


Do computer alerts make
electronic medication management
systems safer?



Rosemary Burke

Concord Repatriation General Hospital

Medication Error is a problem

Is a computer the answer?

Electronic Medication Management

- Computerised Orders- clear, legible, accessible
- Integrate information from a variety of sources eg laboratory, pharmacy systems or references
- Decision Support :
 - Decision **Constraint**-Stopping certain things from happening
 - Decision **Support**-guiding decisions references
 - Passive
 - Active
 - Design

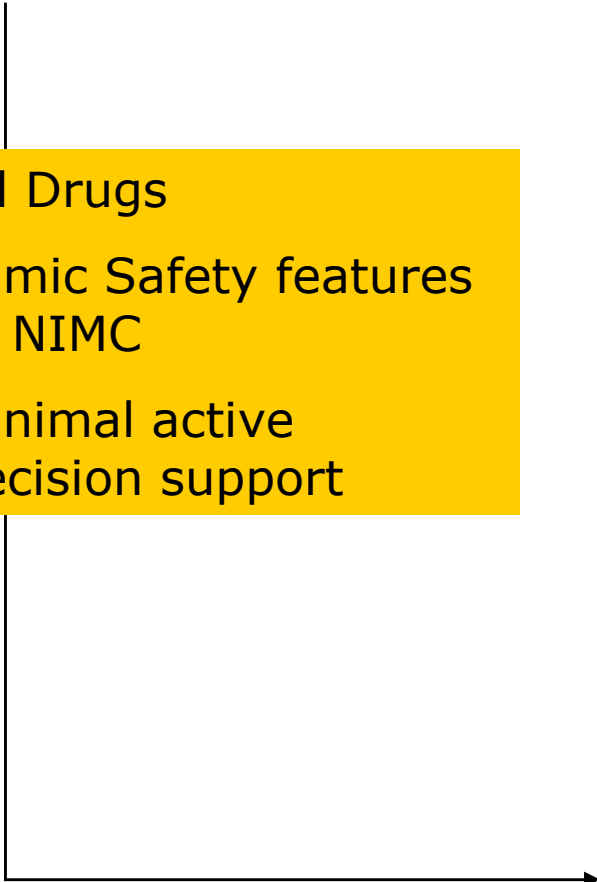
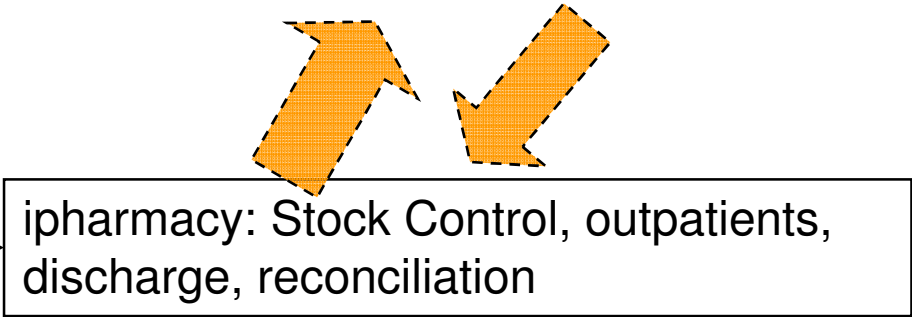
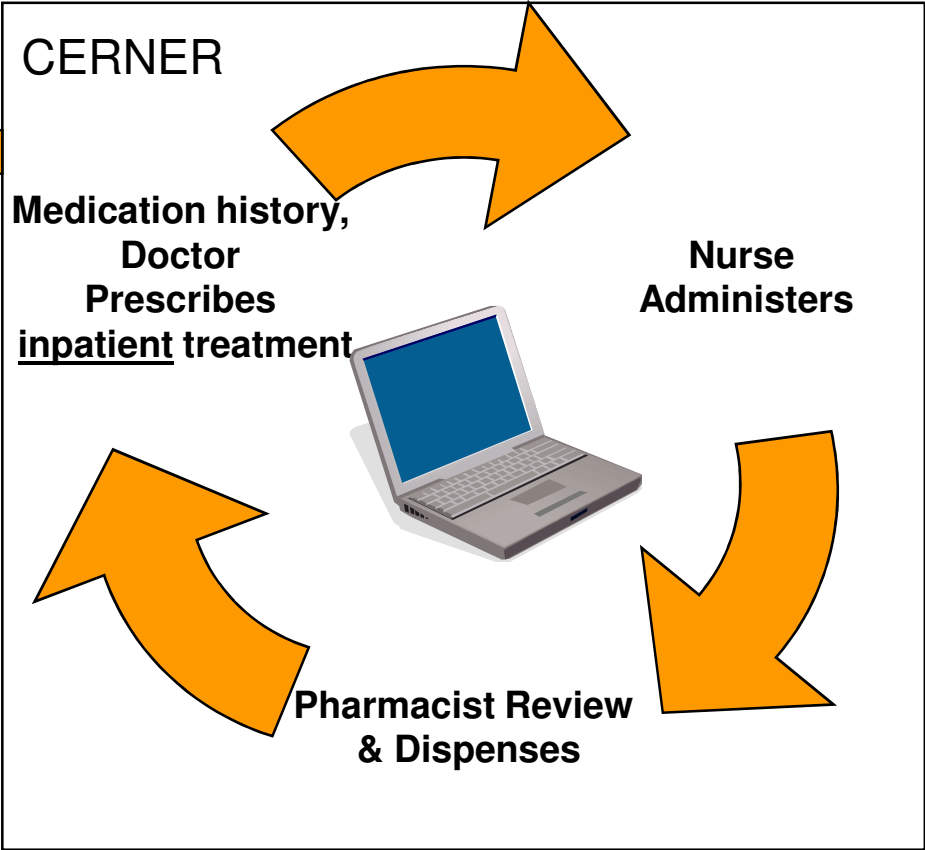
EMM: Our Model

Transfer to community

Electronic Discharge referral



All Drugs
Mimic Safety features of NIMC
Minimal active decision support



Decision Support-we asked, we googled...

- The **greatest benefit** in CPOE is good decision support.....
- Decision Support implemented at the time would have been of **great benefit** & made it easier to sell to colleagues
- Done well clinical decision support is the **key** to many **benefits** in ePrescribing, **Done poorly** it can **prejudice** users against the system

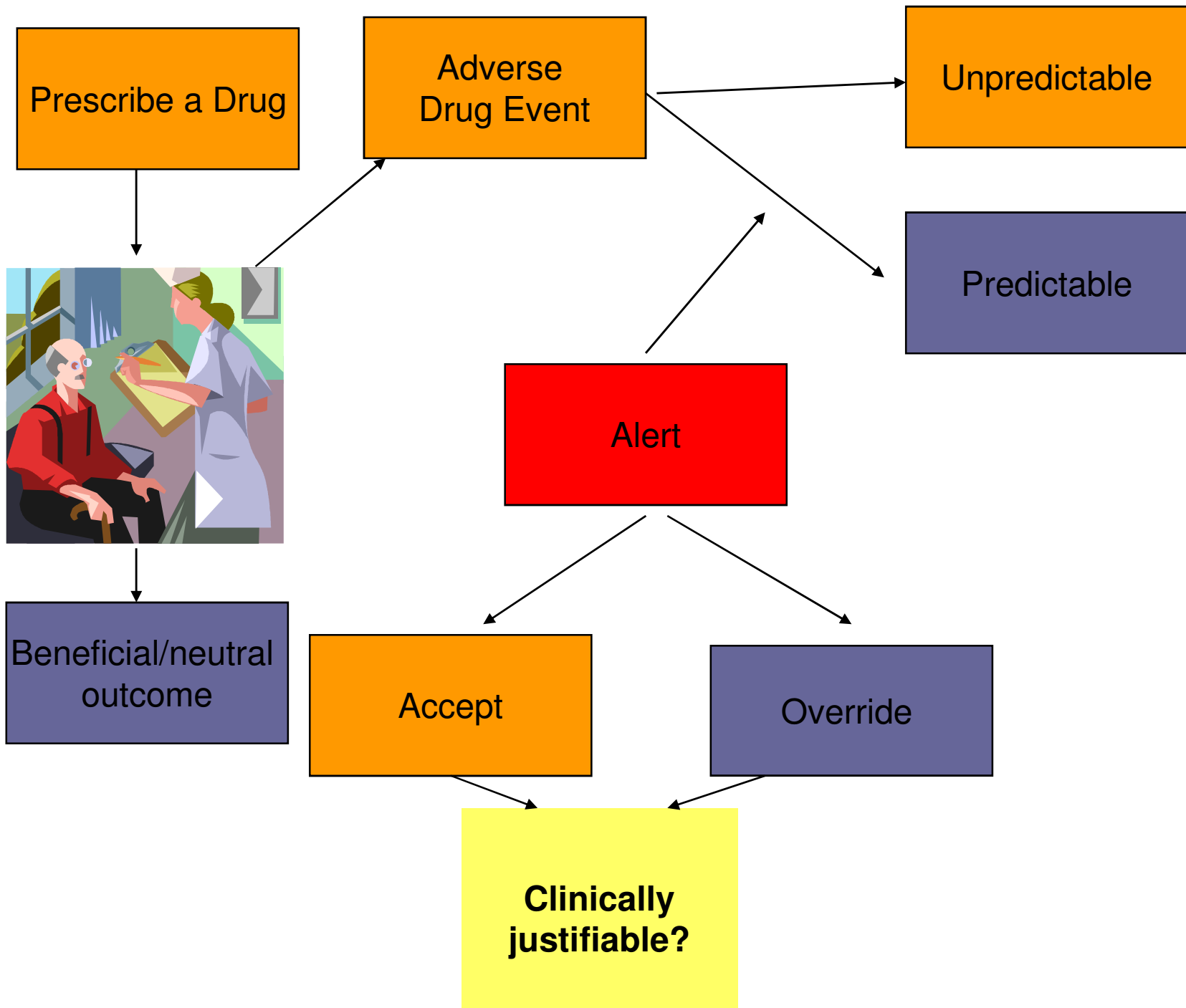


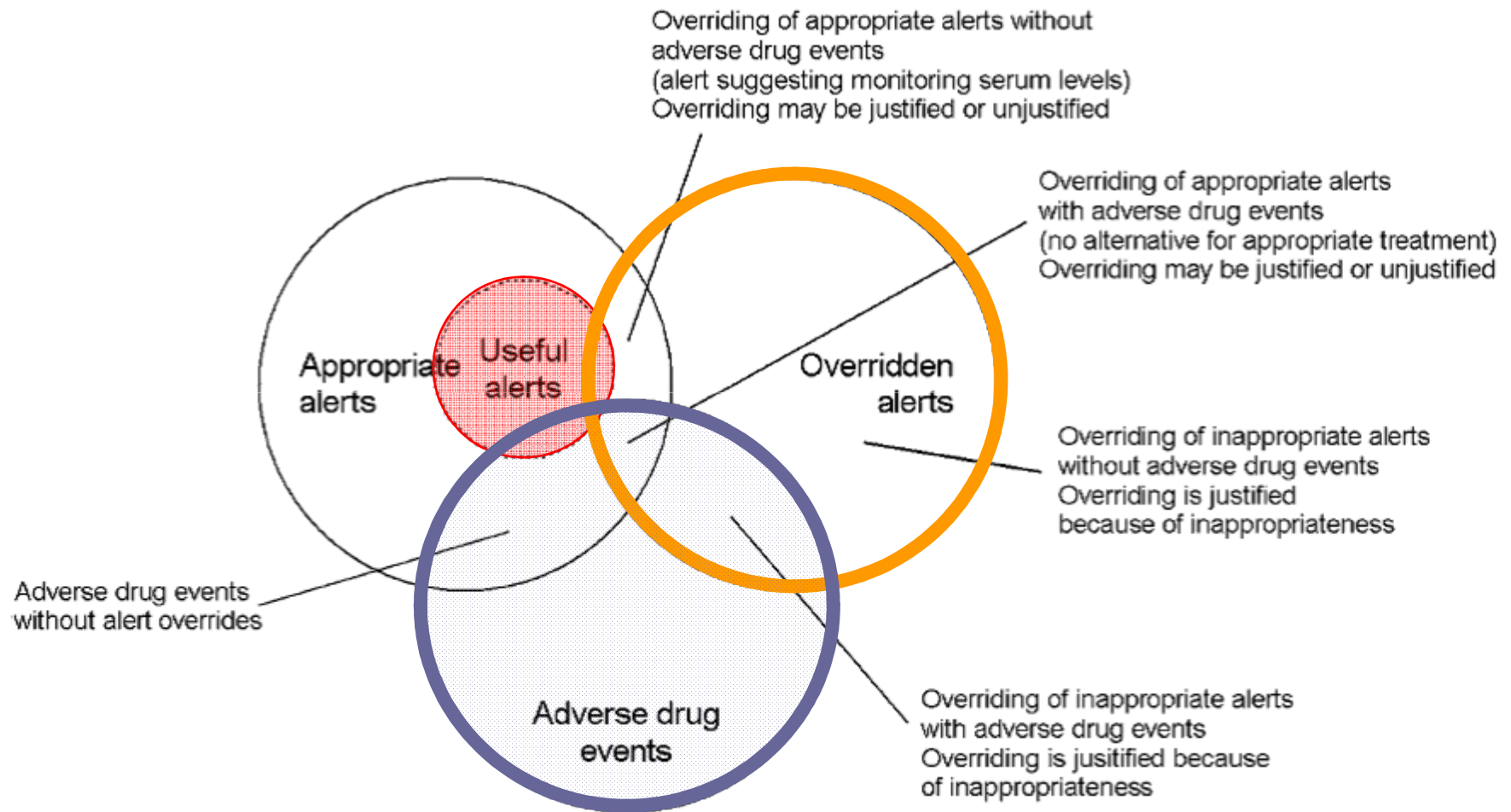
What Exactly is Decision Support?

- Decision **Constraint**-Stopping certain things from happening
- Decision **Support**-guiding decisions references
- Should improve safety, quality and cost effectiveness

Clinical Decision Support in EMM

- ✓ Field Parameters
- ✓ Structured Orders
- ✓ Pre-defined groups or orders
- ✓ Order checking
 - Drug-Drug (active)
 - Drug-Allergy (active)
 - Drug-Condition
 - Duplicate
- Dose limits
- ✓ Complex orders
- ✓ Laboratory/patient/drug (passive)
- Rules Based prompting
- Rules based surveillance





System Goes Live



Major Drug Interaction Alerts

All Allergy/ADR Alerts

there are just too many alerts!!!



- ❑ Overwhelming....
- ❑ Slows the system...
- ❑ I just ignore.....
- ❑ Reset to
Contraindicated on
day 3

Decision Support- Multum database

- Uses pharmacological or structural similarity
 - 6556 Major interactions
 - 2636 contraindicated
- Developed by Multum specific staff (Denver)
- set at an **interrupt** for all allergy/ADR alerts and at **contraindicated** level for drug interactions
- Other alerts eg major, moderate, minor or drug/food can be accessed by drilling down
- Alerts fire on each prescribing, dispensing, pharmacist verification or initiation/renewal
- Override requires a codified reason

Is it set at the correct level?

- ❑ A patient on Azathioprine commences allopurinol without dose adjustment
- ❑ Grand Rounds- changed level for a pharmacist to major
- ❑ Manage expectations of eMM alerts

N Safety Notice: 011/09

7 May 2009

Distributed to:

- Chief Executives
- Directors of Clinical Governance
- Directors of Clinical Operations

Action required by:

- Directors of Clinical Governance

We recommend you also inform:

- Drug and Therapeutic Committees
- Area Directors of Nursing
- Area Directors of Pharmacy
- Pharmacists
- Nurses
- Medical staff

Expert Reference Group

Content reviewed by:

- NSW TAG SAFER Medicines Group
- NSW Medication Safety Strategy Committee

Quality and Safety Branch
NSW Department of Health
Tel. 02 9391 9200
Fax. 02 9391 9556
Email SAFETYALERTS@doh.health.nsw.gov.au
Website: www.health.nsw.gov.au/quality/sabs/index.html

Allopurinol and Azathioprine

A Serious and Known Drug Interaction.

Background

A recent NSW incident resulting in the death of a patient highlights the seriousness of the drug interaction between allopurinol and azathioprine.

In this case, the patient was on existing azathioprine treatment when admitted to hospital and allopurinol was added by a consulting medical team. Opportunities to identify the interaction were missed by the consulting and treating medical teams and pharmacists.

Data collected from pharmacy reporting tools across NSW indicate that this combination of medicines has been unintentionally ordered for numerous other patients but harm was prevented through pharmacist intervention. Its severity and occurrence is well documented in the literature.

Allopurinol inhibits the metabolism of azathioprine, potentially leading to accumulation of toxic azathioprine metabolites which can cause bone marrow toxicity, including anaemia, leucopenia, thrombocytopenia and pancytopenia. Use of allopurinol and azathioprine in combination is best avoided. However, if the combination is required the azathioprine dose must be reduced to 25%-33% of the normal dose. Routine haematological monitoring is also recommended.

Contributing Factors:

- The consulting medical team did not assess the patient's existing therapy when recommending treatment with allopurinol.
- The patient's medicines were not thoroughly reviewed during their admission.
- The medical teams were unaware of the interaction and associated risks.
- The supervising pharmacist was not notified of the drug interaction alert automatically generated by the pharmacy dispensing software. The pharmacy dispensing software used throughout NSW utilises the Stockley drug interaction database which lists and categorises the interactions between different drugs.

Health care practitioners should observe the following points:

- A timely and thorough review of pharmaceutical treatment should occur for all patients, during each admission.
- Doctors and pharmacists should take appropriate care when prescribing, reviewing and dispensing medications to ensure that they have considered possible drug interactions.
- Pharmacists should confirm that their departmental policy ensures that drug interaction alerts are adequately assessed and managed.
- Patients should be educated about potential problems when new drugs are prescribed.

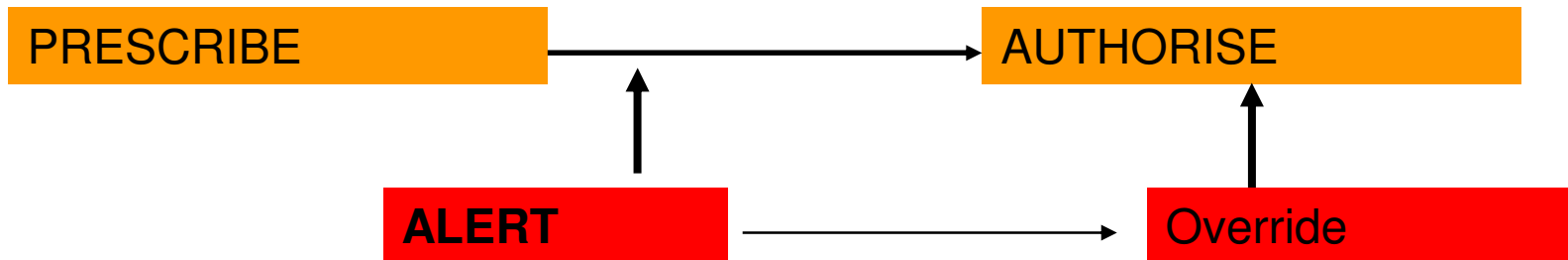
Suggested Actions by Area Health Services

1. Ensure that this safety notice is distributed to all clinical staff involved in the prescribing, dispensing and administration of medications.
2. Ensure staff members new to areas are made aware of the risks and known drug interaction associated with allopurinol and azathioprine use.
3. Ensure staff are aware of drug interaction information available via the CIAP website.
 - The CIAP is at:
<http://www.ciap.health.nsw.gov.au/> or <http://internal.health.nsw.gov.au/2001/>
 - for Mims Drug Alert is http://www.use.hcn.com.au/login_%60%1%60/home.html?l1=drugalert&U1=nhtrain
 - for Micromedex Drug Interaction is http://proxy1.use.hcn.com.au/hcs/librarian/ND_T/HCS/ND_CPR/interactions/ND_PR/interactions/CS/EE6AC/DUPLICATIONSHIELDS/NC/ASATF3/ND_PG/PR/IND_B/HCS/ND_P/interactions/PPPU/okfr/WHy2TV&v4/FFAction/hcs.interactions.FindDrugInteractions

Do people take notice of warnings?



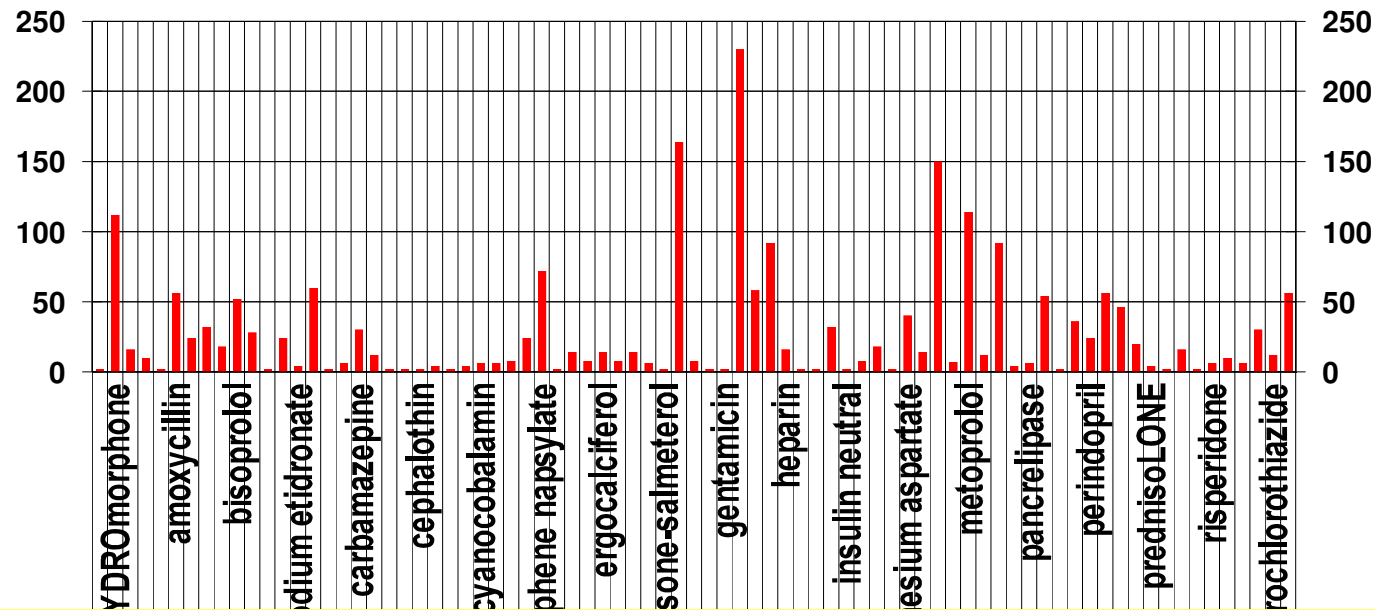
Studying our Alerts



- Track orders that don't proceed
- Analysis of overrides (via a report & retrospective data review)
- Limitation reports need to be run in a timely fashion
- Looked at sensitivity & selectivity
- Focus groups(medical, pharmacist) about attitudes to overrides

Do they work? Orders not proceeded

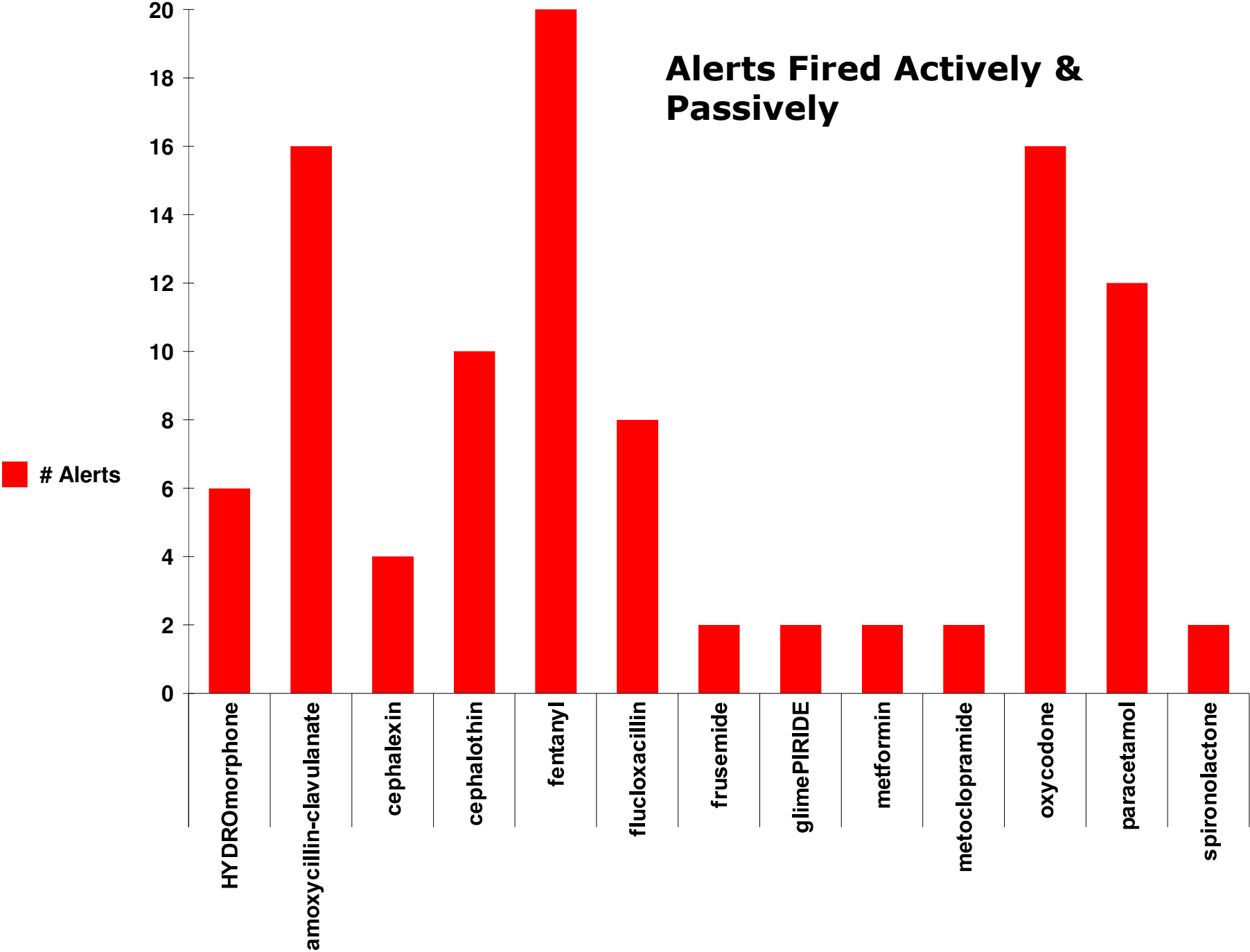
Aug 09



May 08- 4 were penicillin ordered for pt with ADR to penicillin

September 09 13 patients Failure to authorize penicillin -5 with penicillin allergy

Alerts Fired Actively & Passively





Overrides- July 2009

- 376 Allergy Alerts overridden
 - Antibiotics eg penicillin cephalosporin
 - Narcotics
 - Eg Morphine Allergy. Firing with Pethidine.



Analysis Drug Interaction Overrides

(2008)

Do Clinicians Act on Alerts?

- Long term setting, randomised, 47,977 orders, 9414 alerts
 - CNS effects over-sedation 20%, Constipation (13%), Warfarin 12%
 - Prescribers who received alerts slightly more likely to take action (re risk 1.1) Judge et al J Am Med Inform Assoc.2006
- Renal Insufficiency. Likelihood of one dose 89% to 47%, increased duration of training and if patients worsening renal function Zhan et al Am J Health Systems Pharmacists 2006 15;63(4):353-8
- Significant decrease in ICU errors when alerts in place Colpaert et al Crit Care 2006 26;10(1):R21



Most Clinicians Override Alerts

- 40% override most or all of the time in e-prescribing systems although value alerts, and believe a benefit.

Lapane K et al J Gen Intern Med 23(4):442-6

Source	Setting	Design	No. of alerts	% of overrides
Hsieh <i>et al</i> (2004)	Inpatients	Chart review	7761	80% for drug allergy
Isaac <i>et al</i> (2009)	Ambulatory	Retrospective analysis	233537	91.8% for DDI 77% for drug allergy
Lin <i>et al</i> (2008)	Community based outpatient clinics	Prospective study	908	87% for DDI 81% for drug allergy
Mille <i>et al</i> (2008)	Paediatric	Prospective study	3404	69% of DDI
Shah <i>et al</i> (2006)	Ambulatory care	Prospective study	5182	33% overall
Payne <i>et al</i> (2002)	Inpatients	Retrospective study	42,641	88% for DDI 69% for drug allergy
Weingart <i>et al</i> (2006)	Inpatients	Retrospective study	3481	91.2% of drug allergy 94.6% DDI

Slide courtesy
Ms Q Zeng

Why do we Override?

- NPS 22 GP's : overrides occur because of desensitisation to alerts NPS
- Recognition of Alerts: Over a third of respondents felt that up to 30% of drug interaction warnings were insignificant and 13.5% believed 50% of the warnings were insignificant. Coffinder et al (abstract ISPOR)

Do we override because of the quality of Drug Interactions Decision Support?

- Six of the nine systems had a sensitivity rate of greater or equal to 90%. Only one third of the systems had a specificity of greater or equal to 80% with a number of systems providing unhelpful alerts for many minor interactions

Sweidan M, et al MJA 2009; 190(5): 251-4

- 44% of major drug interactions in one text aren't even listed in another

Aronson JK B J Pharmacol 2007;63:6:637-9

Are overrides clinically justifiable & appropriate?

- 7761 alerts fired, 80% overridden
 - 90% overrides related to allergy eg cephalosporin/penicillin
 - Subset 320 patients 6% had ADEs as a result of overrides- but **the override was clinically justifiable** therefore not preventable

Hsieh et al JAMIA 2004; 11(6): 482-491 ■




How to stop inappropriate overriding?

- ✓ Better Specificity
- ✓ Minimise Number of Alerts
- ✓ Interrupts to High Severity Only
- ✓ Require a Reason for Override
- ✓ Monitor Reasons to Increase Specificity

□ Shah et al J Am Med Inform Assoc 2006:13:5-11

What is the literature telling us?

- ❑ Alerts are **valued** but often **overridden**
- ❑ Alerts are overridden because doctors, pharmacists and nurses become **desensitised**
- ❑ They become desensitised because some of the information **lacks sensitivity and specificity**
- ❑ Interactions levels can be different in different texts
- ❑ Overrides may or may not be **clinically justifiable** even if outcome is an ADE



*A computer will do what you tell it to do,
but that may be much different from
what you had in mind” *Joseph Weizenbaum**

- Clinical Decision Making is still required
- Clinicians need to know the limitations of decision support and the impacts of too much
- The Computer cannot replace a clinician-but it can help
- You still need to use the RAM in your own brain
- **Man is still the most extraordinary computer of all.”
— John F. Kennedy**

Thanks to eMM team, Pharmacy Staff Concord, Ms Q Zeng, Prof A McLachlan, Dr K Williams