

Diagnostic Codes in Dentistry — Definition, Utility and Developments to Date

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A b s t r a c t

Diagnostic codes are computer-readable descriptors of patients' conditions contained in computerized patient records. The codes uniquely identify the diagnoses or conditions identified at initial or follow-up examinations that are otherwise written in English or French on the patient chart. Dental diagnostic codes would allow dentists to access information on the types and range of conditions they encounter in their practices, enhance patient communication, track clinical outcomes and monitor best practices. For the profession, system-wide use of the codes could provide information helpful in understanding the oral health of Canadians, demonstrate improvements in oral health, track best practices system-wide, and identify and monitor the progress of high-need groups in Canada. Different systems of diagnostic codes have been implemented by program managers in Germany, the United Kingdom and North America. In Toronto, the former North York Community Dental Services developed and implemented a system that follows the logic used by the Canadian Dental Association for its procedure codes. The American Dental Association is now preparing for the release of SNODENT codes. The addition of diagnostic codes to the service codes already contained in computerized patient records could allow easier analysis of the rich evidence available on the oral health and oral health care of Canadians, thereby enhancing our ability to continuously improve patient care.

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This article describes diagnostic codes and outlines how they might be used in the practice of dentistry. Diagnostic codes are computer-readable descriptors of patients' conditions. They can be a series of letters (alpha characters) or numbers, or a combination of both (alphanumeric characters). The main requirement is that each code uniquely identifies a diagnosis or condition that would otherwise be written in English or French on patients' charts. Ideally, to avoid interpretation errors, the examiner would enter the diagnostic codes onto the computer-based patient record at the time of the diagnosis.

Dentists in Canada are familiar with codes that represent longer descriptive phrases. The CDA's Uniform System of Codes and List of Services (CDA-USC&LS)¹ performs the same function in identifying the dental services provided to patients. The CDA codes uniquely identify dental services that otherwise would have to be described in words. The service codes facilitate the recording of the services in the patient chart, the preparation of patient invoices and the

transmission of billing information to third-party carriers for patient reimbursement.

The potential of diagnostic codes resides in the wealth of information they contain. They would obviously be tied to patient identifiers and the date of examination. They would be entered in the patient's computer-based record along with the service codes identifying the care provided. The diagnoses made at follow-up or recall examinations would also be entered, thereby ensuring that the patient's record of diagnoses and subsequent care is kept up to date in computer-readable files.

With successive examination and treatment cycles, dentists would have readily accessible information on the types and range of conditions affecting their patients and the changes in those conditions as individual patients respond to different types of care. Not all diagnoses would require the provision of a service; for example, Fordyce granules or a torus palatinus are conditions where a diagnosis is not followed by care.

Utility of Diagnostic Codes

The use of diagnostic codes should lend precision to the recording and storage of diagnostic information. It should also improve standardization and produce efficiencies. No doubt longer descriptive diagnoses (of the kind “multiple white spot lesions on smooth surfaces of permanent teeth”) can readily be stored on the patient record. However, when the same information is contained in 4 or 5 characters, storage space, at least on the computerized chart, is reduced significantly. Furthermore, the same information is always recorded in the same way when diagnostic codes are used. For example, the above diagnosis, if recorded in words on the computer record as “several white spot lesions on the buccal surfaces of permanent teeth” would be tabulated as a different condition just because the words are different.

How Would Diagnostic Codes Be Useful to the Individual Practitioner?

Dental diagnostic codes are not commonly used and no studies have been conducted to demonstrate either their utility or their limitations. However, diagnostic codes have the potential to help individual practitioners enhance patient communication, track clinical outcomes and monitor best practices.

Communicating With Patients

Diagnostic codes offer a consistent, comprehensive, computer-readable list of all of the identified conditions or diagnoses made during a visit. The computer could be programmed to print a summary of the diagnoses that the practitioner would then review with the patient and give him or her to take home — a means of ensuring diagnostic information is communicated accurately in terms the patient can understand. This protocol would also provide evidence of that communication for medico-legal purposes. Explanatory text could be stored in the computer and related to each diagnosis to inform patients in plain words of their condition and the types of treatment available.

Tracking Clinical Outcomes

As the database of a particular practice builds over time, a practitioner could begin to use the information accumulating in the computerized records to assess the effectiveness of his or her care. By using diagnostic codes, a dentist would have the capacity to compare the outcomes of patients with a common diagnosis to:

- determine what level of severity of the condition was associated with poor prognoses;
- identify which types of concurrent diagnoses were associated with slower healing;
- learn what types of services provide better outcomes; or
- document what types of services provide longer lasting outcomes.

Matching Care to Best Practices

Where clinical guidelines are published for certain conditions, or the appropriate care has been demonstrated through clinical decision analyses, dentists could again access their own computerized records to compare their pattern of care to the guidelines to:

- identify the gaps between their current pattern of care and the recommended pattern; and
- monitor the changes in their practices as they improve their patient care.

How Would Diagnostic Codes be Useful to the Profession?

The profession as a whole can benefit from computerized diagnostic codes since the codes would provide dental health care information on a regional, provincial or national basis. To illustrate, if the diagnostic data were aggregated across Canadian dental practitioners, the profession would be able to accumulate information on clinical outcomes and best practices for the dental health care system as a whole. Because the data would be obtained from a wider assortment of patients, conditions that are less prevalent, and the services provided to treat them, could be examined on a wider scale. Of course, to ensure confidentiality, patient and provider identifiers would need to be scrambled so that no findings could be linked to an individual. Such information would be helpful in understanding the oral health of Canadians and demonstrate improvements in oral health.

Reporting on the Oral Health of Canadians

System-wide data could allow for an electronic disease-surveillance system across communities, provinces and territories, and Canada as a whole. Even though the information from such a surveillance system would have to be adjusted to account for the poor, the elderly and the relatively unhealthy, who visit the dentist less often,² it would allow the profession to identify the areas of higher disease prevalence and incidence across the country. With information collected over a number of years, we could better describe the natural history of dental diseases and report on the changing oral health of Canadians. Such information provides the basis to plan for preventive and treatment programs, and helps to determine the numbers of, and the training required for, dental care providers.

Demonstrating Improvement of Oral Health Outcomes

System-wide data would also allow the profession to demonstrate the beneficial effects of dental prevention and care as well as the return of society's investment in training dental health care providers and in providing dental health care services.

Identifying and Tracking Best Practices

With such data the profession could assess the extent and severity of dental conditions, develop consensus on the best practices to treat the conditions and track their success. For example, based on diagnostic code data, we could estimate the number of children susceptible to pit and fissure caries on first permanent molars. Best practices might state that these children should receive sealants, and a profession-wide initiative established to achieve sealant applications for, say, 95% of such children within one year of the permanent teeth emerging. As the data flowed in, the records could be examined as to which regions are achieving that result and which regions need to adjust their practices to meet that goal.

Identifying and Tracking High-need Groups

A natural extension of this process would be to identify which groups of people (grouped by age, sex, region) bear the greater burden of illness. Such identification would allow the profession and health authorities to increase efforts to deal with the underlying causes of the excess morbidity, provide more care and track improvements as they occur.

Work Done to Date

The international system of diagnostic codes exists in the Application of the International Classification of Diseases to Dentistry and Stomatology (ICD-DA) system of the World Health Organization.³ While extensive, the codes are scattered throughout medically oriented groups of diseases, are not specific as to primary or permanent teeth, and have no inherent logic to their construction.

A search of the topic revealed 2 English-language articles^{4,5} in Medline, one article in German⁶ and one unpublished report⁷ that describe diagnostic codes. All present systems of diagnostic coding were developed in clinical programs by program managers to document patient data. The Hemprich⁶ system has 126 alphanumeric codes that are particularly useful for oral and maxillo-facial surgery. Gregg and Boyd⁴ provide 41 diagnostic codes that are part of a larger computer program designed for the clinical audit of pediatric dental patients in hospitals in the United Kingdom. Both their codes and the Winston-Salem codes⁷ are based on individual patient's conditions, but we found they lacked specificity.

The Toronto system⁵ is numeric (4 digits) and was developed for use in the former North York Community Dental Services, a school-based pediatric dental program. The first digit indicates the major category (e.g., 0 = caries, 1 = conditions associated with previous restorations, 2 = other conditions of hard tissues). The second digit indicates the classification of the major condition (e.g., 01 = early carious lesion on smooth surface, 02 = early white lesion on pit and fissure surface). The third digit

usually indicates whether the primary or the permanent teeth are affected and the last digit specifies the number of teeth affected or the severity of the condition.

The Toronto system follows the convention of the CDA-USC&LS, with increasing specificity of the description being signified with each digit to the right. The CDA-USC&LS¹ is constructed using a 5-digit hierarchical logical structure. The first digit identifies one of the 10 major categories of services — diagnostic, preventive, restorative, etc. The second digit identifies the type of service; for example, for diagnostic services the second digit identifies whether the service is a clinical exam, a radiograph, a diagnostic template, etc. The third, fourth and fifth digits add ever increasing specificity to the service description such that one 5-digit code uniquely describes one service. That code, along with the tooth identifier (numeric code) and surface descriptors (alpha code), describe the service and locate its application.

In the first year of testing the use of the diagnostic codes in the former North York Community Dental Services, we found that the codes were readily understood and easily used. We attribute this success to the fact that we built the codes on a paradigm that was familiar to the dentists. We also found that the computerized codes corresponded exactly to the written words in the patient chart — in many cases the dentist used the codes as shorthand for the written diagnosis on the chart. The codes were also consistent with the care that was provided subsequently. The codes are still being used by dentists in that region and a further evaluation of their use is underway.

The American Dental Association (ADA) has developed a system of descriptive dental codes, the Systematized Nomenclature of Dentistry (SNODENT). SNODENT codes are a part of SNOMED, a much larger system of coding medical conditions maintained by the College of American Pathologists. SNODENT is a comprehensive taxonomy that contains codes for identifying not only diseases and diagnoses but also anatomy, conditions, morphology and social factors that may affect health or treatment. An examination of a partial listing of the codes provided by the ADA (2001 e-mail from R Lapp to me; unreferenced, see "Acknowledgments") shows that dentists can code not only the dental conditions but also concurrent medical conditions and risk behaviours (e.g., diabetes, smoking behaviour) which might be expected to affect patients' oral health and to influence treatment decisions.

According to Robert Lapp,⁸ director of informatics for the ADA, the system "will be an integral part of the computer-based patient record and, therefore, will be composed of diagnoses, signs and symptoms and complaints. This provides the means not only for diagnostic coding, but when collected, compiled and analyzed, reliable diagnostic treatment outcomes data can be compiled.

It may also be used by third-party payers to eliminate the need for narrative descriptions and other attachments. Dental practice management systems are expected to incorporate SNODENT in their systems to maintain a comprehensive patient health record.”

There are approximately 6,000 SNODENT terms and 4,000 codes. They are alphanumeric with 7 or 8 characters, and are organized according to the etiology of the condition (genetic, infectious, trauma, etc.) (2001 personal communication from P Cannady; unreferenced, see “Acknowledgments”). Although SNODENT codes have yet to be released for general use, the ADA is proposing that they become the standard in the United States. With our close links to the United States, Canadian dentists may be asked to consider using the SNODENT system, and if accepted, the codes will become the Canadian standard as well.

Future Developments

The application of diagnostic codes in dental care will advance the developing science of dental informatics. Dental informatics is “the application of computer and information science to improve dental practice, research and education.”⁹ The field of dental informatics is likely to expand greatly as the computer-based storage of images (radiographs, photographs) and other information becomes more technologically feasible and cheaper for smaller dental office-based systems.

Up to now the rich information contained in patient charts has been available for study only by employing chart abstractors to retrieve the data, thereby involving great expense. As a result, practice-based information has seldom served as a source of data for studies. This situation is unfortunate since data in patient records have the advantage of reflecting the real world. The advances in data storage technology that make data storage easier and less expensive have also made it possible to consider such advances; in other words, the supply has created the demand for this information.

With diagnostic and service codes available in accessible format, the evidence derived from the information contained in the computerized records of Canadians would add to our ability to continuously improve oral health care for patients. ♦

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CDA's definition of oral health:

Oral health is a state of the oral and related tissues and structures that contributes positively to physical, mental and social well-being and the enjoyment of life's possibilities, by allowing the individual to speak, eat and socialize unhindered by pain, discomfort or embarrassment.

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