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A decision support system for diagnosis related groups coding

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ABSTRACT

This study demonstrates that the utilization of a computer-aided decision support system (DSS) for diagnosis related groups (DRGs) coding called DRG-DSS, can both help coders to increase their coding quality and also reduce the time required to train them. However, an information system is of no real value if its intended users are not prepared to avail themselves of it. A quasi-experiment was conducted to evaluate the performance of the DRG-DSS in a hospital. Twelve DRGs coders were recruited and randomly assigned to experimental or control group to code 180 respiratory cases. Both object and subject-based indicators were used to measure the performance of DRG-DSS through a two-stage evaluation process. The results show that the DRG-DSS can effectively enhance the coding quality and all the users had a positive attitude with respect to the system's perceived ease of use and usefulness. Following presentation of the research findings, their implications and limitations are discussed, along with suggestions for future work.

1. Introduction

The Taiwanese government successfully established its National Health Insurance (NHI) in 1995 to provide effective and accessible medical care for the majority of its citizens. Since 1999 factors such as an aging population, increased demand for medical services, and restrictions on rising premiums created a huge disparity between income and expenditure for the Bureau of NHI. The Bureau of NHI thus attempted to reduce medical costs and make medical institutions more efficient by using the Inpatient Prospective Payment System (IPPS). Under the IPPS, each patient is categorized into a diagnosis related groups (DRGs) to help ensure the efficient allocation of medical resources. Each DRGs has a relative weight reflecting the anticipated cost of treatment for an inpatient in that group (CMS, 2009; MedPAC, 2007).

The Taiwanese version of DRGs (TW-DRGs) was developed in 2001 by the Bureau of NHI and was based on the Major Diagnostic Category (MDC). Twenty-five MDCs were produced with a total of 969 codes to gradually replace the fee-for-services (FFS) payment system. Selection of the DRGs codes is in accordance with the factors related to the consumption of medical resources. Five pieces of information on a patient's medical record feature in this context: principal diagnoses, treatments, complications and comorbidities (CCs), age and discharge status. Diagnostic codes are matched with DRGs codes in order to claim the appropriate fees. The factors that affect a hospital's ability to obtain reasonable reimbursement are the accuracy of patient's medical history, disease records, and the principal diagnosis provided by physicians. Therefore the coding quality of the DRGs has become the key factor in the claims process (Lai, Yaung, & Fan, 1998). Coding errors could result in a loss of income for the hospital and an unfair reallocation of resources, to the detriment of public health and institutions alike. Some hospitals claim inflated expenses or redistribute their coding to ensure they receive higher medical payments. Such behavior is referred to as DRG Creep.

The current rate of incorrect DRGs coding in Taiwan is 52%, which is much higher than that of the USA, which stands at 20.8% (Lai et al., 1998). One of the many factors that account for this disparity is that DRGs coding staff in Taiwan usually have a heavy workload and perform multiple tasks, such as cancer registration, editing annual statistical reports, claiming NHI reimbursements, and so on. Hence they have insufficient time to read entire case histories or patient records. Moreover, the DRGs coding process is rather complicated, and the calculation of the optimal code requires considerable professional experience. A heavy workload combined with a lack of attention or effort, may adversely influence the accuracy and completeness of the coding. Another factor is lack of computer assistance, which makes it difficult to improve the reliability of disease classification coding and auditing. Consequently, many hospital managers use information technology to improve their coding performance and eliminate biases.

Decision support systems (DSS) are expected to enhance the effectiveness of decision-making (Todd & Benbasat, 1992) and help

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decision-makers by offering access to information, model analysis, and support tools (Alter, 1977; Keen & Scott-Morton, 1978). Such systems can help address problems related to unstructured or semi-structured decisions (Keen & Scott-Morton, 1978), decisions involved in DRGs coding are one of a kind.

However, user acceptance is required in the first instance to fully realize the value of an information system. The purpose of this study is to evaluate a computer-aided DRG-DSS that was implemented in a hospital containing 800 beds to assist staff members with DRGs coding, especially in regard to the selection and determination of accurate of a principal diagnosis, the optimization of DRGs coding, decrease of error rate, and the identification of inappropriate coding. The respiratory tract diseases (DRGs category code MDC4) were chosen as test material because the Bureau of NHI analyses and reports showed that MCD4 dominated the claims from hospitals and consumed a large portion of medical resources. Therefore, the patient records relating to respiratory tract diseases in the case hospital were used in this experiment.

2. Research methodology

2.1. DRG-DSS

An expert panel consisting of two experienced DRGs coding experts with international disease classification licenses and two specialists in the medical information management discipline was used to enhance the validity of this study. The expert panel and senior users of the DRG-DSS were involved during the whole process of the system's development, in order to improve the chances of system success. A Graphical User Interface (GUI) was devised to create an easy operating environment, which would increase acceptance of the system and reduce training time of users. Figs. 1–4 show some of the DRG-DSS user interface screens.

The model base is an important core component in DSS, containing the logical rules that are necessary for decision-making support. Particular attention was paid to the selection of the principal diagnosis and the optimal DRG codes. Extensive explanations and suggestions were included to help coding staff make optimal decisions.

2.2. The quasi-experimentation

Two stages of DRG-DSS evaluation were performed in this study. Both subjective and objective indicators (Liang, 1986) were used to measure the decision-making performance. In the first stage, a quasi-experimental design was used due to the limited number of coders in the case hospital. The experiment was designed to follow the principles of "low intra-group variation, high inter-group variation and random sampling" (Babbie, 1998). Twelve coding staff members were recruited on account of their similar characteristics, such as their respective years of coding experience, and were then randomly assigned to the experimental (with DRG-DSS assisting in coding) and control groups. In this stage the objective measurements were the accuracy in selecting a principal diagnosis, the completeness of combining the optimal DRGs codes, and the time required for the coding. The three related hypotheses examined in this study are as follows:

H1. The average accuracy in selecting the principal diagnoses for two groups is different.

H2. The average accuracy in selecting the optimal DRGs codes for two groups is different.

H3. The average time spent on coding for two groups is different.

In the second stage, a questionnaire was used to assess the users' subjective recognition and acceptance of the DRG-DSS. Subjective indicators were obtained from the well-known Technology Acceptance Model (TAM) (Davis, 1989), such as perceived ease of use and usefulness of the system. Both objective and subjective indicators were reviewed and confirmed by the expert panel.

In the first stage, 12 qualified coding staff members were recruited and randomly assigned to the experimental or control groups to code 180 respiratory cases. The two experienced experts in DRGs coding previewed the 180 respiratory cases to ensure that they were appropriate for the experiment, and also provided accurate codes for each of the 180 cases. The experiment was independently performed without hinting the participants in advance so as to avoid any potential bias in the results.

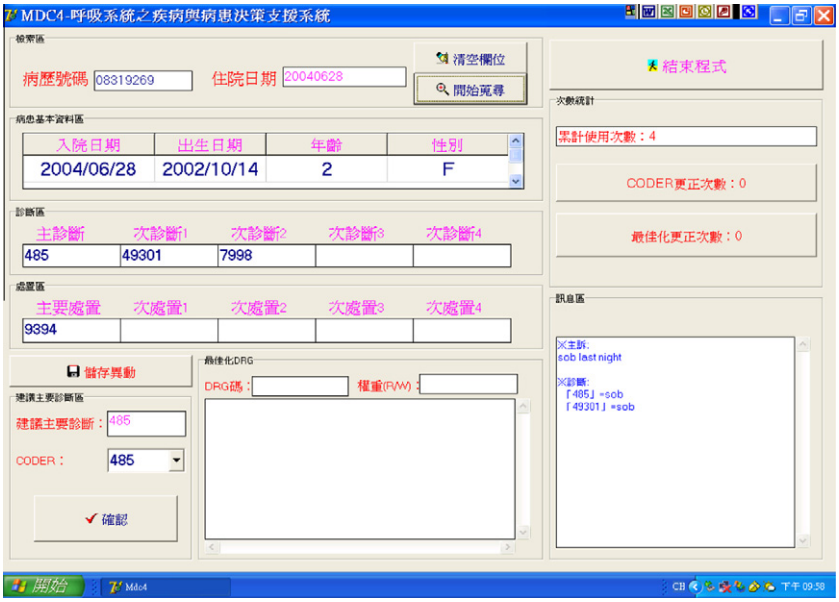

Fig. 1. System recommended primary diagnosis for users.