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Differences in understanding of explanations and risk perception between dental staff and patients: a questionnaire study at a university hospital

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Abstract

Background and purpose Proper self-care necessitates behavioral changes, underpinned by correct knowledge. Oral health literacy (OHL) research constitutes a fundamental foundation for fostering effective self-care practices. However, the extent of the awareness gap between patients and dental staff regarding explanations provided during treatment remains unknown. This descriptive study was conducted to serve as an initial step in bridging this gap.

Methods Questionnaires were distributed to 92 dental staff members and 205 patients at university hospitals, with responses from 72 staff members and 157 patients.

Results In the category assessing understanding of explanations (patient vs. dental staff), patients' self-assessed understanding exceeded the dental staff's estimates in three aspects: disease name ($p=0.03$, $r=0.17$), treatment period ($p=0.01$, $r=0.21$), and pain relief ($p=0.01$, $r=0.19$). Regarding health self-awareness, the high-scoring group significantly outperformed the low-scoring group in explaining treatment risks ($p=0.03$, $r=0.21$) and understanding ($p=0.01$, $r=0.23$). Nevertheless, patients' risk recognition was higher than that of dental staff in three aspects: root canal treatment ($p<0.01$, $r=0.23$), holes in the teeth ($p<0.01$, $r=0.24$), and bleeding during toothbrushing ($p=0.02$, $r=0.17$). Questions on "crack" ($p=0.02$, $r=0.21$) by sex, holes in one's own teeth ($p=0.05$, $r=0.03$), and feeling one's own teeth wobble ($p<0.01$, $r=0.07$) in the intergenerational comparison showed significant differences.

Conclusion Dental staff should not be satisfied merely with having "explained" something to the patient; they must engage in a confirmation process to verify the patient's correct understanding of the information or to identify excessive anxiety.

Keywords Dental care, Dentist-patient relations, Recognition gaps, Oral health literacy

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Introduction

Dental caries and periodontal disease progress chronically if patients neglect treatment and self-care. Therefore, in addition to appropriate treatment, it is necessary to provide patients with satisfactory explanations that can alter their awareness, motivation, and, ultimately, their behavior during treatment. Although patient education research and training in medicine have primarily focused on nursing (e.g. [1]), an equivalent depth of study is lacking in dentistry. Behavioral change is highlighted as a key component of patient education models [2]. However, these studies were conducted within a medical context, and it is uncertain if they can be directly applied to dental treatment. Consequently, the specific factors that drive dental patients' motivation for self-care behavior remain poorly understood.

Research on patient's behavior change in dental domain is beginning to emerge [3, 4]. Motivational Interviewing (MI), initially developed for treating addictions [5–7], has shown some efficacy. Although MI has been applied to periodontal disease treatment with positive outcomes [8], it is specific to counseling approaches. It cannot be considered a systematically developed approach for educating patients on various dental conditions, including caries. Additionally, evidence supporting MI as an effective adjunct intervention to improve oral hygiene and periodontal disease outcomes remains insufficient [9, 10]. The COM-B model and behavior change wheel, which are applied in health promotion and other domains, are also being explored in dentistry [4, 9], though their application remains in developmental stages.

Knowledge is one of the key factors highlighted in these studies. In the initial stage of behavioral change, it is thought that knowledge promotes change through increased self-efficacy [2]. Patients' recognition of their health and illness is also essential for behavioral change [9].

Research concerning patients' knowledge of oral health is increasingly being situated within the domain of oral health literacy (OHL) [11–14]. A significant body of literature has explored the correlation between OHL and clinical oral health outcomes, leading to the development of various validated scales for its measurement [15–17]. The primary focus of OHL research remains the refinement of these assessment methodologies and the advancement of practical health promotion [18].

While existing literature has extensively examined dentist-patient communication [19], risk communication [20], and the dynamics of trust [21], empirical knowledge regarding comprehension gaps and discrepancies in risk perception between patients and dental staff remains sparse, particularly concerning clinical symptom explanations. Mere improvements in health literacy may not suffice; a lack of mutual understanding or persistent errors in risk perception can impede the enhancement of patient awareness, self-care motivation, and subsequent behavioral change.

Consequently, we conducted a cross-sectional, questionnaire-based study to descriptively and empirically investigate these disparities in understanding and risk perception. To the best of our knowledge, this is the inaugural study in dentistry to clarify recognition gaps from the dual perspectives of both providers and patients, yielding significant insights into the nature of clinical explanations.

Materials and methods

This study prioritized the independence of questionnaire items and their frequency of use in clinical settings. We believed patients should be able to recall their situation simply by reading the questionnaire. Therefore, a team of a social research specialist and students (first author (SO), second author (MF), third author (RY), sixth author (TS)) developed items based on preliminary observation and discussion. The fourth author (KN) and the fifth author (YY) then assessed the clinical validity of these items. Each team worked independently during this process. The fourth author (KN) distributed and collected the questionnaire, and the first (SO), second (MF) and third (RY) authors performed data entry and verification of the entered data. The analysis was primarily conducted by the first (SO) and sixth (TS) authors, who mutually confirmed the accuracy of the results. The results were mainly discussed by the sixth author (TS), with the fourth (KN) and fifth (YY) authors reviewing the content for appropriateness from dental education and dentistry perspectives.

Samples and procedures

This study has complied with the STROBE guideline and was approved by the Ethics Review Committee of Tokyo Medical and Dental University (No. D2023-001, approved and conducted before integration as Institute of Science Tokyo). This ethics review assessed whether the study was conducted in accordance with the Helsinki Declaration.

It is widely recognized that descriptive studies often lack the definitive calculation formulas used in experimental designs, posing challenges in justifying sample size adequacy [22]. In the present study, we have detailed the parameters as comprehensively as possible in accordance with the transparent description [22].

The survey was administered to patients aged 18 years and older at Tokyo Medical and Dental University Hospital (Dentistry). Paper-based questionnaires were distributed at the registration desk, and participants were requested to complete them in the waiting area; the forms were collected prior to payment. Dental staff

members, including dentists and dental hygienists from the same institution, also participated. They received and submitted paper questionnaires between November 10 and 17, 2023. While 92 dental staff members and 205 patients initially completed the survey, informed consent was obtained from 72 staff members and 157 patients. As nonparametric tests necessitate larger sample sizes to achieve the same statistical power as parametric tests [23], and considering that the required participant count increases with survey length and the number of variables examined [22], we restricted the number of questions included in the analysis to a minimum.

Following the exclusion of incomplete records through list-wise deletion, the final sample sizes for each cohort were established as shown in Table 1. Because listwise deletion was used, the sample sizes for each table do not match. All study procedures, from recruitment to survey administration, were conducted in Japanese.

The collected questionnaires were digitized by the first, second, and third authors, with the workload divided into three approximately equal parts. Two additional reviewers verified the data entries for accuracy. Analyses were conducted using R software, with the first and final authors independently calculating and verifying the results.

Table 1 Participants

Patients			
age	Male	Female	
< 20	3 (5.8%)	6 (5.7%)	
20–40	8 (15.4%)	21 (20.0%)	
41–64	24 (46.2%)	49 (46.7%)	
65 >	16 (30.8%)	28 (5.8%)	
do not answer	1 (1.9%)	1 (1.0%)	
total	52	105	
Intentions to take care of self-health	Male	Female	
5. strongly agree	17 (32.7%)	18 (17.1%)	
4. agree	19 (36.5%)	49 (46.7%)	
3. intermediate	9 (17.3%)	21 (20.0%)	
2. disagree	3 (5.8%)	5 (4.8%)	
1. strongly disagree	1 (1.9%)	1 (1.0%)	
NA	3 (5.8%)	11 (10.5%)	
total	52	105	
Dental staffs			
years since obtaining license	Male	Female	do not answer
< 3	6 (42.9%)	13 (23.2%)	0 (0%)
3–9	7 (50.0%)	22 (39.3%)	1 (50.0%)
9 >	1 (7.1%)	21 (37.5%)	1 (50.0%)
do not answer	0 (0%)	0 (0%)	0 (0%)
total	14	56	2
occupations	Male	Female	do not answer
dentists (including intern)	14 (100%)	26 (46.4%)	1 (50.0%)
dental hygienists	0 (0%)	30 (53.6%)	1 (50.0%)
total	14	56	2

Questionnaire

The OHL [11–14] questionnaire introduced in the Introduction is a useful resource for assessing patients' literacy. However, it is designed solely to measure literacy and is not well-suited to quantify communication gaps between dental staff and patients in the dental office. Based on our preliminary observations and discussions in the treatment rooms of university hospitals, we concluded that dental staff aim to convey the seriousness of teeth and gums through concrete examples during explanations, to help patients understand the importance of self-care. Therefore, we decided to use concrete examples to capture the recognition gap, which led us to develop items from scratch.

The questionnaire (see Appendices 1 & 2) was divided into three parts. Part 1 gathered demographic attributes (patients: age group, sex, treatment experience; dental staff: years since qualification, sex, occupation) and health self-awareness (patients only) to categorize participants into groups. Part 2 inquired about whether the treatment content had been explained and the level of understanding of that explanation. Patients were asked if they had received an explanation and if they understood it. However, dental staff were asked if they had provided an explanation and if they believed the patients who received it appeared to understand, with responses rated on a 5-point scale (1 = strongly disagree to 5 = strongly agree) (Tables 2 and 3). Part 3 focused on risk perception concerning six clinical scenarios associated with the potential for tooth loss (Tables 4 and 5). For six scenarios with a risk of tooth loss, patients and dental staff rated the perceived risk on a 5-point scale (1 = not serious to 5 = very serious), with an anchor point of 6 for tooth loss. These scenarios, representing risk factors for tooth loss, were selected because they address the three primary etiologies of tooth loss in the Japanese population: periodontal disease, dental caries, and tooth fracture [24]. Furthermore, they encompass frequent inquiries during clinical interviews within the target departments, which serve as primary gateways to specialized care for assessing and communicating patient status. Additionally, we confirmed that each scenario comprises clinically independent questions pertinent to patient evaluation. In addition, the selected scenarios were aligned with five established research questions regarding risk communication in the progression of dental diseases [20]. The items for Parts 2 and 3 were developed by the fourth author—a university hospital clinician and dental education supervisor—in collaboration with the final author, an expert in social research. The structural validity of these items was subsequently reviewed and confirmed by the fifth author, a professor at an affiliated university hospital.

Table 2 Results of Wilcoxon rank-sum test for clinical explanation and its understandings (patients vs. staffs, sex, and care vs. don't care)

Contents	explanation/understanding	patients (*N* = 82)	staffs (*N* = 84)	Wilcoxon signed-rank test			male (*N* = 29)	female (*N* = 53)	Wilcoxon signed-rank test			care (*N* = 54)	don't care (*N* = 6)	Wilcoxon signed-rank test		
		mean [95%CI]		W	*p*	*r*			W	p	*r*			W	p	*r*
Name of the disease	explanation provision/receipt	4.0	3.8	3067	0.20	0.10	3.8	4.1	929	0.10	0.18	3.9	4.2	181	0.63	0.05
		[3.75, 4.17]	[3.64, 4.00]				[3.41, 4.11]	[3.81, 4.34]				[3.65, 4.17]	[3.74, 4.60]			
	expectations/expressions about understanding	3.9	3.7	2796	0.03	0.17	3.6	4.1	1006	0.01	0.27	3.9	3.8	163	0.99	0.00
		[3.69, 4.09]	[3.50, 3.81]				[3.19, 3.91]	[3.84, 4.31]				[3.60, 4.10]	[2.80, 4.87]			
State of the disease	explanation provision/receipt	4.0	4.0	3464	0.94	0.01	3.8	4.1	912	0.14	0.16	4.0	4.2	170	0.83	0.02
		[3.74, 4.18]	[3.86, 4.21]				[3.44, 4.15]	[3.77, 4.34]				[3.72, 4.24]	[3.74, 4.60]			
	expectations/expressions about understanding	3.9	3.7	2943	0.08	0.14	3.7	4.0	909	0.15	0.16	3.9	3.8	156	0.86	0.02
		[3.69, 4.09]	[3.57, 3.86]				[3.32, 4.06]	[3.75, 4.25]				[3.68, 4.17]	[2.80, 4.87]			
Prognosis (risks, etc.) of the disease	explanation provision/receipt	3.5	3.7	3701	0.38	0.07	3.4	3.6	825	0.57	0.06	3.6	3.8	176	0.73	0.03
		[3.29, 3.80]	[3.55, 3.92]				[3.01, 3.89]	[3.28, 3.93]				[3.28, 3.91]	[3.04, 4.62]			
	expectations/expressions about understanding	3.5	3.4	3285	0.59	0.04	3.3	3.5	826	0.56	0.06	3.5	3.7	177	0.70	0.04
		[3.22, 3.71]	[3.25, 3.59]				[2.91, 3.78]	[3.23, 3.83]				[3.18, 3.78]	[2.58, 4.75]			
Treatment period	explanation provision/receipt	3.5	3.4	3087	0.23	0.09	3.5	3.6	802	0.74	0.04	3.4	3.3	156	0.87	0.02
		[3.29, 3.81]	[3.20, 3.61]				[3.02, 3.94]	[3.26, 3.91]				[3.12, 3.77]	[1.90, 4.77]			
	expectations/expressions about understanding	3.5	3.2	2652	0.01	0.21	3.4	3.6	800	0.75	0.04	3.4	3.3	162	1.00	0.00
		[3.26, 3.79]	[3.00, 3.36]				[2.98, 3.92]	[3.24, 3.89]				[3.03, 3.71]	[2.06, 4.60]			
Pain relief	explanation provision/receipt	3.6	3.4	2960	0.10	0.13	3.3	3.8	930	0.10	0.18	3.6	3.3	144	0.64	0.04
		[3.39, 3.88]	[3.24, 3.62]				[2.90, 3.79]	[3.50, 4.09]				[3.28, 3.90]	[1.90, 4.77]			
	expectations/expressions about understanding	3.6	3.3	2725	0.01	0.19	3.2	3.8	952	0.06	0.20	3.6	3.2	138	0.54	0.06
		[3.34, 3.83]	[3.09, 3.44]				[2.78, 3.70]	[3.49, 4.05]				[3.25, 3.86]	[1.62, 4.71]			
Inspection methods and results	explanation provision/receipt	3.8	4.0	3842	0.17	0.11	3.8	3.8	814	0.65	0.05	3.8	3.5	123	0.31	0.10
		[3.60, 4.04]	[3.88, 4.22]				[3.45, 4.14]	[3.54, 4.12]				[3.49, 4.06]	[2.93, 4.07]			
	expectations/expressions about understanding	3.7	3.7	3366	0.79	0.02	3.7	3.8	835	0.50	0.07	3.7	3.3	125	0.33	0.09
		[3.51, 3.96]	[3.55, 3.91]				[3.27, 4.04]	[3.48, 4.06]				[3.40, 3.97]	[2.48, 4.19]			
Treatment approaches	explanation provision/receipt	3.8	3.9	3465	0.94	0.01	3.9	3.8	746	0.82	0.03	3.8	3.3	122	0.30	0.10
		[3.58, 4.03]	[3.69, 4.02]				[3.62, 4.17]	[3.44, 4.07]				[3.47, 4.04]	[2.48, 4.19]			
	expectations/expressions about understanding	3.7	3.5	3016	0.14	0.11	3.8	3.7	741	0.78	0.03	3.6	2.8	92	0.07	0.17
		[3.47, 3.92]	[3.33, 3.67]				[3.43, 4.09]	[3.36, 3.96]				[3.38, 3.92]	[1.80, 3.87]			

Table 2 (continued)

Contents	explanation/understanding	patients (*N* = 82)	staffs (*N* = 84)	Wilcoxon signed-rank test			male (*N* = 29)	female (*N* = 53)	Wilcoxon signed-rank test			care (*N* = 54)	don't care (*N* = 6)	Wilcoxon signed-rank test		
		mean [95%CI]		W	*p*	*r*			W	p	*r*			W	p	*r*
Risks of the treatment	explanation provision/receipt	3.3	3.5	3850	0.17	0.11	3.2	3.3	789	0.84	0.02	3.4	2.2	75	0.03	0.21
		[3.02, 3.54]	[3.29, 3.73]				[2.79, 3.69]	[2.97, 3.64]				[3.06, 3.65]	[0.94, 3.39]			
	expectations/expressions about understanding	3.3	3.3	3448	0.99	0.00	3.3	3.3	750	0.85	0.02	3.4	2.0	67	0.01	0.23
		[3.02, 3.54]	[3.14, 3.50]				[2.80, 3.75]	[2.97, 3.60]				[3.09, 3.65]	[0.67, 3.33]			
Comparison with other treatments	explanation provision/receipt	3.1	3.3	3661	0.47	0.06	2.9	3.2	845	0.44	0.08	3.1	2.5	124	0.32	0.09
		[2.84, 3.40]	[3.03, 3.50]				[2.42, 3.44]	[2.89, 3.57]				[2.74, 3.41]	[1.21, 3.79]			
	expectations/expressions about understanding	3.0	3.2	3638	0.51	0.05	3.0	3.1	763	0.95	0.01	3.0	2.5	128	0.37	0.08
		[2.77, 3.32]	[2.99, 3.39]				[2.49, 3.51]	[2.74, 3.41]				[2.67, 3.33]	[1.21, 3.79]			
Treatment costs	explanation provision/receipt	3.4	3.5	3647	0.50	0.05	3.3	3.4	769	1.00	0.00	3.3	3.0	130	0.42	0.08
		[3.09, 3.64]	[3.26, 3.74]				[2.81, 3.81]	[3.06, 3.73]				[2.98, 3.69]	[2.06, 3.94]			
	expectations/expressions about understanding	3.4	3.4	3537	0.75	0.02	3.4	3.4	707	0.53	0.07	3.4	3.3	151	0.78	0.03
		[3.12, 3.66]	[3.21, 3.67]				[2.98, 3.92]	[3.02, 3.69]				[3.03, 3.71]	[2.25, 4.42]			
Post-treatment maintenance	explanation provision/receipt	3.3	3.5	3943	0.10	0.13	3.1	3.3	821	0.60	0.06	3.4	2.7	110	0.18	0.13
		[2.99, 3.53]	[3.31, 3.76]				[2.64, 3.63]	[2.99, 3.65]				[3.02, 3.69]	[1.23, 4.10]			
	expectations/expressions about understanding	3.2	3.3	3523	0.79	0.02	3.1	3.3	809	0.69	0.04	3.3	2.7	110	0.18	0.13
		[2.97, 3.50]	[3.05, 3.50]				[2.64, 3.63]	[2.97, 3.60]				[3.01, 3.66]	[1.23, 4.10]			

Table 3 Results of Kruskal–Wallis test for clinical explanation and its understandings (age group)

Contents	explanation/understanding	under40 (*N* = 30)	41–64 (*N* = 65)	over65 (*N* = 27)	Kruskal-Walis test		
		mean [95%CI]			χ2	*p*	*η2*
Name of the disease	explanation provision/receipt	4.0 [3.57, 4.43]	3.9 [3.63, 4.20]	4.1 [3.54, 4.60]	0.3	0.86	−0.02
	expectations/expressions about understanding	4.1 [3.81, 4.47]	3.8 [3.49, 4.09]	3.9 [3.41, 4.30]	1.6	0.44	0.00
State of the disease	explanation provision/receipt	4.1 [3.66, 4.63]	3.8 [3.53, 4.13]	4.1 [3.70, 4.59]	2.2	0.34	0.00
	expectations/expressions about understanding	4.2 [3.82, 4.56]	3.7 [3.43, 4.02]	4.0 [3.61, 4.39]	3.5	0.17	0.02
Prognosis (risks, etc.) of the disease	explanation provision/receipt	3.8 [3.34, 4.28]	3.4 [3.11, 3.79]	3.5 [2.72, 4.28]	1.4	0.51	−0.01
	expectations/expressions about understanding	3.8 [3.39, 4.23]	3.4 [3.03, 3.69]	3.3 [2.59, 3.98]	2.7	0.26	0.01
Treatment period	explanation provision/receipt	3.6 [3.09, 4.15]	3.5 [3.15, 3.87]	3.6 [2.90, 4.24]	0.1	0.95	−0.02
	expectations/expressions about understanding	3.6 [3.05, 4.19]	3.5 [3.11, 3.82]	3.6 [2.90, 4.24]	0.4	0.82	−0.02
Pain relief	explanation provision/receipt	3.8 [3.29, 4.24]	3.6 [3.29, 3.94]	3.5 [2.76, 4.24]	0.4	0.83	−0.02
	expectations/expressions about understanding	3.8 [3.36, 4.26]	3.5 [3.20, 3.87]	3.4 [2.72, 4.13]	1.2	0.56	−0.01
Inspection methods and results	explanation provision/receipt	3.8 [3.31, 4.21]	3.8 [3.52, 4.14]	3.9 [3.36, 4.36]	0.2	0.91	−0.02
	expectations/expressions about understanding	3.8 [3.29, 4.24]	3.7 [3.40, 4.05]	3.7 [3.24, 4.19]	0.2	0.91	−0.02
Treatment approaches	explanation provision/receipt	3.6 [3.08, 4.06]	3.9 [3.57, 4.18]	3.9 [3.45, 4.41]	1.5	0.48	−0.01
	expectations/expressions about understanding	3.6 [3.18, 4.06]	3.7 [3.36, 4.00]	3.9 [3.41, 4.30]	0.4	0.83	−0.02
Risks of the treatment	explanation provision/receipt	3.1 [2.56, 3.72]	3.3 [2.96, 3.68]	3.4 [2.78, 3.94]	0.4	0.82	−0.02
	expectations/expressions about understanding	3.2 [2.70, 3.77]	3.3 [2.91, 3.64]	3.4 [2.78, 3.94]	0.1	0.97	−0.02
Comparison with other treatments	explanation provision/receipt	3.2 [2.60, 3.78]	3.0 [2.65, 3.40]	3.4 [2.62, 4.09]	0.9	0.64	−0.01
	expectations/expressions about understanding	3.0 [2.46, 3.63]	3.0 [2.59, 3.32]	3.4 [2.62, 4.09]	1.2	0.55	−0.01
Treatment costs	explanation provision/receipt	3.2 [2.60, 3.78]	3.3 [2.97, 3.71]	3.7 [3.10, 4.33]	1.6	0.45	0.00
	expectations/expressions about understanding	3.3 [2.74, 3.83]	3.3 [2.97, 3.71]	3.7 [3.10, 4.33]	1.5	0.48	−0.01
Post-treatment maintenance	explanation provision/receipt	3.2 [2.66, 3.81]	3.1 [2.81, 3.49]	3.6 [2.84, 4.45]	2.2	0.33	0.00
	expectations/expressions about understanding	3.2 [2.66, 3.81]	3.1 [2.79, 3.46]	3.6 [2.80, 4.35]	2.0	0.38	0.00

Table 4 Results of Wilcoxon rank-sum test for the risk recognition towards losing a tooth (patients vs. staffs, sex, and care vs. don't care)

	patients (*N* = 123)	staffs (*N* = 69)	Wilcoxon signed-rank test			male (*N* = 40)	female (*N* = 83)	Wilcoxon signed-rank test			care (*N* = 80)	don't care (*N* = 9)	Wilcoxon signed-rank test		
Questions	**mean [95%CI]**		**W**	***p***	***r***			**W**	***p***	***r***			**W**	***p***	***r***
Root canal treatment (removing/extract the nerve)	4.1 [3.96, 4.30]	3.8 [3.59, 3.98]	3158	0.00	0.23	4.0 [3.96, 4.30]	4.2 [3.59, 3.98]	1778	0.49	0.06	4.2 [4.01, 4.39]	3.8 [2.94, 4.62]	273	0.20	0.14
Cracks in the tooth	4.3 [4.17, 4.49]	4.3 [4.16, 4.53]	4096	0.66	0.03	4.1 [4.17, 4.49]	4.5 [4.16, 4.53]	2043	0.02	0.21	4.4 [4.18, 4.54]	4.4 [3.42, 5.47]	437	0.24	0.12
Strong chewing strength (clenches teeth)	3.7 [3.52, 3.88]	3.5 [3.29, 3.64]	3562	0.051	0.14	3.6 [3.52, 3.88]	3.7 [3.29, 3.64]	1734	0.68	0.04	3.8 [3.57, 4.00]	3.6 [2.78, 4.33]	316	0.53	0.07
Holes in own teeth (having a cavity)	3.9 [3.74, 4.11]	3.5 [3.31, 3.73]	3092	0.00	0.24	3.8 [3.74, 4.11]	4.0 [3.31, 3.73]	1884	0.20	0.12	4.0 [3.77, 4.23]	3.7 [2.81, 4.53]	295	0.35	0.10
Bleeding during toothbrushing (getting bleeding)	3.6 [3.38, 3.76]	3.2 [3.00, 3.47]	3419	0.02	0.17	3.5 [3.38, 3.76]	3.6 [3.00, 3.47]	1727	0.71	0.03	3.7 [3.44, 3.91]	3.8 [3.03, 4.52]	374	0.84	0.02
Feeling own teeth wobbly	4.4 [4.18, 4.55]	4.3 [4.16, 4.53]	3823	0.20	0.09	4.3 [4.18, 4.55]	4.4 [4.16, 4.53]	1873	0.18	0.12	4.4 [4.14, 4.59]	4.9 [4.63, 5.15]	465	0.09	0.18

Informed consent

The questionnaire incorporated a dedicated section for informed consent, allowing all respondents to explicitly indicate their agreement or disagreement regarding the use of their data. Consequently, the analysis was restricted exclusively to data from participants who provided formal permission.

Statistical analyses

Statistical analyses were performed to evaluate differences in clinical explanations, comprehension levels (Table 2), and risk recognition (Table 4). The Wilcoxon signed-rank test was employed for comparisons across patient–staff groups, sex, and health self-awareness levels. For the analysis of health self-awareness, participants were categorized into high-scoring (scores 4 and 5) and low-scoring (scores 1 and 2) groups. To examine differences among the three age cohorts (< 40, 41–64, and > 65 years), the Kruskal–Wallis test was utilized, followed by the Dunn test with Bonferroni correction for post-hoc pairwise comparisons, as detailed in Tables 3 and 5.

Results

Regarding the provision of explanations, no significant disparities were observed between patients and dental staff. However, significant differences were identified in the 'comprehension gap' (patient's self-assessment vs. staff's prediction) across three specific items: disease name ($p = 0.03$, r = 0.17), treatment duration ($p = 0.01$, r = 0.21), and pain management ($p = 0.01$, r = 0.19). In each of these instances, the patients' self-evaluated comprehension scores significantly exceeded the staff's predictions of patient understanding. Sex-based analysis revealed a significant difference only for the disease name category ($p = 0.01$, r = 0.27). In terms of health self-awareness, the high-scoring group demonstrated significantly higher levels of both perceived risk explanation ($p = 0.03$, r = 0.21) and overall understanding ($p = 0.01$, r = 0.23) compared to the low-scoring group. Conversely, Kruskal–Wallis tests (Table 3) and subsequent post-hoc analyses indicated no significant age-related differences across any of the communication items.

Similarly, risk recognition was analyzed using the Wilcoxon rank-sum test for intergroup comparisons and the Kruskal–Wallis test for age cohorts. In the comparison between patients and dental staff, patients exhibited significantly higher risk perception for three conditions: root canal treatment ($p < 0.01$, r = 0.23), dental caries ($p < 0.01$, r = 0.24), and gingival bleeding during brushing ($p = 0.02$, r = 0.17). Sex-based comparisons indicated a significant difference only for the perception of 'cracks' ($p = 0.02$, r = 0.21), while health self-awareness did not significantly influence risk recognition scores.

Table 5 Results of Kruskal–Wallis test and Dunn test for the risk recognition towards losing a tooth (age group)

Questions	under40 (*N* = 30) mean [95%CI]	41–64 (*N* = 65)	over65 (*N* = 27)	Kruskal-Walis test			Groups			Groups			Groups		
				χ2	*p*	*η*2		*p*	*r*		*p*	*r*		*p*	*r*
Root canal treatment (removing/extract the nerve)	4.2 [3.96, 4.51]	4.2 [3.93, 4.41]	3.9 [3.50, 4.35]	1.3	0.52	−0.01	over65 vs under40	1.00	0.12	41–64 vs over65	0.80	0.11	41–64 vs under40	1.00	0.01
Cracks in the tooth	4.6 [4.35, 4.78]	4.3 [4.11, 4.56]	4.0 [3.59, 4.48]	3.1	0.21	0.01	over65 vs under40	0.24	0.23	41–64 vs over65	0.68	0.12	41–64 vs under40	1.00	0.09
Strong chewing strength (clenches teeth)	3.5 [3.18, 3.88]	3.9 [3.66, 4.15]	3.4 [2.96, 3.78]	6.2	0.05	0.03	over65 vs under40	1.00	0.07	41–64 vs over65	0.08	0.23	41–64 vs under40	0.25	0.18
Holes in own teeth (having a cavity)	4.2 [3.85, 4.55]	4.0 [3.73, 4.21]	3.6 [3.07, 4.04]	5.1	0.08	0.03	over65 vs under40	0.07	0.28	41–64 vs over65	0.40	0.16	41–64 vs under40	0.75	0.12
Bleeding during toothbrushing (getting bleeding)	3.6 [3.21, 3.99]	3.7 [3.43, 3.93]	3.3 [2.78, 3.81]	1.2	0.54	−0.01	over65 vs under40	1.00	0.11	41–64 vs over65	0.82	0.11	41–64 vs under40	1.00	0.01
Feeling own teeth wobbly	4.6 [4.23, 4.90]	4.6 [4.38, 4.73]	3.7 [3.10, 4.24]	10.7	0.00	0.07	over65 vs under40	0.01	0.36	41–64 vs over65	0.01	0.31	41–64 vs under40	1.00	0.06

Intergenerational analysis (Table 5) showed that risk perceptions for dental caries ($p = 0.05$, r = 0.03) and tooth mobility ($p < 0.01$, r = 0.07) were statistically significant. Although post-hoc Dunn tests revealed no specific disparities for dental caries, the perception of tooth mobility was significantly higher in the over-65 age group compared to both the under-40 ($p = 0.01$,r = 0.36) and the 41–64 age groups ($p = 0.01$,r = 0.31).

Discussion

The analysis of recognition and comprehension concerning clinical explanations revealed a notable discrepancy in perceptions between patients and dental staff. Across all evaluated dimensions, patients' self-assessments of their understanding consistently surpassed the estimations made by the staff. Although sex-based differences did not yield definitive conclusions, health self-awareness emerged as a significant factor, as the high-scoring group demonstrated superior outcomes in recognizing treatment-related risks. The general tendency for patient scores to exceed those of the staff likely reflects the high health consciousness characteristic of patients attending a university hospital. Given that low OHL is established to correlate with declines in individual dental health [14, 25, 26] and care recipient outcomes [13, 27], as well as a deterioration in self-care practices [28], future large-scale surveys targeting individuals with low health awareness will be essential.

Previous studies have shown that patients felt inadequately informed about "comparison with other treatments," "treatment period," and "post-treatment maintenance" [19]. However, only the "treatment period" aligned with our findings. Furthermore, the aspects that the patients perceived as being understood received higher scores than those reported by staff members. Although patient dissatisfaction was not directly assessed in the present survey, analyzing the provision of clinical explanations and the perception of comprehension as independent variables could elucidate the intricate relationships between communication, understanding, and satisfaction. Such an analytical approach may facilitate the identification of the specific informational content that patients truly require.

Regarding risk recognition, both patients and dental staff assigned high ratings to tooth cracks and tooth mobility, correctly identifying these as definitive indicators of dental health changes. However, for the three aspects where significant differences were observed, if the dental staff's risk assessment is regarded as the expert baseline, then patients' risk perceptions appear potentially excessive. In the medical field, poor communication with doctors is associated with a 19% higher risk of poor medication adherence [29]. These findings underscore the imperative for measures that ensure

accurate knowledge transfer within dentistry. An analysis of patient-side factors did not reveal any scores that could explain the significant differences observed relative to the dental staff. Notably, the specific symptoms showing significant disparities varied depending on the factor analyzed. When providing risk explanations to patients, the risk of cracked teeth should be emphasized for men, while the implications of tooth mobility should be explained more comprehensively to older adults.

Conclusion

This study investigated the gap between patients and dental staff regarding the provision of explanations during treatment, their understanding of these explanations, and their recognition of risks associated with oral health or disease. Significant disparities were identified across multiple dimensions of treatment explanation comprehension and oral health risk perception, with notable variations associated with specific patient demographic attributes. These findings suggest that clinical communication should be tailored to individual patient profiles to optimize understanding. However, as this study was conducted among staff and outpatients at a single university hospital, caution is warranted regarding the generalizability of these results to broader populations. Furthermore, the questionnaire item concerning 'root canal treatment' encompasses a wide range of clinical etiologies—including advanced dental caries, trauma, acute pain, and dental abscesses—necessitating a more granular breakdown in future investigations to facilitate deeper discussion.

To enhance the robustness of these findings, subsequent research should target diverse cohorts, such as individuals undergoing dental screenings in primary care clinics and educational settings. Additionally, it is essential to conduct large-scale surveys specifically focusing on populations with lower health awareness to evaluate potential attribute-based biases. Further empirical investigation is required to explore the nexus between OHL recognition, objective OHL knowledge, and actual self-care behaviors. Once these recognition gaps are more precisely defined, the development and implementation of targeted solutions to bridge them should be urgently pursued.

Abbreviation

OHL Oral health literacy

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12903-026-08363-x.

Supplementary Material 1.

Supplementary Material 2.

Supplementary Material 3.

Supplementary Material 4.

Supplementary Material 5.

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Authors' contributions

Shiho Otomo: Contributed to conception, design, acquisition, analysis and critically revised the manuscript Maoko Fujisaki: Contributed to conception, design, acquisition, analysis and critically revised the manuscript Risako Yanagase: Contributed to conception, design, acquisition and critically revised the manuscript Kanako Noritake: Contributed to conception, design, acquisition, interpretation and critically revised the manuscript Yoshinobu Yanagi: Contributed to conception, design, acquisition, interpretation, funding acquisition, project administration and critically revised the manuscript Taro Sugihara: Contributed to conception, design, analysis, interpretation, project administration and drafted the manuscript.

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Data availability

All data generated or analyzed during this study are included in supplementary information files.

Declarations

Ethics approval and consent to participate

This study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Review Committee of Tokyo Medical and Dental University (conducted before integration into the Institute of Science Tokyo) (No. D2023-001). The questionnaire was preceded by an explanation of the study's purpose and data handling. Informed consent was obtained from all participants via a confirmation question; only data from those who provided their informed consent were included in the analysis.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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