Diagnoses and Procedures in Pediatric Surgery
At Your Fingertips: A Special Catalogue in the Intranet


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Schlüsselwörter: Diagnosen - Prozeduren - Kinderchirurgie - Dokumentation - Intranet.

Summary: Background: For an adequate documentation in pediatric surgery the international catalogues for diagnoses and procedures in medicine (ICD, ICPM) are often insufficient. In order to achieve a more detailed documentation and guarantee simple and safe usage a special catalogue was created and integrated into an intranet solution.

Methods: The hardware was supplied by the administrator of the clinic, all software necessary could be downloaded as freeware from the internet. The installation of client software at the workstations as so-called database clients was automatically achieved with the uploading of an internet browser. For integration of the database carrying the diagnoses and procedures in pediatric surgery, the author developed a middleware module which connected intranet and database.

Results: The prototype of the database was installed successfully. With the help of an extensive thesaurus diagnoses and procedures for pediatric surgery could be retrieved in a comfortable way by any internet experienced user. Therefore, the time for getting familiar with this tool was short.

Conclusions: Special catalogues of diagnoses and procedures in pediatric surgery could meet the requirements of the new health care guidelines in Germany. The Internet technology applied to a local network as an intranet allowed a simple integration of these catalogues into the process of documentation. People experienced little difficulties to start up working with the system because the interface was familiar. Since the software was downloaded as freeware, overall expenses were low. A later integration of this solution in a documentation system could be possible.

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Kinderrchirurgische Diagnosen und Maßnahmen
mit einem Mausklick:
spezifische Kataloge im Klinik-Intranet

Zusammenfassung: Grundlagen: Für eine sinngeleichte Dokumentation kinderrrheirurgischer Diagnosen und Maßnahmen erweisen sich die internationalen Kataloge (ICD, ICPM) oft als unzureichend. Es wurden daher spezifische kinderrirurgische Kataloge erstellt und in ein Intranet eingebunden, um eine einfache und detaillierte Dokumentation zu ermöglichen.

Methodik: Bezüglich der Hardware konnte auf vorhandene Geräte zugriffen werden, die benötigte Software wurde als „Freeware“ aus dem Internet bezogen. Als Client-Software auf den Arbeitsplätzen war lediglich die Installation eines Internet-Browsers notwendig. Um die in einer Datenbank hinterlegten kinderrirurgischen Diagnosen und Maßnahmen einzuholen, wurde von den Autoren ein notwendiges Kommunikationsmodul programmiert.


Schlussfolgerungen: Mit speziellen kinderrirurgischen Diagnosen- und Maßnahmenkatalogen können die Anforderungen des Gesundheitsstrukturgesetzes in Deutschland erfüllt werden. Die Internet-Technologie, angewendet auf ein lokales Netzwerk (Intranet), erlaubt eine einfache Integration dieser Kataloge in den Dokumentationsablauf. Aufgrund der gewünschten Benutzeroberfläche (Browser) war keine lange Einarbeitungszeit notwendig. Durch die Verwendung von Freeware konnten die Kosten niedrig gehalten werden. Weiterhin ist eine spätere Integration dieser Lösung in ein Dokumentationssystem möglich.

Introduction
After the commencement of the new structural health law in Germany, every diagnosis and procedure in medical institutions has to be documented and encoded within three days. Thus the administration can transfer these informations to the official health insurance to attain expenses. In our pediatric surgical department every diagnosis and procedure must be encoded following the international catalogues ICD and ICPM. But these catalogues often miss specifications for pediatric surgical concerns, and only in rare cases an accordant record in ICD or ICPM can be found.

In order to improve these short comings, a more detailed documentaion, special catalogues for diagnosis (KCD) and procedures (KCPM) in pediatric surgery were created, especially for the purpose of scientific and statistical evaluations. Furthermore, a reference to ICD and ICPM was included to meet the official guidelines.

Over a period of three years, more than 6000 protocols of operations were evaluated. All registered diagnoses and procedures were recorded in a database system and a primary catalogue was created. For every diagnosis (KCD) and procedure (KCPM) an extensive thesaurus was installed to improve the performance of later queries.

After several corrections, for every new verbalized diagnosis and procedure for pediatric surgery an analogous ICD-code or ICPM-code could be achieved. Meanwhile these catalogues contain more then 2500 diagnoses and 2500 procedures in pediatric surgery.

These catalogues were evaluated under real time conditions since 1.1.1998, documenting all diagnoses and procedures in our department of pediatric surgery according to KCD and KCPM. Furthermore, all diagnoses and procedures could be traced to the official catalogues ICD and ICPM. An intense internal controlling was performed to evaluate the output of our documentation. Together with the administration, an additional external controlling was implemented, verifying a very detailed and complete documentation, especially for economical concerns. These newly created catalogues were designed to fit in a database-supported retrieving tool, which was developed according
to our documentation system (1). The handling of complex queries was easy due to the extensive thesaurus and the comfortable interface. An advantage was, that every diagnosis was available for immediate use or later transfer. On the other side, on each computer, from which database queries should be performed, a client of the documentation system had to be installed. Consequently, additional efforts had to be accepted to support these computers, requiring time and money.

Often, only a simple query for a diagnosis and procedure was needed, for example to encode the information to paste them to the administration, not in our documentation system. This should be possible from every computer, even when no client was installed.

In order to reduce costs and support but to provide these special catalogues on every workstation in a comfortable way (2), a concept for an intranet, a HTML-based solution was created, which should meet the conditions according to a speedy, easy-to-use and platform independent client-server information tool (7).

Material and methods

The major task was to set up an intranet for pediatric surgical concerns. According to the experiences from the World Wide Web and the well-known interface of the Web browsers like Netscape (10) or Internet Explorer (11) our information tool had to be based on the approved web technology. Therefore, a Web server had to be installed, to provide our special catalogues on a database system and to transfer them into HTML documents, readable by every browser.

The server hardware was out of stock of our clinic. Due to high processor speed and reliable hardware we decided to use a PowerPC with 200 MHz and equipped with 128 MB RAM. In order to get the best performance we installed the operating system "Linux", which was downloaded from the internet as freeware (4). The web server software was "Apache" (3), the most frequent and best tested HTTP-server in the internet, which was freeware too. In order to manage the catalogues we had to look for a fast and SQL supported relational database system, and we found the freeware "PostgreSQL" to meet our requirements. "PostgreSQL" is a Object-Relational DBMS, supporting almost all SQL constructs, including subselects, transactions, user-defined types and functions. Meanwhile it is the most advanced open-source database available anywhere (6). In an ODBC environment like Microsoft Office "PostgreSQL" allows to execute queries, to show tables and columns, to edit informations simply and safely. At least, the communication software "PHP" (5) – a free developer kit – was installed. "PHP" is a server-side, cross-platform, HTML embedded scripting language which allows to generate dynamic WEB-Sites through the embedded HTML Code in a PHP document and to integrate database-links in a HTML document like in our solution. PHP-enabled web pages are treated just like regular HTML pages and the developer is allowed to edit them the way it normally can create regular HTML pages which happens to have a set of special HTML-tags available to include expanded functionality. With this programming language, a connectivity tool was developed to paste the queried informations into a browsable HTML document. Additionally, the layout of the dynamically generated web pages had to be constructed which was done by a free and simple text editor, "Nedit" (9). After writing a standard HTML document, the described HTML-tags (<?php; ?>) were included and the PHP script was inserted, for example:

```php
if (isset($qry)) {
    $qrystrings = split("+", $qry); ...
    // construct query
    $query = "select distinct on 'ICD 10-Code' icdl0.icdl0 ... 
    ... continued ...
    ";
</html>
```

On the client side, the installation of the needed software was already done by uploading an internet browser (see above).

Finally, our special catalogues had to be edited in such way, that they could be integrated into the relational database system, considering the mandatory ability for easy-to-perform updates.

Results

The prototype of these information tools was installed successfully within two months, not counting the time to develop the special catalogues. The latter was done within a former project over three years. The most time-consuming part of establishing this intranet solution was to program the PHP scripts, to test and to debug the database functionality. With the help of the common and easy to learn interface of the web browsers, the users didn’t have any problems to search for diagnoses and procedures. The query term had only to be entered in a special field and after clicking on a specific button, then the PHP-module managed the database research via a SQL query in an indexed thesaurus (Fig. 1). The query results were delivered integrated in a dynamically generated HTML document by the "Apache" web server supported by the mentioned PHP script.

Discussion

The internet technology applied to a local network as an intranet allowed a simple-to-use integration of the needed special catalogues for diagnoses and procedures in pediatric surgery. Meanwhile, most people are familiar with working with a web browser. This means, to search for diagnoses in a web based intranet retrieval system was very similar to searching for any informations on the internet (8). Thus the great advantage was that no additional costs for training the users incurred. Moreover, through the central and unique integrated mapping of the international catalogues (ICD and ICPM), the requirements of the new health care guidelines in Germany could be fulfilled within the documentation process, verified by an internal and external controlling, and systematical failure by individual references to ICD and ICPM could be dramatically reduced. Other obligatory catalogues for administrative concerns, for example in other countries, could be considered as well.

The total costs (TCO) of the presented retrieving tool were very low, all the needed software could be downloaded from the

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1 Structured Query Language, a database communication language

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**Fig. 1. Database query via www technology on an intranet.**

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