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Open Platform for A Longitudinal Study in Dental Implant

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Abstract

With aesthetical and functional aspects, dental implant is regarded as mostly effective treatment to restore missing teeth. Accordingly, a longitudinal study on the implant is important for both patients and dentists. However, because of the limitation in collecting cases and records, the studies concentrate on only one or few considerable variables. As an effort to solve these problems, we suggest an open platform model to facilitate longitudinal studies in dental implant. It unburdens researchers to collect, share, assess and utilize the related research and reported cases.

Keywords:

dental implants, dental research, information networks, methodology

Introduction

Despite of a short history, dental implant is considered as mostly effective treatment to restore missing teeth. With aesthetical and functional aspects, it is becoming more popular [1][2]. Accordingly, a longitudinal study on the implant is important to help a dentist choose a suitable operational option prior to therapy or manage patient's subsequent events such as a side effect and a failure. However, pinpointing factors of a success and a failure of dental implant is not simply determined because they are either very salient or monotonous. It is also a toilsome study that involves periodic observations of similar cases over long periods of time. Given the requirement for evaluating pre-examinations, treatments and re-call checks, the efforts become much weighted.

As an effort to solve these problems in a dental implant study, we propose an open platform for a longitudinal study to mitigate researchers' burden to collect, share, assess, and utilize the related research and reported cases. Our initiative, inspired by current paradigm to Web 2.0 [3], is in the pursuit of achieving a collaborative intelligence among dental implant researchers and practitioners. We also expect that the concept of an open platform provides solutions to the prolonged problem of the longitudinal study through massive data acquisition, broad ranging collection of cases, and identifying the repetition of the same cases.

Design of the open platform

The proposed open platform is primarily designed to effectively support a longitudinal study of a researcher. We are also objective to solve the problems which even appear at upper level studies. Before, describing the design of the platform, let us list general steps of the conventional studies.

(1) *Identification of a problem and modeling of a hypothesis from one's intuition or survey*: For example, a dentist observed a particular situation from his patients. The dentist constructed a hypothesis about causal relationship describing the situation.

(2) *Background research for a given problem*: To examine any previous work and refutation, the doctor searched MEDLINE and other online medical literature databases.

(3) *Collection of data*: The doctor decided to test the hypothesis by collecting the related data. He can gather the data, e.g., cases and surgical records, from direct hand contacts or some paper works published in conferences and journals.

(4) *Assessment of data quality*: To decrease a risk of bias, a series of data are classified through his own assessment.

(5) *Extracting data according to required form*: He makes an electronic data extraction form to format and to list extracted data into the forms.

(6) *Data synthesis*: From formatted data, he can identify whole connection between considerable valuables.

(7) *Result Interpretation*: Standardization and formalization are performed on the causal relationship identified from the study.

These series of steps require hard works and are sometimes even painful. It is mainly because of the difficulties of data collection, data extraction, and assessment of data quality. By employing the notion of the current web 2.0 and a collaborative intelligence, the platform will mitigate researchers' burden for these steps.

Functionalities of the platform

With postulated desiderata of the open platform for supporting efficient and effective longitudinal studies, the open platform offers functionalities described here.

- *Store & Categorization*: As a basic function, the platform stores and categorizes received data such as surgical reports, summarized records and performed research.
- *Search*: A researcher can easily find out a particular report, record and study through the platform. By a search with single and multiple factors, the platform should enable controversies to be easily caught.
- *Relatives*: A researcher can speculate the specific research and records related to a given problem. Based on the corresponding complications, research are summarized and shown.
- *Import/Export*: A researcher can import/export needed data. To be used in various applications, the data are formatted with an interoperable electronic document like XML and RDF (Resource Description Framework).
- *Collaborative assessment*: A researcher can appraise the study and record whether it is archived by an explicit evaluation method or methodology. The assessment is archived collaboratively to avoid unreliable data.
- *Extraction*: For his/her own research, a researcher can extract and sample specified data from the platform. It is able through an optional selection provided in a user interface.
- *Statistical view*: Statistical difference of selected data and variation of particular field are observed. It provides an overlook on the interested relation.

These functionalities unburden a large part of the steps for the study. For instance, a research can get an inspiration or a problem from the platform by seeking controversial arguments. He also can look for related research topics and results from it, then he can obtain data for the study from it, and so on.

Conceptual view of the system

The figure 2 shows a conceptual view of the system. In the platform, the main users can be divided into two groups; individual clinicians and research groups. Through the platform, individual clinicians can import their case reports for the qualification of their skill or reporting methods. The simple search of a case and an expectation using the case are other benefits individual clinicians can take. The other part of involver is serious research groups. To possess the every benefit of the platform, they may use total functionalities of the platform including a 'Relative', 'Collaborative assessment' and 'Extraction'.

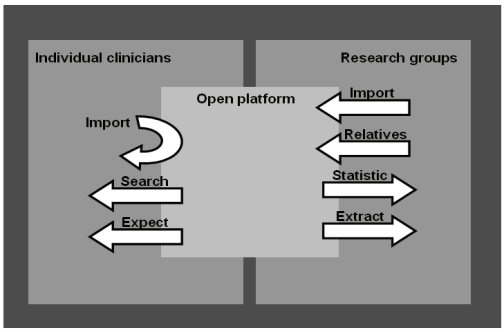

Figure 2 – Conceptual view of the open platform

Conclusion and discussion

We proposed an open platform for a longitudinal study in dental implant. By encourging involvment of positive participants, we expect the platform relieves the burdens to collect, share, assess, and utilize the research and cases for the study. We also have some concerns on keeping it as a sound platform. The first one is from a worry about unreliable and inaccurate data. Even the system employs collaborative assessments for evaluation; it is still remaining problems because of the user with mischief and unseriousness. Another problem is a free-riding of users. If every user wants to get something but to give anything, it will make a trouble in maintenance of the platform. These problems remain as significant challenges to develop a sound system.

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