Optimizing Coding Quality: The Role of the Electronic Medical Record in the Context of Diagnosis Related Groups

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Abstract. In 2003, a new prospective payment system will be introduced in Germany, which is based on the Australian Refined Diagnosis related Groups (AR-DRGs). Physicians must code diagnoses and procedures themselves. Inaccurately or incompletely coded patient records can result in considerable underpayment, so enhancing physicians' coding compliance and competence seems crucial. Coding shall be well integrated in the electronic patient record, providing a simple interface with background information, which is invoked out of the clinical documentation. This paper describes an existing implementation and possible further development.

1. Introduction

Currently, inpatient hospital treatment in Germany is based on daily care rates, flat rates or special payments. The ambiguity, inhomogeneity and possible risks of abuse of this reimbursement system led the German Government to the decision to replace it with a performance-based payment system. Section §17b of the Hospital Financing Law ("Krankenhausfinanzierungsgesetz"), which is part of the healthcare reform ("Gesundheitsreform 2000"), announces essential changes in the hospital reimbursement practise [1;2]. As of 2003, hospital payment shall be founded on a German adaptation of the Australian Refined Diagnosis Related Groups (AR-DRGs). Originally, Diagnosis Related Groups have been developed to provide a basis for the measurement and evaluation of health care delivered in the acute care hospital setting. They constitute a description of hospital output in terms of classes of patients considered to be relatively homogeneous in their consumption of resources. As a prospective payment system they determine a hospital's case mix and its overall costs. Originating in the late sixties in the USA, the DRG technology has experienced an evolutionary development process where later generations of DRG systems have incorporated the improvements made by earlier generations [3;4].

The accurate documentation of the medical record plays an even increasing role: The hospital's reimbursement and its economical survival will depend vitally on the accuracy and completeness of the documentation of diagnoses, procedures and other relevant data like admission weight for infants and hours of mechanical ventilation. This important and potentially time-consuming task has to be well integrated into clinical routine, i.e. in the physicians' workflow in order to enhance their coding compliance and competence. The electronic medical record (EMR) is the ideal basis [5]: It should

- provide a single and comfortable interface to enter diagnosis and procedure codes,

- guide and teach the users in order to enter optimal codes according to the coding rules
- and embed coding in other tasks (like writing medical report, order entry, medical history taking etc.) so that clinical documentation will be optimally supported and "administrative" codes can be automatically generated in the background.

On the other side, one major reason for incorrect coding is that physicians think they have documented enough, but often their documentation is not sufficiently specific to assign a DRG. Embedding an electronic coding component, which provides automatic feedback on how the actually documented diagnosis and procedure codes influence the representation of a clinical case in a specific DRG may help clinicians to better understand the importance of accurate coding for finding the correct Diagnosis Related Group.

In this paper we describe an approach undertaken at the University Hospital of Münster, a 1500 bed maximum care facility, in order to implement a powerful and easy-to-use user interface within the hospital information system, which provides context-sensitive DRG-related information, linking it to existing external and internal information sources. We applied a two step procedure: First we implemented a powerful, web based grouping interface for an Australian grouping software. Then we moved forward to a close integration between this grouping platform and our clinical information system. The goal of this integration is the implementation of an "electronic coding expert" as mentioned above, without any extra data entry effort from the clinician.

2. Methods I – The Web-Based DRG Portal

Shortly after the decision to introduce the Australian Refined Diagnosis Related Groups system in Germany, the DRG Research Group at Münster university hospital set up a web-based DRG information portal[1] as a communication and information platform for researchers, clinicians, medical controlling and hospital administration. The bilingual, German-English website hosts a large variety of comprehensive and up-to-date information about DRGs and DRG-related themes, like coding rules and hints for their interpretation and application, a discussion forum, references to English and German literature and links to other websites. Current research activities and projects and their results are published regularly. It includes a coding tool for diagnoses and procedure codes and DRG-groups, a DRG webgrouper and many other features. Establishing this platform proved a great success, it averages more than 30.000 visits per month.

The core of the site and one of the most requested modules is the web grouper (Figure 1), which integrates seamlessly an original Australian grouping software: It provides an interface, where all relevant clinical data like diagnoses and procedure codes in the German classification systems (ICD10, OPS301 2.1), patient's sex and age, admission mode and weight, hours of mechanical ventilation etc. can be entered ① (see Figure 2). By pressing the button "Group it" they are sent to the Server ②. The Apache web server, running on a Windows NT server machine with php scripting language and a MySQL database management system[2], maps these data to Australian codes where necessary ③, builds a request string and sends it ④ to the Australian grouping software located on the same machine using Microsoft's Component Object Model (COM). The grouper processes these data and sends the results (grouping status, Diagnosis Related Group, Major Diagnostic Category, Patient Complication and Comorbidity Levels and many other information) back to the web server again ⑤, where those data are processed for HTML-output and

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[1] http://drg.uni-muenster.de, last accessed 2002-02-05
[2] http://www.apache.org, http://www.php.net, http://www.mysql.org, last accessed 2002-02-05

transferred to the web browser ⑥. The resulting page gives background information about the resulting DRG, interprets the coding quality, suggests possible corrections and links to different other sources.
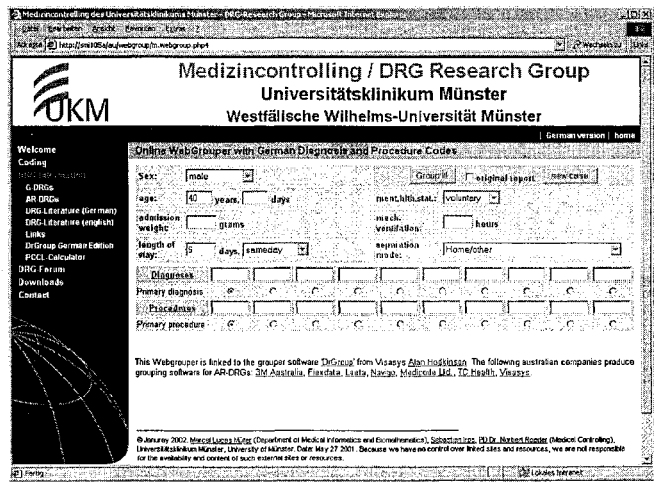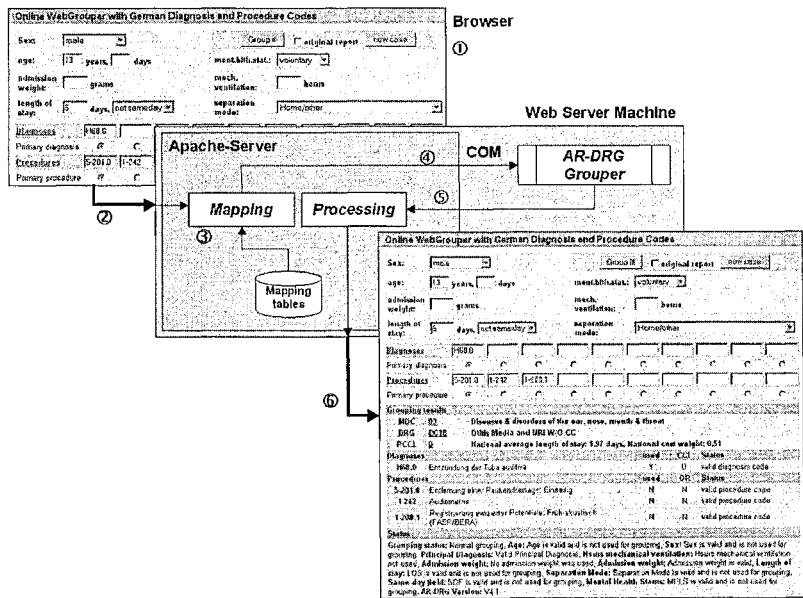

Figure 1: DRG Web portal with web grouper

Figure 2: Grouping process

This grouping platform enabled German clinicians and Medical Controllers to classify their own clinical cases interactively in order to better understand the Australian DRG-algorithms, without the need of re-coding German diagnosis and procedure codes beforehand to make them compliant to the Australian system. But obviously, manual data entry in such a web site is still an extra burden in a busy clinical environment. It would be

even better to have our web site invoked from the HIS, receiving all existing relevant patient data at the same time.

3. Methods II: Integration of the Web grouper in the HIS Environment

Having extensive experiences in integrating external information sources in commercial hospital information systems [6], we integrated the grouping platform mentioned above in our hospital information system (HIS), which is currently being introduced at Münster University Hospital [7]. It incorporates very sophisticated tools for defining "intelligent" data entry forms and includes the possibility of invoking external software products. Its data entry module development tools have been applied to define a new data entry form and to integrate it into the clinical workflow.

Figure 3: DRG Control Center

We built a "DRG Control Center" which acts as a single and common information platform for all DRG-related in- and output, integrating several functions:
- Diagnosis and procedure codes which have been already documented for a patient are loaded automatically into the DRG Control Center ① (see Figure 3).
- It provides an interface ② to enter all DRG-related codes like diagnoses, procedures, admission weight, admission status, hours of mechanical ventilation etc. in the EMR.
- A procedural link has been established to our Web based grouper, so on a single mouse click ③, all available relevant data from the EMR are sent to our web server, where they are processed as described above.
- Two context sensitive information links have been integrated as "info buttons" [8], linking directly (a) to the internal coding guidelines ④ which are available in our hospital's Intranet and (b) to the corresponding clinical guideline in the Internet[3] using the Guideline Search Engine[4] ⑤.

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[3] http://www.uni-duesseldorf.de/WWW/AWMF/ll/index.html, last accessed 2002-02-05
[4] http://www.guideline-search-engine.de, last accessed 2002-02-05

4. Discussion

Integration is a central challenge for clinical information systems [9]. McDonald [5] describes lack of integration as one of the core problems: "The sources of electronic patient information that do exist ... reside on many isolated islands". Other authors have presented examples for successful integration between information sources and clinical data (see e.g. [8]). We have presented an approach for integration between the electronic medical record, clinical coding requirements and clinical guidelines. Within one surface of the HIS, the clinician has access to guidelines for appropriate treatment of his patient, depending on diagnosis and procedure codes. At the same time, he may decide to perform a preliminary grouping process for his patient in order to receive feedback which DRGs might be applicable and which clinical data trigger this DRG assignment. Within the same surface he is able to immediately complete any missing data in the EMR and to receive again feedback in terms of altered DRG grouping and different therapy guidelines.

In this application, we use the EMR as a backbone integration tool to support required coding tasks and to govern diagnostics and therapy. Clinical data is reused to prevent redundant data entry and to achieve data integrity of the EMR. Clinical coding becomes a workflow integrated side process of clinical documentation which does not require undue effort of the clinician in addition to his normal workload. This is achieved in a composite environment of several independent applications and knowledge sources.

A changing healthcare environment in our country deems optimised coding quality a must for survival and prosperity of hospitals. It is our hope that tools such as the DRG control center may provide the basis for good clinical coding and may improve coding quality in clinical routine. But besides, DRG based treatment means also treatment according to approved clinical guidelines in order to assure successful and rapid health recovery for the patient. We should treat our patients in accordance with the best clinical evidence for therapy success. We think that we developed a good information and documentation basis for the clinician to support him with this task. It is clear however, that no computer system, no matter how good it may be, can assume the responsibility of the treating medical doctor.

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