Is there a need for renal computerised clinical decision support in a university hospital setting?

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• The Project
• Baseline Audit
  – Method
  – Results & Analysis
  – Conclusion
BACKGROUND
Clinical systems that utilize data from pharmacy, laboratory, radiology, and patient monitoring systems to relay the physician’s or nurse practitioner’s diagnostic and therapeutic plans, and alert the provider to any allergy or contraindication that the patient may have so that the order may be immediately revised at the point of entry prior to being forwarded electronically for the targeted medical action.
BACKGROUND

-Electronic Prescribing & Medicines Administration Systems (EPMA)

Enabling Capabilities Total %age
1. Enabling Capabilities
2. Types of Medicines
3. Context of Prescribing
4. Medicines Administration
5. Prescriber Type
6. Medicines Optimisation
7. Secondary Use
8. Interoperability
9. Communication
10. Supply & Inventory Management
11. Decision Support

INNOVATION ADOPTION LIFECYCLE

Early Majority
Early Adopters
Late Majority
Innovators
Laggards

2.5%
13.5%
34%
34%
16%
“Match individual patient data to a computerised knowledge base that uses software algorithms to generate patient-specific recommendations that are delivered to healthcare practitioners.”

(Sahota et al., 2011)
THE PROJECT
To explore the opportunity to implement computerized clinical decision support (CCDS) for patients suffering from renal impairment, within a university hospital setting.
THE PROJECT

Objectives

- Is there a need for renal CCDS? By undertaking:
  - Pilot study
  - Baseline audit

- Develop renal CCDS rules that alert for drugs
  - That require dose adjustment in renal impairment as documented in the Renal Drug Handbook
  - That are ineffective in renal impairment

- Pilot renal CCDS

- Calculate the impact
BASELINE AUDIT
BASELINE AUDIT

- AIM

Identify prescriptions that did not adhere to the dosing guidelines outlined in the Renal Drug Handbook.
METHOD
METHOD

Drug Inclusion

Adjust Drugs:
0.125% Levobupivacaine with 2 microg/ml Fentanyl (via epidural pump), Acetazolamide, Amiloride Hydrochloride, Amoxicillin, apixaban, Bendroflumethiazide, Buprenorphine, Buprenorphine (Temgesic) tablets, Candesartan cilexetil, Captopril, Cefaclor, Cefalexin, Cefotaxime, Ceftazidime, Ceftriaxone, Co-amoxiclav, Codeine Phosphate, Diamorphine, Digoxin, Dihydrocodeine Tartrate, Enalapril Maleate, Enoxaparin, Eprosartan, Fentanyl Lozenges, Fluclaxacillin, Fosinopril, Furosemide, Gentamicin, Hydromorphone, Imidapril, Indapamide, Lisinopril, Losartan, Potassium Mannitol 10%, Mannitol 20%, Meptazinol, Metformin Hydrochloride, Methadone, Morphine, Neomycin Sulfate, Neoral, Olmesartan medoxomil, Oxycodone Immediate Release (Oxynorm), Perindopril, Pethidine, Piperacillin / Tazobactam, Quinapril, Ramipril, Rosuvastatin, Simvastatin, Spironolactone, Telmisartan, Tinzaparin, Tobramycin, Tramadol, Trandolapril, Valsartan, Vancomycin

Avoid Drugs:
Aceclofenac, Amikacin, Celecoxib, Diclofenac, Etodolac and Etodolac SR, Etoricoxib, Fungizone, Ibuprofen, Indometacin, Mefenamic Acid, Meloxicam, Nabumetone, Naproxen, piroxicam

No adjustment required (Removed):
Abelcet, Aliskiren, Ambisome, Atorvastatin, Bumetanide, Buprenorphine (BuTrans) patches, Buprenorphine (Transtec) patches, Cefuroxime, Eplerenone, Fentanyl, Fluvasatin, Heparin (all), Irbesartan, Metolazone, Prograf (BD Tacrolimus), Torasemide

Adjustment information not readily available (Removed):
Co-amilofruse 2.5/20, Co-amilofruse 5/40, Co-amilozide 2.5/25, Co-amilozide 5/50 Frusene, Sandimmun, tapentadol, targinac [oxycodone 5mg/naloxone 2.5mg]
METHOD
- Data Request

- 72 drugs potential renal CCDS

- Key information
  - Time period 12 months
  - Pt hospital number
  - Drug, dose, frequency, route – 1st dose, last dose
  - eGFR – 1st dose, last dose
METHOD
- Data Refinement

74,501 PRESCRIPTIONS
Excluded prescriptions:
• When required & One off

63,214 PRESCRIPTIONS
Excluded prescriptions
• Where adjustment was not required

4,919 PRESCRIPTIONS
Excluded prescriptions
• With only one dose

4,069 PRESCRIPTIONS & 25 Drugs
RESULTS & ANALYSIS
## RESULTS & ANALYSIS

### Drug

- **Day**
- **Month**
- **Prescriber Grade**
- **eGFR**
- **Time of Day**
- **Speciality**

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<tr>
<th>Drug Name</th>
<th>First Dose</th>
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<tbody>
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<td></td>
<td>Total doses</td>
<td>Discrepant dose</td>
<td>Rate</td>
</tr>
<tr>
<td>Amikacin</td>
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<td>2</td>
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</tr>
<tr>
<td>Bendroflumethiazide</td>
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</tr>
<tr>
<td>Fungizone</td>
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<td>100%</td>
</tr>
<tr>
<td>Ibuprofen</td>
<td>40</td>
<td>4</td>
<td>100%</td>
</tr>
<tr>
<td>Indapamide</td>
<td>1</td>
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<tr>
<td>Naproxen</td>
<td>9</td>
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<td>100%</td>
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<tr>
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<tr>
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<td>212</td>
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**Total** 4069  656  16%  4069  648  16%
RESULTS & ANALYSIS

-Time of Day (p<0.001)

Percentage Proportion

First Dose

Last Dose

0% 5% 10% 15% 20% 25%

0:00 - 7:59 8:00 - 12:59 13:00 - 17:59 18:00 - 23:59

Delivering the best in care

University Hospitals Birmingham
NHS Foundation Trust
RESULTS & ANALYSIS
-eGFR (p<0.001)

Percentage Proportion

- First Dose
- Last Dose

-<15
-15-29
-30-44
-45-59
-60-90

Delivering the best in care
RESULTS & ANALYSIS
-Speciality (p<0.001)

Percentage Proportion

Vascular Surgery
Urology
Trauma & Orthopaedic
Renal
Plastic Surgery
Oncology
Neurosciences
Maxillofacial Surgery
Liver
General Surgery & GI Medicine
General Medicine
Ear, Nose & Throat
Critical Care
Clinical Haematology
Cardiothoracic Surgery
Cardiology
Burns Surgery
Ambulatory Care

Last Dose
First Dose
CONCLUSION