

# Analysis of Practice of Drug Information Resources by Dentists in Saudi Arabia

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## ABSTRACT

**Aim:** This study's objective was to analyze dentists' practice of drug information resources in the Kingdom of Saudi Arabia. **Methods:** This is a 4-month cross-sectional study about the dentists' practice of drug information resources in Saudi Arabia. It is a self-reported and electronic survey of dentists. We included dentists from interns to consultants and from all specialties in dentistry and located in Saudi Arabia. The survey consisted of two parts. The first part collected demographic information. The second part collected data about the type of drug information inquiries, aspects of dental drug information resources, and the dental drug information resources and types of dental drug information resources used in practice are responsible. We used the 5-point Likert response scale system to obtain responses to the survey questions. The data were collected through the Survey Monkey system and analyzed through the Statistical Package of Social Sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel (version 16). **Results:** The average number of dental information resources was 0.84 per patient daily. The most commonly referred resource in relation to the dental drug information was biweekly (94 (36.43%)), monthly (92 (35.66%)) followed by weekly (35 (13.58%)) newsletter in addition to those published a few times per year (18 (6.98%)). The most frequently searched question was about the adverse reaction (190 (73.36%)) and drug availability (144 (55.60%)), whereas the majority of the dental prescriptions was related to the oral ulcer (83 (32.05%)) and sedation medications (74 (28.57%)). The average score for the item "implemented items for dental drug information resources" was 1.78. The highest score was obtained for the element "an annual plan of dental drug information resources" (1.88). In contrast, the lowest score was obtained for "dental drug information resources dentist's competency" (1.7), with statistically significant differences between all responses ( $p < 0.001$ ). The highest scores of dental drug information resources (to authorities) the responsibility was a clinical pharmacist (4.65) and pharmacy technicians (4.34). In contrast, the lowest score was dentists (2.19), with statistical signification among all answers in each aspect ( $p < 0.001$ ). **Conclusion:** Despite the demand for resources to resolve drug-related dental care problems, the resources were seldom utilized. Targeting education and training of dental information resources is required to improve dental patient care in Saudi Arabia.

**Key words:** Dentist, Practice, Drug Information, Resources, Analysis, Saudi Arabia.

## INTRODUCTION

For the past 40 years, drug information (DI) services have been well-established in Saudi Arabia and worldwide.<sup>1,2</sup> The DI services have several roles, including answering DI-related inquiries, managing drug formulary, and preventing drug-related problems.<sup>3</sup> DI is the knowledge of acquired facts through study, reading, and practical experience related to a chemical substance intended for the diagnostic uses or treatment and prevention of disease.<sup>4</sup> DI also provides both written and/or verbal information related to the drugs and medication therapy upon request from various committees, healthcare providing organizations, patients, and public health officers.<sup>5</sup> Furthermore, providing safe and effective patient care for DI requires a thorough evaluation of a specific patient or patient population. The information must be adopted as a fair, balanced, and unbiased approach when seeking DI. DI includes unlimited resources such as handbooks, mobile applications, and databases.<sup>6</sup> One of the significant components of DI services is references. The DI resources are of three types: primary, secondary, and tertiary resources. The tertiary resources include test

books, whereas primary resources include the journal articles and secondary resources include journal indexes or abstracts of the conferences.<sup>7</sup> The healthcare providers used DI references during the undergraduate courses at various medical, dental, pharmacy, and nursing colleges and during their practice. The pharmacists, physicians, and lesser percentage dentists and nurses utilized the DI services, which has been reduced nowadays and switched to new online DI resources.<sup>8</sup> However, currently high-frequency use of the online and applications of DI resources by a healthcare professional. As a result, the number of drug inquiries decreased received by drug information centers. Other new drug information activities were implemented through DI services such as PharmacoEconomic services and medication utilization evaluation.<sup>8</sup> DI services help to reduce drug mobility and mortality, thereby reducing the economic burden on the healthcare system.<sup>9-13</sup> With an emphasis on dental drug information resources, various dental references included dental DI, dental surgery, orthodontics, dental materials, and other resources. Like other healthcare providers,

dentists refer to DI references that need to be used during their practice. Moreover, DI practice is considered a branch of dental informatics oriented toward dentistry. It deals with managing information, communication, and apps of new technologies in clinical practice and research concerning dentistry.<sup>14</sup> Dentistry has seen comparable groundbreaking advancement that has allowed it to progress based on evidence to enhance quality. The efforts have been an obligatory requisite in each field of healthcare. High-quality and sound dental practice depends not only on the wreckage of the selected evidence but also on the compilation of adequate obtainable research evidence.<sup>15</sup> However, there is hardly any data regarding dentists practicing DI in Saudi Arabia. Previous studies have explored the practice of usage of drug information resources worldwide.<sup>16-19</sup> However, to the best of our knowledge, there are no investigations conducted on the practice of DI resources by dentists in Saudi Arabia or Gulf and Arabian countries. Therefore, in this study, we aimed to evaluate the practice of utilizing DI resources by dentists in Saudi Arabia.

## METHOD

This is a 4-month cross-sectional study conducted to analyze the utilization of dental DI resources in dental practice by dentists in Saudi Arabia. It is a self-reported electronic survey of dentists, including all dentists from interns to consultants and those from across all specialties in dentistry and located in Saudi Arabia. All nondentists or students and those who did not complete the surveys will be excluded from the study. The survey consisted of demographic information and dental DI resources used for dental and non-dental medications. Aspects of dental DI resources (to authorities) are the responsibility and types of dental drug information resources used most frequently in practice. We used 5-point Likert response scale system to obtain the responses of participants. We calculated the sample in this cross-sectional study based on the previous literature: population percentage of 50%, the confidence level of 95% with a *z* score of 1.96 and margin of error of 5–6.5%, and a drop-out rate of 10%. With these parameters, the sample size was calculated as 251 to 432 with a power of study of 80%.<sup>20-22</sup> The response rate required for the estimated sample size is at least 60–70% and above.<sup>22,23</sup> The survey was distributed through social media such as WhatsApp and Telegram groups of dentists. A reminder message was sent once every two weeks. The survey was validated through the revision of expert reviewers and pilot testing. Moreover, the test of reliability was tested with Cronbach's alpha value. The data were collected through the Survey Monkey system and analyzed with the Statistical Package of Social Sciences (SPSS), Jeffery's Amazing Statistics Program (JASP), and Microsoft Excel sheet version 16 software. The STROBE (Strengthening the reporting of observational studies in epidemiology statement: guidelines for reporting observational studies) guided the reporting of this study.<sup>24,25</sup>

## RESULTS

A total of 260 dentists responded to this survey, with most of them coming from the north area (75 (28.85%)) and central region (64 (24.62%)), with statistically significant differences between all analyzed regions ( $p < 0.001$ ). Out of 260 responders, 153 (59.30%) were male, and 105 (40.7%) were female, with statistically significant differences between them ( $p < 0.003$ ). The majority of the responders (257 (98.85%)) were in the age group of 24–35 years, with statistically significant differences among all age groups ( $p < 0.001$ ). Almost half of the responders were interns (135 (51.92%)) followed by residents (63 (24.23%)) and General Practitioner 62 (23.85%), with statistically significant differences among them ( $p < 0.001$ ). Most of the responders belonged to the dental staff (222 (85.38%)), with statistically significant differences between the type of positions ( $p < 0.001$ ). The majority of the responders had approximately

three years of experience (230 (88.46%)), and more than half of them were nonspecialized dentists (217 (84.44%)) with statistically significant differences between all periods of work experience ( $p < 0.001$ ) (Tables 1 and 2). A substantial number of patients needed DI resources, which was unknown by dentists (163 (62.69%)) followed by (1–5) questions daily 59 (22.69%). The number of dental drug information resources used daily was unknown 166 (63.85%) followed by (1–5) references daily was 61 (23.46%). The average number of DI resources accessed was 0.84 per patient daily.

The most dental DI resources used to answer drug information inquires about adults 172 (66.41%) and adolescents 124 (47.88%). The most frequently used dental DI resource was biweekly (94 (36.43%)) or monthly (92 (35.66%)) followed by weekly (35 (13.58%)) and few times per year (18 (6.98%)). The most frequently searched questions were about dental medications: adverse reaction (190 (73.36%)) and drug availability (144 (55.60%)). The most frequently mentioned dental medications in DI resources were for an oral ulcer (83 (32.05%)) and sedation medications (74 (28.57%)), and the most frequently mentioned nondental medications in dental DI resources were anticoagulants (95 (36.96%)) and gastrointestinal tract medications (87 (33.85%)) (Tables 3–5). The average score was recorded for the item “implemented items for dental drug information resources” (1.78), with a high score recorded for the element “annual plan of dental drug information resources” (1.88). The lowest score was recorded for the item “dental drug information resources dentist's competency” (1.7) with statistical significance between all answers in each aspect ( $p < 0.001$ ) (Table 6). The average score

Nationality	Response Count	Response Percent	<i>p</i> -value
Central area	64	24.62%	< 0.001
North area	75	28.85%	
South area	31	11.92%	
East area	36	13.85%	
West area	54	20.77%	
Answered question	260		
Skipped question	0		
Gender	Response Count	Response Percent	
Male	153	59.30%	< 0.003
Female	105	40.70%	
Answered question	258		
Skipped question	2		
Age	Response Count	Response Percent	
24–35	257	98.85%	< 0.001
36–45	3	1.15%	
46–55	0	0.00%	
> 55	0	0.00%	
Answered question	260		
Skipped question	0		

**Table 2: Demographic, social information.**

Dentist Qualifications	Response Count	Response Percent	p-value (chi X2)
Intern	135	51.92%	< 0.001
Resident	63	24.23%	
General Practitioner	62	23.85%	
Specialist	0	0.00%	
Consultant	0	0.00%	
Answered question	260		
Skipped question	0		
Position Held	Response Count	Response Percent	
Director of dental unit	5	1.92%	< 0.001
Assistant director of dental unit	2	0.77%	
Dental Director	31	11.92%	
Dental staff	222	85.38%	
Answered question	260		
Skipped question	0		
Years of experiences at Dentists career	Response Count	Response Percent	
< 1	149	57.31%	< 0.001
1 – 3	81	31.15%	
4 – 6	28	10.77%	
7 - 9	2	0.77%	
> 9	0	0.00%	
Answered question	260		
Skipped question	0		
Dentist Specialties	Response Count	Response Percent	
Dental Public Health	6	2.33%	< 0.001
Endodontics	8	3.11%	
Oral and Maxillofacial Surgery	1	0.39%	
Oral Medicine and Pathology	0	0.00%	
Oral and Maxillofacial Radiology	0	0.00%	
Orthodontics and Dentofacial Orthopedics	1	0.39%	
Pediatric Dentistry	1	0.39%	
Periodontics	0	0.00%	
Prosthodontics	5	1.95%	
Restorative dentistry	18	7.00%	
Special needs dentistry	0	0.00%	
Non-applicable	93	36.19%	
General practitioner	124	48.25%	
Other (please specify)			
Answered question	257		
Skipped question	3		

of frequently used dental drug information resources used was (3.63), with a high score recorded for the element “online evidence-based dental drug information resources” (3.93). In contrast, the lowest scores were recorded for “applications of dental drug information resources” (3.19), with statistically significant differences between all answers in each item ( $p<0.001$ ) (Table 7). The highest score concerning dental drug information resources (to authorities) in terms of the responsibility of types of healthcare professionals was a clinical pharmacist (4.65) and pharmacy technicians (4.34). In contrast, the lowest score was recorded for dentists (2.19), with statistically significant differences among all answers in each aspect ( $p<0.001$ ) (Table 8). In regular biostatistics, the reliability test of McDonald’s  $\omega$  was 0.901, Cronbach’s  $\alpha$  was 0.869, Gultman 2 score was 0.912, and Gultman 6 score was 0.934. In contrast, in Bayesian Biostatistics, the reliability tests of McDonald’s  $\omega$  was 0.901, Cronbach’s  $\alpha$  was 0.868, Gultman 2 score was 0.912, and Gultman 6 score was 0.938.

## DISCUSSION

All healthcare professionals, including dentists, deal with medications daily. The medication process starts from procurement, preparation, and dispensing by the pharmacists and is prescribed by dentists and physicians, followed by pharmacists.<sup>26</sup> The medications, including dental types, need complete information among all stages of medication management. The dentists need to know the right dose for geriatric, adult, and pediatric populations. The status of the patient’s condition

**Table 3: The frequent type of drug information inquiries by the dentist.**

Answer Choices	Responses	
Adverse drug reaction	190	73.36%
Drug Availability	144	55.60%
Compatibility/Stability (chemical,Pharmaceutical, sorption,solubility,etc.)	34	13.13%
Compounding / formulation	7	2.70%
Dosage/schedule	18	6.95%
Drug of choice/therapeutics/Pharmacology	20	7.72%
Drug Identification	19	7.34%
Drug Administration	37	14.29%
Pharmacoeconomics/medications cost	34	13.13%
Pharmacokinetics	41	15.83%
Pregnancy/lactation/teratogenicity	50	19.31%
Poisoning/Toxicology	47	18.15%
Drug-Drug Interaction	43	16.60%
Drug-food interaction	41	15.83%
Drug and laboratory information	35	13.51%
Drug Storage	37	14.29%
Drug indications	88	33.98%
Off labeled used (non approved indication)	31	11.97%
Over the counter medications	39	15.06%
Herbal medicine	80	30.89%
Alternative medicine	114	44.02%
Other (please specify)	14	5.41%
Answered	259	
Skipped	1	

**Table 4: Most type of dental medications used for dental drug information resources.**

Answer Choices	Responses	
	No	%
Antibiotic for dental care	49	18.92%
Antifungal for dental care	46	17.76%
Medications for dental pain	44	16.99%
Medications for bad breathing	58	22.39%
Medications for gingival bleeding	56	21.62%
Medications for gingival swelling	60	23.17%
Medications for dental abscess	63	24.32%
Medications for oral ulcer	83	32.05%
Medications for tooth whitening	61	23.55%
Medication for tongue problems	81	31.27%
Teething medications	60	23.17%
intracanal medications	59	22.78%
Sedation medications	74	28.57%
Anesthesia medications	69	26.64%
Antiviral for dental care	71	27.41%
Medications for oral hygiene	51	19.69%
Muscle relaxant medications	52	20.08%
Anxiolytic medications	20	7.72%
Answered	259	
Skipped	1	

**Table 5: Most type of non-dental medications used for dental drug information resources.**

Answer Choices	Responses	
	No	%
Anti-Diabetic Medication	44	17.12%
Antibiotics	34	13.23%
Antihypertensive Medication	56	21.79%
Cardiac Medication	69	26.85%
Asthma Medication	71	27.63%
Derma Medication	61	23.74%
Anti-Rheumatic medications	64	24.90%
Anti-coagulant	95	36.96%
IV Fluid	70	27.24%
NSAIDs or Pain killer	72	28.02%
GIT medications	87	33.85%
Antineoplastic medications	79	30.74%
Vitamins	76	29.57%
Electrolytes	50	19.46%
Never	8	3.11%
Other (please specify)	0	0.00%
Answered	257	
Skipped	3	

**Table 6: Implementations of items for dental drug information resources?.**

	76-100 % implemented		51-75 %		25-50 %		< 25 % implemented		We do not have any it		I do not know		Total	Weighted Average	p-value (chi X2)
The vision of dental drug information resources	0.38%	1	0.38%	1	7.69%	20	17.31%	45	< 0.001	47	56.15%	146	260	1.80	< 0.001
Mission of dental drug information resources	0.38%	1	1.54%	4	6.54%	17	17.31%	45	19.23%	50	55.00%	143	260	1.82	< 0.001
The strategic plan of dental drug information resources	0.00%	0	0.77%	2	7.72%	20	16.22%	42	22.01%	57	53.28%	138	259	1.81	< 0.001
The annual plan of dental drug information resources	0.38%	1	1.54%	4	6.92%	18	18.46%	48	21.15%	55	51.54%	134	260	1.88	< 0.001
Policy and procedure of dental drug information resources	0.00%	0	1.54%	4	5.00%	13	15.77%	41	22.31%	58	55.38%	144	260	1.76	< 0.001
dental drug information resources dentist competency	0.00%	0	1.15%	3	6.15%	16	13.85%	36	18.46%	48	60.38%	157	260	1.70	< 0.001
dental drug information resources usage quality management	0.38%	1	1.92%	5	6.54%	17	12.69%	33	18.46%	48	60.00%	156	260	1.74	< 0.001
Answered													260		
Skipped													0		

**Table 7: Frequent types of dental drug information resources used in practice by dentist.**

	Always		Sometimes		Rarely		Never		I do not need it		Total	Weighted Average	p-value (chi X2)
	%	n	%	n	%	n	%	n	%	n			
Books dental drug information resources	1.55%	4	64.73%	167	25.58%	66	6.20%	16	1.94%	5	258	3.58	< 0.001
Electronic book dental drug information resources	1.55%	4	73.64%	190	19.38%	50	3.49%	9	1.94%	5	258	3.69	< 0.001
Internet website drug information resources	3.09%	8	77.22%	200	15.06%	39	2.70%	7	1.93%	5	259	3.77	< 0.001
Online Evidence based dental drug information resources	11.20%	29	77.22%	200	6.18%	16	3.86%	10	1.54%	4	259	3.93	< 0.001
Applications of dental drug information resources	1.93%	5	37.07%	96	40.93%	106	18.53%	48	1.54%	4	259	3.19	< 0.001
Answered											259		
Skipped											1		

**Table 8: The responsibility of dental drug information resources.**

	Strongly Agree		Agree		Uncertain		Disagree		Strongly Disagree		Total	Weighted Average	p-value (chi X2)
	%	n	%	n	%	n	%	n	%	n			
Dentist	2.31%	6	11.54%	30	20.38%	53	34.62%	90	31.15%	81	260	2.19	< 0.001
Pharmacist	31.66%	82	65.64%	170	1.93%	5	0.39%	1	0.39%	1	259	4.28	< 0.001
Pharmacy technicians	39.23%	102	56.92%	148	3.08%	8	0.38%	1	0.38%	1	260	4.34	< 0.001
Nurses	1.54%	4	24.71%	64	51.35%	133	22.01%	57	0.39%	1	259	3.05	< 0.001
Drug company	34.88%	90	53.88%	139	10.47%	27	0.39%	1	0.39%	1	258	4.22	< 0.001
Physicians	28.96%	75	66.02%	171	4.63%	12	0.00%	0	0.39%	1	259	4.23	< 0.001
Clinical pharmacist	66.67%	172	31.40%	81	1.94%	5	0.00%	0	0.00%	0	258	4.65	< 0.001
Answered												260	
Skipped												0	

with either regular or non-normal liver or kidney function required answering the drug dosing adjustment.<sup>27,28</sup> All DI was related to the drug storage and administration and medications for patients counseling (27) (28). All previous inquires need full detail of the dental DI resources.<sup>29</sup> The dentist needs to refer to the database information and dental drug information resources.<sup>7,30,31</sup> They also need to know the frequency of drug inquiries to answer their dental medications questions with full patient information.<sup>29,32</sup>

Moreover, the dentist needs unique dental drug information resources, vision or mission, and policy and procedures of dental drug information resources program.<sup>32</sup> This study was conducted to declare the dentist practice of DI resources during daily dental operations or during clinic practice. This survey has high reliability and an almost equal number of both male and female which reflected the reality population. In this study, the majority of the responders were new interns or new graduates and had less experience when compared with general practitioners,

which shows that the younger generation more frequently use electronic survey. The study should have more than half of the dentists' had unknown documentation of patients' number of DI inquiries followed by 1–5 of DI references, similar to the previous study.<sup>16</sup>

In comparison, the number of DI inquiries per patient higher than in another study reflected an increased number of DI inquiries per patient locally.<sup>33</sup> However, the dentists used one and less resource per patient. They referred to biweekly or monthly dental DI resources. The dentists did not frequently use the dental DI resources; therefore, they were not familiar. The majority of responders used dental DI resources for adverse drug reactions or drug availability. Thus, the dentist's high frequency used DI inquires to answer side effects of patients during dental care or get information about the drug availability for such dental disease. According to our hypothesis, dentists did not frequently use DI resources in practice. The dentist search for drug information for medications therapy of the oral ulcer and sedation medication. Simultaneously, the



dentist often searches about side effect medication used for sedation or local anesthetic used for oral ulcers.<sup>34</sup> Both oral cancer and sedation medications are considered a high-risk group of drugs, which requires excellent attention to prevent drug-related problems.<sup>35</sup> Dentists most frequently search for anticoagulant therapy, which shows various adverse effects and is regarded as high alert drugs.<sup>36</sup>

Many practice elements of dental DI resources were not implemented. Comprehensive effort to improve the practice elements for dental drug information resources implementations. Most dentists frequently use evidence-based dental DI resources. However, dental DI apps have been less commonly used in practice. Some dentists were either not familiar with the digital applications of dental DI resources or few resources available in the market. The dentist declared their thoughts the responsibilities of dental drug information resources are the clinical pharmacist, while the dentist least one responsible for drug information resources. This shows that clinical pharmacists have more knowledge with regard to dental DI resources and dentist have less knowledge. Therefore, the clinical pharmacist takes care of the availability of dental DI resource for the dentist or provides education and training to them.<sup>37</sup>

### Limitations and Strengths

This study has some limitations. This survey was conducted through an electronic format, and there was an inadequate number of participants, as only people with internet access could participate. However, this study also had some strengths. For example, this is the first study conducted on a large population in Saudi Arabia concerning DI resources' dentist practice.

### CONCLUSION

So far, studies conducted on information-seeking behaviors of dental practitioners are scarce. Knowledge of dentists' information-seeking actions should advance the translational gap between drug information resources and dental practice.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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### Consent for Publications

Informed consent was obtained from all the participants

### Ethical Approval

This research is exempted from research and ethical committee or an institutional review board (IRB) approval.

<https://www.hhs.gov/ohrp/regulations-and-policy/decision-charts-2018/index.html>

### ABBREVIATIONS

**MOH:** Ministry of Health; **KSA:** Kingdom of Saudi Arabia; **DI:** Drug information; **SPSS:** Statistical package of social sciences; **JASP:** Jeffery's Amazing Statistics Program; **STROBE:** Strengthening the reporting of observational studies in epidemiology.

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