Clinical pharmacy

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Disclosures

I have no disclosures relevant to this presentation.
Plan

Guy’s and St Thomas’ NHS Foundation Trust
Medicines are dangerous
Medicines on the National Agenda (UK)
What is clinical pharmacy
Clinical pharmacy activity
Clinical pharmacy outcomes
Developing clinical pharmacists
Adherence to medicines
Guy’s and St Thomas’ NHS Foundation Trust

1200 bed city centre secondary and tertiary care teaching and Academic Health Science Centre across 3 sites

Over 100,000 inpatients, 600,000 outpatient attendances, 160,000 ER attendances, 7500 babies per year

Over 12,000 staff, 1200 doctors, 6000 nurses

Turnover over £1bn

Pharmacy: 330 staff, 126 pharmacists, 14 pre-registration students, 21 residents, exposure to practice to over 350 undergrads per year

Staff budget £12m, drugs budget £80m+
Kings Health Partners: world-class research, teaching and clinical practice brought together for the benefit of patients

is one of only five UK accredited Academic Health Sciences Centres;

has one of the world's leading research-led universities, ranked in the top 20 universities in the world;

provides education and research in the widest range of subjects allied to medicine of any London institution;

brings together three of London's most successful NHS Foundation Trusts;

has a local population which is among the most ethnically, socially and economically diverse in the world.

has the largest critical care service in the UK, is home to Europe's largest liver transplant centre and UK's largest live kidney donor programme;

provides 24/7 specialist services for victims of stroke and cardiac arrest

has the busiest A&E departments in the UK and is home to a major trauma centre;

has the largest dental school in Europe;

is a major centre for cancer and renal services, with the a leading centre for genetics, stem cell and allergy research

serves over 1.5 million patients every year, has approximately 25,000 employees
Medicines

Medicines are the most frequent intervention made in health care
886 million items costing £8,529m (15% of NHS costs)
Doubled in the last 10 years
40 items per year if over 60
Drug cost inflating at 6.7% per year

Kings Fund 2009
Medicines are dangerous

All: 15 per 100 admissions
Serious: 6.7 per 100 admissions (CI 5.2-8.2)
Fatal: 0.32 per 100 admissions (CI 0.23-0.41)

Lazarou, JAMA, 1998

Potential: 5.5 per 100 admissions

Bates et al, JAMA, 1995

> 2,000,000 patients suffer ADE
approx 106,000 patients died from ADE

5th-7th LARGEST CAUSE OF DEATH IN US

Causes of Errors

Prescribing: 56%
Administration: 34%
Transcription: 6%
Dispensing: 4%
Medicines are dangerous

Prescribing error:

7% (2-14%) of medication orders,

52 (8-227) errors per 100 admissions,

24 (6-212) errors per 1000 patient days.

Lack of standardisation between severity scales prevented any comparison of error severity across studies.

EQUIP study 2009

Prospective data collection

19 acute hospital trusts in North-west England

124,260 medication orders checked on seven ‘census days’

11,077 errors were detected

A mean error rate of 8.9 errors per 100 medication orders.

The majority of errors were deemed potentially significant (53%) or potentially minor (40%).

Potentially serious errors were less common (5%) and potentially lethal errors were found in fewer than 2% of erroneous medication orders.

### Pharmaceutical misadventure (GSTT)

- **n=952**
  - Actual Harm: 214 (22%)
  - Near miss: 730 (78%)

- 282 different drugs involved
  - Anticoagulants: 136 (14%)
  - Antibiotics: 134 (14%)
  - Opioids: 83 (9%)

### Where in the drug use process error occurred (n=953)

- Prescribing: 578 (60%)
- Administration: 181 (19%)
- Supply: 63 (9%)
- Other: 28 (7%)
- Unrecorded: 24 (5%)

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KING’S HEALTH PARTNERS
Quality standards – Hospital Pharmacy

Domain 1

Patient Experience
- Standard 1: Patient-centred
- Standard 2: Episode of care
- Standard 3: Integrated transfer of care

Domain 2

Safe & Effective Use of Medicines
- Standard 4: Effective use of medicines
- Standard 5: Medicines expertise
- Standard 6: Safe use of medicines
- Standard 7: Supply of medicines

Domain 3

Delivering the Service
- Standard 8: Leadership
- Standard 9: Governance and financial management
- Standard 10: Workforce

Professional Standards For Hospital Pharmacy Services
Optimising patient outcomes from medicines

For pharmacy services in acute, mental health, private and community service providers

July 2012
Effective use of medicines

"Medicines optimisation is a vital agenda, not an agenda added on to something else we are trying to do, this is absolutely central to it."

Sir David Nicholson, Chief Executive, NHS
What is Clinical Pharmacy?

Our goal is to ensure each patients’ medicines are optimised for their individual needs

We will do this by ensuring...

- Patients’ medicines are accurately transcribed on admission and discharge
- Patients’ medicines are safe and effective
- Patients receive the correct medicine in a timely manner
- Patients are satisfied with information about medicines
- We communicate effectively with members of the multi-disciplinary team
- We learn from errors and complaints

What we will do this by undertaking the following tasks....

- Medicines Reconciliation on admission or transfer
- Clinical Review of high risk patients
- Supply medicines accurately and in a timely manner
- Record errors in medicines use and put systems in place to prevent recurrence
- Work effectively together and with other members of the MDT
- Provide information and advice about medicines to patients
- Discharge patients safely
- Collect data to demonstrate the impact of medicine on patient care

While at all times abiding by the following operating principles .......

- Making the patient the focus of everything we do
- Supporting our staff to deliver the best care they can
- Ensuring best value in medication use
- Follow and where pragmatic exceed national expectations for medicines use
What do we do

Consult with inpatients and out patients (pharmacy and in clinics)
Medicine reconciliation – 1000 per week (43% require pharmacy input)
Clinical screening – 2500 per week (48% require clinical input)
Antimicrobial stewardship – 350 per weeks
Pt education (90+ % of admissions, 50% of inpatients)
Staff information/education (500+ contacts per week)
Discharge pts (6000 safety critical interventions per month)
100+ interventions per WTE per week
No difference in numbers between eRx and paper
Medicine reconciliations – teaching hospitals

Acknowledgement: Craig Robb
Pharmacy Procurement Project Manager, Regional Pharmacy Procurement Service
Hampshire & IOW □ Oxfordshire □ Berkshire □ Buckinghamshire

KING’S HEALTH PARTNERS
Medicine reconciliation – GSTT

% Medicine Reconciliation Completed by Pharmacy

% MR completed weekdays
% MR completed weekends
% MR completed (TOTAL)
# Pharmacy Intervention

<table>
<thead>
<tr>
<th>Reason for intervention</th>
<th>2009 n (%)</th>
<th>2010 n (%)</th>
<th>2011 n (%)</th>
<th>2012 n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Efficacy</td>
<td>1,137 (42)</td>
<td>1,610 (44)</td>
<td>1,316 (40)</td>
<td>1,177 (40)</td>
</tr>
<tr>
<td>Safety: to prevent ADR</td>
<td>1,030 (38)</td>
<td>1,218 (33)</td>
<td>1,318 (40)</td>
<td>1,108 (38)</td>
</tr>
<tr>
<td>Compliance/ concordance</td>
<td>198 (7)</td>
<td>283 (8)</td>
<td>179 (5)</td>
<td>229 (8)</td>
</tr>
<tr>
<td>Reduce length of stay</td>
<td>136 (5)</td>
<td>275 (8)</td>
<td>236 (7)</td>
<td>140 (5)</td>
</tr>
<tr>
<td>Cost effectiveness</td>
<td>97 (4)</td>
<td>164 (4)</td>
<td>117 (4)</td>
<td>138 (5)</td>
</tr>
<tr>
<td>Safety: in reaction to ADR</td>
<td>95 (4)</td>
<td>95 (3)</td>
<td>139 (4)</td>
<td>159 (5)</td>
</tr>
<tr>
<td>Total</td>
<td>2,693</td>
<td>3,645</td>
<td>3,305</td>
<td>2,951</td>
</tr>
<tr>
<td>FCE bed days</td>
<td>6,614</td>
<td>6,652</td>
<td>6,688</td>
<td>6,651*</td>
</tr>
</tbody>
</table>
Interventions

"Safety critical" interventions on discharge

<table>
<thead>
<tr>
<th>Month</th>
<th>Dose</th>
<th>Drug Name</th>
<th>Frequency</th>
<th>Route</th>
<th>Units</th>
<th>% safety critical amendments of all items</th>
</tr>
</thead>
<tbody>
<tr>
<td>May-12</td>
<td></td>
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<tr>
<td>Jun-12</td>
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<tr>
<td>Jul-12</td>
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<td>Aug-12</td>
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<tr>
<td>Sep-12</td>
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<tr>
<td>Oct-12</td>
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<tr>
<td>Nov-12</td>
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<tr>
<td>Dec-12</td>
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<tr>
<td>Jan-13</td>
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<tr>
<td>Feb-13</td>
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<tr>
<td>Mar-13</td>
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</tr>
</tbody>
</table>
Value of interventions

Economic analysis to support PSG001 Technical patient safety solutions for medicines reconciliation on admission of adults to hospital.

Predominantly based on US data.
Errors requiring extra laboratory tests or treatment without an increased LoS ($95 to $227)
Errors prolonging length of stay ($2,596)
Errors resulting in near-death experience ($2,640).

JCAHO reported cost estimates of $2,000 for an ADE (excluding malpractice)

Cost parameters for preventable ADEs

<table>
<thead>
<tr>
<th>Cost parameter</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detected medication errors</td>
<td>£0 - £6</td>
</tr>
<tr>
<td>Significant (non-increased LoS) pADEs</td>
<td>£65 - £150</td>
</tr>
<tr>
<td>Serious pADEs</td>
<td>£713 - £1,484</td>
</tr>
<tr>
<td>Severe, life threatening, or fatal pADEs</td>
<td>£1,085 - £2,120</td>
</tr>
</tbody>
</table>

A systematic review of the effectiveness and cost-effectiveness of interventions aimed at preventing medication error (medicines reconciliation) at hospital admission. The University of Sheffield, School of Health and Related Research (ScHARR)
Economic analysis

<table>
<thead>
<tr>
<th>Significance</th>
<th>EQUIP (Incidence)</th>
<th>Sheffield (Value £)</th>
<th>GSTT (Incident)</th>
<th>Value (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentially lethal</td>
<td>2%</td>
<td>1,085</td>
<td>53</td>
<td>57,505.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2,120</td>
<td>53</td>
<td>112,360.00</td>
</tr>
<tr>
<td>Potentially serious</td>
<td>5%</td>
<td>713</td>
<td>135</td>
<td>96,255.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1,484</td>
<td>135</td>
<td>200,340.00</td>
</tr>
<tr>
<td>Potentially significant</td>
<td>53%</td>
<td>65</td>
<td>1427</td>
<td>92,755.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>150</td>
<td>1427</td>
<td>214,050.00</td>
</tr>
<tr>
<td>Minor</td>
<td>40%</td>
<td>0</td>
<td>1077</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>1077</td>
<td>6,462.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2780</td>
</tr>
<tr>
<td>Lower value</td>
<td></td>
<td></td>
<td></td>
<td>246,515.00</td>
</tr>
<tr>
<td>Upper value</td>
<td></td>
<td></td>
<td></td>
<td>533,212.00</td>
</tr>
</tbody>
</table>

The cost of delivering ward based pharmacy service was calculated at £22,290 per week.

Using this model the value of contributions ranged from £246k - £533k per week.


### Economic analysis (sensitivity)

<table>
<thead>
<tr>
<th>Significance</th>
<th>EQUIP (Incidence)</th>
<th>Sheffield (Value £)</th>
<th>GSTT (Number)</th>
<th>Value (£)</th>
<th>GSTT (50% number)</th>
<th>Value (£)</th>
<th>GSTT (10% number)</th>
<th>Value (£)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentially lethal</td>
<td>2%</td>
<td>1,085</td>
<td>53</td>
<td>57,505.00</td>
<td>1%</td>
<td>30,163.00</td>
<td>0.2%</td>
<td>6,032.60</td>
</tr>
<tr>
<td></td>
<td>2,120</td>
<td>53</td>
<td>112,360.00</td>
<td>58,936.00</td>
<td>0.2%</td>
<td>11,787.20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potentially serious</td>
<td>5%</td>
<td>713</td>
<td>135</td>
<td>96,255.00</td>
<td>3%</td>
<td>49,553.50</td>
<td>0.5%</td>
<td>9,910.70</td>
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<tr>
<td></td>
<td>1,484</td>
<td>135</td>
<td>200,340.00</td>
<td>103,138.00</td>
<td>0.5%</td>
<td>20,532.60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potentially significant</td>
<td>53%</td>
<td>65</td>
<td>1427</td>
<td>92,755.00</td>
<td>27%</td>
<td>47,885.50</td>
<td>5.3%</td>
<td>9,577.10</td>
</tr>
<tr>
<td></td>
<td>150</td>
<td>1427</td>
<td>214,050.00</td>
<td>110,505.00</td>
<td>5.3%</td>
<td>22,101.00</td>
<td></td>
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</tr>
<tr>
<td>Minor</td>
<td>40%</td>
<td>0</td>
<td>1077</td>
<td>0.00</td>
<td>60%</td>
<td>0.00</td>
<td>94.0%</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>6</td>
<td>1077</td>
<td>6,462.00</td>
<td>10,008.00</td>
<td>94.0%</td>
<td>15,679.20</td>
<td></td>
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<tr>
<td></td>
<td>2780</td>
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<td></td>
</tr>
<tr>
<td></td>
<td><strong>Lower value</strong></td>
<td>246,515.00</td>
<td>127,602.00</td>
<td>25,520.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Upper value</strong></td>
<td>533,212.00</td>
<td>282,587.00</td>
<td>70,195.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Local data suggests only 50% of interventions are “safety critical” with the rest improving clarity, communication or adherence.

If the effectiveness of interventions at GSTT was only 10% of that calculated in EQUIP the pharmacy service would still be, at worst, cost neutral and prevent 5 potentially lethal and 13 potentially serious events per week.
Outcomes of pharmacy interventions
Appropriate prescribing of thromboprophylaxis

Pharmacist contribution to appropriate VTE prophylaxis prescribing and CQUIN target
October 2011 to September 2013

Pharmacists making the difference

Acknowledgement:
Becky Chanda, Senior Anticoagulation Pharmacist, GSTT

Outcome for appropriateness of VTE prophylaxis post-pharmacist intervention
Outcome for appropriateness of VTE prophylaxis pre-pharmacist intervention
CQUIN target
Outcomes of pharmacy interventions
Antimicrobial stewardship

Pharmacists making the difference

Acknowledgement:
Paul Wade, Consultant Pharmacist, ID, GSTT

KING'S HEALTH PARTNERS
Outcomes of pharmacy interventions
Safe NSAID prescribing

Acknowledgement:
Jos Williams /Sarah Wilkinson, Specialist Pharmacist, Elderly Care, GSTT
PSCAG - Educational vision for pharmacists

Attracting the best
MPharm program

Produce the most employable graduates
Post graduate Programs, CPD Peer support

Delivering the best educational experience throughout the pharmacists’ career

Registration

Current activities include:
- Trust staff interview for undergrads
- Trust staff teach at KCL
- Integration of learning in practice – 2nd year CVD ward visits. 3rd year diabetes ward visits
- 4th year clinical module in practice
- Research projects supervised by practitioners in practice
- Limited preferential selection of undergrad to pre-reg places
- Limited preferential selection of pre-regs to B6 places
- Post graduate training for B6s linked to formal academic accreditation.
- Develop trust staff teaching / mentoring skills.
- Clinical academic appointments
- BRC Fellowships (4 in 2013)
- PSCAG Paediatric Pharmacy International Summer School
- PSCAG Research Meetings
- IPS Seminars for all PSCAG staff

Allowing pharmacists to be the best they can be throughout their careers

Pre-reg year????

Pharmaceutical science
Pharmaceutical practice

KING’S HEALTH PARTNERS
The pharmacy model of structured development

Consultant

SpR

SHO/HO

Practitioner

Band 7

Junior

Other team

Other team

Medical Team

Pharmacy Team

Consultation

Referral and direction

Referral and direction

Referral and direction

Patient

Consultation

Consultation

Consultation
Safe use of medicines

This is where junior staff practice.
Effective use of medicines

Evidence based medicine

Patient involvement

Clinical experience

Drug factors

This where mid band staff practice
Economic use of medicines

Decisions on populations

Decisions on individual patients falling outside of guidelines

Ensuring performance against budget
Incl. horizon scanning and budget planning

Effective use of pharmacy resource

This is where senior band staff practice
Foundations of Practice

RPS Foundation Pharmacy Framework
A Framework for professional development in foundation practice across pharmacy.
Advanced practice

1. Expert Professional Practice
2. Collaborative Working Relationships
3. Leadership
4. Management
5. Education, Training and Development
6. Research and Evaluation (R&E)
**Advanced practice**

<table>
<thead>
<tr>
<th>Faculty Stage Descriptions</th>
<th>Post-nominals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage I</strong></td>
<td></td>
</tr>
<tr>
<td>Stage 1 Faculty Member</td>
<td></td>
</tr>
<tr>
<td>For example, early stages of specialist training and advancement, established in a role, performing well, advanced beyond foundation years.</td>
<td>MFRPSI</td>
</tr>
<tr>
<td><strong>Stage II</strong></td>
<td></td>
</tr>
<tr>
<td>Stage 2 Faculty Member</td>
<td></td>
</tr>
<tr>
<td>For example, an expert in an area of practice; experienced.</td>
<td>MFRPSII</td>
</tr>
<tr>
<td>Routinely manages complex situations and a recognised leader locally or regionally.</td>
<td></td>
</tr>
<tr>
<td>Demonstrating excellence in practice.</td>
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<tr>
<td><strong>Faculty Fellow</strong></td>
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<tr>
<td>(highest credentialed Faculty stage)</td>
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</tr>
<tr>
<td>For example, aligned to autonomous clinical lead in community or primary care; corporate level practice in NHS; equivalent leads in academia, business / corporate leadership roles in industry; business or strategic leader in community or primary care.</td>
<td>FFRPS</td>
</tr>
<tr>
<td>A nationally recognised leader in an area of expertise (often internationally) alongside a demonstrable breadth of experience and expertise.</td>
<td></td>
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<tr>
<td>Exceptional.</td>
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</table>
# The future of clinical pharmacy

## Adherence

<table>
<thead>
<tr>
<th>Description</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoidable medicines wastage in primary care is estimated to be £150 million per year (this is a conservative estimate)</td>
<td>(1)</td>
</tr>
<tr>
<td>Between 30 and 50% of medicines are not taken as recommended</td>
<td>(2)</td>
</tr>
<tr>
<td>Ten days after starting a new medicine, 30% of patients are already non-adherent – of these 55% of patients don’t realise they are not taking their medicines correctly, whilst 45% do</td>
<td>(2)</td>
</tr>
<tr>
<td>Ten days after starting a new medicine, 61% of patients feel they are lacking information</td>
<td>(3)</td>
</tr>
<tr>
<td>50% of patients report a problem with their medication at 10 days and at four weeks, in 22% of cases, the problem is still there</td>
<td>(3)</td>
</tr>
<tr>
<td>Just 16% of patients who are prescribed a new medicines are taking it as prescribed, experiencing no problems and receiving as much information as they need</td>
<td>(3)</td>
</tr>
</tbody>
</table>
Discontinuation of clopidogrel in primary care

Boggon, EHJ, August 2011

Only 68.6% of patients with NSTEMI, and 62.8% of patients with STEMI, received a primary care clopidogrel prescription in the first 3 months.

In patients prescribed clopidogrel in the 3 months following discharge, 53% NSTEMI and 54% STEMI were still being prescribed clopidogrel at 12 months.

Death and non-fatal MI doubled (18 vs 36%)
Types of non adherence

- **UNINTENTIONAL Nonadherence**
  - Capacity & Resource
  - Practical Barriers

- **INTENTIONAL Nonadherence**
  - Motivation e.g. beliefs
  - Perceptual Barriers
Intentional Non-Adherence

Communication e.g.
- adapting consultation style

Increasing patient involvement e.g. avoid assumptions about preferences

Understanding the patient’s knowledge, beliefs and concerns about medicines e.g. ask if patient has any specific concerns

Providing information

NICE (Clinical Guideline 76)
Empowering patients and pharmacists

Guy's and St Thomas' NHS Foundation Trust

Questions about your medicines

Information about medicines to cardiac in-patients: Patient satisfaction alongside the role perceptions and practices of doctors, nurses and pharmacists

Vivian Auyeung a,b, Gopal Patel a, Duncan McRobbie b, John Weinman c, Graham Davies a

a King's College London, Institute of Pharmaceutical Science, London, SE1 9NH, UK
b Guy's and St Thomas NHS Foundation Trust, Pharmacy Department, London, SE1 7EH, UK
c King's College London, Institute of Psychiatry, London, SE1 8WT, UK

Information about medicines

ARTICLE INFO

Article history:
Received 17 December 2010
Received in revised form 18 April 2011
Accepted 20 April 2011

Keywords:
Patient satisfaction

ABSTRACT

Objective: To explore the satisfaction of cardiac in-patients regarding the information they received about their medicines, and the role perceptions and practices of practitioners whose responsibility it was to provide such information.

Method: A questionnaire was constructed by selecting medicine information topics from a validated instrument, the satisfaction with Information about Medicines Scale. Patients and practitioners were recruited from cardiac wards at a London teaching hospital providing tertiary care.

Results: Questionnaires were returned by 140 patients and 52 doctors, 53 nurses and 4 pharmacists.
Summary

Medicines are dangerous

Pharmacy activity (including “clinical pharmacy”) reduces patient risk

Clinical pharmacy activity improves hospital performance

Reducing risk and improving performance reduces cost

We need a suitably skilled workforce to deliver this

Despite all this patients still don’t take their medicines

Pharmacists are ideally placed to support patients to take medicines (but will require different skills in addition)
Clinical pharmacy

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Clinical pharmacy... *the age of wisdom?*

- **Medication error**
  - 8% of 2,000 daily reports to NPSA relate to medicines [NRLS April-June 2006]
  - 1,400 serious medication errors detected in 40 trusts (5 days) [Nicholls et al, 2004]
  - Prescribing errors in 1.5% of medication orders [Dean et al, 2002a]
  - Causes of prescribing error [Dean et al, 2002b]
- **Physician-accepted interventions**
  - 3,3371 interventions from 2,220 ward visits in 27 hospitals (5 days)
  - Ward, grade and time predict rate [Barber et al, 1997]
- **Outputs of medicines management (NI)**
  - Length of stay reduced by 2 days
  - Readmission rates decreased by 20%
  - Fiscal benefits included a return of £4.80 to £8.00 for every £1 invested [Scott, GHP/UKCPA 2006]
- **Association with outcomes (US)**
  - Pharmacists per 100 beds and rates of adverse drug reactions
  - Pharmacists per 100 beds and mortality rates
  - Clinical pharmacy services and lower mortality rates [Bond et al, 2006, 1999a, 1999b]