Drug Dosage Adjustment Using Real-Time Renal Dosing System in Korea

Evaluation of the Early Stage of Application

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Introduction

- Patient Safety
  - One of the most important challenges facing health care today
  - An increasingly recognized opportunity for stakeholders in improving quality of health care delivery
- Key solution of adverse events related to inappropriate prescribing: CPOE linked to CDSS
- Effect of CDSS for patients with renal insufficiency
  - NEPHROS study
    - Improvements in appropriateness of dosing(54→67%) and frequency (35→59%)
    - LOS 0.5 days shorter

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Methods (1/3)

- Study sites
  - Seoul National University Bundang Hospital
    - 909-bed, secondary, teaching hospital
    - Geriatric patients oriented
  - Operating full electronic medical record system with medication-related decision support systems

- Implementation of renal dosing system
  - Development of renal dosing knowledge base
    - Pilot-test
    - Expert panel review
  - Put into operation of renal dosing system at August 24, 2006
    - Adult (age $\geq$ 12) inpatients only
    - 2 renal function categories: moderate & severe renal impairment (GFR $\leq$ 50 mL/min)

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Methods (2/3)

- Data collection
  - Study period: September 1~30, 2006
  - Study population: 4,159 inpatients of September
  - Electronically collected logs data whether generated alerts by the renal dosing system

- Evaluation
  - Patient's chart review by clinical pharmacists
  - Performance
    - Appropriateness of renal dosing alerts
  - Clinical impact
    - Acceptance rate of renal dosing alerts
    - Cause of ignorance

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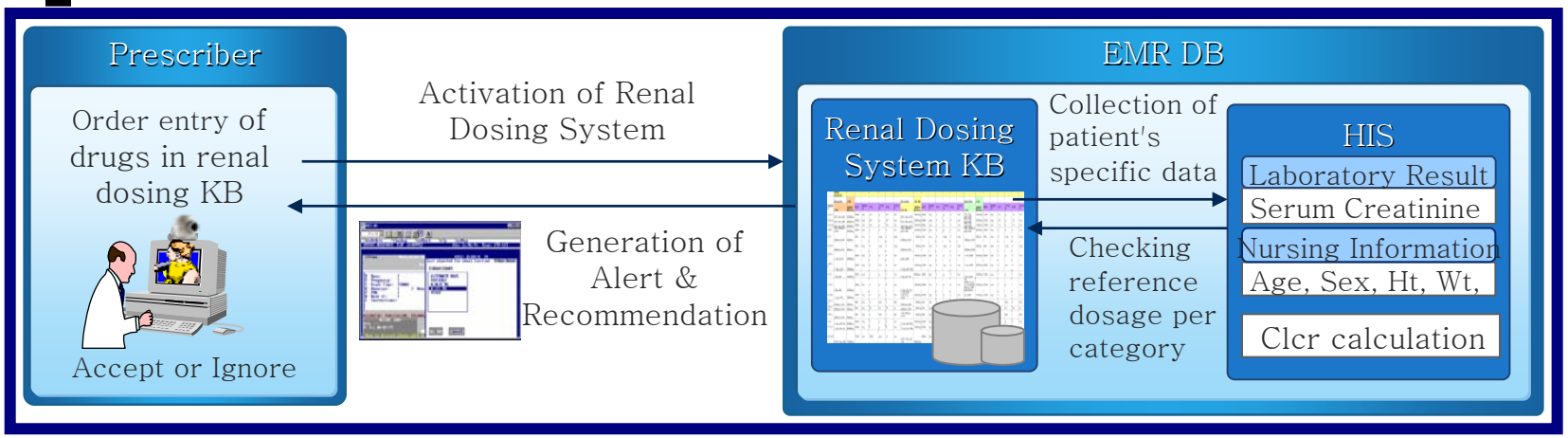
Methods – Study Flow (3/3)



Data Collection and Chart Review
Appropriateness of alert, Prescriber's Acceptance

Outcome Evaluation
Performance and Clinical Impact
of Renal Dosing System

Renal dosing system Evaluation and Revision

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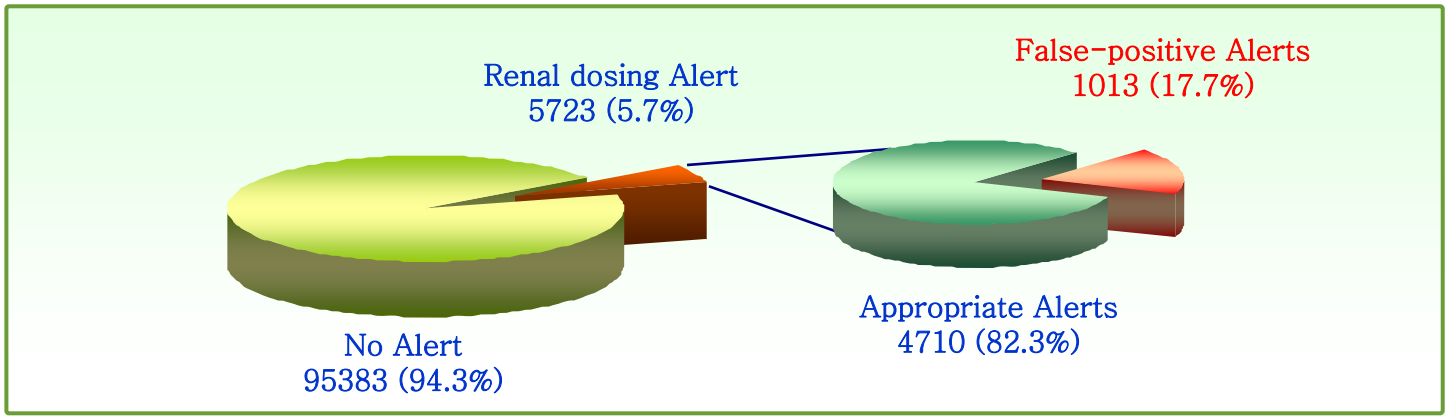
Results (1/3)

- Alert rate of renal dosing system - 5.7%
  - 5,723 alerts/101,106 inpatients' prescription for a 1-month

- Analysis of system performance
  - False-positive rate which didn't match criteria – 1,013 alerts
  - Error rate of renal dosing alerts – 17.7%

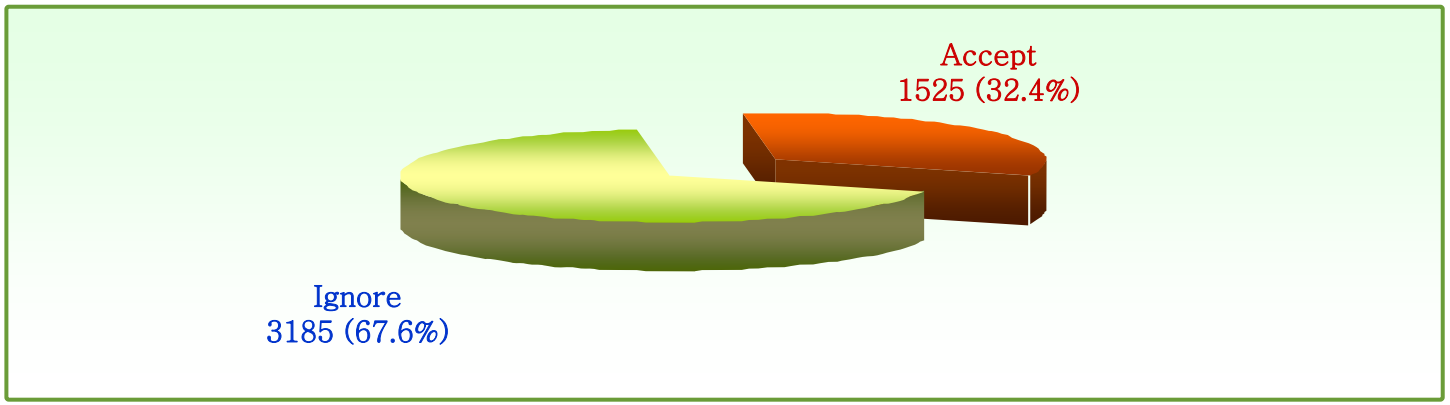
Renal dosing appropriateness alert rates



Results (2/3)

- Analysis of clinical effect
  - Chart review of 4,710 appropriate alerts/385 patients
  - Immediate accept rate (by computer logged data) – 17.7%
  - Ultimate accept rate (by chart review) – 32.4%
- Reason of ignore to alert
  - Therapeutic/temporal use, Don't know why
  - Just below borderline case & Set order

Accept rate of renal dosing alerts



Results (3/3)

- Main drug categories need to adjust dosage
  - Antihistamine – 2, 124 case (45.5%)
  - Antimicrobials – 803 case (17.0%)
  - Hypoglycemic agents – 410 case (8.7%)

- Units occurred frequent alerts
  - Joint disease and Reconstruction Center – 18.8%
  - General Surgery – 14.2%
  - Urology – 12.3%

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Discussion (1/2)

- Low alert rate of renal dosing system (5.7%)
  - Application of strict alerting rule: GFR ≤ 50 ml/min
  - Existence of several medication-related CDSS

- High error rate of alerts (17.7%)
  - Mainly due to error of GFR calculation based on confusion of selection patients' weight
  - Logic: If Actual body weight > Ideal body weight, then take ideal body weight

Discussion (2/2)

- Matters of low acceptance rate
  - Carry out re-test of patients' old renal function
  - Increment of consulting to specialist

  → Meaningful changes of physicians' prescribing behaviors and educational effect

- Issues of considerable ignorance rate of alerts
  - Insufficient applying of each medical unit's practice
  - Medication used in procedure or operation

- Main drug categories occurred alerts
  - Add specialized recommendation by specialist's consultation
  - Expectation of clinically valuable information for patient safety

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Conclusions

- Application of the renal dosing system
  - Adjusted inappropriate doses in many patients
  - Made a beneficial effect to physician's prescribing patterns

  → <u>Meaningful tool with respect to try for preventable health care</u>

- Future research issues
  - Revision of the system
  - Evaluation of economical effect

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