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Drug Dosage Adjustment Using Real-Time Renal Dosing System in Korea: Evaluation of the Early Stage of Application

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Abstract and objective

Medication error prevention using computerized physician order entry (CPOE) with clinical decision support system (CDSS) is known effective to reduce the incidence of adverse drug events (ADEs). In 2006, a renal dosing system was developed and implemented in Seoul National University Bundang Hospital (SNUBH) with a full electronic medical record (EMR) system. To assess the performance of the renal dosing system at the early stage and to analyze the system effects, alerts generated for one month were reviewed by clinical pharmacists retrospectively. Alerting rate was 5.4% and inappropriate alerts were 17.7%. Antihistamine and antimicrobials were mainly needed to adjust dosage. Users' acceptance and overriding rates were 32.4 % and 67.6% respectively. Despite of false-positive and overriding alerts, the renal dosing system adjusted considerable numbers of excess dosing in renally impaired patients and aroused physician's attention for safety.

Keywords:

Clinical Decision Support Systems (CDSS),
Renal Dosing System, Adverse Drug Events (ADEs),
alerts

Introduction

As the awareness of patient safety is increased, ADEs are considered as one of the most important problems to solve. CPOE with CDSS enables to reduce preventable ADEs by alerting at the time of prescribing. For the purpose of patient safety, we developed renal dosing knowledge base and implemented the renal dosing system in SNUBH. This study was designed to evaluate the first phase performance of the system and to identify physician's reaction patterns to alerts.

Methods

SNUBH is a 909-bed, secondary and academic hospital affiliated with Seoul National University of Medicine in Gyeonggi-do, Korea. Since the opening, it has adopted a full EMR system, BESTcare. After loading the renal dosing system in the prescribing environment, data of generated alerts during one month (September, 2006) was collected and reviewed retrospectively. Clinical pharmacists evaluated performance of the system by comparing prescribing dose with individual renal function and assessed physician's feedback patterns.

Results

The number of alerts generated during one month was 5,723 cases and 5.4% of total inpatients' prescriptions, and false-positive alert rate which didn't match criteria was 17.7%. Antihistamine (45.5%) and antimicrobial (17.0%) were main drug categories need to adjust dosage. Units occurred frequent alerts were Joint disease and Reconstruction Center and General Surgery; 18.8% and 14.2% respectively. Physicians' immediate and actual acceptance rates to alerts were 17.7% and 32.4%.

Conclusions

Alert rate of the renal dosing system (50%) was much higher than other types of medication-related alerts in terms of clinical decision support. False-positive alerts were mainly due to errors of study criteria and patient's information recorded in EMR. Considerable drug dosage adjusted within a few days after alerting, but many physicians still ignored alerts. It was accounted for insufficient applying of each medical unit's practice and medication used in procedure or operation. Despite of many limitations, the renal dosing system was meaningful in respect of trying preventable care in practice and beneficial effect of increasing physician's adoption of safer prescribing pattern. In conclusion, application of the renal dosing system adjusted inappropriate doses in many patients and affected physician's prescribing patterns. And further revision of the system and evaluation will be needed.

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