Pharmacy - a working model

Duncan McKenzie

CHRISP AMS Forum 8 September 2011
Contents

• Case for stewardship
• Corporate Support and Governance
• Backed by Policy
• IT Support
• Process
• Marketing and Launch
• A Day in the Life
• Results
• Challenges and Drivers for success.
Royal Hobart Hospital

• 550 bed tertiary teaching referral hospital
• Adult, Paediatric and Neonatal ICU
• Service most other disciplines besides solid organ transplants
RHH – a case for stewardship?

- Resistant organisms
- *C. difficile*
- Antimicrobial usage
- Quality improvement
Clostridium difficile

Figure 5 – Hospital Rates of Clostridium difficile Infection

Total CDI Rate By Hospital per 1000 Separations
July 2006 to Sept 2009
(3 point rolling average)
Figure 21: Australian and international data: Hospital usage rate comparisons

Notes:
1. NAUSP 08/09 includes Australian data from July 2008 to June 2009
2. DANMAP 2008 rates represent 2008 usage
3. NETHMAP 2008 rates represent 2006 usage
4. SWEDRES 2008 rates use numerator data from 2008 and denominator data from 2007
Figure 2: Annual total antimicrobial usage rates for contributing hospitals
**Chart 2:** Total hospital use of fluoroquinolones, aminoglycosides and anti-pseudomonal penicillins plus β-lactamase inhibitor

**Chart 5:** carbapenems

**Source:** Antimicrobial Utilisation and Surveillance Program
Infection Control Service, Dept of Health, SA Government
Antimicrobial usage

- Annual antimicrobial cost ~ $2 million (~20% of drug budget)
- Growth at rate of ~ 11% each year

Figures projected for 2008-2009 onwards based on historical trend
Executive Support

Approved by Executive committee April 2008

RHH Antimicrobial Stewardship Program
Implementation Plan

Background

The RHH has recently experienced a dramatic increase in the rate of vancomycin-resistant enterococcus (VRE), a multi-drug resistant hospital-borne organism that usually results from inappropriate antibiotic usage. The RHH has very poor antimicrobial usage when compared with other Australian hospitals demonstrated via the National Antimicrobial Utilisation Surveillance Program. A program to restrict prescribing of antibiotic drugs has been in place since 2001, but as it is paper-based and poorly policed with no provision of feedback to individual prescribers, it is ineffective.
Governance

• Representatives from key units oversee project and formalise guidelines
  Heam/onc, Paediatrics, ICU, General Medicine, Respiratory, Pharmacy, Nursing, Infectious Diseases and Microbiology, Surgery.

• Report to Clinical Risk quarterly

• KPIs – centre around antimicrobial usage and cost
Restriction Policy

- Classifies antimicrobial drugs into three classes
  FOR INPATIENT USE
  - A – Unrestricted
    – No approval required to prescribe
  - B – Restricted
    – Electronic approval through Guidance software
  - C – Highly Restricted
    – Liaison with ID Service
# Appendix 1. Unrestricted, Restricted and Highly Restricted Antimicrobials

<table>
<thead>
<tr>
<th>Class</th>
<th>Unrestricted Class A</th>
<th>Restricted Class B</th>
<th>Highly Restricted Class C</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antibiotics</strong></td>
<td><strong>Amoxycillin/Clavulanate</strong></td>
<td><strong>Azithromycin (oral, IV)</strong></td>
<td><strong>Amikacin</strong></td>
</tr>
<tr>
<td><strong>Amoxycillin</strong></td>
<td></td>
<td><strong>Ceftiraxone</strong></td>
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<tr>
<td><strong>Amoxycillin</strong></td>
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<td><strong>Ceftriaxone</strong></td>
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<tr>
<td><strong>Benzylpenicillin</strong></td>
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<td><strong>Cefotaxime</strong></td>
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<td><strong>Cefaclor</strong></td>
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<td><strong>Ceftazidime</strong></td>
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<tr>
<td><strong>Cefoxitin</strong></td>
<td></td>
<td><strong>Ceftropolin (oral, IV)</strong></td>
<td><strong>Ertapenem</strong></td>
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<td><strong>Cefuroxime</strong></td>
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<td><strong>Meropenem</strong></td>
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<td><strong>Cefalexin</strong></td>
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<td><strong>Norfloxacin (oral, IV)</strong></td>
<td><strong>Imipenem</strong></td>
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<tr>
<td><strong>Cephalothin</strong></td>
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<td><strong>Norfloxacin</strong></td>
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<td><strong>Cephazolin</strong></td>
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<td><strong>Piperacillin-tazobactam (Tazocin)</strong></td>
<td><strong>Pristinamycin</strong></td>
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<tr>
<td><strong>Clindamycin</strong></td>
<td></td>
<td><strong>Rifampicin</strong></td>
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<tr>
<td><strong>Colistin (inhaled)</strong></td>
<td></td>
<td><strong>Ticarcillin-clavulanate (Timentin)</strong></td>
<td><strong>Quinupristin-dalfopristin</strong></td>
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<tr>
<td><strong>Dicloxacillin</strong></td>
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<td><strong>Tobramycin (inh, IV)</strong></td>
<td><strong>Teicoplanin (IM, IV)</strong></td>
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<tr>
<td><strong>Doxycline</strong></td>
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<td><strong>Vancomycin (oral, IV)</strong></td>
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<td><strong>Erythromycin (oral)</strong></td>
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<tr>
<td><strong>Fluoxacillin</strong></td>
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<tr>
<td><strong>Fusidic Acid</strong></td>
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<tr>
<td><strong>Gentamicin</strong></td>
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<td><strong>Lincomycin</strong></td>
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<tr>
<td><strong>Micronidazole</strong></td>
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<tr>
<td><strong>Nitrofurantion</strong></td>
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<tr>
<td><strong>Phenoxyethylpenicillin (penicillin V)</strong></td>
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<tr>
<td><strong>Sulfamethoxazole/Trimethoprim (Bactrim)</strong></td>
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<tr>
<td><strong>Trimethoprim</strong></td>
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<tr>
<td><strong>Antifungals</strong></td>
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<tr>
<td><strong>Amphotericin</strong> (conventional)**</td>
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<tr>
<td><strong>Amphotericin</strong> (liposomal)**</td>
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<tr>
<td><strong>Fluconazole (oral, IV)</strong></td>
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<tr>
<td><strong>Itraconazole</strong></td>
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<tr>
<td><strong>Posaconazole</strong></td>
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<tr>
<td><strong>Voriconazole</strong></td>
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<tr>
<td><strong>Antivirals</strong></td>
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<tr>
<td><strong>Aciclovir (oral, IV)</strong></td>
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<tr>
<td><strong>Famciclovir</strong></td>
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<tr>
<td><strong>Foscarin (IV)</strong></td>
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<tr>
<td><strong>Valaciclovir</strong></td>
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<td></td>
<td><strong>Ganciclovir (IV)</strong></td>
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<tr>
<td><strong>Oseltamivir</strong></td>
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<td></td>
<td><strong>Valaciclovir (oral)</strong></td>
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<tr>
<td><strong>Zanamivir</strong></td>
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</table>

* Unless Section 100 (S.100) criteria met
Guidance DS

- Web-based clinical decision support system
- Developed by clinicians at Royal Melbourne
- Now deployed widely in Victoria
Welcome to Guidance DS

RHH

Please contact the Infectious Diseases Service for approval extension, to prescribe a category C drug or to request a consult.
This patient meets the criteria for approval for azithromycin use.

The recommended dose is:
Adult: AZITHROMYCIN 1g orally as a single dose

This antibiotic is usually given in combination with other antibiotics for this indication

Use the link on the right to view this topic in the Therapeutic Guidelines: Antibiotic

The approval number will be valid for 1 day.

Note: Azithromycin is category B1 in pregnancy and is compatible with breastfeeding.
No dose adjustment is required for patients with renal impairment.

Click 'Get Approval' or press 'Next' to get an approval number.

--- END OF GUIDELINE ---

Urethritis, Cervicitis or Proctitis – *C. trachomatis* and/or *N. gonorrhoeae*

*Chlamydia trachomatis* (D-K serovar) is now the commonest identifiable cause of urethritis and cervicitis.
Empirical therapy for both gonorrhoea and *Chlamydia* should be routine practice, particularly for urethritis, as the two pathogens may co-exist.

Please refer to the Clinical guidelines for the management of sexually transmitted infections among priority populations

*Chlamydia trachomatis* and *Neisseria gonorrhoeae* infections are notifiable diseases in Tasmania. The Communicable Diseases Prevention Unit (CDPU) will send the diagnosing clinician a questionnaire seeking additional information on individual cases after receiving a notification report from the pathology laboratory as a routine public health response. It is the responsibility of the diagnosing clinician to arrange contact tracing and if there are any queries in relation to contact tracing, the CDPU can provide assistance.
Telephone numbers for the CDPU are:

- Business hours: 62 227727 or 62227710
- After hours: 0408 532 708 (officer on-call)

References

- Therapeutic Guidelines Antibiotic, Version 13 2006. Therapeutic Guidelines Australia
Pharmacy process Class B

- Restricted antimicrobial ordered – pharmacy staff check for approval in Guidance:
  - **Approval obtained** – Supply drug for length of approval
  - **No approval obtained** – 24 hours supply given and a “pharmacy alert” entered into Guidance.
Pre-Launch

- Electronic newsletter
- CEO’s newsletter
- Medical grand rounds
- Unit in-services
- Group emails to clinical staff
- Formal education/training sessions
- Pre-launch survey
Launch May 2009

• Official hospital launch
• Media coverage
• Local television, radio and print media
Waging war on hospital bugs

DANIELLE McKAY

A WAR against superbugs is being waged at the Royal Hobart Hospital.

A specialist team has developed new software which will guide the use of antibiotics in the hope it will not only save money but produce better patient outcomes and reduce antibiotic-resistant bugs.

Specialist pharmacist Duncan McKenzie has headed the Antimicrobial Stewardship Program since the planning process began in 2007.

While antibiotics have revolutionised health care by improving and prolonging life, Mr McKenzie said they had not been without their burdens.

“They can be costly, they can be associated with side effects and there’s also the problem of microbial resistance,” he said. “This is a project to help tackle those issues.”

The evolution of antibiotic-resistant superbugs was a primary target for the project, Mr McKenzie said.

“Tackling hospital-associated infections is seen as one of the scariest problems facing modern health care and superbugs are included in that,” he said.

“But with this project we hope to reduce the breeding of resistant bugs.”

Mr McKenzie said the system would aid doctors by advising which antibiotic option would provide the best treatment option for patients’ core infections.

It is defined as a rational, systematic approach to the use of antimicrobial agents by using the right agent, the correct dose for the appropriate duration while minimising toxicity and emergence of resistance.

“Studies in other hospitals show we can reduce the cost of antibiotics and reduce the use of antibiotics,” he said.

The possibility that the program could be rolled out into general practice remains to be seen, but Mr McKenzie said it was a possibility.

Thursday, May 28, 2009
Efficient Systems & Processes

Leading the Way in Better use of Antibiotics

The hospital recently launched a new tool to support more appropriate and cost-effective antibiotic use.

A simple software program is the hospital’s primary component of a multi-faceted approach to antimicrobial stewardship, (in simple terms, appropriate and cost-effective antibiotic use).

The new program, Enhance RHH, includes a range of factors to oversee antibiotic use including the creation of a team of experts in diagnosing, treating and controlling infection to develop guidelines and educational material; development of a restriction policy to ensure use of broad spectrum antibiotics are used based on best evidence; utilisation of specialised software to enhance education and restriction; and provision of feedback and statistics to medical staff on antibiotic performance.

Antimicrobial stewardship is defined as a rational, systematic approach to the use of antimicrobial agents in order to achieve optimal outcomes. This means using the right agent, at the correct dose, for the appropriate duration in order to cure or prevent infection, while minimizing toxicity and emergence of resistance.

Specialist pharmacist, Duncan McKenzie was the project coordinator and said that while antibiotics had revolutionised healthcare, there was also problems associated with antibiotic use.

Duncan demonstrates use of software to Director, RHH Infection Prevention & Control Unit, Dr Tara Anderson.

“These problems include cost, side effects, allergy and resistance, which is one of that biggest issues facing modern healthcare and is strongly associated with antimicrobial overuse or misuse.”

Duncan said that international research suggested that up to 50% of all antibiotic use is either unnecessary or inappropriate.

“These issues can then be compounded in a hospital environment due to the high numbers of patients and the volume of antibiotic used. The development of new antibiotics has reduced in recent years and as it may be 10-15 years before important new antibiotics find their way to market, maintaining the effectiveness of currently available agents is critically important.”
enhance branding
Antimicrobial Stewardship Program (enhance RHH)

The RHH Antimicrobial Stewardship Program commenced on the 21st May 2009. The primary objective of the program is to promote cost effective and appropriate antimicrobial use within the RHH, minimising the development of antimicrobial resistance and the risk of toxicity.

- Guidance DS (Antimicrobial Approval System)
- RHH Antimicrobial Stewardship Resources
- Useful Contacts

Useful Links
- Australian Commission on Safety and Quality in Healthcare
- National Antibiotic Utilization Surveillance Program (NAUSP)
- Tasmania Infection Prevention and Control Unit
enhanced services

• Daily hospital wide antimicrobial stewardship ward rounds
• Regular ID liaison ward rounds:
  – Adult ICU (twice weekly); since October 2007
  – Haematology-Oncology (weekly)
  – Neonatal/paediatric ICU (weekly)
Daily stewardship rounds

• Senior Pharmacist and ID/Micro registrar or consultant
• See all hospitalised patients requiring attention (Guidance printout)
  – (non-standard indications, pharmacy alerts)
Daily round

- Brief review of patient
- Determine appropriateness therapy

Liaise with primary care team
- Discuss and encourage:
  - streamlining/ de-escalation
  - early cessation of therapy
  - alternative agents
  - ensure Guidance approvals are updated
enhanced guidelines

- Surgical antibiotic prophylaxis
- Febrile neutropenia
- Splenectomy
- PD associated peritonitis
- Vancomycin
- Gentamicin
enhanced education

Hospital wide education to nursing and medical staff on:

• Stewardship
• Vancomycin
• Aminoglycosides
Results
Antimicrobial Point Prevalence Survey Conducted Across Five Pilot Sites

T Anderson¹, D McKenzie¹, K Buising², L Upjohn², N Chaves², K Thursky³, V Wallroth³, Hui Ling Eu¹, Min Shan Gan¹, J Ferguson⁵, P Doherty⁵, K Cairns⁵ and O Cotta⁵

Royal Hobart Hospital¹, Royal Melbourne Hospital², Peter MacCallum Cancer Centre³, School of Pharmacy University of Queensland⁴, John Hunter Hospital⁵ and St Vincent's Hospital Melbourne⁵

Introduction
Safe and appropriate antimicrobial use is the goal of an effective antimicrobial stewardship program. Auditing the actual antimicrobial drugs being prescribed and assessing the appropriateness of their use is important to obtain a better understanding of consumption patterns in a given healthcare setting. This then allows provision of appropriate feedback to prescribers and targeting of strategies to improve antimicrobial use.

The European Surveillance of Antimicrobial Consumption (ESAC) web-based point prevalence surveys have been performed in over 27 countries across Europe since 2001. The surveys allow collection of antimicrobial use data and comparison between facilities.

Further information in relation to the ESAC project is available on the ESAC website:
http://app.esac2.eu/public

5 pilot sites in Australia have collaborated with the ESAC team to set up their own Australian electronic data entry portal and embarked on trialling the ESAC point prevalence survey methodology within their hospitals.

Method
The surveys identified all patients who were receiving antimicrobials on the day of the survey or had received antimicrobial surgical prophylaxis during the previous 24 hours.

For all patients, a survey form was completed. An example is illustrated below:

<table>
<thead>
<tr>
<th>Site (Diagnosis Group) Codes:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indication Codes:</td>
</tr>
</tbody>
</table>

For each antimicrobial, information was obtained on site and indication as illustrated below:

<table>
<thead>
<tr>
<th>Type of Hospital</th>
<th>Inpatient bed</th>
<th>Antimicrobial use by hospital in the preceding month</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>55</td>
<td>*NUISP long-term units, electronic approval available *</td>
</tr>
<tr>
<td>B</td>
<td>250</td>
<td>*NUISP long-term units, electronic approval available *</td>
</tr>
<tr>
<td>C</td>
<td>50</td>
<td>*NUISP long-term units, electronic approval available *</td>
</tr>
<tr>
<td>D</td>
<td>95</td>
<td>Electronic approval available</td>
</tr>
<tr>
<td>E</td>
<td>35</td>
<td>Electronic approval available</td>
</tr>
</tbody>
</table>

Each pilot site utilised a local expert to assess compliance with the appropriateness of antimicrobial therapy relative to local and national guidelines.

Results
The five sites successfully completed the point prevalence surveys: 4 tertiary referral hospitals and 1 specialist cancer centre. Of the 4 tertiary referral hospitals, the percentage of patients receiving antimicrobial therapy was between 57.4%, with 61% of patients in the specialist cancer centre being prescribed antimicrobials on the day of the survey.

Important issues highlighted included the following:
- Poor clinical documentation relating to the indication and planned duration of antimicrobial therapy
- Excessive duration of surgical antibiotic prophylaxis with many hospitals reporting use greater than 3 days
- Excessive use of topical antimicrobial therapy with unclear indication
- Inappropriate dosing of certain antimicrobials including macrolides and extended spectrum penicillins
- Local antimicrobial practices that may have been identified (e.g., were not known to the infectious diseases and pharmacy auditors) without the performance of the survey for example:
  - post-operative cephalosporin use in plastic surgical and ear, nose and throat units
  - vancomycin and third generation cephalosporin use for surgical antibiotic prophylaxis in certain surgical units

Estimated resources required:
- The process was labour intensive
- Most sites required 2-7 people to dedicate a full day to data collection with subsequent time to follow-up missing data
- Initial data collection for a 369 bed hospital took approximately 45 hours
- Additional hours were required for data entry and collation
- Local experts were required to review data quality and to assess appropriateness of therapy based on the data collected

Discussion
The methodology used provided valuable information in relation to antimicrobial use in the healthcare facilities surveyed. The prevalence of antimicrobial use is higher than the mean for European sites as reported by ESAC at 57.4% compared with 39.6% in Europe.

Advantages:
- Obtained a profile of antimicrobial use across the healthcare facility which allows for comparison at regular intervals and benchmarking between facilities
- Assists targeting of strategies to improve antimicrobial use within a healthcare facility
- Useful tool for measuring prevalence of healthcare associated infection

Some difficulties encountered are outlined below:

Difficulties:
- Resources required
- Inconsistencies uncovered in relation to interpretation of some of the tool elements eg: allergy present versus allergy documented
- Measurement of compliance, areas of improvement identified which would improve data quality in relation to non-compliance of therapy
- Extraneous data collected; certain elements identified that removed, would simplify initial data collection
- Provision of snapshot representation of antimicrobial use

Conclusion
All sites undertaking the point prevalence survey using the ESAC methodology felt it to be valuable. All sites plan to repeat the surveys six-twelve monthly. There may be some scope to improve the toolkit without losing comparability to the ESAC data.

Acknowledgements
ESAC team, All patients and staff who contributed to the point prevalence surveys across all pilot sites.

References:
*Resources obtained from ESAC team
Chart 4: glycopeptides

Chart 5: carbapenems

Chart 6: fluoroquinolones (gatifloxacin and moxifloxacin grouped together)

Chart 7: aminoglycosides
Chart 3: 3\textsuperscript{rd}/4\textsuperscript{th} generation cephalosporins (ceftriaxone and cefotaxime grouped together)
Total RHH antibacterial cost: May 2008-April 2009=$990,944 May 2009-April 2010=$745,056 (difference=$245,888)
National benchmark

- Considered the benchmark site for Guidance in Australia.
- Site visits and interest from:
  - The Alfred hospital
  - St Vincent’s Hospital
  - Monash University
  - Queensland (Royal Brisbane and Uni of Qld)
  - Canberra Hospital
Invited speaker invitations

- TICA July 2009
- ASA Fed Conference Feb 2010 and 2011
- Antimicrobial Stewardship forum June 2010
- SHPA Federal Conference Nov 2010
- Tasmanian QUM forum
- CHRISP Qld Sept 2011
Early Experience with the Statewide Rollout of a Computerized Antimicrobial Approval System

Karin A. Thursky, MBBS, MD¹, Marion B. Robertson, B, Pharm¹, Susan B. Luu, B, Pharm¹, Michael J. Richards, MBBS, MD¹, Duncan McKenzie, B, Pharm², Tara Anderson² and Kirsty L. Buisin, MBBS, MD, MPH³, (¹)Victorian infectious diseases service royal melbourne hospital, melbourne, australia, (²)Royal Hobart Hospital, Hobart, australia

Abstract Text

Early Experience with the Statewide Rollout of a Computerized Antimicrobial Approval System

Background: The optimal strategy for improving antimicrobial use in the hospital setting is unknown. Computerized stewardship systems show promise, but their successful uptake depends on adequate preparation and support. In 2 states of Australia the state government offered to pay for a computerized stewardship system called Guidance DS for all public hospitals. This system has a restricted drug approval system, access to guidelines, and auditing capability.

Objective: To describe the issues faced in the implementation of Guidance DS in the public hospitals of Victoria and Tasmania.
Challenges

• Getting started
  – Strong business case (ACHS, data, other centres)
  – Good exec support
  – Dedicated, skilled project staff
  – Marketing!
Challenges

• Belief that software *is* stewardship
  – Only a tool
  – A very blunt tool without multi dis support/ policy/ review/ policing
Challenges

• Prescribers (autonomy)
  – Involve in projects
  – Invite to committee
  – Have good policy to back you
  – Be firm and consistent
  – Consultant to consultant communication
  – Just do it anyway
Challenges

• No ID service
  – Have a local champion
  – Affiliate with a major centre
  – Keep the project simple
Challenges

• Policing and resourcing
  – Keep restricted agent numbers manageable
  – Train multiple staff to perform key stewardship duties
Chart 3: 3rd/4th generation cephalosporins (ceftriaxone and cefotaxime grouped together)
Challenges

• Stewardship Fatigue
  – Don’t know yet!
  – Keep working, keep feeding back
  – Education
  – Research
  – Bring new people into the project
Drivers for Success

• Key areas
  – Focus efforts on key areas
  – Engage regularly
  – Come bearing gifts
Drivers for Success

• Team
  – Leaders
  – Firm but fair
  – Team players
  – Good communicators
  – Accomplished and recognised
Drivers for Success

• Feedback results to the end users
  – Newsletters
  – Website
  – Grand Rounds
  – Unit meetings
Drivers for Success

• Communicate with other centres
  – ID Pharmacist COSP
  – Guidance users group
  – Ausbug
Conclusions

- Challenging
- Time consuming
- Need a strong case
- Great team
- Persistence
- Celebrate your successes
Conclusions

• Stewardship for *me* has been:
  – difficult
  – all consuming (time, energy)
  – frustrating
  – **Infinitely rewarding**
  – **Amazing learning experience**
  – **The most rewarding project in my career**
Acknowledgements

• Dr Tara Anderson
• ID team, Pharmacy, Exec RHH
• Kas, Kirsty, Susan, Renu and Marion at Melb Health
• Matt Rawlins, Dr Ronan Murray
• Dr David Kong