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Dental Hygienists' Intentions to Provide Anticipatory Guidance Recommendations: Application of the Theory of Planned Behavior

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Abstract

Purpose: This study aimed to assess the relationship between the behavioral, normative, and control beliefs of dental hygienists (DHs) and their behavioral intention to provide anticipatory guidance (AG) to expecting parents and caregivers of infants and toddlers. **Methods:** A descriptive, cross-sectional survey design used convenience sampling strategies to recruit DHs (n=335) who provided oral health care to expecting parents and caregivers of children 0-5 years old. A survey was developed based on the Theory of Planned Behavior (TPB) and validated. Descriptive, correlation and regression analyses were conducted to assess the relationships among variables. **Results:** The survey completion rate was 72% (n=241). Strong relationships ($p=.001$) were shown between DHs' behavioral, normative, and control beliefs and their intention to discuss AG with expecting parents and caregivers of infants and toddlers. The TPB model suggests normative ($p<.05$) and control ($p=.001$) beliefs were strong predictors of intention. Control beliefs ($p=.001$) were the strongest predictor of intention for all TPB subscales. The results also indicated that DHs with bachelor's degrees or higher demonstrated more positive normative (Md=73.00, $p<.001$) and control beliefs (Md=94.00) than DHs with associate degrees. **Conclusions:** Although DHs are aware of AG for infants and toddlers, results demonstrated the TPB model might predict DHs' intentions to provide AG based on normative and control beliefs. This information may serve as a baseline for future research exploring DHs' anticipatory guidance behaviors toward caregivers of infants and toddlers.

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ABSTRACT

Purpose: This study aimed to assess the relationship between dental hygienists' behavioral, normative, and control beliefs (DHs) and their behavioral intention to provide anticipatory guidance (AG) to expecting parents and caregivers of infants and toddlers.

Methods: A descriptive, cross-sectional survey design used convenience sampling strategies to recruit DHs (n=335) who provided oral health care to expecting parents and caregivers of children 0-5 years old. A survey was developed based on the Theory of Planned Behavior (TPB) and validated. Descriptive, correlation and regression analyses were conducted to assess the relationships among variables.

Results: The survey completion rate was 72% (n=241). Strong relationships ($p=.001$) were shown between DHs' behavioral, normative, and control beliefs and their intention to discuss AG with expecting parents and caregivers of infants and toddlers. The TPB model suggests normative ($p<.05$) and control ($p=.001$) beliefs were strong predictors of intention. Control beliefs ($p=.001$) were the strongest predictor of intention for all TPB subscales. The results also indicated that DHs with bachelor's degrees or higher demonstrated more positive normative ($Md=73.00$, $p<.001$) and control beliefs ($Md=94.00$) than DHs with associate degrees. **Conclusions:** Although DHs are aware of AG for infants and toddlers, results demonstrated the TPB model might predict DHs' intentions to provide AG based on normative and control beliefs. This information may serve as a baseline for future research exploring DHs' anticipatory guidance behaviors towards caregivers of infants and toddlers.

Keywords: infant oral health, preventive care, anticipatory guidance, toddler oral health

INTRODUCTION

A key component of health care is prevention. Health care professionals advise their caregiver/parent clients to anticipate their children's physical, emotional, psychological, or developmental changes.¹ This concept is described as anticipatory guidance (AG) or preventive counseling.¹ The AG for oral health begins with perinatal care and continues for a lifetime. Counseling in oral health provides patients with information on reducing or eliminating risk factors for dental caries, periodontal disease, trauma, and malocclusion.^{2,3} The American Academy of Pediatric Dentistry (AAPD)² used the oral conditions discussed by the American Dental Association (ADA) to develop a set of AG recommendations for infants and toddlers and children and adolescents. These recommendations include the age of the initial dental visit, oral development and growth, speech and language development, non-nutritive habits, diet and nutrition, and oral injury prevention.^{2,4} The role of dental hygienists in infant and toddler oral health care is to communicate AG to the caregivers.⁵

In 1986, the AAPD adopted the recommendation for children to have their initial dental visit by age one as part of the Guidelines on Infant Oral Health Care.⁶ Three years of age was the typical recommendation before establishing these guidelines. In 2003, to align with the guidance of the AAPD, the American Academy of Pediatrics (AAP) switched their recommendation for the first dental visit for high-risk patients from 3 years of age to 1 year of age.³

Research suggests that when caregivers receive oral health education during prenatal development and infancy, children show a significant decrease in dental disease.^{2,6-12} During the first 12 months of life, children frequently visit their primary care providers. These visits allow the unique opportunity to discuss oral health AG with caregivers.^{6, 8,9} However, barriers, such as time and provider beliefs, often keep primary care providers from discussing oral health concerns or referring patients to oral health providers.^{7,10}

Research shows that 58% of dental hygienists (DHs) did not provide care to infants and toddlers.¹¹ Other research showed that Maryland DHs were unaware that dental caries were an infectious and transmissible disease and that nutritional counseling was necessary.^{7,11,12} Dental hygienists' knowledge regarding nutritional counseling and the etiological factor for dental caries is necessary when providing AG recommendations to caregivers and pregnant women.⁶

Although Manski and Parker¹² and Ruiz et al¹¹ focused on the knowledge and practice behaviors of preventing oral disease in children, neither study focused on the potential reasons why DHs may not provide AG for infants and toddlers to caregivers and expecting women. These studies sampled individual states (North Carolina and Maryland) rather than a national sample of DHs.

This study aimed to assess the relationship between DHs' behavioral, normative, and control beliefs and their behavioral intention to provide AG to expecting parents and caregivers of infants and toddlers. This information provides a foundation to bridge the gap between the DHs' current practice of discussing AG and the factors impacting the intention to educate caregivers about them.

METHODS

A descriptive, cross-sectional survey design was used to assess the behavioral beliefs (BBs), normative beliefs (NBs), and control beliefs (CBs) of a convenience sample of DHs across the United States. Following Institutional Review Board (IRB) approval, the investigators recruited DHs through online dental hygiene forums on Facebook and Instagram. Members of the online dental hygiene forums were provided a link to participate in the survey via Qualtrics®. Inclusion criteria for study participation were limited to dental hygienists who provided oral hygiene care to expecting women, parents of infants and toddlers, or children (0-5 years old) in the United States within the last two years and spoke and read English. The study excluded those DHs who did not meet the above criteria. All participants were provided with study instructions and consented via informed consent before study participation.

An a priori sample size estimation was conducted using G*power 3.1 software.¹³ The following parameters were used for all estimations: $\alpha=0.05$ and $\beta=0.8$. Based on the previous research using the Theory of Planned Behavior (TPB),¹⁴ the effect size of this study was expected to be medium according to Cohen's criteria.¹⁵ For the planned ANCOVA analysis with three independent groups and one covariate, the suggested minimum size was $n=196$ completed surveys.

Survey Instrument

The survey instrument was designed to assess the BBs, NBs, and CBs that lead to DHs' behavioral intentions to provide AG to expecting women and caregivers of infants and toddlers. The investigators developed the instrument using Ajzen's paper on survey construction based on the TPB.¹⁶ According to the TPB, human behavior is led by three considerations: BBs, NBs, and CBs.¹⁷ The BBs result in a person's favorable or unfavorable attitude towards a behavior. Social pressure from peers and colleagues results

in NBs. Control beliefs give rise to the self-efficacy of an individual. The relationship between the three beliefs provides the intention for performing the behavior.

Following the initial development of the survey, a panel of experts ($n=7$) composed of one board-certified pediatric dentist, three dental hygienists, two dental hygiene educators, and a sociologist assessed content validity. Questions were modified based on the content validity index score ($S-CVI=0.85$). Questions were rated 1=not relevant to 4=highly relevant for relevance to the study. Following validation, the survey was assessed for clarity and readability by individuals ($n=10$) who met the study inclusion criteria. The results from the pilot study were not included in the final analysis.

The final survey had 54 questions in six sections, including demographics (9 items), current behaviors (3 items), BBs (12 items), NBs (12 items), CBs (12 items), and behavioral intentions (6 items). Following the survey, participants could follow a link to learn more about AGs, have the link emailed to them for review later, or decline. Four different 6-point Likert scales were used in the development of this survey. The instrument's ranking included categorical scales (e.g., 1 = strongly disagree to 6 = strongly agree) and continuous scales (e.g., age, years of practice).

Cronbach's alpha values were calculated to report an estimate of the internal consistency among items of the TPB subscales. The results were as follows: BBs through six 6-point Likert-type items ($\alpha = 0.36$); NBs through eight 6-point Likert-type items ($\alpha = 0.86$); and CBs through nine 6-point Likert-type items ($\alpha = 0.91$). To improve the internal consistency of the BB each item was assessed to determine the contribution to the increasing alpha. Items were removed until the subscale achieved at least an $\alpha=0.60$. A composite reliability score of 0.60 to 0.70 is acceptable for explanatory research.¹⁸ The final scale included three of the original six combined BB items, resulting in an acceptable internal consistency ($\alpha=0.61$).

Data Analysis

Data analysis was conducted using the SPSS software (version 26.0). Descriptive statistics were calculated using cumulative frequencies for categorical variables and means of central tendency for continuous variables. When possible, a 95% confidence interval was calculated for frequencies and the mean. Categorical demographic variables were tested using the demographic characteristic as the independent variable and the TPB scales (BBs, NBs, and CBs) as the dependent variable in a t-test or ANOVA. The influence of each demographic variable on the belief variables was evaluated using correlation, chi-square tests of independence, t-tests, ANOVA, and regression. Continuous demographic variables were correlated with each of the belief variables. Each intention item was separately regressed onto the belief subscale and any relevant demographic covariates identified in the analysis to assess the combined influence of beliefs on behavioral intention. The critical cutoff alpha level for this study was $p=0.05$.

RESULTS

A total of 335 DHs opened the survey; 94 respondents were removed due to completing less than 80% of the questions, yielding a participation rate of 72% ($n=241$). Most participants were females (99%), worked in private dental clinics (76%), and possessed an associate degree in dental hygiene (74%). Participants were evenly distributed throughout each US region. Further detail regarding the demographic information is summarized in Table I.

Table I. Demographics ($n=241$)

Category	n	%
Gender		
Male	2	0.8%
Female	239	99.2%
US Regions including District of Columbia & Puerto Rico		
West	74	31.4%
South	59	25.0%
Midwest	52	22.0%
Northeast	50	21.2%
District of Columbia	1	0.4%
Primary work setting		
Private Practice	179	75.5%
Dental Service Organization/Corporate Practice	23	9.7%
Community health/Federally Qualified Health Center/ Public Health	19	8.0%

Category	n	%
Alternative Practice/Mobile/Hospital/Group Homes	3	1.3%
Government: military/VA/prisons	2	0.8%
Other	11	4.6%
Entry-level degree type:		
Associates degree program	175	73.8%
Bachelor's degree program	55	23.2%
Certificate program	7	3.0%
Highest college degree		
Certificate	4	1.7%
Associates degree	104	44.1%
Bachelor's degree	102	43.2%
Master's degree	25	10.6%
Doctorate	1	0.4%

Note: %=count/241

Current Practices

Current practices of DHs were categorized into two groups; how frequently they provided care to expecting women, caregivers of infants and toddlers, and children 0-5 years of age and how frequently they provided AG (importance of first dental visit at 12 months, carbohydrate intake, and digit/pacifier habits). When looking at the frequency, DHs provided care to expecting women, caregivers of infants and toddlers, and children 0-5 years of age, "sometimes." When providing AG, DHs reported "often" discussing digit (finger/thumb) sucking and pacifier habits (45%, n=109) and carbohydrate intake (45%, n=109) with caregivers/parents of infants and toddlers, and less frequently discussed the importance of scheduling the child's first dental visit by 12 months of age (20%, n=49) with caregivers and expecting women. More details of the current practices of DHs can be found in Table II.

Table II. Frequency of Patient Care and Current Practices (n=241)

	Never		Sometimes		About half of the time		Most of the time					
	%	n	%	n	%	n	%	n				
Frequency of providing dental hygiene care to:												
Pregnant women	10.8	26	80.5	194	4.6	11	4.1	10				
Caregivers of children 0-5 years old	7.1	17	44.2	106	32.5	78	16.3	39				
Children 0-3 years old	9.6	23	67.4	161	10.9	26	12.1	29				
Children 3-5 years old	2.1	5	69.9	167	12.6	30	15.5	37				
	Never		Rarely		Frequently		Usually		Often		Always	
	%	n	%	n	%	n	%	n	%	n	%	n
How often do you discuss the importance of scheduling the child's first dental visit by 12 months of age with the caregivers/parents of infants and toddlers	7.9	19	19.9	48	24.1	58	27.8	67	9.1	22	11.2	27
How often do you discuss	0.8	2	10.4	25	16.2	39	9.5	23	17.8	43	45.2	109

carbohydrate intake (including juice) with caregivers/parents of infants and toddlers												
How often do you discuss digital (finger/thumb sucking) and pacifier habits with caregivers/parents of infants and toddlers?	2.1	5	19.5	47	18.7	45	22.4	54	22.4	54	14.9	36

Note: % = n/241

Table III. Mean Values of the Theory of Planned Behavior Belief Subscales (n=241)

	Mean	SD	Median	Minimum	Maximum
Behavioral Belief	20.31	4.01	20.00	7.00	30.00
Normative Belief	69.23	9.86	70.00	46.00	93.00
Control Belief	91.26	11.70	90.00	54.00	108.00

Table III shows the descriptive statistics for each of the TPB subscales. The higher subscale scores indicated more of the measured category. For example, the BBs subscale measured each participant's overall approach or avoidance tendency. Higher scores indicate an individual has a stronger approach tendency toward discussing the first visit, digit habits, and carbohydrate intake. Spearman's rank-order correlations were used to examine the correlation between TPB subscales. Higher BB scores were related to lower CB scores ($\rho = -.13, p = .04$). Higher NB scores were also correlated to higher CB scores ($\rho = .36, p < .001$). However, BB scores were not correlated with NB scores ($\rho = .03, p = .64$).

A total of 6 multiple linear regression models were created. Predictor variables consisted of the three TPB subscales (BBs, NBs, and CBs), while the outcome variables were the three long-term intentions and the three immediate behavioral intentions. Table IV shows the results of each statistically significant model.

Table IV. Regression Models, Behavioral, Normative, and Control Beliefs Predicting Intentions

	B	SE.	β	Model Fit
First appointment				
behavioral beliefs	-.047	.017	-.155**	F(3, 239)=29.98** Adj. R ² =0.27
normative beliefs	.026	.007	.211**	
control beliefs	.039	.006	.375**	
Carbohydrates				
behavioral beliefs	-.029	.010	-.179*	F(3, 239)=22.64** Adj. R ² =0.21
normative beliefs	.009	.004	.134*	
control beliefs	.020	.004	.356**	
Digital/pacifier habits				
behavioral beliefs	-.044	.011	-.228**	F(3, 239)=30.52** Adj. R ² =0.27
normative beliefs	.011	.005	.132*	
control beliefs	.026	.004	.394**	
Intention to search				
behavioral beliefs	.033	.025	.082	F(3, 239)=22.64* Adj. R ² =0.06
normative beliefs	-.012	.011	-.070	
control beliefs	.033	.009	.246**	

Note. β = standardized beta coefficient. * = $p < .05$, ** = $.001$.

DHs Intentions to Discuss the First Dental Visit, Carbohydrate Intake, and Digit/Pacifier Habits

The Omnibus F-Test was used to evaluate the TPB subscales when predicting the intentions of DHs to discuss the first dental visit, carbohydrate intake, and digit/pacifier habits with expecting women and caregivers of infants and toddlers within the next 12 months. When using the TPB subscales to predict intention to discuss the first dental appointment in the next 12 months, the Omnibus F-Test was statistically significant ($F(3, 239) = 29.98; p < .000$). As such, decomposition of effects within the regression model could proceed. The R^2 value, also known as the coefficient of determination, was .27 meaning 27% of the variation in the intention to discuss the first appointment can be explained by this model. All three TPB subscales predicted the intention to discuss the first dental appointment within the next 12 months. Every one-unit increase in the BB subscale predicted a 0.16 decrease in intention. The decrease in intention was due to the remaining items on the scale having negative wording. For NB, a one-unit increase predicted a 0.21 increase in intention. A one-unit increase in CB predicts a 0.38 increase in intention.

Likewise, the TPB subscales also predicted intention to discuss carbohydrate intake in the next 12 months; the Omnibus F-Test was statistically significant ($F(3, 239) = 22.64; p < .000$). As such, decomposition of effects within the regression model could proceed. The R^2 value was .21. The R^2 value shows that this model can explain 21% of the intention to discuss carbohydrate intake variation. All three TPB subscales predicted intention; however, CBs were the most significant. A one-unit increase in the BB subscale predicted a 0.18 decrease in intention. A one-unit increase in NB predicted a 0.13 increase in intention. A one-unit increase in CB predicted a 0.36 increase in intention.

Finally, the TPB subscale to predict intention to discuss digit/pacifier habits in the next 12 months, was also statistically significant ($F(3, 239) = 30.52, p < .001$) with an Omnibus F-Test. As such, decomposition of effects within the regression model could proceed. An R^2 value of .27 shows that the model can explain 27% of the intention to discuss digit/pacifier habits variation. Among the three predictor variables, all three TPB subscales predicted intention; however, BB and CB were the stronger predictors. A one-unit increase in the BB subscale predicted a 0.23 decrease in intention. A one-unit increase in NB predicted a 0.13 increase in intention. A one-unit increase in CB predicted a 0.39 increase in intention. Regarding all three TPB subscales, to increase the interpretability of each model, it should be noted that each of the subscales has a broad range and, thus, a one-unit increase is small. A slight increase in the subscale is related to a substantial increase or decrease in the outcome variable.

TPB Subscales and Dental Hygienists' Degree Types

A Mann-Whitney U model was calculated to test the difference between the three subscales of the TPB and DHs degree types. The test indicated that DHs who hold a bachelor's degree had a higher median NB subscale score ($Md=73.00, p < .001$) compared to associates ($Md=68.00$). Bachelor's degree holders also showed a higher median CB subscale score ($Md=94.00$) compared with associate degree holders ($Md = 90.00, p < .001$). Associate or bachelor's degree types did not show any difference in BBs.

A Kruskal-Wallis test was calculated to evaluate the difference between belief subscale scores and highest degree types. Two of the degree types showed a difference in the CB scores (Kruskal-Wallis=.71, $p=.02$). A Mann-Whitney U ad hoc pairwise comparison was calculated for each degree type and CB scores. The results suggested that master's degree holders had a higher CB score when compared with associate degree holders ($U=-37.06, p=.04$). Figure 1 is a boxplot comparison of CB across the highest degree type.

DISCUSSION

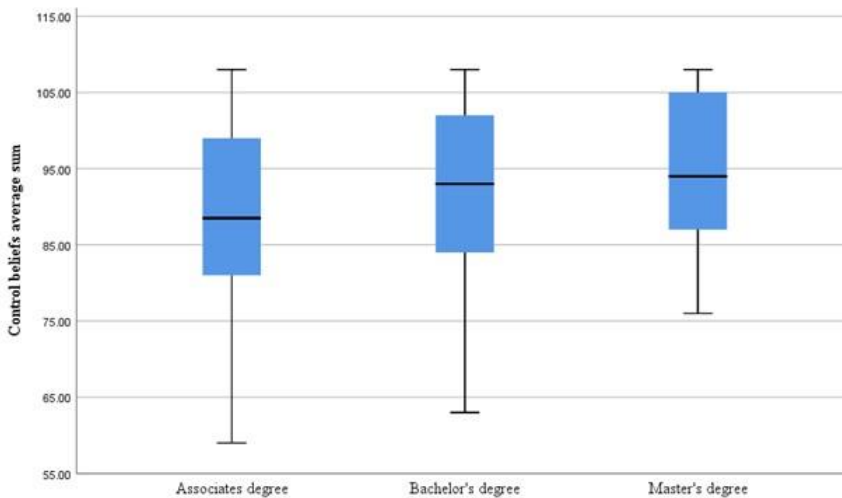
This study aimed to assess the connection between BBs, NBs, and CBs of DHs and their behavioral intention regarding delivering AG to expecting parents and caregivers of infants and toddlers. Providing expecting parents and caregivers of infants and toddlers with AG can aid in establishing a dental home early in life and reduce early childhood caries and some malocclusion issues.⁴ It is critical to understand the intentions and attitudes of DHs towards providing this care, and the TPB can help explain the motivation to communicate the AAPD's guidelines to the patients.

When evaluating current behaviors, the results found DHs discuss carbohydrate intake (73%) and digital or pacifier habits (60%) with caregivers of infants and toddlers more frequently than they discuss the importance of scheduling the child's first visit at 12 months of age (48%). These results contradict the Manski and Parker study, which suggested that 88% of Maryland DHs believed prevention should start at the first tooth's eruption.¹²

To the best of our knowledge, this was the first study to evaluate the behavioral intentions of DH when discussing the AG of infants and toddlers. Results indicated that the hypothesis that the three TPB subscales would predict intentions was strongly supported. Each subscale consisted of items for different behaviors and the combined subscale scores were predictive of the long-term intention across the different behaviors. The three models predicting long-term behavioral intention were statistically significant and the TPB predictors showed a strong influence on the intentions for each of the three main behaviors. The outcomes suggest

the TPB is a valuable framework for explaining DHs' discussion of AG when caring for expecting parents and infants and toddlers. A study on allied health professionals indicated the same outcomes when providing evidence-based practices.¹⁹ The model also suggests that, NBs and CBs had more substantial results, indicating the importance of conforming to what those social groups expect and having self-efficacy were good predictors of intention. These findings were consistent with the study of North Carolina DHs that found current practice situations and familiarity with pediatric guidelines were barriers when providing care to infants and toddlers.¹¹ Although allied health professionals had positive attitudes regarding evidence-based practices, NB and CB inhibited their abilities to follow through with these practices.¹⁹ Likewise, a study of Finnish healthcare professionals' intentions to use clinical guidelines demonstrated that physicians' intentions weighed heavily on CBs, while NBs are the key factor for nurses and other healthcare professions.²⁰ The CBs of DHs were consistently the strongest predictor of intention to provide AG recommendations to caregivers of infants and toddlers.

Figure 1. Mean scores of Control Beliefs Subscale by Highest Degree Earned



Note. Control belief subscale is the sum of each control belief and associated expectation. Higher scores indicate more agreement with control belief item pairs. The Kruskal-Wallis test was significant ($p < .001$) and ad hoc pairwise comparisons using a Mann-Whitney U indicated bachelor's and master's had a higher median control belief score than Associate's but were not different from each other.

The final portion of the survey displayed how education plays a role in intentions. Results indicated that DHs with higher education, bachelor's or master's degree, displayed more positive NBs and CBs. These results indicate that DHs with higher education may be more likely to provide AG recommendations regardless of the thoughts of their peers or having self-efficacy. In this study, DHs also demonstrated higher self-efficacy when they held a master's degree or higher.

Providing AG recommendations to caregivers may help improve the oral health care of infants and toddlers and subsequently children. The use of psychology models provides the ability to target interventions to factors impacting the ability to use evidence-based practices.¹⁸ These findings may help DHs better understand what predicts their behavioral intentions. The results strongly indicated that good predictors of intention were social groups and self-efficacy. This information may serve as a baseline for future research exploring dental hygienists' barriers, behaviors, and intentions when providing anticipatory guidance recommendations to expecting women and caregivers of infants and toddlers. This research information could also open the possibility to look at the behavioral intentions of other health care providers when providing care.

Limitations

There are several limitations within the study. One limitation was the convenience sampling strategy; thus, results cannot be generalized. Since the survey was web-based, limitations included dental hygiene associations' unwillingness to post survey links, technical difficulties, or some of the potential participants may lack technical skills that enabled them to complete the survey. Since this was a self-reported study, limitations included self-reporting, self-selection bias, and recall bias, limiting the survey results. All the above could lead to response bias, meaning there could have been the potential for more responses, results could have been skewed depending on the number of individuals who chose not to participate.

CONCLUSION

This study has demonstrated that the theory of planned behavior is a valuable framework for explaining DHs' intentions to provide AG to expecting parents and caregivers of infants and toddlers. These new findings demonstrated that DHs had positive intentions to provide AG when supported by their peers and having self-efficacy. These results suggest a need for additional information regarding AG for infants and toddlers through dental hygiene curricula or continuing education courses. Another key finding was the relationship between those who obtained education beyond an entry-level associate degree and self-efficacy. This affirms that education increases the confidence of DHs when providing patient care.

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