

# 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

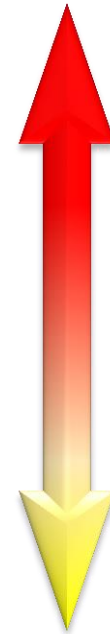
- Review the best error prevention tools (Hierarchy of Effectiveness)
- Explain the role of different types of medication safety technologies
- Emphasize the advantages of Smart Pump Technology
- Explain different methodologies used to minimize the consequences of errors
- Review the medication reconciliation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

# How to Select the Best Error Prevention Tool

## Hierarchy of Effectiveness

- ❑ Forcing functions & constraints
- ❑ Automation / computerization
- ❑ Simplification / standardization
- ❑ Reminders, redundancies, checklists and double checks
- ❑ Rules and policies
- ❑ Education & access information
- ❑ Be careful...Be vigilant

**Highest**



**Lowest**

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# Forcing Functions & Constraints

## Allergy hard stop prior to medication order entry

The screenshot displays a medical software interface with a dark theme. On the left, the 'Order Entry' sidebar is visible, showing a list of tabs: Order, Classif., Details, Set, Admission, Surgery, and Vaccination. The 'Details' tab is selected, showing information for 'Acetaminophen Tablet'. The main area is divided into two panes. The left pane shows the medication details, including the maximum adult daily dose (3,500 mg), dosage (500 mg), frequency (1 qd q24h), and start after (28 days). The right pane is titled 'Alert Confirmation' and displays a message: 'Patient Name patient's clinical info. like allergies, infections and clinical alerts, pregnancies/lactation has been checked. Currently, order is issuing.' Below this message are several sections for allergies and adverse drug reactions, each with a 'Search' button and a 'There is no searched data.' message. The bottom of the interface features a status bar with a 'Sign' button, a 'Discontinue' button, and a 'Close' button.

Order Entry

Drug Acetaminophen Tablet

The maximum Adult Daily Dose Is 3,500 mg

Option

500 mg (1 Tablet) PO

Dosage Calculation

500 mg Oral Oral

Frequency Instruction (Shown on label)

1 (qd q24h) Take every 24 hrs

Start After Px. Duration

Day 28 Day

Settings

STAT Now Reconciliation Medication(Patient brought from

Instruction Remark (Shown on label) Instruction Arabic Re

Administration Details

OP Pharmacy(To Home) Exam Room Outpatie

Order Comments

START IF

END IF

Alert Confirmation

MRN Final Update Date 26/03/2018 11:30 Change History

Patient Name patient's clinical info. like allergies, infections and clinical alerts, pregnancies/lactation has been checked. Currently, order is issuing. Confirm

> Allergy (0 Case)

You can search with the name of medication. Search

Food Insects Other Allergen No Known Allergy

Unable to obtain Allergy

> Adverse Drug Reaction (0 Case) New

There is no searched data.

> Infection (0 Case)

There is no searched data.

> Clinical Alert (0 Case)

There is no searched data.

> Pregnancy/Lactating

There is no searched data.

Close

Sign Discontinue

100%

# Forcing Functions & Constraints

Oral syringes vs. Luer lock syringes



Concentrated electrolytes and Paralyzing Agents: adding constraints



# Automation / Computerization

## Computerized Prescriber Order Entry (CPOE)



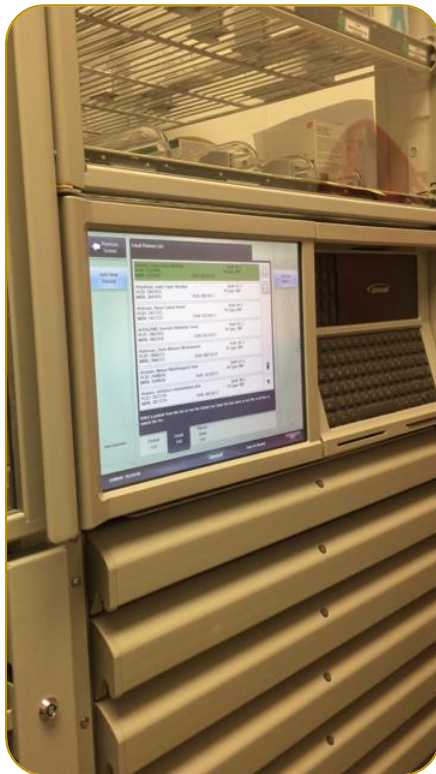
## Electronic Medication Administration Record (e-MAR)

The screenshot displays a software interface for an e-MAR system. At the top, there are tabs for 'Flow Sheet', 'Admission Assessment', 'Nursing Notes', 'Nursing Plan', 'Nurses', and 'Order Entry'. Below these is a navigation bar with buttons for 'Group', 'Medication', 'Examination', 'Intervention', 'NurseOrder', and 'Transfusion'. The main area is a table with columns: 'Order', 'Acting Ref Time', 'Acting Time', 'Status', 'Reviewed', and 'Ordered by'. The table lists various medications and their administration details.

Order	Acting Ref Time	Acting Time	Status	Reviewed	Ordered by
Regular					
Medication					
CarbQalone Na 1 g Injection, Val (ASA) - 1000 mg IV Syringe [D214]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Sterile Water for Injection - 10 mL IV Syringe	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D214] Tylenol every 24 hrs over 3-5min Type of Antibiotic Therapy: Empirical	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Mefenopamide HCl 5 mg/mL Injection, 2 mL Val - 10 mg IV Push [D215]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D215] Tylenol every 12 hrs Steady PAIN Reason: nausea or vomiting	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Mefenoprol Tartrate 50 mg Immediate Release Tablet (ASA) - 25 mg Oral [D216]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D216] Take twice a day	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Alometadine Ca 30 mg Tablet (ASA) - 10 mg Oral [D217]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D217] Take once a day before sleep	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
ESOMeprozole 40 mg Tablet(ASA) - 40 mg Oral [D218]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D218] Take once a day at 8 am	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Aspirin 81 mg Enteric Coated Tablet - 81 mg Oral [D219]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D219] Take every 24 hrs	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Furosemide 40 mg Tablet - 40 mg Oral [D220]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D220] Take every 24 hrs in the morning daily	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Glycerin Adult Suppository - 2 sup Rectal [D221]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D221] Insert in anus every * Comment: insert 2 suppositories daily	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
PEG 3350 gsm Electrolyte Solution (without sodium sulphate) Mowical Adult - 1 L each Oral [D222]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D222] Take twice a day	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Docusate Na 100 mg Capsule - 100 mg Oral [D223]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D223] Take twice a day	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Beacod 5 mg Enteric Coated Tablet - 10 mg Oral [D224]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D224] Take once a day at 8 am PAIN Reason: ensure bowels open daily	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Sodium Phosphate and Rapphosphate Emulsion (Adult) 133 mL - 133 mL Rectal [D225]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
[D225] Insert in anus PAIN Reason: ensure bowels open daily	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Thiamine HCl 30 mg/mL Injection - 2 mL ampule - 100 mg IV Piggyback [D226]	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa
Sodium Cl 0.9% (0.9%) - 100 mL IV Piggyback	08:00	08:00	✓	✓	Emergency Room (KAMQ) Abusabir Mohammad Dsa

# Automation / Computerization

## Automated Dispensing Cabinets (ADCs)



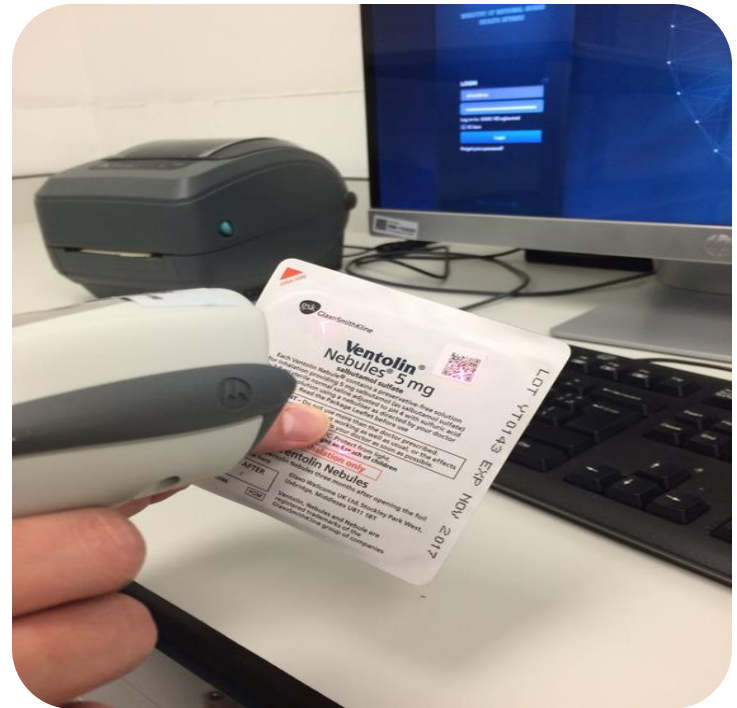


# Automation / Computerization

## Smart Pump



## Point-of-Care Barcoding





# Simplification / Standardization

## Standardized medication labels

**26514**

Warfarin 2 mg tablet

**HAZARDOUS / HIGH ALERT**

**107940**

Cisatracurium 20 mg / 10 mL injection

**HIGH ALERT / PARALYZING AGENT**

**111483**

Fondaparinux 2.5 mg / 0.5mL

**HIGH ALERT - IV ONLY**

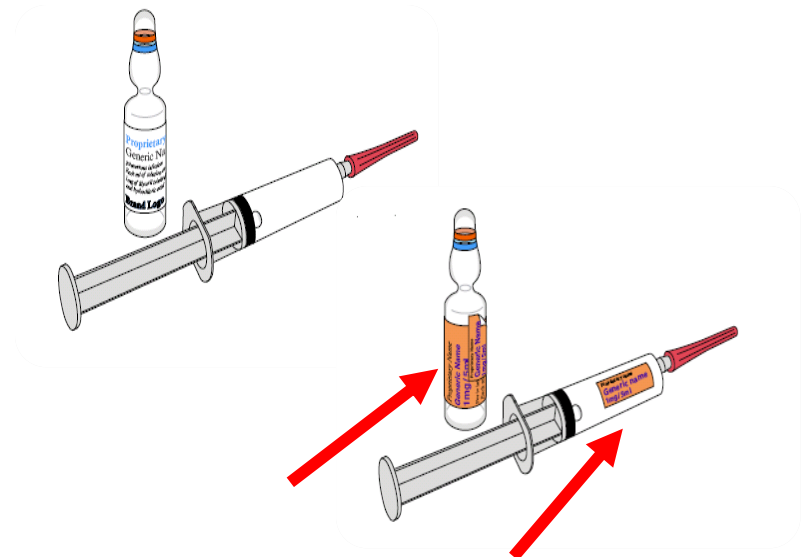
**26504**

Potassium Acetate 2 mEq / mL injection

**HIGH ALERT / CONC. ELECTROLYTE MUST BE DILUTED**

## Safe Labeling of Syringes

all syringes must be labeled if not **immediately** administered



# JCI Note: (MMU.5.2; ME 4)

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)

# Reminders, Redundancies, Checklists & Double-Checks

## Auxiliary medication labels

**High Alert  
Medication**

**WARNING  
Paralyzing Agent –  
Causes Respiratory Arrest –  
Patient Must Be Ventilated**

## Chemotherapy Checklist

Pharmacy Checklists Oncology Forms

MRN : Pt Name :

Med. Form Name

Pharmacy chemotherapy Checking at release.  
Pharmacy chemotherapy Preparation.  
Pharmacy chemotherapy order verification

Visit Date: 25/03/2018

Pharmacy chemotherapy Checking at release.		
Checking chemotherapy by certified pharmacist at release stage:		
*Checking pharmacist will assure the following:	Yes	No
-All information mentioned in Order verification part has been checked.	<input type="radio"/>	<input type="radio"/>
-Right volume aspirated from right drug & injected to the bag.	<input type="radio"/>	<input type="radio"/>
-Right diluent has been used.	<input type="radio"/>	<input type="radio"/>
-Right patient label and auxiliary labels (if required) has been used.	<input type="radio"/>	<input type="radio"/>
-Each bag, syringe of chemotherapy agent has been labeled properly.	<input type="radio"/>	<input type="radio"/>

Classif. Visit Date Written Date Dept Medical Form Name W

Visit Hx.

Save Sign

# Rules and Policies

NGHA > NGHA > Saudi Medication Safety Center > APPs

One Stop Resource

ADR & Med Error / Near Miss Summary Reports

Allergy Information

Antidote Data Sheets

**APPs**

Corporate Pharmacy & Therapeutics Committee, MNG-HA

Links

Medication Safety Information Alert Warnings

NGHA Specific Information

Patient Education Material

Educational Brochures

Reference Material

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 Falls 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

APP 1429-02 Look Alike, Sound Alike and High Alert Medications.pdf

**Organization :** NGHA

**Original Department :** 7339 - SAUDI MEDICATION SAFETY CENTER

**Title :** Look-Alike, Sound-Alike And High Alert Medications

**Statement of 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.

**APP Number :** 1429-02

**Category :** Operation, Administrative, Finance, & others

**Replaces :**

**Remarks :**

**Original Date :** 15-03-2008

**Revised Date :** 07-03-2015

**Effective Date :** 02-07-2015

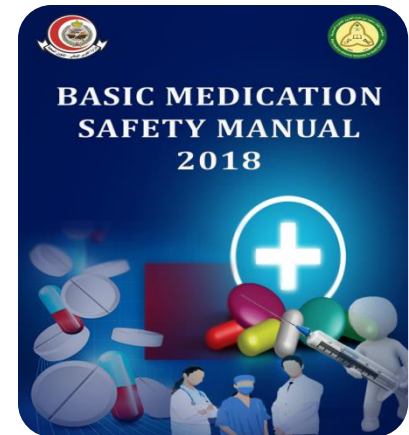
**Appendixes / Attachments :** AO 2015-11-009.pdf  
Appendix A - LASA Drug Names With Tall Man Letters.pdf  
Appendix B - Confused Drug Names.pdf  
Appendix C - HAM requiring IDC.docx  
Appendix D - LASA High Alert Meds-Risk Reduction Strategies for High Alert Meds.pdf

Back


Note: For the best view of APP Go to the View Menu in the Browser Toolbar and change the Text size to 'Medium'

# Staff Education & Access to Information


- One Stop Resource: NGHIA Intranet
  - Basic Medication Safety (BMS) Course
  - Micromedex
  - NGHIA 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



Search this site...


Sign In 

Home Achievements Departments Committees E-Service NGHHA Board Regulations

NGHHA > NGHHA > Saudi Medication Safety Center > One Stop Resource



**One Stop Resource**

- ADR & Med Error / Near Miss Summary Reports
- Allergy Information
- Antidote Data Sheets
- APPs
- Corporate Pharmacy & Therapeutics Committee, MNG-HA
- Links
- Medication Safety Information Alert Warnings
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- Educational Brochures
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- USP Pictograms
- Medication Information for Patients
- Standardized Medication Labels



**Saudi Medication Safety Center**  
المركز السعودي لسلامة الأدوية  
One Stop Resource

- [ADR & Med Error / Near Miss Summary Reports](#)
- [Allergy Information](#)
- [Antidote Data Sheets](#)
- [APPs](#)
- [Corporate Pharmacy & Therapeutics Committee, MNG-HA](#)
- [Links](#)
- [Medication Safety information/alert/warnings](#)
- [Newly Added / Received to MNG-HA Formulary](#)
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 **Search Manual** 

Statement for assistance

If you have any inquiries or need assistance, please contact  
the Saudi Medication Safety Center (SMSC)  
Email: [smc1@ngha.med.sa](mailto:smc1@ngha.med.sa)



# Be Careful...Be Vigilant

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

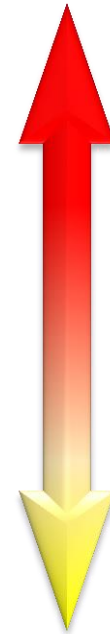


# How to Select the Best Error Prevention Tool

## Hierarchy of Effectiveness

- ❑ Forcing functions & constraints
- ❑ Automation / computerization
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- ❑ Rules and policies
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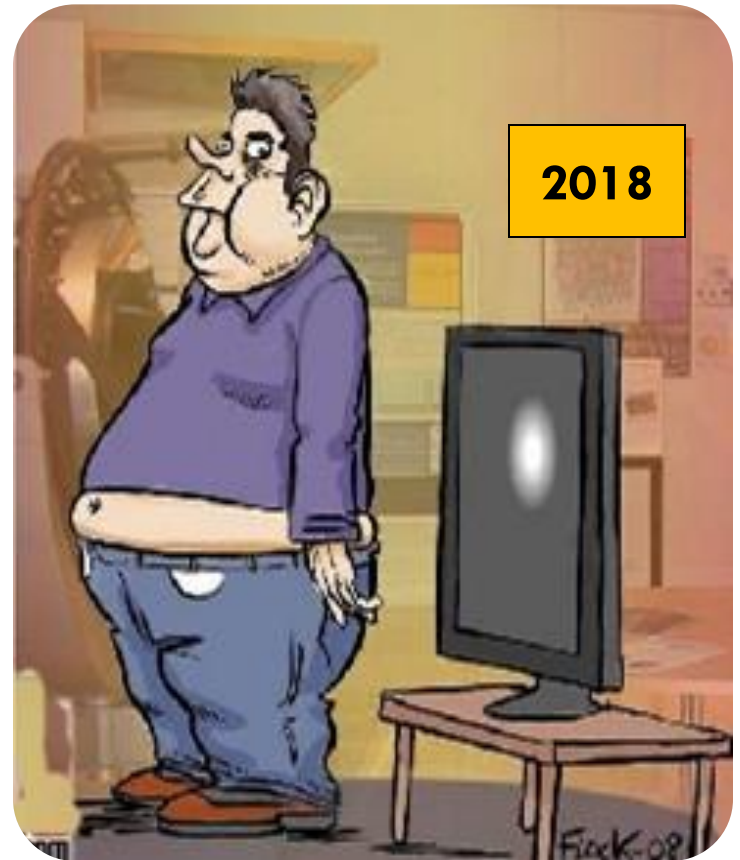
**Highest**



**Lowest**

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# Advances in Technology

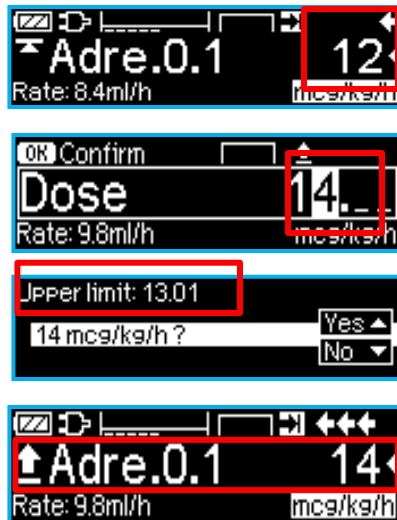


# Smart Infusion Pump Technology

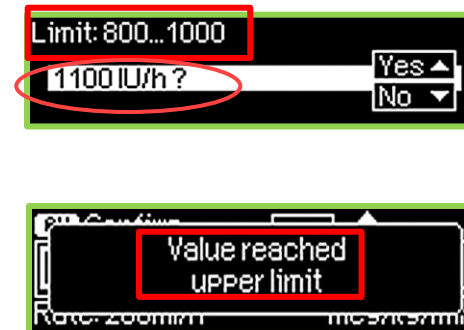
- Smart pumps ensure that medications are delivered within a **safe dose range**
- Utilizing the Drug Library Keeps Your Pump SMART



## 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)



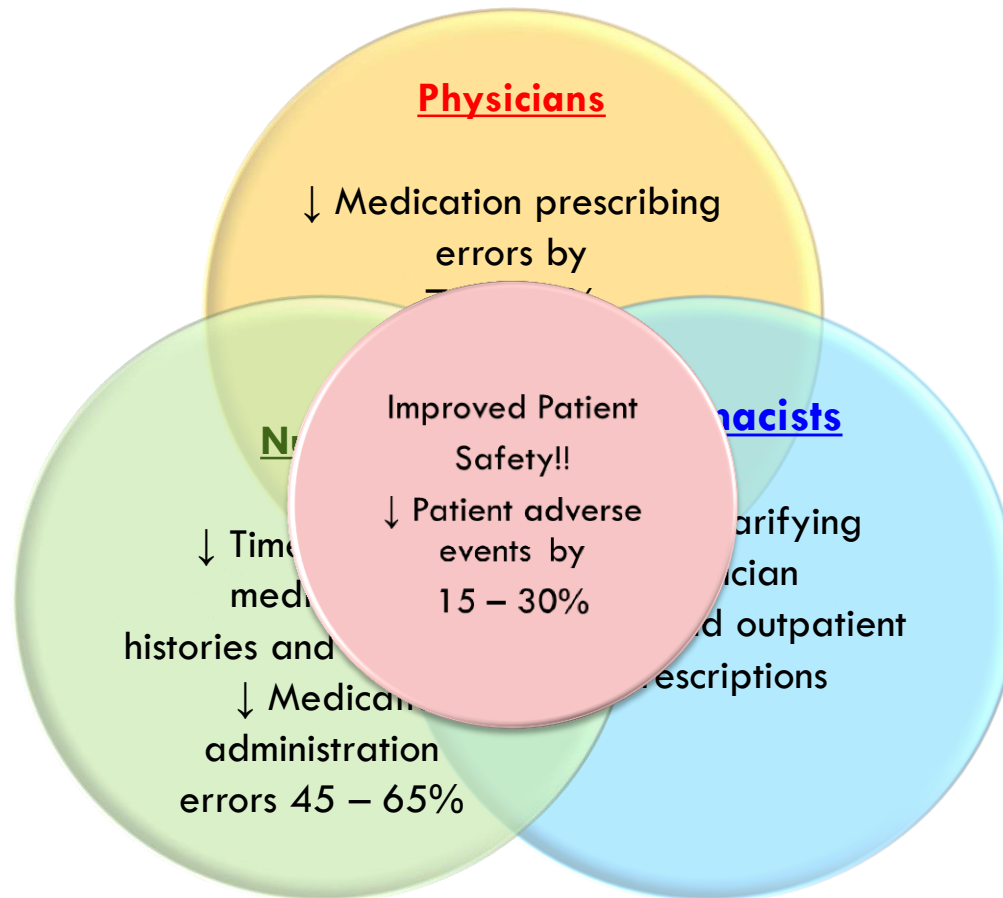
# Medication Reconciliation

- 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.

National Patient Safety Goals Effective January 1, 2013



# 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.

# Medication Reconciliation at MNG-HA

## Best Possible Medication History

## Discharge Plan and Orders

Best Possible Medication History (BPMH)

Discharge Plan and Orders

MRN Pt Name Gender Age Admission Date Last ER Visit Precautions Hx. Dx.

> Current MAR (Active Orders)

Order Name	Contint.	No acti taken	Change
Furosemide Tablet [Frequency : 60 mg Oral For 30 Days] : administer at 0800 and 1400 [(BID) Take twice a day ] Every Day X 30 time(s)	more...	✓	✓
Tear Naturele Preservative Free Ophtalmic Minim [1 gtt Ophthalmic. For 30 Days] (ins. o 3/d) Instill Three times a day	✓	✓	✓
Folic Acid Tablet (LASA) (Anemia) [5 mg Oral For 30 Days] (qd q24h) Take every 24 hrs	✓	✓	✓

> Best Possible Medication History (BPMH)

Source	Classif.	Order Name	Contint.	No acti taken	Change
●	Cont.	Furosemide Tablet [20 mg Oral For 60 Days] 14/03/2018 ~ 12/05/2018 (BID q12h) Take every 12 hrs	✓	✓	✓
●	Cont.	Tear Naturele Preservative Free Ophtalmic Minim [1 gtt Ophthalmic.... 14/03/2018 ~ 12/05/2018 (ins. o 3/d) Instill Three times a day	✓	✓	✓
●	Cont.	Folic Acid Tablet (LASA) (Anemia) [5 mg Oral For 60 Days] 14/03/2018 ~ 12/05/2018 (qd q24h) Take every 24 hrs	✓	✓	✓
●	Cont.	Multivitamin (Renal Formula) Tablet [1. tab Oral For 60 Days] 14/03/2018 ~ 12/05/2018 (qd q24h) Take every 24 hrs	✓	✓	✓
●	Cont.	Ferrous Sulfate Tablet [190 mg Oral For 60 Days] 14/03/2018 ~ 12/05/2018 (qd q24h) Take every 24 hrs	✓	✓	✓
●	Cont.	Alfacalcidol Capsule [0.25 mcg Oral For 60 Days] 14/03/2018 ~ 12/05/2018 (qd q24h) Take every 24 hrs	✓	✓	✓
●	Cont.	NIFEdipine Extended Release Tablet (LASA) [30 mg Oral For 60 Days] 14/03/2018 ~ 12/05/2018 (qd a8) Take at 8 am	✓	✓	✓
●	Cont.	Insulin, Aspart Recombinant (100 Units/mL, 3mL) Prefilled Pen Injecti... 14/03/2018 ~ 12/05/2018 (TID --) Inject right before every meal Three	✓	✓	✓

> Additional Comments (Unresolved/Ongoing medication issues and others)

● Previous Discharge Medication ● Active Out-Patient Prescription ● Review of Medication Vials, Patient/Family Recall, Community Pharmacy, Other

> > Discharge Medication Orders

Copy Order

Order Name

D Folic Acid Tablet (LASA) (Anemia) [5 mg Oral For 30 Days]  
(qd q24h) Take every 24 hrs

D Tear Naturele Preservative Free Ophtalmic Minim [1 gtt Ophthalmic. For 30 Days]  
(ins. o 3/d) Instill Three times a day

D Furosemide Tablet [Frequency : 60 mg Oral For 30 Days]  
: administer at 0800 and 1400  
[(BID) Take twice a day ] Every Day X 30 time(s)

D Multivitamin (Renal Formula) Tablet [1. tab Oral For 60 Days]  
(qd q24h) Take every 24 hrs

Save Print Close

100%

# Patient / patient carer giver Education

- Initiate at the time of prescribing
- 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