



Healthcare Today..

- Is a complex system
- Comprised of numerous intricate parts interacting with multiple other parts in unexpected ways
- Has various levels of specialisation and interdependencies

and these places health care facilities at high risk for accidents

(IOM 2000, Beyea 2002)

What's PICU Like Today....

- Multidisciplinary
- Wide age and size range
- State of art equipment
- Highly advanced care technology
- New mode of drug delivery



- Evidence-based if not best practice
- Wide variety of drugs
- Nurses of different grades

Common Causes of Medication Errors in PICU

Dosage Error:

- Wrong Dilution
- Calculation Error
- Error in Pump Settings
 Omission
 - Prescription Error

Ot her s:

- Wrong Drug
- Wrong Time



Medication Errors

- One type error most reported in the literature and is recognized as an important cause of iatrogenic injury in hospital patients.
- Occur anywhere on the continuum, from prescribing, dispensing, administering.....
- Health care encompasses risks and complexity, and administering medication is probably the highest-risk tasks

Oh..! How do I go from here....



In the past...

 Medication errors have been addressed by a problem-solving approach so that human cause of the error is identified and corrected.

 Although many medication errors are due to human error.....



To Err is Human....

• Abundant evidence in the human factors and cognitive psychology literature recognizes that most human errors are symptoms of underlying system failures.

Human error to adverse drug events is a consequence rather than a cause (DoH, 2000).

Human Fallibility



The IOM report (1999), further cautions the focus of errors on individual responsibility while ignoring system factor that made error possible.

Human factors sciences emphasis methods of improving human performance in complex work system with designing of work systems that compensate for inevitable human fallibility.





• Leape et al (1995), recommended that a systems engineering approach be used to make healthcare delivery systems less error prone by introducing root cause analysis.

Error reports are valuable data which can be used to analyse problem from multiple angles and system.



Incident Reports



for the cause factors....

.... If or the development of preventive measures in minimising medication errors.







Cause and Effect (Root Cause) Analysis



Cause and Effect (Root Cause) Analysis

Six Major Factors Identified

- 1. Medication order not properly communicated
- 2. Lack standard practice in prescribing and transcribing IMR
- 3. Odd time dosing
- 4. Poor IMR design
- 5. Failure to verify order
- 6. Non compliance to practice standard

Verification of Root Causes

- 1. Using questionnaires and documentation records to determine how:
- Information are disseminated
- Medication orders are verified
- 2. Review I MRs:
- IMR design
 - Prescribing and Transcribing process
- Odd time dosing

- 3. Using observation technique to:
- Adherence to standard practice in med. admin.

Review of IMR - Prescriptions

Date	ORAL AND NON-PARENTE Medicine & Bisolvan 4mg tals Klacid 320 mg bd	Doctor's Sig.	Discontinued Date Doctors Sig.	Pharmacy Suppry / Remarks 21 · 4/kp 0 18 0 Brannar 57a ft 151 * pils colonida 2 with both \$9/al (144)		Weight documented on wrong place
*	+ 20 Paractonol 220mg 44 × /4 Paracetand 250 6H Mm Paracetand 250 6H Mm Paracetand 250 6H Mm Paracetand 250 g Hory 4 Paracetanot 250 g Hory 4			Inst Given @ >pm . & sinto	4 • •	different dosages ordered at various point of time
	Syrup paracetand 220 mg 6H × 47 (to path) Somp procetand 220 mg 6H × 4 Syrup paracetand 220 mg 6H × 4 Syrup paracetand 220 mg 6H × 4	2 2 2		6 (41,5 ·		Discontinued and not signed off
1	INJECTIONS IV Rocephine [s 12 H IV Roweich e Zing ON IN Morphene 20 mg in somels 155%; at 05-20005/25;			2137d)] 2110,)] 2110,)]		Oral medication ordered under Injection column
	4hrly but interpret as Hrly Syn parcetand 220 vg 44/4 Dy Parcetone Story the 44	ed	1973			egibility of hand writing and high dosage

Survey on Transcribing of IMR -Verification of Orders

Description	Yes	No
Is there counterchecking of IMR after transcribing	83%	17%
Who checks the IMR? RN checks.	100%	0%
Is the name of countercheck RN recorded in IMR	49%	51%

	どく /
	\mathbf{N}

When is the transcribed IMR checked	%
Immediately	93
During medication serving	5
During handover report	2

	Immediate	1 day	2 days	3 days
IMR sent for billing	36%	19%	36%	9%

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Survey on Transcribing of IMR

Verification of items on IMR

Items on transcribed IMR checked	Yes	No
Patient's name and ID number	97%	3%
Medication orders	100%	0%
Drug allergy	93%	7%
Others e.g. date, weight, doctor signature	93%	7%

Survey on Transcribing of IMR

Number of respondents: 90 RNs

Description	Yes	No
Does the unit has a standard guideline for transcribing IMR	17%	83%

Description	P&P	IMR
If yes, where is the guideline filed	78%	22%

P&P on transcribing of IMR is available in P&P file kept in all wards.

Survey from 90 RNs

Communication and verification of orders

Description	All the time	Most of the time	Some- times	Not at all
During the process of receiving a patient from another ward, are medication orders and time of last administration communicated to you	44%	39%	14%	3%

Observational Study on Administration of Medication On adherence to med. administration practice

- Sample size: 90
- Average patients per shift: 17
- Average no. of RN/s: 2 to 3

Description	Yes	No
Was there counterchecking of drug by 2 RNs	100%	0%
RN carried IMR at bedside	100%	0%
RN/s check and verify patient identity at bedside	78%	22%
Was medication left unconsumed half hour later	11%	89%
Signature of RN/s on IMR after serving	99%	1%

Descriptive study on Nurses' Perception on Factors Contributing to Medication Errors

Sample size: 530 nurses

Respondent: 471 (89%)

Job Grade: NM, NC, SSN and SN

Discipline: O&G, Peds and Neo (wards, ICUs and Emergency Dept)

Survey using scales to:

- Rank the level importance
- Rank the frequency of occurrence
- Score the level of understanding
- Prioritize the choice of preferred measures

Nurses' Perception on level of Importance to Med. Admin.

No	Description	Mean Score
1	Strict adherence to P&P of drug admin.	3.76
2	Take personal responsibility in ensure safe drug administration	3.83
3	Adequate staff level	3.57
4	Minimize distraction	3.58
5	Staff with at least 2 years in current specialty	2.85
6	Have very clear and legible order	3.79
7	Have user friendly IMR for clear documentation	3.57
8	Rounding up medication dosage	3.09
9	Have standardized way of writing prescription	3.55
10	Use generic drug names	3.24
11	Have good pharmacological knowledge of commonly use drugs	3.47
12	Eliminate non critical stat orders	2.9
13	Have periodic training and assessment of pharmaco. knowledge	3.23
14	Have clear assess to drug information	3.45
15	Have clear P&P for counter-checking of medication	3.48 ²⁷

Survey on Nurses' Perception on Level of Importance in Administration of Medication

No.	Description	Mean Score
1	Take personal responsibility in ensure safe drug administration to patients	3.83
2	Have clear and legible order	3.79
3	Strict adherence to drug administration P&P	3.76
4	Minimize distraction	3.58
5	Have adequate staff level	3.57
6	Have user friendly IMR for clear documentation	3.57
7	Have standardized way of writing prescription	3.55
	1 2 3 Not Least Important	4 Very 2 Importar

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Survey on Nurses' Perception on Level of Importance in Med. Administration

Strict Adherence to P&P of drug administration

Grade of staff	NM/ NC	SSNI	SSNII	SNI	SNII	
Percentage rated as Very Important	95%	93%	82%	72%	58%	

Pearson Chi- Square: P value of .000

Take personal responsibility in ensuring safe drug administration to patients

Grade of staff	NM/ NC	SSNI	SSNII	SNI	SNII
Percentage rated as Very Important	95%	97%	86%	79%	71%

Pearson Chi- Square: P value of .005

Survey on Nurses' Perception on Level of Importance in Med. Administration

Have user friendly IMR columns for clear documentation

Years of experience	Below 2	2 to 5	Above 5
	years	years	years
Percentage rated as Very Important	68%	54%	59%

Pearson Chi- Square: P value of .000

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Med. Admin

No	Description	Mean Score
1	Inadequate staff level	2.5
2	Inadequate skilled staff	2.2
3	Having deployed staff	1.8
4	Long working hours	1.5
5	Distraction whilst preparing medication	2.6
6	Unclear orders	2.5
7	Illegible handwriting	2.6
8	Complex Order (more than 5 prescriptions)	2.1
9	Lack skill in calculation (conceptual and measurement disabilities)	1.7
10	Knowledge deficit in medication ordered	1.9
11	Too frequent change in medication order	2.0
12	Change in medication packaging	1.9
13	Medication not readily available	2.1
14	Too many adhoc medication order	2.0
15	Lack access to drug information	1.8 ³¹

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Med. Admin

No	Description	Mean Score
1	Illegible handwriting	2.6
2	Distraction whilst preparing medication	2.6
3	Unclear orders	2.5
4	Inadequate staff level	2.5
5	Inadequate skilled staff	2.2
6	Complex Order	2.1
7	Medication not available for serving	2.1

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Administration of Medication

Illegible handwriting

Pearson Chi- Square: P value of .000

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Med. Admin

Distraction whilst preparing medication

Discipline	Paeds	O&G	Neo
Percentage of respondents who rated Frequently and Most of the Time	65%	38%	16%
Pearson Chi- Square: P value of .000			
	$\mathbf{F}(\mathbf{x})$		
Unclear orders		1 Jak	
Unclear orders Discipline	O&G	Paeds	Neo
Unclear orders Discipline Percentage of respondents who	O&G 50% _(Paeds 39%	Neo 26%

Pearson Chi- Square: P value of .003

MEDICINE TO BE GIVEN ONCE ONLY Dr's Sig. П Unclear Order Time Date predumen TXYZ Book . Frida et alerterbid 34/10/05 insultational 74. prebreakfort XYZ 34 Adrapich 8 am 2/6 2-5/10/03 MSUL artard tu XYZ prelinde Nr.A. Actrapio रुट 3 22/10/07 ner C Adraptat (AN P.2 34110/05 E Atropid 4 deserve To **Problem of** 2X m interpretation **ORAL AND NON-PARENTERAL MEDICINE** Discontinued Ordertor's Sig. Medicin Unclear Date Doctor's Sig. Date XYZ 512/03 3 d Panels XYZ 105 mg 6 hu Rout e 150 n Augmentin Odd doses

"Standard" Peds Medication Dosage

Syr Paracetomol 120mg/5mls

Dosage Ordered	Amount to be given	
90 mg	3.75 mls	
100 mg	4.17 mls	
130 mg	5.42 mls	
140 mg	5.83 mls	
150 mg	6.25 mls	
160 mg	6.67 mls	
180mg	7.5 mls	
200 mg	8.33 mls	
210 mg	8.75 mls	
220 mg	9.17 mls	

I/V Gentamycin 40mg/ml

Dosage Ordered	Amount to be given
20mg	O.5mls
24 mg	0.6mls
28 mg	0.7mls
30 mg	0.75mls
33 mg	0.83mls
40mg	1mls
42mg	1.05mls
45 mg	1.13mls
47 mg	1.18mls
50mg	1.25mls

This variation makes it difficult for providers who work on units to perform efficiently and sets them up to make errors.³⁶

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Med. Admin

Lack mathematic skill in drug calculation

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Med. Admin

Inadequate staff level

Discipline	Paeds	O&G	Neo
Percentage of respondents who rated Most of the Time	19%	13%	2%
Pearson Chi- Square: P value of .000		R	
Inadequate skilled staff		52	
Discipline	Paeds	O&G	Neo

Pearson Chi- Square: P value of .000

SUN	IMARY OF	POST ME	D-ERROR	REVIEW V	VITH STAF	FF & NM		
CASE NUMBER	1	2	3	4	5	6	7	8
DATE	27/8/03 —	22/11/03	07/12/03	12/12/03	16/12/03	25/02/04	19/03/04	22/11/03
TIME	2000 HR	0130 HR	1500 HR	0300 HR	0700 HR	1240 HR	0815 HR	0020 HR
TYPE OF MEDICATION ERROR	Wrong drug	Wrong drug	Wrong dose	Omission	Wrong route	Wrong dose	Wrong drug	Wrong dose
DEMOGRAPHIC OF STAFF INVOLVED								
JOB GRADE	SNI/SN	SN1/SNI	SSN/SNI	SSN/-	SNII/SNI	SSN/SNII	SN/-	SNI/SNI
YEARS OF EXPERIENCE	5 / 4 _½	1 _½ /3	20 / **	23	1 _½ / 4	12/1	6/12	3 / 1 _½
				_				
				—				
IV TRAINED – YES (Y) / NO (N)	Y / N	N / Y	Y / Y	Y	Y / Y	Y / N	N	Y / N
WARD DEMOGRAPHIC								
NO. OF STAFF ON DUTY	4RN	2RN + 2J	4RN + 1J	2RN +1J	3RN + 1J	5RN + 2J	3RN + 2J	2RN + 2J
TOTAL PATIENT	50%	54%	35%	65%	88%	81%	81%	53%
DURING EVENT WHAT WAS THE ROOT CAUSE?	Assumption that drug was available. ? Did not know how to use reference (DIMS)	Failure to: - Check drug Check dose Counter- check with another RN	Failure to: - Check drug Check dose Counter- check @ bedside was not evident	? Unclear prescription order. RN misinterprets order as discontinued	Incomplete prescription Failure to: - Check route Counter- check drug @ bedside	Knowledge deficit of Dr + RN. Failure to: - Comply with guideline on 1st IV dose administrat ⁿ	?Disruption. Failure to: - Check drug Counter- check	Failure to: - Check type of infusion. Check dose Counter- check

Nurses' Perception on Factors Currently Affecting Their Effectiveness in Med. Admin

Too many adhoc medication orders (odd time order)

Discipline	Paeds	O&G	Neo
Percentage of respondents who rated Frequently and Most of the Time	21%)12%	8%

Pearson Chi- Square: P value of .001

Medication not available on time of serving

Discipline	Paeds	O&G	Neo
Percentage of respondents who rated Frequently and Most of the	21%	18%	2%

Pearson Chi-Square: P value of .000

Suggested Measures that maybe helpful in preventing medication error occurrence

No	Description	Rank of Preference
1	Explore root cause and dwell on problem identified	1
2	Instill awareness on the need of taking personal accountability in med. administration	2
3	Improve staff competency in med. administration	3
4	Improve staff competency in drug knowledge	4
-5	Devise staff-directive learning program and perform yearly assessment on staff competency	5
6	Use case scenario to educate staff	6
7	Devise performance improvement plan	7
8	Compartmentalize medication trolley	8
9	Punitive action to those not adhering to standard	9
10	Punitive action to all committed error	10 41

Top 5 Measures that Nurses Rated Helpful in Preventing Medication Error Occurrence

	No	Description	Priority
	1	Explore root cause and dwell on problem identified	1
	2	Instill awareness on the need of taking personal accountability in med. administration	2
	3	Improve staff competency in med. administration	3
	4	Improve staff competency in drug knowledge	4
	5	Devise self-directive learning program and perform yearly assessment on staff competency	5

- Standardisation and simplification in processes which could reduce variation e.g. in prescribing, have legible handwriting, dosing, timing...
- Review I MR and modify design that best suit the staff.

Develop and review procedures to obtain uniform practices across all areas and most importantly make known to all levels of staff.

- Recognise weakness of staff and invest in training, fostering multidisciplinary and teamwork approach in dwelling down to problem identified.
- Recognising adverse work conditions such as distraction, inadequate staff level and poor communication that could be a consequence for error commission.
 - Have quality initiatives such as creating a forum of sharing, raising awareness and facilitating the implementation of practices that improve patient safety..

Conclusion

It imperative for us to:

- Create a culture in which the existence of risk is acknowledged and injury prevention is recognised as <u>everyone's responsibility</u>.
- Provide collaborative and supportive environment for staff members to report near misses and errors.
- Recognise human errors are symptoms of underlying system failures and be willing to dwell on system factors
- Systematically track and evaluate reports as analysing data set has great potential for developing preventive strategies to reduce future errors

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