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ANALYSIS AND EVALUATION OF A RENAL FUNCTION-BASED DOSAGE ADJUSTMENT SYSTEM AT A UNIVERSITY HOSPITAL

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Background

- ✓ Renal insufficiency is relatively common among hospitalized patients, and is associated with an increase in hospitalization-related morbidity and mortality. Drug dosing errors are common in patients with renal impairment and can cause adverse effects and poor outcomes

OBJECTIVES

- ✓ The purpose of this study is to evaluate benefit of the Renal Function Based Dosage Adjustment System in a tertiary Hospital.

METHODS

- ✓ Single institutional, retrospective pre/post study conducted over 3 month periods within 9 years.
- ✓ AS of August 2006, the Renal Function Based Dosage Adjustment System which monitored drug prescription and generated real-time alerting window was implemented and has been operated well in tertiary university hospital in Korea. This system generated a real-time alerting window to monitor the appropriateness of drug prescription. Allows the physician to change or discontinue order or ignore
- ✓ Periods
  April 1 - June 30, 2006 (pre CDSS period)
  April 1 - June 30, 2007 (early CDSS period)
  April 1 - June 30, 2015 (late CDSS period)
- ✓ Data collection: electronically collected each time a clinician entered a prescription that triggered an alert
- ✓ We analyzed data of the 'alerts' of tertiary hospital's Healthcare information System and compared Pre-renal dosing system versus Post-renal dosing system from April to June 2006, 2007, 2015.
- ✓ Definitions
  inappropriate prescription: prescription that was greater than the recommended dose for a given indication
  accepted alert: prescription canceled or modified after the identification of the alerts

RESULTS

- ✓ Among the patients whose admission and discharge periods were included during the study period, 7,587 patients with a estimated glomerular filtration rate(eGFR) of less than 60 and were needed to dose adjustment according to the patient's renal function.
- ✓ There were a total of 309,976 prescriptions during the study period during pre CDSS period the rate of Inappropriate renal dosing prescriptions was 22% in 101,134 orders. For the early CDSS period, the alerts of Inappropriate renal dosing prescriptions was 17,169 (5.1 %) in 338,526 prescriptions For the late CDSS period, the alerts of Inappropriate renal dosing prescriptions was 7,506 (1.9 %) in 387,750 prescriptions.
- ✓ The prescriptions were ordered on a daily basis and it was highly likely that the same drug will be repeatedly prescribed in the same patients, when regarded as only first medication prescription in an individual patients, the rate of inappropriate prescription was 8.7% in 2006, 7.4% in 2007, and 2.7% in 2015.
- ✓ The acceptance rate was 26.4% in the early CDSS period and acceptance rate was 39.4% in the late CDSS period.
- ✓ The drug classes that most frequently generated alerts and inappropriate prescriptions were H2 blockers followed by antimicrobials and hypoglycemic.

AUTHOR DISCLOSURES

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or in direct interest in the subject matter of this presentation:

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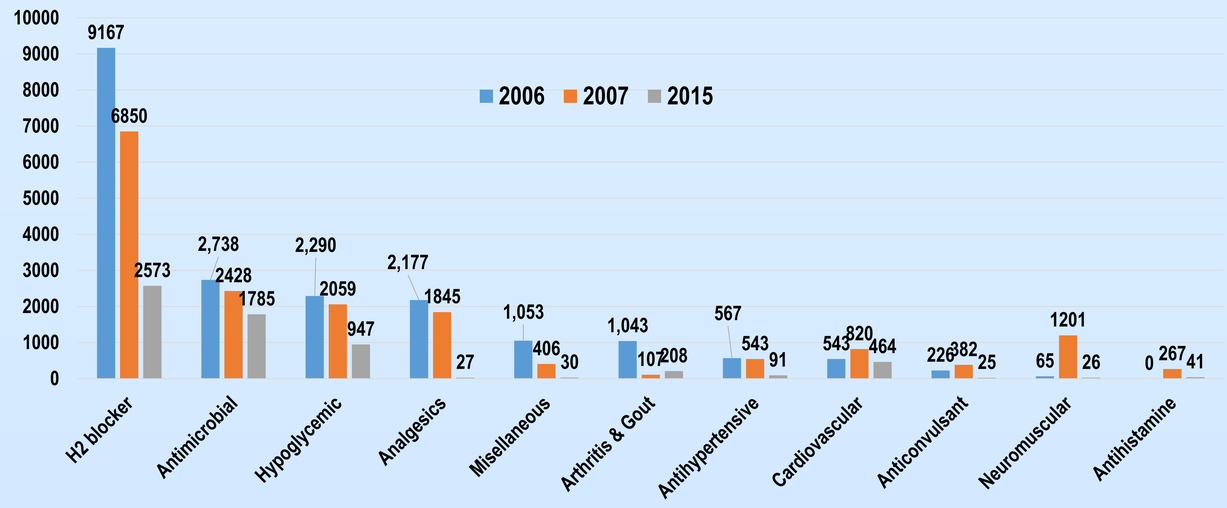
The drug classes that generated alerts



Acceptance rates for Interruptive alerts

	early CDSS period (April to June. 2007)	late CDSS period (April to June. 2015)
No of total orders for inpatients	338,526	387,750
No of total Alerts (% of total orders for inpatients)	17,169 (5.1 %)	7,506 (1.9 %)
No(%) of orders Canceled	2,782 (16.2 %)	1,374 (18.3 %)
No(%) of orders Modified	1,751 (10.2 %)	1,584 (21.1 %)
No(%) of Alert Accepted	4,533 (26.4 %)	2,958 (39.4 %)

Characteristics of study population

Characteristic	Pre CDSS period (n= 2,283), n (%)	Early CDSS period (n= 1,107), n (%)	Late CDSS period (n= 1,041), n (%)
Male	965 (42.3)	457 (41.3)	485 (46.6)
Age			
30-39	27 (1.1)	4 (0.4)	6 (0.6)
40-49	88 (3.9)	12 (1.5)	20 (1.9)
50-59	324 (14.2)	26 (2.3)	70 (6.7)
60-69	819 (35.9)	107 (9.7)	131 (12.6)
70-79	786 (34.4)	370 (33.4)	414 (39.8)
80-89	150 (6.6)	459 (41.5)	356 (34.2)
> 90	89 (3.9)	129 (11.7)	44 (4.2)
Renal function			
> 50 ml/min	389 (17.0)	209 (18.9)	258 (24.8)
10-50 ml/min	1,840 (80.6)	825 (74.5)	699 (67.1)
< 10 ml/min	54 (2.4)	73 (6.6)	84 (8.1)

Discussion

- ✓ In terms of drug class, the most frequently generated alert was from H2 antagonists such as ranitidine and famotidine followed by antimicrobials and hypoglycemic agents. These findings were similar to previous studies on prescriptions for patients with reduced renal function, which found that the most frequently inappropriately used drugs were metformin and glyburide along with ranitidine. In the antimicrobials category the most frequently generated alert medication was cefazoline, followed by piperacillin/tazobactam
- ✓ The acceptance rates may mean that the threshold of the system is lower than other decision system. Initially, one of the purposes of the system was to educate residents and to provide appropriate pharmacotherapy to patients with reduced renal function by informing physicians of changes in renal function.
- ✓ It is not mandatory entering the prescription override reasons for the alerts, most of physicians override without documenting the reasons. However, several examples of the most frequent override reasons were the followings: will monitor/manage the clinical condition, pre-operative prophylactic antimicrobials, the patient's kidney function expected to improve, stress ulcer prophylaxis, gradual dosage adjustment.

CONCLUSION

- ✓ The current system may be practically useful in the improvement of the safety in renal insufficient patients resulting in the realization of the effective pharmacotherapy.
- ✓ To improve clinical acceptance of alerts, this system should strive to maximize effectiveness of alerts/ minimize over-alerting

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