

Guidance for Antimicrobial
Stewardship:
the roll out of a computerised
system in Victoria

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Outline

- Antimicrobial stewardship programs
 - Rationale and evidence for efficacy
 - International/ national initiatives
- Guidance DS
 - Evaluation at RMH
- Statewide rollout

Disclosures:

Guidance DS is owned by Melbourne Health

Addressing Healthcare associated infection

- Infection prevention activities
 - Prevent transmission – Hand Hygiene, Cleaning etc
 - Prevent contamination - maintain Sterility etc
- Antimicrobial stewardship
 - Target pathogens appropriately
 - Limit inappropriate use of antibiotics - stop *generating/ selecting* the multi drug resistant (MDR) organisms



Antimicrobial stewardship

- Encompasses all activities to improve antimicrobial prescribing
 - **Educational**
 - Guidelines, Local opinion leaders, lectures
 - **Restrictive /regulatory**
 - Formularies, Approval systems – pre and post prescription review

“If education is your only intervention then your intervention will fail....”

Antimicrobial stewardship in hospitals

- 75% of inpatients receive antibiotics
 - Up to 50% of these courses are ‘inappropriate’
- Premise:
 - Inadequate therapy leads to poorer patient outcomes
 - Drug use leads to drug resistance – ‘selection pressure’
 - Inadequate dosing facilitates resistance

Antimicrobial Stewardship Programs (ASP) - the evidence

Cochrane review Davey et al 2002

- ASPs are associated with:
 - Better empiric antibiotic selection
 - Reduced length stay
 - Better timing drugs
 - Cost savings
 - Reduced mortality (!)

Updated Cochrane: (2002-2006) due soon

105 studies, 26 RCTs, 60 ITS - studies with microbial, clinical and economic outcomes

Impact on MDR pathogens

- 3rd gen cephalosporins :
 - MDR gram neg
 - Carling 2003, Martin 2005, Brahmi, Buising 2008
 - C difficile
 - Carling 2003
 - MRSA
 - Martin 2005, Buising 2008, Hughes 2004, Charboneau 2006
 - VRE
 - Bradley 2004
- Quinolones
 - MDR gram negs
 - Gottesman 2009

International initiatives

- IDSA and SHEA guidelines 2007
Clin Infect Dis Jan 15th 2007
- WHO Global Alliance for Patient Safety
 - Hand Hygiene
 - Time out Safer Surgery
 - Antimicrobial stewardship 2010

Australian initiatives

- **Australian Commission Quality & Safety in Healthcare**
 - ‘Antimicrobial Stewardship’ working party est Sept 2008
 - Recommendations for Antimicrobial Stewardship Programs in all hospitals
- **Dept Human Services Victoria funding computerised antimicrobial stewardship systems to public hospitals**
 - RMH, PMCC, SVH, Alfred, Peninsula, Eastern, Western, Northern, Latrobe
- Tasmania
- Hunter Valley

Strategies for antimicrobial stewardship in hospital

- Strategies
 - Phone approval systems (Australia)
 - Drug order forms
 - Antimicrobial management teams (UK)
 - **Computerised approval systems** (US and Australia)

Must fit workflow and be acceptable to clinicians

Computerised systems for antimicrobial stewardship

- Pilot systems
 - ADVISE 2001 (RMH)
 - Antimicrobial Approval System 2001 (RMH)
 - IDEAS (Austin 2002)
- Guidance DS 2005 (RMH)
 - iApprove (approvals - restrictive) and
 - iGuide (guidelines - educative)

Guidance Team - ID, Pharmacy, IT , public health/
epidemiologists, psychologists - input from staff

Guidance DS: iApprove

Restricted antimicrobials

- carbapenems, glycopeptides, 3rd and 4th gen cephalosporins, quinolones, aminoglycosides, ext spectrum penicillins,
- ‘Standard indications’
 - *Therapeutic Guidelines: Antibiotic*, with local variation
 - select from a drop down list of approved indications for use
 - initial approval durations nominated (often 3 days)
- ‘Non standard indications’
 - record indication in free text via computer
 - 24 hour access to drug with ID follow up (electronic alert)

The workflow

- Approvals are the responsibility of the unit resident
- At time of prescription, doctor gets electronic approval
 - educational opportunity
- At time of dispensing, pharmacist checks for approval
- If no approval exists,
 - pharmacist never with-holds drug, reminds doctor by pager
 - if >24 hours – ‘pharmacists alert’ via computer to ID reg
- ID registrar
 - reviews indications and liaises with prescriber by phone
 - Documents advice electronically

The RMH evaluation: Usability

250-350 approvals generated per month

Independent evaluators of usability (Monash Uni):

115 participants: Questionnaires, interviews, focus groups

>80% believed that the system increased their knowledge about antibiotics and reduced inappropriate prescribing

> 70% believed that the system improved communication

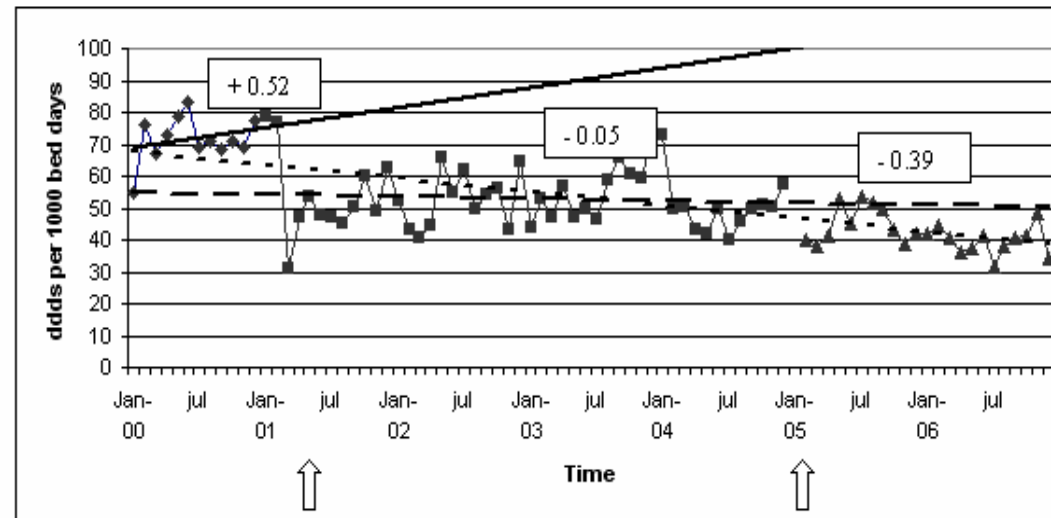
> 60% believed that system was easy to use with daily workflow, esp. young users and those who used the system

Zaidi et al Int J Med Inform 2008

The RMH evaluation: Antibiotic prescribing patterns

Third and fourth gen cephalosporins

a. Third and fourth generation cephalosporins



Interrupted time series using linear regression
to compare time periods
Jan 2000- Dec 2006
dds/ 1000 bed days per month

The RMH evaluation: Antibiotic consumption

Drug class	Gradient ddds/ 1000 bed days vs. time (in months) before pilot	Gradient ddds/ 1000 bed days vs. time (in months) before intervention	Gradient ddds/ 1000 bed days vs. time (in months) after intervention	P value
Cephalosporin ^{3rd} and 4 th gen	+0.52	-0.05	-0.39	<0.01
Glycopeptides	N/A	+0.27	-0.53	0.09
Carbapenems	N/A	+0.12	-0.24	0.21
Quinolones	N/A	+0.76	+0.11	0.08
Amino-glycosides	N/A	+0.15	-0.27	<0.01
Ext spectrum penicillins	N/A	+0.16	+1.16	<0.01

*Buising
JAC 2008*

The RMH evaluation: Benchmarking drug consumption

- National Antimicrobial Utilization Surveillance Program
- 23 tertiary public hospitals, Australia wide
 - Total antibiotic consumption at RMH fell over time
 - RMH 4th lowest consumption 2007
 - RMH moved from 2nd highest to 2nd lowest consumer of restricted antibiotics in ICU 2004-07

The RMH evaluation: Antibiotic sensitivities in bacteria

- Antibiogram constructed every 3 months from 2000
 - ICU and non ICU
- Improved sensitivity profiles of gram negatives (Pseudomonas, Klebsiella, ESBL, Acinetobacter) and fewer methicillin resistant *Staphylococcus aureus* in ICU
 - fall appeared to follow (in time) the fall in antibiotic consumption

Ananda-Rajan et al, abstract ISSSI 2008

Yong et al, abstract IFQSHC 2008

The RMH evaluation

Patient outcomes

Gram negative bacteraemia

No change in mortality or lengths of stay

Audit and feedback

Percentage of restricted drugs dispensed that had approval

General med units (MU1-4): 80-100%

Emergency department 15-20%

Theatre 0%

Sustaining an Antimicrobial Stewardship Program

A computerised system is just a tool, organisational change is needed to sustain effective an antimicrobial stewardship

Antimicrobial Stewardship Committee is VITAL

- Review monthly reports of approvals
- Review all non-standard indications
- Modify content
- Develop / commission guidelines
- Provide feedback Targeted audits
- “Messages of the month” – educational
- Involve ID, Micro, Pharmacy, Infection prevention, Clin pharmacology, quality&risk, junior and senior clinicians

Statewide roll out: 'Readiness Assessment'

All hospitals are different - need to examine existing
ASP, organisational culture

Domains assessed:

- IT – no barrier anywhere
- Resources – variable
- Skills - variable
- Executive support - high
- Process readiness - lacking

The assessment identified “gaps” - feedback to sites

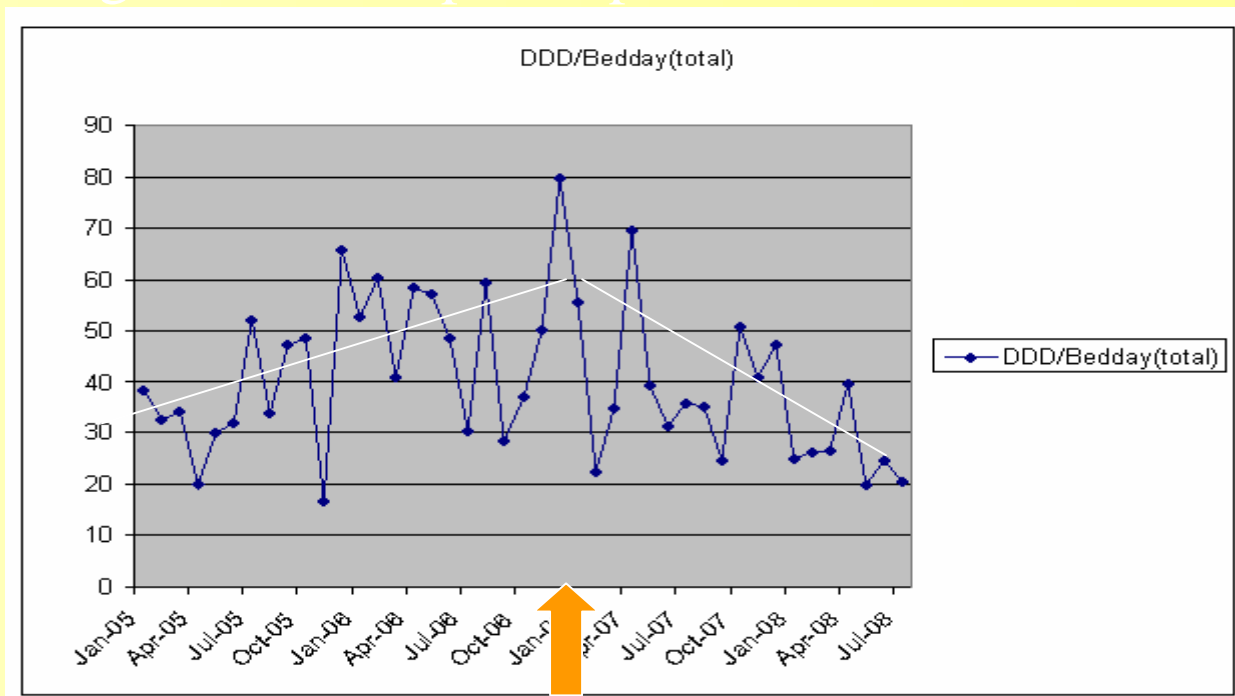
Luu et al ICAAC 2009

Roll out to other sites

- RMH - implemented 2005
- PMCC - implemented 2007
- SVH - implemented 2009
- Northern - implemented 2009
- Peninsula - implemented 2009
- Alfred - implemented 2009/ organisational issues
- Eastern - awaiting MS
- Western - awaiting MS
- Latrobe - awaiting needs assessment
- Tasmania (statewide) - implemented 2009
- Hunter Valley - commencing

Early results: Peter MacCallum Cancer Centre

24 months pre and 18 months post intervention
e.g. Third generation cephalosporins



St Vincent's Hospital

- Establishment multidisciplinary committee
- 270 approvals first month, 230 next month
 - Surgical units biggest users

Earlier identification of patients for ID referral

Empowering pharmacists to report aberrant prescribing

Transparency in drug use

Tasmania

- Employed dedicated antimicrobial pharmacist and ID physician
- Doing daily rounds
- Excellent uptake
- ? Perhaps becoming the benchmark

What we've learnt

- The tool fits workflow elsewhere
- IT seamless: M&S important
- Evaluate 'readiness' - can predict problems
- Project officers
 - share ideas, empowering, momentum
- Multidisciplinary committee
 - Ongoing audit and feedback
- Great scope for impact on prescribing

Next steps

- Multicentre evaluation – Victoria and Tasmania
Unique experiment of worldwide significance!
- Antimicrobial Management team
 - learn from Royal Perth Hospital
- Need for specialisation of pharmacists
 - ? post graduate degree
- Smaller sites - need to assess needs
- Independent pharmacoeconomic study
- International collaborations

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