



Medication safety- II

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Medication safety issues



- Medication errors can take place anywhere in hospitals, homes.
- Adverse drug reaction may occur with any drug.
- Misuse of medicines; either wrongly prescribed by doctor or used by patients themselves.
- Irrational use of medicines using unsafe drugs & irrational combinations.

Medication Errors



Medication error is any preventable event that may cause or lead to inappropriate medication use or patient harm, while the medication is in the control of the health care professional, patient, or consumer. (“NCC MERP”)


NCCMERP = “**National Coordinating Council for Medication Error Reporting and prevention**”.

Epidemiology of medication errors

- Medication errors can occur at any step of medication use.
- It has been estimated that 1.5 million medication error occur & about 1,00,000 die in U.S. each year. Additional hospital treatment costs is estimated at \$ 3.5 billion.
- Medication errors occur in nearly 1 out of every 5 doses given to patients in a hospital.



Epidemiology of medication errors Contd.

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- Studies suggest that about one-half of medication errors in hospitals have potential to harm patients.
 - Although patient harm caused by medication errors is most often temporary in nature, in some cases the harm can be permanent or even fatal.
 - To ensure medication safety in patients; monitoring, analysis and interventions should be done

Types of medication errors

Medication use involves a complex process that is subject to error at many points in healthcare settings.

- Prescription Error
- Transcription Error
- Indent Error
- Dispensing Error
- Administration Error
- Documentation Error



Types of Medication Errors Contd.

➤ **Prescription Errors**

- **Incorrect prescription**
- Illegible handwriting
- Drug history not taken
- Drug allergy not identified
- Out of list abbreviations
- Irrational combinations





➤ **Non Compliance of 6R's**

- Wrong patient
- Wrong drug
- Wrong time
- Wrong dose
- Wrong route
- Wrong method





➤ **Documentation Errors**

- Documented before administration
- No documentation
- Incorrect transcription

➤ **Dispensing Errors**

- Wrong drug dispensed
- Wrong strength of drug dispensed
- Wrong area dispensing
- Cold chain not maintained



Pharmacy



Causes of medication errors

- Difficult to read doctor's order or illegible handwriting.
- When nurses get distracted by other patients, coworkers, or events on the units.
- When nurses are tired and exhausted.
- When there is confusion between 2 drugs with similar names or appearance (Look-alike, Sound-alike or spell-alike)

Causes of medication errors Contd.....



- Miscalculation of dose
- When wrong dose is prescribed
- Failure in identification of patients record (Misidentification)
- Adjustment of infusion device is incorrect or confused by different types & function of infusion devices.



Analysis

Error did not reach the patient (NEAR MISS)

Actual error:

- ERROR, NO HARM
- ERROR, HARM – mild, moderate, serious
- ERROR, DEATH

RCA and detailed analysis to be done for error leading to serious harm or death of patient

Look-alike Sound-alike Drugs



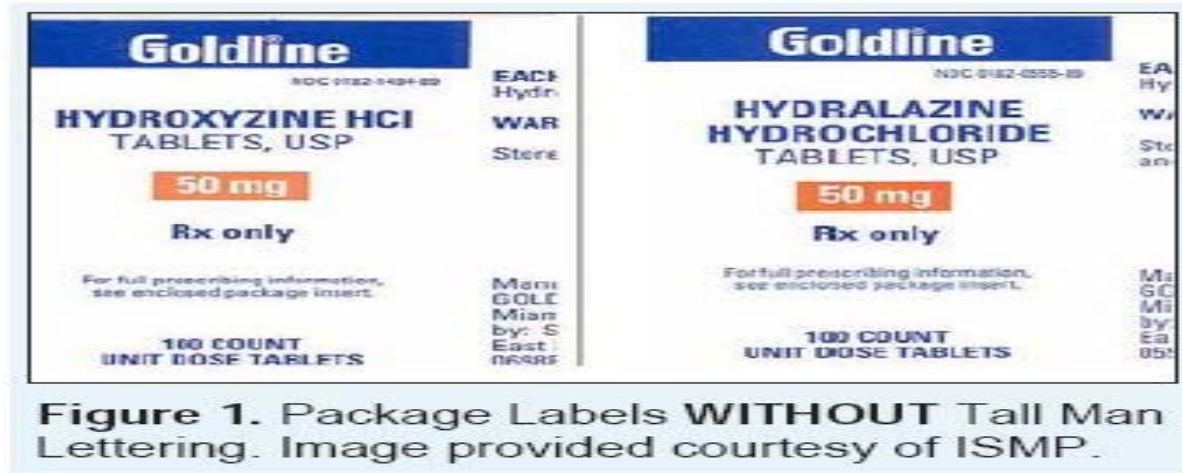
Medications with generic or proprietary names that look or sound like other medication names.

CONSEQUENCES



- *Confusing medication names (Sound similar or Appear similar) may lead to potentially harmful medication errors contributing to adverse events.*
- *Patient may suffer from mild to severe adverse reactions or there may be lack of therapeutic response.*
- *It may also lead to economic losses.*

About LASA drugs



- ❖ *LASA drugs are often due to change in brand name or change in package size.*
- ❖ *LASA drugs should be identified & updated in IP & OP Pharmacy frequently & information should be disseminated to all areas where drugs are used (Floors, emergency, OT's).*



Actions to reduce risk

- *Use Tall-man lettering to differentiate the difference in the names of the drugs. For e.g. Tab diaMOX (Acetazolamide) & Tab diaBOSE (Acarbose)*
- *Store items in segregated areas.*
- *Perform extra verification steps:*
 - *Double check requirement prior to dispensing.*
 - *Double check requirement prior to administration.*
- *Use generic names while prescribing.*
- *Limit the brands of comparable products that are stocked in the pharmacy & the patient care areas.*

Some Medications that are look-alike

<i>Tab Alprax 0.25 mg (Alprazolam)</i>	<i>Tab Domstal 10 mg (Domperidon)</i>
<i>Inj Magnamycin 250mg (Cefoperazone)</i>	<i>Inj Magnex (Cefoperazone+Sulbactam)</i>
<i>Tab Avil (pheniramine)</i>	<i>Tab Lasix (Fruosemide)</i>
<i>Tab Duphaston (Dydrogesterone)</i>	<i>Tab Duvadilan (Isoxsuprin)</i>
<i>Tab Cifran 500mg (Ciprofloxacin)</i>	<i>Tab Zanocin 200mg (Ofloxacin)</i>
<i>Inj NS 100ml infusion (Nacl)</i>	<i>Inj Vitrinal 3% 100ml Infusion (Nacl)</i>
<i>Inj Depomedrol 1ml (Methylprednisolone acetate)</i>	<i>Inj Depomedrol 2ml (Methylprednisolone acetate)</i>

Look-alike drugs continued.....

<i>Inj Magnesium sulphate 25%</i>	<i>Inj Magnesium sulphate 50%</i>
<i>Inj Solumedrol (40mg)</i>	<i>Inj Solumedrol (125mg)</i>
<i>Inj Augmentin (300mg) (Amoxicillin + Clavunate Potassium)</i>	<i>Inj Augmentin (600mg) (Amoxicillin + Clavunate Potassium)</i>
<i>Inj Dalpin (5000iu) (Daltaparin sodium)</i>	<i>Inj Dalpin (2500iu) (Daltaparin sodium)</i>
<i>Tab Dulcolax (Bisacodyl)</i>	<i>Tab Buscopan (Hyoscine Butylbromide)</i>
<i>Tab Augpen LB 625mg (Amoxicillin + Clavunate Potassium + Lactobacillus sporogenes)</i>	<i>Tab Augpen LB 1gm (Amoxicillin + Clavunate Potassium + Lactobacillus sporogenes)</i>

Some Medications that are sound-alike

<i>Asklerol inj 60 mg (Polidocanol)</i>	<i>Syr Alkasol 100 ml (Disodium Hydrogen citrate)</i>
<i>Inj Dotamin (Dobutamine)</i>	<i>Inj Domin (Dopamine)</i>
<i>Tab Monotrate (Isosorbide mononitrate)</i>	<i>Tab Montair (Montelukast)</i>
<i>Tab Ciplar (Propranolol HCL)</i>	<i>Tab Cipril (Lisinopril)</i>
<i>Tab Ferium (Ferrous ascorbate + Folic acid)</i>	<i>Tab Frisium (Clobazam)</i>
<i>Tab Aten (Atenolol)</i>	<i>Tab Aceten (Captopril)</i>
<i>Cap Lyrica (Pregabalin)</i>	<i>Tab Lerka (Lercanadipine)</i>
<i>Tab Levroxa (Levetiracetam)</i>	<i>Tab Levoflox (Levofloxacin)</i>
<i>Tab Diamox (Acetazolamide)</i>	<i>Tab Diabose (Acarbose)</i>

High risk Drugs



Medications that have the highest risk of causing injury when misused are known as high alert / high-risk drugs.

Basis to categorize high risk drug



- ❖ *Those drugs which have low therapeutic index (slight increase in dose can cause harmful effect). E.g- Enoxaparin, Amiodarone*
- ❖ *Those drugs that present a high risk when administered via wrong route. E.g- Insulin, Epinephrine*




Some high risk drugs

- ✓ *Insulin*
- ✓ *Narcotics (Fentanyl, Morphine)*
- ✓ *Potassium Chloride/ Potassium Phosphate (15%)*
- ✓ *Heparin*
- ✓ *Sodium Chloride (greater than 0.9%)*
- ✓ *Chemotherapeutic agent*
- ✓ *Epinephrine*
- ✓ *Nor epinephrine*
- ✓ *Dopamine*



Storage of high risk drugs

- 
- *High risk drugs required in the emergency situation E.g epinephrine, nor epinephrine,*
 - *Should be kept in crash cart separately.*
 - *Should be labeled properly (in capitals)*
 - *Should not be easily accessible.*
 - *High risk drugs required in the emergency situation but are controlled E.g Narcotics*
 - *They should be stored, dispensed & administered according to schedule 'X'.*
 - *Should be kept separately in the cupboard.*
 - *Should be labeled properly (in capitals)*
 - *Should not be easily accessible (under lock & key).*



Prevention of misuse of high risk drugs

- ✓ *Prescription for high risk drugs should be in capitals without any abbreviation, clearly mentioning the name of drug, dose, strength, route of administration & instruction on administration.*
- ✓ *High risk medication order should be verified before dispensing.*
- ✓ *Double checks for right patient, right drug, right dose, and right route of administration must be ensured.*
- ✓ *Antidotes for high risk drugs should be stored and easily accessible.*

List of High Risk Drugs

Inj. Ketamine

Inj. Lidocaine for IV use

Inj. Amiodarone

Inj. Rocuronium

Inj. Insulin

Inj. Dobutamine

Inj. Vasopressin

Inj. Streptokinase

Inj. Norepinephrine

Inj. Fentanyl

Inj. Morphine

Inj. Dopamine

Inj. Propranolol

Inj. Metoprolol

Inj. Alprazolam

Inj. Propofol

Inj. Succinyl Choline

Inj. Atracurium

Inj. Heparin

Inj. Enoxaparin

Inj. Midazolam

Inj. Epinephrine

Inj. Milrinone

Inj. Fondaparinux

Inj. Vecuronium

Inj. Phenylephrine

Inj. Theophylline

Inj. Oxytocin



List of High Risk Drugs (Contd..)

Inj. Labetalol

Inj. Digoxin

Inj. Verapamil

Inj. Procainamide

Tab Warfarin

Inj. Liposomal Amphotericin B

Inj. Potassium chloride/ Potassium Phosphate (15%)

Inj. Sodium Chloride (Hypertonic; greater than 0.9%)

Inj. Magnesium sulphate

Inj Methotrexate

Inj. Nitroprusside Sodium

Dialysis solution; Peritoneal & Hemodialysis

Dextrose (Hypertonic; 20% or greater)

MONITORING OF ADVERSE DRUG REACTIONS



Introduction



- Response to a drug that is noxious and unintended and that occurs at doses used in humans for prophylaxis, diagnosis, or therapy of disease, or for the modification of physiologic function(WHO).
- Purposely excludes therapeutic failures, overdose, drug abuse, noncompliance, and medication errors.



Epidemiology of ADRs

- Substantial morbidity and mortality
- Estimates of incidence vary with study methods, population, and ADR definition
- 4th to 6th leading cause of death among hospitalized patients
- 6.7% incidence of serious ADRs*
- 0.3% to 7% of all hospital admissions
- Annual dollar costs in the billions
- 30% to 60% are preventable

Onset of Event



- **Acute within 60 minutes**

Anaphylactic shock, bronchoconstriction

- **Sub-acute 1 to 24 hours**

Rash, serum sickness, Antibiotic associated colitis

- **Latent > 2 days**

Eczematous eruptions, Tardive dyskinesia



Severity

Severity of reaction:

- **Mild:** bothersome but requires no change in therapy Metallic taste with Metronidazole
- **Moderate:** requires change in therapy, treatment for ADR & Prolonged hospitalization
Amphotericin induced hypokalemia
- **Severe:** disabling or life-threatening QT interval prolongation, kidney failure

Severity Contd.....

FDA Defines **Serious** ADR

- Result in death
- Life-threatening
- Shift to ICU
- Prolong hospitalization
- Cause disability
- Cause congenital anomalies
- Require intervention to prevent permanent injury





Types of ADRs

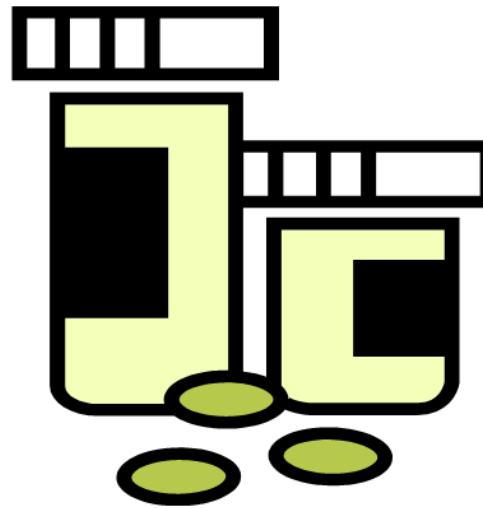
Type A

Extension of pharmacologic effect often predictable and dose dependent responsible for at least two-thirds of ADRs e.g., propranolol and heart block, anticholinergics and dry mouth

Incidence: More than 1 in 100

Type B

Idiosyncratic or immunologic reactions rare and unpredictable e.g., chloramphenicol and aplastic anemia
Rash caused by beta lactam antibiotics.



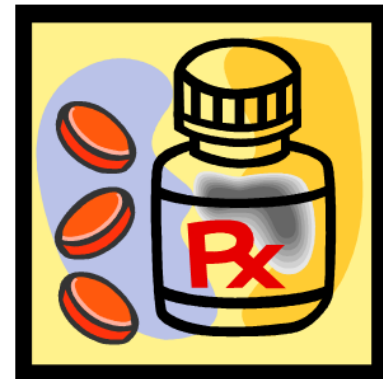


Types of Allergic Reactions

- **Type I** - immediate, anaphylactic (IgE) e.g., anaphylaxis with penicillins
- **Type II** - cytotoxic antibody (IgG, IgM) e.g., methyldopa and hemolytic anemia
- **Type III** - serum sickness (IgG, IgM) antigen-antibody complex – e.g., procainamide-induced lupus
- **Type IV** - delayed hypersensitivity (T cell) e.g., contact dermatitis

Type C

Reactions which are due to long term use of a drug, e.g., tardive dyskinesia with neuroleptics, analgesic nephropathy etc.



Type D

Reactions e.g., taratogenesis, carcinogenesis like clear cell carcinoma of the female reproductive tract in mature women whose mothers have received diethylstilbesterol during pregnancy.



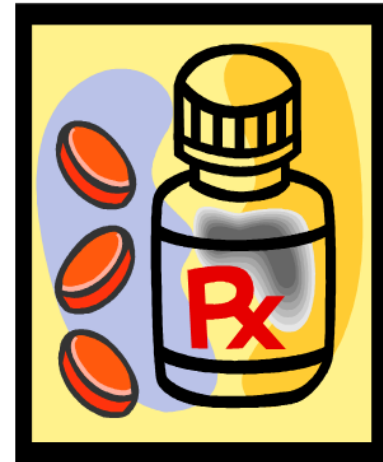
Type E

Reactions which occur when the discontinuation of the drug is too abrupt, especially after long term therapy with the drug e.g., adrenocortical insufficiency due to sudden withdrawal of corticosteroids, rebound hypertension after sudden withdrawal of clonidine.



Drugs those Frequently Cause Allergic Reactions

- Penicillin, Cephalosporin, Sulphonamide
- Tetracycline, Quinolones (Ciprofloxacin)
- Antitubercular
- Local anesthetics, Salicylates
- ACE inhibitors, Carbamazepim





Causality Assessment

- Certain
- Probable
- Possible
- Unlikely
- Unclassified



Causality Assessment

- **Certain**


Dechallenge +ve, Rechallenge +ve & temporal relationship +ve

- **Probable**

Dechallenge +ve, Rechallenge not done & temporal relationship +ve

- **Possible**

Information on Dechallenge & Rechallenge not available & Temporal relationship possible



Some facts about ADRs

- Adverse drug reaction is an unintended reaction to a drug that may occur in the doses normally used in man.
- ADR can be of mild, moderate or severe intensity. ADRs result into increase patient's stay in the hospital, deteriorates quality of life of patients as well as cause economic losses.
- Careful monitoring and reporting can prevent 35 – 50 % of ADRs thus providing quality care to the patient & their safety.



THANK YOU

