Conducting Aggregate Root Cause Analysis in Small Rural Hospitals

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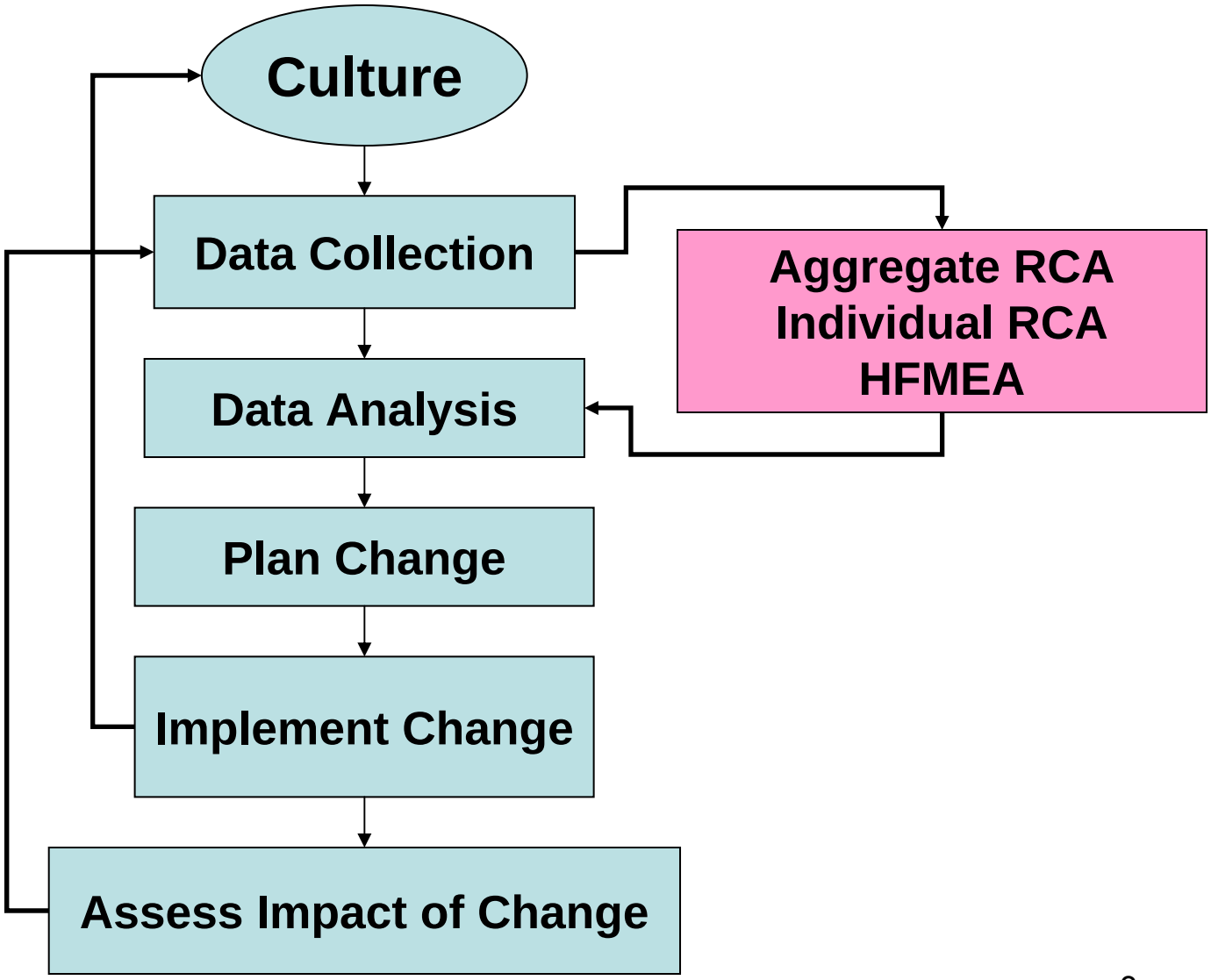
Objectives – Aggregate RCA

- Use Severity Assessment Code (SAC) to determine risk level of events– need for aggregate or individual analysis?
- Use medication error reporting data to identify similar events for aggregate RCA
- Complete an aggregate RCA of similar events in your organization to determine latent sources of error (including role of human factors)

Culture of Safety Model (USP, 2004)



Determining Risk

- Use Safety Assessment Code (SAC) to determine system RISK represented by each event report
  - Assign 1 of 4 severity categories
  - Assign 1 of 4 probability categories

- Score actual and near miss events

Modified from VA National Center for Patient Safety

Severity Categories

- Catastrophic
  - Death or major permanent loss of function (sensory, motor, physiologic or intellectual) not related to the natural course of the patient's illness or underlying condition.

- Major
  - Permanent lessening of bodily function (sensory, motor, physiologic or intellectual) not related to the natural course of the patient's illness or underlying condition.

Severity Categories Cont.

- Moderate
  - Increased length of stay or increased level of care
- Minor
  - No injury, nor increased length of stay, nor increased level of care

Severity Categories

- For actual Adverse Events, assign severity based on patient's condition
- For close calls, assign severity based on reasonable "worst case" systems level scenario
- Example: If 0.5mg digoxin was prepared for a newborn, but the dosing error was discovered by an RN before administration, the error would be considered "catastrophic" because death would be a reasonable outcome of the error

Probability Categories

- How often is it likely to occur in **your** facility?
- Frequent – Likely to occur
  - Several times each year
- Occasional – Probably will occur
  - Several times in 1 to 2 years
- Uncommon – Possible to occur
  - May happen sometime in 2 to 5 years
- Remote – Unlikely to occur
  - May happen sometime in 5 to 30 years

Severity Assessment Code Matrix

Severity Probability	Cata-strophic	Major	Moderate	Minor
Frequent	3	3	2 or 3	1
Occasional	3	2 or 3	1 or 2	1
Uncommon	3	2	1	1
Remote	3	2	1	1

Scoring Example

- MD wrote order to discontinue order for Morphine injection and initiate morphine PCA. The morphine PCA was initiated, but the morphine injection was not discontinued. The 70 year old female was also receiving Ativan. Error was discovered before morphine injection given again.

Scoring Example

- Theophylline was ordered by Dr. @1600. The pt needed a dosage calculated by KG & infused IV. I was contacted at approx 2130 and asked how to mix & infuse dose. It was 5 ½ hours between the time med was ordered and it was given.
- Other examples??

Who Should Assign Scores?

- Severity may require multidisciplinary team
  MD → RPh → RN
- Probability – depends on originating phase
  RN → RPh → MD
- Including MDs may
  - Improve understanding of system
  - Create buy-in
  - Increase the likelihood of participation in future RCAs

Step One

- Create a team with knowledge of process
- Gather and analyze all information about the events being reviewed
  - Error type, severity, cause, contributing factors, location, time
  - Therapeutic class, brand/generic name
  - Phases of Medication Use: ordering, transcription, dispensing, administration, monitoring
  - Equipment used, patient characteristics

Jt Comm J Qual Saf 29(8):434-439, 2003.

Step Two

- Develop a process map (flowchart)
  - Map the actual high-level process, not the ideal
  - Can consider phases of process separately
- Ask frontline staff how the process REALLY works
- Link error descriptions to process map

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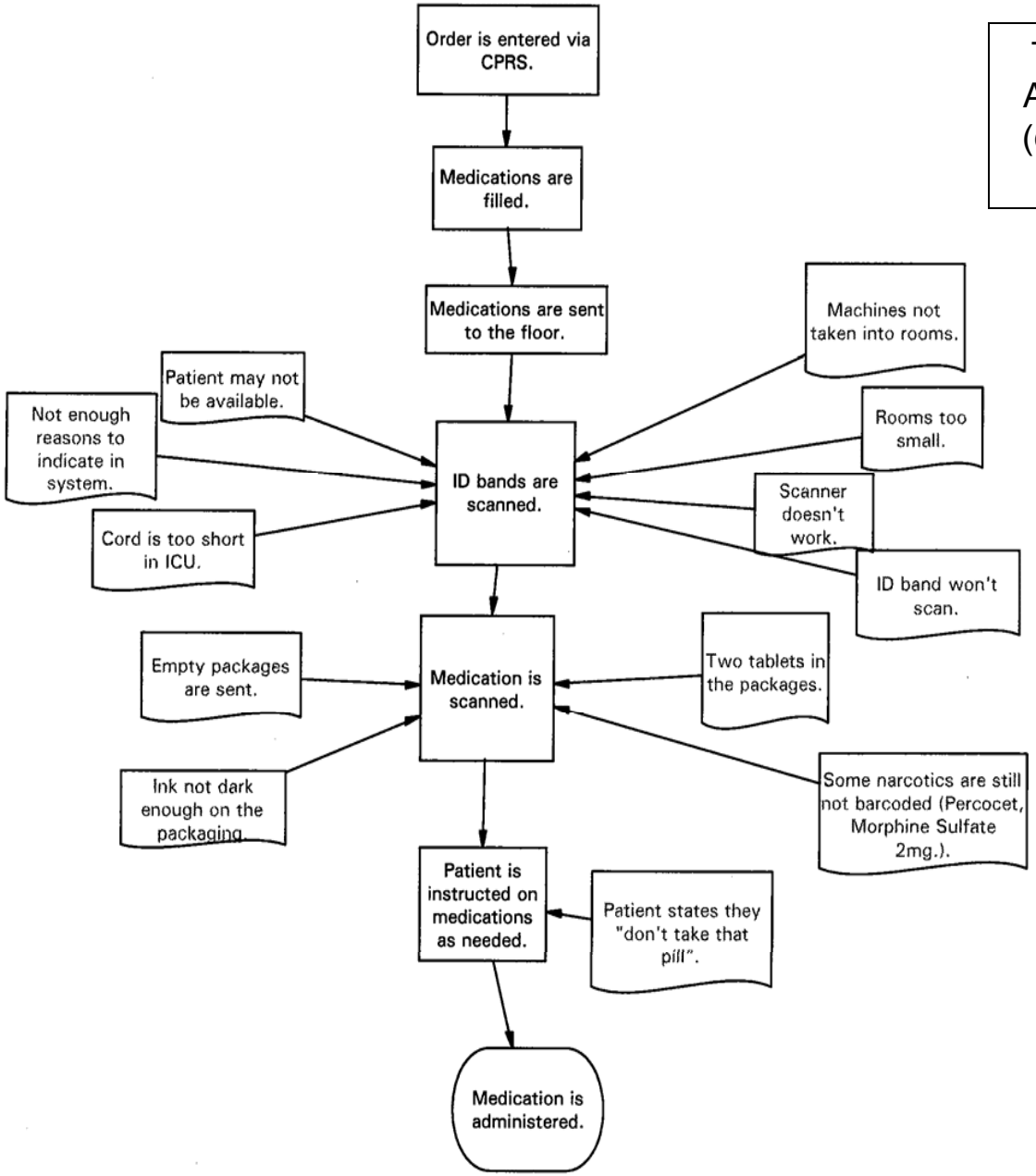
Aggregate Review of Bar-Code Errors



This Figure was taken from an Aggregate Review of 60 events (close calls and adverse events scoring 1 or 2 on SAC).

Step Three

- Describe how the team reviewed the data and its analysis
  - What cases were reviewed
  - Prioritization
- Determine if additional expertise is needed
  - Maintenance, Housekeeping
  - Physician
  - Information Technology

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Step Four

- Identify resources
  - Search for evidence-based best practices
  - Review data sources
    - Policies/procedures from network hospital or peers
  - List those who could provide additional information to the team

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Step Five

- Use the data and process map to determine the focus of the review
  - Identify a part of the process where patients are at most risk
  - Identify part of process where errors happen most frequently
  - What focus will yield the most benefit in decreasing risk to patients/
- Write a description of the focus and why it was chosen

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Step Six

- Determine root cause / contributing factors
  - Ask “why” several times
  - Consider:
    - Communication
    - Training
    - Fatigue / scheduling
    - Environment / equipment
    - Policies / procedures

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Step Seven

- Further develop the root causes
  - Clearly show the cause-&-effect relationship
  - Each human error must have a preceding cause
  - Violations of a procedure are not root causes
  - Failure to act is causal only when there is a pre-existing duty to act

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Step Eight

- Determine actions to address root causes
  - Recommend actions that are evidence-based
  - Evaluate feasibility of change
  - Assess cost of implementation before approaching senior leadership
  - Pilot test the action before widespread adoption
  - Assign accountability for implementation

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Step Nine

- Write outcome measures
  - The measure should answer the question “Is this change an improvement?”
    - Consider intended and unintended consequences
  - Outcome measures usually expressed as percentage or rates to control for changes in census
    - CAUTION: Don’t use rates from voluntary reports. Consider chart review or observation
  - Plan to report results to an oversight body

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Step Ten

- Present analysis and actions to leadership for concurrence
  - Build support from top down and from frontline staff
  - Share lessons learned with all who need to know

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Step Eleven

- Implement actions
- Determine if outcome measures are met
  - Evaluate effectiveness regularly and modify accordingly
  - Don’t let perfect be the enemy of good
  - Empower staff to make changes rapidly

Modified from Jt Comm J Qual Saf 29(8):434-439, 2003.

Aggregate RCA

- Staff may be more receptive to change
  - Process change based on multiple events
  - Focus on potentially serious events--close calls and errors that reached the patient
  - Staff may be less defensive because focus not on a harmful event...blame less prevalent
- May be used in any setting
  - Inpatient, outpatient, long term care, acute care, home care
- Use in all types of reported events
  - Falls, pressure ulcers, employee events, lab

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Aggregate Review Output

- Written document that identifies root causes and action plan to address improvements to processes
- Outcome measures are defined as rates
  - Reporting of error types by severity
    - Increase reporting of wrong patient errors as near misses
    - 25% of omission errors will be near misses related to transcription and infusion causes intercepted before reaching the patient

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Example of Agg. RCA Process

- Identify patterns and system causes of error across groupings of similar events
  - Bar graph of error type by severity...drill down to descriptions
  - Top Five Types of Error Drill Down for A - B reports
  - Top Five Types of Error Drill Down for C - I reports
  - High alert therapeutic classes: anticoagulants, insulin, opioid analgesics
- Relate error descriptions to process map, select focus for improvement, design and evaluate interventions
- Use staff time efficiently—analyze trends; don't analyze each case in-depth

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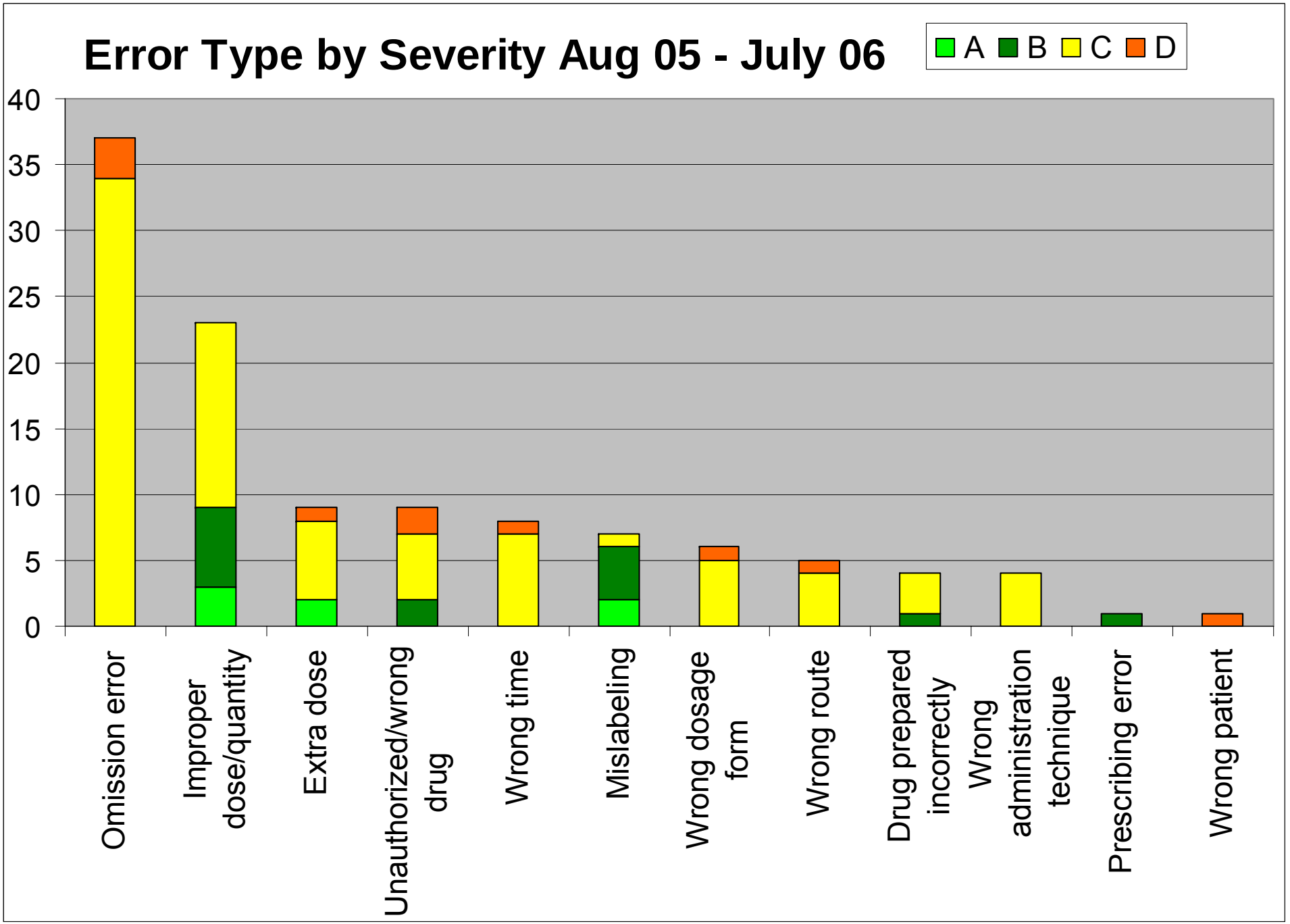

Error Type by Severity Aug 05 - July 06
A
B
C
D
40
35
30
25
20
15
10
5
0
Omission error
Improper dose/quantity
Extra dose
Unauthorized/wrong drug
Wrong time
Mislabeling
Wrong dosage form
Wrong route
Drug prepared incorrectly
Wrong administration technique
Prescribing error
Wrong patient

Typical Item from an Aggregated Review of Medication Errors

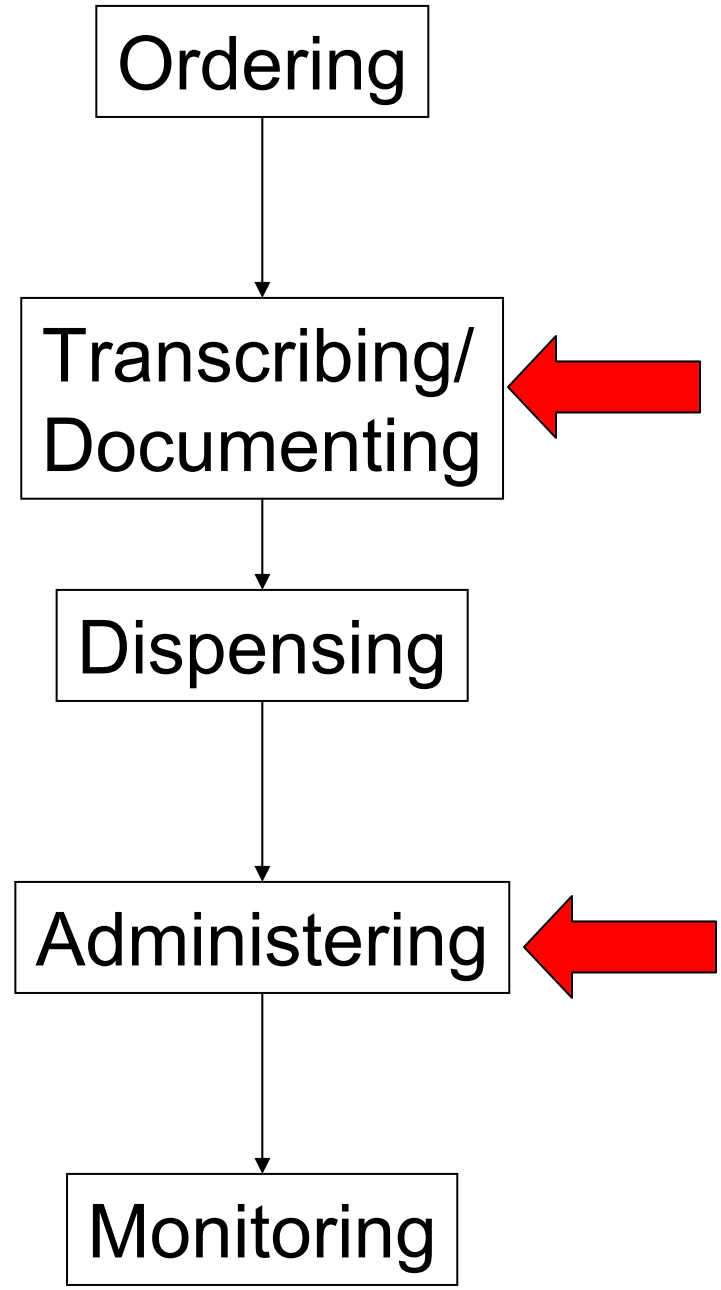
- Of 114 events…
  - **37 (32%) Omission Errors**
    - **All reached the patient**
  - **23 (20%) Improper Dose/Quantity (3As, 6Bs, 14Cs)**
  - **9 Unauthorized Drug (2Bs, 5Cs, 2Ds)**
  - **9 Extra Dose (2As, 6Cs, 1D)**
  - **5 Wrong Route (4Cs, 1D)**
  - **8 Drug Prepared Incorrectly/Wrong Admin Tech**
    - **7Cs, 1B**
  - **1 Wrong Patient (1D)**

Type Of Error (A – B)	Top 3 Causes	Top 3 Contributing Factors	Top 3 Level of Staff, Made	Top 3 Generic Names
Improper dose/quantity (9)*	Transcription inaccurate/omitted (3) Procedure/protocol not followed (2) Labeling (your facility's) (2)	A contributing factor not determined (4) Does not apply (3) Staffing, alternative hours (1)	Does Not Apply (3) Pharmacist (2) Nurse, Registered (2)	Data Not Provided (1) Enalapril (1) Pioglitazone (1)
Mislabeling (6)	Labeling (your facility's) (2) Storage proximity (1) Brand/generic names sound alike (1)	A contributing factor not determined (3) Does not apply (2) Staff, agency/temporary (1)	Pharmacist (2) Does Not Apply (2) Pharmacy Personnel, non-specific (1)	Data Not Provided (2) Enalapril (1) Pioglitazone (1)
Extra dose (2)	Procedure/protocol not followed (1) Documentation (1)	Does not apply (2)	Does Not Apply (2)	Phenytoin Sodium (1) Ocular Lubricant (1)
Unauthorized/wrong drug (2)	Brand/generic names sound alike (1) Brand names sound alike (1) Transcription inaccurate/omitted (1)	A contributing factor not determined (2)	Nursing Personnel, non-specific (1) Pharmacist (1)	Primidone (1) Multiple Vitamins (1)
Drug prepared incorrectly (1)	Knowledge deficit (1)	Staff, agency/temporary (1)	Nurse, Travel (1)	Insulin, Lispro (1)

Type Of Error (C-I)	Top 3 Causes	Top 3 Contributing Factors	Top 3 Level of Staff, Made	Top 3 Generic Names
Omission error (37)*	Procedure/protocol not followed (18) Workflow disruption (8) MAR variance (7)	A contributing factor not determined (16) Distractions (8) Staff, agency/temporary (4)	Nurse, Licensed Practical/Vocational (19) Nurse, Registered (13) Nurse, Travel (3)	Metronidazole (4) Calcium and Vitamin D (3) Sucralfate (2)
Improper dose/quantity (14)	Procedure/protocol not followed (5) Calculation error (3) Brand/generic names look alike (1)	A contributing factor not determined (6) No 24-hour pharmacy (3) Staff, agency/temporary (3)	Nurse, Registered (6) Nurse, Licensed Practical/Vocational (4) Nurse, Travel (2)	Sertraline (1) Lactated Ringers Injection (1) Nitroglycerin (1)
Wrong time (8)	Procedure/protocol not followed (5) Transcription inaccurate/omitted (3) Knowledge deficit (1)	A contributing factor not determined (5) Staffing, alternative hours (1) Workload increase (1)	Nurse, Licensed Practical/Vocational (3) Nurse, Registered (3) Unit Secretary/Clerk (1)	Sucralfate (1) Zoledronic Acid (1) Paroxetine (1)
Extra dose (7)	Procedure/protocol not followed (6) Reconciliation-admission (1) Documentation (1)	A contributing factor not determined (5) Patient transfer (1) Shift change (1)	Nurse, Licensed Practical/Vocational (3) Nurse, Registered (3) Nurse, Travel (1)	Insulin, Regular, Human (2) Bumetanide (1) Potassium Chloride (1
Unauthorized/wrong drug (7)	Similar products (3) Storage proximity (2) Generic names sound alike (2)	A contributing factor not determined (5) Staff, agency/temporary (2) No 24-hour	Pharmacist (3) Nurse, Registered (2) Nurse, Travel (1)	Albuterol (1) Methylprednisolone Acetate (1) Ipratropium and Albuterol (1)

DESCRIPTIONS OF OMISSIONS
Times were yellowed out on the MAR as they were written incorrectly initially, the new times were written next to the yellowed area. LPNC omitted 1 dose as she saw the yellow and mistook it as being discontinued.
At 0930 nurse noted the 0600 primaxin had not infused. The powder was still in the vial but the liquid infused. The powder was not activated
scheduled dose of primaxin hung at 2400. Noted at 0400 that it had not infused. Roller clamp not released
Flagyl 1 gram ordered every 12 hours, nurse gave only one 500mg bag of premix for 2 days. Found by nurse who had hung the bag that she omitted 1/2 of dose. Normally a dose is 500mg so that is what she hung.
Found @ 0730 start of shift. Rocephin not infused. Med still in vial, was not added to addvantage system, only the NS was infused @ 0100. Given @ 0730
Omitted 1700 dose of dicloxicillin
Times meds to be given were changed and lined out and new times written to the side on the MAR. Missed giving metronidazole at 0900. Found at 1315 and given.
Order of vancomycin 1300mg every 36 hours. Med was initiated at 0300 on 7/22/06 as ordered by MD, next dose should have been on 7/23/06 at 1500. There was an X through 7/23/06 on the MAR indicating med was not due on that date. Med given when error found, 19 1/4 hours late.
Blood sugar check ordered for 0300 and not checked until 0500 due to a concurrent emergent situation. Therefore sliding scale insulin was given late at 0500
1400 discovered that 1200 sliding scale insulin was not given. Lab did an extra accucheck, result 284. 8 units of humalog insulin given at 1420

Aggregate Analysis of 37 Omission Errors...
Three primary causes for 67% of true omissions



MAR (9 causes)
Copying,
Yellowing out,
Times not right,
omitted on MAR

Communication (6 Causes)
Concurrent ED,
Change in personnel,
Discharge Reconciliation

Incorrect Activation/ Not Infusing (6 causes)

Wrong Patient Error

- RN went to patient's room, was talking with patient and family. Sat and was talking with them and handed patient, another patient's meds. He took them and swallowed.

Error category	Date of error	Description of error	Cause of error	Therapeutic classification	Action taken	Action taken detail
C	*10/28/2005*	*0900 Lovenox not given, concurrent emergency. In checking md sheet for further meds to be given it was discovered that pt should have had med at 0900, discovered at 1335 and given at 1340*	*Workflow disruption*	*Blood Coagulation Modifiers*	*Informed staff who was also involved in error*	*check MAR's as soon as emergent situation is under control*
C	*12/30/2005*	*Upon doing 2100 accucheck, scheduled Lantus 10 units signed on MAR from previous night shift, but could find no Lantus signed out. Upon investigation, agency nurse from night before documented gave regular insulin (2 units) according to sliding scale at 2100 and at 0200. The regular insulin had been signed on the MAR under the Lantus insulin, and regular insulin was repeated at 0200 but the Doctor only ordered sliding scale insulin at meals.*	*Procedure /protocol not followed*	*Insulin*	*Informed patient's physician; Informed staff who made the initial error*	
D	*11/24/2005*	*Blood sugar check ordered for 0300 and not checked until 0500 due to a concurrent emergent situation. Therefore sliding scale insulin was given late at 0500*	*Workflow disruption*	*Insulin*	*Informed patient's physician; Informed staff who made the initial error*	
D	*05/22/2006*	*1400 discovered that 1200 sliding scale insulin was not given. Lab did an extra accucheck, result 284. 8 units of humalog insulin given at 1420*	*Workflow disruption*	*Insulin*	*Informed patient's physician; Informed staff who made the initial error*	

Conclusion – Aggregate RCA

- Aggregate RCA exposes risk described in Category B and C error reports
  - Uses actual and near miss reports to improve processes
  - Maximizes limited QI resources

- Modify the process to meet your needs!
  - May elect to perform an individual RCA on any report, regardless of SAC score
  - Consider using for all types of incident reports

Using the language of systematic error reporting leads to thinking in the context of the system…