Big data in implant dentistry— "We are standing at the beginning"

An interview with Prof. Arjan Vissink on the current state of big data in implant dentistry

Big data and artificial intelligence in implant dentistry have become significant topics in contemporary discussions. In this interview, Prof. Arjan Vissink, a renowed oral and maxillofacial surgeon from the Faculty of Medical Sciences of the University of Groningen in the Netherlands, provides an insightful exploration of this subject. He delves into the current state of big data in implant dentistry, its future uses and its challenges.

Prof. Vissink, what possibilities does big data offer in dentistry right now, and what does the future hold?
Very few studies have used big data in implant dentistry. We are standing at the beginning. Not much can be said yet of the impact of observations from big data in implant dentistry with regard to diagnostics, risk profiles and prognosis. So far, there has only been cursory study done in this area. Some aspects explored include implant type and diameter used (irrespective of the brand), indication and application, for example immediate or delayed loading, and whether bone augmentation was needed, in addition to general health perspectives, such as smoking, diabetes, immunological diseases, radiotherapy in the head and neck region, and bisphosphonates, with regard to overall implant survival. It has also been investigated whether an oral surgeon or periodontist has a better implant outcome, but the indications for implant placement were not assessed. Whether implants are good solutions in elderly patients has also been studied, specifically for supporting prosthetic restorations and how underlying diseases could compromise the outcome in this situation. The data reported so far is not sufficiently robust to guide decision-making.

Technical innovations are being developed faster than ever before. When will big data be more commonly used in dental practice?
At the moment, there is no direct use of the results of big data studies in implant dentistry for daily dental practice. Only very rough overall data is available, and it is not tailored to the individual patient. There is no data available on immediate or delayed placement, immediate or delayed loading, one- or two-stage procedures, or when an implant site should be considered compromised, etc. We should first begin to better record implant procedures, restorations, procedures used in the upper and lower jaw, situations that necessitate bone regeneration, the implant platform used and more. From such data, better general conclusions could be drawn, and eventually, better recommendations for the individual patient could be made. Although innovations are evolving rapidly, it will be quite some time before the dental practice and the individual patient in particular will benefit from these achievements.

Can you share some tips for dental professionals who want to get more involved with artificial intelligence and the use of big data?

all implant-specific data could be added to that database. An example of big data documentation is the case of the database used for patients with Sjögren's syndrome, a rare autoimmune disease affecting, among other things, the eye (keratoconjunctivitis sicca) and the mouth (hyposalivation, xerostomia). More than 15,000 well-classified Sjögren's patients are anonymously registered in a very valuable database documenting their disease. Those responsible for using the data and writing arising research reports have no access to the patient files. When data is missing or incomplete, the treating clinician is asked to provide the missing data where possible. Financially, there is barely any support.

What are the three most vital things about big data's role in implant dentistry to remember?
Big data in implant dentistry is just getting started. There is no generally approved protocol as to what parameters to evaluate and how to score. First, the content of the questions through which data will be gathered must be arranged, in addition to determining how those responses will be reported.

Thus far, only very general trends have been reported with regard to implant dentistry.

We have to agree on the creation of a standardised database in which all results related to implant treatment will be recorded.

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Dentists should first start with a uniform description of procedures, such as a standardised questionnaire for the initial data collection for as many patients as possible. Better conclusions could be formulated from such data even if they are not yet tailored for the individual and apply just at a group level. It will take much longer before the conclusions drawn from big data research will have a direct impact on individual patient care.

What challenges does the use of big data in dental practice entail?
Big data in implant dentistry is in its infancy. First, a standardised database should be designed in which all details of implant placement and restoration can be recorded in a standardised manner. Standardisation of the data entries will be a starting point for many future studies. Next, dentists who place implants and/or make the prostheses for these implants should take the time to create a record in the database for every patient they treat. Time spent on building the database is time that cannot be used for patient treatment, but it will bring implant dentistry further in the long run. Once the data entry process becomes routine for the dentist, the time requirement will become minimal.

The use of modern technologies also raises concerns regarding data protection. How can this issue be addressed? And are there any other issues that need to be considered when handling personal medical data?
All data can be collected in an anonymised way. We must ensure that insurance companies or organisations who could gain financially cannot access this data. For example, all patient data could be coded in the database using a code only known by the treating physician. Thereafter,

about the interviewee

Prof. Arjan Vissink is a renowned expert in oral medicine at the University Medical Centre Groningen in the Netherlands. His extensive expertise in implantology and reconstructive surgery has led to significant contributions in these fields. Globally recognised, he is frequently invited to speak at international conferences and has authored numerous publications.

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