.9% (95% CI:97.5, 99.5)		
				15 y	98.5% (95% CI: 96.7, 99.3)		
				Success (S)	n= 576		
				Survival (SR)	n= 81		
				Failure (F)	n= 8		
				Removed alio loco	n= 2		

¹Only the 576 successful restorations were qualitatively evaluated

GRESNIGT ET AL. 2012

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Gresnigt et al. 2012 RCT PMID: 22821429	Stichprobengröße: 96 (23) lesions (patients) Einschlusskriterien: Adults without active periodontal or pulpal Diseases; patients with uncontrolled parafunction or insufficient oral were excluded Alter: mean patient age 52.4 years (range, 29-84 years). Follow-up: mean follow-up: 41.3 months	Direct composite resin veneers with Ena-Bond-Enamel HFO N= 48 restorations	Direct composite resin veneers with Clearfil SE Bond-Miris2 N= 48 restorations	Longevity/ survival:	Failures: Enamel HFO: 9/48 Miris2: 3/48 Mean estimated survival rate: Enamel HFO: 81.2% Miris2: 93.8% (p > 0.05).	Notes: - ROB-2 analysis: Low risk	Clinical performance of the direct composite veneers with the tested two micro-hybrid composites (Enamel Plus HFO versus Miris2) together with their bonding agents did not show significant differences
				Modified USPHS criteria:			
				Secondary caries, Fracture	none		
				Post-operative sensitivity (score 1)	Enamel HFO: 2/48 Miris2: 4/48		
				Surface texture (score 2,3)	Enamel HFO: 1/39 Miris2: 2/45		
				Marginal discoloration (score 2,3)	Enamel HFO: 0/39 Miris2: 1/45		

LEMPEL ET AL. 2017

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte		Risk of Bias	Schlussfolgerungen durch die Autoren
Lempel et al. 2017 NRSI PMID: 28256273	Stichprobengröße: N= 65 Einschlusskriterien: Direct composite restorations placed in vital maxillary teeth, >18 y, able to read, physically and psychologically able for procedure, full dentition, normal occlusion, no gen. periodontal disease, continued follow-up Alter: Mean 25.2 y Geschlecht: 25 male, 40 female Follow-up: Mean 7.2 y	Direct microhybrid composite build-ups N= 78 restorations	Direct nanofill composite build-ups N= 85 restorations	Modified USPHS criteria (graded 0 - 4)	Nano (n)	Micro Hybrid (n)	Notes: Authors often classified USPHS criteria more strictly than usual. ROBINS-I-analysis: Serious risk of bias	The overall survival rate was 88.34% up to 10 years. Microhybrid and nanofill RBC restorations showed similar survival rates, however nanofills discolored at a higher rate, meanwhile chipping of the restoration occurred frequently with microhybrids.
				Marginal adaptation 2= unacceptable	0= 75 1= 3	0= 28 1= 3		
				Color match 2= unacceptable	0= 26 1= 7 2= 6	0= 38 1= 2 2= 0		
				Marginal Discoloration 2= unacceptable	0= 71 1= 6 2= 1 ¹	0= 77 1= 8 2= 0		
				Surface roughness 2= unacceptable	0= 76 1= 2	0= 77 1= 8		
				Fracture of Restoration 1= unacceptable	0= 75 1= 2 2= 1 ²	0= 74 1= 5 2= 6		
				Fracture of tooth	0= 78	0= 85		
				Wear of restoration 1= unacceptable	0= 78	0= 85		
				Wear of antagonist 1= unacceptable	0= 78	0= 85		
				Caries 1= unacceptable	0= 78	0= 85		
				Postoperative Sensitivity 2= unacceptable	0= 78 1= 0	0= 84 1= 1		
				Overall survival	88.34%			
				Failure rate	8/78 (10.3%)	11/85 (12.9%)		

MEIJERING ET AL. 1998

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Meijering et al. 1998 RCT PMID: 36357677	Stichprobengröße: N= 112 patients Einschlusskriterien: Only 2 veneers per patient in maxillary anterior region, cervical margin in enamel, no pocket deeper than 4mm, no large restoration, No diastema, No other restoration necessary (i.e. crown). Alter: Mean 30 y Geschlecht: 71% female, 29% male Follow-up: 2.5y	Direct resin composite veneers (DC) N= 69 restorations	Indirect resin composite (IC) and porcelain (P) veneers N= 54 IC restorations N= 56 P restorations	Modified USPHS criteria (graded A,B,C,D)		Notes: No separate analysis for each material regarding USPHS criteria ROB-2-analysis: Serious risk of bias	Porcelain veneers showed the best overall survival
				Chipping/ fracture of restoration	Absolute failure: 6 Relative failure: 10		
				Fracture of tooth	Absolute failure: 2 Relative failure: 0		
				Color mismatch	Absolute failure: 3 Relative failure: 3		
				Dislodgement	Absolute failure: 0 Relative failure: 1		
				Marginal discoloration	Absolute failure: 0 Relative failure: 2		
				Caries	Absolute failure: 0 Relative failure: 2		
				Postoperative sensibility	Absolute failure: 0 Relative failure: 2		
				Absolute failure: 11 VRs	4 in DC, 7 in IC		
Relative failure: 20 VRs	14 in DC, 3 in IC, 3 in P						

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

				<p>Survival percentages:</p> <p>So = overall survival Sf = functional survival Sr = survival of original restoration</p>	<p>Sf-DC: 80% So-DC: 74%</p> <p>Sf-IC: 94% So-IC: 90%</p> <p>Sf-P: 94% So-P:94%</p> <p>type of VR x Sf: p<0.05 type of VR x So: p<0.01</p>		
--	--	--	--	--	--	--	--

PEUMANN'S ET AL. 1997 TEIL I UND II

Referenz, Studientyp	Untersuchte Population	Intervention	Vergleich	Endpunkte	Ergebnisse per Endpunkte	Risk of Bias	Schlussfolgerungen durch die Autoren
Peumanns et al. 1997 Teil I und II NRSI PMID: 9552812 9552813	Stichprobengröße: N= 23 patients	Direct composite restorations	None	Modified USPHS criteria (graded A,B,C,D)	After 5 y (direct and indirect evaluation)	ROBINS-I-analysis: Moderate risk of bias	89% were still aesthetically satisfactory after 5 years of clinical service. The remaining restorations needed replacement, mainly because of severe loss of anatomical form, to a lesser degree because of severe color mismatch. An ultrafine midway-filled densified composite is indicated for use in stress-bearing areas in the anterior region. The type and location of the restoration are determining factors for marginal integrity.
	Einschlusskriterien: Maxillary anterior teeth	N= 87 restorations		Color match	Perfect: 56% Distinct colour mismatch: 2%		
	Alter: 12-19 y			Translucency/ opacity	Slightly translucent: 6% Slightly opaque: 27%		
	Geschlecht: -			Surface roughness	Smooth surface. 76% significantly different results (p<0.05) were recorded between direct and indirect evaluation. At the indirect evaluation, only 38% of the restorations were judged to have a smooth surface.		
	Follow-up: 5y			Anatomic form	Form maintained: 20% Severe loss of form: 10%		

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

					Slight but acceptable loss of form: 70%		
				Combined (CM Color match, TO translucency/opacity, SR surface roughness, AF anatomical form)	Perfect: 11% Clinically acceptable: 89% Clinically unacceptable: 11%		
				Retention	Perfect: 6% Acceptable: 95% unacceptable: 5% no clinical loss		
				Marginal adaptation	Perfect: 53% Acceptable: 93% Unacceptable: 7%		
				Clinical mikroleakage	Perfect: 100% Acceptable: 100% Unacceptable: 0		

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. CERAMIC

Frage: Sollte Komposit statt Keramikveneers bei Klasse Form- und Farbkorrekturen angewandt werden?

Certainty assessment							No der Restaurationen ^c		Wirkung ^d		Certainty	Wichtigkeit
No der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Keramik	Relativ oder Absolut (95% CI)	(95% CI)		
Überlebensrate (Nachbeobachtung: Bereich 1 Jahre bis 2.5 Jahre; bewertet mit: Überlebensrate/Retention)												
1	randomisierte klinische Studie	sehr schwerwiegend ^a	nicht schwerwiegend	nicht schwerwiegend	schwerwiegend ^b	keine	14/69 (20.3%)	3/56 (5.4%)	Not reported		⊕○○○ Sehr niedrig	KRITISCH

CI: confidence interval

Explanations

a. serious concerns (ROB-2)

b. small sample size in relation to the number of intervention groups (randomization of 3 types of materials and different preparation designs)

c. . Number of patients not reported per outcome

PICO FRAGE 5 - DIREKTE KOMPOSITRESTAURATIONEN IN DER RESTAURATIONSKLASSE V

EVIDENZTABELLEN DER EINGESCHLOSSENEN STUDIEN

BEZZERA ET AL. 2020

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Bezzera et al 2020</p> <p>Sys. Review</p> <p>PMID: 32462087</p>	<p>Studientyp: RCTs CCTs Nonrandomized clinical studies</p> <p>Suchzeitraum: No restrictions as to publication date – March 2020</p> <p>Datenbanken: PubMed Scopus Web of Science Cochrane Library</p> <p>Einschlusskriterien: RCTs, CCTs, nonrandomized clinical studies</p> <p>Treatment of noncarious cervical lesions (NCCL) with</p>	<p>Intervention: Composite resin (CR)</p> <p>Komparator: Glass-ionomer cement (GIC)</p>	<p>Longevity/retention, clinical performance according to USPHS/FDI criteria</p> <p>Anatomic form Color match Surface texture Secondary caries Marginal discoloration Marginal adaptation Retention</p>	<p>Studienanzahl: 13</p> <p>Population: <i>Anatomic form:</i> N = 945 lesions in ~168 patients* (8 studies) RD = 0.00 (CI 95% -0.02, 0.002)</p> <p><i>Color:</i> N = 1064 lesions in 196 patients* (9 studies) RD = -0.02 (CI 95% -0.08, 0.04)</p> <p><i>Surface texture:</i> N = 809 lesions in 135 patients ** (7 studies) RD = -0.02 (CI 95% -0.06, 0.02)</p> <p><i>Secondary caries:</i> N = 1330 lesions in 252 patients* (10 studies)</p>	<p>Notes: Considerable heterogeneity for retention, color and surface texture</p> <p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool</p> <p>All studies assessed as low risk of bias</p> <p>AMSTAR-2 Assessment: Low quality</p>	<p>Adeleke, Oginni (2012)²³ Brackett et al. (2003)⁹² Burgess et al. (2004)¹⁰⁴ De Oliveira et al. (2012)¹⁶³ Federlin et al. (1998)²³³ Franco et al. (1998)²⁴⁷ Santiago et al. (2010)⁶⁵⁸ Hussainy et al. (2018)³³⁰ Neo, Chew (1996)⁵²⁶ Onal, Pamir (2005)⁵³⁷ Perdigão et al. (2012)⁵⁷³ Popescu et al. (2016)⁵⁹⁹ Powel, Johnson, Gordon⁶⁰¹ (1995)</p>	<p>GIC showed a clinical performance significantly higher than CR in regard to retention, whereas for the other parameters, GIC was similar to CR</p>

	<p>glass ionomer cement (convention and/or resin-modified) or composite resin</p>			<p>RD = 0.00 (CI 95% -0.01, 0.01)</p> <p><i>Marginal discoloration:</i> N = 1600 lesions in 282 patients** (12 studies) RD = 0.01 (CI 95% -0.01, 0.03)</p> <p><i>Marginal adaptation:</i> N = 1474 lesions in 245 patients** (11 studies) RD = 0.01 (CI 95% -0.01, 0.04)</p> <p><i>Retention:</i> N = 1466 lesions in 259 patients** (11 studies) RD = 0.07 (CI 95% 0.02, 0.12)</p> <p>(Higher RD indicates higher GIC success)</p>			
--	---	--	--	---	--	--	--

a. Outcomes listed only as far as relevant to the PICO question; * number of patients missing in one study; ** number of patients missing in 2 studies; RD= Risk Difference

BOING ET AL. 2018

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Boing et al. 2018</p> <p>Systematic Review</p> <p>PMID: 30349908</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: No restrictions to publication date</p> <p>Datenbanken: Pubmed, Scopus, Web of Science, LILACS, BBO, Cochrane</p> <p>Einschlusskriterien: Parallel and split-mouth RCTS</p> <p>Treatment of noncarious cervical (NCCL) lesions with conventional (GIC) and/ or resin-modified (RMGIC) glass ionomer cement vs. Resin-based composite resins (RC)</p>	<p>Intervention: (Resin-based) Glass ionomer cements (RMGIC/GIC)</p> <p>Komparator: Resin composite (RC)</p>	<p>Longevity/retention, clinical performance according to USPHS/FDI criteria</p> <p>Marginal adaptation</p> <p>Marginal discoloration</p> <p>Secondary caries</p> <p>Color match</p> <p>Surface texture</p>	<p>Studienzahl: 15 articles</p> <p>Population: 1640 (1001) lesions (patients)</p> <p>Adeleke et al. 2012 did not report on the number of patients</p> <p><i>Loss of retention:</i> N=1368 (311) 13 RCTs 1y: RR: 0.28 (CI 95% 0.15-0.52) 2y: RR: 0.18 (CI 95% 0.07-0.43) 3y: RR: 0.26 (CI 95% 0.14-0.48) 5y: RR: 0.13 (CI 95% 0.06-0.27)</p> <p><i>Marginal adaptation:</i> N= 768 (120) 8 RCTs 1y: RR: 1.18 (CI 95% 0.88-1.56) 2y: RR:0.47 (CI 95% 0.11-1.97) 3y: RR: 0.86 (CI 95% 0.73-1.01)</p>	<p>Notes: Considerable heterogeneity for loss of retention, color match & surface texture; usage of GRADE for recommendations</p> <p>Risk of Bias Assessment: Cochrane Collaboration Tool</p> <p>All studies showed an unclear or high risk of bias</p> <p>Meta-Analysis was only performed on studies with unclear risk of bias</p> <p>AMSTAR-2 Assessment:</p> <p>Moderate quality</p>	<p>Adeleke et al. 2012²³</p> <p>Brackett et al, 2003⁹²</p> <p>Burgess et al. 2004¹⁰⁴</p> <p>Fagundes et al. 2014²²⁶</p> <p>Federlin et al. 1998²³³</p> <p>Matis et al. 1996⁴⁸¹</p> <p>Neo et al. 1996⁵²⁶</p> <p>Neo et al. 1996⁵²⁷</p> <p>De Oliveira et al. 2012¹⁶³</p> <p>Ozgünlaltay et al. 2002⁵⁵⁴</p> <p>Perdigão et al. 2012⁵⁷³</p> <p>Powell et al. 1991⁶⁰³</p> <p>Powell et al. 1992⁶⁰²</p> <p>Horsted-Bindsled et al. 1988³²⁵</p> <p>Van Dijken 2000⁷⁷⁷</p>	<p>The loss of retention of RMGIC/GIC was inferior to that of RC, but a higher roughness was observed in the RMGIC/GIC when compared to RC in all follow-ups; color match was better with RC only in the 2-year follow-up when compared to GIC</p>

				<p><i>Marginal discoloration:</i> N: 834 (175) 9 RCTs 1y: RR: 0.88 (CI 95% 0.49-1.59) 2y: RR: 0.08 (CI 95% -0.15-0.32) 3y: RR: 1.30 (CI 95% 0.65-2.63)</p> <p><i>Secondary caries:</i> N: 685 (157) 8 RCTs 1y: RR: -0.00 (CI 95% -0.02-0.02) 2y: RR: 0.00 (CI 95% -0.03-0.03) 3y: RR: -0.00 (CI 95% -0.03-0.02)</p> <p><i>Color match:</i> 532 (145) 7 RCTs 1y: RR: 1.55 (CI 95% 0.73-3.29) 2y: RR: 15.00 (CI 05% 2.03-110.62) 3y: 1.29 (0.70-2.38)</p> <p><i>Surface texture:</i> N: 210 (93) 4 RCTs 1y: RR: 8-58 (CI 95% 2.71-27.17) 3y: RR: 3.45 (CI 95% 1.73-6.89)</p>		
--	--	--	--	---	--	--

a. Outcomes listed only as far as relevant to the PICO question

HAYES ET AL. 2016

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Hayes et al. 2016</p> <p>Systematic Review</p> <p>PMID: 25395000</p>	<p>Studientyp: RCTs and CCTs</p> <p>Suchzeitraum: No restrictions as to publication date – Jan. 2014</p> <p>Datenbanken: PubMed, Embase, Cochrane Register of Controlled Trials (CENTRAL) and grey literature in Open SINGLE</p> <p>Einschlusskriterien: Comparison of at least two different types of restorative materials on carious class V lesions All languages</p>	<p>Interventionen: Resin composite (RC)</p> <p>Kontrolle: Glass ionomer Cement (GIC)/resin- modified GIC (RMGIC), Amalgam (AM)</p>	<p>Longevity/retention</p> <p>Secondary caries</p> <p>(2 studies used USPHS criteria)</p>	<p>Studienzahl: 5 articles</p> <p>Population: 629 (269) lesions (patients)</p> <p><i>Cumulative failure:</i> N= 629 (269) 5 RC: 12m: 17/65 (26.1%) 24m: 35/91 (38.4%) AM: 24m: 0/35 (0.0%) GIC: 12m: 50/138 (36.2%) 24m: 101/123 (82.1%) RMGIC: 12m: 22/129 (17.0%) 24m: 35/48 (72.9%)</p> <p><i>Recurrent marginal caries:</i> N= 629 (269) 5 RC: 12m: 12/64 (18.7%) 24m: 17/69 (24.6%) AM: 24m: - GIC: 12m: 2/104 (1.9%) 24m: 2/51 (3.9%) RMGIC: 12m: 6/124 (4.8%) 24m: 8/36 (22.2%)</p>	<p>Notes: Considerable heterogeneity in study population and design; high caries risk, post-radiation, xerostomic elderly patients</p> <p>No meta- analysis was conducted</p> <p>Risk of Bias Assessment: Cochrane Collaboration's Tool</p> <p>2 studies with high risk of bias, 3 studies with low risk of bias</p> <p>AMSTAR-2 Assessment: Low quality</p>	<p>De Moor et al. 2011¹⁶²</p> <p>Lo et al. 2006⁴¹²</p> <p>McComb et al 2002⁴⁸³</p> <p>Wood et al. 1993⁸⁵⁰</p> <p>Levy and Jensen 1990⁴⁰⁴</p>	<p>There is insufficient evidence to recommend any specific material for routine use in the restoration of root carious lesions</p>

a. Outcomes listed only as far as relevant to the PICO question

HEINTZE ET AL. 2010

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Heintze et al. 2010</p> <p>Systematic Review</p> <p>PMID: 20638116</p>	<p>Studientyp: RCTs CCTs</p> <p>Nonrandomized clinical studies</p> <p>Suchzeitraum: MEDLINE (12/2008) IADR (1994-2008)</p> <p>Datenbanken: MEDLINE, IADR abstracts</p> <p>Einschlusskriterien: At least one adhesive system in Class V cavities; minimal follow-up of 18 months; report on operating technique</p>	<p>Intervention: Composite resin (CR) (4 categories: 3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch)</p> <p>Komparator: Glass ionomer cement (GIC), Resin-based GIC (RMGIC); Polyacid-modified resin composite (PMRC)</p>	<p>Longevity/loss of retention Marginal discoloration Marginal adaptation</p> <p>(Clinical index, combining the former three clinical outcomes)</p>	<p>Studienzahl: 50 articles</p> <p>Population: 105 lesions patient number not reported</p> <p><i>Loss of retention:</i> RMGIC/ GIC: 0.0 (reference) 1-Step SE AS: 0.371 2-Step SE AS: 0.026 2-Step ER AS: 0.446 3-Step ER AS: 0.219 PMRC: 0.416 Class AS: p=0.000</p> <p><i>Marginal discoloration:</i> RMGIC/ GIC: 0.0 (reference) 1-Step SE AS: -0.096 2-Step SE AS: -0.389 2-Step ER AS: -0.245 3-Step ER AS: -0.287 PMRC: -0.028 Class AS: p=0.063</p>	<p>Notes: Linear mixed model</p> <p>Trials only reported in congress abstracts also included</p> <p>Risk of Bias Assessment: Not reported</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Brunton et al. 1999¹⁰² Abdalla et al. 1997a¹⁷ Abdalla et al. 1997b¹⁶ Abdalla et al. 2002²¹ Abdalla et al. 2006²⁰ Abdalla et al. 2007¹⁹ Hennig et al. 2004³¹¹ Smith et al. 2000⁷⁰⁸ Alhadainy et al. 1996³⁰ Van Meerbeek et al. 1996⁸¹⁷ Van Meerbeek et al. 2004⁸¹⁶ Van Meerbeek et al. 1993⁸¹⁴ van Dijken et al. 2000⁷⁷⁷ van Dijken et al. 2004⁷⁸⁰ Kubo et al. 2006³⁸³ Türkün et al. 2003⁷⁵² Türkün et al. 2008⁷⁴⁹ Peumans et al. 2003⁵⁸⁹ Peumans et al. 2005⁵⁸⁶ Perdigão et al. 2005⁵⁶⁸ Folwaczny et al. 2001²⁴⁰ Loguercio et al. 2003⁴²⁰ Demirci et al. 2008¹⁷⁶ Gladys et al. 1998²⁸³ Burgess et al. 2004¹⁰⁴ Franco et al. 2006²⁴⁷ Gallo et al. 2005²⁶⁸ Ermis et al. 2002²¹⁵ Onal et al. 2005⁵³⁷</p>	<p>The 2-step self-etching adhesive systems performed better than the 3-step etch & rinse systems, followed by the glass ionomer cements, resin-modified glass ionomer cements, the 2-step etch & rinse systems, polyacid resin cements and 1-step-self-etch adhesives</p>

				<p><i>Marginal adaptation:</i> RMGIC/ GIC: 0.0 (reference) 1-Step SE AS: 0.135 2-Step SE AS: -0.222 2-Step ER AS: 0.011 3-Step ER AS: -0.098 PMRC: 0.040 Class AS: p = 0.538</p> <p><i>Clinical index:</i> (reference) RMGIC/ GIC: 0.0 1-Step SE AS: 0.139 2-Step SE AS: -0.192 2-Step ER AS: 0.107 3-Step ER AS: -0.058 PMRC: 0.120 Class AS: p = 0.027</p>		<p>Brackett et al. 1999⁹³ Brackett et al. 2001⁹⁰ Brackett et al. 2003⁹² Brackett et al. 2005⁸⁸ Hörsted Bindslev et al. 1996³²⁶ Ritter et al. 2008⁶³³ Schattenberg et al. 2008⁶⁶⁴ Powell et al. 1992⁶⁰² Aw et al. 2005⁴³ Baratieri et al. 2003⁵² Belluz et al. 2005⁶⁶ Schwartz et al. 2000⁶⁷⁷ Swift et al. 2001⁷³⁰ Merte et al. 2000⁴⁸⁷ Perdigão et al. 2005⁵⁶⁹ Dalton Bittencourt et al. 2005¹⁵⁵ Pollington et al. 2008⁵⁹⁷ Duke et al. 1991²⁰² Browning et al. 2000⁹⁸ Özgünaltay et al. 2002⁵⁵⁴ Matis et al. 2004⁴⁸²</p>	
--	--	--	--	--	--	---	--

a. Outcomes listed only as far as relevant to the PICO question

MAHN ET AL. 2015

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Mahn et al. 2015</p> <p>Systematic Review</p> <p>PMID: 33532599</p>	<p>Studientyp: RCTs CCTs</p> <p>Nonrandomized clinical studies</p> <p>Suchzeitraum: 1955-2012</p> <p>Datenbanken: Medline and Scopus</p> <p>Einschlusskriterien: Prospective clinical trial published in ISI journal with at least one adhesive in cervical lesions, at least 18 months follow-up, description of operating technique</p>	<p>Intervention: Composite resin (CR) (4 categories: 3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch)</p> <p>Komparator: Glass ionomer cement (GIC), Resin-based GIC (RMGIC); Polyacid-modified resin composite (PMRC)</p>	<p>Longevity/loss of retention Marginal discoloration Marginal adaptation</p> <p>(Clinical index, combining the former three clinical outcomes)</p>	<p>Studienzahl: 81</p> <p>Population: Number of lesions and patients not reported</p> <p>There were significant differences between different adhesive systems, RMGIC/GIC and PMRC regarding retention ($p < 0.001$), marginal discoloration ($p = 0.006$) and clinical index ($p = 0.002$)</p>	<p>Notes: no mention of who conducted the literature search and how. No mention of heterogeneity.</p> <p>Linear mixed model</p> <p>Combined analysis of RMGIC/GIC</p> <p>Risk of Bias Assessment: Not assessed</p> <p>AMSTAR-2 Assessment: Critically Low quality</p>	<p>Abdalla et al. 2006²⁰ Abdalla et al. 2002²¹ Abdalla et al. 2008¹⁸ Abdalla et al. 1997¹⁷ Abdalla et al. 1997b¹⁶ Abdalla et al. 2007¹⁹ Akimoto et al. 2007²⁷ Alhadainy et al. 1996³⁰ Aw et al. 2005⁴³ Baratier et al. 2003⁵² Belluz et al. 2005⁶⁶ Brackett et al. 2003⁹² Brackett et al. 2005⁸⁸ Brackett et al. 1999⁹³ Brackett et al. 2001⁹⁰ Brackett et al. 2010⁸⁶ Browning et al. 2000⁹⁸ Brunton et al. 1999¹⁰² Burgess et al. 2004¹⁰⁴ Burrow et al. 2012¹¹⁸ Celik et al. 2007¹²⁴ Dalton Bittencourt et al. 2005¹⁵⁵ Demirci et al. 2008¹⁷⁶ De Moor et al. 2011¹⁶² Duke et al. 1991²⁰² Ermis et al. 2008²¹⁸ Ermis et al. 2002²¹⁵ Ermis et al. 2012²¹⁹ Folwaczny et al. 2000²⁴¹ Franco et al. 2006²⁴⁷ Fron et al. 2011²⁶¹ Gallo et al. 2005²⁶⁸ Gladys et al. 1998²⁸³ Henning et al. 2004³¹¹ Hörsted-Blindslev et al. 1996³²⁶ Karaman et al. 2012³⁴⁸ Kim et al. 2009³⁵⁵ Kubo et al. 2009³⁸⁵ Kubo et al. 2006³⁸³</p>	<p>Composite resin restorations placed with two-step self-etching and three-step etch-and-rinse adhesive systems should be preferred over one-step self-etching adhesive systems, GIC-based materials and PMRCs</p>

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Kubo et al. 2010³⁸⁴ Loguercio et al. 2010⁴¹⁷ Loguercio et al. 2003⁴²⁰ Loguercio et al. 2007⁴¹⁴ Loguercio et al. 2008⁴¹⁹ Loguercio et al. 2011⁴¹⁸ Mandras et al. 1997⁴⁵¹ Matis et al. 2004⁴⁸² Merte et al. 2000⁴⁸⁷ Onal et al. 2005⁵³⁷ Özgünaltay et al. 2002⁵⁵⁴ Perdigao et al. 2005⁵⁶⁹ Perdigao et al. 2012⁵⁷³ Perdigao et al. 2015b⁵⁶⁸ Peumanns et al. 2005⁵⁸⁶ Peumanns et al. 2003⁵⁸⁹ Peumanns et al. 2012⁵⁸³ Peumanns et al. 2010⁵⁸⁴ Pollington et al. 2008⁵⁹⁷ Powell et al. 1992⁶⁰² Reis et al. 2010⁶²⁵ Reis et al. 2009⁶²⁴ Reis et al. 2006⁶²³ Ritter et al. 2009⁶³⁴ Ritter et al. 2008⁶³³ Sartori et al. 2012⁶⁶³ Schattenberg et al. 2008⁶⁶⁴ Sugizaki et al. 2007⁷²⁷ Swift et al. 2001⁷³⁰ Türkün et al. 2003⁷⁵² Türkün et al. 2008⁷⁴⁹ Tyas et al. 1989⁷⁶² Tyas 1996⁷⁵⁶ Van Dijken 2000⁷⁷⁷ Van Dijken 2010⁷⁸² Can Dijken 2004⁷⁸⁰ Van Landuyt et al. 2011⁸¹³ Van Meerbeel et al. 1993⁸¹⁴ Van Meerbeek et al. 2004⁸¹⁶ Van Meerbeek et al. 1996⁸¹⁷ Yazici et al. 2010⁸⁵⁹ Zander-Grande et al. 2011⁸⁶³</p>
--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

MEYER-LUECKEL ET AL. 2019

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Meyer-Lueckel et al. 2019</p> <p>Systematic Review</p> <p>PMID: 31412343</p>	<p>Studientyp: RCTs CCTs Nonrandomized clinical studies</p> <p>Suchzeitraum: No restrictions as to publication date – Feb 2019</p> <p>Datenbanken: Pubmed</p> <p>Einschlusskriterien: Adults, natural tooth, exposed cervical area, with or without root caries lesion (RCL), non- or cavitated RCL With/ without xerostomy after radiatio of head and neck</p>	<p>Intervention: Composite resin (CR)</p> <p>Komparator: Glass ionomer cement (GIC), Resin-based GIC (RMGIC)</p>	<p>Longevity/ retention loss</p>	<p>Studienzahl: 9 studies (7 for meta-analysis)</p> <p>Population: 1458 patients 1222 lesions</p> <p><i>Retention</i></p> <p>GIC vs. Comp: Patient without radiation: OR: 1.89 [95% CI: 0.60, 5.95] Patients without radiation (retrospective studies): OR: 1.17 [95% CI:0.73, 1.87] Patients with radiation: OR: 12.37 [95% CI: 3.66, 41.83] Total [95% CI]: OR: 2.94 [95% CI:1.12, 7.71]</p> <p>RMGIC vs. Comp: Patients without radiation: OR: 1.93 [95% CI: 0.46, 8.10] Patients with radiation: OR: 2.81[95% CI:1.22, 5.30] Total [95% CI]: OR: 2.54 [95% CI:1.22, 5.30]</p>	<p>Risk of Bias Assessment: Risk of Bias assessment not sufficiently reported</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Levy & Jensen 1990⁴⁰⁴ Kaurich et al. 1991³⁴⁹ Duke et al. 1998²⁰³ McComb et al. 2002⁴⁸³ De Moor et al. 2011¹⁶² Hayes et al. 2016³⁰⁶ Wierichs et al. 2018⁸³⁶</p>	<p>When restoring conventionally, composites performed better than resin-modified and glass ionomer cements.</p>

a. Outcomes listed only as far as relevant to the PICO question

PEUMANS ET AL. 2005

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Peumans et al. 2005</p> <p>Sys. Review</p> <p>PMID: 16009415</p>	<p>Studientyp: RCTs CCTs</p> <p>Nonrandomized clinical studies</p> <p>Suchzeitraum: January 1998 – May 2004</p> <p>Datenbanken: Database not reported Search of IADR-AADR and ConsEuro abstracts</p> <p>Einschlusskriterien: RCTs, CCTs, nonrandomized clinical studies</p> <p>Treatment of noncarious cervical lesions (NCCL) with glass ionomer cement (convention and/or resin-modified) versus composite resin with different adhesive systems</p>	<p>Intervention: Composite resin (CR) (4 categories: 3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch)</p> <p>Komparator: Glass-ionomer cement (GIC)</p>	<p>Clinical longevity/retention (annual failure rates)</p>	<p>Studienanzahl: 85 (50 Abstracts, gleiche Studien wiederholen sich in den Publikationen)</p> <p>Population: Number of lesions treated or patient number not reported</p> <p><i>Annual failure rates (mean ± SD):</i></p> <p>3-step etch-and-rinse CR: 4.8 ± 4.2%</p> <p>2-step-etch-and-rinse CR: 6.2 ± 5.5%</p> <p>2-step-self-etch CR: 4.7 ± 5.0%</p> <p>1-step-self-etch CR: 8.1 ± 11.3%</p> <p>GIC: 1.9 ± 1.8%</p>	<p>Notes: No exclusion criteria regarding the clinical trials, type of clinical trial not specified, trials only reported in congress abstracts also included</p> <p>Results not weighted</p> <p>Risk of Bias Assessment: Was not performed</p> <p>AMSTAR-2 Assessment:</p> <p>Critically low quality</p>	<p>Akimoto et al. 2001, Abstr. No 232¹¹ Akimoto et al. 2004, Abstr. No 249⁶ Baratieri et al. 2003⁵² Benz et al. 1999, Abstr. No 1633¹³ Boghosian et al. 1998, Abstr. No 3123⁷ Boghosian et al. 1999 Abstr. No 1436¹³ Boghosian 2002 Abstr. No 192⁴ Brackett et al. 1999⁹³ Brackett et al. 2001a, Abstr. No 233¹¹ Brackett et al. 2001b⁹⁰ Brackett et al. 2002a⁹¹ Brackett et al. 2002b⁸⁵ Brackett et al. 2003⁹² Browning et al. 2000⁹⁸ Brunton et al. 1999¹⁰² Burrow and Tyas 1998¹¹⁵ Burrow and Tyas 1999a¹¹⁴ Burrow and Tyas 1999b, Abstr. No 2102¹³ Burrow and Tyas 2001, Abstr. No 1708¹² Burrow and Tyas 2003a, Abstr. No 904⁹ Burrow and Tyas 2003b¹¹⁶ Chinelatti et al. 2004¹³³ Di Lenarda et al. 2000¹⁸³ Dondi Dall'Orologio and Lorenzi 2004, Abstr. No 1375⁶ ElMahdy et al. 1999, Abstr. No 2099¹³ Ermis 2002²¹⁵ Folwaczny et al. 2000²⁴¹ Folwaczny et al. 2001a²⁴⁰ Folwaczny et al. 2001b²⁴²</p>	<p>The study revealed that glass-ionomers bond most effectively, three-step etch-and-rinse adhesives and two-step self-etch adhesives showed a clinically reliable and predictably good clinical performance. The clinical effectiveness of two-step etch-and-rinse adhesives was less favourable, while an inefficient clinical performance was noted for the one-step self-etch adhesives.</p>

	<p>(3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch)</p> <p>Outcome: Clinical longevity/ retention</p>					<p>Friedl et al. 2004, Abstract No 535⁶ Gaglianah et al. 2002, Abstr. No 428⁴ Gladys et al. 2001, Abstr. No 20² Helbig et al. 2004, Abstr. No 537⁶ Kiimm et al. 2002, Abstr. No 438⁴ Kubo et al. 2004, Abstr. No 539⁶ Latta et al. 1998, Abstr. 2582⁷ Latta et al. 2000a, Abstr. No 1030¹⁴ Latta et al. 2000b, Abstr. No 1027¹⁴ Latta et al. 2002, Abstr. No 193⁴ Loguercio et al. 2003⁴²⁰ Martin et al. 2002, Abstr. No 195⁴ McCoy et al. 1998⁴⁸⁴ Morigami et al., Abstr. No 2363⁹ Munoz et al. 2001, Abstr. No 237¹¹ Munoz et al. 2004, Abstr. No 541⁶ Ngo et al. 2001, Abstr. No 1460¹² Özer et al. 2004, Abstr. No 2841⁶ Özgünaltay and Önen 2002 554 Papathanasiou et al. 2004, Abstr. No 538⁶ Perdigão et al. 2001⁵⁷⁰ Peters et al. 1999, Abstr. No 2103¹³ Peters et al. 2001, Abstr. No 230¹¹ Peumans et al. 2001, Abstr. No 17² Peumans et al. 2003⁵⁸⁹ Platt et al. 1998, Abstr. No 1044⁵ Pollington and Van Noort 2002, Abstr. No 448⁴</p>	
--	---	--	--	--	--	---	--

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Pollington and Van Noort 2003, Abstr. No 11¹⁰ Prati et al. 1998⁶⁰⁹ Ripps et al. 2000, Abstr. No 1035¹⁴ Ripps et al. 2001, Abstr. No 231¹¹ Ripps et al. 2002, Abstr. No 446⁴ Rose et al. 2002, Abstr. No 429⁴ Schwartz et al. 1998, Abstr. No 1534⁵ Siegel et al. 1998, Abstr. No 2581⁷ Swift et al. 2001a⁷³² Swift et al. 2001b⁷³⁰ Türkün 2003⁷⁵² Tyas 1998⁷⁵⁵ Tyas and Burrow 2000⁷⁶⁰ Tyas 2000⁷⁵⁸ Tyas and Burrow 2001, Abstract No 1707¹² Tyas and Burrow 2002a⁷⁶¹ Tyas and Burrow 2002b⁷⁵⁹ Ünlü et al. 2002, Abstr. No 27⁸ Van Dijken 2000⁸⁰⁵ Van Dijken 2001, Abstract No. 42³ Van Dijken 2003, Abstr. No 8¹⁰ Van Dijken 2004a, Abstr. No 2840⁶ Van Dijken 2004b⁷⁶⁹ Van Meerbeek et al. 2003, Abstr. No S21¹ Van Meerbeek et al. Oper Dent (accepted) De Munck et al. 2003, Abstr. No 907⁹ Wicht et al. 1998, Abstr. No 672⁵ Wilder et al. 2001, Abstr. No 234¹¹</p>	
--	--	--	--	--	--	--	--

a. Outcomes listed only as far as relevant to the PICO question

PEUMANS ET AL. 2014

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Peumans et al. 2014</p> <p>Sys. Review</p> <p>PMID: 25091726</p>	<p>Studientyp: RCTs CCTs</p> <p>Suchzeitraum: 1950 – 2013</p> <p>Datenbanken: MEDLINE IADR Abstract search</p> <p>Einschlusskriterien: RCTs, CCTs</p> <p>Treatment of noncarious cervical lesions (NCCL) with glass ionomer cement (convention and/or resin-modified) versus composite resin with different adhesive systems (3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch, self-</p>	<p>Intervention: Composite resin (CR) (4 categories: 3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch)</p> <p>Komparator: Glass-ionomer cement (GIC)</p>	<p>Clinical longevity/retention (annual failure rates)</p>	<p>Studienanzahl: 87</p> <p>Population: Number of lesions treated or patient number not reported</p> <p><i>Annual failure rates (mean ± SD):</i> 3-step etch-and-rinse CR: 3.1 ± 2%</p> <p>2-step-etch-and-rinse CR: 5.8 ± 4.9%</p> <p>2-step-self-etch CR: 4.7 ± 5.7%</p> <p>1-step-self-etch CR: 4.4 ± 4.6%</p> <p>GIC: 2.0 ± 1.4%</p> <p>No trials for self-adhesive composites identified</p>	<p>Notes: Trials only reported in congress abstracts also included</p> <p>Risk of Bias Assessment: Was not performed</p> <p>AMSTAR-2 Assessment: Critically low quality</p>	<p>Reis et al. 2009⁶²² Ritter et al. 2009⁶³⁴ Swift et al. 2001a⁷³² Swift et al. 2001b⁷³⁰ Van Landuyt 2011⁸¹³ Van Landuyt 2014⁸¹² Ritter et al. 2008⁶³³ Van Dijken et al. 2008⁷⁹⁹ Loguercio et al. 2008⁴¹⁹ Celik et al. 2007¹²⁴ Van Dijken et al. 2007⁸⁰⁴ Peumans et al. 2007⁵⁸⁰ Van Meerbeek et al. 2004⁸¹⁶ Peumans et al. 2012⁵⁸³ Peumans et al. 2007⁵⁸¹ Peumans et al. 2005⁵⁸² Van Meerbeek et al. 2005⁸¹⁵ Loguercio et al. 2007⁴¹⁴ Burrow and Tyas 2007¹¹⁷ Abdalla and Garcia-Godoy 2006²⁰ Saboia et al. 2006⁶⁵⁵ Reis and Loguercio 2006⁶²³ Reis and Loguercio 2009⁶²⁴ Franco et al. 2006²⁴⁷ Kubo et al. 2006³⁸³ Kubo et al. 2008, Abstr. No 1786³⁸¹ Kubo et al. 2013, Abstr. No 3101³⁸⁰ Onal, Pamir (2005)⁵³⁷ Gladys et al. 1998²⁸³ Gladys et al. 2001, Abstr. No 33²⁸¹ Van Meerbeek et al. 1996⁸¹⁷ Ozgunaltay et al. 2002⁵⁵⁴ Ermis 2002²¹⁵ Folwaczny et al. 2001²⁴² Brackett et al. 2001⁹⁰ Matis et al. 1996⁴⁸¹ Perdigão et al. 2005⁵⁶⁹ Dalton Bittencourt et al. 2005¹⁵⁵</p>	<p>The lowest AFR scores were recorded for GIC, shortly followed by 2-step self-etch, 3-step etch-and-rinse and 1-step self-etch</p>

	<p>adhesive composites)</p> <p>Outcome: Clinical longevity/ retention</p>					<p>Bracket et al. 2005⁸⁸ Gallo et al. 2005²⁶⁸ Perdigão et al. 2005⁵⁶⁸ Turkun 2009, Abstr. No 623⁷⁴⁵ Turkun 2004, Abstr. No 226⁷⁴⁴ Aw et al. 2005⁴³ Matis et al. 2004⁴⁸² Van Dijken 2000⁷⁷⁷ Brackett et al. 1999⁹³ McCoy et al. 1988⁴⁸⁴ Abdalla et al. 1997¹⁶ Neo et al. 1996⁵²⁷ Brackett et al. 2003⁹² Kim et al.³⁵⁵ Brackett et al. 2010⁸⁶ Van Dijken et al. 2010⁷⁷¹ Burgess et al. 2004¹⁰⁴ Van Dijken 2004⁷⁶⁹ Loguercio et al. 2003⁴²⁰ Turkun 2003⁷⁵³ Gurgan et al. 2011, Abstr. No 2944²⁹¹ Kubo et al. 2009³⁸⁵ Kubo et al. 2011, Abstr. No 1144³⁷⁹ Barabanti et al. 2011, Abstr. No 146⁴⁸ Moretto et al. 2013⁵¹⁵ Ottenga et al. 2010, Abstr. No 684⁵⁴⁷ Ottenga et al. 2012, Abstr. No 804⁵⁴⁸ Dondi Dall'Orologio and Lorenzi 2004, Abstr. No 1375⁶ Dondi Dall'Orologio et al. 2010, Abstr. No 688¹⁹⁰ Dondi Dall'Orologio et al. 2009, Abstr. No 105¹⁹² Dondi Dall'Orologio and Lorenzi 2006, Abstr. No 1152²⁶⁵ Burrow and Tyas 2012¹¹⁸ Dondi Dall'Orologio et al. 2009, Abstr. No 547¹⁹³ Peschke et al. 2009, Abstr. No 552⁵⁷⁷ Ermis et al. 2012²¹⁹ Rodrigues et al. 2008, Abstr. No 1784⁶⁴³</p>	
--	---	--	--	--	--	--	--

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

						<p>Helbig et al. 2004, Abstr. No 537⁶ Friedl et al. 2004, Abstract No 535⁶ Platt et al. 1998, Abstr. No 1044⁵ Ngo et al. 2001, Abstr. No 1460¹² Ernst et al. 2007, Abstr. No 895²²¹ Elderton et al. 1977, Abstr. No 1185²¹² Santiago et al. 2010⁶⁵⁸ Fron et al. 2010²⁶¹ Brackett et al. 1977, Abstr. No 373⁸⁷ Zander-Grande et al. 2011⁸⁶³ Can Say et al. 2014¹²¹ Van Dijken et al. 2013⁷⁸³ Yaman et al. 2013⁸⁵⁷ Tuncer et al. 2013⁷⁴³ Qin et al. 2013⁶¹¹ Eliguzeloglu et al. 2012²¹³ Zander-Grande et al. 2014⁸⁶² Perdigão et al. 2014⁵⁷⁴ Dutra-Correa et al. 2013²⁰⁵ Burgess et al. 2013¹⁰⁵ Moosavi et al. 2013⁵¹³ Stojanac et al. 2013⁷¹⁷ Perdigão et al. 2012⁵⁷² Loguercio et al. 2013, Abstr. No 596⁴¹³ Blunck et al. 2013, Abstr. No 3109⁷⁷ Walter et al. 2013, Abstr. No 605⁸²⁴ Kurokawa et al. 2012, Abstr. No 803³⁸⁷ Robles et al. 2012, Abstr. No 805⁶⁴⁰ Ciampalini et al. 2012, Abstr. No 546¹³⁶ Dondi Dall'Orologio et al. 2008, Abstr. No 1785¹⁹¹</p>
--	--	--	--	--	--	---

a. Outcomes listed only as far as relevant to the PICO question

SANTOS ET AL. 2014

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerunge n durch die Autoren der Studie
<p>Santos et al. 2014</p> <p>Sys. Review</p> <p>PMID: 24671713</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: 1990- September 2013</p> <p>Datenbanken: Cochrane Central Register of Controlled Trials EMBASE LILACS Medline IADR Abstract search</p> <p>Einschlusskriterien: RCTs Minimum follow-up of three years; treatment of noncarious cervical lesions (NCCL) with glass ionomer cement (convention and/or resin-modified) or composite resin with different adhesive systems (3-step etch- and-rinse; 2-step-etch- and-rinse; 2-step-self- etch, 1-step-self-etch); Outcome: Clinical longevity/ retention</p>	<p>Intervention: Composite resin (CR) (4 categories: 3- step etch-and- rinse; 2-step- etch-and-rinse; 2-step-self- etch, 1-step- self-etch)</p> <p>Komparator: Glass-ionomer cement (GIC)</p>	<p>Clinical longevity/ retention</p>	<p>Studienanzahl: 27</p> <p>Population: N = 3362 lesions in 1219 patients</p> <p><i>3-step etch and rinse CR vs GIC:</i></p> <p>RR = 1.63 (CI 95% 1.10; 2.43) RD = 11% (CI 95% 3%, 19%)</p> <p><i>2-step etch and rinse CR vs GIC:</i></p> <p>RR = 6.46 (CI 95% 3.50; 11.89) RD = 46% (CI 95% 36%, 57%)</p> <p>(Higher RR and RD indicate higher risk of loss in CR)</p>	<p>Notes: Considerable heterogeneity for retention, color and surface texture</p> <p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool</p> <p>Many studies unclear/ high risk of bias</p> <p>AMSTAR-2 Assessment: Low quality</p>	<p>Van Dijken 2013⁷⁸³ Peumans et al. 2012⁵⁸³ Van Landuyt et al. 2011⁸¹³ Peumans et al. 2010⁵⁸³ Van Dijken et al. 2010⁷⁷¹ Kubo et al. 2010³⁸⁴ Wilder et al. 2009⁸³⁹ Reis et al. 2009⁶²⁴ Ritter et al. 2009⁶³⁴ Pollington et al. 2008⁵⁹⁷ Ritter et al. 2008⁶³³ Van Dijken and Palassen 2008⁷⁹⁹ Loguercio et al. 2007⁴¹⁴ Burrow et al. 2007¹¹⁷ Van Dijken et al. 2007⁸⁰⁴ Kubo et al. 2006³⁸³ Aw et al. 2005⁴³ Van Dijken 2005⁷⁸⁵ Matis et al. 2004⁴⁸² Baratieri et al. 2003⁵² Loguercio et al. 2003⁴²⁰ Ozgunalty et al. 2002⁵⁵⁵ Van Dijken 2000⁷⁷⁷ McCoy et al. 1998⁴⁸⁴ Van Dijken 1996⁷⁸¹ Matis et al. 1996⁴⁸¹ Hörsted-Bindslev et al. 1996³²⁶</p>	<p>A glass ionomer cement has a significantly lower risk of loss compared to either a three-step etch-and-rinse or a two-step etch-and- rinse adhesive system.</p>

a. Outcomes listed only as far as relevant to the PICO question

SCHWENDICKE ET AL. 2016

Referenz/ Studientyp	Untersuchte Studien	(verglichene) Interventionen ^a	untersuchte Endpunkte	Ergebnisse	Methodische Bemerkungen	Eingeschlossene Publikationen	Schlussfolgerungen durch die Autoren der Studie
<p>Schwendicke et al. 2016</p> <p>Sys. Review</p> <p>PMID: 26912220</p>	<p>Studientyp: RCTs</p> <p>Suchzeitraum: 2005 onward (end date not specified)</p> <p>Datenbanken: Cochrane Central Register of Controlled Trials EMBASE MEDLINE</p> <p>Einschlusskriterien: RCTs</p> <p>Treatment of cervical cavitated lesions with resin-modified glass ionomer cement or composite resin with different adhesive systems (3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch) or compomer or ormocer or silorane</p>	<p>Intervention: Composite resin (CR) (4 categories: 3-step etch-and-rinse; 2-step-etch-and-rinse; 2-step-self-etch, 1-step-self-etch)</p> <p>Komparator: Resin-modified Glass-ionomer cement (RMGIC) Compomer (CP) Silorane (SI) Ormocer (ORM)</p>	<p>Clinical longevity/retention</p>	<p>Studienanzahl: 36</p> <p>Population: N = 5330 lesions</p> <p><i>3-step etch and rinse CR vs RMGIC (1 study):</i> OR = 1.58 (CI 95% 0.96; 2.60)</p> <p><i>2-step etch and rinse CR vs RMGIC (5 studies):</i> OR = 5.23 (CI 95% 2.07;13.21)</p> <p><i>2-step self-etch CR vs RMGIC (2 studies):</i> OR = 2.0 (CI 95% 0,16; 25,11)</p> <p><i>2-step etch and rinse CR vs 2-step etch and rinse CP (1 study):</i> OR = 0.33 (CI 95% 0.11; 1.06)</p> <p><i>1-step self-etch CR vs 1-step self-etch CP (2 studies):</i> OR = 1.00 (CI 95% 0.23; 4.37)</p>	<p>Risk of Bias Assessment: Usage of Cochrane Collaboration Tool</p> <p>Most studies unclear or high risk of bias</p> <p>AMSTAR-2 Assessment: Moderate quality</p>	<p>Adeleke, Oginni 2012²³</p> <p>Aw et al. 2005⁴³</p> <p>Brackett et al. 2010⁸⁶</p> <p>Burgess et al. 2013¹⁰⁵</p> <p>Burrow et al. 2007¹¹⁷</p> <p>Celik et al. 2007¹²⁴</p> <p>Dalton Bittencourt et al. 2005¹⁵⁵</p> <p>Dutra-Correa et al. 2013²⁰⁵</p> <p>Eliguzeloglu et al. 2012²¹³</p> <p>Ermis et al. 2012²¹⁹</p> <p>Franco et al. 2006²⁴⁷</p> <p>Kim et al. 2009³⁵⁵</p> <p>Kubo et al. 2006³⁸³</p> <p>Loguercio et al. 2007⁴¹⁴</p> <p>Pollington et al. 2008⁵⁹⁷</p> <p>Qin et al. 2013⁶¹¹</p> <p>Stojanac et al. 2013⁷¹⁷</p> <p>Tuncer et al. 2013⁷⁴³</p> <p>Van Dijken et al. 2007⁸⁰⁴</p> <p>Van Dijken and Pallesen 2008⁷⁹⁹</p>	<p>Resin-modified glass ionomer cements had the highest chance of survival in cervical cavitated lesions; composites or compomers placed via 2-step self-etch and 3-step etch-and-rinse adhesives were ranked next. Restorations placed with 2-step etch-and-rinse or 1-step self-etch adhesives performed worst</p>

	<p>Outcome: Clinical longevity/ retention</p>			<p><i>2-step etch and rinse CR vs 1-step self-etch CP and 2-step self-etch CR vs 1-step self-etch CP (1 study):</i> OR = 1.43 (CI 95% 0.48; 4.25)</p> <p><i>2-step self-etch CR vs 2-step self-etch CP (1 study):</i> OR = 1.00 (CI 95% 0.06; 16.93)</p> <p><i>2-step etch and rinse CR vs 2-step etch and rinse ORM (2 studies):</i> OR = 0.91 (CI 95% 0.29; 2.81)</p> <p><i>First three ranks (SUCRA; mean rank):</i> RMGIC: 96; 1.3 3-step etch-and rinse CR: 69; 3.5 2-step self-etch CR: 60; 4.2</p> <p>(Higher OR indicates higher risk of loss in CR)</p>		<p>Van Dijken 2010⁷⁷¹ Van Landuyt et al. 2014⁸¹² Dondi dall'Orologio and Lorenzi 2014¹⁸⁹ Häfer et al. 2015²⁹⁵ Jyothi et al. 2011³⁴⁵ Koubi et al. 2006³⁶⁷ Moosavi et al. 2013⁵¹³ Paula et al. 2015¹⁶⁴ Perdigão et al. 2012a⁵⁷² Perdigão et al. 2012b⁵⁷³ Söderholm et al. 2013⁷⁰⁹ Türkün et al. 2005⁷⁴⁶ Türkün et al. 2008⁷⁴⁹ Van Dijken 2013⁷⁸³ Van Dijken and Pallesen 2012⁷⁹³ Zhou et al. 2009⁸⁶⁶</p>	
--	---	--	--	--	--	---	--

a. Outcomes listed only as far as relevant to the PICO question

SUMMARY OF EVIDENCE TABLE: COMPOSITE VS. GLASS IONOMER CEMENT

Frage: Sollte Komposit statt Glasionomercement (conventional and resin-modified) bei Klasse V Kavitäten angewandt werden?

Certainty assessment							№ der Restaurationen [§]		Wirkung [†]	Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Glasionomercement	Relativ oder Absolut (95% CI)		
Retention (Nachbeobachtung: Bereich 6 Monate bis 13 Jahre; bewertet mit: Überlebensrate/ Restaurationsverlust)											
10 ^l	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^{b,i}	nicht schwerwiegend ^{c,d}	nicht schwerwiegend	Publikationsbias nicht evaluiert	27/57 (47.4%) ^{h,81} 69/730 (13.2%) ^{h,74} 26/104 (25.0%) ^{h,489} 88/233 (37.8%) ^{h,659}	8/118 (0.07%) ^{h,81} 26/716 (3.6%) ^{h,74} 41/110 (37.3%) ^{h,489} 20/136 (14.7%) ^{h,659}	RR 0.13 ⁸¹ (0.06 bis 0.27) RD 0.07 ⁷⁴ (0.02 bis 0.12) OR 2.54 ⁴⁸⁹ (1.22 bis 5.30) RR 1.63 ⁶⁵⁹ (1.10 bis 2.43) RD 0.11 ⁶⁵⁹ (0.03 bis 0.19) OR 1.58 ^{l,680} (0.96 bis 2.60)	⊕⊕○○ Niedrig	KRITISCH
Marginale Adaptation (Nachbeobachtung: Bereich 12 Monate bis 13 Jahre; bewertet mit: FDI/USPHS criteria)											
4 ^j	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ^l	nicht schwerwiegend ^c	nicht schwerwiegend	Publikationsbias nicht evaluiert	119/198 (60.1%) ^{h,81} 98/646 (15.2%) ^{h,74}	77/163 (47.2%) ^{h,81} 63/679 (9.3%) ^{h,74}	RR 0.86 ⁸¹ (0.73 bis 1.01) RD 0.01 ⁷⁴ (-0.01 bis 0.04)	⊕⊕○○ Niedrig	KRITISCH
Marginale Verfärbung Nachbeobachtung: (Bereich 12 Monate bis 13 Jahre; bewertet mit: FDI/USPHS criteria)											

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ⁶		Wirkung ^k	Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Glasionomerzement	Relativ oder Absolut (95% CI)		
4 ^j	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^a	schwerwiegend ⁱ	nicht schwerwiegend ^c	nicht schwerwiegend	Publikationsbias nicht evaluiert	47/198 (23.7%) ^{h81} 79/756 (10.4%) ^{h74}	51/163 (31.3%) ^{h81} 59/758 (7.8%) ^h 74	RR 1.30 ⁸¹ (0.65 bis 2.63) RD 0.01 ⁷⁴ (-0.01 bis 0.03)	⊕⊕○○ Niedrig	WICHTIG
Anatomische Form (Nachbeobachtung: Bereich 12 Monate bis 36 Monate; bewertet mit: FDI/USPHS criteria)											
1	Systematic Review (including RCTs + NRSIs)	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	455/468 (97.2%) ^h	455/464 (98.1%) ^h	RD 0.00 (-0.02 bis 0.02)	⊕⊕⊕⊕ Hoch	WICHTIG
Farbe (Nachbeobachtung: Bereich 12 Monate bis 36 Monate; bewertet mit: FDI/USPHS criteria)											
2 ^j	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^f	schwerwiegend ^{b,i}	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	77/154 (50.0%) ^{h81} 45/540 (8.3%) ^{h74}	91/139 (65.5%) ^{h81} 75/563 (13.3%) ^{h74}	RR 1.29 ⁸¹ (0.70 bis 2.38) RD -0.02 ⁷⁴ (-0.08 bis 0.04)	⊕⊕○○ Niedrig	WICHTIG
Oberflächentextur (Nachbeobachtung: Bereich 12 Monate bis 36 Monate; bewertet mit: FDI/USPHS criteria)											
2 ^j	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^f	schwerwiegend ^{b,i}	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	19/115 (16.5%) ^{h81} 13/328 (4.0%) ^{h74}	44/71 (62.0%) ^{h81} 30/336 (8.9%) ^{h74}	RR 3.45 ⁸¹ (1.73 bis 6.89) RD -0.02 ⁷⁴ (-0.06 bis 0.02)	⊕⊕○○ Niedrig	WICHTIG
Sekundärkaries (Nachbeobachtung: Bereich 12 Monate bis 36 Monate; bewertet mit: FDI/USPHS criteria)											

Evidenzbericht S3-Leitlinie "Direkte Kompositrestaurationen an bleibenden Zähnen im Front- und Seitenzahnbereich"

Certainty assessment							№ der Restaurationen ^g		Wirkung ^k	Certainty	Wichtigkeit
№ der Studien	Studiendesign	Risiko für Bias	Inkonsistenz	Indirektheit	Fehlende Genauigkeit	Andere Faktoren	Komposit	Glasionomerzement	Relativ oder Absolut (95% CI)		
3 ^j	Systematic Reviews (including RCTs + NRSIs)	schwerwiegend ^f	nicht schwerwiegend	nicht schwerwiegend	nicht schwerwiegend	Publikationsbias nicht evaluiert	1/155 (0.01%) ^{h 81} 190/578 (32.9%) ^{h 74}	0/115 (0%) ^{h 81} 188/642 (29.3%) ^{h 74}	RR 0.00 ⁸¹ (-0.03 bis 0.02) RD 0.00 ⁷⁴ (-0.01 bis 0.01)	⊕⊕⊕○ Moderat	KRITISCH

CI: confidence interval; RR: risk ratio; RD: risk difference

Explanations

- a. Most systematic reviews showed unclear/high risk of bias of the included studies or did not assess the risk of bias of the included studies at all
- b. high heterogeneity in between the studies included in the reviews
- c. Differences in the retention of composite restorations were present regarding the type of adhesive system, subgroup analyses were performed in most reviews, see reported results in tables of included studies
- d. Differences in the retention of GIC vs. composite were found for patients with and without head and neck radiation in one systematic review, appropriate subgroup analysis was performed, see reported results in tables of included studies
- e. Only Risk Difference (RD) reported, no relative risk measure reported
- f. unclear/high risk of bias of many of the included studies
- g. number of patients not reported per outcome
- h. event = failure of the restoration outcome
- i. Although studies included in the reviews overlapped, different cut-offs were chosen regarding the FDI/USPHS criteria for the meta-analyses
- j. Studies included in the reviews overlap
- k. Relative or absolute risks so far as reported in the included systematic reviews. For further results, see tables of included studies
- l. OR calculated in favor of resin-modified GIC

ÜBERSICHTSTABELLE DER AMSTAR-2 EVALUATION SYSTEMATISCHER REVIEWS

	1 ^a	2 ^b	3 ^c	4 ^d	5 ^e	6 ^f	7 ^g	8 ^h	9.1 ⁱ	9.2 ^j	10 ^k	11.1 ^l	11.2 ^m	12 ⁿ	13 ^o	14 ^p	15 ^q	16 ^r	Overall
Afrashtehfar et al. 2017	Y	N	Y	Y	Y	N	Y	Y	Y	PY	Y	N	Y	N	Y	N	N	Y	Low quality
Alcaraz et al. 2014	Y	Y	N	Y	Y	Y	Y	Y	Y	*2	Y	Y	*3	Y	Y	Y	Y	Y	High quality
Antony et al. 2008	Y	N	N	Y	Y	Y	N	Y	Y	Y	N	*3	*3	*3	Y	Y	*3	Y	Low quality
Astvaldsdottir et al. 2015	Y	N	N	PY	Y	Y	Y	Y	PY	PY	N	N	N	Y	Y	N	N	Y	Low quality
Beck et al. 2015/Brunthaler 2003	Y	N	N	PY	N	N	N	PY	N	N	N	N	N	N	N	N	N	N	Critically low quality
Bezerra et al. 2020	Y	PY	N	PY	Y	Y	N	Y	Y	Y	N	Y	N	Y	Y	Y	N	Y	Low quality
Boing et al. 2018	Y	Y	Y	Y	Y	Y	N	Y	PY	*2	N	Y	*3	Y	Y	N	N	N	Moderate quality
Da Veiga et al. 2016	Y	PY	N	Y	Y	Y	Y	Y	Y	*2	Y	Y	*3	Y	Y	Y	N	Y	Moderate quality
Demarco et al. 2012	N	N	N	N	N	N	N	N	N	N	N	*3	*3	*3	N	N	N	N	Critically low quality
Dietschi et al. 2019	Y	N	N	PY	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Critically low quality
Downer et al. 1999	Y	N	N	Y	N	N	Y	N	N	N	N	*3	*3	*3	Y	N	*3	N	Critically low quality
El Mowafy et al. 1994	Y	N	N	N	N	N	PY	PY	N	N	N	Y	N	N	N	Y	N	N	Critically low quality
Hayes et al. 2016	Y	Y	N	Y	Y	Y	N	Y	*1	N	N	*3	*3	*3	Y	N	*3	N	Low quality
Heintze et al. 2010	Y	PY	N	PY	N	N	N	N	*1	N	N	*3	N	N	N	N	N	N	Critically low quality
Heintze et al. 2012	Y	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Critically low quality
Hickel et al. 2001	Y	N	Y	N	N	N	N	PY	*1	N	N	*3	*3	*3	N	N	*3	N	Critically low quality
Kodzaeva et al. 2019	Y	N	N	PY	N	N	N	PY	N	N	N	N	N	N	N	N	N	Y	Critically low quality

Magno et al. 2016	Y	PY	N	PY	Y	Y	PY	PY	Y	*2	PY	Y	*3	Y	Y	Y	N	N	Moderate quality
Mahn et al. 2015	Y	PY	N	PY	N	N	N	Y	*1	N	N	*3	Y	N	N	N	N	N	Critically low quality
Manhart et al. 2004	Y	N	N	N	N	N	N	PY	*1	N	N	*3	N	N	N	N	N	N	Critically low quality
Meyer-Lueckel et al. 2019	Y	PY	Y	PY	Y	Y	Y	Y	*1	N	N	*3	Y	N	N	N	N	Y	Critically low quality
Moraschini et al. 2015	Y	PY	Y	PY	Y	Y	N	PY	N	PY	N	Y	N	Y	Y	Y	Y	N	Low quality
Opdam et al. 2014	Y	N	N	PY	Y	N	N	PY	N	N	N	N	N	N	N	N	N	Y	Critically low quality
Peumanns et al. 2005	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Y	Critically low quality
Peumanns et al. 2014	Y	N	N	PY	Y	Y	N	N	N	N	N	N	N	N	N	N	N	N	Critically low quality
Santos et al. 2014	Y	N	Y	Y	Y	Y	Y	Y	Y	*2	N	Y	*3	N	Y	Y	N	N	Low quality
Schwendicke et al. 2016	Y	N	Y	PY	Y	Y	Y	Y	Y	*2	N	Y	*3	Y	Y	N	Y	Y	Moderate quality
Van de Sande et al. 2016	Y	N	N	PY	Y	Y	N	Y	N	N	N	*3	*3	*3	N	N	*3	Y	Critically low quality
Vetromilla et al. 2020	Y	Y	N	PY	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	N	N	Y	Low quality
Worthington et al. 2021	Y	Y	N	Y	Y	Y	Y	Y	Y	*2	Y	Y	*3	Y	Y	Y	Y	Y	High quality

Y= Yes, PY= Partial Yes, N= No, *¹ = included only NRSIs, *² = included only RCTs, *³ = No meta-analysis was conducted

Questions:

^a Did the research questions and inclusion criteria for the review include the components of PICO?

^b Did the report of the review contain an explicit statement that the review methods were established prior to the conduct of the review and did the report justify any significant deviations from the protocol?

^c Did the review authors explain their selection of the study designs for inclusion in the review?

^d Did the review authors use a comprehensive literature search strategy?

^e Did the review authors perform study selection in duplicate?

^f Did the review authors perform data extraction in duplicate?

^g Did the review authors provide a list of excluded studies and justify the exclusions?

^h Did the review authors describe the included studies in adequate detail?

ⁱ Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review? For RCTs:

^j Did the review authors use a satisfactory technique for assessing the risk of bias (RoB) in individual studies that were included in the review? For NRSIs:

^k Did the review authors report on the sources of funding for the studies included in the review?

^l If meta-analysis was performed did the review authors use appropriate methods for statistical combination of results?

^m If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis? For RCTs:

ⁿ If meta-analysis was performed, did the review authors assess the potential impact of RoB in individual studies on the results of the meta-analysis or other evidence synthesis? For NRSI:

^o Did the review authors account for RoB in individual studies when interpreting/ discussing the results of the review?

^p Did the review authors provide a satisfactory explanation for, and discussion of, any heterogeneity observed in the results of the review?

^q If they performed quantitative synthesis did the review authors carry out an adequate investigation of publication bias (small study bias) and discuss its likely impact on the results of the review?

^r Did the review authors report any potential sources of conflict of interest, including any funding they received for conducting the review?

ÜBERSICHTSTABELLE DER ROB-2 EVALUATION RANDOMISierter KONTROLLierter KLINISCHER STUDIEN

	D1	D2	D3	D4	D5	Overall			
Fennis et al. 2014									Low risk
El Aziz et al. 2020									Some concerns
Al-Khayatt et al. 2013									High risk
Gresnigt et al. 2012									
Meijering et al. 1998									

D1 Randomisation process

D2 Deviations from the intended interventions

D3 Missing outcome data

D4 Measurement of the outcome

D5 Selection of the reported result

ÜBERSICHTSTABELLE DER ROBINS-I EVALUATION NICHT RANDOMISIERTER KLINISCHER STUDIEN

Study	Risk of bias domains							Overall
	D1	D2	D3	D4	D5	D6	D7	
Alonso et al. 2012	-	+	+	+	+	-	+	-
Coelho et al. 2015	-	X	-	+	-	-	+	X
Deliperi et al. 2006	-	+	+	+	+	-	+	-
Demirci et al. 2008	-	-	+	+	-	-	X	X
Demirci et al. 2015	-	+	+	+	+	+	+	-
Frese et al. 2013	-	X	+	+	-	+	+	X
Frese et al. 2020	-	-	+	+	-	+	+	-
Lempel et al. 2017	-	X	+	+	+	-	+	X
Meijering et al. 1998	-	+	-	X	+	-	X	X
Peumans et al. 1997	-	-	+	+	+	-	+	-
Poyser et al. 2007	+	+	+	+	+	-	+	-
Smales et al. 1992	X	-	-	X	-	+	+	X

Domains:
 D1: Bias due to confounding.
 D2: Bias due to selection of participants.
 D3: Bias in classification of interventions.
 D4: Bias due to deviations from intended interventions.
 D5: Bias due to missing data.
 D6: Bias in measurement of outcomes.
 D7: Bias in selection of the reported result.

Judgement
 X Serious
 - Moderate
 + Low

REFERENZEN

1. ConsEuro Abstracts. ConsEuro.
2. Continental European Division 35th Annual Meeting September 23-25, 1999 Montpellier, France. *Journal of Dental Research* 2001;80:1194-1255.
3. Continental European Division & Scandinavian Association for Dental Research: 4th Joint Meeting August 24-27, 2000 Warsaw, Poland. *Journal of Dental Research* 2001;80:1256-1306.
4. Spec Iss A. *J Dent Res* 2002;81.
5. Spec Iss A. *J Dent Res* 1998;77.
6. Spec Iss A/ CDrom. *J Dent Res* 2004;83.
7. Spec Iss B. *J Dent Res* 1998;77.
8. Spec Iss B. *J Dent Res* 2002;81.
9. Spec Iss B. *J Dent Res* 2003;82.
10. Spec Iss C. *J Dent Res* 2003;82.
11. Spec Iss/ AADR Abstracts. *J Dent Res* 2001;80.
12. Spec Iss/ IADR Abstracts. *J Dent Res* 2001;80.
13. Spec Iss/ IADR Abstracts. *J Dent Res* 1999;78.
14. Spec Iss/ IADR Abstracts. *J Dent Res* 2000;79.
15. Abdalla AI, Alhadainy HA. 2-year clinical evaluation of Class I posterior composites. *American journal of dentistry* 1996;9:150-152.
16. Abdalla AI, Alhadainy HA. Clinical evaluation of hybrid ionomer restoratives in Class V abrasion lesions: two-year results. *Quintessence Int* 1997;28:255-258.
17. Abdalla AI, Alhadainy HA, García-Godoy F. Clinical evaluation of glass ionomers and compomers in Class V carious lesions. *American journal of dentistry* 1997;10:18-20.
18. Abdalla AI, El Sayed HY. Clinical evaluation of a self-etch adhesive in non-carious cervical lesions. *American journal of dentistry* 2008;21:327-330.
19. Abdalla AI, Garcia-Godoy F. Clinical performance of a self-etch adhesive in Class V restorations made with and without acid etching. *J Dent* 2007;35:558-563.
20. Abdalla AI, García-Godoy F. Clinical evaluation of self-etch adhesives in Class V non-carious lesions. *Am J Dent* 2006;19:289-292.
21. Abdalla AI, Mahallawy SE, Davidson CL. Clinical and SEM evaluations of three compomer systems in Class V carious lesions. *J Oral Rehabil* 2002;29:714-719.
22. Aberg CH, van Dijken JW, Olofsson AL. Three-year comparison of fired ceramic inlays cemented with composite resin or glass ionomer cement. *Acta Odontol Scand* 1994;52:140-149.
23. Adeleke, Oginni A. Clinical evaluation of resin composite and resin-modified glass ionomer cement in non-carious cervical lesions. *J West Afr Coll Surg* 2012;2:21-37.
24. Ajlouni R, Ajlouni K, Abu-Hanna A. Maximizing the esthetics of anterior teeth by conservative restorative dentistry: resin-based composite veneers. *Texas Dental Journal* 2006;123:956-961.

25. Akerboom HB, Advokaat JG, Van Amerongen WE, Borgmeijer PJ. Long-term evaluation and reresoration of amalgam restorations. *Community Dent Oral Epidemiol* 1993;21:45-48.
26. Akimoto N, Ohmori K, Hanabusa M, Momoi Y. An eighteen-month clinical evaluation of posterior restorations with fluoride releasing adhesive and composite systems. *Dental materials journal* 2011;30:411-418.
27. Akimoto N, Takamizu M, Momoi Y. 10-year Clinical Evaluation of a Self-etching Adhesive System. *Operative Dentistry* 2007;32:3-10.
28. Al-Khayatt AS, Ray-Chaudhuri A, Poyser NJ, Briggs PF, Porter RW, Kelleher MG, et al. Direct composite restorations for the worn mandibular anterior dentition: a 7-year follow-up of a prospective randomised controlled split-mouth clinical trial. *J Oral Rehabil* 2013;40:389-401.
29. Al-Samhan A, Al-Enezi H, Alomari Q. Clinical evaluation of posterior resin composite restorations placed by dental students of Kuwait University. *Med Princ Pract* 2010;19:299-304.
30. Alhadainy HA, Abdalla AI. 2-year clinical evaluation of dentin bonding systems. *American journal of dentistry* 1996;9:77-79.
31. Allan DN. The durability of conservative restorations. *British dental journal* 1969;126:172-177.
32. Allan DN. A longitudinal study of dental restorations. *British dental journal* 1977;143:87-89.
33. Alonso V, Caserio M. A clinical study of direct composite full-coverage crowns: long-term results. *Oper Dent* 2012;37:432-441.
34. Alonso V, Darriba I, Caserío M. Retrospective evaluation of posterior composite resin sandwich restorations with Herculite XRV: 18-year findings. *Quintessence international (Berlin, Germany : 1985)* 2017;48:93-101.
35. Andersson-Wenckert IE, van Dijken JW, Horstedt P. Modified Class II open sandwich restorations: evaluation of interfacial adaptation and influence of different restorative techniques. *European Journal of Oral Sciences* 2002;110:270-275.
36. Andersson-Wenckert IE, van Dijken JWV, Kieri C. Durability of extensive Class II open-sandwich restorations with a resin-modified glass ionomer cement after 6 years. *American journal of dentistry* 2004;17:43-50.
37. Anonymous. Triodent V4 matrix system eases bulk-fill resin placement, improves polymerization. *Compendium of Continuing Education in Dentistry* 2014;35:436.
38. Antony K, Genser D, Hiebinger C, Windisch F. Longevity of dental amalgam in comparison to composite materials. *GMS Health Technology Assessment* 2008;4:Doc12.
39. Arhun N, Cehreli SB. Do adhesive systems leave resin coats on the surfaces of the metal matrix bands? An adhesive remnant characterization. *International Journal of Periodontics & Restorative Dentistry* 2013;33:e43-50.
40. Arhun N, Celik C, Yamanel K. Clinical evaluation of resin-based composites in posterior restorations: two-year results. *Oper Dent* 2010;35:397-404.
41. Arnelund CF, Johansson A, Ericson M, Häger P, Fyrberg KA. Five-year evaluation of two resin-retained ceramic systems: a retrospective study in a general practice setting. *The International journal of prosthodontics* 2004;17:302-306.
42. Askar H, Krois J, Gostemeyer G, Schwendicke F. Secondary caries risk of different adhesive strategies and restorative materials in permanent teeth: Systematic review and network meta-analysis. *Journal of Dentistry* 2021;104:103541.

43. Aw TC, Lepe X, Johnson GH, Mancl LA. A three-year clinical evaluation of two-bottle versus one-bottle dentin adhesives. *J Am Dent Assoc* 2005;136:311-322.
44. Bachelard B, Becker M, Bonté E, Nebot D, Pujol F, Zha J, et al. Evaluation clinique d'un système adhésif de quatrième génération dans les restaurations composites antérieures : Résultats à un an. *Revue d'odonto-stomatologie* 1997;26:11-25.
45. Baillod R, Krejci I, Lutz F. ["Adhesive anterior tooth restorations" with the use of dentin bonding with and without a cavity liner]. *Schweizer Monatsschrift für Zahnmedizin* 1994;104:290-296.
46. Baldissera RA, Corrêa MB, Schuch HS, Collares K, Nascimento GG, Jardim PS, et al. Are there universal restorative composites for anterior and posterior teeth? *J Dent* 2013;41:1027-1035.
47. Balevi B. Caries risk and number of restored surfaces have impact on the survival of posterior composite restorations. *Evidence-Based Dentistry* 2014;15:118-119.
48. Barabanti N, Cerutti F, Acquaviva PA, A C. 24-Month clinical evaluation of class-V restorations with two different composites, Abstr. No 146. *J Dent Res* 2011;90A.
49. Barabanti N, Gagliani M, Roulet JF, Testori T, Ozcan M, Cerutti A. Marginal quality of posterior microhybrid resin composite restorations applied using two polymerisation protocols: 5-year randomised split mouth trial. *Journal of Dentistry* 2013;41:436-442.
50. Baracco B, Perdigão J, Cabrera E, Ceballos L. Two-year clinical performance of a low-shrinkage composite in posterior restorations. *Oper Dent* 2013;38:591-600.
51. Baracco B, Perdigão J, Cabrera E, Giráldez I, Ceballos L. Clinical Evaluation of a Low-shrinkage Composite in Posterior Restorations: One-Year Results. *Operative Dentistry* 2012;37:117-129.
52. Baratieri LN, Canabarro S, Lopes GC, Ritter AV. Effect of resin viscosity and enamel beveling on the clinical performance of Class V composite restorations: three-year results. *Oper Dent* 2003;28:482-487.
53. Baratieri LN, Ritter AV. Four-year clinical evaluation of posterior resin-based composite restorations placed using the total-etch technique. *J Esthet Restor Dent* 2001;13:50-57.
54. Barghi N, Berry TG. Clinical evaluation of etched porcelain onlays: a 4-year report. *Compend Contin Educ Dent* 2002;23:657-660, 662, 664 passim; quiz 674.
55. Barnes DM, Blank LW, Thompson VP, Holston AM, Gingell JC. A 5- and 8-year clinical evaluation of a posterior composite resin. *Quintessence Int* 1991;22:143-151.
56. Barregard L, Trachtenberg F, McKinlay S. Renal effects of dental amalgam in children: the New England children's amalgam trial. *Environ Health Perspect* 2008;116:394-399.
57. Barros M, De Queiroz Rodrigues MI, Muniz F, Rodrigues LKA. Selective, stepwise, or nonselective removal of carious tissue: which technique offers lower risk for the treatment of dental caries in permanent teeth? A systematic review and meta-analysis. *Clinical Oral Investigations* 2020;24:521-532.
58. Bartlett D, Sundaram G. An up to 3-year randomized clinical study comparing indirect and direct resin composites used to restore worn posterior teeth. *Int J Prosthodont* 2006;19:613-617.
59. Beck F, Dumitrescu N, König F, Graf A, Bauer P, Sperr W, et al. One-year evaluation of two hybrid composites placed in a randomized-controlled clinical trial. *Dental Materials* 2014;30:824-838.
60. Behle CA. Conservative direct and indirect resin posterior restorative alternatives for cracked dentition. *Practical Periodontics & Aesthetic Dentistry* 1997;9:405-413; quiz 414.

61. Beier US, Kapferer I, Dumfahrt H. Clinical long-term evaluation and failure characteristics of 1,335 all-ceramic restorations. *Int J Prosthodont* 2012;25:70-78.
62. Bekes K, Boeckler L, Gernhardt CR, Schaller HG. Clinical performance of a self-etching and a total-etch adhesive system - 2-year results. *J Oral Rehabil* 2007;34:855-861.
63. Belcheva AB. Esthetic restoration of traumatized permanent teeth in children using composite vestibular veneers (preliminary communication). *Folia Medica (Plovdiv)* 2001;43:9-11.
64. Bellinger DC, Daniel D, Trachtenberg F, Tavares M, McKinlay S. Dental amalgam restorations and children's neuropsychological function: the New England Children's Amalgam Trial. *Environ Health Perspect* 2007;115:440-446.
65. Bellinger DC, Trachtenberg F, Zhang A, Tavares M, Daniel D, McKinlay S. Dental amalgam and psychosocial status: the New England Children's Amalgam Trial. *J Dent Res* 2008;87:470-474.
66. Belluz M, Pedrocca M, Gagliani M. Restorative treatment of cervical lesions with resin composites: 4-year results. *American journal of dentistry* 2005;18:307-310.
67. Belvedere PC. Direct bulk placement for posterior composites using an anatomically shaped clear matrix creating true anatomic interproximal surfaces. *Journal of the Indiana Dental Association* 2006;85:14-18.
68. Belvedere PC. Posterior composites: injecting composite resins and using Mylar matrix bands will eliminate gingival margin failures and increase tight contacts. *Northwest Dentistry* 1994;73:19-22.
69. Bentley C, Drake CW. Longevity of restorations in a dental school clinic. *J Dent Educ* 1986;50:594-600.
70. Berg NG, Dérand T. A 5-year evaluation of ceramic inlays (CEREC). *Swedish dental journal* 1997;21:121-127.
71. Bernardo M, Luis H, Martin MD, Leroux BG, Rue T, Leitao J, et al. Survival and reasons for failure of amalgam versus composite posterior restorations placed in a randomized clinical trial. *J Am Dent Assoc* 2007;138:775-783.
72. Bernardo M, Luis H, Martin MD, Leroux BG, Rue T, Leitão J, et al. Survival and reasons for failure of amalgam versus composite posterior restorations placed in a randomized clinical trial. *The Journal of the American Dental Association* 2007;138:775-783.
73. Bessing C, Lundqvist P. A 1-year clinical examination of indirect composite resin inlays: a preliminary report. *Quintessence international (Berlin, Germany : 1985)* 1991;22:153-157.
74. Bezerra IM, Brito ACM, de Sousa SA, Santiago BM, Cavalcanti YW, de Almeida LFD. Glass ionomer cements compared with composite resin in restoration of noncarious cervical lesions: A systematic review and meta-analysis. *Heliyon* 2020;6:e03969.
75. Bindl A, Mörmann WH. Clinical and SEM evaluation of all-ceramic chair-side CAD/CAM-generated partial crowns. *Eur J Oral Sci* 2003;111:163-169.
76. Bjertness E, Sønju T. Survival analysis of amalgam restorations in long-term recall patients. *Acta Odontol Scand* 1990;48:93-97.
77. Blunck U, Steidten J, Sandberg N, P Z. Two-year clinical performance of one-step self-etch adhesives in cervical restorations, Abstr. No. 3109. *J Dent Res* 2013;92A.
78. Boeckler A, Boeckler L, Eppendorf K, Schaller H, Gernhardt C. A Prospective, Randomized Clinical Trial of a Two-step Self-etching vs Two-step Etch-and-Rinse Adhesive and SEM Margin Analysis: Four-year Results. *The Journal of Adhesive Dentistry* 2012;14:585-592.

79. Boeckler A, Schaller HG, Gernhardt CR. A prospective, double-blind, randomized clinical trial of a one-step, self-etch adhesive with and without an intermediary layer of a flowable composite: a 2-year evaluation. *Quintessence international* (Berlin, Germany : 1985) 2012;43:279-286.
80. Bogacki RE, Hunt RJ, del Aguila M, Smith WR. Survival analysis of posterior restorations using an insurance claims database. *Oper Dent* 2002;27:488-492.
81. Boing TF, de Geus JL, Wambier LM, Loguercio AD, Reis A, Gomes OMM. Are Glass-Ionomer Cement Restorations in Cervical Lesions More Long-Lasting than Resin-based Composite Resins? A Systematic Review and Meta-Analysis. *J Adhes Dent* 2018;20:435-452.
82. Boksman L, Jordan RE, Suzuk M, Charles DH. A visible light-cured posterior composite resin: results of a 3-year clinical evaluation. *The Journal of the American Dental Association* 1986;112:627-631.
83. Borgia E, Baron R, Borgia JL. Quality and Survival of Direct Light-Activated Composite Resin Restorations in Posterior Teeth: A 5- to 20-Year Retrospective Longitudinal Study. *Journal of Prosthodontics* 2019;28:e195-e203.
84. Bottenberg P, Jacquet W, Alaerts M, Keulemans F. A prospective randomized clinical trial of one bis-GMA-based and two ormocer-based composite restorative systems in class II cavities: Five-year results. *J Dent* 2009;37:198-203.
85. Brackett MG, Dib A, Brackett WW, Estrada BE, Reyes AA. One-year clinical performance of a resin-modified glass ionomer and a resin composite restorative material in unprepared Class V restorations. *Oper Dent* 2002;27:112-116.
86. Brackett MG, Dib A, Franco G, Estrada BE, Brackett WW. Two-year clinical performance of Clearfil SE and Clearfil S3 in restoration of unabraded non-carious class V lesions. *Oper Dent* 2010;35:273-278.
87. Brackett WW, Gilpatrick RO, Browning WD, PN. G. Clinical performance of a light-cured glass ionomer restorative material, Abstr. No. 373. *J Dent Res* 1977;76:185.
88. Brackett WW, Brackett MG, Dib A, Franco G, Estudillo H. Eighteen-month clinical performance of a self-etching primer in unprepared class V resin restorations. *Oper Dent* 2005;30:424-429.
89. Brackett WW, Browning WD, Brackett MG, Callan RS, Blalock JS. Effect of Restoration Size on the Clinical Performance of Posterior "Packable" Resin Composites Over 18 Months. *Operative Dentistry* 2007;32:212-216.
90. Brackett WW, Browning WD, Ross JA, Brackett MG. Two-year clinical performance of a polyacid-modified resin composite and a resin-modified glass-ionomer restorative material. *Oper Dent* 2001;26:12-16.
91. Brackett WW, Covey DA, St Germain HA, Jr. One-year clinical performance of a self-etching adhesive in class V resin composites cured by two methods. *Operative Dentistry* 2002;27:218-222.
92. Brackett WW, Dib A, Brackett MG, Reyes AA, Estrada BE. Two-year clinical performance of Class V resin-modified glass-ionomer and resin composite restorations. *Oper Dent* 2003;28:477-481.
93. Brackett WW, Gilpatrick RO, Browning WD, Gregory PN. Two-year clinical performance of a resin-modified glass-ionomer restorative material. *Oper Dent* 1999;24:9-13.
94. Braga RR, Ballester RY, Ferracane JL. Factors involved in the development of polymerization shrinkage stress in resin-composites: a systematic review. *Dental Materials* 2005;21:962-970.

95. Braun AR, Frankenberger R, Krämer N. Clinical performance and margin analysis of ariston pHc versus Solitaire I as posterior restorations after 1 year. *Clin Oral Investig* 2001;5:139-147.
96. Browning DF. Alternative method for making ideal contacts when placing direct posterior composite resin. *Journal of the American Dental Association* 2000;131:809.
97. Browning WD. Critical appraisal. 2015 Update: Approaches to Caries Removal. *Journal of Esthetic & Restorative Dentistry: Official Publication of the American Academy of Esthetic Dentistry* 2015;27:383-396.
98. Browning WD, Brackett WW, Gilpatrick RO. Two-year clinical comparison of a microfilled and a hybrid resin-based composite in non-carious Class V lesions. *Oper Dent* 2000;25:46-50.
99. Brunson W, Bayne S, Sturdevant J, Roberson T, Wilder A, Taylor D. Three-year clinical evaluation of a self-cured posterior composite resin. *Dental Materials* 1989;5:127-132.
100. Brunthaler A, König F, Lucas T, Sperr W, Schedle A. Longevity of direct resin composite restorations in posterior teeth. *Clinical Oral Investigations* 2003;7:63-70.
101. Brunthaler A, König F, Lucas T, Sperr W, Schedle A. Longevity of direct resin composite restorations in posterior teeth: a review. *Clinical oral investigations* 2003;7:63-70.
102. Brunton PA, Cowan AJ, Wilson MA, Wilson NH. A three-year evaluation of restorations placed with a smear-layer-mediated dentin bonding agent in non-carious cervical lesions. *The Journal of Adhesive Dentistry* 1999;1:333-341.
103. Buchalla W, Attin T, Hellwig E. Influence of dentin conditioning on bond strength of light-cured ionomer restorative materials and polyacid-modified composite resins. *J Clin Dent* 1996;7:81-84.
104. Burgess JO, Gallo JR, Ripps AH, Walker RS, Ireland EJ. Clinical evaluation of four Class 5 restorative materials: 3-year recall. *American Journal of Dentistry* 2004;17:147-150.
105. Burgess JO, Sadid-Zadeh R, Cakir D, Ramp LC. Clinical evaluation of self-etch and total-etch adhesive systems in noncarious cervical lesions: a two-year report. *Oper Dent* 2013;38:477-487.
106. Burke EJ, Qualtrough AJ. Aesthetic inlays: composite or ceramic? *Br Dent J* 1994;176:53-60.
107. Burke F, Cheung SW, Möhr IA, Wilson NH. Restoration longevity and analysis of reasons for the placement and replacement of restorations provided by vocational dental practitioners and their trainers in the United Kingdom. *Quintessence International* 1999;30.
108. Burke F, Wilson N, Cheung S, Mjör I. Influence of patient factors on age of restorations at failure and reasons for their placement and replacement. *Journal of Dentistry* 2001;29:317-324.
109. Burke FJ, Crisp RJ, James A, Mackenzie L, Pal A, Sands P, et al. Two year clinical evaluation of a low-shrink resin composite material in UK general dental practices. *Dent Mater* 2011;27:622-630.
110. Burke FJ, Lucarotti PS, Holder R. Outcome of direct restorations placed within the general dental services in England and Wales (Part 4): influence of time and place. *J Dent* 2005;33:837-847.
111. Burke FJ, Lucarotti PS, Holder RL. Outcome of direct restorations placed within the general dental services in England and Wales (Part 2): variation by patients' characteristics. *J Dent* 2005;33:817-826.
112. Burke FJ, Shortall AC. Successful restoration of load-bearing cavities in posterior teeth with direct-replacement resin-based composite. *Dental Update* 2001;28:388-394, 396, 398.

113. Burke FJT, Crisp RJ, Balkenhol M, Bell TJ, Lamb JJ, McDermott K, et al. Two-year evaluation of restorations of a packable composite placed in UK general dental practices. *British dental journal* 2005;199:293-296.

114. Burrow M, Tyas M. 1-year clinical evaluation of one-step in non-carious cervical lesions. *American Journal of Dentistry* 1999;12:283-285.
115. Burrow M, Tyas M. Clinical evaluation of a resin-modified glass-ionomer adhesive system. *Oper Dent* 1998;23:290-293.
116. Burrow M, Tyas M. Clinical evaluation of an 'all-in-one' bonding system to non-carious cervical lesions—results at one year. *Australian dental journal* 2003;48:180-182.
117. Burrow MF, Tyas MJ. Clinical evaluation of three adhesive systems for the restoration of non-carious cervical lesions. *Oper Dent* 2007;32:11-15.
118. Burrow MF, Tyas MJ. Comparison of two all-in-one adhesives bonded to non-carious cervical lesions--results at 3 years. *Clin Oral Investig* 2012;16:1089-1094.
119. Busato AL, Loguercio AD, Reis A, Carrilho MR. Clinical evaluation of posterior composite restorations: 6-year results. *American journal of dentistry* 2001;14:304-308.
120. Cajazeira MR, De Saboia TM, Maia LC. Influence of the operatory field isolation technique on tooth-colored direct dental restorations. *American Journal of Dentistry* 2014;27:155-159.
121. Can Say E, Özel E, Yurdagüven H, Soyman M. Three-year clinical evaluation of a two-step self-etch adhesive with or without selective enamel etching in non-carious cervical sclerotic lesions. *Clin Oral Investig* 2014;18:1427-1433.
122. Cardoso M, Coelho A, Lima R, Amaro I, Paula A, Marto CM, et al. Efficacy and Patient's Acceptance of Alternative Methods for Caries Removal-a Systematic Review. *Journal of Clinical Medicine* 2020;9:23.
123. Çelik Ç, Arhun N, Yamanel K. Clinical evaluation of resin-based composites in posterior restorations: a 3-year study. *Med Princ Pract* 2014;23:453-459.
124. Celik C, Ozgünaltay G, Attar N. Clinical evaluation of flowable resins in non-carious cervical lesions: two-year results. *Oper Dent* 2007;32:313-321.
125. Cenci MS, Demarco FF, Pereira CL, Lund RG, de Carvalho RM. One-year comparison of metallic and translucent matrices in Class II composite resin restorations. *American Journal of Dentistry* 2007;20:41-45.
126. Cenci MS, Lund RG, Pereira CL, de Carvalho RM, Demarco FF. In vivo and in vitro evaluation of Class II composite resin restorations with different matrix systems. *Journal of Adhesive Dentistry* 2006;8:127-132.
127. Cerutti A, Barabanti N, Ozcan M. Clinical Performance of Posterior Microhybrid Resin Composite Restorations Applied Using Regular and High-Power Mode Polymerization Protocols According to USPHS and SQUACE Criteria: 10-Year Randomized Controlled Split-Mouth Trial. *Journal of Adhesive Dentistry* 2020;22:343-351.
128. Cetin AR, Unlu N, Cobanoglu N. A Five-Year Clinical Evaluation of Direct Nanofilled and Indirect Composite Resin Restorations in Posterior Teeth. *Operative Dentistry* 2013;38:E31-E41.

129. Chadwick BL, Dummer PMH, Dunstan FDJ, Gilmour ASM, Jones RJ, Phillips CJ, et al. The longevity of dental restorations: a systematic review. 2001.

130. Chan DC, Browning WD, Frazier KB, Brackett MG. Clinical evaluation of the soft-start (pulse-delay) polymerization technique in Class I and II composite restorations. *Operative Dentistry* 2008;33:265-271.
131. Chee B, Rickman LJ, Satterthwaite JD. Adhesives for the restoration of non-carious cervical lesions: a systematic review. *Journal of Dentistry* 2012;40:443-452.
132. Chen HY, Hickel R, Setcos JC, Kunzelmann KH. Effects of surface finish and fatigue testing on the fracture strength of CAD-CAM and pressed-ceramic crowns. *J Prosthet Dent* 1999;82:468-475.
133. Chinelatti M, Ramos R, Chimello D, Palma-Dibb R. Clinical performance of a resin-modified glass-ionomer and two polyacid-modified resin composites in cervical lesions restorations: 1-year follow-up. *Journal of oral rehabilitation* 2004;31:251-257.
134. Cho SD, Browning WD, Walton KS. Clinical use of a sectional matrix and ring. *Operative Dentistry* 2010;35:587-591.
135. Christensen RP, Christensen GJ. In vivo comparison of a microfilled and a composite resin: a three-year report. *J Prosthet Dent* 1982;48:657-663.
136. Ciampalini G, Barabanti N, Don D, Madini L, A. C. 48-Month clinical evaluation of Class-V restorations with two different composites, Abstr. No. 546. *J Dent Res* 2012;91C.
137. Cichon p, Kerschbaum T. Verweildauer zahnärztlicher Restaurationen bei Behinderten. *Deutsche Zahnärztliche Zeitschrift* 1999:96-102.
138. Clarkson JE, Ramsay CR, Ricketts D, Banerjee A, Deery C, Lamont T, et al. Selective Caries Removal in Permanent Teeth (SCRiPT) for the treatment of deep carious lesions: a randomised controlled clinical trial in primary care. *BMC Oral Health* 2021;21:336.
139. Coe J. Which adhesive strategy for non-carious cervical lesions? *Evidence-Based Dentistry* 2017;18:119-120.
140. Coelho-De-Souza FH, Camargo JC, Beskow T, Balestrin MD, Klein-Júnior CA, Demarco FF. A randomized double-blind clinical trial of posterior composite restorations with or without bevel: 1-year follow-up. *J Appl Oral Sci* 2012;20:174-179.
141. Collares K, Corrêa MB, Laske M, Kramer E, Reiss B, Moraes RR, et al. A practice-based research network on the survival of ceramic inlay/onlay restorations. *Dental Materials* 2016;32:687-694.
142. Collins CJ, Bryant RW, Hodge KL. A clinical evaluation of posterior composite resin restorations: 8-year findings. *J Dent* 1998;26:311-317.
143. Coppola MN, Ozcan YA, Bogacki R. Evaluation of performance of dental providers on posterior restorations: does experience matter? A data envelopment analysis (DEA) approach. *Journal of Medical Systems* 2003;27:445-456.
144. Cortes O, Garcia-Godoy F, Boj JR. Bond strength of resin-reinforced glass ionomer cements after enamel etching. *Am J Dent* 1993;6:299-301.
145. Crabb HS. The survival of dental restorations in a teaching hospital. *British dental journal* 1981;150:315-318.
146. Crumpler D, Heymann H, Shugars D, Bayne S, Leinfelder K. Five-year clinical investigation of one conventional composite and three microfilled resins in anterior teeth. *Dental Materials* 1988;4:217-222.

147. Cunningham J, Mair LH, Foster MA, Ireland RS. Clinical evaluation of three posterior composite and two amalgam restorative materials: 3-year results. *Br Dent J* 1990;169:319-323.

148. Cvitko E, Denehy G, Boyer DB. Effect of matrix systems and polymerization techniques on microleakage of Class II resin composite restorations. *American Journal of Dentistry* 1992;5:321-323.
149. da Rosa Rodolpho PA, Cenci MS, Donassollo TA, Loguercio AD, Demarco FF. A clinical evaluation of posterior composite restorations: 17-year findings. *J Dent* 2006;34:427-435.
150. Da Rosa Rodolpho PA, Donassollo TA, Cenci MS, Loguercio AD, Moraes RR, Bronkhorst EM, et al. 22-Year clinical evaluation of the performance of two posterior composites with different filler characteristics. *Dent Mater* 2011;27:955-963.
151. da Silva TSP, de Castro RF, Magno MB, Maia LC, Silva ESMHDJ. Do HEMA-free adhesive systems have better clinical performance than HEMA-containing systems in noncarious cervical lesions? A systematic review and meta-analysis. *Journal of Dentistry* 2018;74:1-14.
152. da Veiga AM, Cunha AC, Ferreira DM, da Silva Fidalgo TK, Chianca TK, Reis KR, et al. Longevity of direct and indirect resin composite restorations in permanent posterior teeth: A systematic review and meta-analysis. *Journal of Dentistry* 2016;54:1-12.
153. Dahl BL, Oilo G. In vivo wear ranking of some restorative materials. *Quintessence Int* 1994;25:561-565.
154. Dahl JE, Eriksen HM. Reasons for replacement of amalgam dental restorations. *Scandinavian journal of dental research* 1978;86:404-407.
155. Dalton Bittencourt D, Ezecelevski IG, Reis A, Van Dijken JWV, Loguercio AD. An 18-months' evaluation of self-etch and etch & rinse adhesive in non-carious cervical lesions. *Acta Odontologica Scandinavica* 2005;63:173-178.
156. Daudt E, Lopes GC, Vieira LC. Does operatory field isolation influence the performance of direct adhesive restorations? *Journal of Adhesive Dentistry* 2013;15:27-32.
157. Davis RD, Mayhew RB. A clinical comparison of three anterior restorative resins at 3 years. *The Journal of the American Dental Association* 1986;112:659-663.
158. de Andrade AKM, Duarte RM, Silva FMe, Batista AUD, Lima KC, Monteiro GQM, et al. Resin Composite Class I Restorations: A 54-month Randomized Clinical Trial. *Operative Dentistry* 2014;39:588-594.
159. De Araujo MA, Araújo RM, Marsilio AL. A retrospective look at esthetic resin composite and glass-ionomer Class III restorations: a 2-year clinical evaluation. *Quintessence international* 1998;29.
160. de Assis C, Lemos C, Gomes J, Vasconcelos B, Moraes S, Braz R, et al. Clinical Efficiency of Self-etching One-Step and Two-Step Adhesives in NCCL: A Systematic Review and Meta-analysis. *Operative Dentistry* 2020;45:598-607.
161. de Lourdes Rodrigues Accorinte M, Reis A, Dourado Loguercio A, Cavalcanti de Araujo V, Muench A. Influence of rubber dam isolation on human pulp responses after capping with calcium hydroxide and an adhesive system. *Quintessence International* 2006;37:205-212.

162. De Moor RJ, Stassen IG, van 't Veldt Y, Torbeyns D, Hommez GM. Two-year clinical performance of glass ionomer and resin composite restorations in xerostomic head- and neck-irradiated cancer patients. *Clin Oral Investig* 2011;15:31-38.

163. de Oliveira FG, Machado LS, Rocha EP, de Alexandre RS, Briso ALF, Mazza M, et al. Clinical evaluation of a composite resin and a resin-modified glass-ionomer cement in non-carious cervical lesions: one-year results. *IJCD* 2012;5:1-11.
164. de Paula EA, Tay LY, Kose C, Mena-Serrano A, Reis A, Perdigão J, et al. Randomized clinical trial of four adhesion strategies in cervical lesions: 12-month results. *Int J Esthet Dent* 2015;10:122-145.
165. de Souza FB, Guimarães RP, Silva CH. A clinical evaluation of packable and microhybrid resin composite restorations: one-year report. *Quintessence international* (Berlin, Germany : 1985) 2005;36:41-48.
166. De Trey E, Lutz F. Beurteilung von 16 Monate alten unterschiedlich aufgebauten approximalen Frontzahnfüllungen *Schweizer Monatszeitschrift für Zahnmedizin* 1977:694-704.
167. Delbons FB, Perdigão J, Araujo E, Melo Freire CA, Caldas DD, Cardoso JL, et al. Randomized clinical trial of four adhesion strategies in posterior restorations-18-month results. *J Esthet Restor Dent* 2015;27:107-117.
168. Deliperi S. Clinical Evaluation of Nonvital Tooth Whitening and Composite Resin Restorations: Five-year Results. *Int J Esthet Dent* 2008;3:148-159.
169. Deliperi S, Bardwell DN. Clinical Evaluation of Direct Cuspal Coverage with Posterior Composite Resin Restorations. *Journal of Esthetic and Restorative Dentistry* 2006;18:256-265.
170. Deliperi S, Bardwell DN, Alleman D. Clinical evaluation of stress-reducing direct composite restorations in structurally compromised molars: a 2-year report. *Oper Dent* 2012;37:109-116.
171. Demarco FF, Cenci MS, Lima FG, Donassollo TA, Andre Dde A, Leida FL. Class II composite restorations with metallic and translucent matrices: 2-year follow-up findings. *Journal of Dentistry* 2007;35:231-237.
172. Demarco FF, Cenci MS, Lima FG, Donassollo TA, André Dde A, Leida FL. Class II composite restorations with metallic and translucent matrices: 2-year follow-up findings. *J Dent* 2007;35:231-237.
173. Demarco FF, Pereira-Cenci T, de Almeida Andre D, de Sousa Barbosa RP, Piva E, Cenci MS. Effects of metallic or translucent matrices for Class II composite restorations: 4-year clinical follow-up findings. *Clinical Oral Investigations* 2011;15:39-47.
174. Demarco FF, Pereira-Cenci T, de Almeida André D, de Sousa Barbosa RP, Piva E, Cenci MS. Effects of metallic or translucent matrices for class II composite restorations: 4-year clinical follow-up findings. *Clinical Oral Investigations* 2011;15:39-47.
175. Demirci M, Ersev H, Sancakli HS, Topçubaşı M. Clinical evaluation of a polyacid-modified resin composite (Dyract) in Class III cavities: 5-year results. *American Journal of Dentistry* 2006;19:293-296.
176. Demirci M, Sancakli HS, Uysal O. Clinical evaluation of a polyacid-modified resin composite (Dyract) in class V carious lesions: 5-year results. *Clin Oral Investig* 2008;12:157-163.
177. Demirci M, Uçok M. Two-year clinical evaluation of Dyract in small Class I cavities. *Am J Dent* 2002;15:312-316.
178. Demirci M, Yildiz E, Uysal Ö. Comparative clinical evaluation of different treatment approaches using a microfilled resin composite and a compomer in Class III cavities: two-year results. *Oper Dent* 2008;33:7-14.

179. Derkson GD, Richardson AS, Waldman R. Clinical evaluation of composite and amalgam posterior restorations: one year results. *J Can Dent Assoc* 1982;48:45-47.
180. Derkson GD, Richardson AS, Waldman R. Clinical evaluation of composite resin and amalgam posterior restorations: three year results. *J Can Dent Assoc* 1984;50:478-480.
181. DeRouen TA, Martin MD, Leroux BG, Townes BD, Woods JS, Leitao J, et al. Neurobehavioral effects of dental amalgam in children: a randomized clinical trial. *JAMA* 2006;295:1784-1792.
182. Derrick RE. Establishing a tight contact in a Class II resin-based composite restoration. *Journal of the American Dental Association* 2000;131:1326-1327.
183. Di Lenarda R, Cadenaro M, De Stefano Dorigo E. Cervical compomer restorations: the role of cavity etching in a 48-month clinical evaluation. *Oper Dent* 2000;25:382-387.
184. Dietschi D, Holz J. A clinical trial of four light-curing posterior composite resins: two-year report. *Quintessence international (Berlin, Germany : 1985)* 1990;21:965-975.
185. Dietz W, Montag R, Kraft U, Walther M, Sigusch BW, Gaengler P. Longitudinal micromorphological 15-year results of posterior composite restorations using three-dimensional scanning electron microscopy. *Journal of Dentistry* 2014;42:959-969.
186. Dijken JWV. A 6-year prospective evaluation of a one-step HEMA-free self-etching adhesive in Class II restorations. *Dental Materials* 2013;29:1116-1122.
187. Din FM. A permanently bondable matrix band for composite restorations. *Compendium* 1992;13:836, 838, 840 passim.
188. Dogon I, Nathanson D, Van Leeuwen M. A long-term clinical evaluation of class IV acid-etched composite resin restorations. *The Compendium of continuing education in dentistry* 1980;1:385-390.
189. Dondi dall'Orologio G, Lorenzi R. Restorations in abrasion/erosion cervical lesions: 8-year results of a triple blind randomized controlled trial. *American journal of dentistry* 2014;27:245-250.
190. Dondi Dall'orologio G, Fazzi F, R L. Restoration of cervical lesions: 7-year results of a RCT, Abstr. No. 688. *J Dent Res* 2010;89B.
191. Dondi dall'orologio G, Fazzi F, R L. Restoration of cervical lesions: 60-month results of a RCT, Abstr. No. 1785. *J Dent Res* 2008;87B.
192. Dondi dall'orologio G, Lodi D FF, R L. Restoration of NCCIs: 6-year results of a RCT, Abstr. No. 105. *J Dent Res* 2009;88B.
193. Dondi Dall'orologio G FF, Lorenzi R. . Restoration of NCCIs: 60-month results of a QRCT, Abstr. No. 547. *J Dent Res* 2009;88A.
194. Donly KJ, Jensen ME, Triolo P, Chan D. A clinical comparison of resin composite inlay and onlay posterior restorations and cast-gold restorations at 7 years. *Quintessence Int* 1999;30:163-168.
195. Dorri M, Martinez-Zapata MJ, Walsh T, Marinho VCC, Sheiham A, Zaror C. Atraumatic restorative treatment versus conventional restorative treatment for managing dental caries. *Cochrane Database of Systematic Reviews* 2017.
196. Dostalova T, Racek J, Lozekova E, Rerichova M. Composite veneers, crowns, and inlay bridges after orthodontic therapy--a three-year prospective study. *General Dentistry* 2003;51:129-132.
197. Doukoudakis S. Establishing approximal contacts in Class 2 composite resin restorations. *Operative Dentistry* 1996;21:182-184.

198. Downer M, Azli N, Bedi R, Moles D, Setchell D. How long do routine dental restorations last? A systematic review. *British Dental Journal* 1999;187:432-439.
199. Drake CW. A comparison of restoration longevity in maxillary and mandibular teeth. *The Journal of the American Dental Association* 1988;116:651-654.
200. Drake CW. Dental restoration longevity: survival functions and statistical indices in low and high failure rate groups. *Community Dent Oral Epidemiol* 1988;16:258-262.
201. Dresch W, Volpato S, Gomes JC, Ribeiro NR, Reis A, Loguercio AD. Clinical Evaluation of a Nanofilled Composite in Posterior Teeth: 12-month Results. *Operative Dentistry* 2006;31:409-417.
202. Duke ES, Robbins JW, Snyder DS. Clinical evaluation of a dentinal adhesive system: three-year results. *Quintessence international* (Berlin, Germany : 1985) 1991;22:889-895.
203. Duke ES, Trevino DF. A resin-modified glass ionomer restorative: three-year clinical results. *J Indiana Dent Assoc* 1998;77:13-16, 25.
204. Durr ES, Ahmad MZ, Gaikwad RN, Arjumand B. Comparison of two different matrix band systems in restoring two surface cavities in posterior teeth done by senior undergraduate students at Qassim University, Saudi Arabia: A randomized controlled clinical trial. *Indian Journal of Dental Research* 2018;29:459-464.
205. Dutra-Correa M, Saraceni CH, Ciaramicoli MT, Kiyam VH, Queiroz CS. Effect of chlorhexidine on the 18-month clinical performance of two adhesives. *J Adhes Dent* 2013;15:287-292.
206. Dutra D, Pereira G, Kantorski KZ, Valandro LF, Zanatta FB. Does Finishing and Polishing of Restorative Materials Affect Bacterial Adhesion and Biofilm Formation? A Systematic Review. *Operative Dentistry* 2018;43:E37-E52.
207. Eames WB, Strain JD, Weitman RT, Williams AK. Clinical comparison of composite, amalgam, and silicate restorations. *Journal of the American Dental Association* (1939) 1974;89:1111-1117.
208. Efes BG, Dörter C, Gömeç Y. Clinical evaluation of an ormocer, a nanofill composite and a hybrid composite at 2 years. *Am J Dent* 2006;19:236-240.
209. Efes BG, Dörter C, Gömeç Y, Koray F. Two-year clinical evaluation of ormocer and nanofill composite with and without a flowable liner. *J Adhes Dent* 2006;8:119-126.
210. Efes BG, Yaman BC, Gurbuz O, Gümüştas B. Randomized controlled trial of the 2-year clinical performance of a silorane-based resin composite in class 1 posterior restorations. *Am J Dent* 2013;26:33-38.
211. el-Mowafy OM, Lewis DW, Benmergui C, Levinton C. Meta-analysis on long-term clinical performance of posterior composite restorations. *J Dent* 1994;22:33-43.
212. Elderton RJ, Vowles RW, Bell CJ, KJ M. Three-year retention of cervical compomer restorations in non-undercut cavities, Abstr. No. 1185. *J Dent Res* 1997;76:162.
213. Eliguzeloglu Dalkılıç E, Omurlu H. Two-year clinical evaluation of three adhesive systems in non-carious cervical lesions. *Journal of applied oral science : revista FOB* 2012;20:192-199.
214. Ergücü Z, Türkün LS. Clinical performance of novel resin composites in posterior teeth: 18-month results. *The Journal of Adhesive Dentistry* 2007;9:209-216.
215. Ermiş RB. Two-year clinical evaluation of four polyacid-modified resin composites and a resin-modified glass-ionomer cement in Class V lesions. *Quintessence international* (Berlin, Germany : 1985) 2002;33:542-548.

216. Ermis RB, Kam O, Celik EU, Temel UB. Clinical evaluation of a two-step etch&rinse and a two-step self-etch adhesive system in Class II restorations: two-year results. *Oper Dent* 2009;34:656-663.
217. Ermis RB, Temel UB, Celik E, Kam O. Clinical performance of a two-step self-etch adhesive with additional enamel etching in Class III cavities. *Oper Dent* 2010;35:147-155.
218. Ermiş RB, Van Landuyt K, Cardoso MV, Peumans M, Van Meerbeek B. Eighteen-month clinical effectiveness of one-step self-etch adhesive. Abstract 573. *Journal of Dental Research* 2008;87C.
219. Ermis RB, Van Landuyt KL, Cardoso MV, De Munck J, Van Meerbeek B, Peumans M. Clinical effectiveness of a one-step self-etch adhesive in non-carious cervical lesions at 2 years. *Clin Oral Investig* 2012;16:889-897.
220. Ernst C-P, Brandenbusch M, Meyer G, Canbek K, Gottschalk F, Willershausen B. Two-year clinical performance of a nanofiller vs a fine-particle hybrid resin composite. *Clinical Oral Investigations* 2006;10:119-125.
221. Ernst CP, Brandenbusch M, Meyer GR, Canbek K, Werling U, B W. Hybrid bond and Xeno III in cervical lesions: two year results, Abstr. No. 895. *J Dent Res* 2007;86A.
222. Ernst CP, Canbek K, Aksogan K, Willershausen B. Two-year clinical performance of a packable posterior composite with and without a flowable composite liner. *Clin Oral Investig* 2003;7:129-134.
223. Ernst CP, Martin M, Stuff S, Willershausen B. Clinical performance of a packable resin composite for posterior teeth after 3 years. *Clin Oral Investig* 2001;5:148-155.
224. Erpenstein H, Borchard R, Kerschbaum T. Long-term clinical results of galvano-ceramic and glass-ceramic individual crowns. *The Journal of Prosthetic Dentistry* 2000;83:530-534.
225. Erpenstein H, Kerschbaum T, Halfin T. Long-term survival of cast-gold inlays in a specialized dental practice. *Clin Oral Investig* 2001;5:162-166.
226. Fagundes TC, Barata TJ, Bresciani E, Santiago S, Franco EB, Lauris JR, et al. Seven-year clinical performance of resin composite versus resin-modified glass ionomer restorations in noncarious cervical lesions. *Oper Dent* 2014;39:578-587.
227. Fagundes TC, Barata TJ, Carvalho CA, Franco EB, van Dijken JW, Navarro MF. Clinical evaluation of two packable posterior composites: a five-year follow-up. *J Am Dent Assoc* 2009;140:447-454.
228. Fahim SE, Mostafa MA, Abi-Elhassan MH, Taher HM. Clinical Behaviour and Marginal Sealing of Bulk-Fill Resin Composite Restorations Using Light Amplified High-Intensity LEDs Curing: A Randomized Controlled Clinical Trial. *Open Access Macedonian Journal of Medical Sciences* 2019;7:1360-1368.
229. Farsai PS. Although HEMA-Containing Dental Adhesive Systems Have High Hydrophilic Characteristics, Their Clinical Performance Is Similar to HEMA-Free Dental Adhesive Systems for Noncarious Cervical Lesions. *The Journal of Evidencebased Dental Practice* 2018;18:336-338.
230. Farsai PS. Limited Evidence Suggests There Is No Difference Between the Clinical Longevity of direct vs Indirect Composite Resins in Class I and II Cavities. *The Journal of Evidencebased Dental Practice* 2017;17:110-112.
231. Favetti M, Montagner AF, Fontes ST, Martins TM, Masotti AS, Jardim PDS, et al. Effects of cervical restorations on the periodontal tissues: 5-year follow-up results of a randomized clinical trial. *Journal of Dentistry* 2021;106:103571.

232. Federlin M, Hiller KA, Schmalz G. Controlled, prospective clinical split-mouth study of cast gold vs. ceramic partial crowns: 5.5 year results. *American journal of dentistry* 2010;23:161-167.
233. Federlin M, Thonemann B, Schmalz G, Urlinger T. Clinical evaluation of different adhesive systems for restoring teeth with erosion lesions. *Clinical oral investigations* 1998;2:58-66.
234. Felden A, Schmalz G, Federlin M, Hiller KA. Retrospective clinical investigation and survival analysis on ceramic inlays and partial ceramic crowns: results up to 7 years. *Clin Oral Investig* 1998;2:161-167.
235. Felden A, Schmalz G, Hiller KA. Retrospective clinical study and survival analysis on partial ceramic crowns: results up to 7 years. *Clin Oral Investig* 2000;4:199-205.
236. Fennis WM, Kuijs RH, Roeters FJ, Creugers NH, Kreulen CM. Randomized control trial of composite cuspal restorations: five-year results. *J Dent Res* 2014;93:36-41.
237. Ferrari M, Mason PN, Bertelli E. A new dentinal bonding agent and microfilled resin system: a 2-year clinical report. *Quintessence international (Berlin, Germany : 1985)* 1990;21:875-881.
238. Flessa H, Manhart J, Ile N, Chen H, Kunzelmann K, Hickel R. Mechanical properties of microfilled composite restorative materials Proceedings of the Continental European Division of the IADR Rome, Italy IADR, 2001.
239. Fokkinga WA, Kreulen CM, Bronkhorst EM, Creugers NH. Composite resin core-crown reconstructions: an up to 17-year follow-up of a controlled clinical trial. *Int J Prosthodont* 2008;21:109-115.
240. Folwaczny M, Loher C, Mehl A, Kunzelmann KH, Hickel R. Class V lesions restored with four different tooth-colored materials--3-year results. *Clin Oral Investig* 2001;5:31-39.
241. Folwaczny M, Loher C, Mehl A, Kunzelmann KH, Hinkel R. Tooth-colored filling materials for the restoration of cervical lesions: a 24-month follow-up study. *Oper Dent* 2000;25:251-258.
242. Folwaczny M, Mehl A, Kunzelmann K, Hickel R. Clinical performance of a resin-modified glass-ionomer and a compomer in restoring non-carious cervical lesions. 5-year results. *American Journal of Dentistry* 2001;14:153-156.
243. Fontana M. Limited evidence for main reason for failure of partially excavated and restored teeth. *Evidence-Based Dentistry* 2014;15:16-17.
244. Forss H, Widström E. From amalgam to composite: selection of restorative materials and restoration longevity in Finland. *Acta Odontologica Scandinavica* 2001;59:57-62.
245. Forss H, Widström E. Reasons for restorative therapy and the longevity of restorations in adults. *Acta Odontologica Scandinavica* 2004;62:82-86.
246. Fradeani M, Aquilano A, Bassein L. Longitudinal study of pressed glass-ceramic inlays for four and a half years. *J Prosthet Dent* 1997;78:346-353.
247. Franco EB, Benetti AR, Ishikiriama SK, Santiago SL, Lauris JRP, Jorge MFF, et al. 5-year clinical performance of resin composite versus resin modified glass ionomer restorative system in non-carious cervical lesions. *Oper Dent* 2006;31:403-408.
248. Frankenberger R, Petschelt A, Krämer N. Leucite-reinforced glass ceramic inlays and onlays after six years: clinical behavior. *Oper Dent* 2000;25:459-465.
249. Frankenberger R, Reinelt C, Krämer N. Nanohybrid vs. fine hybrid composite in extended class II cavities: 8-year results. *Clinical Oral Investigations* 2014;18:125-137.
250. Frederickson D, Setcos J. Clinical evaluation of indirect posterior composite restorations over three years. *Journal of Dental Research* 1994:381.

251. Freilich MA, Goldberg AJ, Gilpatrick RO, Simonsen RJ. Direct and indirect evaluation of posterior composite restorations at three years. *Dent Mater* 1992;8:60-64.
252. Frencken JE, Liang S, Zhang Q. Survival estimates of atraumatic restorative treatment versus traditional restorative treatment: a systematic review with meta-analyses. *British Dental Journal* 2021;21:21.
253. Frencken JE, Makoni F, Sithole WD. ART restorations and glass ionomer sealants in Zimbabwe: survival after 3 years. *Community Dent Oral Epidemiol* 1998;26:372-381.
254. Frencken JE, Makoni F, Sithole WD. Atraumatic restorative treatment and glass-ionomer sealants in a school oral health programme in Zimbabwe: evaluation after 1 year. *Caries Res* 1996;30:428-433.
255. Frencken JE, Songpaisan Y, Phantumvanit P, Pilot T. An atraumatic restorative treatment (ART) technique: evaluation after one year. *Int Dent J* 1994;44:460-464.
256. Frese C, Schiller P, Staehle HJ, Wolff D. Recontouring teeth and closing diastemas with direct composite buildups: a 5-year follow-up. *J Dent* 2013;41:979-985.
257. Friedl KH, Hiller KA, Schmalz G, Bey B. Clinical and quantitative marginal analysis of feldspathic ceramic inlays at 4 years. *Clin Oral Investig* 1997;1:163-168.
258. Friedl KH, Schmalz G, Hiller KA, Saller A. In-vivo evaluation of a feldspathic ceramic system: 2-year results. *J Dent* 1996;24:25-31.
259. Fritz U, Fischbach H, Harke I. Langzeitverweildauer von Goldgußfüllungen *Deutsche Zahnärztliche Zeitschrift* 1992;714-716.
260. Fron Chabouis H, Prot C, Fonteneau C, Nasr K, Chabreron O, Cazier S, et al. Efficacy of composite versus ceramic inlays and onlays: study protocol for the CECOIA randomized controlled trial. *Trials [Electronic Resource]* 2013;14:278.
261. Fron H, Vergnes JN, Moussally C, Cazier S, Simon AL, Chieze JB, et al. Effectiveness of a new one-step self-etch adhesive in the restoration of non-cariou cervical lesions: 2-year results of a randomized controlled practice-based study. *Dental materials : official publication of the Academy of Dental Materials* 2011;27:304-312.
262. Füllemann J, Krejci I, Lutz F. Koinpositinlsys: Klinische und rasterelekttroneninkrcisliopische Untersuchung nach einjähriger Funktionszeit. *Schweizer Monatszeitschrift für Zahnmedizin* 1992;292-298.
263. Fuzzi M, Rappelli G. Ceramic inlays: clinical assessment and survival rate. *J Adhes Dent* 1999;1:71-79.
264. Fuzzi M, Rappelli G. Survival rate of ceramic inlays. *J Dent* 1998;26:623-626.
265. G DDo, R. L. Restoration of cervical lesions: 3-year results of a RCT, Abstr. No. 1152. 2006;85B.
266. Gaengler P, Hoyer I, Montag R. Clinical evaluation of posterior composite restorations: the 10-year report. *Journal of Adhesive Dentistry* 2001;3.
267. Gaengler P, Hoyer I, Montag R. Clinical evaluation of posterior composite restorations: the 10-year report. *The Journal of Adhesive Dentistry* 2001;3:185-194.
268. Gallo JR, Burgess JO, Ripps AH, Walker RS, Ireland EJ, Mercante DE, et al. Three-year clinical evaluation of a compomer and a resin composite as Class V filling materials. *Oper Dent* 2005;30:275-281.

269. Gallo JR, Burgess JO, Ripps AH, Walker RS, Winkler MM, Mercante DE, et al. Two-year clinical evaluation of a posterior resin composite using a fourth- and fifth-generation bonding agent. *Oper Dent* 2005;30:290-296.
-
270. Gao W, Peng D, Smales RJ, Yip KH. Comparison of atraumatic restorative treatment and conventional restorative procedures in a hospital clinic: evaluation after 30 months. *Quintessence Int* 2003;34:31-37.
271. Geier DA, Carmody T, Kern JK, King PG, Geier MR. A dose-dependent relationship between mercury exposure from dental amalgams and urinary mercury levels: a further assessment of the Casa Pia Children's Dental Amalgam Trial. *Hum Exp Toxicol* 2012;31:11-17.
272. Geier DA, Carmody T, Kern JK, King PG, Geier MR. A dose-dependent relationship between mercury exposure from dental amalgams and urinary mercury levels: a further assessment of the Casa Pia Children's Dental Amalgam Trial. *Human & Experimental Toxicology* 2011;31:11-17.
273. Geier DA, Carmody T, Kern JK, King PG, Geier MR. A significant dose-dependent relationship between mercury exposure from dental amalgams and kidney integrity biomarkers: a further assessment of the Casa Pia children's dental amalgam trial. *Hum Exp Toxicol* 2013;32:434-440.
274. Geier DA, Carmody T, Kern JK, King PG, Geier MR. A significant relationship between mercury exposure from dental amalgams and urinary porphyrins: a further assessment of the Casa Pia children's dental amalgam trial. *Biometals* 2011;24:215-224.
275. Gerhardt C, Salhab J, Schaller H. Die Zugfestigkeit verschiedener Dentinhaftvermittler auf trockenem und perfundiertem Dentin *Deutsche Zahnärztliche Zeitschrift* 2001:467-471.
276. Geurtsen W, Schoeler U. A 4-year retrospective clinical study of Class I and Class II composite restorations. *J Dent* 1997;25:229-232.
277. Giacaman RA, Munoz-Sandoval C, Neuhaus KW, Fontana M, Chalas R. Evidence-based strategies for the minimally invasive treatment of carious lesions: Review of the literature. *Advances in Clinical & Experimental Medicine* 2018;27:1009-1016.
278. Gianordoli Neto R, Santiago SL, Mendonça JS, Passos VF, Lauris JR, Navarro MF. One year clinical evaluation of two different types of composite resins in posterior teeth. *The journal of contemporary dental practice* 2008;9:26-33.
279. Gibson GB, Richardson AS, Patton RE, Waldman R. A clinical evaluation of occlusal composite and amalgam restorations: one- and two-year results. *Journal of the American Dental Association (1939)* 1982;104:335-337.
280. Gilthorpe MS, Mayhew MT, Bulman JS. Multilevel survival analysis of amalgam restorations amongst RAF personnel. *Community Dent Health* 2002;19:3-11.
281. Gladys S, Van Meerbeek B, Lambrechts P, G V. Clinical effectiveness of a glass-ionomer, resin-modified glass-ionomers and a polyacid-modified resin composite in cervical Class V lesions after 3 years, Abstr. No 33. *J Dent Res* 2001;80.
282. Gladys S, Van Meerbeek B, Inokoshi S, Willems G, Braem M, Lambrechts P, et al. Clinical and semiquantitative marginal analysis of four tooth-coloured inlay systems at 3 years. *J Dent* 1995;23:329-338.
-
283. Gladys S, Van Meerbeek B, Lambrechts P, Vanherle G. Marginal adaptation and retention of a glass-ionomer, resin-modified glass-ionomers and a polyacid-modified resin composite in cervical Class-V lesions. *Dental materials : official publication of the Academy of Dental Materials* 1998;14:294-306.

284. Gomes IA, Filho EM, Mariz DC, Borges AH, Tonetto MR, Firoozmand LM, et al. In vivo Evaluation of Proximal Resin Composite Restorations performed using Three Different Matrix Systems. *Journal of Contemporary Dental Practice [Electronic Resource]* 2015;16:643-647.

285. Gonçalves FS, Leal CD, Bueno AC, Freitas AB, Moreira AN, Magalhães CS. A double-blind randomized clinical trial of a silorane-based resin composite in class 2 restorations: 18-month follow-up. *Am J Dent* 2013;26:93-98.
286. Gordan VV, Mjör IA, Vazquez O, Watson RE, Wilson N. Self-etching primer and resin-based restorative material: two-year clinical evaluation. *J Esthet Restor Dent* 2002;14:296-302.
287. Gordan VV, Mondragon E, Watson RE, Garvan C, Mjör IA. A clinical evaluation of a self-etching primer and a giomer restorative material: results at eight years. *J Am Dent Assoc* 2007;138:621-627.
288. Gresnigt MM, Kalk W, Ozcan M. Randomized controlled split-mouth clinical trial of direct laminate veneers with two micro-hybrid resin composites. *J Dent* 2012;40:766-775.
289. Gruythuysen RJ, Kreulen CM, Tobi H, van Amerongen E, Akerboom HB. 15-year evaluation of Class II amalgam restorations. *Community Dent Oral Epidemiol* 1996;24:207-210.
290. Guess PC, Selz CF, Steinhart YN, Stampf S, Strub JR. Prospective clinical split-mouth study of pressed and CAD/CAM all-ceramic partial-coverage restorations: 7-year results. *The International journal of prosthodontics* 2013;26:21-25.
291. Gurgan S, Kiremitci A, E F. Clinical evaluation of self-etch adhesive in cervical lesions: 36-month results, Abstr. No 2944. *J Dent Res* 2011;90A.
292. Guyatt G, Oxman AD, Akl EA, Kunz R, Vist G, Brozek J, et al. GRADE guidelines: 1. Introduction-GRADE evidence profiles and summary of findings tables. *J Clin Epidemiol* 2011;64:383-394.
293. Haas M, Arnetzl G, Pertl C, Polansky R, Semtan M. Cerec vs laboratory inlays. In: Mörmann W (ed). *Cerec 10-year Anniversary Symposium*. Chicago, USA: Quintessence Publishing, 1996:299-312.
294. Haas M, Arnetzl G, Wegschneider W, König K, Bratschenko R. Klinische und werkstoffkundliche Erfahrungen mit Komposit-, Keramik- und Goldinlays. *Deutsche Zahnärztliche Zeitschrift* 1993;18-22.
295. Häfer M, Jentsch H, Haak R, Schneider H. A three-year clinical evaluation of a one-step self-etch and a two-step etch-and-rinse adhesive in non-cariou cervical lesions. *J Dent* 2015;43:350-361.
296. Hamama HH, Yiu CK, Burrow MF, King NM. Systematic Review and Meta-Analysis of Randomized Clinical Trials on Chemomechanical Caries Removal. *Operative Dentistry* 2015;40:E167-178.
297. Hamm G, Manhart J, Hickel R. A simple 2 parameter fit to Kaplan-Meier-survival-curves characterizing the longevity of dental restorations. *Proceedings Triannual Meeting of the European Federation of Conservative Dentistry (EFCD)*. Munich, Germany: ConsEuro, 2003.
298. Hannig M. Five-year clinical evaluation of a heat- and pressure-cured composite resin inlay system. *Journal of Dental Research* 1996:260.

299. Hardan LS, Amm EW, Ghayad A. Effect of different modes of light curing and resin composites on microleakage of Class II restorations. *Odonto-Stomatologie Tropicale* 2008;31:27-34.

300. Hasselrot L. Tunnel restorations in permanent teeth. A 7 year follow up study. Swedish dental journal 1998;22:1-7.
301. Hasselrot L. Tunnel restorations. A 3 1/2-year follow up study of Class I and II tunnel restorations in permanent and primary teeth. Swed Dent J 1993;17:173-182.
302. Hawthorne WS, Smales RJ. Factors influencing long-term restoration survival in three private dental practices in Adelaide. Aust Dent J 1997;42:59-63.
303. Hayashi M, Tsuchitani Y, Kawamura Y, Miura M, Takeshige F, Ebisu S. Eight-year clinical evaluation of fired ceramic inlays. Oper Dent 2000;25:473-481.
304. Hayashi M, Tsuchitani Y, Miura M, Takeshige F, Ebisu S. 6-year clinical evaluation of fired ceramic inlays. Oper Dent 1998;23:318-326.
305. Hayashi M, Wilson NHF. Marginal deterioration as a predictor of failure of a posterior composite. European Journal of Oral Sciences 2003;111:155-162.
306. Hayes M, da Mata C, Tada S, Cole M, McKenna G, Burke FL, et al. Evaluation of Biodentine in the Restoration of Root Caries: A Randomized Controlled Trial. JDR Clinical & Translational Research 2016;1:51-58.
307. Helbig E, Klimm H, Haufe E, Richter G. Klinische Fünfjahresstudie zum Feinpartikelhybrid P-50 in Kombination mit Scotchbond 2. Acta Med Dent Helv 1998;3:171-177.
308. Helbig EB, Klimm HW, Schreger IE, Haufe E, Natusch I. [Controlled clinical study of the anterior composite-adhesive system Point 4/OptiBond Solo Plus]. Schweizer Monatsschrift für Zahnmedizin 2002;112:1230-1235.
309. Hellak AF, Riepe EM, Seubert A, Korbmacher-Steiner HM. Enamel demineralization after different methods of interproximal polishing. Clinical Oral Investigations 2015;19:1965-1972.
310. Hendriks FH, Letzel H, Vrijhoef MM. Composite versus amalgam restorations. A three-year clinical evaluation. J Oral Rehabil 1986;13:401-411.
311. Hennig A, Helbig E, Haufe E, Richter G, Klimm H. Die Versorgung von Klasse-V-Kavitäten mit dem Ormocer-basierenden Füllungssystem Admira. Swiss Dental Journal 2004:104-114.
312. Heymann HO, Bayne SC, Sturdevant JR, Wilder AD, Jr., Roberson TM. The clinical performance of CAD-CAM-generated ceramic inlays: a four-year study. Journal of the American Dental Association (1939) 1996;127:1171-1181.
313. Hickel R. Glass ionomers, cermets, hybrid ionomers and compomers - (long-term) clinical evaluation Trans Academy Dental Materials 1996:105-129.
314. Hickel R. Moderne Füllungswerkstoffe. Deutsche zahnärztliche Zeitschrift 1997:572-585.
315. Hickel R. Zur Problematik hypersensibler Zähne nach Eingliederung von Adhäsivinlays. Deutsche zahnärztliche Zeitschrift 1990:740-742.
316. Hickel R, Dasch W, Janda R, Tyas M, Anusavice K. New direct restorative materials. FDI Commission Project. International dental journal 1998;48:3-16.
317. Hickel R, Kunzelmann K. Keramikinlays und Veneers. Munich, Germany: Hanser Publishing, 1997.
318. Hickel R, Manhart J. Longevity of restorations in posterior teeth and reasons for failure. J Adhes Dent 2001;3:45-64.
319. Hickel R, Manhart J. Longevity of restorations, . In: Wilson N, Roulet J-F, Fuzzi M (eds). Advances in Operative Dentistry - Challenges of the Future. Chicagi, USA: Quintessence, 2001.

320. Hickel R, Petschelt A, Maier J, Voß A, Sauter M. Nachuntersuchung von Füllungen mit Cermet-Zement (Ketac-Silver). Deutsche zahnärztliche Zeitschrift 1988;851-853.
321. Ho TF, Smales RJ, Fang DT. A 2-year clinical study of two glass ionomer cements used in the atraumatic restorative treatment (ART) technique. Community Dent Oral Epidemiol 1999;27:195-201.
322. Hoefler V, Nagaoka H, Miller CS. Long-term survival and vitality outcomes of permanent teeth following deep caries treatment with step-wise and partial-caries-removal: A Systematic Review. Journal of Dentistry 2016;54:25-32.
323. Höglund C, van Dijken J, Olofsson AL. A clinical evaluation of adhesively luted ceramic inlays. A two year follow-up study. Swedish dental journal 1992;16:169-171.
324. Höhnk H, Hannig M. Dentalmaterialien mit Potential: Compomere & Co 1998:264-269.
325. Horsted-Bindslev P, Knudsen J, Baelum V. Dentin adhesive materials for restoration of cervical erosions. Two and three year clinical observations. American journal of dentistry 1988;1:195-199.
326. Hörsted-Bindslev P, Knudsen J, Baelum V. 3-year clinical evaluation of modified Gluma adhesive systems in cervical abrasion/erosion lesions. Am J Dent 1996;9:22-26.
327. Hugo B, Otto A, Stassinakis A, Hofmann N, Klaiber B. Retrospektive In-vivo-Untersuchung von Sonicsys-approx-Füllungen. Schweizer Monatszeitschrift für Zahnmedizin 2001:152-158.
328. Hugo B, Stassinakis A, Hofmann N, Hausmann P, Klaiber B. [In vivo study of small class II composite fillings]. Schweiz Monatsschr Zahnmed 2001;111:11-18.
329. Hurst D. Amalgam or composite fillings--which material lasts longer? Evidence-Based Dentistry 2014;15:50-51.
330. Hussainy SN, Nasim I, Thomas T, Ranjan M. Clinical performance of resin-modified glass ionomer cement, flowable composite, and polyacid-modified resin composite in noncarious cervical lesions: One-year follow-up. Journal of conservative dentistry: JCD 2018;21:510.
331. Huth KC, Manhard J, Hickel R, Kunzelmann KH. Three-year clinical performance of a compomer in stress-bearing restorations in permanent posterior teeth. American journal of dentistry 2003;16:255-259.
332. Huth KC, Selbertinger S, Kunzelmann KH, Hickel R. Compomer for Class I/II restorations—results after 6 months
Journal of Dental Research 1999:285.
333. Isidor F, Brøndum K. A clinical evaluation of porcelain inlays. J Prosthet Dent 1995;74:140-144.
334. Jacobsen T, Norlund A, Englund GS, Tranaeus S. Application of laser technology for removal of caries: a systematic review of controlled clinical trials. Acta Odontologica Scandinavica 2011;69:65-74.
335. Jang JH, Kim HY, Shin SM, Lee CO, Kim DS, Choi KK, et al. Clinical Effectiveness of Different Polishing Systems and Self-Etch Adhesives in Class V Composite Resin Restorations: Two-Year Randomized Controlled Clinical Trial. Operative Dentistry 2017;42:19-29.
336. Jaramillo-Cartagena R, Lopez-Galeano EJ, Latorre-Correa F, Agudelo-Suarez AA. Effect of Polishing Systems on the Surface Roughness of Nano-Hybrid and Nano-Filling Composite Resins: A Systematic Review. Dentistry Journal 2021;9:12.

337. Jedynakiewicz N, Martin N, Fletcher J. A clinical evaluation of a posterior compomer restorative at 3 years

Journal of Dental Research 2002;52.

338. Jensen ME. A two-year clinical study of posterior etched-porcelain resin-bonded restorations. American journal of dentistry 1988;1:27-33.
339. Joelson K, Herr P, Holz J, Baume LJ. [Clinical, macro- and microphotographic control of 4 composite resins]. Schweizerische Monatsschrift für Zahnheilkunde = Revue mensuelle suisse d'odonto-stomatologie 1981;91:877-897.
340. Johnson GH, Bales DJ, Gordon GE, Powell LV. Clinical performance of posterior composite resin restorations. Quintessence international (Berlin, Germany : 1985) 1992;23:705-711.
341. Jokstad A, Mjör IA. Analyses of long-term clinical behavior of class-II amalgam restorations. Acta Odontol Scand 1991;49:47-63.
342. Jokstad A, Mjör IA, Nilner K, Kaping S. Clinical performance of three anterior restorative materials over 10 years. Quintessence international (Berlin, Germany : 1985) 1994;25:101-108.
343. Jokstad A, Mjör IA, Qvist V. The age of restorations in situ. Acta Odontol Scand 1994;52:234-242.
344. Jung M, Hornung K, Klimek J. Polishing occlusal surfaces of direct Class II composite restorations in vivo. Operative Dentistry 2005;30:139-146.
345. Jyothi K, Annapurna S, Kumar AS, Venugopal P, Jayashankara C. Clinical evaluation of giomer- and resin-modified glass ionomer cement in class V noncarious cervical lesions: An in vivo study. J Conserv Dent 2011;14:409-413.
346. Kamann W, Gängler P. Zur Funktionszeit von Amalgam-, Komposite- und Goldhämmerfüllungen. ZWR 1999:270-273.
347. Kaplowitz GJ. Achieving tight contacts in Class II direct resin restorations. Journal of the American Dental Association 1997;128:1012-1013.
348. Karaman E, Yazici AR, Ozgunaltay G, Dayangac B. Clinical evaluation of a nanohybrid and a flowable resin composite in non-carious cervical lesions: 24-month results. The Journal of Adhesive Dentistry 2012;14:485-492.
349. Kaurich M, Kawakami K, Perez P, Munn T, Hasse AL, Garrett NR. A clinical comparison of a glass ionomer cement and a microfilled composite resin in restoring root caries: two-year results. Gen Dent 1991;39:346-349.
350. Kays BT, Sneed WD, Nuckles DB. Microhardness of Class II composite resin restorations with different matrices and light positions. Journal of Prosthetic Dentistry 1991;65:487-490.
351. Kemaloglu H, Pamir T, Tezel H. A 3-year randomized clinical trial evaluating two different bonded posterior restorations: Amalgam versus resin composite. Eur J Dent 2016;10:16-22.
352. Khairallah C, Hokayem A. [Long-term clinical evaluation of 2 dental materials used for the preparation of esthetic inlays]. Odontostomatol Trop 2009;32:5-13.
353. Kielbassa AM, Philipp F. Restoring proximal cavities of molars using the proximal box elevation technique: Systematic review and report of a case. Quintessence International 2015;46:751-764.
354. Kim K-L, Namgung C, Cho B-H. The effect of clinical performance on the survival estimates of direct restorations. rde 2013;38:11-20.

355. Kim SY, Lee KW, Seong SR, Lee MA, Lee IB, Son HH, et al. Two-year clinical effectiveness of adhesives and retention form on resin composite restorations of non-cariou cervical lesions. *Oper Dent* 2009;34:507-515.
356. Kinomoto Y, Inoue Y, Ebisu S. A two-year comparison of resin-based composite tunnel and Class II restorations in a randomized controlled trial. *American journal of dentistry* 2004;17:253-256.
357. Kiremitci A, Alpaslan T, Gurgan S. Six-year clinical evaluation of packable composite restorations. *Oper Dent* 2009;34:11-17.
358. Kiremitci A, Bolay S. A 3-year clinical evaluation of a gallium restorative alloy. *J Oral Rehabil* 2003;30:664-667.
359. Kiremitçi A, Bolay S, Gürgan S. Two-year performance of glass-ceramic insert-resin composite restorations: clinical and scanning electron microscopic evaluation. *Quintessence international (Berlin, Germany : 1985)* 1998;29:417-421.
360. Klimm W, Wolff U, Natusch I. Evaluation of Class II composite and ceramic restorations in vivo and in vitro
Journal of Dental Research 1999:308.
361. Kohler B, Rasmusson CG, Odman P. A five-year clinical evaluation of Class II composite resin restorations. *J Dent* 2000;28:111-116.
362. Köhler B, Rasmusson CG, Ödman P. A five-year clinical evaluation of Class II composite resin restorations. *Journal of Dentistry* 2000;28:111-116.
363. Kolker JL, Damiano PC, Armstrong SR, Bentler SE, Flach SD, Caplan DJ, et al. Natural history of treatment outcomes for teeth with large amalgam and crown restorations. *Oper Dent* 2004;29:614-622.
364. Komatsu M, Wakui A, Obara M, Kubota M, Okuda R. Two-year clinical observation of light-cured composite resin restorations placed with a dentinal bonding agent. *Quintessence international (Berlin, Germany : 1985)* 1990:1001-1006.
365. Kopperud SE, Tveit AB, Gaarden T, Sandvik L, Espelid I. Longevity of posterior dental restorations and reasons for failure. *European Journal of Oral Sciences* 2012;120:539-548.
366. Koubi S, Raskin A, Bukiet F, Pignoly C, Toca E, Tassery H. One-year clinical evaluation of two resin composites, two polymerization methods, and a resin-modified glass ionomer in non-cariou cervical lesions. *Journal of Contemporary Dental Practice [Electronic Resource]* 2006;7:42-53.
367. Koubi S, Raskin A, Bukiet F, Pignoly C, Toca E, Tassery H. One-year clinical evaluation of two resin composites, two polymerization methods, and a resin-modified glass ionomer in non-cariou cervical lesions. *J Contemp Dent Pract* 2006;7:42-53.
368. Krämer N, Frankenberger R, Pelka M, Petschelt A. IPS Empress inlays and onlays after four years--a clinical study. *J Dent* 1999;27:325-331.
369. Kramer N, Garcia-Godoy F, Reinelt C, Feilzer AJ, Frankenberger R. Nanohybrid vs. fine hybrid composite in extended Class II cavities after six years. *Dental materials : official publication of the Academy of Dental Materials* 2011;27:455-464.
370. Krämer N, García-Godoy F, Reinelt C, Frankenberger R. Clinical performance of posterior compomer restorations over 4 years. *American journal of dentistry* 2006;19:61-66.
371. Krämer N, Kunzelmann KH, Mumesohn M, Pelka M, Hickel R. Langzeiterfahrungen mit einem mikrogefüllten Komposit als Inlaysystem. *Deutsche zahnärztliche Zeitschrift* 1996:342-344.

372. Krämer N, Kunzelmann KH, Pollety T, Pelka M, Hickel R. Langzeiterfahrungen mit Cermet-Zementfüllungen in Klasse-I/II-Kavitäten. Deutsche zahnärztliche Zeitschrift 1994;905-909.
373. Krämer N, Reinelt C, Frankenberger R. Ten-year Clinical Performance of Posterior Resin Composite Restorations. The Journal of Adhesive Dentistry 2015;17:433-441.
374. Krejci I, Güntert A, Lutz F. Scanning electron microscopic and clinical examination of composite resin inlays/onlays up to 12 months in situ. Quintessence international (Berlin, Germany : 1985) 1994;25:403-409.
375. Krejci I, Krejci D, Lutz F. Clinical evaluation of a new pressed glass ceramic inlay material over 1.5 years. Quintessence international (Berlin, Germany : 1985) 1992;23:181-186.
376. Krejci I, Lutz F. Marginal adaptation of Class V restorations using different restorative techniques. J Dent 1991;19:24-32.
377. Kreulen CM, Tobi H, Gruythuysen RJ, van Amerongen WE, Borgmeijer PJ. Replacement risk of amalgam treatment modalities: 15-year results. J Dent 1998;26:627-632.
378. Krithikadatta J. Clinical effectiveness of contemporary dentin bonding agents. Journal of Conservative Dentistry 2010;13:173-183.
379. Kubo S, Kawasaki A, Kawakubo A, Y H. Five-year clinical evaluation of two all-in-one systems, Abstr. No 1144. J Dent Res 2011;90A.
380. Kubo S, Kubo H, Yokota H, Yokota Y, Y H. Twelve-year clinical evaluation of two adhesives in non-cariou cervical Lesions, Abstract No 3101. J Dent Res 2013;92A.
381. Kubo S, Yokota H, Takada H, Y H. Eight-year clinical evaluation of two adhesives in non-cariou cervical lesions, Abstr. No. 1786. J Dent Res 2008;87B.
382. Kubo S, Kawasaki A, Hayashi Y. Factors associated with the longevity of resin composite restorations. Dent Mater J 2011;30:374-383.
383. Kubo S, Kawasaki K, Yokota H, Hayashi Y. Five-year clinical evaluation of two adhesive systems in non-cariou cervical lesions. J Dent 2006;34:97-105.
384. Kubo S, Yokota H, Yokota H, Hayashi Y. Three-year clinical evaluation of a flowable and a hybrid resin composite in non-cariou cervical lesions. J Dent 2010;38:191-200.
385. Kubo S, Yokota H, Yokota H, Hayashi Y. Two-year clinical evaluation of one-step self-etch systems in non-cariou cervical lesions. J Dent 2009;37:149-155.
386. Kuijs RH, Fennis WM, Kreulen CM, Roeters FJ, Creugers NH, Burgersdijk RC. A randomized clinical trial of cusp-replacing resin composite restorations: efficiency and short-term effectiveness. Int J Prosthodont 2006;19:349-354.
387. Kurokawa H, Takamizawa T, Rikuta A, Tsubota K, M. M. Long-term clinical evaluation of one-step self-etch adhesive systems, Abstr. No. 803. J Dent Res 2012;91A.
388. Kwon SR, Oyoyo U, Li Y. Influence of application techniques on contact formation and voids in anterior resin composite restorations. Operative dentistry 2014;39:213-220.
389. Laegreid T, Gjerdet NR, Johansson A-K. Extensive composite molar restorations: 3 years clinical evaluation. Acta Odontologica Scandinavica 2012;70:344-352.
390. Laegreid T, Gjerdet NR, Johansson A, Johansson AK. Clinical decision making on extensive molar restorations. Oper Dent 2014;39:E231-240.
391. Laske M, Opdam NJM, Bronkhorst EM, Braspenning JCC, Huysmans MCDNJM. Longevity of direct restorations in Dutch dental practices. Descriptive study out of a practice based research network. Journal of Dentistry 2016;46:12-17.

392. Lauterbach M, Martins IP, Castro-Caldas A, Bernardo M, Luis H, Amaral H, et al. Neurological outcomes in children with and without amalgam-related mercury exposure: seven years of longitudinal observations in a randomized trial. *J Am Dent Assoc* 2008;139:138-145.
393. Lavelle CL. A cross-sectional longitudinal survey into the durability of amalgam restorations. *J Dent* 1976;4:139-143.
394. Leempoel PJ, Eschen S, De Haan AF, Van't Hof MA. An evaluation of crowns and bridges in a general dental practice. *J Oral Rehabil* 1985;12:515-528.
395. Lehner C, Studer S, Brodbeck U, Schärer P. Six-year clinical results of leucite-reinforced glass ceramic inlays and onlays *Schweizer Monatszeitschrift für Zahnmedizin* 1998:137-146.
396. Leinfelder KF, Sluder TB, Santos J, Wall JT. Five-year clinical evaluation of anterior and posterior restorations of composite resins. *Operative Dentistry* 1980:57-65.
397. Leinfelder KF, Sluder TB, Sockwell CL, Strickland WD, Wall JT. Clinical evaluation of composite resins as anterior and posterior restorative materials. *J Prosthet Dent* 1975;33:407-416.
398. Leirskar J, Nordbø H, Thoresen NR, Henaug T, von der Fehr FR. A four to six years follow-up of indirect resin composite inlays/onlays. *Acta Odontol Scand* 2003;61:247-251.
399. Leloup G, D'Hoore W, Bouter D, Degrange M, Vreven J. Meta-analytical review of factors involved in dentin adherence. *Journal of Dental Research* 2001;80:1605-1614.
400. Lempel E, Lovász BV, Meszarics R, Jeges S, Tóth Á, Szalma J. Direct resin composite restorations for fractured maxillary teeth and diastema closure: A 7 years retrospective evaluation of survival and influencing factors. *Dent Mater* 2017;33:467-476.
401. Letzel H. Survival rates and reasons for failure of posterior composite restorations in multicentre clinical trial. *Journal of Dentistry* 1989;17:S10-S17.
402. Letzel H, van 't Hof MA, Marshall GW, Marshall SJ. The influence of the amalgam alloy on the survival of amalgam restorations: a secondary analysis of multiple controlled clinical trials. *J Dent Res* 1997;76:1787-1798.
403. Letzel H, van 't Hof MA, Vrijhoef MM, Marshall GW, Jr., Marshall SJ. A controlled clinical study of amalgam restorations: survival, failures, and causes of failure. *Dent Mater* 1989;5:115-121.
404. Levy SM, Jensen ME. A clinical evaluation of the restoration of root surface caries. *Spec Care Dentist* 1990;10:156-160.
405. Li T, Zhai X, Song F, Zhu H. Selective versus non-selective removal for dental caries: a systematic review and meta-analysis. *Acta Odontologica Scandinavica* 2018;76:135-140.
406. Lima RBW, Troconis CCM, Moreno MBP, Murillo-Gomez F, De Goes MF. Depth of cure of bulk fill resin composites: A systematic review. *Journal of Esthetic & Restorative Dentistry: Official Publication of the American Academy of Esthetic Dentistry* 2018;30:492-501.
407. Lima VP, Soares K, Caldeira VS, Faria ESAL, Loomans B, Moraes RR. Airborne-particle Abrasion and Dentin Bonding: Systematic Review and Meta-analysis. *Operative Dentistry* 2021;46:E21-E33.
408. Lin H, Wang J, Yan W. A three-year clinical evaluation of five light-cured composite resins in fillings of posterior teeth. *Zhonghua kou Qiang yi xue za zhi= Zhonghua Kouqiang Yixue Zazhi= Chinese Journal of Stomatology* 1997;32:242-245.
409. Lindberg A, van Dijken JW, Lindberg M. 3-year evaluation of a new open sandwich technique in Class II cavities. *American journal of dentistry* 2003;16:33-36.

410. Lindberg A, van Dijken JW, Lindberg M. Nine-year evaluation of a polyacid-modified resin composite/resin composite open sandwich technique in Class II cavities. *J Dent* 2007;35:124-129.

411. Lins R, Sebold M, Magno MB, Maia LC, Martins L, Giannini M. Does the Type of Solvent in Dental Adhesives Influence the Clinical Performance of Composite Restorations Placed in Noncarious Cervical Lesions? A Systematic Review and Meta-analysis. *Operative Dentistry* 2020;45:E237-E254.
412. Lo EC, Luo Y, Tan HP, Dyson JE, Corbet EF. ART and conventional root restorations in elders after 12 months. *J Dent Res* 2006;85:929-932.
413. Loguercio AD, Ferri L, Costa TR, A. R. 18-Month clinical evaluation of new etch-and-rinse adhesive in cervical lesions, Abstr. No. 596. *J Dent Res* 2013;92A.
414. Loguercio AD, Bittencourt DD, Baratieri LN, Reis A. A 36-month evaluation of self-etch and etch-and-rinse adhesives in noncarious cervical lesions. *The Journal of the American Dental Association* 2007;138:507-514.
415. Loguercio AD, Lorini E, Weiss RV, Tori AP, Picinatto CC, Ribeiro NR, et al. A 12-month clinical evaluation of composite resins in class III restorations. *The Journal of Adhesive Dentistry* 2007;9:57-64.
416. Loguercio AD, Luque-Martinez I, Lisboa AH, Higashi C, Queiroz VA, Rego RO, et al. Influence of Isolation Method of the Operative Field on Gingival Damage, Patients' Preference, and Restoration Retention in Noncarious Cervical Lesions. *Operative Dentistry* 2015;40:581-593.
417. Loguercio AD, Mânica D, Ferneda F, Zander-Grande C, Amaral R, Stanislawczuk R, et al. A randomized clinical evaluation of a one- and two-step self-etch adhesive over 24 months. *Oper Dent* 2010;35:265-272.
418. Loguercio AD, Raffo J, Bassani F, Balestrini H, Santo D, do Amaral RC, et al. 24-month clinical evaluation in non-carious cervical lesions of a two-step etch-and-rinse adhesive applied using a rubbing motion. *Clin Oral Investig* 2011;15:589-596.
419. Loguercio AD, Reis A. Application of a dental adhesive using the self-etch and etch-and-rinse approaches: an 18-month clinical evaluation. *J Am Dent Assoc* 2008;139:53-61.
420. Loguercio AD, Reis A, Barbosa AN, Roulet JF. Five-year double-blind randomized clinical evaluation of a resin-modified glass ionomer and a polyacid-modified resin in noncarious cervical lesions. *The Journal of Adhesive Dentistry* 2003;5:323-332.
421. Loguercio AD, Reis A, Rodrigues Filho LE, Busato AL. One-year clinical evaluation of posterior packable resin composite restorations. *Oper Dent* 2001;26:427-434.
422. Loomans BA, Opdam NJ, Bronkhorst EM, Roeters FJ, Dorfer CE. A clinical study on interdental separation techniques. *Operative Dentistry* 2007;32:207-211.
423. Loomans BA, Opdam NJ, Roeters FJ, Bronkhorst EM, Burgersdijk RC, Dorfer CE. A randomized clinical trial on proximal contacts of posterior composites. *Journal of Dentistry* 2006;34:292-297.
424. Lopes LG, Cefaly DF, Franco EB, Mondelli RF, Lauris JR, Navarro MF. Clinical evaluation of two "packable" posterior composite resins. *Clin Oral Investig* 2002;6:79-83.

425. Lopes LG, Cefaly DFG, Franco EB, Mondelli RFL, Lauris JRP, Navarro MFL. Clinical evaluation of two "packable" posterior composite resins: two-year results. *Clinical Oral Investigations* 2003;7:123-128.

426. Lösche G. Klasse-II-Kompositfüllungen mit und ohne konfektionierte Glaskeramik-Inserts. Eine in-vivo-Studie

Deutsche zahnärztliche Zeitschrift 1996;389-394.

427. Lucarotti PS, Holder RL, Burke FJ. Analysis of an administrative database of half a million restorations over 11 years. J Dent 2005;33:791-803.
428. Lucarotti PS, Holder RL, Burke FJ. Outcome of direct restorations placed within the general dental services in England and Wales (Part 1): variation by type of restoration and re-intervention. J Dent 2005;33:805-815.
429. Lucarotti PS, Holder RL, Burke FJ. Outcome of direct restorations placed within the general dental services in England and Wales (Part 3): variation by dentist factors. J Dent 2005;33:827-835.
430. Lumley PJ, Fisher FJ. Tunnel restorations: a long-term pilot study over a minimum of five years. Journal of Dentistry 1995;23:213-215.
431. Lundin S, Koch G. Class I and II posterior composite resin restorations after 5 and 10 years. Swedish dental journal 1999;23:165-171.
432. Lundin SA. Studies on posterior composite resins with special reference to class II restorations. Swed Dent J Suppl 1990;73:1-41.
433. Lundin SA, Koch G. Class I and II composite resin restorations: 4-year clinical follow up. Swedish dental journal 1989;13:217-227.
434. Lundin SA, Koch G. Class I and II posterior composite resin restorations after 5 and 10 years. Swed Dent J 1999;23:165-171.
435. Lundin SA, Rasmusson CG. Clinical evaluation of a resin composite and bonding agent in Class I and II restorations: 2-year results. Quintessence international (Berlin, Germany : 1985) 2004;35:758-762.
436. Luo Y, Lo EC, Fang DT, Smales RJ, Wei SH. Clinical evaluation of Dyract AP restorative in permanent molars: 2-year results. American journal of dentistry 2002;15:403-406.
437. Luo Y, Lo EC, Fang DT, Wei SH. Clinical evaluation of polyacid-modified resin composite posterior restorations: one-year results. Quintessence international (Berlin, Germany : 1985) 2000;31:630-636.
438. Lussi A, Hugo B, Hotz P. [The effect of 2 finishing methods on the micromorphology of the proximal box margin. An in-vivo study]. Schweizer Monatschrift für Zahnmedizin 1992;102:1175-1180.
439. Lutz F, Ochsenbein H, Lüscher B. Nachkontrolle von 11/4 jährigen Adhäsivfüllungen Schweizer Monatszeitschrift für Zahnmedizin 1977:126-136.
440. Madrid Troconis CC, Santos-Silva AR, Brandao TB, Lopes MA, de Goes MF. Impact of head and neck radiotherapy on the mechanical behavior of composite resins and adhesive systems: A systematic review. Dental Materials 2017;33:1229-1243.
441. Mahmood S, Smales RJ. Longevity of dental restorations in selected patients from different practice environments. Australian dental journal 1994;39:15-17.
442. Mahmoud S, Ali A, Hegazi H. A Three-year Prospective Randomized Study of Silorane- and Methacrylate-based Composite Restorative Systems in Class II Restorations. The Journal of Adhesive Dentistry 2014;16:285-292.

443. Mahmoud SH, El-Embaby AE, AbdAllah AM. Clinical Performance of Ormocer, Nanofilled, and Nanoceramic Resin Composites in Class I and Class II Restorations: A Three-year Evaluation. *Operative Dentistry* 2014;39:32-42.
444. Mahmoud SH, El-Embaby AE, AbdAllah AM, Hamama HH. Two-year clinical evaluation of ormocer, nanohybrid and nanofill composite restorative systems in posterior teeth. *The Journal of Adhesive Dentistry* 2008;10:315-322.
445. Mahn E, Rousson V, Heintze S. Meta-Analysis of the Influence of Bonding Parameters on the Clinical Outcome of Tooth-colored Cervical Restorations. *Journal of Adhesive Dentistry* 2015;17:391-403.
446. Mair LH. Ten-year clinical assessment of three posterior resin composites and two amalgams. *Quintessence Int* 1998;29:483-490.
447. Malament KA, Socransky SS. Survival of Dicor glass-ceramic dental restorations over 14 years. Part II: effect of thickness of Dicor material and design of tooth preparation. *J Prosthet Dent* 1999;81:662-667.
448. Mallow P, Durward C, Klaipo M. Comparison of two glass ionomer cements using the ART technique *Journal of Dental Research* 1995:405.
449. Mallow PK, Durward CS, Klaipo M. Restoration of permanent teeth in young rural children in Cambodia using the atraumatic restorative treatment (ART) technique and Fuji II glass ionomer cement. *International journal of paediatric dentistry* 1998;8:35-40.
450. Manchorova NA, Vladimirov SB, Donencheva ZK, Drashkovich IS, Manolov SK, Todorova VI. Clinical evaluation of restorations with self-etch adhesive and nanofilled composite in class I and class II cavities. *Folia Med (Plovdiv)* 2008;50:46-52.
451. Mandras RS, Thurmond JW, Latta MA, Matranga LF, Kildee JM, Barkmeier WW. Three-year clinical evaluation of the Clearfil Liner Bond system. *Oper Dent* 1997;22:266-270.
452. Mangani F, Cerutti A, Putignano A, Bollero R, Madini L. Clinical approach to anterior adhesive restorations using resin composite veneers. *The European Journal Of Esthetic Dentistry : Official Journal Of The European Academy of Esthetic Dentistry* 2007;2:188-209.
453. Manhart J, Chen H, Albrecht A, Neuerer P, Hickel R. Four-year clinical evaluation of composite and ceramic inlays
Journal of Dental Research 2002:332.
454. Manhart J, Chen H, Hamm G, Hickel R. Buonocore Memorial Lecture. Review of the clinical survival of direct and indirect restorations in posterior teeth of the permanent dentition. *Oper Dent* 2004;29:481-508.
455. Manhart J, Chen H, Kunzelmann KH, Hickel R. Werkstoffkundliche Charakterisierung eines Füllungsmaterialies auf Ormocer-Basis im Vergleich zu einem Komposit und einem Kompomer. *ZMK* 1999:807-812.
456. Manhart J, Chen H, Spoerlein F, Hickel R. 2-year clinical evaluation of definite ormocer-restorations in posterior teeth. *Journal of Dental Research* 2002:80.
457. Manhart J, Chen HY, Hickel R. Clinical evaluation of the posterior composite Quixfil in class I and II cavities: 4-year follow-up of a randomized controlled trial. *J Adhes Dent* 2010;12:237-243.
458. Manhart J, Chen HY, Neuerer P, Scheibenbogen-Fuchsbrunner A, Hickel R. Three-year clinical evaluation of composite and ceramic inlays. *American journal of dentistry* 2001;14:95-99.

459. Manhart J, Glomb C, Stueckgen D, Neuerer P, Flessa H, Hickel R. Clinical evaluation of a self-etching adhesive at 2 years. *Journal of Dental Research* 2002:233.
460. Manhart J, Hickel R. Esthetic compomer restorations in posterior teeth using a new all-in-one adhesive: case presentation. *Journal of esthetic dentistry* 1999;11:250-258.
461. Manhart J, Hickel R. Kiinische Studie zum Einsatz eines All-in-one-Adhäsivs. Erste Ergebnisse nach 6 Monaten. *Quintessenz* 1999:1277-1288.
462. Manhart J, Hollwich B, Mehl A, Kunzelmann KH, Hickel R. Randqualität von Ormocer- und Kompositfüllungen in Klasse-II-Kavitäten nach künstlicher Alterung. *Deutsche Zahnärztliche Zeitschrift* 1999:89-95.
463. Manhart J, Huetzen D, Chen H, Neuerer P, Hickel R. Three-year clinical evaluation of Artglass- and Charismainlays
Journal of Dental Research 2002:333.
464. Manhart J, Huth KC, Glomb C, Stueckgen D, Neuerer P, Flessa H, et al. Clinical evaluation of a self-etching adhesive at 3 years European Festival of Oral Science. Cardiff, Wales GB: *British Dental Journal*, 2002.
465. Manhart J, Ilie N, Dullin P, Draegert U, Chen H, Kunzelmann KH, et al. Flexure mechanical properties of compomer materials. *Journal of Dental Research* 2001:204.
466. Manhart J, Ilie N, Neuerer P, Chen H, Kunzelmann KH, Hickel R. Flexure mechanical properties of packable and hybrid composites. *Journal of Dental Research* 2001:203.
467. Manhart J, Kunzelmann KH, Chen HY, Hickel R. Mechanical properties and wear behavior of light-cured packable composite resins. *Dent Mater* 2000;16:33-40.
468. Manhart J, Li D, Powers J, Hickel R. Bonding of compomers to deep dentin under various surface conditions. *Journal of Dental Research* 1998:787.
469. Manhart J, Mehl A, Schroeter R, Obster B, Hickel R. Bond strength of composite to dentin treated by air abrasion. *Oper Dent* 1999;24:223-232.
470. Manhart J, Neuerer P, Scheibenbogen-Fuchsbrunner A, Hickel R. Three-year clinical evaluation of direct and indirect composite restorations in posterior teeth. *J Prosthet Dent* 2000;84:289-296.
471. Mannerberg F, Birkhed D, Göran E. Kunststoff-Füllungen im Seitenzahnbereich Fünf Jahre klinische Erfahrungen mir Isocap und drei verschiedenen konventionellen Composites (I). *Die Quintessenz* 1983:911-917.
472. Mannerberg F, Birkhed D, Göran E. Kunststoff-Füllungen im Seitenzahnbereich Fünf Jahre klinische Erfahrungen mir Isocap und drei verschiedenen konventionellen Composites (II). *Die Quintessenz* 1983:1135-1144.
473. Mannerberg F, Birkhed D, Göran E. Kunststoff-Füllungen im Seitenzahnbereich Fünf Jahre klinische Erfahrungen mir Isocap und drei verschiedenen konventionellen Composites (III). *Die Quintessenz* 1983:1319-1323.
474. Mannocci F, Qualtrough A, Worthington HV, Watson TF, Pitt Ford T. Randomized clinical comparison of endodontically treated teeth restored with amalgam or with fiber posts and resin composite: five-year results. *Oper Dent* 2005;30:9-15.
475. Mannocci F, Qualtrough AJ, Worthington HV, Watson TF, Pitt Ford TR. Randomized clinical comparison of endodontically treated teeth restored with amalgam or with fiber posts and resin composite: five-year results. *Oper Dent* 2005;30:9-15.

476. Martin JA, Bader JD. Five-year treatment outcomes for teeth with large amalgams and crowns. *Oper Dent* 1997;22:72-78.
477. Martin N, Jedyakiewicz NM. Clinical performance of CEREC ceramic inlays: a systematic review. *Dent Mater* 1999;15:54-61.
478. Maryniuk GA, Kaplan SH. Longevity of restorations: survey results of dentists' estimates and attitudes. *Journal of the American Dental Association (1939)* 1986;112:39-45.
479. Maserejian NN, Hauser R, Tavares M, Trachtenberg FL, Shrader P, McKinlay S. Dental composites and amalgam and physical development in children. *J Dent Res* 2012;91:1019-1025.
480. Maserejian NN, Trachtenberg FL, Hauser R, McKinlay S, Shrader P, Tavares M, et al. Dental composite restorations and psychosocial function in children. *Pediatrics* 2012;130:e328-338.
481. Matis BA, Cochran M, Carlson T. Longevity of glass-ionomer restorative materials: results of a 10-year evaluation. *Quintessence international (Berlin, Germany : 1985)* 1996;27:373-382.
482. Matis BA, Cochran MJ, Carlson TJ, Guba C, Eckert GJ. A three-year clinical evaluation of two dentin bonding agents. *J Am Dent Assoc* 2004;135:451-457.
483. McComb D, Erickson RL, Maxymiw WG, Wood RE. A clinical comparison of glass ionomer, resin-modified glass ionomer and resin composite restorations in the treatment of cervical caries in xerostomic head and neck radiation patients. *Oper Dent* 2002;27:430-437.
484. McCoy RB, Anderson MH, Lepe X, Johnson GH. CLINICAL SUCCESS OF CLASS V COMPOSITE RESIN RESTORATIONS WITHOUT MECHANICAL RETENTION. *The Journal of the American Dental Association* 1998;129:593-599.
485. Meereis CTW, Munchow EA, de Oliveira da Rosa WL, da Silva AF, Piva E. Polymerization shrinkage stress of resin-based dental materials: A systematic review and meta-analyses of composition strategies. *Journal of the Mechanical Behavior of Biomedical Materials* 2018;82:268-281.
486. Meijering AC, Creugers NH, Roeters FJ, Mulder J. Survival of three types of veneer restorations in a clinical trial: a 2.5-year interim evaluation. *Journal of Dentistry* 1998;26:563-568.
487. Merte K, Fröhlich M, Häfer M, Hirsch E, Schneider H, Winkler M. Two-year clinical performance of two primer adhesives on class V restorations. *Journal of biomedical materials research* 2000;53:93-99.
488. Mertz-Fairhurst EJ, Curtis JW, Jr., Ergle JW, Rueggeberg FA, Adair SM. Ultraconservative and cariostatic sealed restorations: results at year 10. *Journal of the American Dental Association (1939)* 1998;129:55-66.
489. Meyer-Lueckel H, Machiulskiene V, Giacaman RA. How to Intervene in the Root Caries Process? Systematic Review and Meta-Analyses. *Caries Res* 2019;53:599-608.
490. Miao C, Yang X, Wong MC, Zou J, Zhou X, Li C, et al. Rubber dam isolation for restorative treatment in dental patients. *Cochrane Database of Systematic Reviews* 2021;5:CD009858.
491. Millar BJ, Robinson PB, Inglis AT. Clinical evaluation of an anterior hybrid composite resin over 8 years. *Br Dent J* 1997;182:26-30.
492. Mitchell RJ, Koike M, Okabe T. Posterior amalgam restorations--usage, regulation, and longevity. *Dent Clin North Am* 2007;51:573-589, v.

493. Mjör I, Jokstad A. Five-year study of Class II restorations in permanent teeth using amalgam, glass polyalkenoate (ionomer) cermet and resin-based composite materials. *Journal of dentistry* 1993;21:338-343.

494. Mjör I, Moorhead J. Selection of restorative materials, reasons for replacement, and longevity of restorations in Florida. *The Journal of the American College of Dentists* 1998;65:27-33.
495. Mjör IA. Amalgam and composite resin restorations: longevity and reasons for replacement. In: Abusavice K (ed). *Quality evaluation of dental restorations*. Chicago, USA: Quintessence, 1989:61-80.
496. Mjör IA. Glass-ionomer cement restorations and secondary caries: a preliminary report. *Quintessence international* (Berlin, Germany : 1985) 1996;27:171-174.
497. Mjör IA. Long term cost of restorative therapy using different materials. *Scandinavian journal of dental research* 1992;100:60-65.
498. Mjör IA. Problems and benefits associated with restorative materials: side-effects and long-term cost. *Advances in dental research* 1992;6:7-16.
499. Mjör IA. The reasons for replacement and the age of failed restorations in general dental practice. *Acta Odontologica Scandinavica* 1997;55:58-63.
500. Mjör IA. A recurring problem: research in restorative dentistry... But there is a light at the end of the tunnel. *J Dent Res* 2004;83:92.
501. Mjör IA. Selection of restorative materials in general dental practice in Sweden. *Acta Odontol Scand* 1997;55:53-57.
502. Mjör IA, Dahl JE, Moorhead JE. Age of restorations at replacement in permanent teeth in general dental practice. *Acta Odontologica Scandinavica* 2000;58:97-101.
503. Mjör IA, Jokstad A. Five-year study of Class II restorations in permanent teeth using amalgam, glass polyalkenoate (ionomer) cermet and resin-based composite materials. *J Dent* 1993;21:338-343.
504. Mjör IA, Jokstad A. Five-year study of Class II restorations in permanent teeth using amalgam, glass polyalkenoate (ionomer) cermet and resin-based composite materials. *Journal of Dentistry* 1993;21:338-343.
505. Mjör IA, Jokstad A, Qvist V. Longevity of posterior restorations. *International dental journal* 1990;40:11-17.
506. Mjör IA, Medina JE. Reasons for placement, replacement, and age of gold restorations in selected practices. *Oper Dent* 1993;18:82-87.
507. Mjör IA, Toffenetti F. Placement and replacement of amalgam restorations in Italy. *Oper Dent* 1992;17:70-73.
508. Moffa J. Comparative performance of amalgam and composite resin restorations and criteria for their use. In: Anusavice K (ed). *Quality evaluation of dental restorations*. Chicago: Quintessence 1989:125-133.
509. Molin M, Karlsson S. A 3-year clinical follow-up study of a ceramic (Optec) inlay system. *Acta Odontol Scand* 1996;54:145-149.

510. Molin MK, Karlsson SL. A randomized 5-year clinical evaluation of 3 ceramic inlay systems. *The International journal of prosthodontics* 2000;13:194-200.
511. Monaco C, Llukacej A, Baldissara P, Arena A, Scotti R. Zirconia-based versus metal-based single crowns veneered with overpressing ceramic for restoration of posterior endodontically

- treated teeth: 5-year results of a randomized controlled clinical study. *Journal of Dentistry* 2017;65:56-63.
512. Monteiro PM, Manso MC, Gavinha S, Melo P. Two-year clinical evaluation of packable and nanostructured resin-based composites placed with two techniques. *J Am Dent Assoc* 2010;141:319-329.
513. Moosavi H, Kimyai S, Forghani M, Khodadadi R. The Clinical Effectiveness of Various Adhesive Systems: An 18-Month Evaluation. *Oper Dent* 2013;38:134-141.
514. Moraschini V, Fai CK, Alto RM, Dos Santos GO. Amalgam and resin composite longevity of posterior restorations: A systematic review and meta-analysis. *J Dent* 2015;43:1043-1050.
515. Moretto SG, Russo EM, Carvalho RC, De Munck J, Van Landuyt K, Peumans M, et al. 3-year clinical effectiveness of one-step adhesives in non-cariou cervical lesions. *J Dent* 2013;41:675-682.
516. Mörmann W, Brandestini M. Die Cerec Computer Rekonstruktion. Inlays. Onlays und Veneers. Berlin, Germany: Quintessenz Verlag, 1989.
517. Mörmann W, Krejci I. Computer-designed inlays after 5 years in situ: clinical performance and scanning electron microscopic evaluation. *Quintessence international* (Berlin, Germany : 1985) 1992;23:109-115.
518. Morris C, Garman T, Kinzer R, Binon P. Clinical evaluation of an experimental composite in Class II restorations. A three year report. *J Dent Res* 1977;56.
519. Mount GJ. Longevity in glass-ionomer restorations: review of a successful technique. *Quintessence international* (Berlin, Germany : 1985) 1997;28:643-650.
520. Moura FR, Romano AR, Lund RG, Piva E, Rodrigues Júnior SA, Demarco FF. Three-year clinical performance of composite restorations placed by undergraduate dental students. *Braz Dent J* 2011;22:111-116.
521. Munchow EA, Meereis CTW, de Oliveira da Rosa WL, da Silva AF, Piva E. Polymerization shrinkage stress of resin-based dental materials: A systematic review and meta-analyses of technique protocol and photo-activation strategies. *Journal of the Mechanical Behavior of Biomedical Materials* 2018;82:77-86.
522. Nagasiri R, Chitmongkolsuk S. Long-term survival of endodontically treated molars without crown coverage: a retrospective cohort study. *The Journal of prosthetic dentistry* 2005;93:164-170.
523. Naghipur S, Pesun I, Nowakowski A, Kim A. Twelve-year survival of 2-surface composite resin and amalgam premolar restorations placed by dental students. *The Journal of Prosthetic Dentistry* 2016;116:336-339.
524. Narhi TO, Tanner J, Ostela I, Narva K, Nohrstrom T, Tirri T, et al. Anterior Z250 resin composite restorations: one-year evaluation of clinical performance. *Clinical Oral Investigations* 2003;7:241-243.
525. Nassar CA, de Moraes RC, Secundes MB, Bernardon P, Nassar PO, Camilotti V. The Effect of Resin Composites and Polishing Procedure on Periodontal Tissue Parameters in Patients with Diabetes Mellitus. *European Journal of Prosthodontics & Restorative Dentistry* 2014;22:146-151.
526. Neo J, Chew C-L. Direct tooth-colored materials for noncarious lesions: a 3-year clinical report. *Quintessence Int* 1996;27:183-188.

527. Neo J, Chew CL, Yap A, Sidhu S. Clinical evaluation of tooth-colored materials in cervical lesions. *Am J Dent* 1996;9:15-18.
528. Nicolaisen S, von der Fehr FR, Lunder N, Thomsen I. Performance of tunnel restorations at 3-6 years. *J Dent* 2000;28:383-387.
529. Nordbø H, Leirskar J, von der Fehr FR. Saucer-shaped cavity preparations for posterior approximal resin composite restorations: observations up to 10 years. *Quintessence Int* 1998;29:5-11.
530. Nordbø H, Leirskar J, von der Fehr FR. Schüsselförmige Kavitätenpräparation für proximale Kompositrestaurationen im Seitenzahnbereich - Beobachtungen bis zu 10 Jahren. *Quintessenz der zahnärztlichen Literatur* 1998:773-779.
531. Norman RD, Wright JS, Rydberg RJ, Felkner LL. A 5-year study comparing a posterior composite resin and an amalgam. *J Prosthet Dent* 1990;64:523-529.
532. O'Neal SJ, Miracle RL, Leinfelder KF. Evaluating interfacial gaps for esthetic inlays. *Journal of the American Dental Association (1939)* 1993;124:48-54.
533. Oberländer H, Hiller KA, Thonemann B, Schmalz G. Clinical evaluation of packable composite resins in Class-II restorations. *Clin Oral Investig* 2001;5:102-107.
534. Odman P. A 3-year clinical evaluation of Cerana prefabricated ceramic inlays. *The International journal of prosthodontics* 2002;15:79-82.
535. Oldenburg TR, Vann Jr W, Dilley D. Composite restorations for primary molars: two-year results. *Pediatr Dent* 1985;7:96-103.
536. Olley RC, Andiappan M, Frost PM. An up to 50-year follow-up of crown and veneer survival in a dental practice. *The Journal of Prosthetic Dentistry* 2018;119:935-941.
537. Onal B, Pamir T. The two-year clinical performance of esthetic restorative materials in noncarious cervical lesions. *J Am Dent Assoc* 2005;136:1547-1555.
538. Opdam N, Loomans B, Roeters F, Bronkhorst E. Five-year clinical performance of posterior resin composite restorations placed by dental students. *Journal of dentistry* 2004;32:379-383.
539. Opdam NJ, Bronkhorst EM, Loomans BA, Huysmans MC. 12-year survival of composite vs. amalgam restorations. *J Dent Res* 2010;89:1063-1067.
540. Opdam NJ, Bronkhorst EM, Roeters JM, Loomans BA. Longevity and reasons for failure of sandwich and total-etch posterior composite resin restorations. *The Journal of Adhesive Dentistry* 2007;9:469-475.
541. Opdam NJ, Bronkhorst EM, Roeters JM, Loomans BA. A retrospective clinical study on longevity of posterior composite and amalgam restorations. *Dental materials* 2007;23:2-8.
542. Opdam NJ, Loomans BA, Roeters FJ, Bronkhorst EM. Five-year clinical performance of posterior resin composite restorations placed by dental students. *J Dent* 2004;32:379-383.
543. Osborne J, Berry T. 3-year clinical evaluation of glass ionomer cements as Class III restorations. *American Journal of Dentistry* 1990;3:40-43.
544. Osborne JW, Gale EN, Ferguson GW. One-yr and two-year clinical evaluation of a composite resin vs. amalgam. *J Prosthet Dent* 1973;30:795-800.
545. Osborne JW, Norman RD, Gale EN. A 12-year clinical evaluation of two composite resins. *Quintessence Int* 1990;21:111-114.

546. Osborne JW, Norman RD, Gale EN. A 14-year clinical assessment of 12 amalgam alloys. *Quintessence international* (Berlin, Germany : 1985) 1991;22:857-864.
547. Ottenga M, Nimmo S, KJ S. Two-year clinical evaluation of two self-etching dentin adhesives, Abstr. No 684. *J Dent Res* 2010;89B.
548. Ottenga M, S N, KJ S. Four-year clinical evaluation of two self-etching dentin adhesives, Abstr. No 804. *J Dent Res* 2012;91A.
549. Otto T. Cerec-Restaurationen. *Schweizer Monatszeitschrift für Zahnmedizin* 1995:1039-1044.
550. Otto T, De Nisco S. Computer-aided direct ceramic restorations: a 10-year prospective clinical study of Cerec CAD/CAM inlays and onlays. *The International journal of prosthodontics* 2002;15:122-128.
551. Otto T, Schneider D. Long-term clinical results of chairside Cerec CAD/CAM inlays and onlays: a case series. *Int J Prosthodont* 2008;21:53-59.
552. Owens BM, Phebus JG. An evidence-based review of dental matrix systems. *General Dentistry* 2016;64:64-70.
553. Ozakar-Ilday N, Zorba YO, Yildiz M, Erdem V, Seven N, Demirbuga S. Three-year clinical performance of two indirect composite inlays compared to direct composite restorations. *Med Oral Patol Oral Cir Bucal* 2013;18:e521-528.
554. Özgünaltay G, Onen A. Three-year clinical evaluation of a resin modified glass-ionomer cement and a composite resin in non-carious class V lesions. *J Oral Rehabil* 2002;29:1037-1041.
555. Özgünaltay G, Önen A. Three-year clinical evaluation of a resin modified glass-ionomer cement and a composite resin in non-carious class V lesions. *Journal of Oral Rehabilitation* 2002;29:1037-1041.
556. Palaniappan S, Bharadwaj D, Mattar DL, Peumans M, Van Meerbeek B, Lambrechts P. Three-year randomized clinical trial to evaluate the clinical performance and wear of a nanocomposite versus a hybrid composite. *Dental Materials* 2009;25:1302-1314.
557. Palaniappan S, Elsen L, Lijnen I, Peumans M, Van Meerbeek B, Lambrechts P. Three-year randomised clinical trial to evaluate the clinical performance, quantitative and qualitative wear patterns of hybrid composite restorations. *Clinical Oral Investigations* 2010;14:441-458.
558. Pallesen U, Qvist V. Composite resin fillings and inlays. An 11-year evaluation. *Clin Oral Investig* 2003;7:71-79.
559. Pallesen U, van Dijken JW. An 8-year evaluation of sintered ceramic and glass ceramic inlays processed by the Cerec CAD/CAM system. *Eur J Oral Sci* 2000;108:239-246.
560. Pallesen U, van Dijken JWV. A randomized controlled 27 years follow up of three resin composites in Class II restorations. *Journal of Dentistry* 2015;43:1547-1558.
561. Pallesen U, van Dijken JWV. A randomized controlled 30 years follow up of three conventional resin composites in Class II restorations. *Dental Materials* 2015;31:1232-1244.
562. Passia N, Stampf S, Strub JR. Five-year results of a prospective randomised controlled clinical trial of posterior computer-aided design-computer-aided manufacturing ZrSiO₄-ceramic crowns. *Journal of Oral Rehabilitation* 2013;40:609-617.
563. Paterson N. The longevity of restorations. A study of 200 regular attenders in a general dental practice. *British dental journal* 1984;157:23-25.
564. Paula AM, Boing TF, Wambier LM, Hanzen TA, Loguercio AD, Armas-Vega A, et al. Clinical Performance of Non-Carious Cervical Restorations Restored with the "Sandwich Technique"

- and Composite Resin: A Systematic Review and Meta-analysis. *Journal of Adhesive Dentistry* 2019;21:497-508.
565. Pazinato FB, Gionordoli Neto R, Wang L, Mondelli J, Mondelli RF, Navarro MF. 56-month clinical performance of Class I and II resin composite restorations. *J Appl Oral Sci* 2012;20:323-328.
566. Pecie R, Krejci I, Garcia-Godoy F, Bortolotto T. Noncarious cervical lesions (NCCL)--a clinical concept based on the literature review. Part 2: restoration. *American Journal of Dentistry* 2011;24:183-192.
567. Pelka M, Schmidt G, Petschelt A. Klinische Qualitätsbeurteilung von gegossenen Metallinlays und -onlays. *Deutsche zahnärztliche Zeitschrift* 1996:268-272.
568. Perdigão J, Carmo AR, Anauate-Netto C, Amore R, Lewgoy HR, Cordeiro HJ, et al. Clinical performance of a self-etching adhesive at 18 months. *Am J Dent* 2005;18:135-140.
569. Perdigão J, Carmo AR, Geraldeli S. Eighteen-month clinical evaluation of two dentin adhesives applied on dry vs moist dentin. *J Adhes Dent* 2005;7:253-258.
570. Perdigão J, Carmo AR, Geraldeli S, Dutra HR, Masuda MS. Six-month clinical evaluation of two dentin adhesives applied on dry vs moist dentin. *Journal of Adhesive Dentistry* 2001;3.
571. Perdigão J, Dutra-Corrêa M, Anauate-Netto C, Castilhos N, Carmo AR, Lewgoy HR, et al. Two-year clinical evaluation of self-etching adhesives in posterior restorations. *The Journal of Adhesive Dentistry* 2009;11:149-159.
572. Perdigão J, Dutra-Corrêa M, Saraceni CH, Ciaramicoli MT, Kiyan VH, Queiroz CS. Randomized clinical trial of four adhesion strategies: 18-month results. *Oper Dent* 2012;37:3-11.
573. Perdigão J, Dutra-Corrêa M, Saraceni S, Ciaramicoli M, Kiyan V. Randomized clinical trial of two resin-modified glass ionomer materials: 1-year results. *Oper Dent* 2012;37:591-601.
574. Perdigão J, Kose C, Mena-Serrano AP, De Paula EA, Tay LY, Reis A, et al. A new universal simplified adhesive: 18-month clinical evaluation. *Oper Dent* 2014;39:113-127.
575. Perry RD, Kugel G. Two-year clinical evaluation of a high-density posterior restorative material. *Compendium of continuing education in dentistry (Jamesburg, NJ : 1995)* 2000;21:1067-1072, 1074, 1076 passim; quiz 1080.
576. Perry RD, Kugel G, Habib CM, McGarry P, Settembrini L. A two-year clinical evaluation of TPH for restoration of Class II carious lesions in permanent teeth. *Gen Dent* 1997;45:344-349.
577. Peschke A, Watzke R, JF R. One-step vs. Two-step self-etch-adhesive for cervical restorations after 2 years, Abstr. No. 552. *J Dent Res* 2009;88A.
578. Peters TC, Roeters JJ, Frankenmolen FW. Clinical evaluation of Dyract in primary molars: 1-year results. *American journal of dentistry* 1996;9:83-88.
579. Peumans M, De Munck J, Mine A, Van Meerbeek B. Clinical effectiveness of contemporary adhesives for the restoration of non-carious cervical lesions. A systematic review. *Dental Materials* 2014;30:1089-1103.
580. Peumans M, De Munck J, Van Landuyt K, Kanumilli P, Yoshida Y, Inoue S, et al. Restoring cervical lesions with flexible composites. *Dental materials* 2007;23:749-754.
581. Peumans M, De Munck J, Van Landuyt K, Lambrechts P, Van Meerbeek B. Five-year clinical effectiveness of a two-step self-etching adhesive. *Journal of Adhesive Dentistry* 2007;9.
582. Peumans M, De Munck J, Van Landuyt K, Lambrechts P, Van Meerbeek B. Three-year clinical effectiveness of a two-step self-etch adhesive in cervical lesions. *European journal of oral sciences* 2005;113:512-518.

583. Peumans M, De Munck J, Van Landuyt KL, Poitevin A, Lambrechts P, Van Meerbeek B. A 13-year clinical evaluation of two three-step etch-and-rinse adhesives in non-carious class-V lesions. *Clin Oral Investig* 2012;16:129-137.
584. Peumans M, De Munck J, Van Landuyt KL, Poitevin A, Lambrechts P, Van Meerbeek B. Eight-year clinical evaluation of a 2-step self-etch adhesive with and without selective enamel etching. *Dental materials : official publication of the Academy of Dental Materials* 2010;26:1176-1184.
585. Peumans M, Kanumilli P, De Munck J, Van Landuyt K, Lambrechts P, Van Meerbeek B. Clinical effectiveness of contemporary adhesives: a systematic review of current clinical trials. *Dental Materials* 2005;21:864-881.
586. Peumans M, Munck J, Van Landuyt K, Lambrechts P, Van Meerbeek B. Three-year clinical effectiveness of a two-step self-etch adhesive in cervical lesions. *Eur J Oral Sci* 2005;113:512-518.
587. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. The 5-year clinical performance of direct composite additions to correct tooth form and position. I. Esthetic qualities. *Clin Oral Investig* 1997;1:12-18.
588. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. The 5-year clinical performance of direct composite additions to correct tooth form and position. II. Marginal qualities. *Clin Oral Investig* 1997;1:19-26.
589. Peumans M, Van Meerbeek B, Lambrechts P, Vanherle G. Two-year clinical effectiveness of a resin-modified glass-ionomer adhesive. *American journal of dentistry* 2003;16:363-368.
590. Phantumvanit P, Songpaisan Y, Pilot T, Frencken JE. Atraumatic restorative treatment (ART): a three-year community field trial in Thailand--survival of one-surface restorations in the permanent dentition. *Journal of public health dentistry* 1996;56:141-145; discussion 161-143.
591. Phillips RW, Avery DR, Mehra R, Swartz ML, McCune RJ. Observations on a composite resin for class II restorations: two-year report. *J Prosthet Dent* 1972;28:164-169.
592. Pieper K, Meyer G, Marienhagen B, Motsch A. A long-term study of amalgam and composite fillings. *Deutsche zahnärztliche Zeitschrift* 1991;46:222-225.
593. Pignoly C, Elbaum R, Koubi G. [Isolation of the operative field in esthetic restorative dentistry]. *Clinic Odontologia* 1990;11:297-303.
594. Pilebro CE, van Dijken JW. Analysis of factors affecting failure of glass cermet tunnel restorations in a multi-center study. *Clin Oral Investig* 2001;5:96-101.
595. Plasmans PJ, Creugers NH, Mulder J. Long-term survival of extensive amalgam restorations. *J Dent Res* 1998;77:453-460.
596. Plasmans PJ, van 't Hof MA. A 4-year clinical evaluation of extensive amalgam restorations--description of the failures. *J Oral Rehabil* 1993;20:561-570.
597. Pollington S, van Noort R. A clinical evaluation of a resin composite and a compomer in non-carious Class V lesions. A 3-year follow-up. *Am J Dent* 2008;21:49-52.
598. Poon EC, Smales RJ, Yip KH. Clinical evaluation of packable and conventional hybrid posterior resin-based composites: results at 3.5 years. *J Am Dent Assoc* 2005;136:1533-1540.
599. Popescu SM, Țuculină MJ, Manolea HO, Mercuț R, Scriciu M. Randomized clinical trial of adhesive restorations in non carious cervical lesions. *Key Engineering Materials: Trans Tech Publ*, 2016:3-11.

600. Posselt A, Kerschbaum T. Longevity of 2328 chairside Cerec inlays and onlays. *International journal of computerized dentistry* 2003;6:231-248.
601. Powell L, Johnson G, Gordon G. Factors associated with clinical success of cervical abrasion/erosion restorations. *Oper Dent* 1995;20:7-13.
602. Powell LV, Gordon GE, Johnson GH. Clinical comparison of Class V resin composite and glass ionomer restorations. *American journal of dentistry* 1992;5:249-252.
603. Powell LV, Gordon GE, Johnson GH. Clinical evaluation of direct esthetic restorations in cervical abrasion/erosion lesions: one-year results. *Quintessence international (Berlin, Germany : 1985)* 1991;22:687-692.
604. Powers J, Farah J. Compomers. *The Dental Advisor* 1998:1-5.
605. Prabhu R, Bhaskaran S, Geetha Prabhu KR, Eswaran MA, Phanikrishna G, Deepthi B. Clinical evaluation of direct composite restoration done for midline diastema closure - long-term study. *Journal of pharmacy & bioallied sciences* 2015;7:S559-562.
606. Prakki A, Cilli R, Saad JO, Rodrigues JR. Clinical evaluation of proximal contacts of Class II esthetic direct restorations. *Quintessence International* 2004;35:785-789.
607. Prakki A, Cilli R, Saad JO, Rodrigues JR. Clinical evaluation of proximal contacts of Class II esthetic direct restorations. *Quintessence international (Berlin, Germany : 1985)* 2004;35:785-789.
608. Prakki A, Nunes MC, Cefaly DF, Lauris JR, Navarro MF. Six-year evaluation of the atraumatic restorative treatment approach in permanent-tooth Class III restorations. *Journal of Adhesive Dentistry* 2008;10:233-237.
609. Prati C, Chersoni S, Cretti L, Montanari G. Retention and marginal adaptation of a compomer placed in non-stress-bearing areas used with the total-etch technique: a 3-year retrospective study. *Clinical Oral Investigations* 1998;2:168-173.
610. Prati C, Montanari G. Three-year clinical study of two composite resins and one non-gamma 2 conventional amalgam in posterior teeth. *Schweizer Monatsschrift für Zahnmedizin= Revue mensuelle suisse d'odonto-stomatologie= Rivista mensile svizzera di odontologia e stomatologia* 1988;98:120-125.
611. Qin W, Song Z, Ye YY, Lin ZM. Two-year clinical evaluation of composite resins in non-carious cervical lesions. *Clin Oral Investig* 2013;17:799-804.
612. Qualtrough AJ, Wilson NH. A 3-year clinical evaluation of a porcelain inlay system. *J Dent* 1996;24:317-323.
613. Qvist V, Qvist J, Mjör IA. Placement and longevity of tooth-colored restorations in Denmark. *Acta Odontol Scand* 1990;48:305-311.
614. Qvist V, Strøm C. 11-year assessment of Class-III resin restorations completed with two restorative procedures. *Acta Odontol Scand* 1993;51:253-262.
615. Rasines Alcaraz MG, Veitz-Keenan A, Sahrman P, Schmidlin PR, Davis D, Iheozor-Ejiofor Z. Direct composite resin fillings versus amalgam fillings for permanent or adult posterior teeth. *The Cochrane database of systematic reviews* 2014:Cd005620.
616. Raskin A, Michotte-Theall B, Vreven J, Wilson NH. Clinical evaluation of a posterior composite 10-year report. *J Dent* 1999;27:13-19.
617. Raskin A, Setcos JC, Vreven J, Wilson NH. Influence of the isolation method on the 10-year clinical behaviour of posterior resin composite restorations. *Clin Oral Investig* 2000;4:148-152.

618. Raskin A, Setcos JC, Vreven J, Wilson NH. Influence of the isolation method on the 10-year clinical behaviour of posterior resin composite restorations. *Clinical Oral Investigations* 2000;4:148-152.
619. Rasmusson CG, Lundin SA. Class II restorations in six different posterior composite resins: five-year results. *Swed Dent J* 1995;19:173-182.
620. Rau PJ, Pioch T, Staehle HJ, Dorfer CE. Influence of the rubber dam on proximal contact strengths. *Operative Dentistry* 2006;31:171-175.
621. Reis A, Dourado Loguercio A, Schroeder M, Luque-Martinez I, Masterson D, Cople Maia L. Does the adhesive strategy influence the post-operative sensitivity in adult patients with posterior resin composite restorations?: A systematic review and meta-analysis. *Dental Materials* 2015;31:1052-1067.
622. Reis A, Leite TM, Matte K, Michels R, Amaral RC, Geraldeli S, et al. Improving clinical retention of one-step self-etching adhesive systems with an additional hydrophobic adhesive layer. *The Journal of the American Dental Association* 2009;140:877-885.
623. Reis A, Loguercio AD. A 24-month follow-up of flowable resin composite as an intermediate layer in non-carious cervical lesions. *Oper Dent* 2006;31:523-529.
624. Reis A, Loguercio AD. A 36-month clinical evaluation of ethanol/water and acetone-based etch-and-rinse adhesives in non-carious cervical lesions. *Oper Dent* 2009;34:384-391.
625. Reis A, Mânica D, Ferneda F, Amaral R, Stanislawczuk R, Manso A, et al. A 24-month randomized clinical trial of a two- and three-step etch-and-rinse technique. *American journal of dentistry* 2010;23:231-236.
626. Reis AF, Vestphal M, Amaral RCD, Rodrigues JA, Roulet JF, Roscoe MG. Efficiency of polymerization of bulk-fill composite resins: a systematic review. *Pesquisa Odontologica Brasileira = Brazilian Oral Research* 2017;31:e59.
627. Reiss B, Walther W. Clinical long-term results and 10-year Kaplan-Meier analysis of Cerec restorations. *International journal of computerized dentistry* 2000;3:9-23.
628. Reiss B, Walther W. Ereignisanalyse und klinische Langzeitergebnisse mit Cerec-Keramikinlays. *Deutsche Zahnärztliche Zeitschrift* 1998;65-68.
629. Reiss B, Walther W. Überlebensanalyse und klinische Nachuntersuchungen von zahnfarbenen Einlagefüllungen nach dem CEREC-Verfahren

Zahnärztliche Welt

1991:329-332.

630. Reusens B, D'hoore W, Vreven J. In vivo comparison of a microfilled and a hybrid minifilled composite resin in Class III restorations: 2-year follow-up. *Clinical Oral Investigations* 1999;3:62-69.
631. Richardson A, Derkson G. Clinical evaluation of light-cured and auto-cured composite resin restorations. *Journal (Canadian Dental Association)* 1987;53:681-683.
632. Rinke S, Kramer K, Bürgers R, Roediger M. A practice-based clinical evaluation of the survival and success of metal-ceramic and zirconia molar crowns: 5-year results. *Journal of Oral Rehabilitation* 2016;43:136-144.
633. Ritter AV, Heymann HO, Swift EJ, Jr., Sturdevant JR, Wilder AD, Jr. Clinical evaluation of an all-in-one adhesive in non-carious cervical lesions with different degrees of dentin sclerosis. *Oper Dent* 2008;33:370-378.

634. Ritter AV, Swift EJ, Jr., Heymann HO, Sturdevant JR, Wilder AD, Jr. An eight-year clinical evaluation of filled and unfilled one-bottle dental adhesives. *J Am Dent Assoc* 2009;140:28-37; quiz 111-112.
-
635. Robbins JW, Summitt JB. Longevity of complex amalgam restorations. *Oper Dent* 1988;13:54-57.
636. Roberts JF, Sherriff M. The fate and survival of amalgam and preformed crown molar restorations placed in a specialist paediatric dental practice. *Br Dent J* 1990;169:237-244.
637. Roberts MW, Moffa JP, Jenkins WA. Clinical evaluation of three acid-etch composite resin systems: two-year report. *Journal of the American Dental Association (1939)* 1978;97:829-832.
638. Robinson AA, Rowe AH, Maberley ML. A three-year study of the clinical performance of a posterior composite and a lathe cut amalgam alloy. *Br Dent J* 1988;164:248-252.
639. Robinson AD. The life of a filling. *British dental journal* 1971;130:206-208.
640. Robles A, Sadid-Zadeh R, Anabtawi M, Givan D, Waldo B, Ramp L, et al. Two-year clinical evaluation of three adhesives in Class V restorations, Abstr. No. 805. *J Dent Res* 2012;91A.
641. Rocha AC, Da Rosa W, Cocco AR, Da Silva AF, Piva E, Lund RG. Influence of Surface Treatment on Composite Adhesion in Noncarious Cervical Lesions: Systematic Review and Meta-analysis. *Operative Dentistry* 2018;43:508-519.
642. Rodolpho PADR, Donassollo TA, Cenci MS, Loguercio AD, Moraes RR, Bronkhorst EM, et al. 22-Year clinical evaluation of the performance of two posterior composites with different filler characteristics. *Dental materials* 2011;27:955-963.
643. Rodrigues LKA, Fernandes CAO, Macedo GV, RM C. Clinical trial of acid-etching prior to a self-etching adhesive system, Abstr. No. 1784. *J Dent Res* 2008;87B.
644. Rosin M, Schwahn C, Kordass B, Korschake C, Greese U, Teichmann D, et al. A multipractice clinical evaluation of an ORMOCER restorative--2-year results. *Quintessence International* 2007;38:e306-315.
645. Rosin M, Steffen H, Korschake C, Greese U, Teichmann D, Hartmann A, et al. One-year evaluation of an Ormocer restorative-a multipractice clinical trial. *Clinical Oral Investigations* 2003;7:20-26.
646. Roulet J-F, Herder S. Seitenzahnversorgung mit adhäsiv befestigten Keramikinlays. Berlin, Germany: Quintessenz Verlag, 1989.
647. Roulet JF. Benefits and disadvantages of tooth-coloured alternatives to amalgam. *J Dent* 1997;25:459-473.
648. Roulet JF. Longevity of glass ceramic inlays and amalgam--results up to 6 years. *Clin Oral Investig* 1997;1:40-46.
649. Roulet JF, Mettler P, Friedrich U. Ein klinischer Vergleich dreier Komposits mit Amalgam für Klasse-II-Füllungen unter besonderer Berücksichtigung der Abrasion. Resultate nach 2 Jahren. . *Schweiz Monatsschr Zahnmed* 1980:19-30.
650. Roulet JF, Mettler P, Friedrich U. Studie über die Abrasion von Komposits im Seitenzahnbereich - Reslutate nach 3 Jahren. *Deutsch Zahnärz Z* 1980:433-497.
-
651. Rowe AHR. A five year study of the clinical performance of a posterior composite resin restorative material. *Journal of Dentistry* 1989;17:S6-S9.
652. Rule DC, Elliott B. Semi-permanent restoration of fractured incisors in young patients. A clinical evaluation of one "acid-etch" technique. *British dental journal* 1975;139:272-275.

653. Rykke M. Dental materials for posterior restorations. *Endodontics & dental traumatology* 1992;8:139-148.
654. Sabbagh J, Dagher S, El Osta N, Souhaid P. Randomized Clinical Trial of a Self-Adhering Flowable Composite for Class I Restorations: 2-Year Results. *International Journal of Dentistry* 2017;2017:5041529.
655. Saboia Vde P, Almeida PC, Rittet AV, Swift EJ, Jr., Pimenta LA. 2-year Clinical evaluation of sodium hypochlorite treatment in the restoration of non-cariou cervical lesions: a pilot study. *Oper Dent* 2006;31:530-535.
656. Sachdeo A, Gray GB, Sulieman MA, Jagger DC. Comparison of wear and clinical performance between amalgam, composite and open sandwich restorations: 2-year results. *Eur J Prosthodont Restor Dent* 2004;12:15-20.
657. Sadeghi M, Lynch CD, Shahamat N. Eighteen-month clinical evaluation of microhybrid, packable and nanofilled resin composites in Class I restorations. *Journal of Oral Rehabilitation* 2010;37:532-537.
658. Santiago SL, Passos VF, Vieira AHM, Navarro MFdL, Lauris JRP, Franco EB. Two-year clinical evaluation of resinous restorative systems in non-cariou cervical lesions. *Brazilian dental journal* 2010;21:229-234.
659. Santos MJ, Ari N, Steele S, Costella J, Banting D. Retention of tooth-colored restorations in non-cariou cervical lesions--a systematic review. *Clin Oral Investig* 2014;18:1369-1381.
660. Santos MJ, Ari N, Steele S, Costella J, Banting D. Retention of tooth-colored restorations in non-cariou cervical lesions--a systematic review. *Clinical Oral Investigations* 2014;18:1369-1381.
661. Santos MJMC, Freitas MC, Azevedo LM, Santos GC, Navarro MF, Francischone CE, et al. Clinical evaluation of ceramic inlays and onlays fabricated with two systems: 12-year follow-up. *Clinical Oral Investigations* 2016;20:1683-1690.
662. Sarrett DC, Brooks CN, Rose JT. Clinical performance evaluation of a packable posterior composite in bulk-cured restorations. *J Am Dent Assoc* 2006;137:71-80.
663. Sartori N, Lopes GC, Vieira LC. Clinical performance of cervical restorations with desensitizing agents: 18-month clinical trial. *The Journal of Adhesive Dentistry* 2012;14:183-189.
664. Schattenberg A, Werling U, Willershausen B, Ernst CP. Two-year clinical performance of two one-step self-etching adhesives in the restoration of cervical lesions. *Clin Oral Investig* 2008;12:225-232.
665. Scheibenbogen-Fuchsbrunner A, Manhart J, Kremers L, Kunzelmann KH, Hickel R. Two-year clinical evaluation of direct and indirect composite restorations in posterior teeth. *J Prosthet Dent* 1999;82:391-397.
666. Scheibenbogen A, Manhart J, Kunzelmann KH, Hickel R. One-year clinical evaluation of composite and ceramic inlays in posterior teeth. *J Prosthet Dent* 1998;80:410-416.
667. Schenkel AB, Veitz-Keenan A. Dental cavity liners for Class I and Class II resin-based composite restorations. *Cochrane Database of Systematic Reviews* 2019;3:CD010526.
668. Schirrmeister JF, Huber K, Hellwig E, Hahn P. Four-year evaluation of a resin composite including nanofillers in posterior cavities. *The Journal of Adhesive Dentistry* 2009;11:399-404.
669. Schlapbach T, Hotz P, Roulet J. Ein klinischer Vergleich konventionell und mikrogefüllter Komposits für Klasse 3 Füllungen-Resultate nach 2 Jahren. *Schweiz Mschr Zahnheilk* 1982;92:667-680.

670. Schlapbach T, Hotz P, Roulet JF. [Clinical comparison of conventional and microfilled composites for class-III fillings: results after 2 years]. *Schweizerische Monatsschrift für Zahnheilkunde = Revue mensuelle suisse d'odonto-stomatologie* 1982;92:667-680.
671. Schlösser R, Kerschbaum T, Ahrens F, Cramer M. Überlebensrate von Teil- und Voligußkronen. *Deutsche Zahnärztliche Zeitschrift* 1993;696-698.
672. Schmidt M, Dige I, Kirkevang L-L, Vaeth M, Hørsted-Bindslev P. Five-year evaluation of a low-shrinkage Silorane resin composite material: A randomized clinical trial. *Clinical Oral Investigations* 2015;19:245-251.
673. Schoch M, Krämer N, Frankenberger R, Petschelt A. Direct posterior composite restorations with a new adhesive system: one-year results. *The Journal of Adhesive Dentistry* 1999;1:167-173.
674. Scholtanus JD, Özcan M. Clinical longevity of extensive direct composite restorations in amalgam replacement: Up to 3.5 years follow-up. *Journal of Dentistry* 2014;42:1404-1410.
675. Schroeder M, Correa IC, Bauer J, Loguercio AD, Reis A. Influence of adhesive strategy on clinical parameters in cervical restorations: A systematic review and meta-analysis. *Journal of Dentistry* 2017;62:36-53.
676. Schulz P, Johansson A, Arvidson K. A retrospective study of Mirage ceramic inlays over up to 9 years. *The International journal of prosthodontics* 2003;16:510-514.
677. Schwartz R, Haveman C, Conn L, Summit J, Robbins J. Clinical evaluation of a one bottle adhesive: 18 month results. Abstract No. 1534. *Journal of Dental Research* 2000:75.
678. Schwendicke F, Blunck U, Paris S, Gostemeyer G. Choice of comparator in restorative trials: A network analysis. *Dental Materials* 2015;31:1502-1509.
679. Schwendicke F, Dörfer CE, Paris S. Incomplete Caries Removal: A Systematic Review and Meta-analysis. *Journal of Dental Research* 2013;92:306-314.
680. Schwendicke F, Gostemeyer G, Blunck U, Paris S, Hsu LY, Tu YK. Directly Placed Restorative Materials: Review and Network Meta-analysis. *Journal of Dental Research* 2016;95:613-622.
681. Schwendicke F, Meyer-Lueckel H, Dorfer C, Paris S. Failure of incompletely excavated teeth--a systematic review. *Journal of Dentistry* 2013;41:569-580.
682. Schwendicke F, Walsh T, Lamont T, Al-yaseen W, Bjørndal L, Clarkson JE, et al. Interventions for treating cavitated or dentine carious lesions. *Cochrane Database of Systematic Reviews* 2021.
683. Setcos J, Bassiouny M, Brunson W, Norman R. CLINICAL-EVALUATION OF A POSTERIOR COMPOSITE (3-YEAR RESULTS). *JOURNAL OF DENTAL RESEARCH: AMER ASSOC DENTAL RESEARCH* 1619 DUKE ST, ALEXANDRIA, VA 22314, 1987:129-129.
684. Setcos JC, Staninec M, Wilson NH. A two-year randomized, controlled clinical evaluation of bonded amalgam restorations. *The Journal of Adhesive Dentistry* 1999;1:323-331.
685. Shea BJ, Reeves BC, Wells G, Thuku M, Hamel C, Moran J, et al. AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ (Clinical research ed)* 2017;358:j4008.
686. Shenker BJ, Maserejian NN, Zhang A, McKinlay S. Immune function effects of dental amalgam in children: a randomized clinical trial. *J Am Dent Assoc* 2008;139:1496-1505.
687. Shey Z, Oppenheim M. A clinical evaluation of a radiopaque material in the restoration of anterior and posterior teeth. *Journal of the American Dental Association (1939)* 1979;98:569-571.

688. Sheykholeslam Z, Oppenheim M, Houpt MI. Clinical comparison of sealant and bonding systems in the restoration of fractured anterior teeth. *Journal of the American Dental Association (1939)* 1977;95:1140-1144.
689. Shi L, Wang X, Zhao Q, Zhang Y, Zhang L, Ren Y, et al. Evaluation of packable and conventional hybrid resin composites in Class I restorations: three-year results of a randomized, double-blind and controlled clinical trial. *Oper Dent* 2010;35:11-19.
690. Shintani H, Satou N, Satou J. Clinical evaluation of two posterior composite resins retained with bonding agents. *The Journal of Prosthetic Dentistry* 1989;62:627-632.
691. Sia CF, Levey C. HEMA-free or HEMA-containing adhesive systems for non-cariou cervical lesions. *Evidence-Based Dentistry* 2018;19:114-115.
692. Sjögren G, Bergman M, Molin M, Bessing C. A clinical examination of ceramic (Cerec) inlays. *Acta Odontol Scand* 1992;50:171-178.
693. Sjögren G, Hedlund SO, Jonsson C, Sandström A. A 3-year follow-up study of preformed beta-quartz glass-ceramic insert restorations. *Quintessence international (Berlin, Germany : 1985)* 2000;31:25-31.
694. Sjögren G, Molin M, van Dijken JW. A 5-year clinical evaluation of ceramic inlays (Cerec) cemented with a dual-cured or chemically cured resin composite luting agent. *Acta Odontol Scand* 1998;56:263-267.
695. Skupien JA, Cenci MS, Opdam NJ, Kreulen CM, Huysmans M-C, Pereira-Cenci T. Crown vs. composite for post-retained restorations: A randomized clinical trial. *Journal of Dentistry* 2016;48:34-39.
696. Skupien JA, Opdam N, Winnen R, Bronkhorst E, Kreulen C, Pereira-Cenci T, et al. A Practice-based Study on the Survival of Restored Endodontically Treated Teeth. *Journal of Endodontics* 2013;39:1335-1340.
697. Smales RJ. Composite resin restorations. A three-year clinical assessment of four materials. *Australian dental journal* 1975;20:228-234.
698. Smales RJ. Effect of rubber dam isolation on restoration deterioration. *American Journal of Dentistry* 1992;5:277-279.
699. Smales RJ. Longevity of cusp-covered amalgams: survivals after 15 years. *Oper Dent* 1991;16:17-20.
700. Smales RJ. Rubber dam usage related to restoration quality and survival. *Br Dent J* 1993;174:330-333.
701. Smales RJ, Etemadi S. Survival of ceramic onlays placed with and without metal reinforcement. *J Prosthet Dent* 2004;91:548-553.
702. Smales RJ, Gerke DC. Clinical evaluation of four anterior composite resins over five years. *Dent Mater* 1992;8:246-251.
703. Smales RJ, Gerke DC, White IL. Clinical evaluation of occlusal glass ionomer, resin, and amalgam restorations. *J Dent* 1990;18:243-249.
704. Smales RJ, Hawthorne WS. Long-term survival and cost-effectiveness of five dental restorative materials used in various classes of cavity preparations. *Int Dent J* 1996;46:126-130.
705. Smales RJ, Hawthorne WS. Long-term survival of extensive amalgams and posterior crowns. *J Dent* 1997;25:225-227.

706. Smales RJ, Webster DA, Leppard PI. Survival predictions of amalgam restorations. *J Dent* 1991;19:272-277.
707. Smales RJ, Webster DA, Leppard PI. Survival predictions of four types of dental restorative materials. *J Dent* 1991;19:278-282.
708. Smith C, Dickson G, Morris C, Cliett B. Two-year clinical evaluation of non-retentive Class V restorations. Abstract No. 3031. *Journal of Dental Research* 2000;75:396.
709. Söderholm KJ, Ottenga M, Nimmo S. Four-year clinical evaluation of two self-etching dentin adhesives of different pH values used to restore non-retentive cervical lesions. *Am J Dent* 2013;26:28-32.
710. Soncini JA, Maserejian NN, Trachtenberg F, Tavares M, Hayes C. The longevity of amalgam versus compomer/composite restorations in posterior primary and permanent teeth: findings From the New England Children's Amalgam Trial. *J Am Dent Assoc* 2007;138:763-772.
711. Spinaz E. Longevity of composite restorations of traumatically injured teeth. *Am J Dent* 2004;17:407-411.
712. Spreafico RC, Krejci I, Dietschi D. Clinical performance and marginal adaptation of class II direct and semidirect composite restorations over 3.5 years in vivo. *J Dent* 2005;33:499-507.
713. Stefanski S, van Dijken JWV. Clinical performance of a nanofilled resin composite with and without an intermediary layer of flowable composite: a 2-year evaluation. *Clinical Oral Investigations* 2012;16:147-153.
714. Stenberg R, Matsson L. Clinical evaluation of glass ceramic inlays (Dicor). *Acta Odontol Scand* 1993;51:91-97.
715. Sterne JA, Hernán MA, Reeves BC, Savović J, Berkman ND, Viswanathan M, et al. ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions. *BMJ (Clinical research ed)* 2016;355:i4919.
716. Sterne JAC, Savović J, Page MJ, Elbers RG, Blencowe NS, Boutron I, et al. RoB 2: a revised tool for assessing risk of bias in randomised trials. *BMJ (Clinical research ed)* 2019;366:l4898.
717. Stojanac IL, Premovic MT, Ramic BD, Drobac MR, Stojšin IM, Petrovic LM. Noncarious cervical lesions restored with three different tooth-colored materials: two-year results. *Oper Dent* 2013;38:12-20.
718. Stoll R, Sieweke M, Pieper K, Stachniss V, Schulte A. Longevity of cast gold inlays and partial crowns--a retrospective study at a dental school clinic. *Clin Oral Investig* 1999;3:100-104.
719. Strand GV, Nordbø H, Leirskar J, von der Fehr FR, Eide GE. Tunnel restorations placed in routine practice and observed for 24 to 54 months. *Quintessence international (Berlin, Germany : 1985)* 2000;31:453-460.
720. Strand GV, Nordbø H, Tveit AB, Espelid I, Wikstrand K, Eide GE. A 3-year clinical study of tunnel restorations. *Eur J Oral Sci* 1996;104:384-389.
721. Strassler HE, Ganesh NF. Critical Factors for Successful Restorations: Light-Curing, Light-Energy Monitoring, and Matrices. *Compendium of Continuing Education in Dentistry* 2018;39:120-121.
722. Studer S, Lehner C, Brodbeck U, Schäfer P. Short-term results of IPS-Empress inlays and onlays. *Journal of prosthodontics : official journal of the American College of Prosthodontists* 1996;5:277-287.

723. Studer SP, Wettstein F, Lehner C, Zullo TG, Schärer P. Long-term survival estimates of cast gold inlays and onlays with their analysis of failures. *J Oral Rehabil* 2000;27:461-472.
724. STURDEVANT J. Five-year study of two light-cured posterior composite resins. *Dental materials : official publication of the Academy of Dental Materials* 1989;5:127-132.
725. Sturdevant J, Lundeen T, Sluder Jr T, Leinfelder K. Three-year study of two light-cured posterior composite resins. *Dental Materials* 1986;2:263-268.
726. Sturdevant JR, Lundeen TF, Sluder TB, Wilder AD, Taylor DF. Five-year study of two light-cured posterior composite resins. *Dent Mater* 1988;4:105-110.
727. Sugizaki J, Morigami M, Uno S, Yamada T. Clinical evaluation and interfacial morphology observation of Xeno III self-etching resin bonding and restorative system. *Dental materials journal* 2007;26:602-607.
728. Summitt JB, Burgess JO, Berry TG, Robbins JW, Osborne JW, Haveman CW. The performance of bonded vs. pin-retained complex amalgam restorations: a five-year clinical evaluation. *Journal of the American Dental Association (1939)* 2001;132:923-931.
729. Svanberg M. Class II amalgam restorations, glass-ionomer tunnel restorations, and caries development on adjacent tooth surfaces: a 3-year clinical study. *Caries research* 1992;26:315-318.
730. Swift EJ, Jr., Perdigão J, Wilder AD, Jr., Heymann HO, Sturdevant JR, Bayne SC. Clinical evaluation of two one-bottle dentin adhesives at three years. *J Am Dent Assoc* 2001;132:1117-1123.
731. Swift EJ, Jr., Ritter AV, Heymann HO, Sturdevant JR, Wilder AD, Jr. 36-month clinical evaluation of two adhesives and microhybrid resin composites in Class I restorations. *American journal of dentistry* 2008;21:148-152.
732. Swift Jr E, Perdigão J, Heymann H, Wilder Jr A, Bayne S, May Jr K, et al. Eighteen-month clinical evaluation of a filled and unfilled dentin adhesive. *Journal of Dentistry* 2001;29:1-6.
733. Szesz A, Parreiras S, Reis A, Loguercio A. Selective enamel etching in cervical lesions for self-etch adhesives: A systematic review and meta-analysis. *Journal of Dentistry* 2016;53:1-11.
734. Teixeira N, Webber MBF, Nassar CA, Camilotti V, Mendonca MJ, Sinhoreti MAC. Influence of Different Composites and Polishing Techniques on Periodontal Tissues near Noncarious Cervical Lesions: A Controlled, Randomized, Blinded Clinical Trial. *European journal of dentistry* 2019;13:635-641.
735. Thonemann B, Federlin M, Schmalz G, Schams A. Clinical evaluation of heat-pressed glass-ceramic inlays in vivo: 2-year results. *Clin Oral Investig* 1997;1:27-34.
736. Thordrup M, Isidor F, Hörsted-Bindslev P. A 3-year study of inlays milled from machinable ceramic blocks representing 2 different inlay systems. *Quintessence international (Berlin, Germany : 1985)* 1999;30:829-836.
737. Thordrup M, Isidor F, Hörsted-Bindslev P. A 5-year clinical study of indirect and direct resin composite and ceramic inlays. *Quintessence international (Berlin, Germany : 1985)* 2001;32:199-205.
738. Thordrup M, Isidor F, Hörsted-Bindslev P. A one-year clinical study of indirect and direct composite and ceramic inlays. *Scandinavian journal of dental research* 1994;102:186-192.
739. Tidehag P, Gunne J. A 2-year clinical follow-up study of IPS Empress ceramic inlays. *The International journal of prosthodontics* 1995;8:456-460.

740. Tonn EM, Ryge G. Clinical evaluations of composite resin restorations in primary molars: a 4-year follow-up study. *Journal of the American Dental Association (1939)* 1988;117:603-606.
741. Torres CRG, Rêgo HMC, Perote LCCC, Santos LFTF, Kamozaki MBB, Gutierrez NC, et al. A split-mouth randomized clinical trial of conventional and heavy flowable composites in class II restorations. *Journal of Dentistry* 2014;42:793-799.
742. Triolo P, Barkmeier W, Los S. Bonding efficacy of a compomer using different conditioning procedures. *Journal of Dental Research* 1995:107.
743. Tuncer D, Yazici AR, Özgünaltay G, Dayangac B. Clinical evaluation of different adhesives used in the restoration of non-cariou cervical lesions: 24-month results. *Aust Dent J* 2013;58:94-100.
744. Turkun LS. Clinical performance of a new antibacterial adhesive system at 18-months, Abstr. No 226. *J Dent Res* 2004;83B.
745. Turkun LS. Five-year clinical performance of an antibacterial adhesive system, Abstr. No 623. *J Dent Res* 2009;87C.
746. Türkün LS. The clinical performance of one- and two-step self-etching adhesive systems at one year. *J Am Dent Assoc* 2005;136:656-664; quiz 683.
747. Türkün LS, Aktener BO. Twenty-four-month clinical evaluation of different posterior composite resin materials. *J Am Dent Assoc* 2001;132:196-203; quiz 224-195.
748. Türkün LS, Aktener BO, Ateş M. Clinical evaluation of different posterior resin composite materials: a 7-year report. *Quintessence international (Berlin, Germany : 1985)* 2003;34:418-426.
749. Türkün LS, Celik EU. Noncariou class V lesions restored with a polyacid modified resin composite and a nanocomposite: a two-year clinical trial. *J Adhes Dent* 2008;10:399-405.
750. Türkün LS, Türkün M, Ozata F. Clinical performance of a packable resin composite for a period of 3 years. *Quintessence international (Berlin, Germany : 1985)* 2005;36:365-372.
751. Türkün LS, Türkün M, Ozata F. Two-year clinical evaluation of a packable resin-based composite. *Journal of the American Dental Association (1939)* 2003;134:1205-1212.
752. Türkün SL. Clinical evaluation of a self-etching and a one-bottle adhesive system at two years. *J Dent* 2003;31:527-534.
753. Türkün ŞL. Clinical evaluation of a self-etching and a one-bottle adhesive system at two years. *Journal of Dentistry* 2003;31:527-534.
754. Tyas M. Placement and replacement of restorations by selected practitioners. *Australian Dental Journal* 2005;50:81-89.
755. Tyas MJ. Clinical evaluation of a polyacid-modified resin composite (compomer). *Oper Dent* 1998;23:77-80.
756. Tyas MJ. Clinical performance of two dentine adhesives: 2-year results. *Aust Dent J* 1996;41:324-327.
757. Tyas MJ. Correlation between fracture properties and clinical performance of composite resins in Class IV cavities. *Australian dental journal* 1990;35:46-49.
758. Tyas MJ. Three-year clinical evaluation of a polyacid-modified resin composite (Dyract). *Oper Dent* 2000;25:152-154.
759. Tyas MJ, Burrow MF. Clinical evaluation of a resin-modified glass ionomer adhesive system: results at five years. *Oper Dent* 2002;27:438-441.

760. Tyas MJ, Burrow MF. Clinical evaluation of EBS dentine bonding agent:one year results. *Australian Dental Journal* 2000;45:115-117.
761. Tyas MJ, Burrow MF. Three-year clinical evaluation of One-Step in non-carious cervical lesions. *Am J Dent* 2002;15:309-311.
762. Tyas MJ, Toohey A, Clark J. Clinical evaluation of the bond between composite resin and etched glass ionomer cement. *Aust Dent J* 1989;34:1-4.
763. van de Sande FH, Da Rosa Rodolpho PA, Basso GR, Patias R, da Rosa QF, Demarco FF, et al. 18-year survival of posterior composite resin restorations with and without glass ionomer cement as base. *Dental Materials* 2015;31:669-675.
764. van de Sande FH, Opdam NJ, Rodolpho PA, Correa MB, Demarco FF, Cenci MS. Patient risk factors' influence on survival of posterior composites. *J Dent Res* 2013;92:78s-83s.
765. van der Veen HJ, Pilon HF, Henry PP. Clinical performance of one microfilled and two hybrid anterior composite resins. *Quintessence international* (Berlin, Germany : 1985) 1989;20:547-550.
766. van der Vyver PJ. Posterior composite resin restorations. Part 3. Matrix systems. *SADJ* 2002;57:221-226.
767. van Dijken J. 5-6 year evaluation of direct composite inlays [abstract 1801] *J Dent Res* 1994;327.
768. van Dijken J. A clinical evaluation of anterior conventional, microfiller and hybrid composite resin fillings. *Acta Odontol Scand* 1985;44:357-367.
769. Van Dijken J. Durability of three simplified adhesive systems in Class V non-carious cervical dentin lesions. *American Journal of Dentistry* 2004;17:27-32.
770. Van Dijken J. Longevity of new hybrid restorative materials in class III cavities. *European journal of oral sciences* 1999;107:215-219.
771. Van Dijken J. A prospective 8-year evaluation of a mild two-step self-etching adhesive and a heavily filled two-step etch-and-rinse system in non-carious cervical lesions. *Dental materials : official publication of the Academy of Dental Materials* 2010;26:940-946.
772. Van Dijken J, Olofsson A, Holm C. Five year evaluation of class III composite resin restorations in cavities pre-treated with an oxalic-or a phosphoric acid conditioner. *Journal of oral rehabilitation* 1999;26:364-371.
773. van Dijken J, Pallesen U. Randomized 3-year Clinical Evaluation of Class I and II Posterior Resin Restorations Placed with a Bulk-fill Resin Composite and a One-step Self-etching Adhesive. *The Journal of Adhesive Dentistry* 2015;17:81-88.
774. van Dijken J, Pallesen U. Three-year Randomized Clinical Study of a One-step Universal Adhesive and a Two-step Self-etch Adhesive in Class II Composite Restorations. *The Journal of Adhesive Dentistry* 2017;19:287-294.
775. van Dijken JW. A 6-year clinical evaluation of Class I poly-acid modified resin composite/resin composite laminate restorations cured with a two-step curing technique. *Dent Mater* 2003;19:423-428.
776. van Dijken JW. A clinical evaluation of anterior conventional, microfiller, and hybrid composite resin fillings. A 6-year follow-up study. *Acta Odontol Scand* 1986;44:357-367.
777. van Dijken JW. Clinical evaluation of three adhesive systems in class V non-carious lesions. *Dental materials : official publication of the Academy of Dental Materials* 2000;16:285-291.

778. van Dijken JW. Direct resin composite inlays/onlays: an 11 year follow-up. *Journal of Dentistry* 2000;28:299-306.
779. van Dijken JW. Durability of resin composite restorations in high C-factor cavities: a 12-year follow-up. *J Dent* 2010;38:469-474.
780. van Dijken JW. Durability of three simplified adhesive systems in Class V non-cariou cervical dentin lesions. *American journal of dentistry* 2004;17:27-32.
781. van Dijken JW. Four-year evaluation of the effect of 10% polyacrylic acid or water rinsing pretreatment on retention of glass polyalkenoate cement. *Eur J Oral Sci* 1996;104:64-66.
782. van Dijken JW. A prospective 8-year evaluation of a mild two-step self-etching adhesive and a heavily filled two-step etch-and-rinse system in non-cariou cervical lesions. *Dent Mater* 2010;26:940-946.
783. van Dijken JW. A randomized controlled 5-year prospective study of two HEMA-free adhesives, a 1-step self etching and a 3-step etch-and-rinse, in non-cariou cervical lesions. *Dental materials : official publication of the Academy of Dental Materials* 2013;29:e271-280.
784. van Dijken JW. Resin-modified glass ionomer cement and self-cured resin composite luted ceramic inlays. A 5-year clinical evaluation. *Dent Mater* 2003;19:670-674.
785. van Dijken JW. Retention of a resin-modified glass ionomer adhesive in non-cariou cervical lesions. A 6-year follow-up. *J Dent* 2005;33:541-547.
786. van Dijken JW. Three-year performance of a calcium-, fluoride-, and hydroxyl-ions-releasing resin composite. *Acta Odontol Scand* 2002;60:155-159.
787. van Dijken JW, Hasselrot L. A prospective 15-year evaluation of extensive dentin-enamel-bonded pressed ceramic coverages. *Dent Mater* 2010;26:929-939.
788. van Dijken JW, Hasselrot L, Ormin A, Olofsson AL. Restorations with extensive dentin/enamel-bonded ceramic coverage. A 5-year follow-up. *Eur J Oral Sci* 2001;109:222-229.
789. van Dijken JW, Höglund-Aberg C, Olofsson AL. Fired ceramic inlays: a 6-year follow up. *J Dent* 1998;26:219-225.
790. van Dijken JW, Lindberg A. Clinical effectiveness of a low-shrinkage resin composite: a five-year evaluation. *J Adhes Dent* 2009;11:143-148.
791. van Dijken JW, Olofsson AL, Holm C. Five year evaluation of class III composite resin restorations in cavities pre-treated with an oxalic- or a phosphoric acid conditioner. *Journal of Oral Rehabilitation* 1999;26:364-371.
792. van Dijken JW, Ormin A, Olofsson AL. Clinical performance of pressed ceramic inlays luted with resin-modified glass ionomer and autopolymerizing resin composite cements. *J Prosthet Dent* 1999;82:529-535.
793. van Dijken JW, Pallesen U. A 7-year randomized prospective study of a one-step self-etching adhesive in non-cariou cervical lesions. The effect of curing modes and restorative material. *J Dent* 2012;40:1060-1067.
794. van Dijken JW, Pallesen U. A 7-year randomized prospective study of a one-step self-etching adhesive in non-cariou cervical lesions. The effect of curing modes and restorative material. *Journal of Dentistry* 2012;40:1060-1067.
795. van Dijken JW, Pallesen U. Clinical performance of a hybrid resin composite with and without an intermediate layer of flowable resin composite: a 7-year evaluation. *Dental materials : official publication of the Academy of Dental Materials* 2011;27:150-156.

796. van Dijken JW, Pallesen U. Eight-year randomized clinical evaluation of Class II nanohybrid resin composite restorations bonded with a one-step self-etch or a two-step etch-and-rinse adhesive. *Clin Oral Investig* 2015;19:1371-1379.
-
797. van Dijken JW, Pallesen U. Four-year clinical evaluation of Class II nano-hybrid resin composite restorations bonded with a one-step self-etch and a two-step etch-and-rinse adhesive. *J Dent* 2011;39:16-25.
798. Van Dijken JW, Pallesen U. Fracture frequency and longevity of fractured resin composite, polyacid-modified resin composite, and resin-modified glass ionomer cement class IV restorations: an up to 14 years of follow-up. *Clinical Oral Investigations* 2010;14:217-222.
799. Van Dijken JW, Pallesen U. Long-term dentin retention of etch-and-rinse and self-etch adhesives and a resin-modified glass ionomer cement in non-cariou cervical lesions. *Dental Materials* 2008;24:915-922.
800. van Dijken JW, Pallesen U. Randomized 3-year clinical evaluation of Class I and II posterior resin restorations placed with a bulk-fill resin composite and a one-step self-etching adhesive. *J Adhes Dent* 2015;17:81-88.
801. van Dijken JW, Pallesen U. A randomized 10-year prospective follow-up of Class II nanohybrid and conventional hybrid resin composite restorations. *The Journal of Adhesive Dentistry* 2014;16:585-592.
802. van Dijken JW, Sunnegårdh-Grönberg K. Fiber-reinforced packable resin composites in Class II cavities. *J Dent* 2006;34:763-769.
803. Van Dijken JW, Sunnegårdh-Grönberg K. A four-year clinical evaluation of a highly filled hybrid resin composite in posterior cavities. *J Adhes Dent* 2005;7:343-349.
804. van Dijken JW, Sunnegårdh-Grönberg K, Lindberg A. Clinical long-term retention of etch-and-rinse and self-etch adhesive systems in non-cariou cervical lesions: a 13 years evaluation. *Dental materials* 2007;23:1101-1107.
805. van Dijken JWV. Clinical evaluation of three adhesive systems in class V non-cariou lesions. *Dental Materials* 2000;16:285-291.
806. van Dijken JWV. Direct resin composite inlays/onlays: an 11 year follow-up. *Journal of Dentistry* 2000;28:299-306.
807. van Dijken JWV, Lindberg A. A 15-year randomized controlled study of a reduced shrinkage stress resin composite. *Dental Materials* 2015;31:1150-1158.
808. van Dijken JWV, Pallesen U. Clinical performance of a hybrid resin composite with and without an intermediate layer of flowable resin composite: A 7-year evaluation. *Dental Materials* 2011;27:150-156.
809. van Dijken JWV, Pallesen U. Eight-year randomized clinical evaluation of Class II nanohybrid resin composite restorations bonded with a one-step self-etch or a two-step etch-and-rinse adhesive. *Clinical Oral Investigations* 2015;19:1371-1379.
810. van Dijken JWV, Pallesen U. Posterior bulk-filled resin composite restorations: A 5-year randomized controlled clinical study. *Journal of Dentistry* 2016;51:29-35.
-
811. van Dijken JWV, Pallesen U. A randomized controlled three year evaluation of "bulk-filled" posterior resin restorations based on stress decreasing resin technology. *Dental Materials* 2014;30:e245-e251.

812. Van Landuyt KL, De Munck J, Ermis RB, Peumans M, Van Meerbeek B. Five-year clinical performance of a HEMA-free one-step self-etch adhesive in noncarious cervical lesions. *Clinical Oral Investigations* 2014;18:1045-1052.
813. Van Landuyt KL, Peumans M, De Munck J, Cardoso MV, Ermis B, Van Meerbeek B. Three-year clinical performance of a HEMA-free one-step self-etch adhesive in non-carious cervical lesions. *European Journal of Oral Sciences* 2011;119:511-516.
814. Van Meerbeek B, Braem M, Lambrechts P, Vanherle G. Two-year clinical evaluation of two dentine-adhesive systems in cervical lesions. *J Dent* 1993;21:195-202.
815. Van Meerbeek B, Kanumilli P, De Munck J, Van Landuyt K, Lambrechts P, Peumans M. A randomized controlled study evaluating the effectiveness of a two-step self-etch adhesive with and without selective phosphoric-acid etching of enamel. *Dental Materials* 2005;21:375-383.
816. Van Meerbeek B, Kanumilli PV, De Munck J, Van Landuyt K, Lambrechts P, Peumans M. A randomized, controlled trial evaluating the three-year clinical effectiveness of two etch & rinse adhesives in cervical lesions. *Oper Dent* 2004;29:376-385.
817. Van Meerbeek B, Peumans M, Gladys S, Braem M, Lambrechts P, Vanherle G. Three-year clinical effectiveness of four total-etch dentinal adhesive systems in cervical lesions. *Quintessence Int* 1996;27:775-784.
818. Van Nieuwenhuysen JP, D'Hoore W, Carvalho J, Qvist V. Long-term evaluation of extensive restorations in permanent teeth. *J Dent* 2003;31:395-405.
819. van Noort R, Davis LG. A prospective study of the survival of chemically activated anterior resin composite restorations in general dental practice: 5-year results. *J Dent* 1993;21:209-215.
820. Vetromilla BM, Opdam NJ, Leida FL, Sarkis-Onofre R, Demarco FF, van der Loo MPJ, et al. Treatment options for large posterior restorations: a systematic review and network meta-analysis. *Journal of the American Dental Association* 2020;151:614-624.e618.
821. Vilkinis V, Hörsted-Bindslev P, Baelum V. Two-year evaluation of class II resin-modified glass ionomer cement/composite open sandwich and composite restorations. *Clin Oral Investig* 2000;4:133-139.
822. Wagner J, Hiller KA, Schmalz G. Long-term clinical performance and longevity of gold alloy vs ceramic partial crowns. *Clin Oral Investig* 2003;7:80-85.
823. Wakefield C. Commentary: effect of polishing direction on the marginal adaptation of composite resin restorations. *Journal of Esthetic & Restorative Dentistry: Official Publication of the American Academy of Esthetic Dentistry* 2013;25:139-140.
824. Walter R, Swift Jr EJ, Boushell LW, Heymann H, Wilder Jr AD, Sturdevant J, et al. Clinical evaluation of dental adhesives of different bonding strategies, Abstr. No. 605. *J Dent Res* 2013;92A.
825. Walter R, Boushell LW, Heymann HO, Ritter AV, Sturdevant JR, Wilder Jr AD, et al. Three-Year Clinical Evaluation of a Silorane Composite Resin. *Journal of Esthetic and Restorative Dentistry* 2014;26:179-190.
826. Walther W, Reiss B, Toutenburg H. Longitudinale Ereignisanalyse von Cerec-Einlagefüllungen. *Deutsche Zahnärztliche Zeitschrift* 1994:914-917.
827. Wang Y, Li C, Yuan H, Wong MC, Zou J, Shi Z, et al. Rubber dam isolation for restorative treatment in dental patients. *Cochrane Database of Systematic Reviews* 2016;9:CD009858.

828. Wang Z, Shen Y, Haapasalo M. Effect of smear layer against disinfection protocols on *Enterococcus faecalis*-infected dentin. *J Endod* 2013;39:1395-1400.
829. Wassell RW, Walls AW, McCabe JF. Direct composite inlays versus conventional composite restorations: three-year clinical results. *British dental journal* 1995;179:343-349.
830. Wassell RW, Walls AWG, McCabe JF. Direct composite inlays versus conventional composite restorations: 5-year follow-up. *Journal of Dentistry* 2000;28:375-382.
831. Weber-Gaud ML, Herr P, Holz J. [Control of the clinical behavior of 4 composites after 1 year]. *Schweizerische Monatsschrift für Zahnheilkunde = Revue mensuelle suisse d'odontostomatologie* 1982;92:1013-1031.
832. Welbury RR, Walls AW, Murray JJ, McCabe JF. The management of occlusal caries in permanent molars. A 5-year clinical trial comparing a minimal composite with an amalgam restoration. *British dental journal* 1990;169:361-366.
833. Wendt SL, Jr., Leinfelder KF. Clinical evaluation of a heat-treated resin composite inlay: 3-year results. *American journal of dentistry* 1992;5:258-262.
834. Wendt SL, Jr., Ziemiecki TL, Leinfelder KF. Proximal wear rates by tooth position of resin composite restorations. *J Dent* 1996;24:33-39.
835. Wiedmer C, Krejci I, Lutz F. Klinische, röntgenologische und rasterelektronenoptische Untersuchung von Kompositinlays nach fünfjähriger Funktionszeit. *Acta Med Dent Helv* 1997;301-307.
836. Wierichs RJ, Kramer EJ, Meyer-Lueckel H. Risk factors for failure of class V restorations of carious cervical lesions in general dental practices. *J Dent* 2018;77:87-92.
837. Wilder AD, Bayne SC, May KN, Leinfelder KF, Taylor DF. Five-year clinical study of u.v.-polymerized posterior composites. *J Dent* 1991;19:214-220.
838. Wilder AD, Jr., May KN, Jr., Bayne SC, Taylor DF, Leinfelder KF. Seventeen-year clinical study of ultraviolet-cured posterior composite Class I and II restorations. *Journal of Esthetic Dentistry* 1999;11:135-142.
839. Wilder AD, Jr., Swift EJ, Jr., Heymann HO, Ritter AV, Sturdevant JR, Bayne SC. A 12-year clinical evaluation of a three-step dentin adhesive in noncarious cervical lesions. *J Am Dent Assoc* 2009;140:526-535.
840. Wilder Jr AD, May Jr KN, Bayne SC, Taylor DF, Leinfelder KF. Seventeen-year clinical study of ultraviolet-cured posterior composite Class I and II restorations. *Journal of Esthetic and Restorative Dentistry* 1999;11:135-142.
841. Wilson MA, Cowan AJ, Randall RC, Crisp RJ, Wilson NH. A practice-based, randomized, controlled clinical trial of a new resin composite restorative: one-year results. *Oper Dent* 2002;27:423-429.
842. Wilson NH, Burke FJ, Mjör IA. Reasons for placement and replacement of restorations of direct restorative materials by a selected group of practitioners in the United Kingdom. *Quintessence international (Berlin, Germany : 1985)* 1997;28:245-248.
843. Wilson NH, Cowan AJ, Unterbrink G, Wilson MA, Crisp RJ. A clinical evaluation of Class II composites placed using a decoupling technique. *The Journal of Adhesive Dentistry* 2000;2:319-329.
844. Wilson NH, Gordan VV, Brunton PA, Wilson MA, Crisp RJ, Mjör IA. Two-centre evaluation of a resin composite/ self-etching restorative system: three-year findings. *The Journal of Adhesive Dentistry* 2006;8:47-51.

845. Wilson NH, Norman RD. Five-year findings of a multiclinical trial for a posterior composite. *J Dent* 1991;19:153-159.
846. Wilson NH, Wastell DG, Norman RD. Five-year performance of high-copper content amalgam restorations in a multiclinical trial of a posterior composite. *J Dent* 1996;24:203-210.
847. Wilson NH, Wilson MA, Wastell DG, Smith GA. A clinical trial of a visible light cured posterior composite resin restorative material: five-year results. *Quintessence Int* 1988;19:675-681.
848. Wirsching E, Loomans BA, Klaiber B, Dorfer CE. Influence of matrix systems on proximal contact tightness of 2- and 3-surface posterior composite restorations in vivo. *Journal of Dentistry* 2011;39:386-390.
849. Wolter H, Storch W, Ott H. New inorganic/organic copolymers (ORMOCERs) for dental applications *Materials Research Society Cymposia Proceedings* 1994:143-149.
850. Wood RE, Maxymiw WG, McComb D. A clinical comparison of glass ionomer (polyalkenoate) and silver amalgam restorations in the treatment of Class 5 caries in xerostomic head and neck cancer patients. *Oper Dent* 1993;18:94-102.
851. Woods JS, Heyer NJ, Russo JE, Martin MD, Pillai PB, Farin FM. Modification of neurobehavioral effects of mercury by genetic polymorphisms of metallothionein in children. *Neurotoxicol Teratol* 2013;39:36-44.
852. Woods JS, Martin MD, Leroux BG, DeRouen TA, Bernardo MF, Luis HS, et al. Biomarkers of kidney integrity in children and adolescents with dental amalgam mercury exposure: findings from the Casa Pia children's amalgam trial. *Environ Res* 2008;108:393-399.
853. Woods JS, Martin MD, Leroux BG, DeRouen TA, Bernardo MF, Luis HS, et al. Urinary porphyrin excretion in children with mercury amalgam treatment: findings from the Casa Pia Children's Dental Amalgam Trial. *J Toxicol Environ Health A* 2009;72:891-896.
854. Woods JS, Martin MD, Leroux BG, DeRouen TA, Leitão JG, Bernardo MF, et al. The contribution of dental amalgam to urinary mercury excretion in children. *Environ Health Perspect* 2007;115:1527-1531.
855. Worthington HV, Khangura S, Seal K, Mierzwinski-Urban M, Veitz-Keenan A, Sahrman P, et al. Direct composite resin fillings versus amalgam fillings for permanent posterior teeth. *The Cochrane database of systematic reviews* 2021;8:Cd005620.
856. Wucher M, Grobler SR, Senekal PJ. A 3-year clinical evaluation of a compomer, a composite and a compomer/composite (sandwich) in class II restorations. *American journal of dentistry* 2002;15:274-278.
857. Yaman B, Doğruer I, Gümüştas B, Guray B. Three-year randomized clinical evaluation of a low-shrinkage silorane-based resin composite in non-carious cervical lesions. *Clinical oral investigations* 2013;18.
858. Yazici AR, Antonson SA, Kutuk ZB, Ergin E. Thirty-Six-Month Clinical Comparison of Bulk Fill and Nanofill Composite Restorations. *Oper Dent* 2017;42:478-485.
859. Yazici AR, Celik C, Ozgünaltay G, Dayangaç B. The effects of different light-curing units on the clinical performance of nanofilled composite resin restorations in non-carious cervical lesions: 3-year follow-up. *The Journal of Adhesive Dentistry* 2010;12:231-236.
860. Yazici AR, Ustunkol I, Ozgunaltay G, Dayangac B. Three-year clinical evaluation of different restorative resins in class I restorations. *Oper Dent* 2014;39:248-255.

861. Yip KH, Smales RJ, Gao W, Peng D. The effects of two cavity preparation methods on the longevity of glass ionomer cement restorations: an evaluation after 12 months. *Journal of the American Dental Association (1939)* 2002;133:744-751; quiz 769.
862. Zander-Grande C, Amaral RC, Loguercio AD, Barroso LP, Reis A. Clinical performance of one-step self-etch adhesives applied actively in cervical lesions: 24-month clinical trial. *Oper Dent* 2014;39:228-238.
863. Zander-Grande C, Ferreira SQ, da Costa TR, Loguercio AD, Reis A. Application of etch-and-rinse adhesives on dry and rewet dentin under rubbing action: a 24-month clinical evaluation. *J Am Dent Assoc* 2011;142:828-835.
864. Zhang Y, Chen W, Zhang J, Li Y. Does Er,Cr:YSGG reduce the microleakage of restorations when used for cavity preparation? A systematic review and meta-analysis. *BMC Oral Health* 2020;20:269.
865. Zhang Y, Jiang A. The influence of Er:YAG laser treatment on the shear bond strength of enamel and dentin: a systematic review and meta-analysis. *Quintessence International* 2020;51:8-16.
866. Zhou Z, Yu S, Jiang Y, Lin Y, Xiong Y, Ni L. A randomized, controlled clinical trial of one-step self-etching adhesive systems in non-carious cervical lesions. *Am J Dent* 2009;22:235-240.
867. Zimmer S, Göhlich O, Rüttermann S, Lang H, Raab WH, Barthel CR. Long-term survival of Cerec restorations: a 10-year study. *Oper Dent* 2008;33:484-487.
868. Ziraps A, Honkala E. Clinical trial of a new glass ionomer for an atraumatic restorative treatment technique in class I restorations placed in Latvian school children. *Medical principles and practice : international journal of the Kuwait University, Health Science Centre* 2002;11 Suppl 1:44-47.
869. Zuellig-Singer R, Bryant RW. Three-year evaluation of computer-machined ceramic inlays: influence of luting agent. *Quintessence international (Berlin, Germany : 1985)* 1998;29:573-582.