Antimicrobial stewardship
key performance indicators

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ID pharmacist FSH
June 2015
declarations

- educational lectures for Astra Zeneca, Gilead and Amgen
overview

• key performance indicators
  – stewardship clinical care standards
    • NAPS
      – sNAPS
    – NAUSP
  – others
    • National Quality Use of Medicines Indicators for Australian Hospitals
    • literature (round adherence data)
    • resistance data?
ACSQHC clinical care standards for antimicrobial stewardship 2014

- nine standards
- five have clinical indicators
  - most can be measured by NAPS point-prevalence audit
  - longitudinal data now exists
    - RPH has performed NAPS 2012-2014
      - hospital-wide survey in 2011
1. Life threatening conditions

Indicator 1a: median time to first dose of antibiotics for life threatening conditions

sepsis kills
AKH ED collecting data
4. Use of guidelines and clinical condition Adherence to guidelines

Indicator 4a antibiotic prescribing in accordance with guidelines

NAPS

% non-adherent (eTG or local)
2014 24.9% (24.3% nationally)
2013 29.9% (24.5% nationally)
2012 30%

benchmarked nationally
4. Use of guidelines and clinical condition Adherence to guidelines

Indicator 4b antibiotic-allergy mismatch

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>0.7%</td>
</tr>
<tr>
<td>2013</td>
<td>1.4%</td>
</tr>
<tr>
<td>2012</td>
<td>2%</td>
</tr>
</tbody>
</table>
6. Documentation of reason for prescribing antibiotics

6a) Indication documented

NAPS

2014 78.9% (national 75.1%)
2013 70.8% (national 69.6%)
2012 81%

benchmarked nationally
7. Use of broad spectrum antibiotics

7a) review of patients on broad-spectrum antibiotics

Figure 44: Total hospital (ICU plus non-ICU) usage rates FYE 2014: penicillin with beta-lactamase inhibitor (antipseudomonal)
8. Review of treatment

7a) review of patients on broad-spectrum antibiotics (stewardship rounds) targeting piperacillin/tazobactam at FSH front-end restriction (eg. 3 days empirically for peritonitis, then stewie review)

214 piperacillin/tazocin reviews (of 526)
  surgical 71.9%
  medical 18.7%
  other 9.3%
Stewardship rounds FSH – 2015

- **January**
  - 28 patients seen
  - 89% full adherence (84/94)
  - 7% ignored (7/94)

- **February**
  - 75 patients
  - 76% full adherence (170/225)
  - 14% ignored (31/225)

- **March**
  - 96 patients
  - 76% full adherence (234/308)
  - 16% ignored (48/275)

- **April**
  - 89 patients
  - 66% full adherence (197/300)
  - 20% ignored (59/300)

- **May (e-referral 76%, 92% pharm, 8% medical)**
  - 117 patients
  - 67% full adherence (216/322)
  - 21% ignored (69/322)
Stewie

**Infectious Diseases Consultation** (clinical examination and review by ID registrar and ID Consultant)
A medical referral for formal ID consult is appropriate for patients with:
- Severe and/or complex community and hospital-acquired infections, including sexually transmitted infections, tropical and travel-related infections, and infections in immunocompromised patients
- Infection due to multiresistant organisms
- HIV infection and HIV-related complications
- A need for long-term antimicrobials such as for osteomyelitis, especially where home intravenous antibiotics may be appropriate
- Diabetic foot infection as part of the multidisciplinary inpatient diabetic foot service
- Suspected or proven endocarditis according to FSH

**Antimicrobial Stewardship Round Review** (notes/chart review only by ID consultant and ID pharmacist)
A medical or pharmacist referral should be considered for patients:
- Who have been approved for restricted antimicrobials (refer to Drug Formulary System for current restrictions)
- Who require ID advice

For patients who are complex, it may be suggested on review by antimicrobial stewardship round that a formal ID consult is required.

Creating an e-referral for either a formal ID consultation or an Antimicrobial Stewardship Round review does not replace the need to obtain initial approval for restricted antimicrobials.
Rounds - all advice (RPH)

% Adherence

ASA Abstracts 2014
9. Surgical prophylaxis

9a) in accordance with guidelines
9b) timely administration wrt surgery
9c) cessation after surgery

benchmarked nationally
Surgical prophylaxis
% discontinued with 24 hours (NAPS)

- target: 5% (95% discontinued)
- 2014 (still continuing >24 hours)
  - 31/44 (70.5%) nationally 36.3%
- 2013 (still continuing >24 hours)
  - 19/36 (52.8%) nationally 39.9%
- 2012 (still continuing >24 hours)
  - 76%
Surgical prophylaxis
others

• % adherence to guidelines
• administration time (in relation to start of procedure)
• sNAPS
  – surgical procedures
  – surgical journey
    • pre-op, peri-op and post-op antibiotics
    • 30-day SSI follow-up
# National Antimicrobial Prescribing Survey

<table>
<thead>
<tr>
<th>Patient identification number</th>
<th>Date of birth / age</th>
<th>Gender</th>
<th>Date of admission</th>
<th>Specialty</th>
<th>Height cm</th>
<th>Weight kg</th>
<th>eGFR / CrCl ml/min</th>
</tr>
</thead>
</table>

## Procedure details

- **Procedure date**
- **Procedures this admission**
  - [ ] 1st
  - [ ] 2nd or more
- **Procedure**
  - [ ] elective
  - [ ] emergency
  - [ ] not assessable
- **Was the wound or procedure contaminated / dirty?**
  - [ ] yes
  - [ ] no
- **Surgeon**
- **Anaesthetist**

## Supporting data

- **Allergies and adverse drug reactions to antimicrobials**
  - [ ] nil known
  - [ ] not documented
  - [ ] present; specify drug and nature
- **Risk factors**
  - [ ] immunocompromised
  - [ ] malignancy
  - [ ] diabetes
  - [ ] current smoker
  - [ ] BMI > 30
  - [ ] ASA score > 2
  - [ ] MRSA colonised
  - [ ] transferred from another facility
- **Microbiology; provide any relevant results**
  - [ ] none relevant

## Peri-operative antimicrobials

- **Documented administration time**
  - **Start time**: 
  - **End time**: 

- **Compliance with guidelines**
  - **Therapeutic guidelines**: 
  - **Local guidelines**: 
  - **Decided therapy**: 
  - **Non-compliant**: 
  - **Not available**: 
  - **Not assessable**: 
  - **Allergy mismatch**: 
  - **Microbiology mismatch**: 
  - **Incorrect dose**: 
  - **Incorrect route**: 
  - **Incorrect timing**: 
  - **Spectrum too broad**: 
  - **Spectrum too narrow**: 
  - **Not restricted; approval given**: 

## Peri-operative antimicrobials include any repeat doses

- **Antimicrobial**
- **Dose**
- **Route**
- **Not assessable**
- **Nearest 15 minutes**
- **Exact time**
- **Start time**: 
- **End time**: 

- **Repeat dose**: 

- **None prescribed**

*Select Therapeutic Guidelines if local guidelines are the same*
## Post-operative antimicrobials

*only include those relating to the procedure, including any discharge scripts*

<table>
<thead>
<tr>
<th>Start date and time</th>
<th>End date and time</th>
<th>Antimicrobial</th>
<th>Dose</th>
<th>Route</th>
<th>Freq</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

- **Prophylaxis**
  - **Treatment**
  - **Not assessable**

- **Indication**

- **Compliance with guidelines**
  - Allergy mismatch
  - Microbiology mismatch
  - Incorrect dose / frequency
  - Incorrect route
  - Spectrum too narrow
  - Spectrum too broad
  - Antimicrobial not indicated
  - If restricted: approval given

- **Appropriateness (1-5)**

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### Clinical notes or comments

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### 30 day follow up

- **Surgical site infection**
  - none identified / not assessable
  - identified; select type and microbiology if relevant
  - superficial
  - deep incisional
  - organ space
  - prosthesis

- **Microbiology**

- **Clostridium difficile infection**
  - none identified
  - yes

- **Unplanned admission to ICU**
  - none identified
  - yes

- **Unplanned readmission to hospital**
  - none identified
  - yes

- **Death**
  - none identified
  - yes

- **Other morbidity**
  - none identified
  - yes; specify
Standards without indicators

- Statement 2 – microbiological testing
- Statement 3 – information on treatment options
- Statement 5 – taking antibiotics as prescribed
Indicators of effectiveness

- *C. difficile* (HISWA)
- SAB
- *E. coli*
  - tic/clav use associated with decrease in susceptibility
  - no effect to date with pip/taz
- others (antibiogram)
RPH hospital acquired infection rate for C difficile 2010-2014
with smoothed trend line and 95% confidence limits
(remove outlier at 2012 Q4)
antibiogram

Royal Perth Hospital Antibiogram January to December 2012
Reported as % susceptible, all clinical specimens, single isolate per patient

<table>
<thead>
<tr>
<th>Organism</th>
<th>Penicillin</th>
<th>Amoxicillin</th>
<th>Flucloxicillin</th>
<th>Vancomycin</th>
<th>Erythromycin</th>
<th>Clindamycin</th>
<th>Teliporadine</th>
<th>Cotrimoxazole</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus aureus (all)</td>
<td>14</td>
<td>79</td>
<td>100</td>
<td>81</td>
<td>82</td>
<td>98</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>MSSA</td>
<td>17</td>
<td>100</td>
<td>100</td>
<td>88</td>
<td>88</td>
<td>88</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>MRSA</td>
<td>0</td>
<td>0</td>
<td>100</td>
<td>58</td>
<td>59</td>
<td>98</td>
<td>NT</td>
<td>NT</td>
</tr>
<tr>
<td>S. epidermidis</td>
<td>15</td>
<td>45</td>
<td>100</td>
<td>50</td>
<td>68</td>
<td>91</td>
<td>NT</td>
<td>NT</td>
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<tr>
<td>Enterococci</td>
<td>74</td>
<td></td>
<td>100</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Group A/C/G streptococci</td>
<td>100</td>
<td></td>
<td>100</td>
<td>90</td>
<td>91</td>
<td>NT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S. pneumoniae</td>
<td>98</td>
<td></td>
<td>100</td>
<td>81</td>
<td>92</td>
<td>NT</td>
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MSSA = methicillin susceptible S. aureus, MRSA = methicillin resistant S. aureus, NT = not
a. Only non-urinary isolates for QEII Medical Centre
b. Results for Staphylococci may differ between hospitals due to different reporting method
c. As reported (S/R)

Royal Perth Hospital Antibiogram January to December 2013
Reported as % susceptible, all clinical specimens, single isolate per patient

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<td>88</td>
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<td>97</td>
<td>NT</td>
<td>NT</td>
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<tr>
<td>MRSA</td>
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<td>100</td>
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<tr>
<td>Coag Neg Staph</td>
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<td>100</td>
<td>93</td>
<td>94</td>
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<tr>
<td>S. pneumoniae</td>
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<td>100</td>
<td>75</td>
<td></td>
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</tbody>
</table>

NT = not routinely tested, R = innate resistance
MSSA = methicillin susceptible S. aureus, MRSA = methicillin resistant S. aureus
a. As reported (S/R)
b. Selective testing may underestimate % susceptible

NT = not routinely tested, R = innate resistance
MSSA = methicillin susceptible S. aureus, MRSA = methicillin resistant S. aureus
a. Results for Staphylococci may differ between hospitals due to different reporting methodologies.
b. As reported (S/R)
Indicators of appropriateness

- NAPS
- NAUSP
- National QUM Indicators for Australian Hospitals 2014
- literature
Percentage appropriateness (NAPS)

Optimal (1)
2014 55.3% (56.4% nationally)
2013 55.1%
2012 (67% appropriate – category 1 and 2-adequate)

Suboptimal/inadequate (3 and 4)
2014 21.6% (nationally 22.7%)
2013 23.9% (nationally 23.7%)
2012 33%

benchmarked nationally can be subjective
Reasons for inappropriate prescriptions 2013 Vs 2012
Where is the inappropriate use happening?

“Vitamin T” assessment from NAPS 2012

• surgical teams more likely to prescribe according to guidelines (P<0.005)

• top 3 inappropriate indications
  – UTI, CAP, febrile neutropenia

Davis et al. Unpublished data
most common antibiotics

• cephazolin increasing
• p/t and a/c decreasing

<table>
<thead>
<tr>
<th>%/year</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2014 national</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pip/taz</td>
<td>21.8</td>
<td>15.8</td>
<td>14.6</td>
<td>6.3</td>
</tr>
<tr>
<td>Amox/clav</td>
<td>10.8</td>
<td>5.6</td>
<td>6.2</td>
<td>6.1</td>
</tr>
<tr>
<td>cephazolin</td>
<td>6.4</td>
<td>9.7</td>
<td>9.8</td>
<td>10.4</td>
</tr>
</tbody>
</table>

• 2014 ceftriaxone 3.8% (9.1% nationally)
National QUM indicators

- appropriate surgical prophylaxis
- % restricted antibiotics approved
- % empirical gentamicin >48 hrs
- %CAP assessed by scoring system
- %CAP treatment concordant with guidelines
## Restricted antimicrobials point-prevalence audits

<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of all prescriptions that were for restricted antimicrobials</td>
<td>17%</td>
<td>22.9%</td>
<td>33.2%</td>
<td>32.3%</td>
</tr>
<tr>
<td>% of restricted antimicrobial prescriptions that were micro/ID approved</td>
<td>52%</td>
<td>79.5%</td>
<td>62%</td>
<td>80%</td>
</tr>
</tbody>
</table>
conclusion

– most KPIs associated with clinical care standards are measurable by NAPS
  • starting to obtain longitudinal data
  • aiming to improve locally/beat national figures

– many KPIs available
  • mainly process measures
  • outcome measures more difficult to assess