RESEARCH PAPER

Knowledge, Attitude and Practice towards Guided Surgery: A Questionnaire-Based Study among Dental Practitioners

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ABSTRACT

Background: Guided surgery combines three-dimensional imaging, virtual treatment planning, and additive manufacturing to fabricate patient-specific surgical templates. It has gained widespread application in implant, temporomandibular joint, orthognathic, oncologic, and endodontic surgeries. However, its successful implementation depends on clinicians' knowledge, attitude, and practice, which remain inadequately explored among dental practitioners in central India.

Aim: To assess the knowledge, attitude, and practice of dental practitioners towards guided surgery.

Materials and Methods: A cross-sectional questionnaire-based study was conducted among 204 dental practitioners in Chhattisgarh, India. A structured questionnaire comprising seven items assessed knowledge, attitude, and practice regarding guided surgery among Bachelor of Dental Surgery (BDS) and Master of Dental Surgery (MDS) professionals. Associations with qualification, gender, and years of professional experience were analysed using the chi-square test, with $p<0.05$ considered statistically significant.

Results: Of the 204 participants, 114 (55.9%) were MDS and 90 (44.1%) were BDS graduates. Knowledge of guided surgery was significantly higher among MDS participants ($P=0.003$). Qualification was significantly associated with perceived usefulness of guided surgery in implant, temporomandibular joint, orthognathic, oncologic, endodontic, and periapical surgeries ($P\leq0.006$), perceived contribution of 3D printing ($P=0.001$) and combined 3D imaging with 3D printing ($P<0.001$), confidence in personal skills ($P<0.001$), patients' willingness ($P=0.008$), and the need to update knowledge and skills ($P<0.001$). Professional experience showed significant associations with knowledge and most practice-related variables, whereas gender demonstrated no significant association except for confidence in personal skills ($P=0.013$).

Conclusion: MDS qualification and greater professional experience were associated with better knowledge and more favourable perceptions of guided surgery. Continuous education and training may improve its adoption in routine dental practice.

Keywords: Guided surgery; computer-assisted surgery; static computer-assisted implant surgery; dental practitioners; knowledge, attitude and practice.

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INTRODUCTION

Over the past two decades, digital technology has transformed the planning and execution of surgical procedures across the dental specialties. Computer-assisted, or "guided," surgery integrates three-dimensional imaging, virtual treatment planning, and additive manufacturing (3D printing) to translate a preoperative digital plan into a physical surgical guide or template that directs osteotomy, drilling, or implant placement with a precision that free-hand techniques cannot reliably reproduce [1,2]. Static computer-assisted implant surgery (s-CAIS), which uses a tooth-, mucosa-, or bone-supported template fabricated from a fused cone-beam computed

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tomography (CBCT) and intraoral scan dataset, together with dynamic navigation systems that provide real-time optical tracking of the drill, constitute the two principal technological pathways of guided implant surgery. Systematic reviews and meta-analyses have consistently shown that both pathways substantially improve the accuracy of implant positioning compared with conventional free-hand placement [1,2].

The scope of guided-surgery applications, however, extends well beyond implant dentistry. In temporomandibular joint (TMJ) surgery, patient-specific three-dimensional printed cutting guides derived from virtual surgical planning are increasingly used to define resection margins and prosthesis position in the management of ankylosis and other severe joint pathology [3]. In orthognathic surgery, three-dimensional virtual surgical planning with CAD/CAM-fabricated splints and guides has replaced conventional two-dimensional cephalometric planning in many centres, with systematic reviews reporting sub-millimetre accuracy of the transferred surgical plan [4]. In head and neck oncologic reconstruction, virtual surgical planning allows the ablative and reconstructive teams to design resection and fibula-cutting guides before the patient enters the operating room, improving the accuracy of bony cuts and facilitating immediate dental rehabilitation [5]. Guided approaches have also been adapted for endodontic surgery and non-surgical retreatment, where static and dynamic navigation templates assist in locating calcified canals and performing apicoectomy and root-end resection with reported gains in precision over free-hand access [6].

Data on the knowledge, attitude, and practice of dental practitioners in India towards guided surgery, particularly outside major metropolitan academic centres, remain limited. The present cross-sectional questionnaire-based study was therefore undertaken to determine the knowledge, attitude, and practice towards guided surgery among dental practitioners in Chhattisgarh, and to examine how these parameters varied with qualification, gender, and years of professional experience.

MATERIALS AND METHODS

Study design and setting

This cross-sectional, questionnaire-based study was conducted among dental professionals practicing in the state of Chhattisgarh, India. Ethical clearance was obtained from the Institutional Ethics Committee prior to the start of data collection and the study was conducted in accordance with the principles of the Declaration of Helsinki. Participation was voluntary, and informed consent was obtained from all participants before enrolment.

Study population

A total of 204 dental professionals holding either a Bachelor of Dental Surgery (BDS) or Master of Dental Surgery (MDS) qualification, and currently engaged in clinical practice or postgraduate training in Chhattisgarh, were enrolled using a convenience sampling technique.

Questionnaire

Knowledge, attitude, and practice towards guided surgery were assessed using a structured, self-administered questionnaire comprising seven items (Q1–Q7). Q1 assessed overall knowledge of guided surgery on a five-point ordinal scale (not at all to definitely yes). Q2 assessed the perceived usefulness of guided surgery across six clinical applications — implant surgery (Q2A), TMJ surgery (Q2B), orthognathic surgery (Q2C), onco surgery (Q2D), endodontics (Q2E), and periapical surgery (Q2F) — each rated on a five-point frequency scale (never/seldom to almost always). Q3 assessed the perceived contribution of technological innovations, namely 3D imaging (Q3A), 3D printing (Q3B), the combined use of both (Q3C), and neither technology (Q3D). Items Q4 through Q7 assessed perceived barriers to the adoption of guided surgery — confidence in personal skill, cost of guided surgery, patients' unwillingness, and the need to update knowledge and skills, respectively — each rated on a five-point Likert agreement scale (strongly disagree to strongly agree); for consolidated presentation, these four barrier items are reported together in the results tables as Q4A–D.

Statistical analysis

Data were entered into a spreadsheet and analysed using SPSS statistical software (IBM Corp., Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages. The association between questionnaire responses and qualification (BDS vs MDS), gender (male vs female), and years of professional experience (<5, 5–10, and >10 years) was assessed using the chi-square test. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Among the 204 participants, 114 were MDS graduates and 90 were BDS graduates. Male participants were more than female participants. With respect to professional experience, the majority of participants had less than 5 years of experience and only few had more than 10 years of experience. (Figure 1).

The association between qualification and the questionnaire items (Table 1) showed that knowledge of guided surgery (Q1) differed significantly between BDS and MDS participants (P=0.003). Significant associations were also observed for the perceived usefulness of guided surgery in implant surgery (Q2A, P=0.006), TMJ surgery (Q2B, P<0.001), orthognathic surgery (Q2C, P<0.001), onco surgery (Q2D, P<0.001), endodontics (Q2E, P<0.001), and periapical surgery (Q2F, P=0.002). Regarding technological innovations, no significant association was observed for 3D imaging (Q3A, P=0.083), whereas significant associations were found for 3D printing (Q3B, P=0.001), both 3D imaging and 3D printing (Q3C, P<0.001), and neither technology (Q3D, P<0.001). Among the perceived barriers to adopting guided surgery, confidence in personal skill (Q4A, P<0.001), patients' unwillingness (Q4C, P=0.008), and the need to update knowledge and skills (Q4D, P<0.001) were significantly associated with qualification, whereas the cost of guided surgery (Q4B, P=0.229) was not.

The association between gender and the questionnaire items (Table 2) demonstrated no statistically significant differences for knowledge of guided surgery (Q1, P=0.221), perceived usefulness in implant surgery (Q2A, P=0.530), TMJ surgery (Q2B, P=0.644), orthognathic surgery (Q2C, P=0.497), onco surgery (Q2D, P=0.254), endodontics (Q2E, P=0.138), periapical surgery (Q2F, P=0.691), contribution of 3D imaging (Q3A, P=0.411), 3D printing (Q3B, P=0.549), both technologies (Q3C, P=0.091), neither technology (Q3D, P=0.414), cost of guided surgery (Q4B, P=0.091), patients' unwillingness (Q4C, P=0.691), or the need to update knowledge and skills (Q4D, P=0.928). A statistically significant association was observed only for confidence in personal skill as a barrier to adopting guided surgery (Q4A, P=0.013).

The association between years of professional experience and the questionnaire items (Table 3) revealed statistically significant differences in knowledge of guided surgery (Q1, P=0.001). Significant associations were also observed for the perceived usefulness of guided surgery in implant surgery (Q2A, P=0.042), TMJ surgery (Q2B, P=0.001), orthognathic surgery (Q2C, P=0.019), onco surgery (Q2D, P<0.001), and endodontics (Q2E, P<0.001), whereas no significant association was found for periapical surgery (Q2F, P=0.123). The perceived contribution of 3D imaging (Q3A, P<0.001), 3D printing (Q3B, P=0.012), both 3D imaging and 3D printing (Q3C, P<0.001), and neither technology (Q3D, P=0.002) were all significantly associated with years of experience. Similarly, confidence in personal skill (Q4A, P<0.001), cost of guided surgery (Q4B, P<0.001), patients' unwillingness (Q4C, P=0.003), and the need to update knowledge and skills (Q4D, P=0.003) showed statistically significant associations with professional experience.

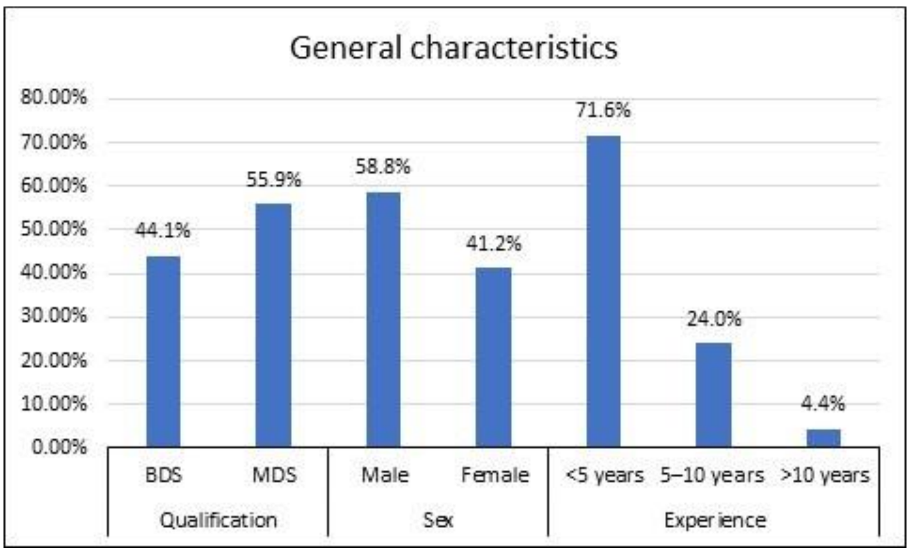

Figure 1. Distribution of Qualification, Gender and Experience of the study participants

Table 1. Association of Qualification with Questionnaire Items

Questionnaire Item	Sub-item	Response	BDS (n=90)	MDS (n=114)	P value
Q1. Knowledge of guided surgery	-	Not at all	3 (3.3%)	0 (0.0%)	0.003
		Slightly	43 (47.8%)	37 (32.5%)	
		Somewhat	29 (32.2%)	37 (32.5%)	
		Moderately	11 (12.2%)	18 (15.8%)	
		Definitely yes	4 (4.4%)	22 (19.3%)	
Q2. Usefulness	**Implant surgery**	Seldom	0 (0.0%)	1 (0.9%)	0.006
		Sometimes	14 (15.6%)	30 (26.3%)	
		Often	46 (51.1%)	33 (28.9%)	
		Almost always	30 (33.3%)	50 (43.9%)	
	TMJ surgery	Seldom	0 (0.0%)	9 (7.9%)	0.000
		Sometimes	13 (14.4%)	47 (41.2%)	
		Often	49 (54.4%)	42 (36.8%)	
		Almost always	28 (31.1%)	16 (14.0%)	

	Orthognathic surgery	Never	1 (1.1%)	1 (0.9%)	0.000
		Seldom	2 (2.2%)	13 (11.4%)	
		Sometimes	19 (21.1%)	47 (41.2%)	
		Often	48 (53.3%)	37 (32.5%)	
		Almost always	20 (22.2%)	16 (14.0%)	
	Onco surgery	Never	3 (3.3%)	7 (6.1%)	0.000
		Seldom	4 (4.4%)	24 (21.1%)	
		Sometimes	16 (17.8%)	33 (28.9%)	
		Often	51 (56.7%)	25 (21.9%)	
		Almost always	16 (17.8%)	25 (21.9%)	
	Endodontics	Never	2 (2.2%)	4 (3.5%)	0.000
		Seldom	10 (11.1%)	36 (31.6%)	
		Sometimes	21 (23.3%)	46 (40.4%)	
		Often	46 (51.1%)	22 (19.3%)	
		Almost always	11 (12.2%)	6 (5.3%)	
	Periapical surgery	Never	3 (3.3%)	4 (3.5%)	0.002
		Seldom	18 (20.0%)	47 (41.2%)	
		Sometimes	24 (26.7%)	36 (31.6%)	
		Often	37 (41.1%)	23 (20.2%)	
		Almost always	8 (8.9%)	4 (3.5%)	
Q3. Contribution of technology	**3D Imaging**	Never	1 (1.1%)	2 (1.8%)	0.083
		Seldom	3 (3.3%)	2 (1.8%)	
		Sometimes	10 (11.1%)	24 (21.1%)	
		Often	37 (41.1%)	29 (25.4%)	
		Almost always	39 (43.3%)	57 (50.0%)	
	3D Printing	Never	1 (1.1%)	2 (1.8%)	0.001
		Seldom	2 (2.2%)	17 (14.9%)	
		Sometimes	21 (23.3%)	37 (32.5%)	
		Often	29 (32.2%)	37 (32.5%)	
		Almost always	37 (41.1%)	21 (18.4%)	
	Both 3D Imaging & Printing	Never	1 (1.1%)	4 (3.5%)	0.000
		Seldom	24 (26.7%)	12 (10.5%)	
		Sometimes	19 (21.1%)	46 (40.4%)	
		Often	29 (32.2%)	18 (15.8%)	
		Almost always	17 (18.9%)	34 (29.8%)	
	Neither	Never	70 (77.8%)	90 (78.9%)	0.000
		Seldom	7 (7.8%)	6 (5.3%)	
		Sometimes	1 (1.1%)	17 (14.9%)	
		Often	11 (12.2%)	1 (0.9%)	
		Almost always	1 (1.1%)	0 (0.0%)	
Q4. Barrier	**Confidence in personal skill**	Strongly disagree	3 (3.3%)	11 (9.6%)	0.000
		Disagree	11 (12.2%)	31 (27.2%)	
		Undecided	15 (16.7%)	32 (28.1%)	
		Agree	54 (60.0%)	18 (15.8%)	
		Strongly agree	7 (7.8%)	22 (19.3%)	
	Cost of guided surgery	Strongly disagree	1 (1.1%)	0 (0.0%)	0.229
		Disagree	2 (2.2%)	0 (0.0%)	
		Undecided	5 (5.6%)	5 (4.4%)	
		Agree	44 (48.9%)	67 (58.8%)	
		Strongly agree	38 (42.2%)	42 (36.8%)	
	Patient's unwillingness	Disagree	7 (7.8%)	2 (1.8%)	0.008
		Undecided	4 (4.4%)	16 (14.0%)	
		Agree	41 (45.6%)	62 (54.4%)	
		Strongly agree	38 (42.2%)	34 (29.8%)	
	Need to update knowledge/skills	Strongly disagree	0 (0.0%)	4 (3.5%)	0.000
		Disagree	1 (1.1%)	10 (8.8%)	

		Undecided	5 (5.6%)	32 (28.1%)	
		Agree	67 (74.4%)	52 (45.6%)	
		Strongly agree	17 (18.9%)	16 (14.0%)	

Table 2. Association of Gender with Questionnaire Items

Questionnaire Item	Sub-item	Response	Male (n=120)	Female (n=84)	P value
Q1. Knowledge of guided surgery	-	Not at all	3 (2.5%)	0 (0.0%)	0.221
		Slightly	50 (41.7%)	30 (35.7%)	
		Somewhat	40 (33.3%)	26 (31.0%)	
		Moderately	16 (13.3%)	13 (15.5%)	
		Definitely yes	11 (9.2%)	15 (17.9%)	
Q2. Usefulness	**Implant surgery**	Seldom	0 (0.0%)	1 (1.2%)	0.530
		Sometimes	27 (22.5%)	17 (20.2%)	
		Often	49 (40.8%)	30 (35.7%)	
		Almost always	44 (36.7%)	36 (42.9%)	
	TMJ surgery	Seldom	6 (5.0%)	3 (3.6%)	0.644
		Sometimes	34 (28.3%)	26 (31.0%)	
		Often	57 (47.5%)	34 (40.5%)	
		Almost always	23 (19.2%)	21 (25.0%)	
	Orthognathic surgery	Never	1 (0.8%)	1 (1.2%)	0.497
		Seldom	11 (9.2%)	4 (4.8%)	
		Sometimes	40 (33.3%)	26 (31.0%)	
		Often	51 (42.5%)	34 (40.5%)	
		Almost always	17 (14.2%)	19 (22.6%)	
	Onco surgery	Never	6 (5.0%)	4 (4.8%)	0.254
		Seldom	17 (14.2%)	11 (13.1%)	
		Sometimes	29 (24.2%)	20 (23.8%)	
		Often	50 (41.7%)	26 (31.0%)	
		Almost always	18 (15.0%)	23 (27.4%)	
	Endodontics	Never	1 (0.8%)	5 (6.0%)	0.138
		Seldom	32 (26.7%)	14 (16.7%)	
		Sometimes	38 (31.7%)	29 (34.5%)	
		Often	40 (33.3%)	28 (33.3%)	
		Almost always	9 (7.5%)	8 (9.5%)	
	Periapical surgery	Never	4 (3.3%)	3 (3.6%)	0.691
		Seldom	39 (32.5%)	26 (31.0%)	
		Sometimes	31 (25.8%)	29 (34.5%)	
		Often	39 (32.5%)	21 (25.0%)	
		Almost always	7 (5.8%)	5 (6.0%)	
Q3. Contribution of technology	**3D Imaging**	Never	2 (1.7%)	1 (1.2%)	0.411
		Seldom	3 (2.5%)	2 (2.4%)	
		Sometimes	24 (20.0%)	10 (11.9%)	
		Often	41 (34.2%)	25 (29.8%)	
		Almost always	50 (41.7%)	46 (54.8%)	

	3D Printing	Never	3 (2.5%)	0 (0.0%)	0.549
		Seldom	11 (9.2%)	8 (9.5%)	
		Sometimes	36 (30.0%)	22 (26.2%)	
		Often	39 (32.5%)	27 (32.1%)	
		Almost always	31 (25.8%)	27 (32.1%)	
	Both 3D Imaging & Printing	Never	5 (4.2%)	0 (0.0%)	0.091
		Seldom	25 (20.8%)	11 (13.1%)	
		Sometimes	40 (33.3%)	25 (29.8%)	
		Often	25 (20.8%)	22 (26.2%)	
		Almost always	25 (20.8%)	26 (31.0%)	
	Neither	Never	93 (77.5%)	67 (79.8%)	0.414
		Seldom	6 (5.0%)	7 (8.3%)	
		Sometimes	13 (10.8%)	5 (6.0%)	
		Often	8 (6.7%)	4 (4.8%)	
		Almost always	0 (0.0%)	1 (1.2%)	
Q4. Barrier	**Confidence in personal skill**	Strongly disagree	14 (11.7%)	0 (0.0%)	0.013
		Disagree	25 (20.8%)	17 (20.2%)	
		Undecided	25 (20.8%)	22 (26.2%)	
		Agree	37 (30.8%)	35 (41.7%)	
		Strongly agree	19 (15.8%)	10 (11.9%)	
	Cost of guided surgery	Strongly disagree	1 (0.8%)	0 (0.0%)	0.091
		Disagree	0 (0.0%)	2 (2.4%)	
		Undecided	6 (5.0%)	4 (4.8%)	
		Agree	72 (60.0%)	39 (46.4%)	
		Strongly agree	41 (34.2%)	39 (46.4%)	
	Patient's unwillingness	Disagree	4 (3.3%)	5 (6.0%)	0.691
		Undecided	11 (9.2%)	9 (10.7%)	
		Agree	64 (53.3%)	39 (46.4%)	
		Strongly agree	41 (34.2%)	31 (36.9%)	
	Need to update knowledge/skills	Strongly disagree	3 (2.5%)	1 (1.2%)	0.928
		Disagree	7 (5.8%)	4 (4.8%)	
		Undecided	20 (16.7%)	17 (20.2%)	
		Agree	70 (58.3%)	49 (58.3%)	
		Strongly agree	20 (16.7%)	13 (15.5%)	

Table 3. Association of Experience with Questionnaire Items

Questionnaire Item	Sub-item	Response	<5 years (n=146)	5-10 years (n=49)	>10 years (n=9)	P value
Q1. Knowledge of guided surgery	-	Not at all	2 (1.4%)	1 (2.0%)	0 (0.0%)	0.001
		Slightly	45 (30.8%)	34 (69.4%)	1 (11.1%)	
		Somewhat	52 (35.6%)	12 (24.5%)	2 (22.2%)	
		Moderately	25 (17.1%)	2 (4.1%)	2 (22.2%)	
		Definitely yes	22 (15.1%)	0 (0.0%)	4 (44.4%)	
Q2. Usefulness	**Implant surgery**	Seldom	1 (0.7%)	0 (0.0%)	0 (0.0%)	0.042
		Sometimes	34 (23.3%)	7 (14.3%)	3 (33.3%)	

		Often	45 (30.8%)	32 (65.3%)	2 (22.2%)	
		Almost always	66 (45.2%)	10 (20.4%)	4 (44.4%)	
	TMJ surgery	Seldom	9 (6.2%)	0 (0.0%)	0 (0.0%)	0.001
		Sometimes	51 (34.9%)	5 (10.2%)	4 (44.4%)	
		Often	52 (35.6%)	36 (73.5%)	3 (33.3%)	
		Almost always	34 (23.3%)	8 (16.3%)	2 (22.2%)	
	Orthognathic surgery	Never	1 (0.7%)	0 (0.0%)	1 (11.1%)	0.019
		Seldom	14 (9.6%)	1 (2.0%)	0 (0.0%)	
		Sometimes	50 (34.2%)	15 (30.6%)	1 (11.1%)	
		Often	54 (37.0%)	27 (55.1%)	4 (44.4%)	
		Almost always	27 (18.5%)	6 (12.2%)	3 (33.3%)	
	Onco surgery	Never	8 (5.5%)	0 (0.0%)	2 (22.2%)	0.000
		Seldom	25 (17.1%)	3 (6.1%)	0 (0.0%)	
		Sometimes	37 (25.3%)	10 (20.4%)	2 (22.2%)	
		Often	40 (27.4%)	33 (67.3%)	3 (33.3%)	
		Almost always	36 (24.7%)	3 (6.1%)	2 (22.2%)	
	Endodontics	Never	6 (4.1%)	0 (0.0%)	0 (0.0%)	0.000
		Seldom	41 (28.1%)	2 (4.1%)	3 (33.3%)	
		Sometimes	53 (36.3%)	11 (22.4%)	3 (33.3%)	
		Often	35 (24.0%)	32 (65.3%)	1 (11.1%)	
		Almost always	11 (7.5%)	4 (8.2%)	2 (22.2%)	
	Periapical surgery	Never	7 (4.8%)	0 (0.0%)	0 (0.0%)	0.123
		Seldom	51 (34.9%)	12 (24.5%)	2 (22.2%)	
		Sometimes	45 (30.8%)	12 (24.5%)	3 (33.3%)	
		Often	34 (23.3%)	23 (46.9%)	3 (33.3%)	
		Almost always	9 (6.2%)	2 (4.1%)	1 (11.1%)	
Q3. Contribution of technology	**3D Imaging**	Never	2 (1.4%)	0 (0.0%)	1 (11.1%)	0.000
		Seldom	3 (2.1%)	2 (4.1%)	0 (0.0%)	
		Sometimes	26 (17.8%)	8 (16.3%)	0 (0.0%)	
		Often	33 (22.6%)	32 (65.3%)	1 (11.1%)	
		Almost always	82 (56.2%)	7 (14.3%)	7 (77.8%)	
	3D Printing	Never	2 (1.4%)	0 (0.0%)	1 (11.1%)	0.012
		Seldom	18 (12.3%)	1 (2.0%)	0 (0.0%)	
		Sometimes	40 (27.4%)	17 (34.7%)	1 (11.1%)	
		Often	45 (30.8%)	20 (40.8%)	1 (11.1%)	
		Almost always	41 (28.1%)	11 (22.4%)	6 (66.7%)	
	Both 3D Imaging & Printing	Never	4 (2.7%)	0 (0.0%)	1 (11.1%)	0.000
		Seldom	15 (10.3%)	21 (42.9%)	0 (0.0%)	
		Sometimes	51 (34.9%)	13 (26.5%)	1 (11.1%)	
		Often	32 (21.9%)	14 (28.6%)	1 (11.1%)	
		Almost always	44 (30.1%)	1 (2.0%)	6 (66.7%)	
	Neither	Never	113 (77.4%)	40 (81.6%)	7 (77.8%)	0.002
		Seldom	10 (6.8%)	3 (6.1%)	0 (0.0%)	
		Sometimes	18 (12.3%)	0 (0.0%)	0 (0.0%)	
		Often	5 (3.4%)	6 (12.2%)	1 (11.1%)	
		Almost always	0 (0.0%)	0 (0.0%)	1 (11.1%)	
Q4. Barrier	**Confidence in personal skill**	Strongly disagree	12 (8.2%)	2 (4.1%)	0 (0.0%)	0.000
		Disagree	35 (24.0%)	6 (12.2%)	1 (11.1%)	
		Undecided	39 (26.7%)	5 (10.2%)	3 (33.3%)	
		Agree	34 (23.3%)	34 (69.4%)	4 (44.4%)	
		Strongly agree	26 (17.8%)	2 (4.1%)	1 (11.1%)	
	Cost of guided surgery	Strongly disagree	0 (0.0%)	0 (0.0%)	1 (11.1%)	0.000
		Disagree	0 (0.0%)	0 (0.0%)	2 (22.2%)	
		Undecided	8 (5.5%)	1 (2.0%)	1 (11.1%)	
		Agree	75 (51.4%)	32 (65.3%)	4 (44.4%)	

		Strongly agree	63 (43.2%)	16 (32.7%)	1 (11.1%)	
	Patient's unwillingness	Disagree	5 (3.4%)	1 (2.0%)	3 (33.3%)	0.003
		Undecided	18 (12.3%)	1 (2.0%)	1 (11.1%)	
		Agree	71 (48.6%)	29 (59.2%)	3 (33.3%)	
		Strongly agree	52 (35.6%)	18 (36.7%)	2 (22.2%)	
	Need to update knowledge/skills	Strongly disagree	4 (2.7%)	0 (0.0%)	0 (0.0%)	0.003
		Disagree	11 (7.5%)	0 (0.0%)	0 (0.0%)	
		Undecided	34 (23.3%)	3 (6.1%)	0 (0.0%)	
		Agree	72 (49.3%)	42 (85.7%)	5 (55.6%)	
		Strongly agree	25 (17.1%)	4 (8.2%)	4 (44.4%)	

DISCUSSION

The present study demonstrated a generally favourable level of knowledge of guided surgery among dental practitioners in Chhattisgarh, with a majority of respondents reporting at least moderate familiarity with the technology and endorsing its usefulness across a range of clinical applications. This pattern mirrors that reported in comparable KAP surveys from other regions: among Saudi Arabian dental practitioners, an overwhelming majority reported knowledge of 3D printing technology, although actual clinical uptake remained more modest [7], and a Karnataka-based cross-sectional study of Indian dental practitioners and technicians similarly reported very high self-reported knowledge of 3D printing applications, with implant surgical guides representing one of the most familiar applications [8]. In the present cohort, MDS-qualified specialists demonstrated significantly greater knowledge and perceived usefulness of guided surgery than BDS graduates across almost every clinical application assessed, a finding consistent with a structural-equation-modelling analysis of Chinese dentists in Jiangsu province in which higher baseline knowledge was directly associated with a more positive attitude, and in turn with greater self-reported practice, of digital dental technologies [9]. Years of clinical experience similarly emerged as a strong determinant of knowledge and perceived usefulness in the present study, a pattern that has been described in several regional KAP surveys of digital dentistry [9,10].

Perceived usefulness of guided surgery in implant surgery was rated highest among the clinical applications assessed, which is unsurprising given that static and dynamic computer-assisted implant surgery represent the most extensively validated and widely marketed of the guided-surgery workflows, with systematic reviews and meta-analyses consistently demonstrating clinically meaningful improvements in implant-placement accuracy compared with free-hand surgery [1,2]. Usefulness ratings for TMJ, orthognathic, and oncologic applications were comparatively lower and showed wider variation by qualification and experience, which likely reflects both the lower case volume of these procedures in general dental practice and the fact that the underlying evidence base for these applications, while growing, has been generated predominantly within oral and maxillofacial and reconstructive surgery literature rather than in general or restorative dental practice [3–5]. Guided endodontic and periapical applications were rated as least useful overall; this is consistent with the comparatively recent introduction of static and dynamic guided endodontic templates into clinical practice, even though narrative reviews report favourable outcomes for guided access to calcified canals and guided periapical surgery in appropriately selected cases [6,11].

Gender was not significantly associated with knowledge of guided surgery, or with perceived usefulness, across the great majority of items assessed in the present study, the sole exception being confidence in personal skill as a barrier. This largely gender-neutral pattern is in keeping with several international KAP surveys of digital-dentistry technologies, in which qualification and clinical experience, rather than gender, have consistently emerged as the principal determinants of knowledge and adoption [9].

With respect to barriers, cost of guided surgery was endorsed by the majority of respondents regardless of qualification or gender, and was the only barrier item that did not differ significantly by qualification or gender in the present study. This finding is consistent with cost being identified as the leading barrier to digital-technology adoption in a recent multi-country survey of dental professionals in Southeast Asia, in which cost was cited as the primary obstacle to adopting digital workflows across all participating countries [10]. Confidence in personal skill and the perceived need to update knowledge and skills, by contrast, differed significantly by both qualification and experience in the present study, suggesting that structured continuing professional development and hands-on training, rather than equipment cost alone, may be the more actionable lever for improving readiness to adopt guided-surgery workflows among less experienced or BDS-qualified practitioners.

Overall, these findings suggest that while knowledge of guided surgery is now reasonably well established among dental practitioners in this region, translating that knowledge into confident clinical practice will require targeted, experience-stratified training initiatives, particularly for early-career and undergraduate-qualified practitioners, alongside continued efforts to improve the affordability and accessibility of the underlying digital infrastructure.

LIMITATIONS

This cross-sectional design and use of a convenience sample from a single Indian state limit the generalisability of the findings to dental practitioners in other regions.

CONCLUSION

The present study demonstrated a generally favourable level of knowledge and perception regarding guided surgery among dental practitioners. Participants recognised its usefulness across various clinical applications, particularly in implant surgery, and acknowledged the importance of technological innovations such as 3D imaging and 3D printing. Qualification and professional experience significantly influenced knowledge, perceived applications, technological knowledge, and barriers to adopting guided surgery, whereas gender showed minimal influence. Cost, the need to update knowledge and skills, confidence in personal ability, and patient-related factors emerged as important barriers to adoption. These findings emphasise the need for continued education, skill development, and greater accessibility to facilitate the wider implementation of guided surgery in routine dental practice.

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Nil.

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