Medication Safety over the next 20 years

Building Tomorrow's Health Services

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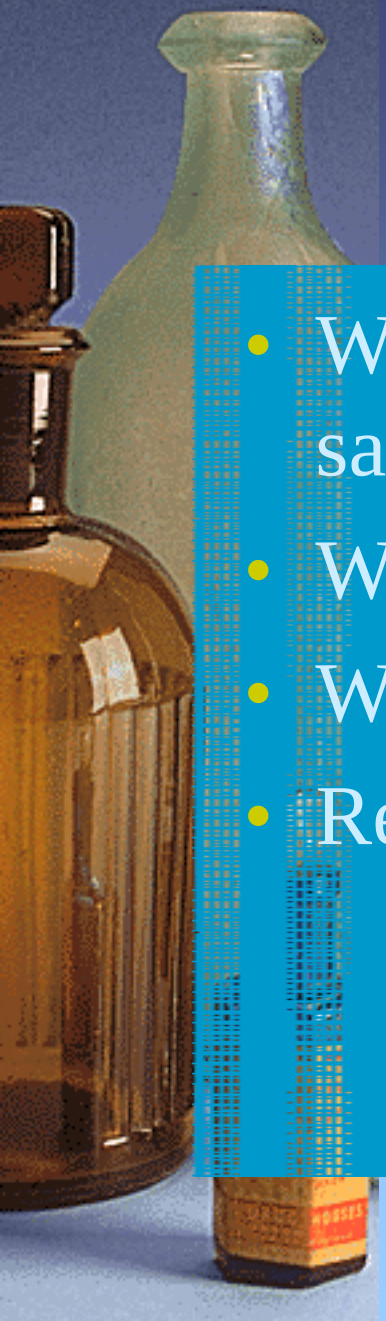
CMDHB

Caveats

- Secondary care focussed
- CMDHB examples
- 20 year projections are difficult

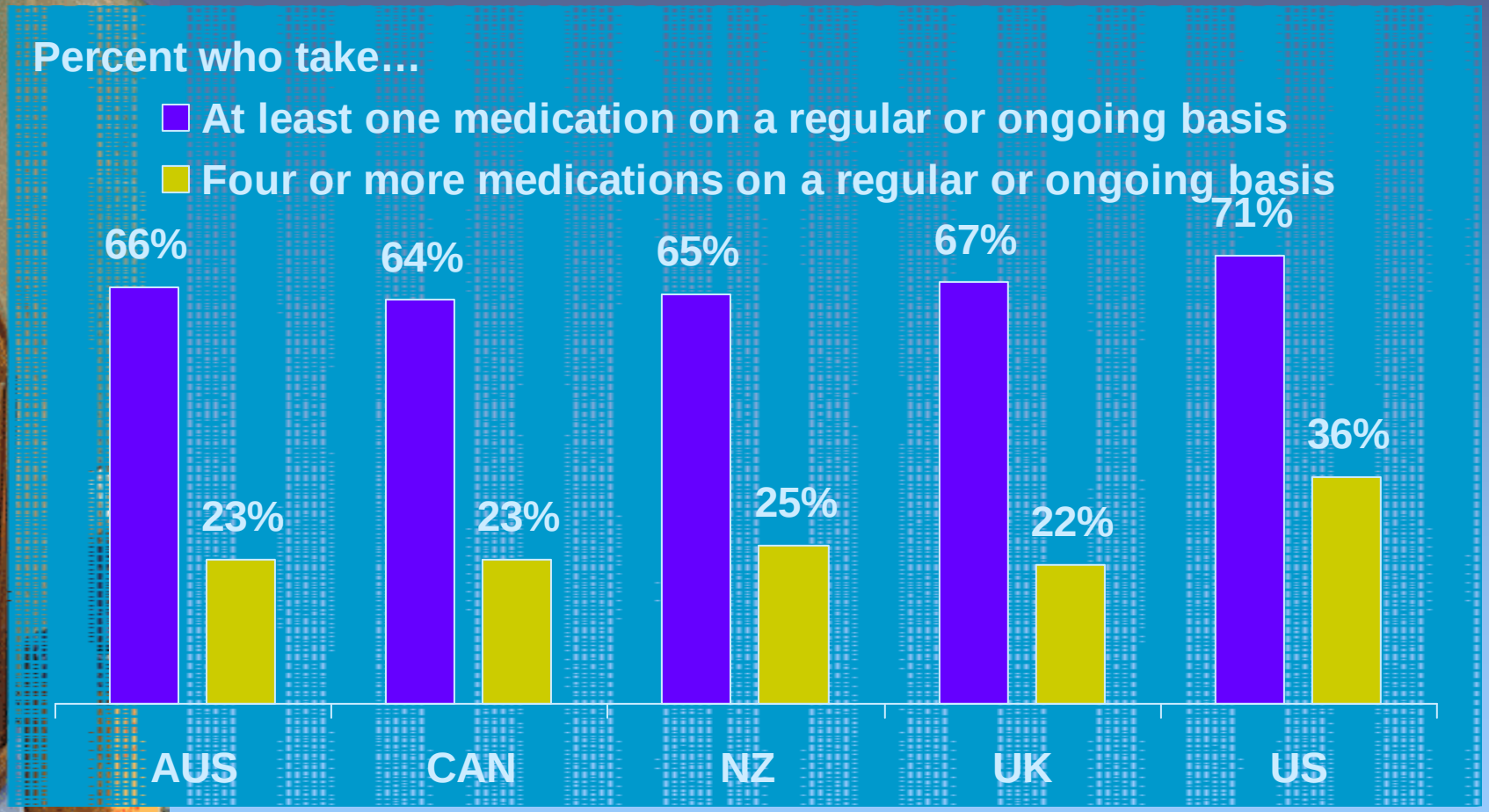


Outline

- Why should we worry about medication safety?
- What are we currently doing?
- What might the future hold?
- Recommendations for the forum

Why should we worry about medication safety?

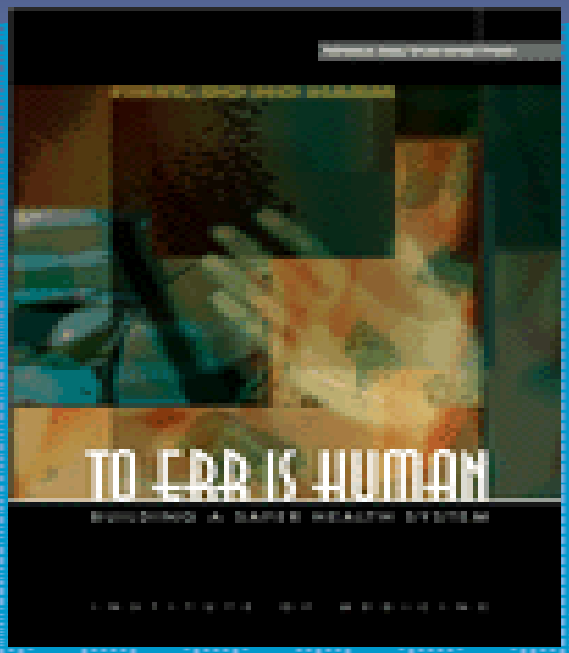
Medications are the most common therapeutic intervention



Blendon et al. May/June 2003 *Health Affairs*

Adverse events are common

- **Medical AE studies**
  - Harvard study 4%
  - Australia 16%
  - UK 10%
  - NZ 13%



- **IOM report**

"44,000 - 98,000 Americans die each year as a result of medical errors" - 8th leading cause of death

Adverse Drug Events (ADE) common AE

- Systematic review of AE studies – 74 485 patient records
- AE – median 12%
- Preventable – 44%
- **ADE = 15% (2nd most common)[1]**
- Most ADE occur during **prescribing** (39%) and **administration** stages (38%)[2]

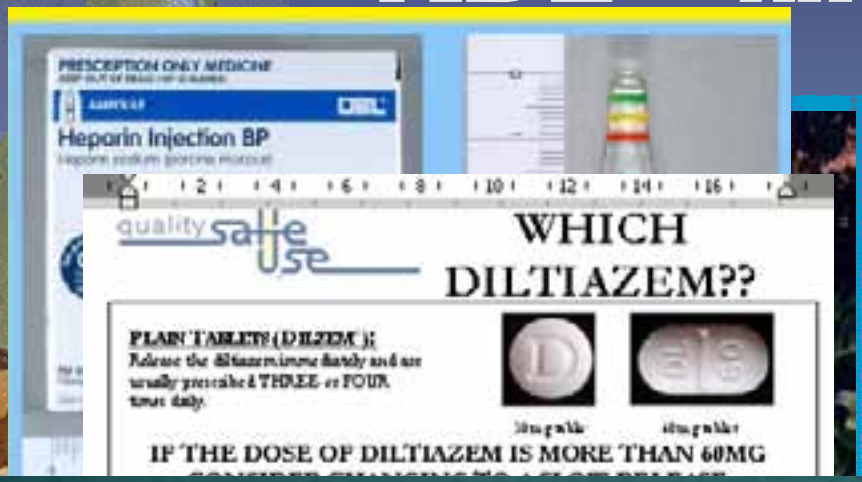
1. E N de Vries et al. The incidence and nature of in-hospital adverse events: a systematic review QSHC 2008
2. LL Leape et al. Systems analysis of adverse drug events.1995 JAMA

Adverse Drug Events (ADE) at a DHB-level

Estimate from Peter Davis study:

- 361 people affected by preventable inpatient ADEs every year
- 44 people die or suffer permanent disability every year as a result
- 2815 extra bed days every year
- Cost to DHB = NZ$1.66 to $3.35 million per year

ADE – known problems

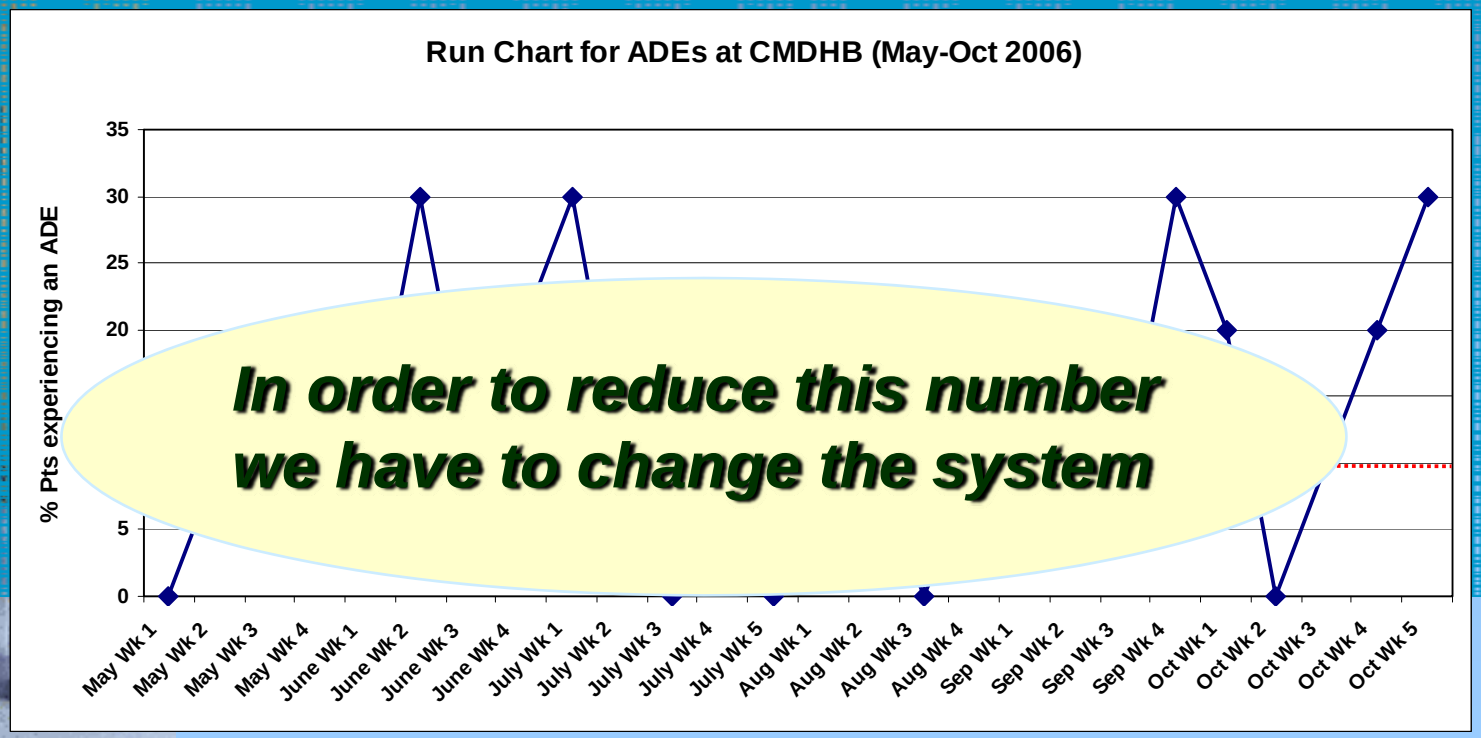


- Interface between 1º and 2º care high risk
- Look alike/sound alike meds

Adverse drug event rate

Every system is perfectly designed to produce the results that it does produce

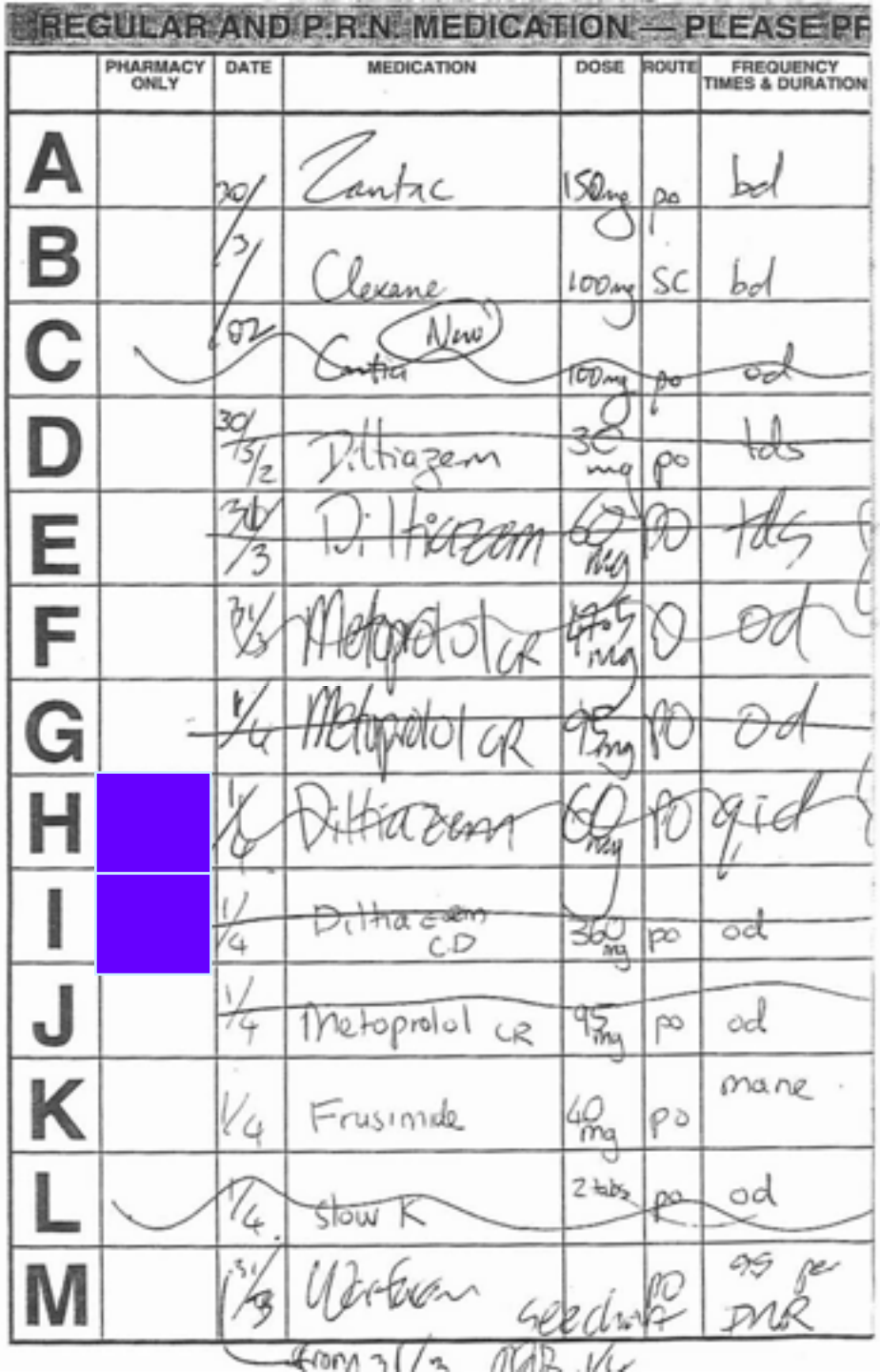
At MMH we have a 'stable' medication system that is perfectly designed to harm (potentially harm) 1 out of every 10 patients



Systems approach: Active & Latent failures

Case history

49 year-old man – previously well - admitted with atrial flutter, HR 150, BP not compromised.



REGULAR AND P.R.N. MEDICATION — PLEASE PR

	PHARMACY ONLY	DATE	MEDICATION	DOSE	ROUTE	FREQUENCY TIMES & DURATION
A		30/3	Zantac	150mg	po	bd
B		1/3	Clexane	100mg	SC	bd
C		1/3	Cardia New	100mg	po	od
D		30/3	Diltiazem	30mg	po	tds
E		30/3	Diltiazem	60mg	po	tds
F		31/3	Metoprolol CR	47.5mg	po	od
G		1/4	Metoprolol CR	95mg	po	od
H		1/4	Diltiazem	60mg	po	qid
I		1/4	Diltiazem CD	360mg	po	od
J		1/4	Metoprolol CR	95mg	po	od
K		1/4	Frusimide	40mg	po	mane
L		1/4	slow K	2 tabs	po	od
M		31/3	Warfarin see chart		PO	as per INR

from 31/3

Signatures
have been removed

Profound hypotension, arrested, 3 day ICU stay, acute renal failure temporary dialysis. Extended hospital stay But survived.

Response:

Nurse instructed to ‘reflect’ on incident

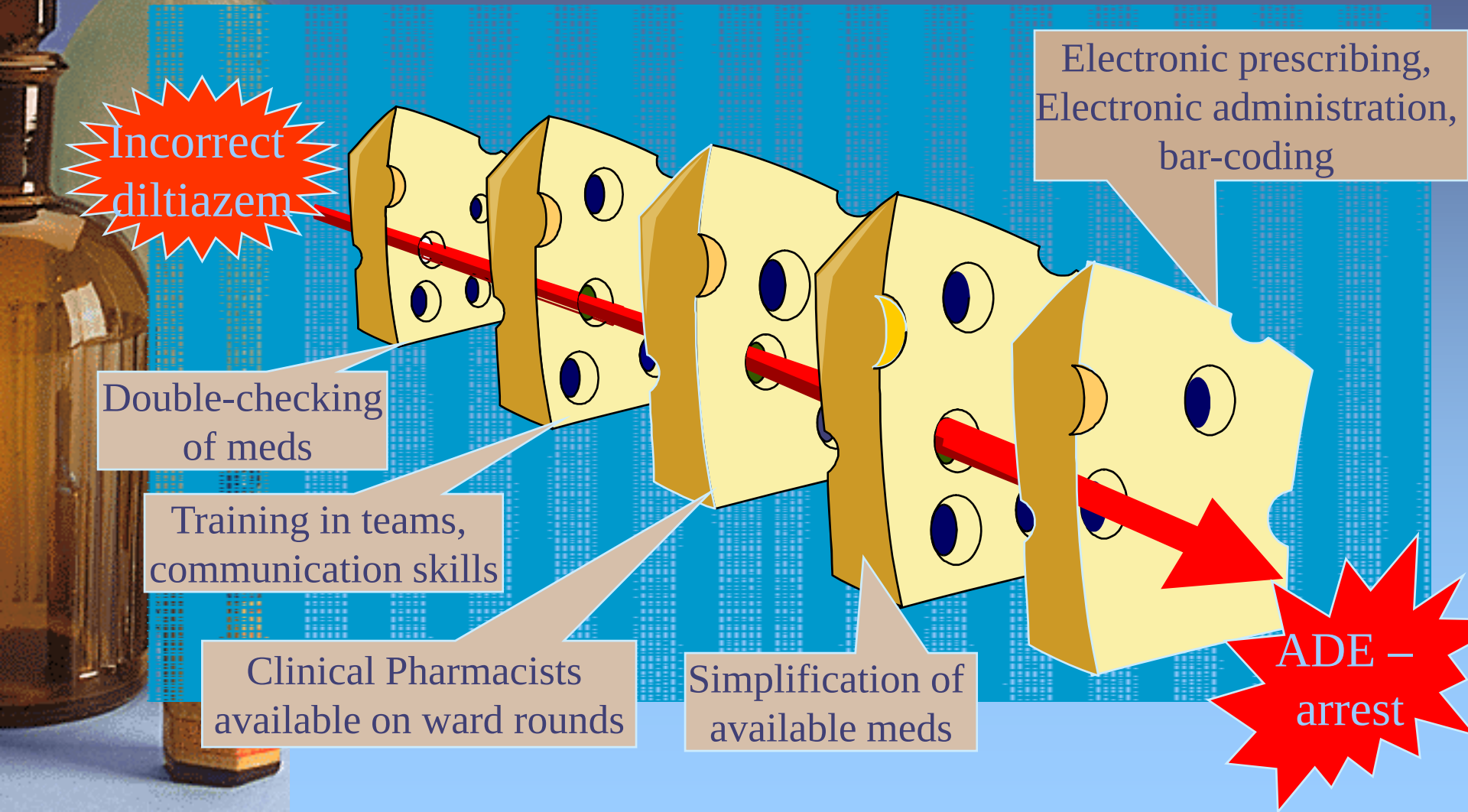
What I learnt from the incident?

- I think I need to slow down for the information to registered before I act.
- I think it paid to double check the drugs that comes in different doses and its action. E.g. Slow release and Control release.
- I felt we need constant reminding in the treatment room. E.g. chart.
- I felt I need to learn more about the drugs and its actions.
- I also felt it paid for the prescriber to notify staff if the prescribed new or chan drugs if they come before or after the administered time of medications. May the doctor may highlight their prescriptions.

Dangers with the individual person approach

- **Denial is the norm - errors are not reported**
- **If errors are uncovered, individuals may be removed, but 'risk situation" remains**
- **The same errors will repeat themselves & therefore we are no safer**

Systems approach to diltiazem error



What are we currently doing to improve medication safety?

Implement proven strategies

1. **Medication reconciliation**
2. **Pyxis administration machines**
3. **Increase clinical pharmacists on wards**
4. **Smart pumps**
5. **Attention to ‘high-risk’ medications**
6. **QIC Safer Medication Management**

MR on admission

Survey:

- >70% of admission medication histories had at least one error
- 16 weeks, total errors intercepted = 1,812

Hospitals Story

RSS

Errors in up to 70% of elderly's medication

6:00AM Wednesday May 02, 2007
By Errol Hong

View as a single page Page 1 of 2

Up to 70 per cent of the medication histories of elderly patients admitted to Auckland City Hospital have omissions or errors, a study has found.

Most of the mistakes were minor, but a third of the discrepancies could give rise to discomfort or potential harm, the Auckland University study found.

The study looked at 653 patients aged over 75 who were taking five or more medicines.

Twelve cases were potentially serious enough to "prolong hospital admission".

Pete Hodgson says money will be set aside for a barcode system to stop patients being given the wrong drugs

Doctor Signature:

Date/Time:

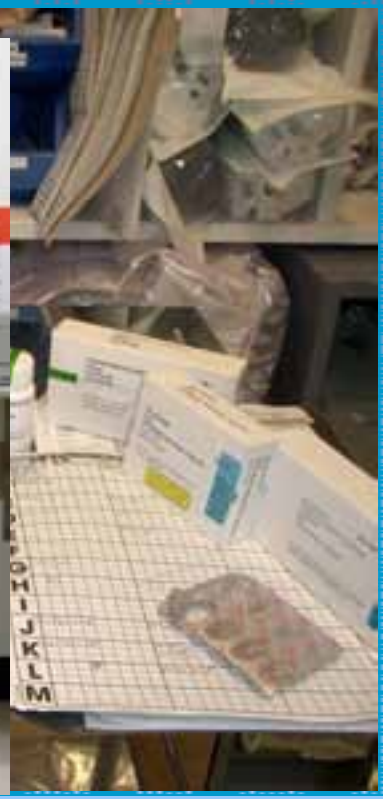
ECONCILIATION FORM

MR on discharge – near future

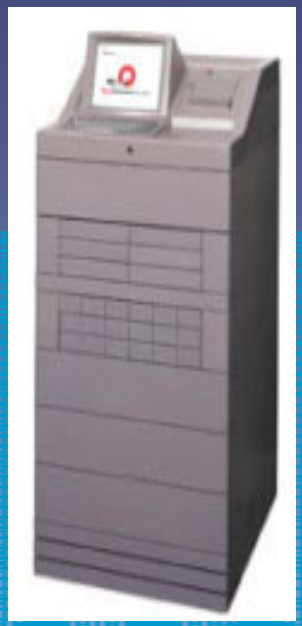
Admission Medications	Discharge Medications	Change	Reason
-	**Omeprazole (Losec)** 20mg Capsules 20mg, PO, OD, 1 month (Script)	Started	Started as Pt was having regurgitation symptoms
Docusate sodium & Sennosides A and B (Coloxyl with Senna Tablets) Tablets 2 tablets, PO, BD PRN	**Docusate sodium & Sennosides A and B (Coloxyl with Senna Tablets)** Tablets 2 tablets, PO, BD PRN	Continued	-
Cilazapril monohydrate (Inhibace) 2.5mg Tablets 2.5mg, PO, OD	**Cilazapril monohydrate (Inhibace)** 2.5mg Tablets 5mg, PO, OD, 1 month (Script)	Changed	Dose increased to manage hypertension
Frusemide (Diurin 40) 40mg Tablets 40mg PO OD	-	Stopped	Stopped as Pt dehydrated
Isosorbide mononitrate (Duride) 60mg Controlled Release Tablets 30mg, PO, OD	**Isosorbide mononitrate (Duride)** 60mg Controlled Release Tablets 60mg, PO, OD (Script)	Changed	Dose increased to manage hypertension
Allopurinol (Progout) 300mg Tablets 300mg, PO, OD	**Allopurinol (Progout)** 300mg Tablets 300mg, PO, OD	Continued	-
Aspirin (Cartia) 100mg Enteric coated Tablets 100mg, PO, OD	**Aspirin (Cartia)** 100mg Enteric coated Tablets 100mg, PO, OD	Continued	-

Improving medication administration

Cupboard from an Imprest System

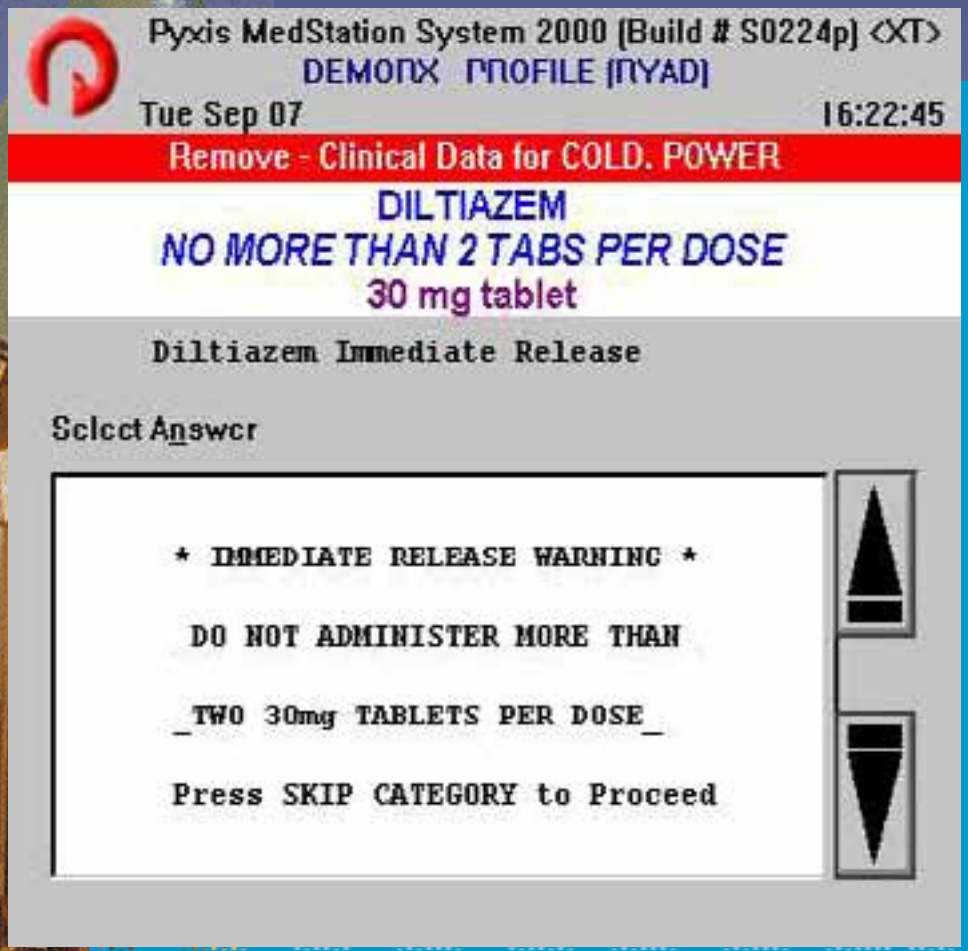


Pyxis



- Automated unit used for the distribution and storage of medicine in clinical areas
- Process facilitates getting clinical pharmacists on war

Pyxis - Accessing Medication



High Risk Medications

- Warfarin
- Morphine
- Insulin
- Potassium
- Vincristine

Warfarin

WARFARIN PATIENT INFORMATION

Warfarin stops clots from being made or getting bigger

The right dose = the right INR

Take your tablets at the same time every evening

Your doctor or nurse will tell you how many tablets to take and when to go for your next blood test

Call doctor or nurse if any of the following occurs:

- Any unusual bleeding or bruising
- Severe unexplained pain
- Fever, vomiting, diarrhoea, infection

Other medicines can affect warfarin:
Ask your pharmacist or doctor about <u>all</u> your medicines

Mix your green vegetables with other coloured vegetables*

*This does not apply if you are on Dilcoz. You must consult with a doctor

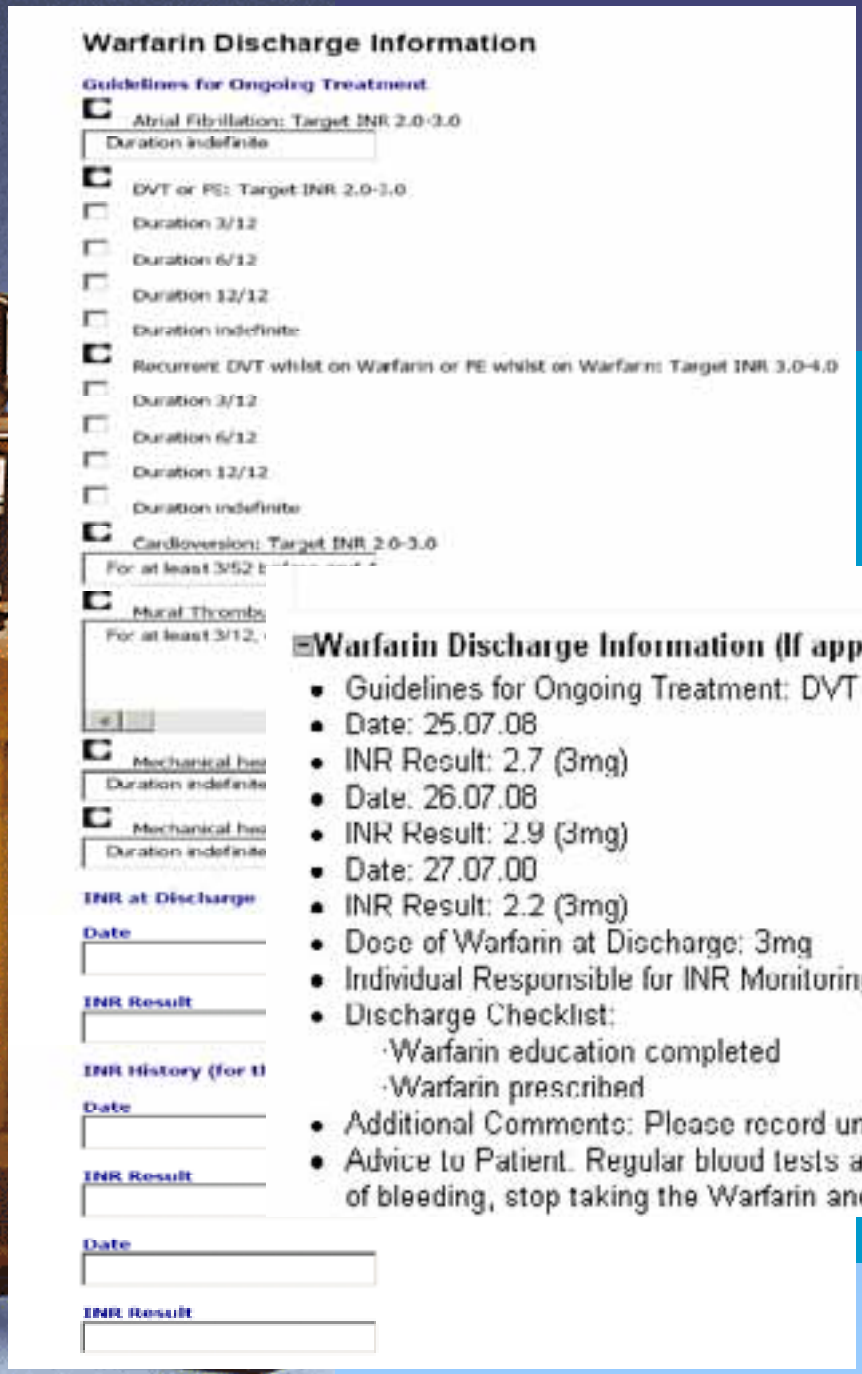
Take your warfarin at _____

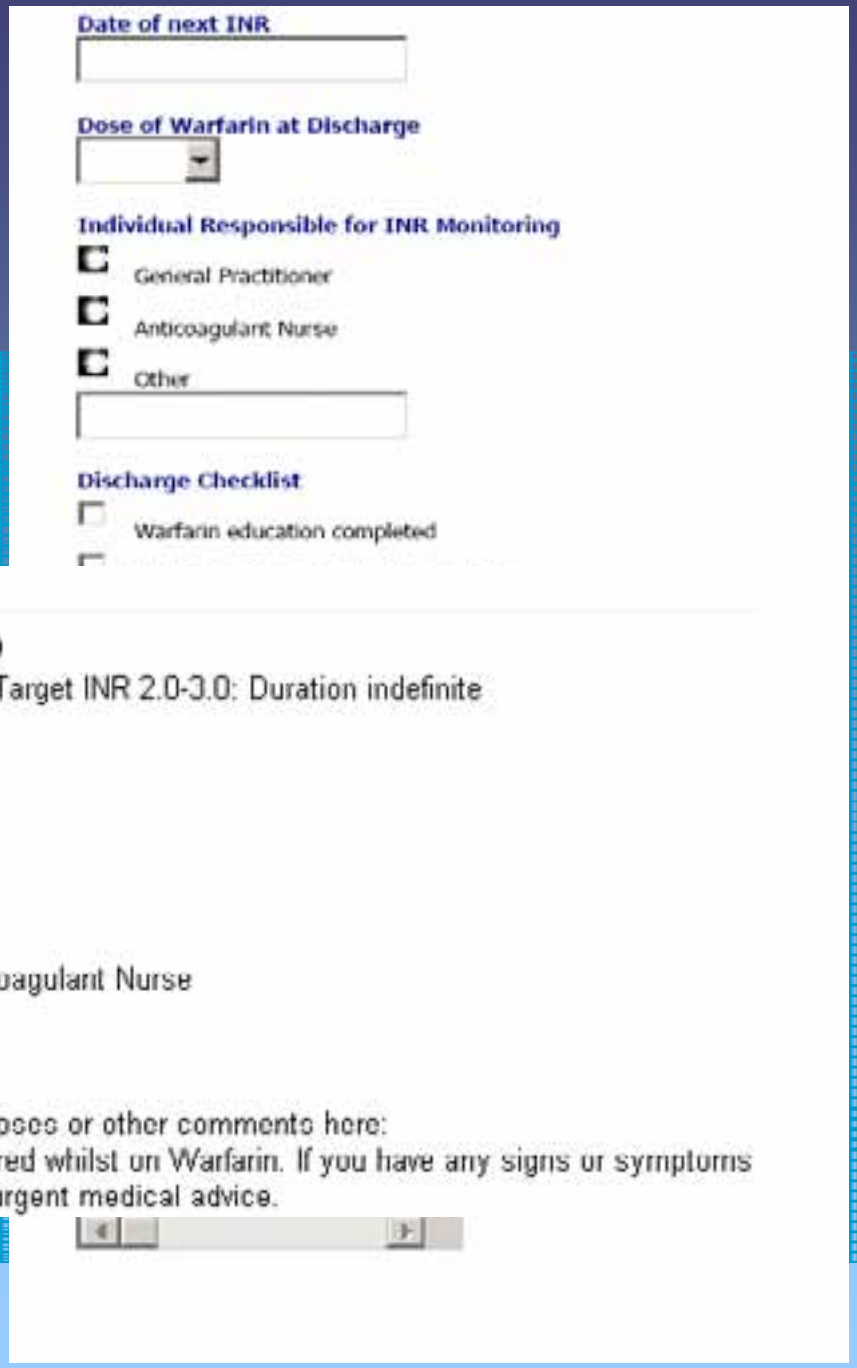
Have regular blood tests starting _____

Phone your doctor for your INR results on the day of your blood test

Take the recommended dose until your next blood test

Other information/recommendations:





Warfarin Discharge Information (If applicable)

- Guidelines for Ongoing Treatment: DVT or PE: Target INR 2.0-3.0: Duration indefinite
- Date: 25.07.08
- INR Result: 2.7 (3mg)
- Date. 26.07.08
- INR Result: 2.9 (3mg)
- Date: 27.07.00
- INR Result: 2.2 (3mg)
- Dose of Warfarin at Discharge: 3mg
- Individual Responsible for INR Monitoring. Anticoagulant Nurse
- Discharge Checklist:
  - Warfarin education completed
  - Warfarin prescribed
- Additional Comments: Please record unusual doses or other comments here:
- Advice to Patient. Regular blood tests are required whilst on Warfarin. If you have any signs or symptoms of bleeding, stop taking the Warfarin and seek urgent medical advice.

Morphine

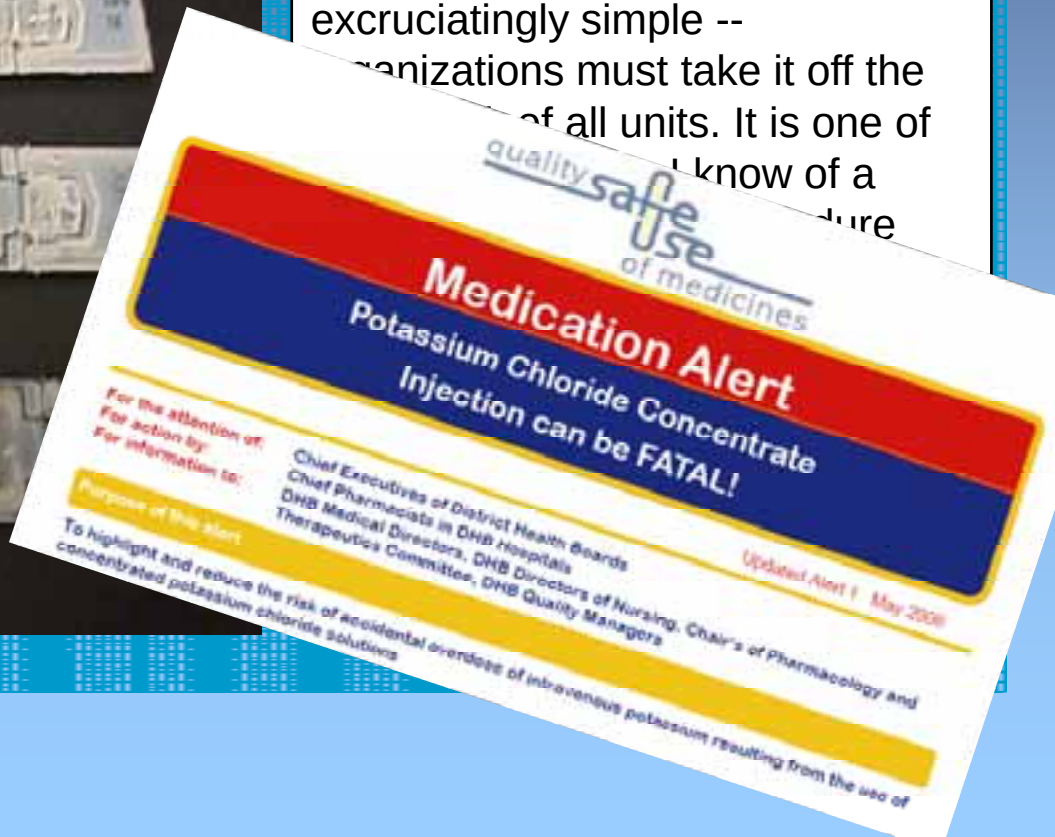
- High risk of overdoses
- Look-alike packaging

What we've done:

- Removed high-dose morphine from wards (dispensed on a named basis only)
- Pyxis machines

High risk medications: Concentrated KCL

"The way to prevent tragic deaths from accidental intravenous injection of concentrated KCl is excruciatingly simple -- ...anizations must take it off the ...f all units. It is one of ...know of a ...dure



Insulin

- Errors with insulin infusions – hypoglycaemic events
- Errors on discharge

Current GIK Infusion Set up

10% Dextrose with KCl

1L 0.9% NaCl for insulin infusion

Volumetric pump with Dext and KCl running at 100ml/hr

Metriset with 99ml NaCl and 1ml (100units) Insulin

Volumetric pump for insulin as per sliding scale (usually between 1-16 ml/hr)

Proposed GIK Via Syringe Driver and Volumetric Pumps

Syringe driver with insulin infusing at 2ml/hr (2 units)

Volumetric Pump with 10% Dextrose and KCl

Insulin tubing is blue

Preventing intrathecal vincristine

- Vincristine now delivered in 100 ml bags

BMJ

Not again!

Preventing errors lies in redesign—not exhortation

The BMJ devoted a theme issue and a conference last year to reducing medical errors and promoting patient safety. To read this issue and for further information on the ideas advanced in this editorial, please see http://bmj.com/ content/vol320/ issue7237

Again, a young patient with leukaemia is dying, not from his disease, but from an erroneous intrathecal injection of vincristine, intended for intravenous use.[1] Again, the newspapers express outrage; they count up to 15 identical cases over the past 15 years. The hospital apologises, again, and two doctors are suspended, pending "investigation." The NHS explains; steps will be taken, again.

And trust erodes, again, as a confused public grieves with the patient and his family, wonder if they are safe. Spurred by the headlines, each asks, again, "Could I be next?" The answer, of course, is, "Yes."

Less than a year ago the chief medical officer of England's NHS, in a landmark report on threats to patient safety in the NHS, courageously labelled the problem of medical errors as pervasive and consequential. He promised progress and even speculated that very soon—intrathecal injection of intravenous chemotherapeutic agents—as one targeted for "zero" occurrences: not just safer, but perfectly safe.[2] So how could this happen—again?

The answer is surprisingly mundane. It is this: we are human, and humans err.[3] Despite outrage, despite grief, despite experience, despite our best efforts, despite our deepest wishes, we are born fallible and will remain so.

There are two video rental stores in my town—Blockbuster and West Coast Video. I rented selecting heroes, nor in seeking Superman. Tomorrow, like today, we will be human.

The remedy is in changing systems of work. The remedy *is* in design.[4] A small number of children used to be killed each year by their parents' inadvertently backing their cars over them as they switched to reverse gear. The car would suddenly jump back and strike the child. That almost never happens today because almost all cars with automatic transmissions have a lockout feature: they cannot be switched into reverse gear unless the driver's foot depresses the brake pedal. A small number of patients used to die each year in operating theatres because the anaesthetist inadvertently connected the nitrous oxide tank to the oxygen line and vice versa. That almost never happens now, because the connecting fittings for oxygen and nitrous oxide have been made different from—and incompatible with—each other on all anaesthesia machines. Not even a saboteur today, much less a fatigued doctor, could connect the oxygen line to the nitrous oxide: it cannot be done.

Equipment is not the only possible object for productive redesign. We can, using modern principles from human factors engineering, reliability sciences, research on group dynamics, communication theory, and semiotics (to name but a few relevant disciplines), devise better job and task designs, better alarms and signalling systems, better communication patterns, better team training, and better simulation environments

Safe & Quality Use of Medicines committee

Medication Safety over the next 5 years: QIC Medication Safety Programme

1. Medication reconciliation
2. National drug chart, & e-medication record, & e-prescribing
3. Standardizing and linking all medication information systems
4. Bar-coding down to unit dose

Health Story

RSS

$100m bid to end drug deaths in hospitals

5:00AM Tuesday August 21, 2007
By Martin Johnston

The Health Ministry wants hospitals to spend more than $100 million on computer systems and bedside barcoding of patients to reduce fatal and disabling drug errors.

A discussion document obtained by the *Herald* under the Official Information Act shows the scheme would cost up to $114 million over 12 years.

The proposal is for all public hospitals to introduce fully electronic drug-prescribing systems or computerised patient medication records and connect these to the hospital pharmacy. Drugs would be re-packaged into single-dose packs carrying barcodes, and patients would wear bracelets containing their own unique barcode.

Nurses would scan the drug pack and bracelet before giving patients their medicines, and errors – such as the wrong patient or wrong drug – would be flagged.

YOUR VIEWS

Have you been given the wrong drugs in hospital?

→ Send us Your Views

National Drug chart

- UK has had a national drug chart since 1960
- Standardise approach
- Build in safety concepts
- Anticipate e-medication chart

E-prescribing

- Provides access to e-formulary, with default doses and range checks
- Access to laboratory tests
- Provides checks for drug allergy or drug-drug interaction
- Eliminates errors due to illegibility of doctors handwriting

CPOE

- Recommended by Academy of Health, Institute for Safe Medication Practices, Leapfrog group
- Why have we not already done it?
- Cost
- Vision
- Culture – “What is perceived as unbroken, we will not fix”

Dr. M Morgan

Technology and medication safety

Exhibit 7. Strong Support for Use of Information Technology to Improve Patient Care

Percent reporting very important/important for improving patient care:	Total: Very important or important	Very important	Important
Doctors use computerized medical records	86	41	45
Doctors can access your tests results, such as lab tests or X-rays, electronically	89	53	36
Doctors can share information electronically with other doctors	89	49	41
Doctors prescribe your medications electronically	71	32	39

Note: Subgroups may not sum to total due to rounding.
Source: Commonwealth Fund Survey of Public Views of the U.S. Health Care System, 2008.

Bar-coding and Bedside verification

- FDA has made bar-coding mandatory

"By giving health care providers a way to check medications and doses quickly, we create an opportunity to reduce the risk of medication errors that can seriously harm patients."

- For medication safety very important to apply bar-codes at unit dose

The Future

Medications prescribed Electronically

Checked by Clinical Pharmacist

Available immediately for removal by Nurses

Bar code, checks

Administered to the Patient

What might the future hold?

Medication safety in 20 years

- Measurement of ADEs routine (trigger tool) with continuous improvement of our system of delivering medications
- Embedded technological advances – e-prescribing, bar-coding
- Greater transfer of medication information – possibly web-based, accessible by patients, GPs, Hospital staff and community pharmacists
- Greater role for clinical pharmacists
- Greater role for patients