



ORIGINAL ARTICLE

Evaluation of complacency about dental implants with shared decision making and satisfaction scores: A cross-sectional study



Mohammed A AlSarhan^{a,*}, Razan S. Alaqeely^a, Reham AlJasser^a,
Dalal H Otaibi^a, Saleh AlOraini^a, Ibraheem F. Alshiddi^b

^a Department of Periodontics and Community Dentistry, Dental College, King Saud University, Riyadh, Saudi Arabia

^b Department of Prosthetic Dental Sciences, Dental College, King Saud University, Riyadh, Saudi Arabia

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Abstract Background: The dentist-patient relationship is delicate. Engaging the patient in the dental treatment planning especially for lengthy procedures as dental implants improves the relation as well as treatment outcomes including patient satisfaction. We aimed at evaluating the importance of Shared Decision making (SDM) and level of satisfaction among dental implant patients by employing SDM and satisfaction scores.

Materials & Methods: The present cross-sectional study was pursued between April 2019 to September 2019, among dental implant patients ($n = 144$) who have completed their prosthetic part of implant treatment with at least 3 months of post-restoration evaluation. Demographic and implant data were collected from electronic filing system (Salud) as well as measurement of SDM score. Data were analyzed using SPSS 24.0 version statistical software.

Results: The mean satisfaction score was higher for implant placement with Periodontists (31.9%). However, among surgical specialist the mean satisfaction score was found to be higher for oral surgeons who had 1–5 years of experience (46.5%). Patients reported that their decision making was greatly influenced by the treating dentist. A statistical significance was found where (64.6%) of Implant patients would like to undergo the procedure again ($p < 0.0001$).

Conclusion: Shared decision-making and patient satisfaction enables the treatment delivery to be more effective and ethical, in addition to being patient-centered care.

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* Corresponding author at: 3938 King Saud University, 12372 Riyadh, Saudi Arabia.

E-mail address: malsarhan@ksu.edu.sa (M.A AlSarhan).

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1. Introduction

Patient satisfaction is the focus of current clinical practice (Adler et al., 2016). The availability of a wide range of treatment options has increased the scope for sharing opinions and patient interaction (Elgezawi et al., 2017, Helayl Al Waqdani et al., 2021). Medical decision making, in particular, has four popular models 1) Paternalistic decision making, 2) Interpretative decision making, 3) Informed decision making, and 4) shared decision making (SDM) (Charles et al., 1999). In recent times, SDM model, which emphasizes patients and doctors making decisions together, has become a more popular method within decision-making models (Woodhouse et al., 2017). The 'shared' decision making model reinforce the clinician's responsibility to involve patients, and proactively conceive how these aspects may be used to make suitable clinical decisions. SDM is unique by being a two-way approach for information, where clinician deliver possible treatment options and patient provide his own thoughts toward specific situation, in order to reach proper treatment plan. This is much appreciated in the dental health care wherein the patients share their responsibilities with the clinicians in making the treatment choices and hence gain knowledge about the possible outcomes (Légaré et al., 2012, Pieterse et al., 2011).

In treatments requiring long term patient cooperation and regular follow-up as in dental implants, SDM model is poorly explored and rarely reported (Pieterse et al., 2011) (Alzahrani and Gibson, 2018, AMERICA, 2001, Charles et al., 1997) . For the past few decades, implant dentistry has evolved to a degree where it is now considered as the first choice of therapy to replace missing teeth (Romeo et al., 2004). Despite its functional superiority, different case scenarios involving dental implant procedures may require a careful and personalized process of surgical and prosthetic planning (Légaré and Witteman, 2013). Furthermore, the post-treatment satisfaction and successful long term outcomes is considered a very important aspect for patient's quality of life(Becker et al., 2016). However, patient's decision making for implant therapies are influenced by several factors like esthetic or functional position of implant placement, confounding health care needs of the patient and cost. (Pommer et al., 2011)

Decision making by dentists offering an implant is based on multiple determinants like commercial, legal, and professional obligations in addition to patient preference and affordability(Oshima Lee and Emanuel, 2013). Individual's oral hygiene, appearance and demographic details, and anxiety towards the procedures involved also influence the dentist's decision for choosing an implant replacement(Al Baker et al., 2016, Wyne et al., 2017, Khalaf et al., 2021). Thus, the dentist-patient interaction during the process of providing dental implant replacements is of utmost importance for the overall management and decision making. However, there is a paucity of research in identifying SDM assessment during such type of procedures (Alzahrani and Gibson, 2018). The objective of the present cross-sectional study was to evaluate SDM and satisfaction among patients who received dental implants and identify patients/dentist characteristic related.

2. Materials and methods

2.1. Ethical approval

The study was pursued as a cross-sectional survey, in the department of periodontology, College of Dentistry, King Saud University and approved by the research ethics committee (KSUMC-E194197).

2.2. Sampling frame

The sample size was calculated based on an assumed statistical power of 0.8, confidence level of 95% ($p < 0.05$), and 5% confidence interval. A stratified random sample of 209 participants were recruited through record screening from the Implant center at King Saud University dental hospital. The patients qualifying the inclusion and exclusion criteria were contacted through telephonic conversation.

Inclusion criteria:

1. Patients above 18 years old of both genders who have received dental implants
2. Patients who have finished the prosthetic part with at least 3 months of post-restoration evaluation between April 2019 to September 2019.

Exclusion criteria:

1. Medically ill patient that need advanced care or unable to continue treatment.
2. Patients with history of psychological disturbance, brain surgery, or abdominal neurologic function or advanced reconstruction surgical procedures were excluded.

2.3. Data collection

Patients who satisfied the inclusion criteria were contacted by phone and those who were willing to complete the phone call questionnaire were included in the study. The patients received a verbal explanation of the aim of this study and the significance of their participation, and a verbal consent was recorded. Demographic and implant data were collected from electronic filing system (Salud Two-Ten Health Limited, Ireland).

2.4. Research instrument

The questionnaire was divided into 3 parts,

- The first section was recording and updating demographics of the study sample including age, gender, nationality, employment status and educational level.
- Shared decision making (SDM) questions (Kriston et al., 2010a) were constructed to cover 8 statements with a 5-point Likert scale. Decision making variables included the patients' perception of their treating dentist and the treatment process. Patients were asked to rate their dentist participatory decision style using the following questions: 1) "If different treatment options were given and discussed? 2) "If they know about problem they had and the consequences of

it; and 3) “if the advantages and disadvantages of different treatment modalities were discussed”. The questionnaire was partially adapted from 9 to item Shared Decision-Making Questionnaire and adjusted to be specific for dental implant

- Furthermore, the validated questionnaire also assessed the patient satisfaction during implant treatment as part of oral Health Impact Profile-14(Al-Jundi et al., 2007).

2.5. Data analysis

Data were analyzed using SPSS (24.0 version) statistical software. Descriptive statistics (frequencies, proportions, mean and standard deviation) were used to describe the categorical and quantitative variables. Pearson’s Chi-square test was used to compare the distribution of categorical responses of 8 statements of SDM and satisfaction each. Student’s *t*-test for independent samples and one-way analysis of variance followed by Tukey’s multiple comparison test were used to compare the mean values of SDM and satisfaction scores. A *p*-value of ≤ 0.05 was used to report the statistical significance of the study results.

3. Results

From the total sample size was (209), 144 subjects responded to participate (68.9%). The missing 65 were as follow: 45 refused to participate, 12 did not receive all the prosthetic crowns yet, and 8 were unable to be reached. Among the 144 study subjects, about 89% were above 30 years of age, gender was approximately equally distributed and 93.1% were Saudi nationals. Around 81.3% were married, 60.4% were employed and only 12.5% have completed higher education. (Table 1). The clinical procedures underwent for the process of implant restoration is elaborated in Table 2. > 50% of patients experienced a period of 3 to 6 months from implant placement to restoration. Most of the implant placement was done by Periodontists (74.3%) whereas only 25.7% were placed by Oral & maxillofacial Surgeons (OMFS).

The experience of clinical practice was observed as 1 to 5 years, 5–10 years and > 10 years. Around 46.5% of surgeons reported had 5–10 years of experience, whereas 47.9% of prosthodontists had > 10 years of experience. In majority of cases (87.5%) the placement was delayed, and the position of implant was observed to be upper (36.1%), lower (41%) and in both arches (22.9%). Most of the cases (77.1%) had up to 1–2 and 3–5 implants. The screw type retention mechanism was used in 86.8% of the cases and bone graft was carried out in 24.3% of the cases. (Table 2).

In this study, 8 statements of SDM were used to know the responses on 5-point scale from the study subjects. The distribution of responses of these 8 SDM statement were compared, which enumerated a high statistically significant difference. For the 1st, 2nd, 3rd, 4th, 5th, 6th & 7th SAD statements, high proportion of study subjects (80.5%, 84.8%, 88.2%, 79.8%, 62.5%, 75.7% & 81.2%) (Table 3) had responded as Strongly agree and agree when compared to the proportion of study subjects who had responded as neutral, disagree, and strongly disagree, which is highly statistically significant. For the remaining one SDM statements (8th), high proportion

Table 1 Comparison of mean values of SDM scores in relation to the demographic and professional characteristics of study subjects.

Characteristics	Mean (Sd..)	t-value/F-value	p-value
Age groups			
< 30	32.0(5.4)	0.590	0.556
30–50	31.6(5.8)		
> 50	30.6(6.1)		
Gender			
Male	30.5(6.3)	–1.420	0.158
Female	31.9(5.4)		
Nationality			
Saudi	31.2(6.0)	–0.269	0.789
Non-Saudi	31.7(4.0)		
Marital status			
Single	32.3(6.2)	1.044	0.298
Married	30.9(5.8)		
Employment status			
Employed	31.1(6.3)	–0.251	0.802
Unemployed	31.4(5.2)		
Educational status			
High school	32.9(3.4)	1.988	0.141
Below high school	31.2(6.2)		
Higher education	29.1(5.8)		
Surgeon specialty			
Perio	31.9(5.2)	2.639	0.009*
OMFS	29.0(7.2)		
Surgeon experience			
1–5 years	33.7(4.9)	5.611	0.005*
5–10 years	30.3(5.3)		
> 10 years	29.9(7.1)		
Prosthodontists experience			
1–5 years	31.8(6.5)	0.571	0.567
5–10 years	31.5(6.3)		
> 10 years	30.7(5.2)		

* Statistically significant.

of study subjects (60.4%) had responded as neutral, disagree, and strongly disagree when compared to the proportion of study subjects who had responded as strongly agree and agree which is highly statistically significant. (Table 3). Most of study subjects agreed on receiving information about the treatment and were aware about their problem. Also, around 80% of responses were told about the risks and benefits of treatment with dental implants and were influenced by the treated dentists to replace their missing teeth with implants. Out of the respondents, 60.4% didn’t have dental implants prior to attend the college clinics (Table 3).

Also, 8 statements of satisfaction were used to assess the satisfaction towards the implant among the study subjects, where the responses were observed as strongly agree, agree neutral, disagree and strongly disagree. Satisfaction was assessed for study subjects by questions related to function, esthetics, and presence of discomfort. The distribution of these responses was compared, where highly statistically significant difference was observed in all the responses of 8 statements. For the 1st, 2nd, 3rd, 4th, 5th, 6th & 8th satisfaction statements, lower proportion of study subjects (35.5%, 52.1%, 37.5%

Table 2 Comparison of mean values of Satisfaction scores in relation to the demographic and professional characteristics of study subjects.

Characteristics	Mean (Sd.)	t-value/F-value	p-value
<u>Age groups</u>			
< 30	24.8(9.1)	1.548	0.216
30–50	27.7(6.4)		
> 50	28.2(6.7)		
<u>Gender</u>			
Male	28.3(5.9)	1.197	0.233
Female	26.9(7.6)		
<u>Nationality</u>			
Saudi	27.4(6.9)	–1.399	0.164
Non-Saudi	30.5(4.3)		
<u>Marital status</u>			
Single	23.4(7.8)	–3.307	0.001*
Married	28.4(6.4)		
<u>Employment status</u>			
Employed	27.7(6.7)	0.155	0.877
Unemployed	27.5(7.2)		
<u>Educational status</u>			
High school	25.5(7.7)	1.804	0.168
Below high school	27.7(6.5)		
Higher education	29.6(7.5)		
<u>Surgeon specialty</u>			
Perio	27.0(7.2)	–1.691	0.093
OMFS	29.2(5.6)		
<u>Surgeon experience</u>			
1–5 years	24.3(7.3)	8.337	< 0.001*
5–10 years	29.5(6.2)		
> 10 years	27.9(5.9)		
<u>Prosthodontists experience</u>			
1–5 years	25.8(7.6)	2.526	0.084
5–10 years	27.9(8.8)		
> 10 years	28.7(5.1)		

* Statistically significant.

%,23.7%,36.1%,24.3%& 35.4%) had responded as Strongly agree and agree when compared to the proportion of study subjects w5.89)who had responded as neutral, disagree and strongly disagree, which is highly statistically significant. For the remaining one Satisfaction statements (7th), high proportion of study subjects (88.2%) had responded as strongly agree and agree when compared to the proportion of study subjects who had responded as neutral, disagree and strongly disagree which is highly statistically significant (Table 4). A high number of responses showed satisfaction toward the received treatment (Table 4). However, around half of the respondents complain of bad smell from the prosthesis and 35.5% were not satisfied with esthetic result. Most of responses didn't complain of discomfort during surgical or prosthetic treatment and willing to do the procedure again if necessary (Table 4).

On Analysis, Pairwise comparison test indicates no significant difference in the mean SDM scores of subjects of 5–10 years and > 10 years of experience in comparison to surgeons with 1–5 years of experience ($p = 0.005$). SDM score was affected by surgeon's specialty were SDM scores were higher for patients treated by periodontists ($p = 0.009$). There was no statistically significant difference in the mean values of

SDM scores in relation to other characteristics (Age groups, gender, nationality, marital status, employment status, educational status and Prosthodontist's experience). (Table 1), However, the SDM statements (Table 3) proved to have statistical significance ($p < 0.0001$) for all the variables. Despite, a larger part of the study population being provided with ample information about Implant procedures, their decision-making was greatly influenced by the treating dentist ($p < 0.0001$). Around 80.2% of the survey participants knew about the complications of not replacing the missing teeth and hence showed positivity towards shared decision making.

However, Pairwise comparison test indicates mean satisfaction score of subjects with 1–5 years of experience were having significantly lower mean satisfaction score and no significant difference in the mean satisfaction scores of subjects of 5–10 years and > 10 years of experience. And there is no statistically significant difference in the mean values of Satisfaction scores in relation to other characteristics (Age groups, nationality, employment status, educational status, surgeon specialty, and Prosthodontist's experience) except for marital status where married subjects were having higher mean satisfaction score (28.38) when compared with subjects who were single (23.39) ($p < 0.0001$).

The satisfaction score (Table 4) shows that though a minority of the study subjects (36.6%) complained of discomfort during the prosthetic restoration of the implant process 65.3% were able to tolerate treatment. The majority of the study sample (67.2%) were fully satisfied with Implant procedures and would recommend it for others. While a statistically significant 64.6% of Implant patients would like to undergo the procedure again ($p < 0.0001$).

4. Discussion

Implants have now become an inevitable part of dentistry for the rehabilitation of edentulous areas. Esthetic demands have increased the fervor for varied treatment options (Albarrak et al., 2019). This has also increased the avenues for patient opinions and preference regarding the different Implant protocols (Aljhani and Zawawi, 2010, Ramalingam, 2015). SDM enables building a good patient-doctor relation in the clinical encounters sharing the information's and express preferences during decision-making process (Elgezawi et al., 2017). In the present study, the mean values of SDM scores were compared in relation to the demographic and professional characteristics of study subjects, where the statistically significant difference was observed in relation to surgical specialty and surgeon's experience levels. The implants done by Periodontists were found significantly higher mean SDM scores when compared to those done by Oral surgeons ($t = 2.639$, $p = 0.009$). This may be attributed to increased number of implant placement referrals received by the periodontal department for common dental implant procedures. While the mean SDM scores of surgeons with 1–5 years of the experience was significantly higher than surgeons with 5–10 years and > 10 years of experience ($F = 5.611$, $p = 0.005$). We speculate that young practitioners tend to invest more time in educating patients about their current situation and treatment options. Interestingly with the increasing years of gaining experience the focus of learning the different approaches in delivering the information to the patient is enhanced (Ha and Longnecker, 2010).

Table 3 Comparison of distribution of responses towards 8 SDM statements.

SDM Statements	Responses					X ² -value	p-value
	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree		
I had previous information about possible treatment options before seeing my dentist	70(48.6)	46 (31.9)	10(6.9)	11(7.6)	7(4.9)	108.986	< 0.0001
After explaining alternative treatment option, the dentist ask me to choose what I prefer	81(56.3)	41 (28.5)	3(2.1)	12(8.3)	7(4.9)	149.194	< 0.0001
I am fully aware of the problem of missing a tooth/teeth in my mouth	84(58.3)	43 (29.9)	4(2.8)	6(4.2)	7(4.9)	168.708	< 0.0001
I understand the potential complications of not replacing my missing tooth with a dental implant	68(47.2)	47 (32.6)	14(9.7)	9(6.3)	6(4.2)	104.125	< 0.0001
I have tried to solve the problem of missing teeth elsewhere prior to attending KSU clinics	41(28.5)	49 (34.0)	17 (11.8)	19(13.2)	18(12.5)	31.556	< 0.0001
The dentist in charge have explained thoroughly the potential risks vs benefits of replacing my missing teeth with dental implants	58(40.3)	51 (35.4)	18 (12.5)	11(7.6)	6(4.2)	79.815	< 0.0001
The dentist have influenced my decision making to replace my missing teeth	66(45.8)	51 (35.4)	11(7.6)	8(5.6)	8(5.6)	106.208	< 0.0001
I had previous experience with dental implants prior to attending KSU clinics	22(15.3)	35 (24.3)	9(6.3)	46(31.9)	32(22.2)	27.181	< 0.0001

The primary determinant of patient acceptance to a long-term procedure is to have an effective and informative discussion with their health care provider (Charles et al., 1999, Habib et al., 2014). Earlier studies have evaluated this aspect of decision-making in several areas including oncology and radiotherapy (Joosten et al., 2008). Although the practice of SDM is considered critical in more serious medical conditions, in dentistry few reports addressed this issue (Woodhouse et al., 2017). However, components of the SDM model prioritize the active participation of the patient with his clinician in gaining knowledge about his condition, recognizing available treatment options, and shared agreement on the best approach of therapy. Further, SDM emphasizes, the importance of sharing patients' opinions and desires and discussing potential benefits and limitations with their clinicians to reach an agreement that satisfies both. In addition, SDM is arguably considered more effective on patient satisfaction and outcomes for therapeutic interventions requiring longer, extended management.

The majority of the qualitative research assessing dental implant experiences was based on opinions shared by the elderly sample population before and after the treatments (Shay and Lafata, 2015, Ramalingam et al., 2017). This paucity in qualitative research on patients' experience with implants has also been deeply emphasized (Kashbour et al., 2015). In dental practice, there are only a few systems that have been established to examine the decision-making models

like SDM due to recent emergence (Kriston et al., 2010b). In particular, there is a lack of a standardized coding system to assess the impact of SDM decision-making in implant patients (García-Layana et al., 2018). Interestingly, patient autonomy, competency, and rights to participate or defer treatments which are essential for patient satisfaction are some of the key features of SDM model (Elwyn et al., 2012). However, there is compromised oral health-related quality of life of patients and increased conflict of interest when the treatment becomes unsuccessful (Narby et al., 2012, Sundar et al., 2018). Nevertheless, if patient participation is increased in decision making and provide more of relevant treatment information these ordeals can be minimized (Sharma et al., 2014, AlKindi et al., 2018). In accordance, this necessitates the importance to focus on developing the dentist's interaction skills and raising the patient's awareness of their rights and autonomy to participate or defer their treatment decisions (Alzahrani and Gibson, 2018, AlKindi et al., 2018).

Literature reveals that the level of satisfaction among dental implant patients determines the long-term success of the implant procedures. (Adler et al., 2016) (Alzahrani and Gibson, 2018). In the current study, the mean values of Satisfaction scores were compared in relation to the demographic and professional characteristics of study subjects, where the statistically significant difference was observed in relation to marital status and oral surgeon's experience levels. The married subjects were having

Table 4 Comparison of distribution of responses towards 8 statements of satisfaction.

Satisfaction statements	Responses					X ² -value	p-value
	Strongly agree	Agree	Neutral	Disagree	Strongly Disagree		
Complain from esthetics after implant therapy	25(17.4)	26 (18.1)	20 (13.9)	49(34.0)	24(16.7)	18.431	0.001
Complain from ulcerations and/or bad smell after implant therapy	31(21.5)	44 (30.6)	14(9.7)	31(21.5)	24(16.7)	16.764	0.002
Complain from speech and/or chewing capacity after implant therapy	15(10.4)	39 (27.1)	23 (16.0)	43(29.9)	24(16.7)	19.194	0.001
Discomfort during surgical part	9(6.3)	25 (17.4)	8(5.6)	50(34.7)	52(36.1)	63.431	<0.0001
Discomfort during prosthetic part	20(13.9)	32 (22.2)	13(9.0)	40(27.8)	39(27.1)	19.681	0.001
There was discomfort during treatment experienced	14(9.7)	21 (14.6)	15 (10.4)	55(38.2)	39(27.1)	43.778	<0.0001
I would be 100% willing to undergo this procedure again recommend this procedure	89(61.8)	38 (26.4)	12(8.3)	2(1.4)	3(2.1)	186.62	<0.0001
If I have the chance to undergo this procedure again, I will not do it	13(9.0)	38 (26.4)	17 (11.8)	37(25.7)	39(27.1)	22.389	<0.0001

significantly higher mean Satisfaction scores when compared with the subjects who were single ($t = -3.307$, $p = 0.001$). And the mean Satisfaction scores of oral surgeons with 5–10 years of experience were having significantly higher mean satisfaction scores when compared with the surgeons with 1–5 years and > 10 years of experience ($F = 8.337$, $p < 0.001$). The enumerated study results elicits that more experienced surgeons had greater management and speed compared to less experienced practitioners (Riley et al., 2012).

The present study revealed a high level of patient satisfaction over the service provided during the Implant procedures. This included placement of implants, the position of implants, and bone grafts. These findings contrasted with a previous study wherein longer wait for dental treatment schedules and delays in appointments were reported to cause patient dissatisfaction (Gürdal et al., 2000). However, shared decision-making will increase the level of patient compliance and satisfaction in the Implant treatment modalities (Vahdat et al., 2014).

5. Limitations

Although the current study explored a very important topic in dentist-patient relationship, the results should be interpreted with cautious due to the nature of the study design being a cross sectional one which may not elaborate the causal relationship between SDM and satisfaction with dentist and patient characteristics. In addition, the recall time variability during the study period was noticed and may influence the actual feelings of participants, as those patients may not be able to recall and fully reflect on specific details of their implant experiences.

6. Conclusions and Future recommendations.

The present study reiterated the significance of assessing patient satisfaction about Implant procedures through the SDM and satisfaction scores. Educated patients acknowledge

the autonomy of well-informed and shared decisions with their implant specialists. Future longitudinal studies on the short- and long-term effects of SDM for dental implant patients, whether they choose implant as treatment or other modality, is needed to evaluate the influence of dental implant practitioners' approaches in discussing treatment options. Further, standardized SDM methods should be advocated as part of implant consultations to improve health care quality.

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CRedit authorship contribution statement

Mohammed A. AlSarhan: Conceptualization, Methodology, Validation, Investigation, Writing – original draft, Supervision, Project administration. **Razan S. Alaqeely:** Conceptualization, Methodology, Software, Validation, Investigation, Data curation, Writing – original draft, Project administration. **Reham Al Jasser:** Methodology, Validation, Formal analysis, Resources, Data curation, Writing – review & editing. **Dalal Al Otaibi:** Formal analysis, Writing – review & editing. **Saleh Al Oraini:** Software, Writing – review & editing. **Ibraheem F. Alshiddi:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- Adler, L., Liedholm, E., Silvegren, M., Modin, C., Buhlin, K., Jansson, L.J.A.O.S., 2016. Patient satisfaction 8–14 years after dental implant therapy—a questionnaire study. *74*, 423–429.
- AL BAKER, A., HABIB, S. R. & AL AMRI, M. D. 2016. Preserving esthetics, occlusion and occlusal vertical dimension in a patient with fixed prostheses seeking dental implant treatment. *The Saudi Dental Journal*, *28*, 203–208.
- Al-Jundi, M.A., Szentpétery, A., John, M.T., 2007. An Arabic version of the Oral Health Impact Profile: translation and psychometric properties. *Int. Dent. J.* *57*, 84–92.
- Albarrak, A.A., Alrumaih, H.S., Al-Humaidan, A., Al-Thobity, A.M., Alshahrani, F.A., 2019. Multidisciplinary approach with predictable esthetics: A case report. *The Saudi Dental Journal* *31*, S89–S95.
- Aljhani, A., Zawawi, K.H., 2010. The use of mini-implants in en masse retraction for the treatment of bimaxillary dentoalveolar protrusion. *The Saudi Dental Journal* *22*, 35–39.
- Alkindi, M., Ramalingam, S., Abuhaimeed, A., Alkharan, H., 2018. Undergraduate Implant Dentistry Training In Saudi Dental Schools. *J Ayub Med Coll Abbottabad* *30*, 217–222.
- Alzahrani, A.A.H., Gibson, B., 2018a. Scoping review of the role of shared decision making in dental implant consultations. *JDR Clinical & Translational Research* *3*, 130–140.
- Alzahrani, A.A.H., Gibson, B.J., 2018b. Scoping review of the role of shared decision making in dental implant consultations. *3* (2), 130–140.
- AMERICA, C. O. Q. O. H. C. I. & STAFF, I. O. M. 2001. Crossing the quality chasm: A new health system for the 21st century, National Academies Press.
- Becker, W., Hujuel, P., Becker, B.E., Wohrle, P., 2016. Dental implants in an aged population: evaluation of periodontal health, bone loss, implant survival, and quality of life. *Clinical implant dentistry and related research* *18*, 473–479.
- Charles, C., Gafni, A., Whelan, T., 1997. Shared decision-making in the medical encounter: what does it mean?(or it takes at least two to tango). *Soc. Sci. Med.* *44*, 681–692.
- Charles, C., Gafni, A., Whelan, T., 1999. Decision-making in the physician-patient encounter: revisiting the shared treatment decision-making model. *Soc. Sci. Med.* *49*, 651–661.
- Elgezawi, M., Hassan, K., Alagl, A., Al-Thobity, A.M., Al-Mutairi, B., Al-Houtan, T., Sadaf, S., 2017. Complexity of comprehensive care treatments in undergraduate dental programs: The benefits of observing and assisting experienced faculty members. *The Saudi Dental Journal* *29*, 161–166.
- Elwyn, G., Frosch, D., Thomson, R., Joseph-Williams, N., Lloyd, A., Kinnersley, P., Cording, E., Tomson, D., Dodd, C., Rollnick, S., 2012. Shared decision making: a model for clinical practice. *J. Gen. Intern. Med.* *27*, 1361–1367.
- García-Layana, A., Figueroa, M.S., Arias, L., Adán, A., Cabrera, F., Abalde, M., Fernández-Vega, A., Navarro, R., Cervera, E., Silva, R., Armada, F., Donate, J., Ruiz-Moreno, J.M., 2018. Clinical Decision-Making when Treating Diabetic Macular Edema Patients with Dexamethasone Intravitreal Implants. *Ophthalmologica* *240*, 61–72.
- Gürdal, P., Cankaya, H., Onem, E., Dinçer, S., Yılmaz, T., 2000. Factors of patient satisfaction/dissatisfaction in a dental faculty outpatient clinic in Turkey. *Commun. Dent. Oral Epidemiol.* *28*, 461–469.
- Ha, J.F., Longnecker, N., 2010. Doctor-patient communication: a review. *Ochsner J* *10*, 38–43.
- HABIB, S. R., RAMALINGAM, S., AL BELADI, A. & AL HABIB, A. 2014. Patient's satisfaction with the dental care provided by dental students. *J Ayub Med Coll Abbottabad*, *26*, 353–6.
- Helayl Al Waqdani, Nuha, Alomari, Mohammad, Al-Dhalaan, Reem Mohammed, Alwaqdani, Reem, 2021. Decision making process by senior residents of Saudi Board in restorative dentistry for nonsurgical endodontic retreatment: A retrospective study. *The Saudi Dental Journal*. *33* (2), 78–84.
- Joosten, E.A., Defuentes-Merillas, L., de Weert, G., Sensky, T., van der Staak, C., de Jong, C.A., 2008. Systematic review of the effects of shared decision-making on patient satisfaction, treatment adherence and health status. *Psychother. Psychosom.* *77*, 219–226.
- Kashbour, W.A., Rousseau, N.S., Ellis, J.S., Thomason, J.M., 2015. Patients' experiences of dental implant treatment: A literature review of key qualitative studies. *J. Dent.* *43* (7), 789–797.
- Khalaf, Khaled, Kheder, Waad, El-Kishawi, Mohamed, AlQahtani, Haif A., Ghiasi, Fatemeh S., Alabdulkareem, Mohammad N., Zahiri, Abdullah N., Rahmani, Noorieh I., 2021. The role of prosthetic, orthodontic and implant-supported rehabilitation in the management of secondary malocclusion to maxillofacial trauma- A systematic review. *The Saudi Dental Journal* *33* (4), 177–183.
- Kriston, L., Scholl, I., Hölzel, L., Simon, D., Loh, A., Härter, M., 2010. The 9-item Shared Decision Making Questionnaire (SDM-Q-9). Development and psychometric properties in a primary care sample. *Patient Educ. Couns.* *80*, 94–99.
- Légaré, F., Politi, M.C., Drolet, R., Desroches, S., Stacey, D., Bekker, H., 2012. Training health professionals in shared decision-making: An international environmental scan. *Patient Educ. Couns.* *88*, 159–169.
- Légaré, France, Witteman, Holly O., 2013. Shared decision making: examining key elements and barriers to adoption into routine clinical practice. *Health Aff.* *32* (2), 276–284.
- Narby, B., Hallberg, U., Bagewitz, I., Soderfeldt, B., 2012. Grounded Theory on Factors Involved in the Decision-Making Processes of Patients Treated with Implant Therapy. *Int. J. Prosthodont.* *25*, 270–278.
- OSHIMA LEE, E. & EMANUEL, E. J. 2013. Shared decision making to improve care and reduce costs. *New England Journal of Medicine*, *368*, 6–8.
- Pieterse, A.H., Henselmans, I., de Haes, H.C.J.M., Koning, C.C.E., Geijsen, E.D., Smets, E.M.A., 2011. Shared decision making: Prostate cancer patients' appraisal of treatment alternatives and oncologists' eliciting and responding behavior, an explorative study. *Patient Educ. Couns.* *85*, e251–e259.
- Pommer, B., Zechner, W., Watzak, G., Ulm, C., Watzek, G., Tepper, G., 2011. Progress and trends in patients' mindset on dental implants. II: implant acceptance, patient-perceived costs and patient satisfaction. *Clin. Oral Implant Res.* *22*, 106–112.
- RAMALINGAM, S. 2015. Role of maxillofacial trauma scoring systems in determining the economic burden to maxillofacial trauma patients in India. *J Int Oral Health*, *7*, 38–43.
- Ramalingam, S., Habib, S.R., Sundar, C., Dawas, A.B., Al-Rashed, M., Al-Bader, R., 2017. Perceptions of dental interns in Saudi Arabia toward implant placement in medically compromised patients. *J Educ Health Promot* *6*, 104.
- RILEY, J. L., 3RD, GORDAN, V. V., RINDAL, D. B., FELLOWS, J. L., QVIST, V., PATEL, S., FOY, P., WILLIAMS, O. D. & GILBERT, G. H. 2012. Components of patient satisfaction with a dental restorative visit: results from the Dental Practice-Based Research Network. *J Am Dent Assoc*, *143*, 1002–10.
- Romeo, E., Lops, D., Margutti, E., Ghisolfi, M., Chiapasco, M., Vogel, G., 2004. Long-term survival and success of oral implants in the treatment of full and partial arches: a 7-year prospective study with the ITI dental implant system. *Int. J. Oral Maxillofac. Implants* *19*.
- Sharma, R., Mithas, S., Kankanhalli, A., 2014. Transforming decision-making processes: A research agenda for understanding the impact

- of business analytics on organisations. *European Journal of Information Systems* 23, 433–441.
- Shay, L.A., Lafata, J.E., 2015. Where is the evidence? A systematic review of shared decision making and patient outcomes. *Med. Decis. Making* 35, 114–131.
- Sundar, C., Ramalingam, S., Mohan, V., Pradeepa, R., Ramakrishnan, M.J., 2018. Periodontal therapy as an adjunctive modality for HbA1c reduction in type-2 diabetic patients. *J Educ Health Promot* 7, 152.
- Vahdat, S., Hamzehgardeshi, L., Hessam, S., Hamzehgardeshi, Z., 2014. Patient involvement in health care decision making: a review. *Iran Red Crescent Med J* 16, e12454.
- Woodhouse, K., Tremont, K., Vachani, A., Schapira, M., Vapiwala, N., Simone, C., Berman, A., 2017. A Review of Shared Decision-Making and Patient Decision Aids in Radiation Oncology. *J. Cancer Educ.* 32.
- Wyne, A.H., Al-Hammad, N.S., Splieth, C.H., 2017. Oral health comprehension in parents of Saudi cerebral palsy children. *The Saudi Dental Journal* 29, 156–160.