

# Universal Adhesive Brands Functional Performance and Survival: 18 to 48 months Systematic Report



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**AIMS** To compare retention rates of Universal Adhesive (UA) Brands in non-carious cervical lesions (NCCL) restorations and, to evaluate their functional survival by adhesion modes, Etch-and-Rinse (ER), Self-Etch (SE) and Selective Enamel Etching (SEE).

**MATERIAL & METHODS** A Systematic search was performed in PubMed, Web-of-Science and B-on for randomized clinical trials (RCTs) published between 2015-2025. Only RCTs assessing retention of UAs with 18-48 months follow-ups, by USPHS/FDI criteria, were included. PROSPERO CRD420251026490; PRISMA 2020 and PICO framework (Figure 1). Risk of bias assessed by the RoB-2 tool (Figure 2). Kaplan–Meier survival analysis and cumulative incidence of retention failure by FDI criteria were performed, with scores 1–3 considered acceptable and 4–5 classified as failure. Statistical significance was set at  $p < 0.05$ .

## RESULTS

Of 251 screened records, 21 RCTs were eligible (Figure 2), comprising 16 UA brands (Table 1) with overall similar retention rates ( $p > 0.05$ ), median follow-up of 24-month (IQR 24-36 months).

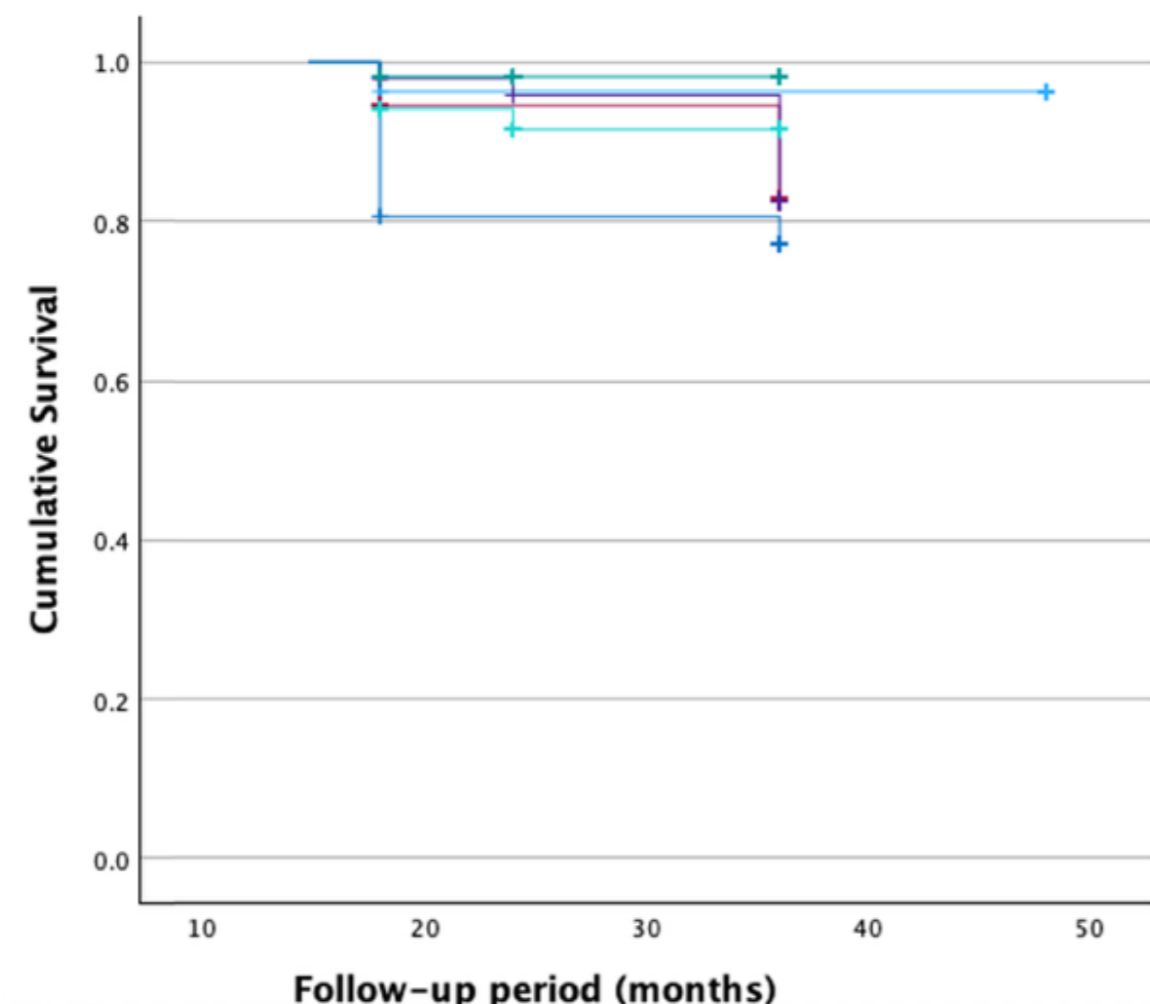
Scotchbond™ Universal [1,5,14,2], Single Bond Universal [16,23,9] and Clearfil™ Universal Bond-Quick [17,22,11,20] were the most frequently evaluated; Those 3M™ UAs consistently showed the highest retention rates, particularly with ER/SEE approaches ( $\approx 98$ –100%). The longest follow-up (48 months) was reported for Ambar Universal APS® [19] which maintained high ER retention (95.6%) but lower SE performance (79.5%). In contrast, Xeno® Select demonstrated the lowest retention rates, especially in SEE (48%) and SE (41%) modes [12].

**Table 1 – Retention (%) of UAs assessed by USPHS/FDI criteria across 21 RCTs (18–48 months follow-up)**

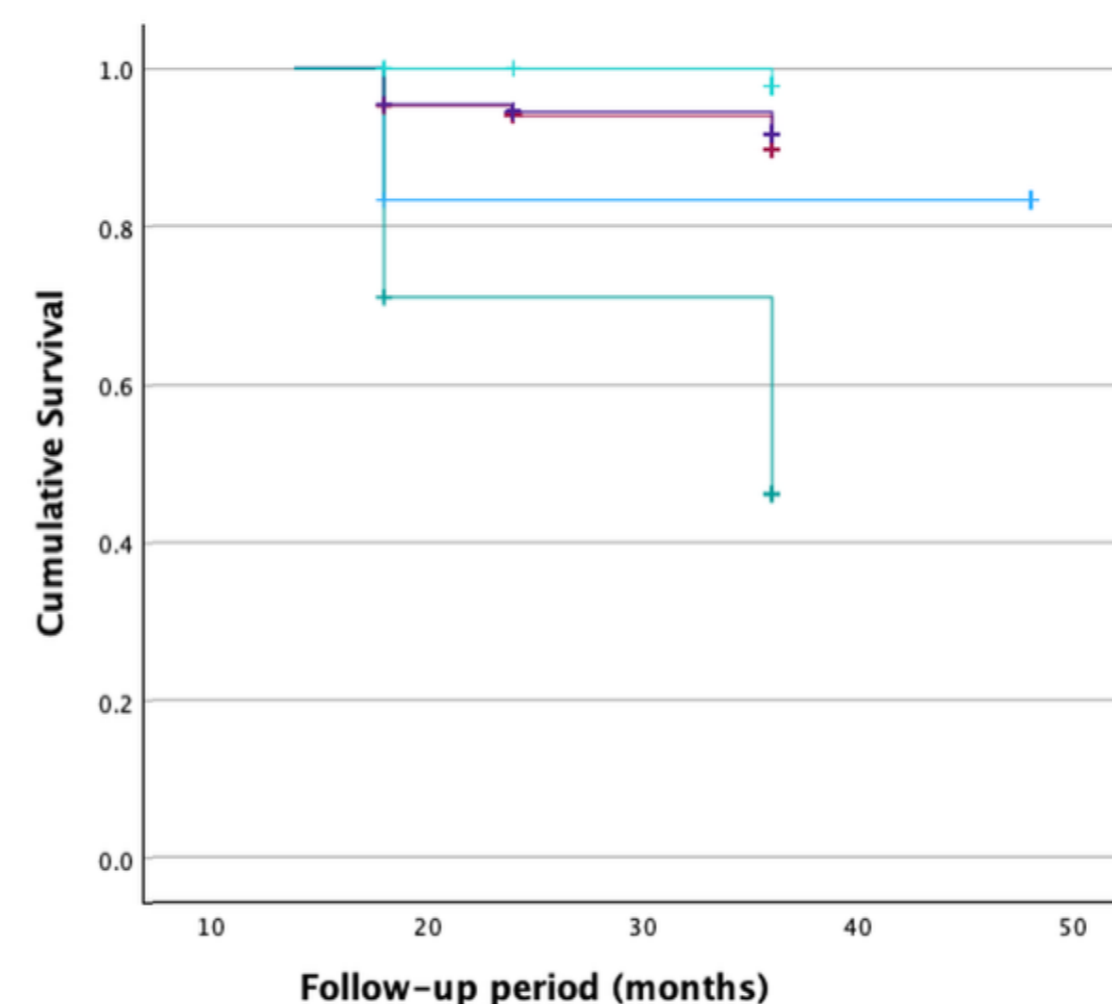
UA Brands	Follow-up (months) [Reference]	Retention (%) by Adhesion modes	Criteria p value (>.05)
Ambar Universal APS®	48m [19]	ER: 95.6%; SE: 79.5%	USPHS/FDI
Scotchbond™ Universal 3M™	24m [1,5,14], 36m [2]	ER & SEE: 100–98%; SE: 87.5–89%	USPHS/FDI
Futurabond® U	24m [15], 36m* [12]	ER: 90.6%-91.3%; SEE: 93.5%*; SE: 90.6%-87%	USPHS/FDI
3M™ Single Bond Universal	24m [16, 23], 36m* [9]	ER: 100%-98.1%; SEE: 82.5–98.2%; SE: 98.1%*	USPHS
Clearfil™ Universal Bond Quick	18m* [17,22], 24m* [11], 36m [20]	ER: 100%*-87.2%; SEE: 100%*- 86.3%; SE: 90.9%*-84%*	USPHS/FDI
iBond® Universal	18m* [4], 36m [21]	ER: 82.6%; SEE: 96.8%*-95.7%; SE: 97.8%	USPHS*/FDI
Xeno® Select	36m [12]	ER: 74%; SEE: 48%; SE: 41%	USPHS/FDI
Adhese® Universal	24m [10,15]	ER: 82.1%; SE: 96.4%	USPHS/FDI
All-Bond Universal®	24m [3]	ER: 100%; SEE: 94.1%; SE: 75%	USPHS
Gluma® Bond Universal	24m [3]	ER: 100%; SEE: 93.7%; SE: 72.2%	USPHS
Prime&Bond Universal®	24m [18]	SE: 90%	USPHS
Scotchbond™ Universal Plus	24m [23]	ER: 100%	USPHS
Tetric® N-Bond Universal	24m [11]	ER: 97.4%	USPHS
Prime&Bond Active®	18m [17]	ER: 95.5%; SE: 90.9%	USPHS/FDI
Clearfil™ Universal Bond	18m [4]	SEE: 100%	USPHS
G-Premio Bond®	18m [4]	SEE: 100%	USPHS

ER: Each-and-Rinse; SEE: Selective Enamel Etching; SE: Self-Each; USPHS: United States Public Health Service Criteria; p value according to Kruskal-wallis test ( $p > .05$ ); \*Retention according to follow-up.

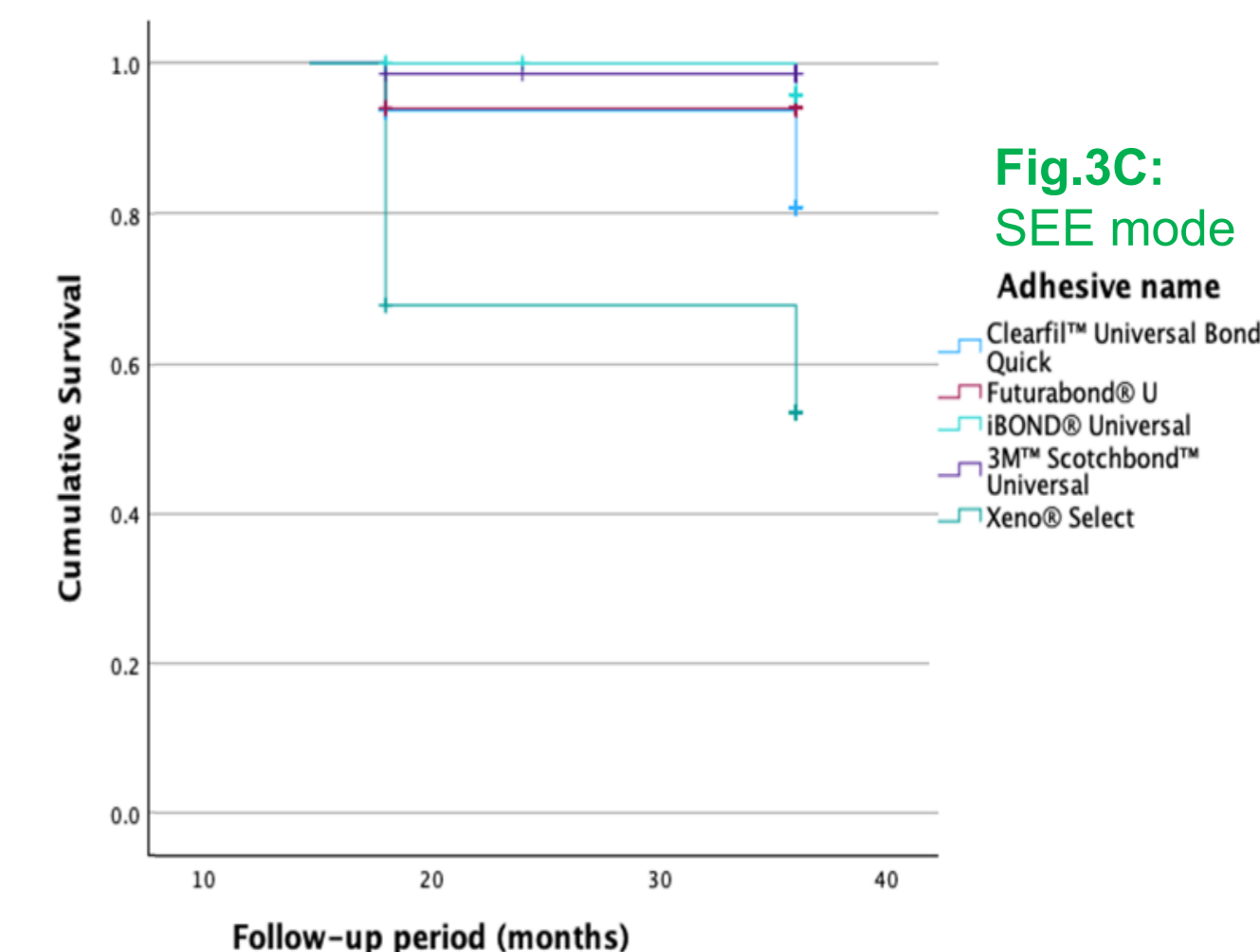
**Figure 3 – Kaplan Meier cumulative survival curves regarding retention (%) of UA with at least 36-month of clinical evaluation by FDI criteria, and according the ER (Fig. 3A), the SE (Fig. 3B) and the SEE (Fig. 3C) modes, over 18-48 months.**



**Fig.3A:**  
ER mode



**Fig.3B:**  
SE mode



**Fig.3C:**  
SEE mode

**CONCLUSIONS** UA brands applied by ER and SEE adhesion modes confirmed a decisive impact on long-term retention though, no UA brand can yet be considered as gold-standard for retention survival over 18th-48th month.

**KEYWORDS** Universal adhesives; Multimode adhesive; Dental bonding; Non-Carious Cervical Lesion (NCCLs); FDI criteria; USPHS criteria; Randomized Clinical Trial (RCT); Retention

**Figure 1. PICO framework & Research Question (RQ).**

PICO Element	Key Description
Population (P)	Human adults ( $\geq 18$ years) with non-carious cervical lesions (NCCLs) restored using composite resin
Intervention (I)	Universal Adhesives (UAs) brands as experimental or control groups, applied by adhesion modes: • Etch & Rinse (ER) • Self-Etch (SE) • Selective Enamel Etch (SEE)
Comparison (C)	• Between UA commercial brands • Between adhesion modes (ER vs. SE vs. SEE)
Outcomes (O)	Clinical retention success rates at 18–48 months, assessed by: • FDI criteria • USPHS criteria

RQ: How different UAs brands and adhesion modes (ER, SE, or SEE) compare in clinical retention of NCCL restorations over 18 - 48 months?

**Figure 2. Risk of bias assessment of 23 RCTs using the Cochrane Risk of Bias RoB 2 tool.**

Authors, Year	RCT ID [Ref]	D1	D2	D3	D4	D5	Overall
Lawson et al., 2015	[1]	!	+	+	+	+	!
Loguercio et al., 2015	[2]	+	+	+	+	+	+
Oz, Ergin, et al., 2019	[3]	+	!	+	+	+	!
Oz, Kutuk, et al., 2019	[4]	+	!	+	+	+	!
Zanatta et al., 2019	[5]	+	!	+	+	+	!
Ruschel et al., 2023	[6]	!	-	-	-	+	-
Kemaloglu et al., 2020	[7]	+	+	+	-	+	-
Perdigão et al., 2020	[8]	+	+	+	+	+	+
Atalay et al., 2020	[9]	!	!	+	+	+	!
Cruz et al., 2021	[10]	!	+	+	+	+	!
Manarte-Monteiro et al., 2021	[11]	+	!	+	+	+	!
Oz et al., 2022	[12]	!	!	!	+	+	!
Barcelheiro et al., 2022	[13]	+	+	+	+	+	+
Albuquerque et al., 2022	[14]	+	+	+	+	+	+
Haak et al., 2022	[15]	!	+	+	+	+	!
Mathias-Santamaria et al., 2023	[16]	+	+	+	+	+	+
Almeida et al., 2023	[17]	+	+	+	+	+	+
Oliveira et al., 2023	[18]	!	!	+	+	+	!
Matos et al., 2023	[19]	+	+	+	+	+	+
Peumans et al., 2023	[20]	!	!	+	+	+	!
Haak et al., 2023	[21]	!	+	+	+	+	!
Almeida et al., 2024	[22]	+	+	+	+	+	+
Dawoud et al., 2025	[23]	+	!	+	+	+	!

RCT ID: Reference number assigned to each eligible study. D1: Randomization process; D2: Deviations from the intended interventions; D3: Missing outcome data; D4: Measurement of the out-come; D5: Selection of the reported result. Low Risk of bias (+); Some concerns of bias (!); High risk (-).

Overall, ER and SEE modes yielded superior retention (median up to 100%–USPHS;  $p < 0.001$ ) whereas in SE mode showed lower and more variable retention (median 87.0%;  $p > 0.05$ ). Survival analysis (Figure 3) revealed stable retention failure for most of UA brands in ER and more variability in SE modes. Log-rank test showed differences among UA brands for ER ( $\chi^2 = 19.68$ ,  $df = 5$ ,  $p = 0.0014$ ), for SE ( $\chi^2 = 51.88$ ,  $df = 4$ ,  $p < 0.0001$ ) and for SEE ( $\chi^2 = 47.28$ ,  $df = 4$ ,  $p < 0.0001$ ) modes.

## REFERENCES



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