

# Measurement for success in AMS programs

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# Antimicrobial Stewardship

A systematic approach to optimising antibiotic use

- Reduces inappropriate use
- Improves patient outcomes
- Reduces consequences of antimicrobial use such as antimicrobial resistance, toxicity and unnecessary costs



MacDougall & Polk, 2005

# The case for a national AMS program

	NO	YES
Multidisciplinary AMS team	57	19
Regular feedback on AMS prescribing and use	42	34
Clinical guidelines to guide prescribing	20	54
Program for conversion of IV to oral	47	29
Regular multidisciplinary AMS ward rounds	69	6
Hand hygiene program to minimise AMR	1	78

# ▶ The NSQHS Standards – Mandatory accreditation Jan 2013

Standard 1  
**Governance for Safety and  
Quality in Health  
Service Organisations**



Standard 2  
**Partnering with  
Consumers**



Standard 3  
**Healthcare  
Associated  
Infections**



Standard 4  
**Medication  
Safety**



Standard 5  
**Patient Identification  
and Procedure  
Matching**



Standard 6  
**Clinical  
Handover**



Standard 7  
**Blood and Blood  
Products**



Standard 8  
**Preventing and  
Managing Pressure  
Injuries**



Standard 9  
**Recognising and  
Responding to Clinical  
Deterioration in Acute  
Health Care**



Standard 10  
**Preventing Falls and  
Harm from Falls**



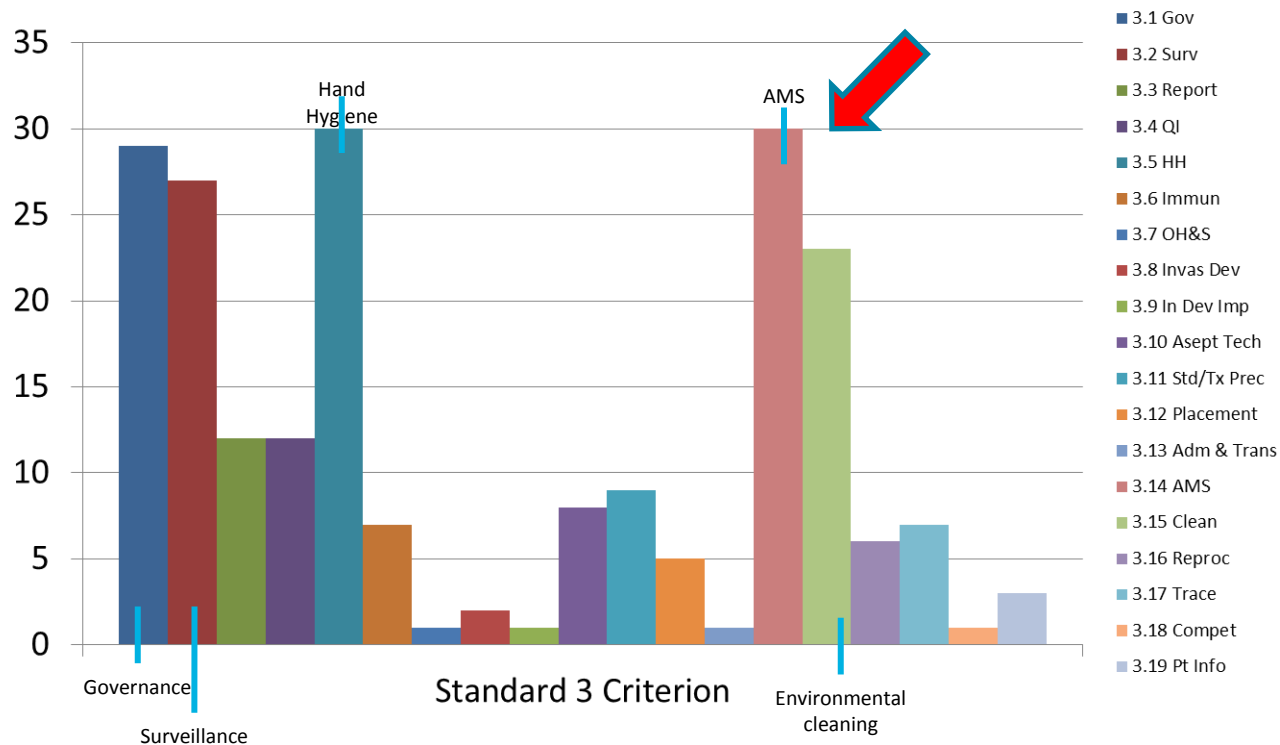
# By end 2015

100% of public hospitals, private hospitals, day procedure services and dental practice:

1. Had an AMS program in place
2. Prescribers with access to national therapeutic antibiotic guidelines
3. Monitor antimicrobial usage and resistance
4. Action is taken to improve the effectiveness of antimicrobial stewardship

# Met with Merit

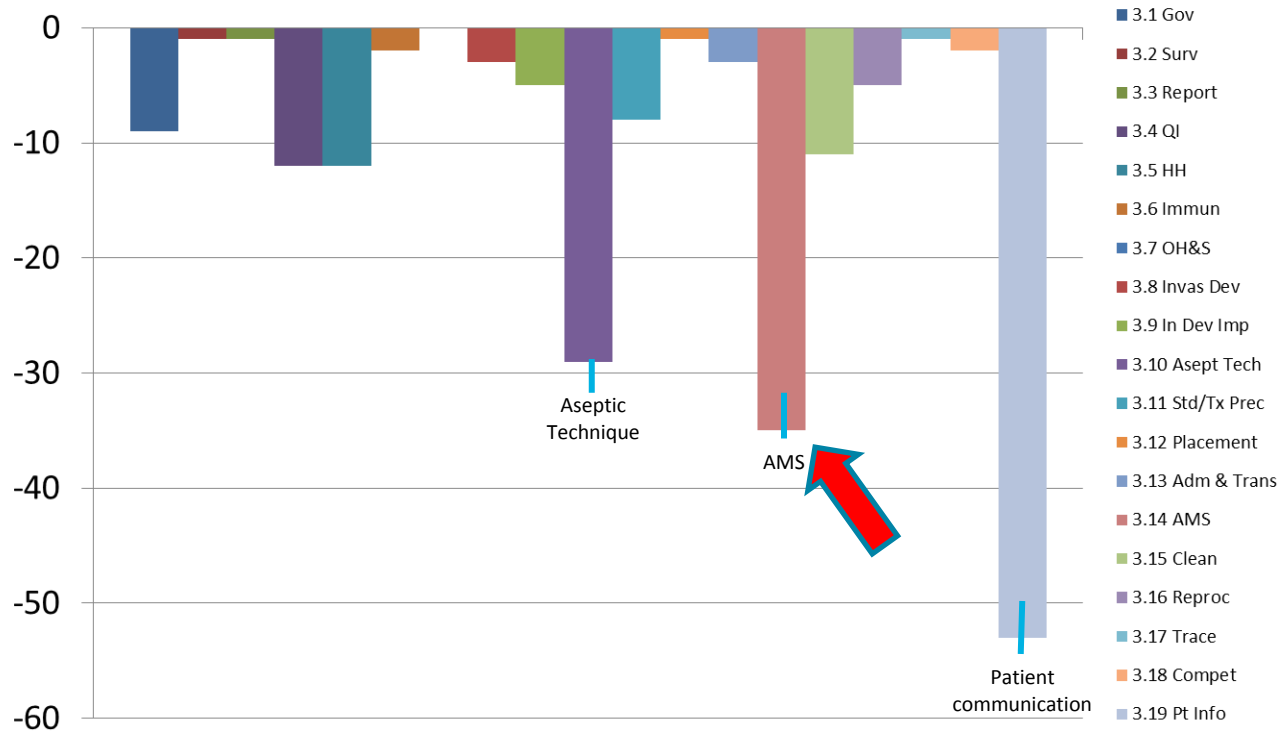
## Health service accreditation



March-December 2013

# Not Met

## Health service accreditation



March-December 2013



# Considerations for measurement

- priority topic areas
- availability of existing indicators
- pros and cons of different measures/indicators
- evidence or literature available
- ready availability of data
- purpose of targets and indicators
- steps required to establish and implement indicators.
- utility of data across various settings



# AMS in different settings



## Standard 3: Preventing and Controlling Healthcare Associated Infections

Table 2 provides suggestions for ways in which strategies to support antimicrobial stewardship (AMS) might be implemented in different settings.

Table 2: Options for Implementation of antimicrobial stewardship in different facilities

Program elements	Health service organisation (e.g. Local Hospital Network/district or private hospital organisation)	Large urban hospital or tertiary facility (includes large private hospitals)	Other or rural/district hospital	Small hospital/medical service (MPS) (less than 50 beds)	Day surgery/procedure unit or services
Executive leadership	Network/district/management group executive sponsorship and support for AMS program	Local executive sponsorship and support for AMS program	Local executive sponsorship and support for AMS program	Local executive sponsorship and support for AMS program	Owner/management support for AMS program
Governance arrangements, structure and lines of communication	Director of AMS program and multidisciplinary AMS committee comprising core representation of: <ul style="list-style-type: none"> <li>a member of executive</li> <li>a pharmacist</li> <li>an infectious diseases physician and/or medical microbiologist</li> </ul> AMS part of safety and quality plan Links to committees responsible for drugs and therapeutics and infection prevention and control	Director of AMS program – pharmacist, infectious diseases physician or medical microbiologist with Multidisciplinary AMS team (see below) Links to committees responsible for drugs and therapeutics	Pharmacist (where possible) When no pharmacist available a clinician/nurse with dedicated time for AMS coordinates with input from local or network/district infectious diseases physician and medical microbiologist Links to committees responsible for drugs and therapeutics	Facility manager coordinates with input from local or network pharmacist, infectious diseases physician and medical microbiologist Links to committees responsible for drugs and therapeutics	Facility manager coordinates, with support from specialist visiting clinicians and/or pharmacist where available Links to committees responsible for drugs and therapeutics
AMS team	No	Yes <ul style="list-style-type: none"> <li>AMS director (appointed from multidisciplinary AMS team) pharmacist, infectious diseases physician or medical microbiologist and pharmacist with dedicated time for AMS</li> <li>With inclusion of infection control practitioner, prescribing clinicians from key departments including intensive care</li> </ul>	Yes <ul style="list-style-type: none"> <li>Onsite or network/district</li> <li>Pharmacist recommended with dedicated time for AMS</li> <li>Prescribing clinician and/or nurse</li> <li>Coordinates with input from infectious diseases physician and medical microbiologist</li> </ul> (These services may be available onsite or as an agreed external consultancy)	Yes <ul style="list-style-type: none"> <li>May be onsite or local network/district</li> <li>Facility manager, prescribing clinician and pharmacist where available (onsite or as an agreed external consultancy) or nurse</li> <li>External support from an infectious diseases physician and medical microbiologist</li> </ul> (As an agreed external consultancy)	Yes <ul style="list-style-type: none"> <li>Facility manager, nurse and visiting medical officer (surgeon or anaesthetic representative or pharmacist where available)</li> </ul>
Antimicrobial policy with defined components	Yes <ul style="list-style-type: none"> <li>Outlines scope of program, is endorsed by network/district/management group executive and roles and responsibilities defined</li> </ul>	Yes <ul style="list-style-type: none"> <li>Outlines scope of program, endorsed by senior executive and management group; roles and responsibilities defined</li> <li>May be developed and implemented locally or as part of higher level process</li> </ul>	Yes <ul style="list-style-type: none"> <li>Preferably determined by a district-wide approach to outline scope of program</li> </ul>	Yes <ul style="list-style-type: none"> <li>Preferably determined by a network/district-wide approach to outline scope of program</li> </ul>	Yes <ul style="list-style-type: none"> <li>Preferably determined/developed/initiated and overseen by broader organisational management</li> <li>Policy specifies agreed local approach to surgical prophylaxis</li> </ul>

(Table continued next page)

Table of options  
pp36-7, SQIG

# Rural and regional hospitals

- About 1/3 of hospitals in Australia are < 20 beds
- Depend on GP visiting medical officers
- Lack of access to ID physicians, clinical microbiology, pharmacists or pathology services
- Lack of access to education and training
- Difficulty in retaining experienced clinicians

# Private hospital sector

- > 40% of all hospital care and > 60% of surgery
- Limited scope to introduce restrictions, prescribing policies,
- No inherent hierarchy in private hospitals – but some influence by peers
- Doctors are the customers
- Nurses often follow doctors protocols rigidly
- ID physicians involved at patient rather than hospital level

**Doctor - Patient**

**NOT**

**Hospital - Patient**

# Aged and residential care facilities

- Widespread inappropriate use of antibiotics reported in surveys
- MDR reported in patients
- Multiple GPs involved in one facility
- Use of telephone orders rather than physical examination
- Use of dip sticks to diagnose UTI
- Family expectation of treatment
- Patient transfer
- Education levels of staff

**Patient in RACF**



**Patient in hospital**

# Explore potential to establish indicators and targets for antimicrobial stewardship

- The aim of indicators and targets
  - enhance the utility of data provided in current surveillance programs,
  - make it actionable and
  - to improve practice.
- The availability of an agreed set of indicators
  - reduce unnecessary effort by individual organisations in developing indicators, and
  - promote a nationally consistent approach to data collection and measurement.

# Topic areas explored by national AMS

1. Aminoglycosides
2. 3rd generation cephalosporins/cephalexin
3. Amoxicillin-clavulanate for Intravenous Use
4. Appropriateness (NAPS)
5. Volume antibiotic data (NAUSP)
6. Indicators for rural and remote sites
7. Medicine Insight data
8. Cascade reporting
9. Surgical prophylaxis
10. Documentation of indication
11. Sepsis
12. Transatlantic Taskforce on Antimicrobial Resistance (TATFAR) core and supplemental indicators

# 1. Aminoglycoside use as a KPI

## KPI

- *Structural measures* <sup>1,2</sup>
  - evaluate appropriateness of indication for AG therapy
  - adherence to dosing (including duration) guidelines ,and
  - monitoring (AG levels, CrCl and vestibular/oto function
  - % of drug levels out side of therapeutic range
- *Outcome measures*<sup>1</sup>
  - Adverse effects :(nephrotoxicity, ototoxicity, vestibular dysfunction)
  - Efficacy: e.g. Clinical outcomes for patients who had resistant gram negative infections who did/did not receive aminoglycosides (where not contraindicated)

1. Therapeutic Guidelines: Antibiotic, version 15
2. Indicators for Quality Use of Medicines in Australian Hospitals. NSW Therapeutic Advisory Group. 2007
3. Northern Devon Healthcare NHS Trust, Gentamicin in adults, including extended interval gentamicin (5mg/kg) and multiple daily dosing guidance guideline (v 4.1). 2016: Barnstaple, Devon UK [Available at: <http://www.northdevonhealth.nhs.uk/wp-content/uploads/2016/02/Gentamicin-in-Adults-Guideline-v4.1-PDF-04FEB16.pdf>]



## 2. Potential indicators for 3rd Generation cephalosporins/cephalexin

1. 3rd and 4th generation cephalosporin use as percentage of total antimicrobial use
2. Setting a target for consumption of 3rd generation cephalosporins e.g.  $< 20$  DDD/1000 OBDs (all of hospital use).
3. Setting a target for reducing inappropriate use of all or specific cephalosporins.
4. Setting target for consumption of quinolones e.g.  $< 30$  DDDs/1000 OBDs (all of hospital use).

### 3. Amoxicillin-clavulanate for Intravenous Use

#### Possible Key Performance Indicators IV AMC

- Increase in use of parenteral amoxicillin-clavulanate (NAUSP\*)
- Reduction in use of piperacillin-tazobactam (NAUSP)
- Reduction in use of gentamicin (NAUSP)
- Reduction in the use of carbapenems (NAUSP)
- No decrease in appropriateness of prescribing of AMC in hospitals, as measured by NAPS
- Hospital rates of HA *Clostridium difficile* infection

## 4. Appropriateness as a KPI

- What is the area that has been identified for improvement
  - Inappropriate use of antibiotics (unnecessary use, wrong dose/choice/duration)
- Purpose of measurement
  - Ensure use of antibiotics is justifiable and meets recommendations in each case
- Are there existing measurements for the topic
  - Yes Hospital NAPS
  - May need modifications for small remote/rural (under discussion)
  - Aged care does not currently do appropriateness (would need off site assessors to do this),
  - Community would also likely need external assessors to do this (even if electronic extraction).
- Evidence or literature to inform the proposed target/indicator
  - Therapeutic Guidelines
- Current availability of data sources
  - Wide buy-in,
  - Data back to 2013 to compare
- Target audience
  - Local to foster improvement at hospital level
  - Jurisdictional/national level – assess performance
  - Guideline authors

A/ Professor Kirsty Buising,  
Victorian Infectious Diseases Service, Royal Melbourne Hospital

# Pros and cons of appropriateness

- Valid tool exists
- Wide adoption
- Generalisable
- Clinically meaningful
- Used in paediatric, private, rural
- ? Scope for automation (machine learning)
- Still involves subjectivity
- Not really internationally comparable (as definition might vary with guideline)
- Sites need support and training to join (ongoing)
- Many auditors cannot assess appropriateness themselves
- Duration not well captured

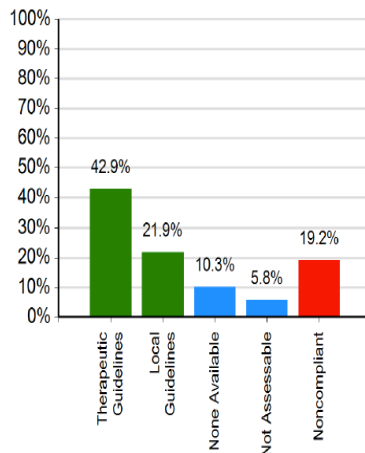
A/ Professor Kirsty Buising,  
Victorian Infectious Diseases Service, Royal Melbourne Hospital

# National Antimicrobial Prescribing Survey

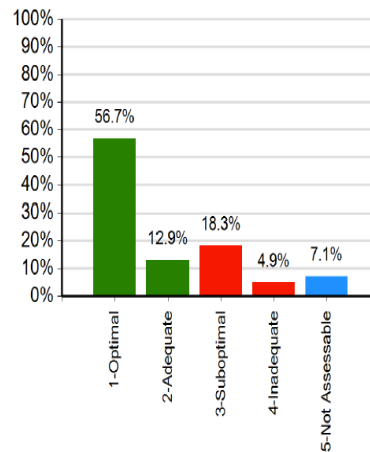
## Percentage of Patients on Antimicrobials: 42.2 % (144 of 341 Patients)

Number of patients on antimicrobials divided by the total number of beds surveyed

### Compliance with Guidelines



### Appropriateness of Antimicrobial

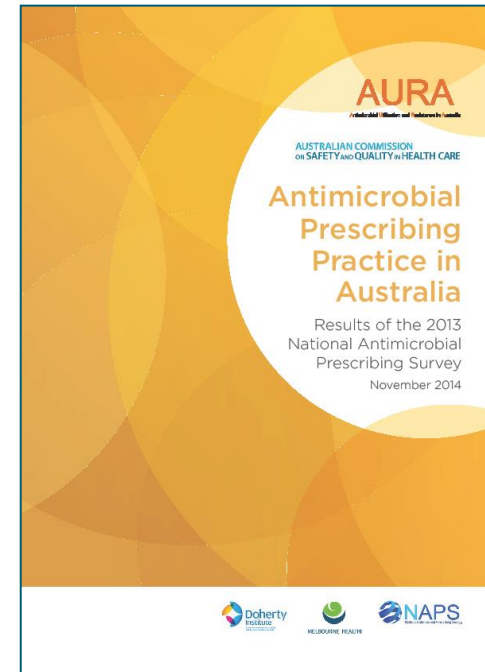


Therapeutic and Local Guidelines	64.7%	Appropriate	69.6%
None available or Not Assessable	16.1%	Inappropriate	23.2%
Non-compliant	19.2%	Not Assessable	7.1%

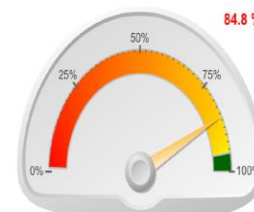
'Therapeutic Guidelines' and 'Local Guidelines' are deemed as being **compliant** with guidelines (displayed in green)

'Optimal' and 'Adequate' are deemed as being **appropriate** (displayed in green).

'Suboptimal' and 'Inadequate' are deemed as being **inappropriate** (displayed in red)

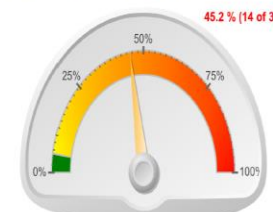


### Documentation of Indication



The percentage of total prescriptions where an indication was documented.  
For best practice this should ideally be greater than 95% (green section)

### Surgical Prophylaxis given for greater than 24 hours



The percentage of surgical prophylaxis prescriptions where the duration of prophylaxis was for greater than 24 hours post surgery.  
For best practice this should ideally be less than 5% (green section)

## 5. Volume antibiotic use (NAUSP)

### **Purpose of measurement**

- trends of overall antibiotic use over time
- local hospital benchmarked to national
- stratified by AIHW hospital classification

### **Existing measurements for the topic**

Monthly antimicrobial usage data and patient admission data converted to the internationally recognised drug usage rate of defined daily dose (DDD) per 1000 occupied bed days.

- Paediatric and neonatal data excluded
- Ward and unit level prescribing not available (except ICU)

## 5. Volume antibiotic use (NAUSP)

### **Pros and cons of proposed measures**

- Volume based data important to target patterns of prescribing
- Limitations of DDDs as a measure

### **Evidence to inform the proposed target/indicator**

- No cut-offs in Australia (although UK, Scotland, Norway, Portugal have had DDD/(inhabitants per day, n patients per day)

### **Current availability of data sources**

- Yes - But complexities with extract and uploading

### **Target audience**

- Fosters improvement at local AND jurisdictional level
- Data is used for national AURA reporting



## 6. Indicators for rural and remote sites

- No specific AMS KPIs reported for rural/regional AMS program
- Generic ones [e.g. NAUSP, NAPS, Ceftriaxone use, HAI Clinical Indicators (MRSA rates etc)]
- In general, use same as larger metro hospital.
- Baker J et. al. (unpublished data):
  - *“It is hard to define what success looks like particularly in small facilities where you have small numbers where antimicrobial resistance patterns are influenced by what is happening in the community as well as what is happening in the hospital”*
  - *“Rural and remote services should be benchmarked to a high standard through hard end points with numerical... quality usage data”*
  - *“..the rural and remote should all benchmark against each other...”*
  - *“Keep it simple”*

Dr David Kong  
Ballarat Health Services

# Proposal for national surgical prophylaxis Measure

## Possible Australian approach

- consistent national procedure-specific SAP measures
  - specific procedures rather than overall SAP compliance measure
  - limited in capture of Australian antimicrobial prescribers and overall SAP prescribing
  - resource implications of mandating SAP measure
  - procedure-specific national SAP data complemented by data provided by the Hospital NAPS data set
  - with the SSI surveillance activities or with the AMS program?
- Focus on a specific high risk surgical procedure/s
  - Consider similar approach to New Zealand
  - Consider a procedure selection process for facilities
  - Consider 9a-c of AMS CCS
  - How to select a high risk surgical procedure?

Dr Tara Anderson  
Royal Hobart Hospital

# The Clinical Care Standard for AMS



**AUSTRALIAN COMMISSION  
ON SAFETY AND QUALITY IN HEALTH CARE**

TRIM 87170

**Indicator Specification: Consultation Draft  
Clinical Care Standard for  
Antimicrobial Stewardship**

**December 2013**



## Supporting documents

Fact sheets for consumers and clinicians

Indicator specifications

# 11. What will be measured to provide evidence for Sepsis?

- Existence of hospital sepsis recognition and management protocol with regular auditing for compliance. Specifically:
  - Empirical antimicrobial use at diagnosis
    - Guidelines for choice of agent/s, dose, dosing regimen, timing
    - Guidelines for appropriate microbiological sampling +/- biomarkers
    - Evidence of systematic auditing to determine compliance with above
  - De-escalation/cessation of antimicrobial therapy
    - Guidelines for checking/interpreting results of microbiological sampling +/- biomarker trends
    - Guidelines for appropriate cessation/de-escalation of empirical antimicrobial therapy based on microbiological +/- biomarker results
    - Evidence of systematic auditing to determine compliance with above
  - Duration of antimicrobial therapy
    - Guidelines for duration of antimicrobial therapy
    - Evidence of systematic auditing to determine compliance with above

# Existing measurements

## Surviving sepsis 2016 recommendations

- Hospitals and hospital systems have a performance improvement program for sepsis, including sepsis screening for acutely ill, high-risk patients
- Appropriate routine microbiologic cultures (including blood) be obtained before starting antimicrobial therapy in patients with suspected sepsis or septic shock if doing so results in no substantial delay in the start of antimicrobials
- Administration of IV antimicrobials be initiated as soon as possible after recognition and within one hour for both sepsis and septic shock (**moderate**)
- Empiric broad-spectrum therapy with one or more antimicrobials for patients presenting with sepsis or septic shock to cover all likely pathogens (including bacterial and potentially fungal or viral coverage) (**strong**)
- Empiric antimicrobial therapy be narrowed once pathogen identification and sensitivities are established and/or adequate clinical improvement is noted
- Dosing strategies of antimicrobials be optimized based on accepted pharmacokinetic/pharmacodynamic principles and specific drug properties in patients with sepsis or septic shock
- Antimicrobial treatment duration of 7 to 10 days is adequate for most serious infections associated with sepsis and septic shock (**weak**)
- Measurement of procalcitonin levels can be used to support shortening the duration of antimicrobial therapy in sepsis patients or discontinuation of empiric antibiotics in patients who initially appeared to have sepsis, but subsequently have limited clinical evidence of infection (**weak**)
- **These (or a combination of these, or just the first one) could be used as the basis for an assessment checklist which should be adequate (i.e. no more required)**

# Pros and Cons

- Easier to measure
  - Existence of formal sepsis protocol
  - Collection of appropriate cultures prior to commencing therapy
  - Timing of first dose of antimicrobials
  - Initial broad spectrum agent used
  - NB – requires careful documentation of timing of various interventions and ongoing regular auditing, may require additional resources (depending on the way in which interventions are recorded)
- More difficult to measure
  - Appropriate narrowing/cessation of therapy
  - Dosing strategies
  - Total duration of antibiotics
  - Appropriate use of biomarkers
  - NB – auditing will require input by a clinician with expertise in AMS eg ID physician, clinical microbiologist, AMS pharmacist
- Current availability of data sources
  - Site dependent
- Target audience
  - First indicator – jurisdictional/national level
  - Remaining indicators – foster improvement at a hospital level

# Thank you

AMS Advisory Committee members

HAI Team at ACSQHC



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