Medicines management
Safer use of medicines

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The plan

- The Commission
- Types of error
- Types of intervention to prevent error
- Just culture
- Reporting errors
- Look after each other
Learning outcomes

• At the end of this session you will be able to:
  1. Discuss recent HQSC initiatives to improve patient safety
  2. Describe actions you can take as a nurse to reduce the likelihood of a medication error
  3. List system level interventions that can reduce medication error
HQSC: The Commission

We work towards achieving the New Zealand Triple Aim for Quality Improvement:

- improved quality, safety and experience of care
- improved health and equity for all populations
- better value for public health system resources
Principles

• Vision = a world-class patient-centred health and disability sector
• Doing the right thing – and doing it right
• Work with clinicians, providers and consumers to improve health and disability services
• Quality and safety improvements will mean fewer people harmed, more lives saved, and financial savings within the sector
What the Commission does (1)

• Monitor and report on quality and safety
  – Support reporting and management of health care incidents
• Build sector capability for quality and safety improvement
• Support clinicians to be leaders of quality and safety improvement and follow best practice
• Build consumer engagement and partnership
• Influence the health quality and safety agenda and be a catalyst for change
What the Commission does (2)
Specific programmes

- Hand hygiene
- Infection prevention
- Safe surgery
- Fall programme
- Pressure injuries
- Deteriorating patient
- Advance care planning

- Aged residential care (ARC)
- Mental Health & Addiction
Atlas of healthcare variation: polypharmacy

HQSC Atlas of Healthcare Variation | Polypharmacy in older people

Method

Select Indicators

1. People receiving five or more long-term medications
   - By year, percent
   - By age (2016), percent
   - People dispensed 5-7 long-term medications
   - People dispensed 8-10 long-term medications
   - People dispensed 11+ long-term medications
   - People aged 65 and over who received the triple therapy
   - People who received an antipsychotic
   - People who received benzodiazepine or zopiclone
   - People dispensed both an antipsychotic and benzodiazepine or zopiclone
   - People who received benzodiazepine or zopiclone and a strong opioid following a public hospital event

Chart series: People receiving five or more long-term medications

Bar chart: By year, percent (2014)

Sector feedback

DHIS - Ratio - Coast

- Auckland: 35.1 - 17,803
- Bay of Plenty: 35.6 - 14,482
- Canterbury: 37 - 28,553
- Capital and Coast: 32.6 - 13,877
- Counties Manukau: 36.5 - 21,679
- Hawke's Bay: 35.8 - 9,732
- Hurst: 35.4 - 7,693
- Lakes: 34.5 - 5,311
- Mid-Central: 38.9 - 10,992
- Nelson Marlborough: 35.4 - 9,153
- Northland: 32.8 - 9,823
- South Canterbury: 40.4 - 4,784
- Southern: 41.5 - 20,327
- Taranaki: 38.9 - 2,218
- Taranaki: 40.1 - 7,578
- Waikato: 36.7 - 20,865
- Waikato: 36.1 - 3,038
- Waikato: 33.9 - 25,093
- West Coast: 37.7 - 2,013
- Whangarei: 38.3 - 4,477

Find My Atlases
Medication safety programme

Aim: to improve medication safety by leading and guiding the sector on:

• Safe prescribing, dispensing, administration and monitoring of medicines
• Accurate and timely transfer of medicine information at transition points of care
• Reducing harm from high-risk medicines and situations
• Providing expert advice, tools, resources for the sector
Current Priorities (medication safety) (1)

1. Safe use of opioids
   - Quality and safety marker (QSM) development
   - Opioid stewardship

2. Consumer engagement
   - In-patient experience
     - building on the results from the recent discharge experience project in four DHBs
     - ‘Raising the Bar on the National Patient Experience Survey’
     - Medication side effect question - Did a member of staff tell you about medication side effects to watch for when you went home?
Three co-designed nudges
(consumers and local hospital staff)
1. Optimised discharge summary for patients
2. Home safe checklist
3. Follow-up phone calls
Current Priorities (medication safety) (2)

3. Support electronic medicines systems
   • NZePS
   • ePharmacy, eMedRec, ePA
   • e-Health Record

4. Medicine reconciliation (electronic and paper)
   • Quality and safety marker (QSM) – revisit
   • Information, technical questions
Current Priorities (3)

5. Aged residential care (ARC)
6. National medication chart review
7. Tall Man lettering review
   • Look-alike sound-alike

<table>
<thead>
<tr>
<th>diPYRIDAMOLE</th>
<th>diSOPYRAMIDe</th>
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<tbody>
<tr>
<td>doTHIEpin</td>
<td>doXEpin</td>
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<tr>
<td>fluARlIx</td>
<td>fluVAX</td>
</tr>
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</table>

8. Event reporting (hospitals)
Learning from events and the literature

- Alerts, Safety Signals, Open Books
- Working with PHARMAC and Medsafe
- Working with professional bodies
- Newsletter alerts
Patient Safety Week

• 2017  Medication safety
• 2018  Infection prevention and control with a focus on good hand hygiene
         + antibiotic stewardship
Other resources

New resources

- Patient engagement is widely acknowledged as a cornerstone of patient safety
- Active partners
Why medication safety?

What do the data tell us?
USA data – medical error

• To Err is Human framed patient safety as a serious public safety issue
• 1999 estimates

44,000 - 98,000
Annual deaths from medical error among hospitalized patients.

43,458
Annual deaths from car crashes.

42,297
Annual deaths from breast cancer.

16,516
Annual deaths from AIDS.

New Zealand data

- Trigger tool methodology
- Across 6 DHBs
- 2,659 reviews (small sample size)
- Medication-related harm quite common
- 30 adverse drug events per 100 admissions

<table>
<thead>
<tr>
<th>Effect</th>
<th>Extent</th>
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<tbody>
<tr>
<td>Minor</td>
<td>61%</td>
</tr>
<tr>
<td>Hospital admission or ↑ LOS</td>
<td>35%</td>
</tr>
<tr>
<td>Permanent harm or death</td>
<td>1.6%</td>
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<tr>
<td>Opioids (32%)</td>
<td>40%</td>
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<tr>
<td>anticoagulant or antiplatelet (9%)</td>
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</table>

<table>
<thead>
<tr>
<th>Effect</th>
<th>Extent</th>
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<tbody>
<tr>
<td>As inpatient</td>
<td>65%</td>
</tr>
<tr>
<td>In community setting</td>
<td>29%</td>
</tr>
<tr>
<td>Resulted in readmission</td>
<td>5.5%</td>
</tr>
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The extent of harm

Every year in NZ as a result of adverse medicine events:

- 44,954 people are severely harmed
- 2,247 people die
- Preventable adverse drug events cost $222.5 million to the health system

• Data based on hospital events
• Values you get are dependent on which study and the assumptions used in your calculations

## System-level context (2)

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<th></th>
<th>2013</th>
<th>Injuries</th>
<th>Deaths</th>
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<tbody>
<tr>
<td>Roads¹</td>
<td>11,219</td>
<td></td>
<td>293</td>
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<tr>
<td>Mental Health²</td>
<td>7,267</td>
<td>508</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self harm hospitalisations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medicines³</td>
<td>44,954</td>
<td>2,247</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Severe harm</td>
<td>(permanent harm and /or, intervention required to sustain life)</td>
<td></td>
</tr>
</tbody>
</table>

2018: 379

Common types of medication error

- Administration of an error against a known allergy
- Look-alike sound-alike medicines (LASA)
- mg versus mL dosing
- Tenfold dose error
- Variation in strength of liquid medicine
• Medicine confusion:
• Look-alike sound-alike medicines (LASA)

Disopyramide vs Dipyridamole

Clonazepam vs Clozapine
• mg versus mL dosing

The patient was prescribed clozapine 25 mg. The patient was administered 25 mL of clozapine 50 mg/mL liquid, a 50x overdose.

The patient subsequently aspirated and was transferred to ICU for intubation and mechanical ventilation.
• Tenfold dose error - anagrelide

Patient charted 5 mg anagrelide. Dose should have 0.5 mg (usual dose). 3 doses administered.

The prescription was incorrect.
5 mg required 10 capsules.
Usual dose range 1-3 mg daily in divided doses
maximum single dose 2.5 mg
maximum 10 mg daily
• **Dose error - gentamicin**

Patient charted gentamicin 2 g
(typical adult dose is ~350 mg or so)

Nurse questioned / challenged the dose,
but the prescriber insisted.

Required 25 x ampoules to prepare the dose
(gentamicin 80 mg/2 mL)
MORE THAN TWO COULD BE A CLUE

It is uncommon to need more than two or three tablets, capsules, vials, ampules, etc., to prepare a single dose of medication.

Before using more than two or three of anything to prepare a medication dose, verify with a pharmacist.
• Tenfold dose error - metoprolol

11.875 mg prescribed; 118.75 mg administered.

Patient became hypotensive, severely bradycardic. Transferred to ICU, administered glucagon, intravenous fluids, but died 16 hours later.
• Tenfold dose error - metoprolol

95 mg
23.75 mg or 2.5 x 47.5 mg
118.75 mg 118.75 mg
Variation in strength of liquid medicine

A 7-year-old with cerebral palsy was prescribed baclofen.

The pharmacy inadvertently gave them 10 times the intended amount.

The child had three hospital visits that involved increased seizures, shortness of breath and deep breathing.
• Variation in strength of liquid medicine

• A compounded product resulting in the incorrect strength being made
• Commercial product = 10 mg/10 mL
  – an non-funded, unapproved medicine in New Zealand
• Prescribed as 10 mg/10 mL
• New Zealand standard formulation = 10 mg/mL
• Pharmacist compounded 10 mg/mL – but did not provide a corresponding reduction in the dose volume
• Misinterpretation of labelled strength

Ciclosporin 100mg IV BD prescribed.
Ampoules are 50 mg/mL in 5mL = 250mg per ampoule.

Patient received 2x amps (500mg) instead of 2mL.
Elevated ciclosporin levels, patient pancytopenic, acute kidney injury and dialysis commenced.
No one goes to work intending to harm someone
Insulin pens

• How do insulin pens work?
• What could go wrong?

• We will come back to this later
• Please – I need the syringes back

With thanks to: Novo Nordisk & Lilly for providing the pens for teaching purposes
Healthcare is highly complex and variable.

An interconnection between people, systems, environment and cultures.
Healthcare is a risky activity
Well….

• In part, the risks in healthcare are due to the illness or injury that brings the patient to healthcare and the lifesaving interventions provided.

The risk of death from hospitalisation is small compared with the (close to certain) risk of death with untreated bacterial meningitis or a ruptured viscus.
Nurses, doctors and pharmacists are expected to function perfectly 100% of the time …

… but…. we work in an imperfect system

… and … we are all fallible
Accident Investigations

• Human error is listed often as a contributing factor
• Most of the time, accidents are the result of multiple events
• Contributing factors could be personal, environmental, mechanical, organisational, or any combination of these
Accident Investigations

• FAA ‘dirty dozen’ preconditions for unsafe acts
  – Fatigue
  – Stress
  – Complacency
  – Communication
  – Awareness
  – Distraction
  – Lack of knowledge
  – Teamwork
  – Lack of resources
  – Pressure
  – Lack of assertiveness
  – Norms
Airlines
If a crew member is sick and can’t be replaced the flight is cancelled

In healthcare
We can’t close a ward if a staff member is sick
‘Human error happens so it is important that organisations have systems with defences built into them to prevent those errors from reaching a patient’
We know that mistakes will happen

So ... we need to get better at preventing them
No single intervention will prevent error
James Reason’s Swiss Cheese Model
SAFETY BARRIERS

Some holes due to active failures

Other holes due to latent conditions
System orientated changes produce long-standing results.

Information, education, rules, policies, alerts: Whilst important these do not typically result in long-lasting change.

Removal
ENFit, NRFit connectors

Bedside verification
Integrated SMART pumps
ePrescribing & administration
SMART pumps WIFI communication
Bar code scanning
SMART pump stand alone

National medication chart
ISBAR
Tall man lettering

Independent double checks
Education
Audits
Posters / alerts / reminders

Rules / standards / policies
Forcing functions
Low impact interventions

- Education
- Information
- Reflective exemplar
- Rule, policies and protocols
- Posters
- Signs
- Reminders
Back to the insulin pen ....

- Failure Mode Effects Analysis
Failure Mode Effects Analysis

• FMEA
• Prospective risk assessment
• How could it go wrong and what is the resultant effect?

• Anticipating and reducing potential risks
  – Risk-reduction strategies before implementation
Failure Modes and Effects of insulin pen

- Incorrect storage
- Using expired product
- Needlestick injury
- LASA presentations – mix-up of pens / insulin types
- Not removing the pen cap
- Not removing the needle outer cap
- Not removing the needle inner cap
- Not priming the needle
- Not removing the needle post dose (air /bugs)
- Not disposing of the needle correctly
- Not replacing the needle
- Using cartridge like an multidose vial (bubbles)
- Sharing insulin pens (bugs ~ 50%)
- Inserting the wrong cartridge
- Empty cartridge
- Not mixing cloudy insulin (clumping; blockage; dose)
- Wrong / no dose dialled up
- Withdrawing the needle too quickly (≠10 seconds)
- Dialling down the dose – not pushing the button
- Using the demonstration devices ‘therapeutically’
Design failures
Look-alike sound-alike
But ... sometimes it matters

Chemist gives cancer patient wrong meds

TRACEY CHATTERTON • 15:20, Aug 07 2014

A Napier pharmacy gave a breast cancer patient the wrong medication which she unknowingly took for three months.

In March last year, the woman went to Napier Balmoral Pharmacy for a three month supply of tamoxifen, a Health and Disability Commission report says.

The woman, known as Ms A, was prescribed a five-year course of the drug following a bilateral mastectomy and chemotherapy in 2012.

A staff member correctly typed out a prescription label for 20mg tamoxifen but it was put on the wrong bottle, an investigation by the pharmacy found.

A similarly named drug, tenoxicam 20mg was mistakenly taken from the shelf and given to Ms A.
• Pindolol vs Prednisone

• Levomepromazine vs Levetiracetam

• Disopyramide vs Dipyridamole

• Clonazepam vs Clozapine
Tall man lettering

- To reduce the risk of LASA name errors
- A combination of upper and lower case letters
- Highlight differences
- More easily distinguished

<table>
<thead>
<tr>
<th>Medicine 1</th>
<th>Medicine 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>fluOXETine</td>
<td>fluVOXAMine</td>
</tr>
<tr>
<td>cLARITHROMYcin</td>
<td>cPROFLOXAcin</td>
</tr>
<tr>
<td>disOPYRAMIDe</td>
<td>diPYRIDAMOLE</td>
</tr>
<tr>
<td>CLONazepam</td>
<td>cLOZAPine</td>
</tr>
</tbody>
</table>

The NZ list tall man lettering list:
www.hqsc.govt.nz/assets/Medication-Safety/Tall-Man-lettering/Tall-Man-poster-Dec-2013.PDF
Medicines storage considerations

- Sufficient space
- Separate bin per medicine
- Label bins not shelves
- Use tall man lettering for high risk
- Segregation by route
- Stock vs patient’s own
- Alphabetically
- But separate look-alike sound-alike
- Different salt forms
  - hyoscine BUTYLBromide
  - hyoscine HYDROBromide
- Different strengths

- Noise levels / interruptions
- Lighting
- Temperature
Look-alike sound-alike (summary)

1. Tall man lettering
2. Separate storage
3. State the indication of the prescription
4. Computer listing of both brand and generic names (less impact in NZ as low brand prescribing)
5. Electronic alerts for LASA medicines
6. Report near-misses and events nationally
   - National action eg, FlexPen
NovoMix 30 Flexpen / Novo Rapid Flexpen
NovoMix 30 Flexpen / Novo Rapid Flexpen

Reports of events

- Pharmacy Defence Association (PDA)
- Health and Disability Commissioner (HDC)
- Individual practitioners

Solutions / actions

- Change in labelling packaging: To the pen and the box
- Warnings included in NZF [http://nzf.org.nz/nzf_3650]
- Education for consumers
- Education for pharmacists
- Pharmacy dispensing software alerts
- Separate medicines data sheets
Independent double check (1)

A procedure in which two health care professionals
- separately check
  (alone and apart from each other, then compare results)
- each component of a medicine
  (the prescription, calculation, components and preparation)
- before administering it to the patient.
Independent double check (2)

- **Independent**
  - separately check each element of the work process
  - without interference, discussion or prompting
  - the first person must not talk the second person through the preparation and checking of the medication
  - calculations must to completed before comparing the results from the first person

- Performed correctly - intercept and prevent errors

- Use selectively
### Comparison to prescriber’s order:
- Is this the prescribed drug?
- Is this the prescribed dose/strength/rate of infusion?
- Is this the prescribed route of administration?
- Is this the right patient?
- Is this the prescribed frequency/time for drug administration?

### Additional cognitive checks:
- Does the drug’s indication match the patient’s diagnoses or conditions?
- Is this the right formulation of the drug?
- Are dose calculations correct?
- Is the dosing formula used to derive the dose correct (mg/kg)?
- Is the prescribed dose appropriate for this patient?
- Is the dosing frequency/timing appropriate for this patient?
- Is the route of administration safe and proper for this patient?
- Are pump settings correct (if applicable)?
- Is the infusion line attached to the correct port (if applicable)?
- Have appropriate monitoring tests been ordered?
- Are the test results upon which a dose has been based verified as belonging to this patient?
Standardisation

• Checklists
  – Surgical safety checklist
• Common format documentation
  – National medication charts
  – Deteriorating patient / adult vital signs chart
• Template forms (with standard layout of fields required)
• Communication
  – ISBAR
• Resus trolley layout
IT support

- Automated dispensing cabinets
- ePA (prescribing and administration)
- NZePS (NZ electronic prescription service)
- eMedRec (eMedicine reconciliation)
- My list of medicines
- Bar coding
Bedside verification

- Barcode at Point of Care (BPOC)
The Second Opinion cartoon featured this month is a classic Rob Rogers from 1998.
Forcing functions (1)

- Medical gases
Forcing functions (2)

• ENFit connectors
Forcing functions (3)

- NRFit connectors

Luer (Small Bore)

NRFit™ (Non-Luer)

Slip

Lock
Just culture

- A culture of trust, learning and accountability
- Asks:
  - ‘who are hurt, what do they need, and whose obligation is it to meet that need?’
- It doesn’t dwell on questions about rules, violations and consequences

Sidney Dekker
Just culture (2)

- Gathers those affected by an incident
  - collaborates on collectively addressing the harms and needs created by it
  - in a way that is respectful to all parties
- It holds people accountable by looking forward to what must be done to repair, to heal and to prevent
Just culture

- **Human error**: Inadvertent action: slips, lapses, mistakes
  - **Reassure**
  - **Unintentional**
  - **No blame**

- **At-risk behavior**: A choice: risk not recognized or believed justified
  - **Coach**

- **Reckless behavior**: Conscious disregard of unreasonable risk
  - **Punish**
  - **Deliberate**
  - **Culpable**

- **Malicious behavior**: Violations, Gross negligence, Criminal offences
  - **Malicious**

(3)
This video is for training purposes only
Medication error vs adverse drug reaction

Medication errors

Allergies
Side effects
Drug-Drug interactions
Drug-Disease interactions

With thanks to Dr Michael Hamilton, Institute for Safe Medication Practices Canada, November 2017
Near miss

or a

Good catch

An event that could have resulted in unwanted consequences, but did not because, either by chance or through timely intervention, the event did not reach the patient.
Reflection

• Do you report all events?
• Including near-miss medication events?
• Or do you ‘fix and forget’?
• If not … why not?
“If we learn from our mistakes, shouldn’t I try to make as many mistakes as possible?”
Learning for events - principles

1. Open communication
2. Consumer participation
3. Culturally appropriate review practice
4. System change
5. Accountability
6. Safe reporting
Medication error / adverse event review

• Things go right 99% of the time
• What is different about now?
• What particular circumstances are different this time?
  • Environment
  • Patient
  • Medicine
  • Yourself
Learning from events

• Select system-based recommendations
• A small number of higher-leverage interventions are likely to be more effective than less effective strategies
• Ensure that recommendations are SMART (specific, measurable, attainable, relevant, time based)
• Continuously monitor and assess the effectiveness of any interventions
• Let each other know what is working and what is not
Rules - legislation

- Designed to protect patients from harm
- Eg, Misuse of Drugs Act & Regulation
  - To protect against harm caused by abuse, diversion, dependence

- Standing orders
- Controlled Drugs
Specific traps

- Verbal orders
- Labelling
- Abbreviations
Verbal orders

- Write the order down
- Read it back to the prescriber
- Second check
  - to hear the order from the prescriber
  - write it down
  - Read it back to the prescriber

- Local policy
- NZNO guidelines

NZNO 2014. Guidelines for nurses on the administration of medicines
Always label

- Unless drawn up at the bedside and administered immediately
- Oral and IV (and topical) - chlorhexidine
- And ... Check the label
Bothersome abbreviations

You Can't Abbreviate Safety

<table>
<thead>
<tr>
<th>DO NOT USE</th>
<th>USE</th>
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<tbody>
<tr>
<td>abbreviated chemical names (eg, HCL)</td>
<td>full name</td>
</tr>
<tr>
<td>abbreviated medicine names (eg, MTX, HCT)</td>
<td>full name</td>
</tr>
<tr>
<td>μg or mcg</td>
<td>microgram</td>
</tr>
<tr>
<td>U or IU</td>
<td>unit or international unit</td>
</tr>
<tr>
<td>ng</td>
<td>nanogram</td>
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<tr>
<td>OD, od, or O.D.</td>
<td>daily or intended time of administration</td>
</tr>
<tr>
<td>SC</td>
<td>subcut or subcutaneous</td>
</tr>
<tr>
<td>SL</td>
<td>subling or sublingual</td>
</tr>
<tr>
<td>mEq or milliequivalent</td>
<td>millimole or mmol</td>
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<tr>
<td>Q.D, q.d, qd, QD</td>
<td>daily</td>
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<td>decimal points without a leading zero</td>
<td>smaller units (eg, 500 micrograms) or a leading zero eg, 0.5mg</td>
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<tr>
<td>(eg, .5mg)</td>
<td></td>
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<tr>
<td>a trailing zero (eg, 1.0mg, 100.0g)</td>
<td>without a trailing zero eg, 1mg, 100g</td>
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</table>
A collective responsibility

• Safety is everyone’s job
• Look after each other
  – Not to catch them out
  – To care for your colleague, to protect them and their patients
Listen for the voice in the back of your mind
Medication safety

WE NEED YOU!
TO MAKE IT HAPPEN
thank you!