

Safeguards to Prevent Medication Errors



Basic Medication Safety (BMS) Certification Course
King Saud bin Abdulaziz University for Health Sciences,
Ministry of National Guard – Health Affairs

Learning Objectives

- Review the best error prevention tools (Hierarchy of Effectiveness)
- Explain the role of different types of medication safety technologies
- Emphasize the advantages of Smart Pump Technology
- Explain different methodologies used to minimize the consequences of errors
- Review the medication reconciliation process
- Discuss the importance and impact of patient education

How to Select the Best Error Prevention Tool

Hierarchy of Effectiveness

1. Forcing functions & constraints
2. Automation / computerization
3. Simplification / standardization
4. Reminders, redundancies, checklists
and double checks
5. Rules and policies
6. Education & access information
7. Be careful...Be vigilant

Highest



Lowest

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1. Forcing Functions & Constraints

Allergy hard stop prior to medication order entry

The screenshot displays a medical software interface for 'Order Entry - GUI - Amoxicillin'. The interface is divided into several sections:

- Left Sidebar:** Contains navigation options such as 'Patient Shortcuts', 'New Order Review', 'Order Entry', 'Med Profile', and 'Chemo Order Entry'. Below these are patient-specific tabs for 'Neonate, Two', 'Order Entry - GUI - Am...', and 'Patient List - inpatients'.
- Top Header:** Shows the title 'Order Entry - GUI - Amoxicillin' and the author information 'Written by KAMC-PHY, Physician, MD at 23-Feb-1'.
- Advisories Panel:** Lists 'Allergy Check: Allergies Not Documented!' with a red 'X' icon and 'Dose Range Check' with a blue 'i' icon.
- Right Panel:** Displays the error message: 'Allergy Check: Allergies Not Documented!', 'Action: Error', and a detailed notice: 'Notice: Allergies have not yet been documented for this patient. Hospital policy states that allergies must be documented before medication orders can be placed. Please verify and document allergy information.'

A blue callout bubble with a white background and a blue border is positioned over the 'Allergy Check' advisory. It contains the text: **Order entry hard stop due to allergy not yet documented**.

1. Forcing Functions & Constraints

Oral syringes vs. Luer lock syringes



JCI Note: (MMU.5.2; ME 2)

Medications drawn up, not administered immediately, should be consistently labeled with:

- Patient name and MRN
- Medication name
- Dosage / concentration
- Date prepared
- Beyond-Use Date (BUD)

1. Forcing Functions & Constraints

Concentrated electrolytes and Paralyzing Agents:
adding constraints



2. Automation / Computerization

Computerized Prescriber Order Entry (CPOE)



2. Automation / Computerization

Electronic Medication Administration Record (e-MAR)

Order List

Flow Sheet
 Admission Assessment
 Nursing Note
 Nursing Plan
 Nurses : Order Entry

Group
 Medication
 Examination
 Intervention
 NurseOrder

 Default
 Check Duty
 ReadBa

Order	Acting Plan Time	Acting Tim
Regular		
Medication		
Mycophenolate Mofetil 500 mg Tablet 750mg { Oral } [D:14/15] <i>(bid q12h) Take every 12 hrs</i>	09:00/, 21:00/,	08:30/A, 21:00/,
MethylPREDNISolone (Solu-Medrol) 40 mg/mL Injection, 1 mL Ampule 70mg { IV Push } [D:14/15] <i>(q24h) Inject every 24 hrs</i>	09:00/,	09:15/A,
Salbutamol 5 mg/2.5mL Solution Neb for Inhalation 2mg { Inhalation via Nebulizer } PRN [D:13/15] <i>(inhale 4/d) Inhale Four times a day In 3mL Normal Saline, Via Nebulizer PRN Reason: if wheezing</i>	09:00/, 13:00/, 17:00/, 21:00/,	09:00/, 13:00/, 17:00/, 21:00/,
Ipratropium Bromide Solution(250mcg/mL) for Inhalation, 2mL Vial 250mcg { Inhalation via Nebulizer } PRN [D:13/15] <i>(inhale) Inhale in 3mL NS via nebulizer PRN Reason: if wheezing</i>	09:00/,	09:00/,
Metoclopramide HCl 5 mg/mL Injection, 2 mL Vial 10mg { IV Push } [D:12/15] <i>(q8h) Inject every 8 hrs Slowly</i>	06:00/, 14:00/, 22:00/,	05:59/A, 14:00/, 22:00/,
Dextrose 50% Injection(50) Vial 50mL { IV Push } PRN [D:9/14] <i>(q6h) Inject every 6 hrs Bolus PRN Reason: If blood glucose Less than 2.2 mmol/L : Stop insulin and give</i>	06:00/, 12:00/, 18:00/, 00:00/,	06:00/, 12:00/, 18:00/, 21/12/2015
Acyclovir 200 mg/5 mL Suspension 400mg { Oral } [D:8/15] <i>(qd q24h) Take every 24 hrs</i>	09:00/,	08:30/A,
Piperacillin/Tazobactam 4.5 g Injection, Vial 3.375g { IV Piggyback } [D:8/8]	06:00/, 12:00/, 18:00/, 00:00/,	05:00/A, 06:00/, 11:29/A, 18:00/, 2
Sodium Cl 0.9%(50) 50mL { IV Piggyback } <i>(q6h) Inject every 6 hrs over 30min Type of Antibiotic Therapy : Therapeutic</i>	06:00/, 12:00/, 18:00/, 00:00/,	05:00/A, 06:00/, 11:29/A, 18:00/, 2
Caspofungin 50 mg Injection, Vial 50mg { IV Piggyback } [D:7/8]	09:00/,	08:45/A,
Sodium Cl 0.9%(250) 250mL { IV Piggyback } <i>(q24h) Inject every 24 hrs Maintenance * Comment: 70mg stat followed by 50mg daily Type of Antibiotic</i>	09:00/,	08:45/A,

Pre Op
 Intra-Op
 Post-Op
 Out On Pass
 Discharge
 Request for Cosign
 Continuous
 Changed Order
 New Order
 Confirmed Order
 Narcotic
 BlueSlip

2. Automation / Computerization

Medication Dispensing Robotics



2. Automation / Computerization

Automated Dispensing Cabinets (ADCs)

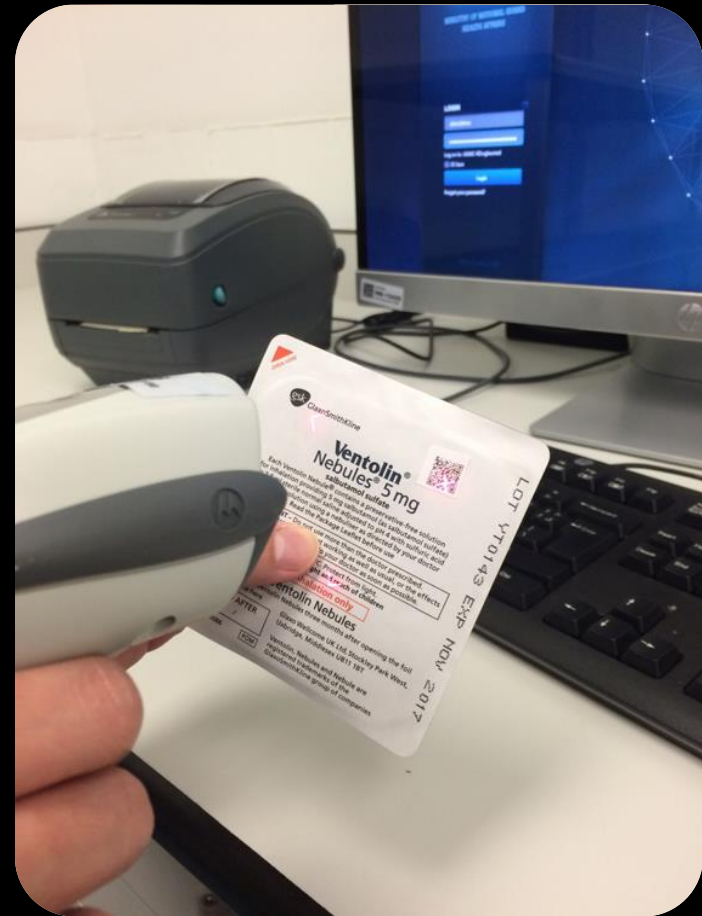


2. Automation / Computerization

Smart Pump



Point-of-Care Barcoding



3. Simplification / Standardization

Standardized medication labels

26523

Abciximab 10 mg / 5 mL injection

HIGH ALERT MEDICATION

26224

Bretylum 500 mg / 10 mL injection

HIGH ALERT MEDICATION

107940

Cisatracurium 20 mg / 10 mL injection

HIGH ALERT MEDICATION / PARALYZING AGENT

108380

Warfarin 3 mg tablet

HIGH ALERT MEDICATION

26256

Atenolol 0.5 mg / mL injection

HIGH ALERT MEDICATION

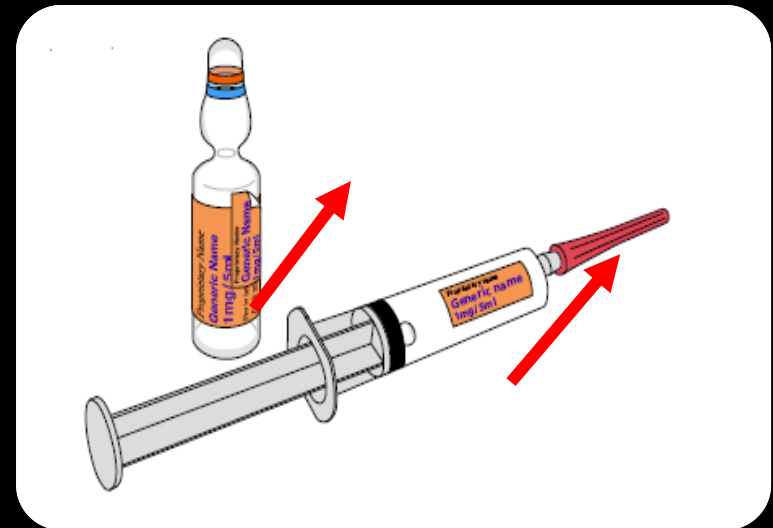
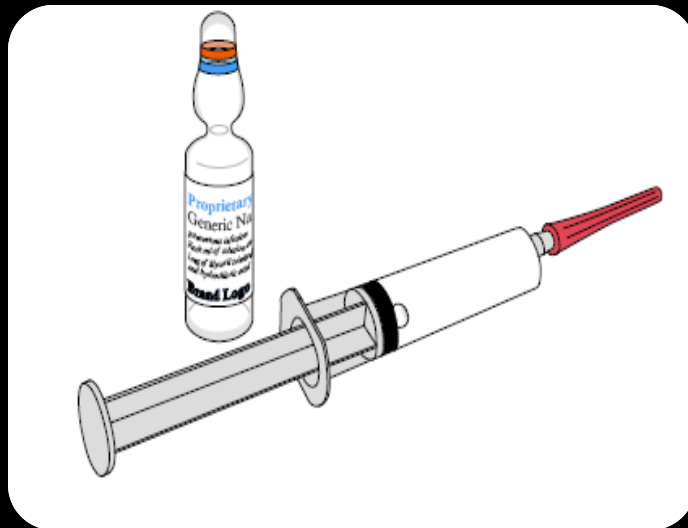
111308

Dexmedetomidine 100 mcg / mL injection

HIGH ALERT MEDICATION

3. Simplification / Standardization

Safe Labeling of Syringes: all syringes must be labeled if not **immediately** administered



4. Reminders, Redundancies, Checklists & Double-Checks

Auxiliary medication labels

**HIGH ALERT
MEDICATION**

**WARNING:
PARALYZING AGENT – CAUSES
RESPIRATORY ARREST!**

Chemotherapy Checklist

Chemo Checklist		
Cautions	NKA, NKDA	More...
Chemotherapy Checklist		
New Event Time	Tue, 12/02/13 0827	Prev Event Status (unscheduled)
1) Performed By:	Rph Saad Al Nofaie, RPh	
2) Review copy of original document used to determine the prescribed regimen:	<input type="text"/>	
3) Verify the signature of consultant and to certified Nurses:	<input type="text"/>	
4) Check patient identification information (MRN; name):	<input type="text"/>	
5) Recalculate patient's BSA, unit conversions, patient-specific dose and dose adjustments:	<input type="text"/>	
6) Confirm diagnosis and appropriateness of chemotherapy regimen for the diagnosis:	<input type="text"/>	
7) Prepare chemotherapy worksheet and labels:	<input type="text"/>	
8) The pharmacist preparing the labels must enter their initials on order/worksheet:	<input type="text"/>	
9) The pharmacy technician must gather the patient-specific labels with medication:	<input type="text"/>	
10) The pharmacist must check the final product:	<input type="text"/>	
11) The correct drug has been used:	<input type="text"/>	
12) The drug was reconstituted correctly, using the correct volume and diluents:	<input type="text"/>	
13) The volume of drug used was accurately measured for the prescribed dose:	<input type="text"/>	
14) The label is correct in regards to patient:	<input type="text"/>	
15) Place chemotherapy preparation in plastic zip-lock bag:	<input type="text"/>	
16) Comment:	<input type="text"/>	

5. Rules and Policies

NGHA > NGHA > Saudi Medication Safety Center > APPs

One Stop Resource
ADR & Med Error / Near Miss Summary Reports

APPs

Corporate Pharmacy & Therapeutics Committee, MNG-HA

Links

Medication Safety Information Alert Warnings

NGHA Specific Information

Patient Education Material

Educational Brochure

ISMP Medication Leaflets


USP Pictograms

Medication Information for Patients

Standardized Medication Labels

APPs

URL
1419-08 Patient Informed Consent
1423-05 Sentinel Events and Root Cause Analysis
1426-01 Drug Samples
1426-18 Patient & Family Education
1427-16 Error-Prone Abbreviations, Symbols, and Dose Designations
1427-29 Recall of Medications, Medical Supplies, Devices and Equipment
1428-10 Medical Credentialing, Privileging, & Promotions
1429-02 Look-Alike, Sound-Alike & High Alert Medications
1429-03 Prescribing & Dispensing Medication Guidelines
1429-19 Conflict of Interest
1429-31 Disposal, Sale and Donation of Items at MNG-HA
1429-33 Vaccine Storage, Transport & Handling
1430-05 Fall Risk Prevention & Management
1430-06 Palliative & End-Of-Life Care
1430-07 Pain Management
1430-10 Clinical Record Content & Documentation Standards
1430-16 Patient Identification
1430-29 Activation of Code Black - Disaster
1430-31 Management of Spills of Hazardous Materials
1430-41 Code Blue Activation - Cardiopulmonary Resuscitation
1430-46 Hazardous Materials & Waste Management



المملكة العربية السعودية
وزارة الحرس الوطني
الشؤون الصحية

Kingdom of Saudi Arabia
Ministry of National Guard
Health Affairs

APP

**MINISTRY OF NATIONAL GUARD - HEALTH AFFAIRS
ADMINISTRATIVE POLICY AND PROCEDURES**

NUMBER : 1429-02
TITLE : LOOK-ALIKE, SOUND-ALIKE AND HIGH ALERT MEDICATIONS
ORIGINATING DEPT. : SAUDI MEDICATION SAFETY CENTER (7339)
ORIGINAL DATE : MARCH 2008
REVISED DATE : MARCH 2015

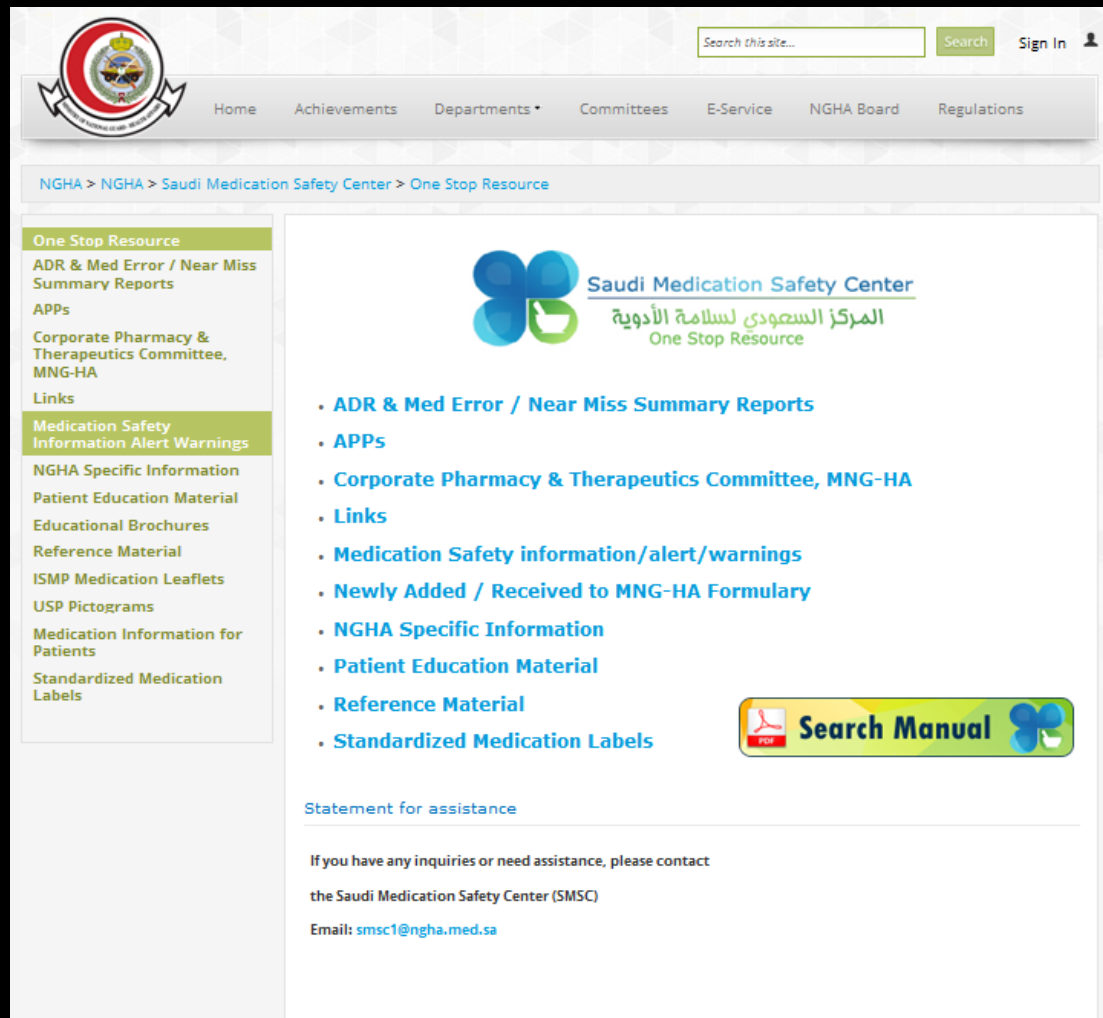
- PURPOSE**
To provide a process regarding the identification, location, labeling and storage of high alert medications and look-alike, sound-alike (LASA) within all Ministry of National Guard - Health Affairs (MNG-HA) and affiliated facilities to promote patient safety.
- APPLICABILITY**
To all MNG-HA employees involved in the medication use process: procuring, storing, prescribing, dispensing, administering and monitoring of medications listed in the MNG-HA Drug Formulary.
- RELATED REFERENCES**
 - APP 1430-16: Patient Identification
 - APP 1433-18: Concentrated Electrolytes
 - APP 1433-36: Medication Storage & Security/Control Requirements
 - Institute for Safe Medication Practices (ISMP), ISMPs List of Confused Drug Names
 - Joint Commission International Accreditation Standards for Hospitals, 5th Edition (April 2014) - IPSC.3, ME.1-3

6. Staff Education & Access to Information

- One Stop Resource: NGHAI Intranet
 - Basic Medication Safety (BMS) Course
 - Micromedex
 - NGHAI Drug Formulary
 - Standardized medication labels
 - APPs, protocols & guidelines
- Use of electronic devices to access information
- Medication safety messages via SMS & TV screens in hospital corridors



One Stop Resource



The screenshot shows the website interface for the Saudi Medication Safety Center. At the top left is the national emblem of Saudi Arabia. To its right is a search bar with the placeholder text "Search this site..." and a "Search" button. Further right is a "Sign In" link with a user icon. Below these elements is a horizontal navigation menu with the following items: Home, Achievements, Departments (with a dropdown arrow), Committees, E-Service, NGHA Board, and Regulations. A breadcrumb trail below the menu reads: "NGHA > NGHA > Saudi Medication Safety Center > One Stop Resource".

The main content area is divided into two columns. The left column is a sidebar with a green header "One Stop Resource" and the following menu items: "ADR & Med Error / Near Miss Summary Reports", "APPs", "Corporate Pharmacy & Therapeutics Committee, MNG-HA", and "Links". Below this is another green header "Medication Safety Information Alert Warnings" followed by: "NGHA Specific Information", "Patient Education Material", "Educational Brochures", "Reference Material", "ISMP Medication Leaflets", "USP Pictograms", "Medication Information for Patients", and "Standardized Medication Labels".

The right column features the Saudi Medication Safety Center logo, which consists of four blue circles arranged in a cross shape, with a green circle containing a white mortar and pestle symbol in the center. To the right of the logo is the text "Saudi Medication Safety Center" and "المركز السعودي لسلامة الأدوية" (Saudi Center for Drug Safety) with "One Stop Resource" below it. A list of links is provided in blue text:

- [ADR & Med Error / Near Miss Summary Reports](#)
- [APPs](#)
- [Corporate Pharmacy & Therapeutics Committee, MNG-HA](#)
- [Links](#)
- [Medication Safety information/alert/warnings](#)
- [Newly Added / Received to MNG-HA Formulary](#)
- [NGHA Specific Information](#)
- [Patient Education Material](#)
- [Reference Material](#)
- [Standardized Medication Labels](#)

Below the list is a green button with a PDF icon and the text "Search Manual" next to the center logo. At the bottom of the right column, there is a section titled "Statement for assistance" with the following text: "If you have any inquiries or need assistance, please contact the Saudi Medication Safety Center (SMSC) Email: smsc1@ngha.med.sa".

7. Be Careful...Be Vigilant

ALL healthcare providers are responsible and accountable for their acts and omissions

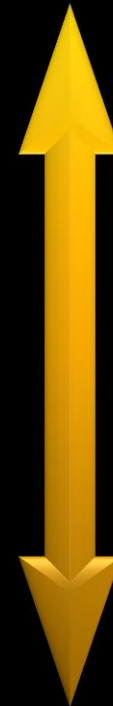


How to Select the Best Error Prevention Tool

Hierarchy of Effectiveness

1. Forcing functions & constraints
2. Automation / computerization
3. Simplification / standardization
4. Reminders, redundancies, checklists and double checks
5. Rules and policies
6. Education & access information
7. Be careful...Be vigilant

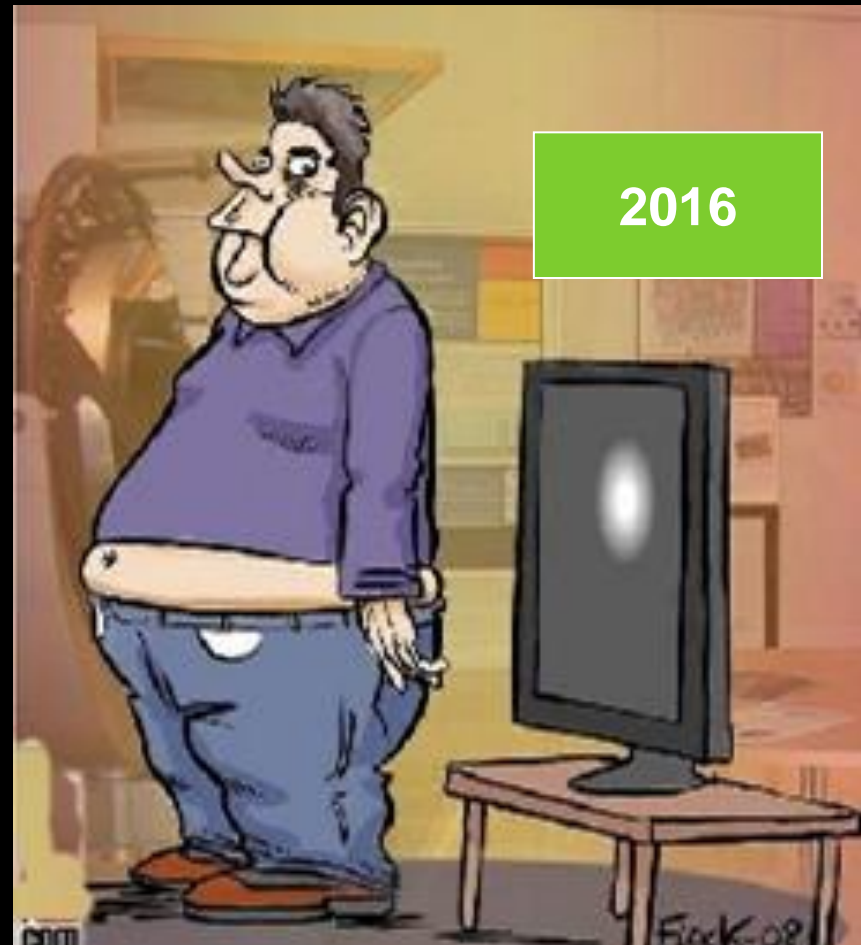
Highest



Lowest

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Advances in Technology



Medication Error Report

Ministry of Health, Saudi Arabia

Drug
Interactions

Patient received
DYAZIDE® (diuretic) while
on Lithium

High Lithium:
Mania
Renal Failure,
Hemodialysis &
Death

Clinical Decision Support (CDS) software for CPOE systems
assists in *detecting and correcting* lethal medication errors

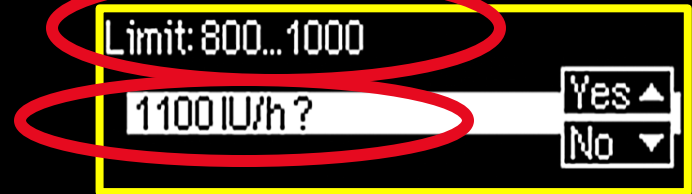
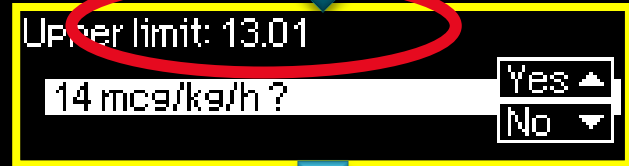
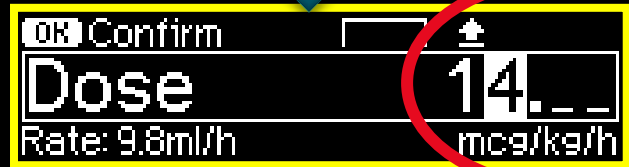
Smart Infusion Pump Technology

- Smart pumps ensure that medications are delivered within a **safe dose range**
- Utilizing the Drug Library Keeps Your Pump SMART



Soft Limit Override

Hard Limit Stop



Minimize the Consequences of Errors

- Reduce the amount of Floor Stock
- Stock the lowest concentration required for treatment
 - (e.g., 5,000 units vs. 125,000 units)
- Availability of antidotes
- Availability of Anaphylactic Kit (Adult & Pediatric)



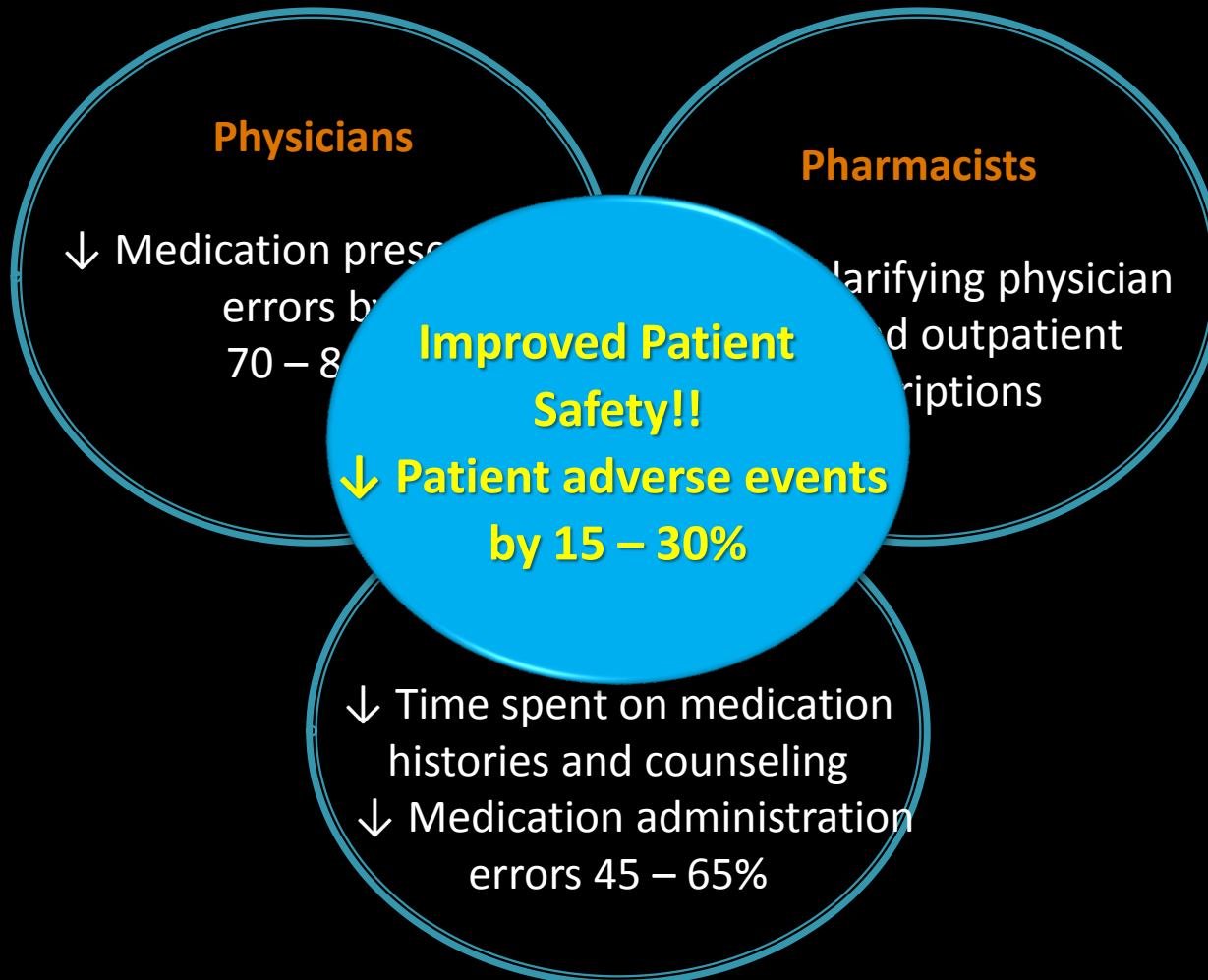
Medication Reconciliation

- The process of comparing the medications a patient is taking (and should be taking) with newly ordered medications.
- The comparison addresses duplications, omissions, and interactions, and the need to continue current medications.
- The type of information that clinicians use to reconcile medications include (among others) medication name, dose, frequency, route, and purpose.
- More than 40% of medication errors occur during:
 - Admission, Transfer and Discharge.

Medication Reconciliation: Five Steps

1. Develop a list of current medications
(Best Possible Medication History – BPMH)
2. Develop a list of medications to be prescribed
3. Compare the medications on the two lists
4. Make clinical decisions based on the comparison
5. Communicate the new list to appropriate caregivers and to the patient

Impact of Medication Reconciliation



Whittington J, et al. *Qual Manag Health Care* 2004;13(1):53-9. Rozich JD et al. *Jt Comm J Qual Saf* 2004;18(4):201-5. Michels RD et al. *AJHP* 2003;60:1982-1986.

Future of Medication Reconciliation at MNG-HA

Order Selection | Order History | Search | Consolidated Medication List

Consolidated Med List Options 

Medication Type:

- All Medication Types
- H - Home Medications
- V - Visit Orders
- D - Discharge Medications

Visit Order Type:

- All
- Active Only

H	V	D	Medication	Information	Last Dose	Start	Stop	Source
▼ Home Medications								
H			Atorvastatin Calcium 10 MG ...					
H			Simvastatin 10 MG Oral Tablet					
▼ Visit Orders								
V			No Active Medications					

Patient Education

- Initiate at the time of **prescribing**
- Involve patients and caregivers
- Inform patients of drug name, purpose, dose, and side effects
- Encourage patients to ask questions and expect answers
- Listen to what the patient is saying, as he / she is the last independent **double-check**

Why is Patient Education Important?



Safe Patient Care Is Our Goal

