

CLINICAL ANALYTICS AND REPORTING FOR AMS IN HOSPITALS WITH EMM

Dr Angus Ritchie



Health

Background

Sydney Local Health District

Excellence in health and healthcare for all



Health

Structure & Workforce

- ▶ 7 hospital facilities
- ▶ Community health “8th” facility
- ▶ 12,000 staff
- ▶ 670,000 population
- ▶ 1m visitors daily

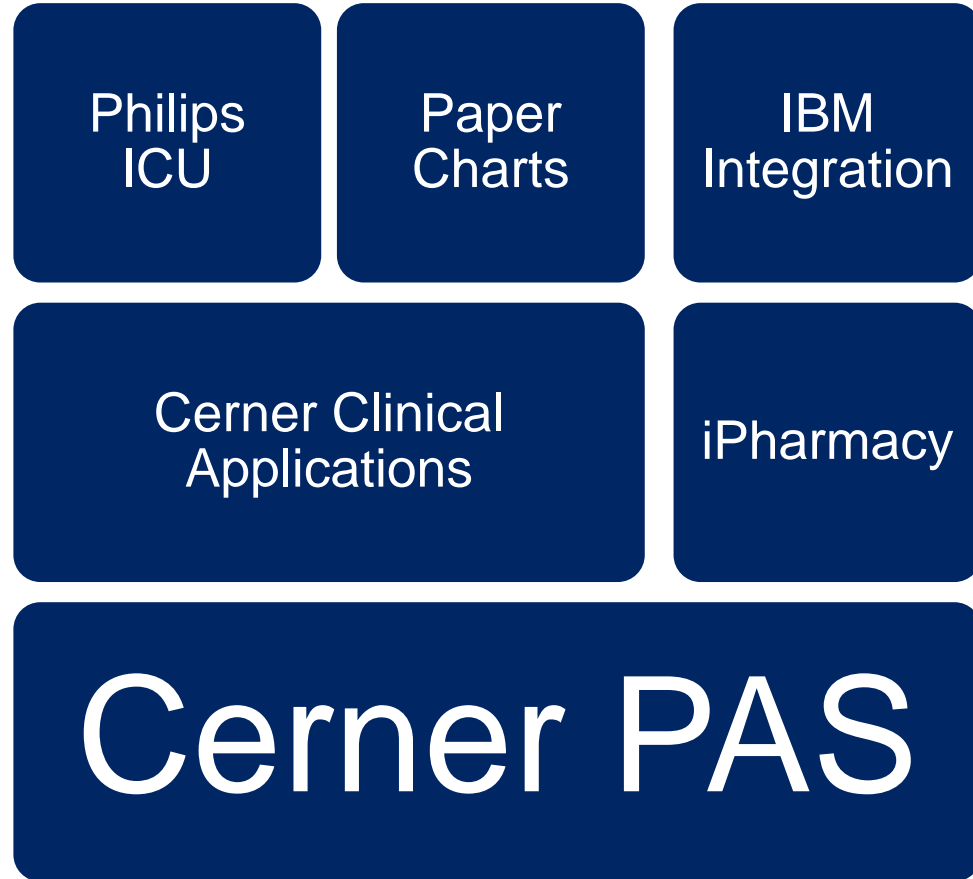
Annual Activity

- ▶ ED presentations >160,000
- ▶ Acute encounters >350,000
- ▶ Deliveries 8,500
 - ▶ 9% NSW

EMR Overview

- ▶ Cerner client since 1991
- ▶ Code 2015.01.25
- ▶ Shared eMR domain (SWSLHD)
- ▶ 7 million distinct records
- ▶ 945 TB data under management
- ▶ 29,000 users
- ▶ SLHD
 - ▶ >132,000 chart opens daily
 - ▶ >5,000 pharmacy orders daily

Context



- ▶ Restriction Lists
- ▶ Controlled Imprest & Dispensing
- ▶ Free text indications (mandatory)
- ▶ Approval Codes (OEF)
- ▶ Targeted Audit & Feedback
- ▶ NAUSP Surveys
- ▶ No third-party CDS used e.g. Guidance, eASY or IDEA(3)s
- ▶ Health Informatics Unit with a Research & Development Team
- ▶ Long term commitment to and investment in AMS

The Opportunity

Bringing the “Power” to Cerner's PowerChart for Antimicrobial Stewardship FREE

Jason M. Pogue, Brian A. Potoski, Michael Postelnick, Ryan P. Mynatt, David P. Trupiano, Gregory A. Eschenauer, Keith S. Kaye

Clinical Infectious Diseases, Volume 59, Issue 3, 1 August 2014, Pages 416–424,

<https://doi.org/10.1093/cid/ciu271>

Published: 18 April 2014 **Article history** ▼

What ingredients are necessary?



Registry



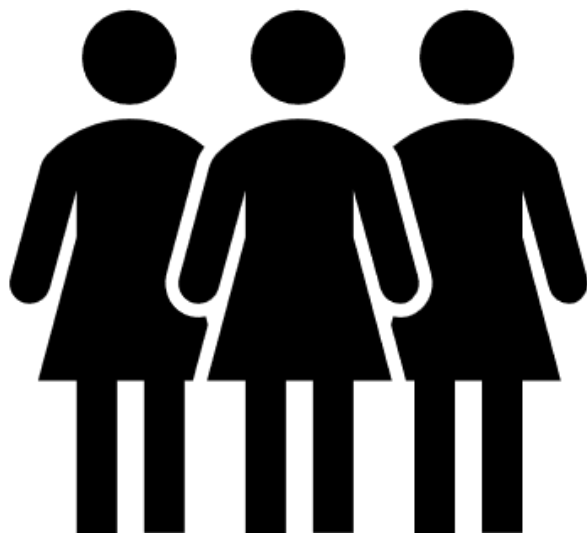
Intervention



Care Team

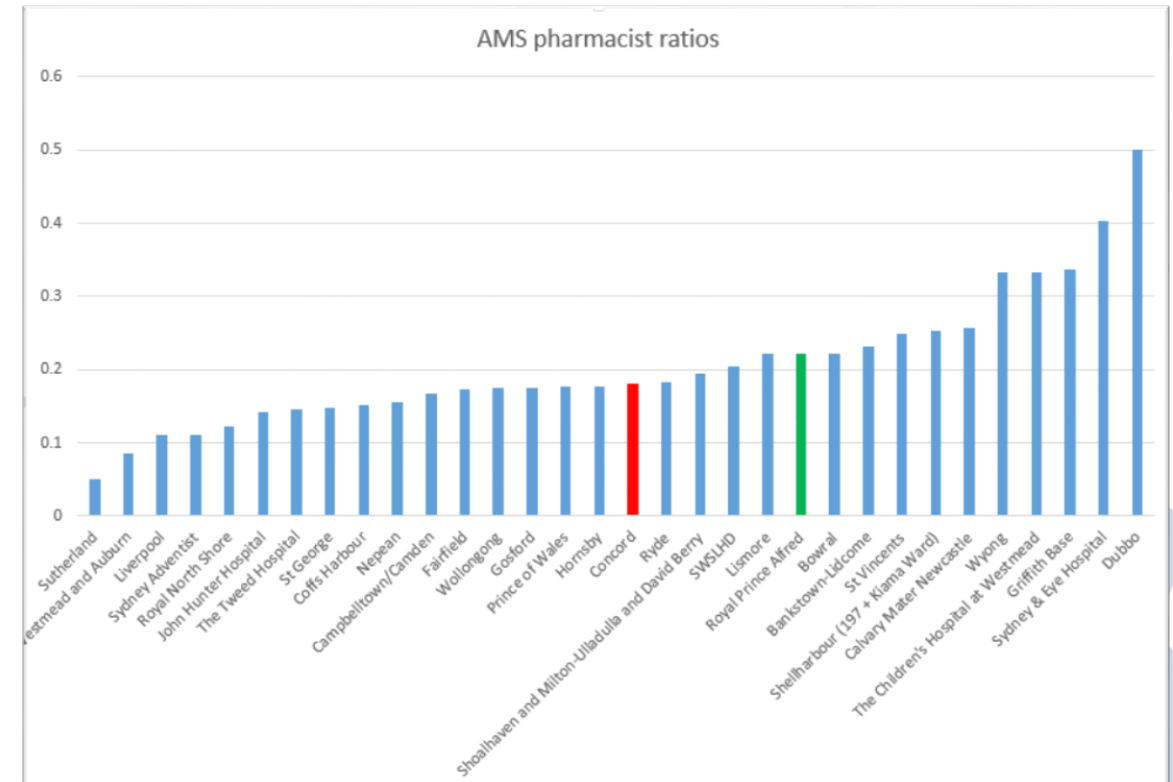
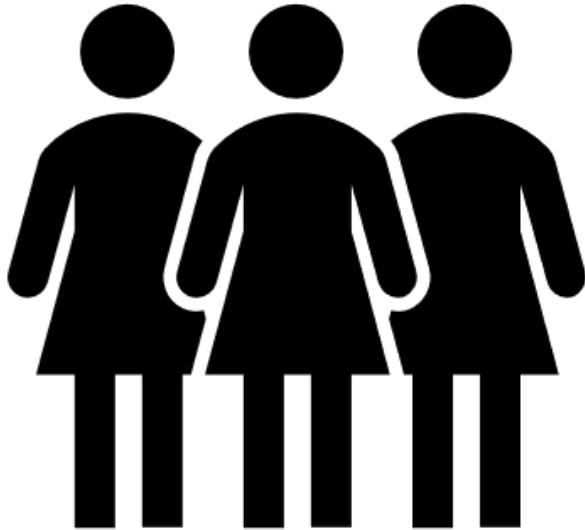


Care Team

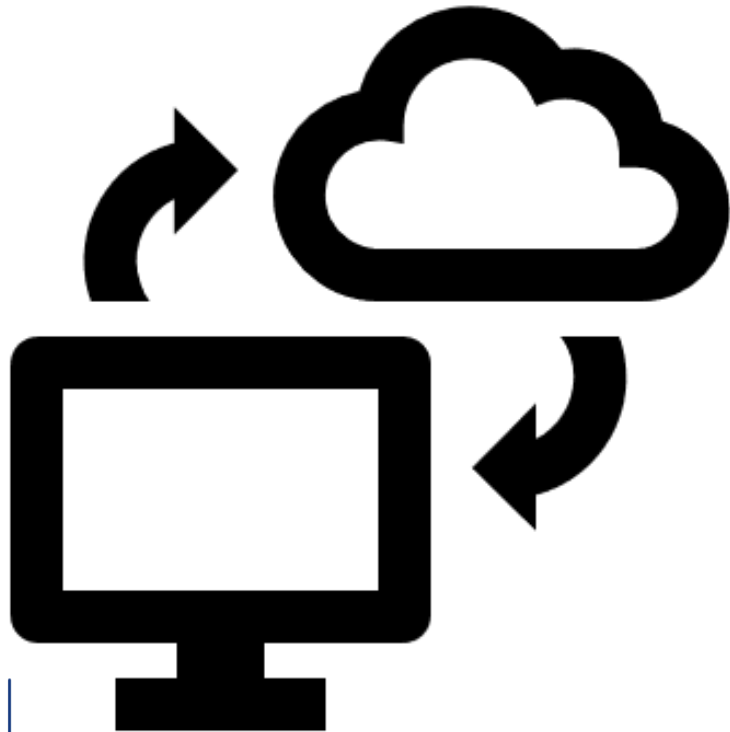


Site	Beds	eMeds	AMS Medical	AMS Pharmacy
CRGH	550	2015	0.5	1.0
RPA	900	2017	1.5	2.0
TCH	215	2019	0.5	0

Care Team



Registry



1. Business Objects Business Intelligence Report
 - a. All active antimicrobial orders
 - b. Automated extract 8am daily
 - c. Automated email delivery to AMS distribution list
 - d. Highlighted items without approval

Business Objects Report

eMeds Antibiotics Surveillance Daily Approval

Facility: Concord

All orders of the anti-infectives therapeutic class regardless of whether there is an approval number present or not. The field titled >24/48h no approval is a derived field where a one indicates the order is >= 24/48 hrs and still missing approval number. The field titled >7days is a derived field where a one indicates the orders is >=7days. This data comes from a database that is up to date as of 15min prior to when the report is run. Patients currently in HDU & HITH are filtered out. Prescriptions and home meds are filtered out.

CRGH

Report Run Date	Order Date & Time	Order Catalog	Display Line	Indication	Patient Name	MRN	Gender	Medical Service	Ordering Physician	Attending Physician	Ward at Time of Order	Current Ward	Approval Number
12/03/2019 07:35	04/03/2019 11:01	amoxicillin	500 mg, Oral, Capsule, TDS, infection	infection			Female	GERIATRIC MEDICINE			11	10	
12/03/2019 07:35	06/03/2019 11:21	amoxicillin	1 g, Oral, Capsule, midday, mediastinal collection	mediastinal collection			Male	UPPER GIT			1N	1N	
12/03/2019 07:35	08/03/2019 13:38	amoxicillin	500 mg, Oral, Capsule, TDS, UTI, 4 day(s), Final scheduled dose: 12/03/2019 14:00:00	UTI			Male	GERIATRIC MEDICINE			11	11	
12/03/2019 07:35	10/03/2019 11:33	amoxicillin	1 g, Oral, Capsule, BD, UTI, 9 dose, Final scheduled dose: 15/03/2019 20:00:00	UTI			Female	GERIATRIC MEDICINE			15	15	
			250 mg, Oral, Capsule, mane, post	post									

All Current Orders for AB on Su

>24h no approval

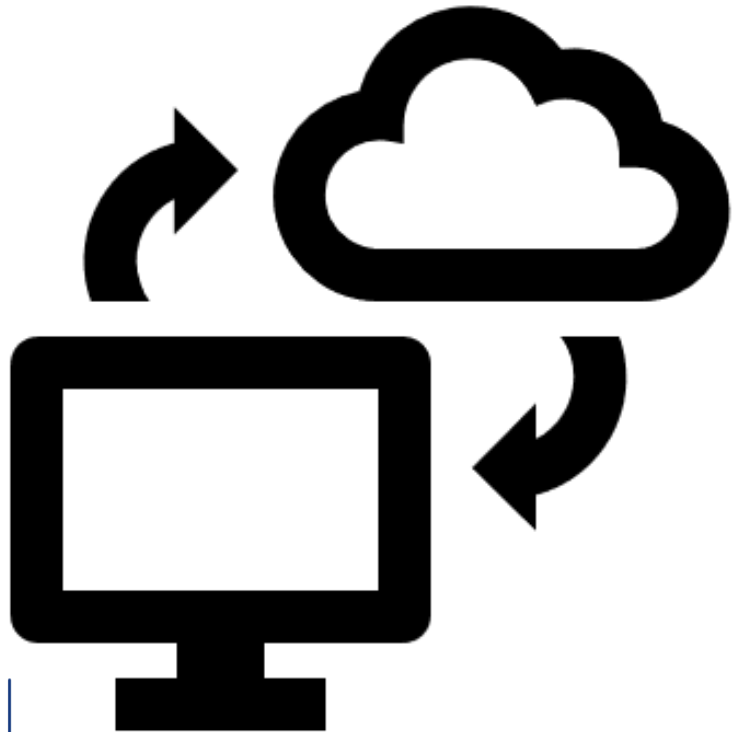
>48h no approval

Query Summary



Health

Registry



1. Business Objects Business Intelligence Report
2. Real-time Dashboard
 - a. Simple, web-based interface
 - b. Accessible within PowerChart (all Doctors, Pharmacists)
 - c. Real-time global antimicrobial surveillance
 - d. Customisable user-interface

Live AMS © (custom MPage™)

Live AMS 

Missing Approval Restricted Drugs MPage Help Refresh Reset Admin Concord Repatriation General Hospital All (40) Search:

0

Copy Print Column visibility Detailed

INT	BC	Note	ADR	Age	Medical Service	Current Ward	Order Catalog	Dose	Route	Approval Number	Indication	AMS Duration
				29 Years	GERIATRIC MEDICINE	10	nystatin	100,000 unit q6 hr	Oral		test	0
				40 Years	GERIATRIC MEDICINE	10	ceftriaxone	1 g daily	IV Infus	123456789	interface testing	0
				67 Years	RENAL MEDICINE	14	gentamicin	320 mg q24 hr	IV Infus		UTI	1
				85 Years	RENAL MEDICINE	14	gentamicin	320 mg q24 hr	IV Infus		anaerobic infection	1
				67 Years	RENAL MEDICINE	14	gentamicin	6 mg/kg Once	IV Inject		for resuscitation	1
				26 Years	GERIATRIC MEDICINE	DHIS Stabilisation	abacavir	300 mg BD	Oral		test	4

Live AMS © (custom MPage™)

Copyright SLHD HIU v3.0

Copy Print Column visibility Detailed Search:

Search Approv Search Indicatio Search AMS D

Approval Indication AMS
Number Duration

MRN: [REDACTED]
Name: [REDACTED]

flucloxacillin 2 g q6 hr IV Infus
hydroxychloroquine 400 mg daily after food Oral
rifampicin 600 mg daily before food Oral

Test	Result	Verified Date
Creatinine	61µmol/L	18/06/2018 16:56
Estimated GFR	88mL/min/1.73m ²	18/06/2018 16:56
WCC	8.7x10 ⁹ /L	18/06/2018 16:01
Neutrophils	6.4x10 ⁹ /L	18/06/2018 16:01
C Reactive Protein	20.2mg/L	18/06/2018 17:14
Body Weight	72kg	17/06/2018 20:36

Close

72 Years ORTHOPAEDICS 6N flucloxacillin 2 g q6 hr IV Infus Right knee sepsis 290

Usage & Performance

MPages Profile | MPage Details

✔ Data Complete

[BACK](#)

[PAGEVIEWS](#) | [PDF](#) | [HELP](#)

Custom: AMS_MPAGE

01-Mar-2019 to 11-Mar-2019
Current Month

166
Page Loads

7
Average Daily Providers

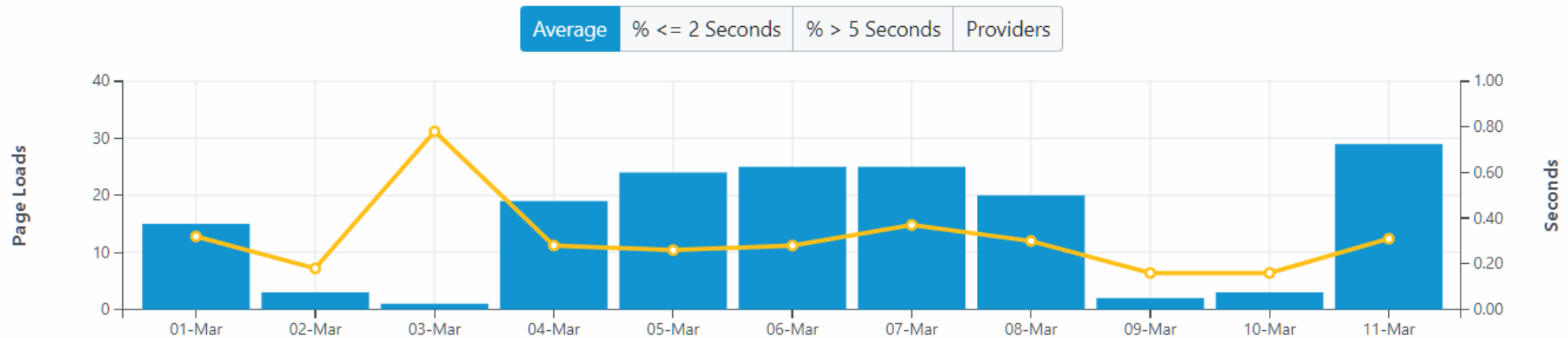
0.2
% > 5 Seconds

98.8
% <= 2 Seconds

0.30
Average Seconds

Page Load Volume and Average Component Time (All Providers)

[Options](#)



Interventions



1. Order Sentences
2. Approval Codes
3. Alerts
4. Intervention & Review Flags
5. Real-time Audits



Order Sentences

A nudge toward good practice whilst preserving prescriber autonomy



Example: gentamicin

Gentamicin **mg/kg**, IV infus, Soln, inj, q24hr, **3 dose**, Infuse in Sodium Chloride 0.9% or Glucose 5%

Gentamicin 1 mg/kg, IV infus, Soln, inj, q8hr, **Endocarditis**, Infuse in Sodium Chloride 0.9% or Glucose 5%

Gentamicin 2 mg/kg, IV infus, Soln, inj, **Once, Surgical Prophylaxis**, Infuse in Sodium Chloride 0.9% or Glucose 5%

Approval Codes

▼ Details for **ceftriaxone**

Details | Order Comments

+ [Icons]

Remaining Administrations: 49 Stop: 06/04/

FIRST DOSE Date/Time:	10-03-2019 18:00	▼	*Dose:	1 g	▼
Route:	IV Infus	▼	Form:	Pwdr, sterile	▼
*Frequency:	BD	▼	PRN:		▼
*Indication:	fever		Max Dose/24 hrs:		
Approval Number:	13EG5728		Pharmacy Order Priority:		▼
Patient's Own Meds:	<input type="radio"/> Yes <input type="radio"/> No		Duration from now to end point:		▼
Stop Date and Time:	06/04/2019	▲ ▼	Special Instructions:		
	0800	▲ ▼			
Additional Instructions:	Refer to Aus Injectable Drugs Han...				

Alerts

- Risk: delayed administration of antibiotic 1st dose
- Approach: interruptive alert
 - V1.0 triggered if first dose was the next day
 - V2.0 changed to trigger if > 1 hour from order

Discern: (4 of 4)



Anti-infective Start Date/Time

Issue: The first dose of this azithromycin order is scheduled to be given more than one hour from now at 01-05-2018 12:55

Action: Choose Accept or Modify the start date/time

Note: Subsequent doses will revert to normal administration times

Example: QID will be scheduled at 6am, 12pm, 6pm and 10pm

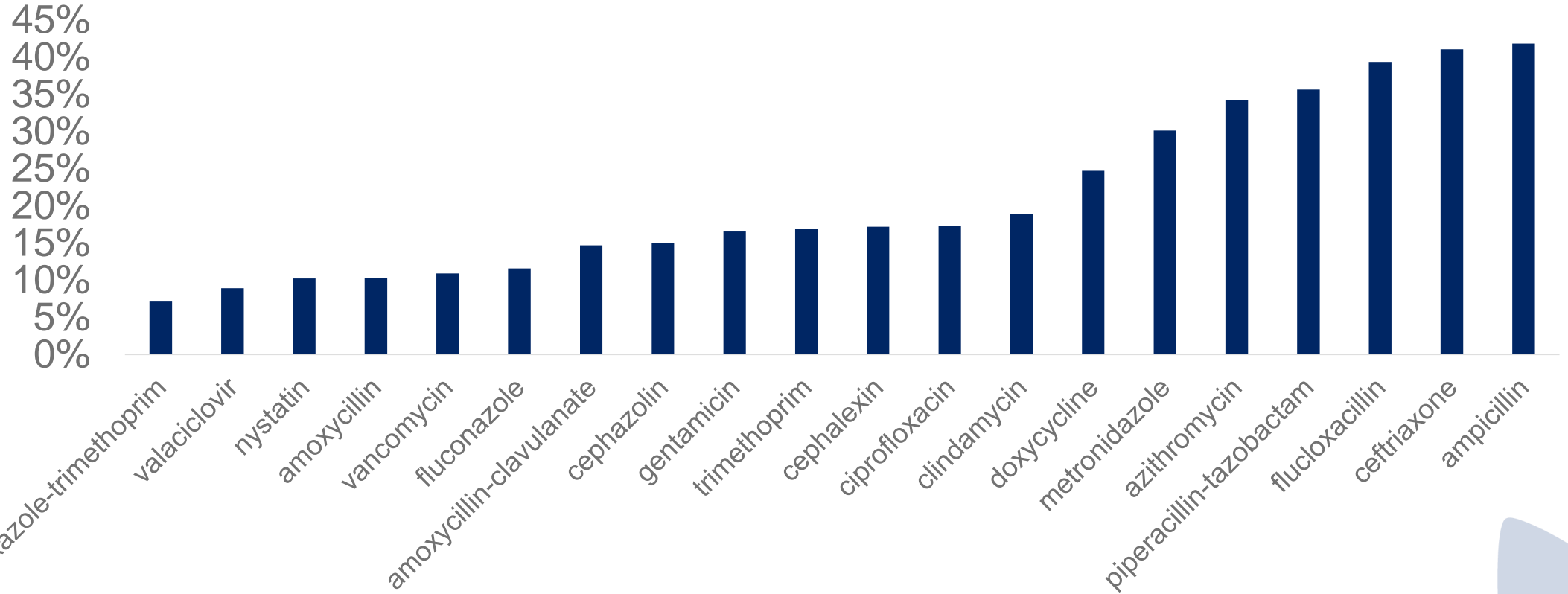
Alert Action

Accept

Modify Start Date/Time

OK

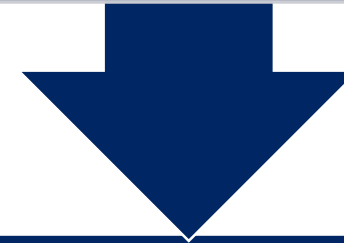
Proportion of antibiotic orders modified after alert fired (n=11333)



Live AMS & Rapid Product Recall

Antimicrobial shortages

Real-time monitoring off all drugs, including those that may not be restricted



Example: quarantine all IV metronidazole after hours June 2018

Hospital 1 – Live AMS was used to identify all patients on IV metronidazole

- Alternative therapy implemented (10-15 minutes)
- One phone call

Hospital 2 – no eMeds, no Live AMS

- JMO walked around all beds identifying patients on IV metronidazole (over 2 hours)
- 5 phone calls

Discussion

- ▶ Indication to initiate antibiotic vs diagnosis
 - ▶ Benefit of free-text indications
- ▶ Restriction list standardisation
- ▶ Clean database categorisation of 'antimicrobials'
 - ▶ E.g. hydroxychloroquine
- ▶ Security, privacy and audit
 - ▶ E.g. HIV
- ▶ 'Collegial' clinical relationships
 - ▶ Much more 'active' than audit and feedback
 - ▶ Interdepartmental meetings
- ▶ Complete picture not just target areas
 - ▶ Allows surveillance of outlying wards which have not been traditionally been a focus (Psychiatric unit, DOSAC)
- ▶ Remote monitoring
- ▶ Rapid review when blood culture is positive
- ▶ Allergy rounds
- ▶ Detection of 'emergent' phenomenon
- ▶ The 'Hawthorne' effect
- ▶ Minimal maintenance
- ▶ Order sets & PowerPlans
 - ▶ Pre-approved indications (indication-based prescribing)
 - ▶ Diagnosis associations
- ▶ No more approval codes
- ▶ Therapeutic monitoring
 - ▶ Microbiology
 - ▶ Drug levels
 - ▶ Biomarkers
- ▶ Outcome measures



“Quality use of medicines rather than a program that focuses primarily on restricted antimicrobials”

Dr Timothy Gray – A Paradigm Shift

Acknowledgements

- Dr Tim Gray, ID Physician
- ID & AMS Colleagues in SLHD

- Mr Magnus Blomqvist, Manager Clinical Analytics & Clinical Decision Support, HIU
- Ms Jo Hegarty, Developer Clinical Analytics & Clinical Decision Support, HIU

- Ms Rosemary Burke, Chief Pharmacy Information Officer, SLHD

- Available for licensing – contact Angus.Ritchie@health.nsw.gov.au