

Protocols and Efficacy of Vital Pulp Therapy in Primary and Immature Permanent Teeth: A **Comparative Study Among General Dentists, Pediatric Dentists, and Endodontists**



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INTRODUCTION

Vital pulp therapy (VPT) is a critical procedure in preserving the health of primary and immature permanent teeth. It includes treatments such as indirect pulp capping, direct pulp capping, and pulpotomies. These procedures are essential for maintaining tooth vitality and function. The data on treatment effects on root development and long-term tooth survival are limited (1) Existing literature lacks comprehensive surveys evaluating the knowledge and practices of general dentists, pediatric dentists, and endodontists regarding VPT. Vital therapy is critical in the management of immature permanent teeth with deep carious lesions, as it preserves pulpal vitality necessary for continued root development and apical closure. (1). Pulpotomy, a widely utilized method, plays a significant role in maintaining vital pulp and promoting root formation in immature permanent teeth affected by caries or trauma. (2). While this method of pulp treatment is less invasive and economical, it is more challenging in primary teeth due to a higher content of undifferentiated mesenchymal stem cells, which can lead to internal resorption and treatment failure. (3) Modern pediatric dentistry focuses on new strategies to stimulate the regenerative capacity of dental tissues. Reducing bacterial contamination and inflammation, the primary causes of treatment failure, is crucial. (8)

OBJECTIVES

The objective of this research study is to conduct a survey to assess the knowledge, current understanding, and protocols being implemented in real-world dentistry regarding vital pulp therapy for primary and immature permanent teeth.

MATERIAL AND METHODS

A 26-question survey was built using Qualtrics and sent by email to active and student members of AAPD, AGD, and AAE after IRB approval (#100859). The questions addressed practitioner demographic information, knowledge of VPT, clinical practice and perceived effectiveness of VPT, skill confidence, materials, and resources. Data analysis used descriptive statistics, Fisher's Exact or chi-square tests, and t-tests. Across all analyses, a p-value less than 0.05 was considered statistically significant. All analyses were performed using R, version 4.3.0 (R Foundation for Statistical Computing; Vienna, Austria).

RESULTS

215 PD, 56 ED, and 54 GD from 5 regions (West, Southwest, Southeast, Northeast, and Midwest) responded to the survey. Most were male (56%) and providers who have been in private practice (64%) for over 16 years (51%).



Figure 1: number of respondents by gender. Two percent of the participants preferred not to respond.



latest guidelines/statements from the AAPD or AAE regarding VPT? (Fisher exact test, p < 0.0001).





Figure 2: In the past 5 years, have you attended any CE courses that have presented techniques? (Fisher exact



Figure 4. What sources do you primarily rely on for information about VPT? (Fisher exact test, p < 0.0001).



long-term success of VPT? (Fisher exact test, p < 0.0001).

Over 90% were trained in the USA. Most providers, probably (36%) or definitely (32%) regularly refer to clinical guidelines on VPT. 37% strongly agree that they are more likely to perform VPT on immature permanent teeth than on mature permanent teeth. 59% of ED reported being extremely confident in their ability to accurately diagnose cases that are suitable for VPT. Meanwhile, 54% of PD and 60% of GD reported being somewhat confident. 65% of GD are somewhat confident in their ability to perform VPT. MTA was the material chosen by 80% in cases where the tooth has pulp vitality and pulp was exposed and pulpotomies (68%). Most of respondents (68%) do not feel that insurance coverage plays a role in whether you perform VPT. 55% of ED believe pulpotomy is more successful than IPT.



Figure 7: In cases of deep caries when pulp proximity is present, which materials do you most commonly use for indirect pulp capping? (select all that applies) (Fisher exact test, p < 0.0001).

Page Chapper	Fectors	PD	GD	ED
U.	Non-diagnostic factors	83 (40.9%)	18 (34.0%)	31 (55.4%)
	Periopical radiolucency on the X-ray or presence of abscess*	204 (94.9%)	45 (84.9%)	48 (85.7%)
	Presence of caries when pulp exposure happens*	46 (21.4%)	22 (41.5%)	10 (17.9%)
Table 1: Please select a	Provoked point	43 (20.9%)	17 (32.1%)	12 (21.4%)
the aspects that would	Pulp exposure size*	62 (28.8%)	25 (47.2%)	16 (28.6%)
the aspects that would	Spontaneous pain*	181 (84.2%)	39 (73.6%)	30 (53.6%)
be a contraindication for VPT on immature permanent teeth with	Lityfemilianity with VPT techniques and materials*	13 (6.0%)	10 (18.9%)	2 (3.6%)
	Non-diagnostic factors	72 (33.5%)	15 (28.3%)	25 (44.6%)
	Periopical radiolucency on the X-ray or presence of abscess	185 (86.0%)	45 (84.2%)	52 (92.9%)
deep carious lesion.	Presence of cories when pulp exposure happens*	35 (16.3%)	20 (37.7%)	7 (12.5%)
	Provoked poin*	61 (28.4%)	20 (37.7%)	9 (16.1%)
	Pulp exposure size*	65 (30.2%)	27 (50.9%)	12 (21.4%)
	Spontaneous pain*	161 (74.9%)	39 (73.6%)	25 (44.6%)
	Unformitarity with VPT techniques and materials*	16 (7.4%)	11 (20.8%)	2 (3.6%)

CONCLUSIONS

The survey revealed varied confidence levels and practice patterns among dental providers regarding vital pulp therapy, with a general preference for using MTA and performing pulpotomies in vital cases. Despite differences in training and experience, most respondents refer to clinical guidelines.

References: 1, Tong, H. J., Seremidi, K., Stratigaki, E., Kloukos, D., Duggal, M., & Gizani, S. (2022), Deep dentine caries management of immature permanent posterior teeth with vital pulp: A systematic review and meta-analysis, Journal of dentistry, 124, 104214, 2, Chen, Y., Chen, X., Zhang, Y., Zhou, F., Deng, J., Zou, J., & Wang, Y. (2019). Materials for pulpotomy in immature permanent teeth: a systematic review and meta-analysis. BMC oral health, 19(1), 227. 3. Han, S., & Zhang, Q. (2023). Vital pulp therapy following pulpotomy in immature permanent teeth with carious exposure. The Journal of clinical pediatric dentistry, 47(5), 65–72. 4. Abuelniel, G. M., Duggal, M. S., Duggal, S., & Kabel, N. R. (2021). Evaluation of Mineral Trioxide Aggregate and Biodentine as pulpotomy agents in immature first permanent molars with carious pulp exposure: A randomised clinical trial, European journal of paediatric dentistry. 22(1), 19–25. 5, Xiao, W., Shi, W. T., & Wang, J. (2022). Study of Inflamed Vital Pulp Therapy in Immature Permanent Teeth with Irreversible Pulpitis and Apical Periodontitis. Chinese journal of stomatology, 57(3), 287–291. 6. Gizani, S., Seremidi, K., Stratigaki, E., Tong, H. J., Duggal, M., & Kloukos, D. (2021). Vital Pulp Therapy in Primary Teeth with Deep Caries: An Umbrella Review. Pediatric dentistry, 43(6), 426–437. 7. Coll, J. A., Dhar, V., Chen, C. Y., Crystal, Y. O., Guelmann, M., Marghalani, A. A., AlShamali, S., Xu, Z., Glickman, G., & Wedeward, R. (2023). Primary Tooth Vital Pulp Treatment Interventions: Systematic Review and Meta-Analyses. Pediatric dentistry, 45(6), 474–546. 8. Kulkarni, P., Tiwari, S., Agrawal, N., Kumar, A., Umarekar, P., & Bhargava, S. (2022). Clinical Outcome of Direct Pulp Therapy in Primary Teeth: A Systematic Review and Meta-analysis. Journal of the Indian Society of Pedodontics and Preventive Dentistry, 40(2), 105–111. 9. Coll, J. A., Dhar, V., Chen, C. Y., Crystal, Y. O., Guelmann, M., Marghalani, A. A., AlShamali, S., Xu, Z., Glickman, G. N., & Wedeward, R. (2024). Use of Vital Pulp Therapies in Primary Teeth 2024. Pediatric dentistry, 46(1), 13-26. 10. Stratigaki, E., Tong, H. J., Seremidi, K., Kloukos, D., Duggal, M., & Gizani, S. (2022). Contemporary management of deep caries in primary teeth: a systematic review and meta-analysis. European archives of paediatric dentistry: official journal of the European Academy of Paediatric Dentistry, 23(5), 695-725.