Challenges in Dental Implant Identification and Need of Universal Dental Implant Identification, Numbering, and Nomenclature System

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ABSTRACT

Aim: As the number of dental implant patients and implant practitioners is increasing worldwide, implant(s) identification poses a daunting task in absence of detailed records. The purpose of this cross-sectional study was to survey the dental implant practitioners for methods used by them for record-keeping of dental implants and means of implant identification in cases where treatment records are inadequate. A unique Sharma Jhingta Implant identification, numbering, and nomenclature system is proposed to address the need for a universal implant documentation system.

Materials and methods: A cross-sectional study was planned. An electronic Google survey form was sent to 150 dentists with questions pertaining to study objectives. The questionnaire had two sections: the first section captured the demographic details of the respondents and the second section had questions on implant systems. It consisted of both open-ended and close-ended questions. Descriptive analysis was done and percentages were calculated for the responses.

Results: Responses of 104 implantologists were analyzed. Adin, Nobel Biocare, and Osstem were commonly used implant systems and the majority of clinicians were still using conventional methods of record-keeping namely patient treatment card and clinic record register (77.3% and 86.7%, respectively). Implantologists were facing difficulties in implant identification in previously treated patients and were either using their clinical judgment (72%) or professional colleagues' opinion to identify implants. Implant identification software and apps were not used commonly by respondents.

Conclusion: There is a need for a universally accepted standardized method of implant identification numbering and nomenclature. Sharma Jhingta IINN system is an effective and easy to learn method for implant documentation.

Keywords: Database, Dental implants, Terminology.

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INTRODUCTION

The practice of dental implantology is witnessing an exponential rise worldwide and is providing patients with unparalleled levels of an efficient, predictable, convenient, and affordable option of oral rehabilitation adding quality of life to millions of people.[1] Dental implants offer significant functional and biological advantages over conventional prosthetic approaches.[2]

There are hundreds of implant manufacturers worldwide producing a large number of implant systems and prosthetic components for different clinical situations. Therefore, identifying the implant system in the patients presents a major problem that has been increasing lately. The identification of dental implant systems in patients with inadequate treatment records is a significant challenge because patients may receive treatment from different dentists over some time. As implant restorations have increased longevity, the associated complications increase with the duration of implant function.[3] These complications are managed much later than initial implant therapy and this compounds the problem of implant and components identification. Additionally, for implant maintenance, repairs, restorative referrals, or planning of additional dental implants, details of placed implants are essential.

In situations of dilemmas over implant system identification, valuable time is spent on taking implant radiographs and using different resources as websites of implant companies, opinions from

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colleagues or company representatives to help identify the system. This is a frustrating, costly, time-consuming process, which adversely affects the clinician's efficiency.[4] Moreover, miscommunication can readily occur within the scientific community and between the different disciplines involved in implant dentistry owing to the absence of a universally accepted implant identification and nomenclature system. Also, it is necessary to use a standardized implant nomenclature system for patient chart documentation, case presentation, and record-keeping.

Authors have proposed unique Sharma and Jhingta dental implant identification, numbering, and nomenclature system (Sharma Jhingta IINN system) to streamline and standardize dental implantology.[5] The system comprises seven components.

The purpose of this study was to evaluate four aspects of dental implant identification and documentation:

- What are different methods employed by implant practitioners for record-keeping of patients and performed dental implants in clinical practice?
- What sources are employed by implantologists to identify an implant with inadequate or unavailable previous records?
- What are the views of implantologists on the need for a standardized universal system of implant identification, numbering, and nomenclature?
- What are the suggestions of implantologists regarding the applicability of the Sharma Jhingta system?

MATERIALS AND METHODS

It was a cross-sectional study, employing a questionnaire method of data collection. The questionnaire had two sections: the first section captured the demographic details of the respondents and the second section had questions on implant systems. It consisted of both open-ended and close-ended questions. The questionnaire was converted into Google forms and the mode of data collection was purely electronic.

The survey specifically targeted dentists who practice clinical implantology. An e-mail comprising the detailed purpose of the study, the questionnaire, and instructions for attempting the questionnaire, was sent to 150 dentists randomly.

A copy of the Sharma Jhingta system of implant identification, numbering, and nomenclature system was attached with survey form link.[5] The first and second components involve a representation of the quadrant and tooth number as used in the commonly accepted FDI system of tooth numbering.[6] This gives information of implant location spatially in the quadrant and corresponding to equivalent natural tooth/teeth. The third component identifies the dental implant and differentiates it from a natural tooth. The "‡" symbol is used to represent an endosseous dental implant. The fourth component describes dimensions of a dental implant, i.e., diameter and length of implant represented with symbol "Ø". The fifth component describes the type of dental implant with the name of the implant system and manufacture name. Additionally, implant manufacturer reference card/warranty card may be attached to patient record specified with date and procedure(s) details.

The sixth component gives information on dental implant prosthesis, its composition, and type of retention. The seventh component is used for any additional information pertaining to dental implant namely implant-abutment connection, abutment design, etc. (Table 1).

An example of application of the system was presented as "Nobel replace dental implant from Nobel Biocare is placed corresponding to maxillary right first molar with a dimension of 5.0 and 11 mm, tri channel connection, and screw-retained prosthesis,the representation becomes: 16‡Ø5x11 Nobel replace, Nobel Biocare, screw-retained, tri-channel connection.

Descriptive analysis was done and percentages were calculated for the responses. Graphs were made with MS Excel (Microsoft Windows 10).

Table 1: Sharma Jhingta dental implant identification, numbering, and nomenclature system

Components	1	2	3	4	5	6	7
Descriptions and representations	Dental implant position spatially in quadrant according to FDI tooth numbering system	Implant location identified with natural equivalent tooth/teeth according to FDI tooth numbering system	Endosseous dental implant symbol "‡"	Diameter and length of the implant with symbol "Ø"	Type of dental implant and name of the implant manufacturer	Characteristics of prosthesis	Additional information (abutment characteristics)

Results

A total of 115 completed questionnaires were returned (response rate, 76.6%). Eleven questionnaires were excluded as the concerned dentists were not performing dental implants. The responses of 104 implantologists are summarized in Table 2 and Figures 1 and 2.

Demographic Characteristics and Implant Preference and Practice Information

The majority of respondents practiced implantology in India. Almost two-thirds had private clinical practice. 58.7% of respondents had >5 years of clinical implant experience. 65.3% were using 1–3 implant systems whereas 30.7% were using 4–6 implant systems. Adin, Nobel Biocare, Osstem, Alpha bio, Dentium, and Bio horizons were the most commonly practiced implant system in decreasing order.

Modes of Record-keeping of Dental Implant Patients

The majority of responding implantologists were maintained implant treatment records in patient treatment cards and additionally with the clinic records (77.3 and 86.7%, respectively). Practice management software and photographic and radiographic record methods were nominally used at 5.3 and 2.6%, respectively.

Table 2: Characteristics of the respondents who participated in the survey (in %)

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Nature of implant practice	Academic institution	28
	Exclusive clinical practice	72
Country of practice	India	92
	USA/Canada	8
Years of practice	Less than 5 years	41.3
	More than 5 years	58.7
Implant systems used	1–3	65.3
	4–6	30.7
	7–10	4
Most commonly used dental implant systems	Adin	54.7
	Nobel Biocare	46.7
	Osstem	46.7
	Alpha bio	25.3
	Dentium	24
	Biohorizon	22.7
There is a need for universal dental implant identification, numbering, and nomenclature system	Agree	96
	Disagree	4
Sharma Jhingta system of dental implant identification, numbering, and nomenclature system fulfills the need for such a standardized global system	Agree	86.7
	Disagree	13.3
There is a need for a global database system with patient and implant details	Agree	84
	Disagree	16
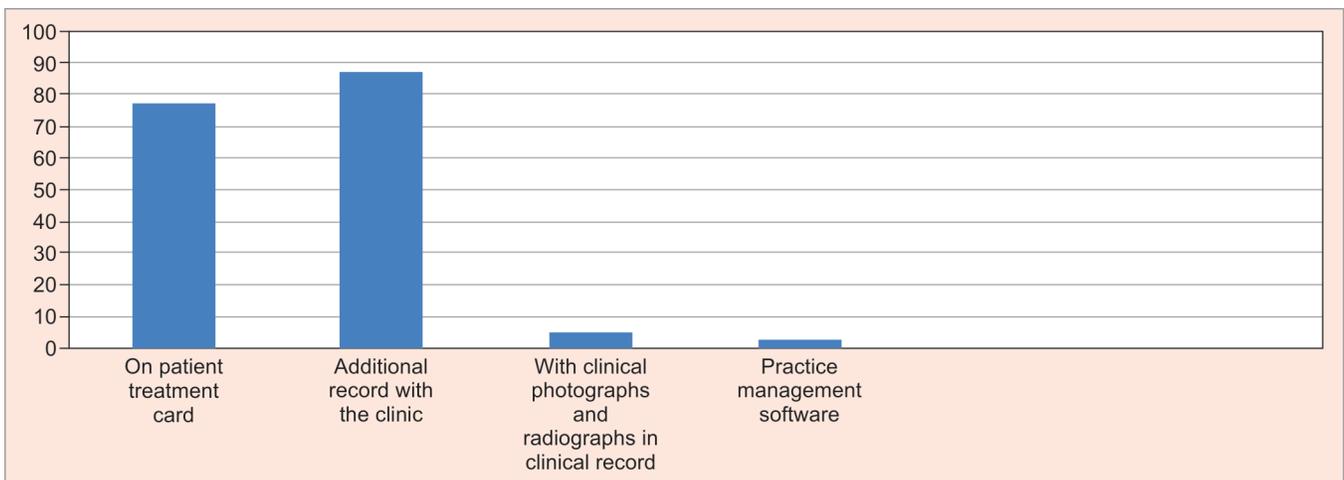
Fig. 1: The methods used by respondents for record-keeping of dental implant patients in clinical practice
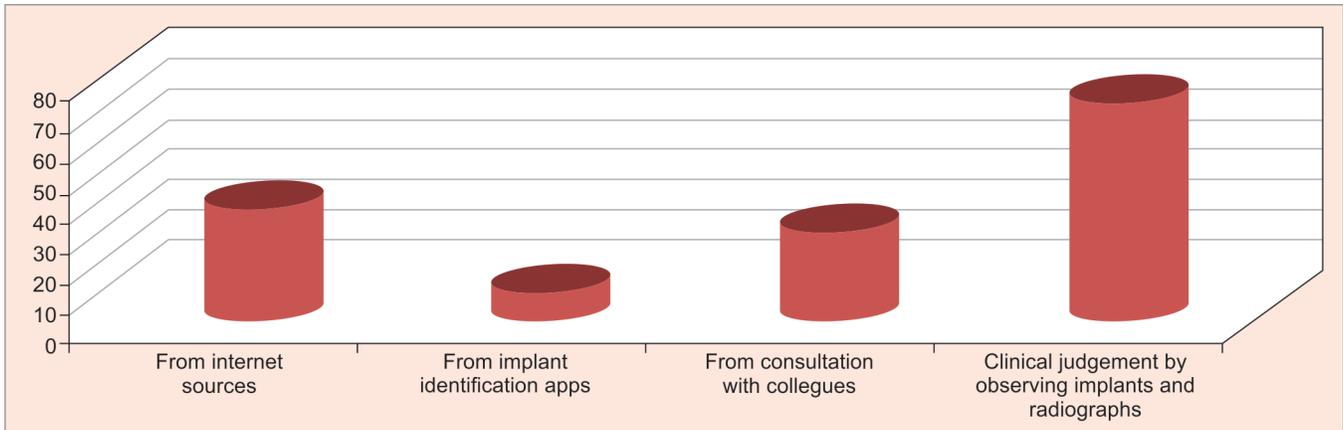
Fig. 2: The methods used by respondents for implant identification in clinical practice with insufficient available treatment records

Methods of Identification of Dental Implant in Cases of Non-availability of Sufficient Records

To identify implants with unavailable records, 72% of implant practitioners were relying on their clinical judgment and radiographic interpretation. Consultation with professional colleagues and searching implant websites or other internet sources were other approaches used for implant identification 29.3 and 37.3%, respectively. Assistance from implant identification apps was taken by 9.3% of respondents. More than one means of implant identification was used by the majority of respondents.

Need of Universal Dental Implant Identification, Numbering, and Nomenclature System and Views and Suggestions on Sharma Jhingta IINN System

Most of the respondents agreed to the need for universal dental implant identification, numbering, and nomenclature system. They also felt the need of maintaining a global database system with patient and implant details that can be integrated into the electronic medical record system of clinical practice. 86.7% of respondents acknowledged the Sharma Jhingta system as filling the void of such a standardized system and approved of its application in clinical practice and implant research. Responding implantologists suggested that a Universal system of tooth notation should be used in regions where the FDI system is not followed and the system should be validated on pterygoid, zygomatic, and cortical implants in addition to endosseous implants. Many implant practitioners also suggested the use of bar code encryption by implant manufacturers as part of medical device regulations and incorporation of laser-etched batch and serial numbers in implant collars for retrieval of implant information. These design modifications can have significant clinical and forensic applications.

Discussion

Surveys have been used by the dental profession in the past to establish a professional consensus, especially in areas of limited or conflicting evidence.[7] No survey has assessed the methods employed by implant practitioners for record-keeping of dental implants in clinical practice and means employed to identify an implant in cases of unavailable previous records. Similarly, no attempts have been done in literature or by implant manufacturers to suggest a universal system to standardize implant nomenclature and documentation. This article attempts to fulfill both the objectives for the first time in literature.

The dental record contains personal and dental treatment information generated by the practice and is indispensable to deliver quality patient care and follow-up. Dental records can also be used for forensic purposes and have importance in teaching, research, and legal matters.[8] The importance of uniform terminology and nomenclature for a profession cannot be an overemphasized concept. It is essential for effective communication and efficient searching in computerized databases using commonly accepted terms and keywords.[9]

The literature is limited on the standardized method of dental implant record-keeping with worldwide acceptance. The survey assessed 104 implant practitioners with 58.7% having >5 years of implant experience. Adin, Nobel Biocare, and Osstem were the three most commonly used implant system. More than one implant system was commonly used by clinicians which makes implant identification a serious problem in clinical practice.

The present survey found that implant clinicians were commonly using conventional methods of record-keeping on patient treatment cards and clinic records which are challenging to retain for patients' lifetime and are incomprehensive and prone to get misplaced or lost. The use of electronic medical records systems in the practice was found to be limited.

The majority of implantologists use their clinical judgment or consultation of a professional colleague to identify implants in cases of insufficient or unavailable records. This method is time-consuming, unpredictable, prone to human errors, and is impractical with an increasing number of implant systems presently available. Other methods like assessing implant manufacturer's websites and internet sources consume patient's chair time and decrease clinician productivity. Implant recognition software is a good aid that uses radiographs for identifying implants but they have limited implant systems database, are expensive, time-consuming, and do not provide precise and complete details. Most of the respondents believed an imperative need for a uniform standardized system of implant identification, numbering, and nomenclature, and a global database of all implants placed worldwide.

The Sharma Jhingta implant identification, numbering, and nomenclature system proposed by authors provide detailed yet systemic information about the implant. The system is easy to

use, learn, and communicate. Its universal acceptance and use will ensure a uniform method of communication, documentation, and reference with regard to dental implants and associated prosthesis. Implant manufacturers maintaining records of patients and placed implants using the same Sharma Jhingta IINN system will be instrumental for future references that can be assessed globally. The system can also be used in the field of forensic dentistry. The authors suggest the article be treated as a baseline document that can be used in other parts of the world to identify challenges faced in dental implant identification and to test the validity of the Sharma Jhingta IINN system. The limitation of this study is the small sample size used in the survey and less response rate achieved.

Conclusion

The need for universal implant identification and nomenclature systems is irrefutable. A universal system of implant identification is need of the hour, enabling dentists, patients, and participating third parties to accurately identify a particular implant and historically record, follow, and communicate its bio-clinical status. The advantage of using the Sharma Jhingta IINN system is that it is easily understood and can also be practiced in clinical situations without difficulty.

Acknowledgments

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