

Ensuring Student Competence in Essential Dental Consultation Communication Skills for Patient Care: Developing, Validating and Piloting a Comprehensive Checklist

Sunila B Sangappa¹, Thomas V Chacko², Shital Bhandary³

ABSTRACT

Aim: Ability to communicate effectively as a core competency for dental practitioners is deemed important for a patient-centered practice. This study aims to pilot the process of developing and using a comprehensive checklist for ensuring student competence in essential dental consultation communication for patient care.

Materials and methods: A total of 87 third-year dental undergraduate students' videotaped patient interviews were independently rated by six raters to evaluate the psychometric properties of the developed Dental Consultation Communication Assessment Checklist (DCCAC). Students were given training in basic consultation communication skills and patient interview techniques according to the developed DCCAC. Improvement in communication was assessed in pre-intervention and post-intervention using the checklist for giving feedback on performance of real patient examination.

Results: The majority of faculty (84%) and patients (93%) gave positive feedback (satisfaction) on the process and 87% of the students' feedback indicated they would use their learning regarding communication skills in the future (transfer to practice). This comprehensive tool was found to be highly reliable with internal consistency reliability (Cronbach's alpha) of 0.987. Construct validity of the tool was examined through principal components analysis with varimax rotation. Based on the principal component analysis, new extracted domains demonstrated very high internal consistency (Cronbach's alpha range = 0.975–1.00).

Conclusion: The product arising from the development and psychometric testing of DCCAC for undergraduate dental students has the potential to be used as a valid tool to assess clinical competence during a patient interview and provide specific and formative feedback/self-reflection for consciously improving performance during the next patient encounters. Self-reflection during formative years will also make them reflective practitioners engaging in continuing professional development (CPD) in the future.

Clinical significance: The DCCAC developed by us would ensure that dental graduates will be competent in dental consultation communication and use the habit of self-reflection to engage in CPD to improve the quality of patient-centered care.

Keywords: Assessment tool, Checklist development, Competency, Dental communication checklist, Dental consultation, Dentist–patient interaction, Validation.

World Journal of Dentistry (2019); 10.5005/jp-journals-10015-1677

INTRODUCTION

Effective therapeutic communication is critical for positive oral and general health outcomes.¹

New graduates are expected to become competent and capable of functioning (independently) in real practice settings. Across the world, communication skills are identified as one of the core competencies of a graduating dentist for safe and independent practice of dentistry.² Despite the importance, systematic development of those skills in student practitioners tends to be limited and often overshadowed by curricular time spent teaching technical skills rather than integrating behavioral and technical abilities.³ There is wide variation in the degree of formal teaching and the timing of the teaching of communication skills in dental and medical schools.⁴ The assessment of students' communication is crucial as it is a core competency skill.² Unstructured process of learning, such as direct observation, faculty role-modelling, and subjective evaluations lead to wide variability in the communication skills acquired by students with different tutors and different institutions.⁵

Although, the value of communication skills training is emphasized by Dental Council of India in Bachelor of Dental Surgery and Master of Dental Surgery dental syllabus, there is lack of clarity on how and who will teach as well as when (scheduling in

¹Department of Prosthodontics and Crown and Bridge, JSS Dental College and Hospital, JSS Academy of Higher Education and Research, Mysuru, Karnataka, India

²Medical Education, Believers Church Medical College and Hospital, Thiruvalla, Kerala, India; PSG FAIMER Regional Institute, Coimbatore, Tamil Nadu, India

³School of Public Health, Patan Academy of Health Sciences, Lalitpur, Nepal

Corresponding Author: Sunila B Sangappa, Department of Prosthodontics and Crown and Bridge, JSS Dental College and Hospital, JSS Academy of Higher Education and Research, Mysuru, Karnataka, India, Phone: +91 9591613824, e-mail: drsunilabs@gmail.com

How to cite this article: Sangappa SB, Chacko TV, Bhandary S. Ensuring Student Competence in Essential Dental Consultation Communication Skills for Patient Care: Developing, Validating and Piloting a Comprehensive Checklist. *World J Dent* 2019;10(6):413–421.

Source of support: JSS Academy of Higher Education and Research

Conflict of interest: None

existing curriculum) and its assessment (whether in the formative or summative).

Dental educators are also challenged to select a framework for skill development in order to implement a uniform model for teaching and assessment.⁶ Because models of clinical dental communication are almost nonexistent, dental educators, and researchers have drawn upon practices seen in medical schools for models to be replicated, such as Macy model, Manitoba model and Calgary-Cambridge communication framework by Haak and coauthors.⁷ Tools have been developed in which instructors observing patient care,⁵⁻⁸ standardized patients in simulations rate dental students' skills.⁹⁻¹² Although the medical model is often applied to the dental environment, they fail to acknowledge some of the communication skills unique to the dental context, such as anxiety and fear, especially with the mouth already open.

The dental consultation communication checklist (DCCC) by Theaker et al. although being reliable (high-interobserver agreement) did not demonstrate its effects across clinical applications.⁵ The revised 2007 Patient Communication Assessment Instrument (PCAI), Student Communication Assessment Instrument (SCAI) new components demonstrated adequate outcomes in terms of validity and reliability compared with the original PCAI and SCAI while there are recommendations for future research to measure communication skills in different contexts.¹³ Therefore, the objective of this study was to pilot the process of developing and using a comprehensive checklist for ensuring student competence in essential dental consultation communication skills for patient care in the Indian context, getting it content validated by subject experts and psychometrically tested for construct validity and reliability.

MATERIALS AND METHODS

This is an experimental (educational intervention) study. Ethical clearance was obtained from the Institutional Review Board. Methodology followed is depicted in Flowchart 1.

Development of Tool

Development of assessment/feedback tool involved a two-step process.¹⁴ (A) Development stage using judgment-quantification process. (B) An explorative qualitative approach stage using a focus group discussion among the faculty, postgraduates, and interns of the institution. The core competencies were identified through qualitative studies that helped broadly frame the instrument's constituent domains. This initial compendium version of Dental Consultation Communication Assessment Checklist (DCCAC)

consisted of 7 domains, 47 items, 1 global rating scale, and the behavioral cues.

Checking for Content Validity

A panel of five experts of the Department of Prosthodontics worked independently to evaluate the new comprehensive instrument for representativeness of items in content domain regarding the content relevance, clarity, and conciseness of each assessment item using a four-point rating scale to obtain content validity index (CVI) = 1.00 with seven domains and 40 items (Tables 1 and 2).

Pilot Testing of the DCCAC to Check its Feasibility in Administering it and its Validity, Reliability Besides its Effectiveness and Usefulness as Perceived by its Users

This was done with a cohort of 17 third-year first-term dental students fluent with English after informed consent. The subjects were mostly women ($n = 12$; 70.58%) with an age range of 21-22 years. Encounters of students during two simulated patient interviews (Interns) were rated by two prosthodontists with 40 item dental consultation communication rating checklist involving 7 domains using a four-point scale.

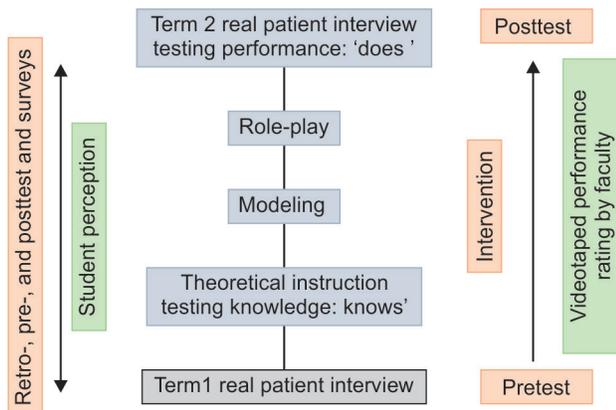
Process of Psychometric Testing

A total of 87 third-year dental undergraduate students were recruited and rated by six raters to evaluate the newly developed DCCAC for the psychometric properties of the factor structure of the checklist during student-patient encounter communication that was videotaped, related to the procedure "fabrication of removable denture prosthesis."

Inclusion of Seven Domains in the DCCAC

Following a similar process of integration and content skills made by authors of Enhanced Calgary Cambridge guide, we incorporated in the DCCAC oral examination instead of physical examination as one of the key tasks that enables student learners to see the fit between oral examination and the communication tasks. The checklist also introduces two communication process domains, namely, building the relationship and structuring the interview to expand the total domains to seven domains to emphasize the communication components in the five tasks that are performed in sequence in dental interviews and the two communication process-related ones that occur as continuous threads throughout the interview. This helps learners conceptualize more accurately the communication process itself and the relationships among the various tasks that comprise it.¹⁴

Flowchart 1: Study methodology



RESULTS

Test for Content Validity

The CVI and scale content validity index (S-CVI) were calculated. In the first round of content validity testing, seven items were eliminated due to low S-CVI < 0.78 and S-CVI that received universal agreement by experts that the items are rated 3 or 4 (clubbed together as "relevant") was S-CVI = 0.8636. Second round of content validation by experts of the revised tool with seven domains and 40 items resulted in CVI = 1.00 and for revised items the final S-CVI that received universal agreement by experts that the items are rated 3 or 4 was S-CVI = 1. Reviewing the items for content validity from 0.836 to 1 seven items that were dropped out were encourages the patients to express feelings;

Table 1: Output from content validation by subject experts: final 40 items in the checklist under the seven domains of Dental Consultation Communication Assessment Checklist (DCCAC)

<i>Domain 1: initiating session</i>	
Q1	Reads case notes/referral letter
Q2	Greets patient
Q3	Attends to patient's physical comfort on the dental chair (chair height, head rest and light), establishes eye contact at the beginning and maintains it at reasonable intervals
Q4	Introduces self and role and seats at the patient's height or below on operating stool
Q5	Invites patient to explain reason for visit
Q6	Listens attentively to opening statement, without interrupting
Q7	Identifies the patient's problems with open questions
Q8	Is sensitive to patient's needs
<i>Domain 2: gathering information</i>	
Q9	Encourages patient to tell the details of the problem(s) present in own words
Q10	Question style open to closed
Q11	Listens attentively, not interrupting, allowing patient sufficient time
Q12	Facilitates patient's responses verbally and nonverbally
Q13	Picks up verbal and nonverbal cues (body language, speech, facial expression)
Q14	Clarifies patient's statements that are unclear or need amplification
Q15	Periodically summarizes/paraphrases to verify own understanding of what the patient has said
Q16	Explores patient's problem to discover biomedical perspective
Q17	Explores patient's problem to discover patient's perspective
Q18	Uses concise, easily understood questions, avoids/adequately explains jargon
Q19	Actively determines and explores patient's ideas, concerns regarding the problem, patient's expectations
<i>Domain 3: oral examination</i>	
Q20	Provides clear instructions to patient/patient informed what s/he is doing

attends to timing and interviewing on task; shares thinking with patient to encourage patient's involvement; demonstrates appropriate confidence; during the oral examination, explains process, asks permission; asks patients what other information would be helpful, e.g., etiology, prognosis; gives an explanation at appropriate times; and avoids giving advice, information, or reassurance prematurely.

Tests for Reliability and Generalizability of Included Items

Table 3 shows Krippendorff's alpha based on the SPSS Macro from Hayes and Krippendorff for inter-rater reliability and generalizability theory analysis using G String II Program from PERD, McMaster University for the G-coefficient was used to analyze the pilot study ($n = 17$) data. The results indicated that each item's inter-rater

<i>Domain 3: oral examination</i>	
Q21	Ensures patient's dignity
Q22	Explains rationale for questions or procedure of oral examination
<i>Domain 4: providing structure</i>	
Q23	Summarizes intraoral findings and reflects back patients' statements and uses signposting
Q24	Gives background information while establishing dates and sequence of past events
Q25	States importance of keeping up appointments
<i>Domain 5: building relationship</i>	
Q26	Demonstrates appropriate nonverbal behavior eye contact
Q27	Demonstrates appropriate nonverbal behavior facial expression
Q28	Demonstrates appropriate nonverbal behavior posture
Q29	Demonstrates appropriate nonverbal behavior position and movement
Q30	Demonstrates appropriate nonverbal behavior vocal cues, e.g., rate, volume
Q31	If reads/writes notes, does not allow that to interfere with dialogue or rapport
Q32	Accepts legitimacy of patient's views and feelings; is not judgmental
Q33	Uses empathy to communicate understanding and appreciation
Q34	Provides support; expresses concern, engages in shared decision making
<i>Domain 6: explanation and planning</i>	
Q35	Provides explanation/information, such as plan for the day
Q36	Brief behavioral counselling towards oral hygiene/smoking/oral habits
Q37	Provides explanation/information of costs and steps of dental procedure and referrals
Q38	Uses appropriate terminology
Q39	Includes patient in the discussion
<i>Domain 7: closing session</i>	
Q40	Summarizes session briefly, clarifies plan of care and gives clear instructions of closing consultation

reliability (measured with Krippendorff's α for an individual occasion was 1.0, except for items 17 (0.83 on each occasion) and 18 (1.0 on one occasion, 0.68 on another). The generalizability theory analysis of checklist scores for 17 students by two raters on two occasions using fully crossed design yielded a G-coefficient of 0.718. Variance components revealed that about 7% of the variance was associated with the student whereas student \times item facet accounted for 20%, and occasion \times item facet for 9%; most variance was associated with item alone (32%), whereas occasion alone was (0%). The student \times rater \times item facet accounted for nearly 8% of variance, whereas the student \times rater \times occasion \times item accounted for nearly 16%. Other facets explained less than 5% variance. No revision on the items was required, based on the results of the pilot testing as items of the tool accounted for more variance and G-coefficient was found to be acceptable (>0.70).

Table 2: Summary of measures to establish content validity for the DCCAC

Measure	Clarity	Relevance	Conciseness
Item content validity index (I-CVI) and scale content validity index (S-CVI) for first round of evaluation with 47 items			
S-CVI/ave (average of I-CVI)	0.8955	0.9	0.9
S-CVI/UA (proportion of items that received universal agreement by experts that the items are rated 3 or 4)	0.8636	0.8636	0.8636
I-CVI and S-CVI revised tool with 40 items sent to the experts for a second round of evaluation			
S-CVI/ave (average of I-CVI)	1	1	1
S-CVI/UA (proportion of items that received universal agreement by experts that the items are rated 3 or 4)	1	1	1

Results from Psychometric Testing

The dental undergraduate students were aged 21–22 years with 83% ($n = 87$) women. Demographic data (e.g., age, sex, and ethnicity) were also obtained. The process of item analysis for internal consistency. Seven domains of the DCCAC with items were analyzed using IBM SPSS version 20 software. Internal consistency was evaluated using Cronbach's alpha and item-to-total correlation followed by exploratory factor analysis. Principal component analysis based on Varimax rotation with Kaiser normalization (eigenvalue > 1) and factor loading of 0.6 and more was used. Psychometric studies based on 522 ratings of 87 students by six raters indicated a very homogenous scoring. This is further supported by the coefficient of variation as the percent of variation in the total score hovered around 25% mark for all the raters. This shows the lack of discrimination among the students by the rater, which is also supported by low-variance components in the pilot test. Kruskal–Wallis test was used to compare the average (median) among the raters and its p value was found to be 0.995, which confirms that the median of the total score was equal among raters.

Reliability of the Composite Tool

According to the psychometric study of 522 ratings, the tool is found to be highly reliable as the internal consistency reliability (Cronbach's alpha) was 0.987. This means that around 98% of the variation in the tool is explained by the items included in the tool. The total score formed by adding all the 40-item scores (DCCAC scale score) are 55.83 with standard deviation (SD) of 14.133. This means that 95% of the students' score lies between $55.83 \pm 1.96 \times 14.133$. The standard error of measurement of 1.611 suggested that if the test is repeated 100 times, 95% of the times the DCCAC scale mean will lie within $55.83 \pm 1.96 \times 1.611$. As the standard error is low, the test is highly reliable. Cronbach's alpha, mean, SD, and variance with the deletion of particular item from the scale under consideration is depicted in Table 3. The corrected item-total correlation is above 0.6 for all the items indicating very good correlations between the items used in the checklist.

Factor Analysis of the Structure

The scree plot (Fig. 1) obtained from an exploratory factor analysis (principal component analysis) suggests retaining three or four factors (components) as it bends first at these points. The exploratory factor analysis determined that the domains and

items created supported what constitutes an effective clinical communication and this strengthens the construct validity of items defining each communication domains. Table 4 depicts the extraction of variance from the principal component analysis. Based on Kaiser's criteria (eigenvalue > 1), the principal component analysis clearly suggested retaining four factors (components) as it explained around 96% of the total variance.

A rotated component matrix of the four components is shown in Table 5. Thirteen items loaded on component 1. These included items from five of the seven predefined domains: gathering information (DCCAC D2), providing structure (DCCAC D4), building relationships (DCCAC D5), explanation and planning (DCCAC D6), and closing session (DCCAC D7); 13 items loaded on component 2. These included items from three of the seven predefined domains suggesting that the new domains (Table 6) are multidimensional. Based on the above findings, it was concluded that the results support continuing with all items in the checklist.

Program Evaluation of Effectiveness of the Intervention Using the New Checklist

This was measured using the Kirkpatrick model where level I (reaction) was for student's perception about the benefits of the intervention in both settings, i.e., observation of clinical encounters and simulated parts were positive. Student perception of benefit: students' rating of the observation component ($n = 87$) were as follows the majority of students 84 (97%) perceived that the intern role-playing exercise helped them distinguish between less and more effective clinician–patient communication, 51 (59%) students felt assessing the clinician's role during the intern role-playing exercise enhanced their understanding of how to use the communication checklists, while student role-playing exercise helped 62 (72%) to become comfortable with role-playing. 54 (62%) students felt that this exercise facilitated better interactions with patients. Student perception of benefit: students' rating of the simulation component ($n = 87$) were as follows: the majority of students 79 (91%) perceived that the simulation exercise made them aware of their strengths and 84 (97%) of their weakness in communicating with patients respectively. Around 65 (75%) felt comfortable practicing communication skills in front of classmates and 82 (94%) perceived that this exercise improved their confidence in communicating with patients. Overall, 79 (90%) felt that the experience was worthwhile.

Kirkpatrick level II (results/learning) in this study shows that the program did improve the students' communication skills significantly (Table 7).

DISCUSSION

There is a distinct need among dentists for advanced interpersonal communication skills to reduce patient fear and anxiety and the inability of the patient to speak for extended periods during treatment.¹⁵ This study developed a validated and reliable checklist covering the content, process and perceptual skills required during dental consultation communication that can be used in future studies to look at the gap between knowledge and practice of dental undergraduate students.

The checklist developed in this study also includes both verbal and nonverbal communication skills and patient satisfaction/ ratings as part of the assessment as recommended for assessing communication competence in the literature.^{3,16,17}

Use of a Likert scale incorporated within this new assessment instrument will improve its ability to provide formative feedback



Developing Essential Dental Consultation Communication Skills Checklist

Table 3: Validation of items on the DCCAC: corrected item mean, standard deviation (SD), variance. Item total correlation, and Cronbach's alpha (CA) if item deleted from the tool

	<i>Mean</i>	<i>Variance</i>	<i>SD</i>	<i>Corrected item total correlation</i>	<i>CA</i>
1 Read case notes/referral letter	23.43	39.041	6.248	0.936	0.975
2 Greets patient and establishes eye contact at the beginning of the consultation	23.43	39.041	6.248	0.854	0.975
3 Attends to patient physical comfort on the dental chair (chair height, head rest and light)	23.43	39.041	6.248	0.817	0.975
4 Introduces self and role and seats at the patient's height or below on operating stool	23.43	39.041	6.248	0.806	0.975
5 Invites patient to explain reason for visit	23.43	39.041	6.248	0.830	0.975
6 Listens attentively to opening statement, without interrupt	23.43	39.041	6.248	0.777	0.975
7 Identifies the patient's problems with open questions	23.43	39.041	6.248	0.777	0.975
8 Is sensitive to patients needs	23.43	39.041	6.248	0.777	0.975
9 Encourages patient to tell the details of the problem(s) present in own wordings	23.43	39.041	6.248	0.796	0.975
10 Question style open to closed	23.43	39.041	6.248	0.798	0.975
11 Listens attentively, not interrupting, allowing patient time	23.43	39.041	6.248	0.798	0.975
12 Facilitates patient's responses verbally and nonverbally	21.33	18.944	4.352	0.904	1.000
13 Picks up verbal and nonverbal cues (body language, speech, facial expression)	21.33	18.944	4.352	0.904	1.000
14 Clarifies patient's statements that are unclear or need amplification	21.33	18.944	4.352	0.904	1.000
15 Periodically summarizes to verify own understanding of what the patient has said	21.33	18.944	4.352	0.904	1.000
16 Explores patient's problem to discover biomedical perspective	21.33	18.944	4.352	0.904	1.000
17 Explores patient's problem to discover patient's perspective	9.15	16.364	4.045	0.901	0.996
18 Background information while establishing dates and sequence of past events	21.33	18.944	4.352	0.901	1.000
19 Uses concise, easily understood questions, avoids/adequately explains jargon	9.15	16.364	4.045	0.901	0.996
20 Actively determines and explores patient's ideas, concerns regarding the problem, patient's expectations	9.15	16.364	4.045	0.901	0.996
21 Provides clear instructions to patient/patient informed what he is doing	23.43	39.041	6.248	0.701	0.975
22 Ensures patient dignity	23.43	39.041	6.248	0.817	0.975
23 Explains rationale for questions or procedure of oral examination	9.15	16.364	4.045	0.901	0.996
24 Summarises intraoral findings and reflects back patients' statements and uses signposting	9.15	16.364	4.045	0.779	0.996
25 Demonstrates appropriate nonverbal behavior facial expression	9.15	16.364	4.045	0.901	0.996
26 Demonstrates appropriate nonverbal behavior posture	9.15	16.364	4.045	0.901	0.996
27 Demonstrates appropriate nonverbal behavior position and movement	9.15	16.364	4.045	0.901	0.996
28 Demonstrates appropriate nonverbal behavior vocal cues, e.g., rate, volume	9.15	16.364	4.045	0.901	0.996
29 If reads, writes notes, does not interfere with dialogue or rapport	9.15	16.364	4.045	0.901	0.996
30 Accepts legitimacy of patient's views and feelings; is not judgmental	1.91	2.083	1.443	0.611	1.000
31 Uses empathy to communicate understanding and appreciation	21.33	18.944	4.352	0.904	1.000
32 Provides support; expresses concern; offers mutual participation	1.91	2.083	1.443	0.611	1.000
33 Provides explanation/information such as plan for the day	1.91	2.083	1.443	0.611	1.000
34 Brief behavioral counselling towards oral hygiene/smoking/oral habits	21.33	18.944	4.352	0.904	1.000
35 Provides explanation/information of costs and steps of dental procedure and referrals	21.33	18.944	4.352	0.904	1.000
36 Importance of keeping up appointments	21.33	18.944	4.352	0.904	1.000
37 Uses appropriate terminology	21.33	18.944	4.352	0.904	1.000
38 Includes patient in the discussion	9.15	16.364	4.045	0.901	0.996
39 Summarises session briefly, clarifies plan of care and gives clear instructions of closing consultation	21.33	18.944	4.352	0.904	1.000

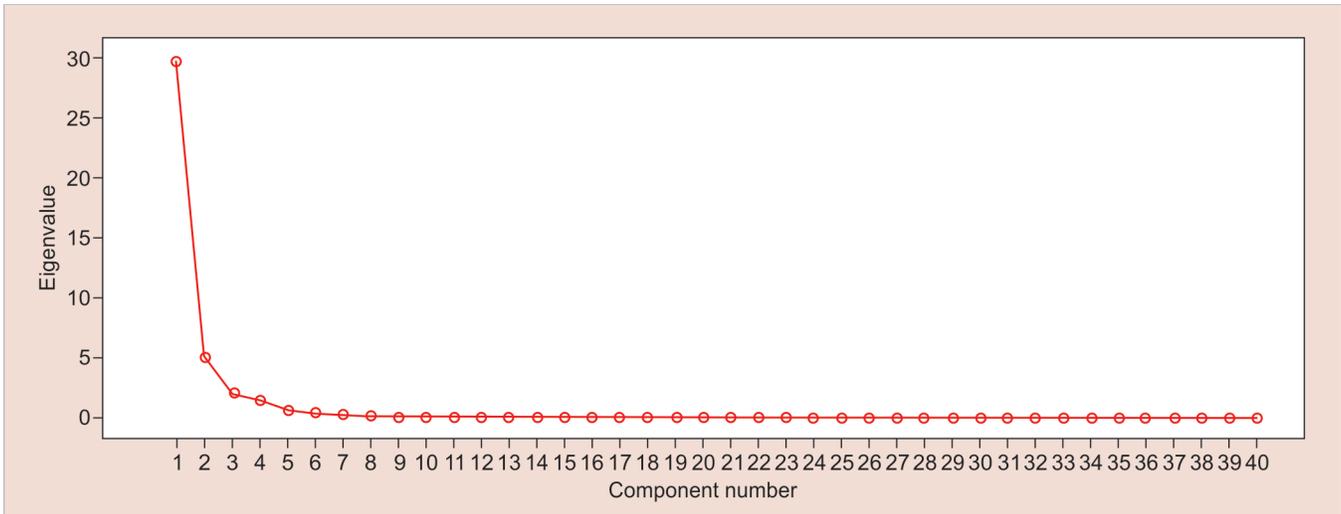


Fig. 1: Scree plot obtained from principal component analysis

Table 4: Total variance explained using principal component analysis on the components

Component	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %	Total	% of variance	Cumulative %
1	29.76	74.40	74.40	29.76	74.40	74.40	14.32	35.81	35.81
2	5.07	12.69	87.09	5.07	12.69	87.09	11.87	29.68	65.49
3	2.05	5.12	92.20	2.05	5.12	92.20	8.72	21.79	87.29
4	1.47	3.68	95.88	1.47	3.68	95.88	3.44	8.59	95.88
5	0.63	1.59	97.47						
6	0.39	0.98	98.45						
39	0.00	0.00	100.00						
40	0.00	0.00	100.00						

and “fine-tune” skills.⁵ Although dichotomous “checklist” assessments have been shown to provide a clearer behavioral definitions and increased reliability for less experienced assessors in medical applications, the benefit from its use at the formative stage is accepted.¹⁸

Student assessment of clinical communication skills plays a key role in developing students’ ability to be patient-centered and so targeted student-patient encounters with feedback on performance in authentic dental treatment settings improves the quality of communication.¹⁹ Calgary Cambridge guide that has the advantage of validated accessible summary of skills and the foundation for programs at all levels was considered in this study. Content skills allow us to gather the information contained in the traditional medical history, such as chief complaint, history of present illness, and so on. Process skills relate to the way the information is gathered or given, the way the relationship is built and includes other things such as the structure, pace and flow of the interview. Perceptual skills are the underlying thoughts, feelings, and attitudes, which influence communication.²⁰ Enhanced Calgary-Cambridge guide combines the “old” content of the biomedical history with the “new” content of the patient’s perspective, of the medical interview, and includes a place for examination.¹⁴ This study has emphasized the essential components and modified the 71 items of the Calgary-Cambridge guide to 40 to suit a dental consultation interview.

Content validity is an essential step in the development of new empirical measuring instrument because it represents a basic mechanism for linking abstract concepts with observable and measurable behavioral indicators/markers.¹³ During the second (judgment/quantification) stage of development of the new instrument when a selected panel of content experts evaluate the instrument and rate item relevance to the domain of content, Lynn et al. recommended use of six or more judges and that the CVI should be no lower than 0.78 for an item to be judged acceptable. In our study, CVI calculated for each item under the seven domains and for the overall instrument resulted in CVI of 1.00, which indicates good agreement between the raters.²¹

Videotaping of a clinical encounter is an important teaching tool from which learners identify areas to improve. It is very useful in recognizing their actual behavior during interactions with patients as it is not possible to be fully aware of all that one is doing during an interview, particularly for nonverbal cues.²² In this study, the student-patient interview that was videotaped after obtaining consent from both the patient and student was used in the development of construct validity of the instrument for capturing the communication dynamics.

When the factor analysis of the structure of this instrument was tested using the principal components analysis (Table 6), only four components were retained. The new component titles were revised to better reflect each components that were as initial sharing of

Table 5: Rotated component matrix of four factors for DCCAC (factor loadings >0.60 retained)

	Component			
	1	2	3	4
<i>Factor 1 caring and sharing of information</i>				
Q12	0.867			
Q13	0.867			
Q14	0.867			
Q15	0.867			
Q16	0.867			
Q18	0.867			
Q25	0.867			
Q26	0.867			
Q35	0.867			
Q36	0.867			
Q37	0.867			
Q38	0.867			
Q40	0.867			
<i>Factor 2 interpersonal interaction and decision making</i>				
Q1		0.933		
Q2		0.933		
Q3		0.933		
Q4		0.921		
Q5		0.921		
Q6		0.913		
Q7		0.858		
Q8		0.841		
Q9		0.841		
Q10		0.839		
Q11		0.770		
Q21		0.754		
Q22		0.605		
<i>Factor 3 building professional relationship</i>				
Q17			0.755	
Q19			0.755	
Q20			0.755	
Q23			0.755	
Q24			0.755	
Q26			0.755	
Q27			0.755	
Q28			0.755	
Q29			0.755	
Q30			0.755	
Q39			0.667	
<i>Factor 4 planning</i>				
Q31				0.912
Q33				0.912
Q34				0.912

information, interpersonal communication and decision making, building professional relationship and planning.

Given that patients make up half of the dentist–patient relationship, patient perspectives are of considerable worth in

designing communication assessment tools.² A further major flaw identified in assessment tools prior to 2010 is that they failed to acknowledge the patient’s perspectives as part of the evaluation or even as a part of the validation of the tools used.¹⁶ In our study,

Table 6: Cronbach's alpha (CA) for the original domains and new domains derived by factor analysis

Initial domain title	CA	Number of items	New domain title	CA	Number of items
1 Initiating session	0.959	8	1 Initial sharing of information	0.975	13
2 Gathering information	0.954	11	2 Interpersonal communication and decision making	1.000	13
3 Oral examination	0.829	3	3 Building professional relationship	0.996	11
4 Providing structure	0.980	3	4 Planning	1.000	3
5 Building relationship	0.884	9			
6 Explanation and planning	0.947	5			
7 Closing session	Cronbach's alpha can't be obtained	1			
Total		40			40

Table 7: Effectiveness of the intervention (Kirkpatrick level II—students' self-rating of their learning): comparison of students rating of their own communication skills before and after the training program ($n = 87$)

Questionnaire items	Before mean (SD)	After mean (SD)	t value	Cohen's d
Q1 Provides structure to discussions with patients	3.51 (0.716)	4.02 (0.625)	-5.43*	0.75
Q2 Helps build rapport with patients	3.21 (0.739)	3.89 (0.721)	-3.08*	0.93
Q3 Helps recognize patients' verbal cues	3.48 (0.720)	3.98 (0.681)	-4.70*	0.71
Q4 Helps recognize patients' nonverbal cues	3.26 (0.801)	4.02 (0.797)	-4.85*	0.95
Q5 Helps decrease patient anxiety	3.12 (0.989)	4.00 (0.830)	-4.43*	0.96
Q6 Increases accuracy of history taking	3.23 (0.751)	3.53 (0.753)	-3.97*	0.40
Q7 Listens attentively, not interrupting, allowing patient time	3.43 (0.721)	3.85 (0.795)	-4.10*	0.55
Q8 Provides appropriate type and amount of information to patients	3.49 (0.738)	4.10 (0.678)	-5.50*	0.86
Q9 Helps explore patients' perspectives relative to treatment preferences	3.39 (0.991)	4.18 (0.797)	-4.85*	0.87
Q10 Helps negotiate a mutually acceptable treatment plan	3.65 (0.726)	4.12 (0.785)	-4.64*	0.62
Q11 Helps relate to patients' concerns and desires	3.57 (0.716)	4.10 (0.740)	-4.75*	0.72
Q12 Helps motivate patients	3.08 (0.984)	3.99 (0.874)	-4.63*	0.97
Q13 Helps manage patients' concerns regarding undesirable outcome	3.19 (0.880)	3.75 (0.791)	-4.32*	0.70

* $p < 0.001$ each item rated (1 = very low, 5 = very high)

patient's perspective was captured by obtaining their feedback on student performance through a questionnaire using a three-point Likert scale.

Limitations and Recommendations for Future Research

As instrument development is an iterative process, further studies should be conducted on a larger cohort in other dental disciplines and for intraoral examination. Besides using DCCAC for self-assessment and peer-assessment, preceptors could use DCCAC to evaluate students' clinical competency. Thus, future studies could explore the inter-rater reliability of the DCCAC when used by preceptors to examine the relationship between perceived and actual competence, which would further strengthen the convergent validity of the DCCAC. In addition, patients can be involved to obtain

their feedback on extent of their experience being patient-centered to further validate the construct of the DCCAC.

CONCLUSION

In order to facilitate the integration of communication skills training components into undergraduate dental curriculum and initiate institutional changes, overcoming dentist-centric culture is an important component. The product that has emerged from the development and psychometric testing of DCCAC for undergraduate dental students has the potential to be used as a valid tool to assess the dental undergraduate students during a patient interview and provide specific and formative feedback to enhance the comprehensive clinical learning experience. A detailed description of the process is also expected to help and encourage

other dental educators to develop other instruments of clinical performance assessment and validate them.

CLINICAL SIGNIFICANCE

Patients have better health outcomes when the provider is a good communicator with the ability to understand the patient's perspective in terms of needs, preferences, and values to guide the clinical decisions for effective patient-centered care. Dental Consultation Communication Assessment Checklist functions as a tool for developing the skills of self-reflection and feedback in clinical skills learning and assessment.

REFERENCES

1. Maguire P, Pitceathly C. Key communication skills and how to acquire them. *BMJ* 2002;325(7366):697–700. DOI: 10.1136/bmj.325.7366.697.
2. Wener ME, Schönwetter DJ, Mazurat N. Developing new dental communication skills assessment tools by including patients and other stakeholders. *J Dent Educ* 2011;75(12):1527–1541.
3. Yoshida T, Milgrom P, Coldwell S. How do U.S. and Canadian dental schools teach interpersonal communication skills? *J Dent Educ* 2002;66(11):1281–1288.
4. Hargie O, Dickson D, Boohan M, et al. A survey of communication skills training in UK schools of medicine: present practices and prospective proposals. *Med Educ* 1998;32(1):25–34. DOI: 10.1046/j.1365-2923.1998.00154.x.
5. Theaker E, Kay E, Gill S. Development and preliminary evaluation of an instrument designed to assess dental students' communication skills. *Br Dent J* 2000;188(1):40–44. DOI: 10.1038/sj.bdj.4800382.
6. Rider EA, Hinrichs MM, Lown BA. A model for communication skills assessment across the undergraduate curriculum. *Med Teach* 2006;28(5):e127–e134. DOI: 10.1080/01421590600726540.
7. Haak R, Rosenbohm J, Koerfer A, et al. The effects of undergraduate education in communication skills: a randomized controlled clinical trial. *Eur J Dent Educ* 2008;12(4):213–318. DOI: 10.1111/j.1600-0579.2008.00521.x.
8. Hottel TL, Hardigan PC. Improvement in the interpersonal communication skills of dental students. *J Dent Educ* 2005;69(2):281–284.
9. Logan HL, Muller PJ, Edwards Y, et al. Using standardized patients to assess presentation of a dental treatment plan. *J Dent Educ* 1999;63(10):729–737.
10. Johnson JA, Kopp KC. Effectiveness of standardized patient instruction. *J Dent Educ* 1996;60(3):262–266.
11. Kopp KC, Johnson JA. Checklist agreement between standardized patients and faculty. *J Dent Educ* 1995;59(8):824–829.
12. Sangappa SB, Tekian A. Communication skills course in an Indian undergraduate dental curriculum: a randomized controlled trial. *J Dent Educ* 2013;77(8):1092–1098.
13. Wynd CA, Schmidt BA, Schaefer MA. Two quantitative approaches for estimating content validity. *West J Nurs Res* 2003;25(5):508–518. DOI: 10.1177/0193945903252998.
14. Kurtz S, Silverman J, Benson J, et al. Marrying content and process in clinical method teaching: enhancing the Calgary-Cambridge guides. *Acad Med* 2003;78(8):802–809. DOI: 10.1097/00001888-200308000-00011.
15. Assessment of communication skills among dental students: a narrative review. Available at <http://kateamos.com/assessment-of-communication-skills-among-dental-students-a-narrative-review/>.
16. Carey JA, Madill A, Manogue M. Communication skills in dental education: a systematic research review. *Eur J Dent Educ* 2010;14(2):69–78. DOI: 10.1111/j.1600-0579.2009.00586.x.
17. Schirmer J, Mauksch L, Lang F, et al. Assessing communication competence: a review of current tools. *Fam Med* 2005;37(3):184–192.
18. Regehr G, MacRae H, Reznick R, et al. Comparing the psychometric properties of checklists and global rating scales for assessing performance on an OSCE-format examination. *Acad Med* 1998;73(9):993–997. DOI: 10.1097/00001888-199809000-00020.
19. Schönwetter DJ, Wener ME, Mazurat N. Determining the validity and reliability of clinical communication assessment tools for dental patients and students. *J Dent Educ* 2012;76(10):1276–1290.
20. Silverman JD, Kurtz SM, Draper J. *Skills for Communicating with Patients*, 3rd ed. Oxford: Radcliffe Publishing; 2013.
21. Lynn MR. Determination and quantification of content validity. *Nurs Res* 1986;35(6):382–385. DOI: 10.1097/00006199-198611000-00017.
22. Al Odhayani A, Ratnapalan S. Teaching communication skills. *Can Fam Physician* 2011;57(10):1216–1218.