Learning From Adverse Events: Using Knowledge for Safer Care

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Overview

- Identification of the incidence of adverse events is a useful first step in raising awareness and focusing attention on improving patient and client safety
- Improving work processes, teamwork and communication skills and work environment remain major challenge in all healthcare
- The current focus on root cause analysis as an improvement strategy needs to be balanced with other approaches that address patient safety

Canadian Adverse Events Study

- Reviewers examined 3776 charts in 20 hospitals and found 289 AEs
- After weighting for the sample frame, the overall AE rate was 7.5% [CI 5.7 -9.3] – this means 1 in 13 hospital patients in year 2000 experienced an AE
- 2.8% of patients had one or more *preventable* AEs [CI 2.0 – 3.6] (i.e. 37.3% of AEs are preventable)
- 65% of AEs resulted in either no disability or minimal and moderate impairment with recovery within 6 months
- 1.6% of acute care medical and non-surgical patients had an AE and later died

Incidence Estimates from Other Chart Review Studies

Country	N	Year	Incidence of AEs	Preventable?
USA (NY)	30,121	1991	3.7%	58%
Australia	14,000	1992	16.6% (10.6%)	51%
USA (Utah & Colorado)	15,000	2000	2.9%	-
England	1,014	2001	11.7%	50%
New Zealand	6,579	2004	12.9%	37%
Denmark	1,097	2001	9.0%	40.4%

Is the Canadian Number Correct?

- The CAES was designed to provide a robust estimate from chart reviews but this assessment likely underestimates the true rate since
  ◦ The first level review selected 40% of charts which had triggers for second review which determined if AEs had occurred-- however some of the charts not selected will have AEs
  ◦ We could not detect AEs which are discovered after the index admission at another hospital
  ◦ The reviewers only had access to the chart available and many AEs occur and are not recorded in the charts
  ◦ Some of the charts randomly selected for review were not available to the reviewers and others were substituted. The missing charts have an increased likelihood of an AE
- Both the literature and experts believe that the methods used in the CAES find between ⅓ and ¼ of the actual AEs
- Other methods find higher rates and multiple method studies find that each method identifies AEs not found in other ways

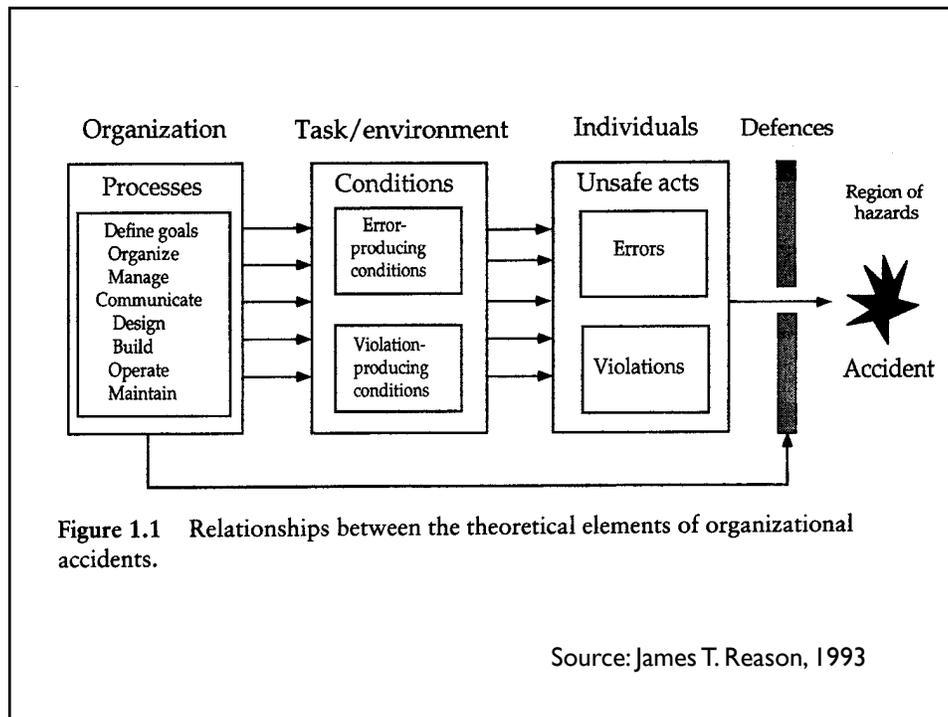# Detecting Adverse Events

Jha *J Am Med Inf Assoc* 1998;5:305
O'Neil *Ann Int Med* 1993;119:370

Methods	AE/1000 admissions
1. Incident Reports	5
2. Retrospective Chart Review	30
3. Stimulated Voluntary Reports	30
4. Automated Flags	55
5. Daily chart review	85
6. Automated Flags and Daily Review	130
7. Trigger Tool	400

Adapted from P. Hebert

Figure 1.1 Relationships between the theoretical elements of organizational accidents.

Source: James T. Reason, 1993

Root Cause Analysis

- A set of tools and an approach
- RCA is based on the premise that people do not come to work to do a bad job or make an error, but given the right set of   circumstances any of us can make a mistake
- It forces us to look past the easy answer that it was someone's fault - to answer the tougher question as to why the error occurred. It is seldom a single reason

Injury and Near Miss Detection

Epidemiological Analyses

Successful Change Ideas From Elsewhere

System Fixes to Improve Safety

Process Analyses RCA, FMEA HACCP

Prioritization

Rapid Cycle Testing

Deployment and Implementation

Holding the Gains

Institute of Medicine, 2004
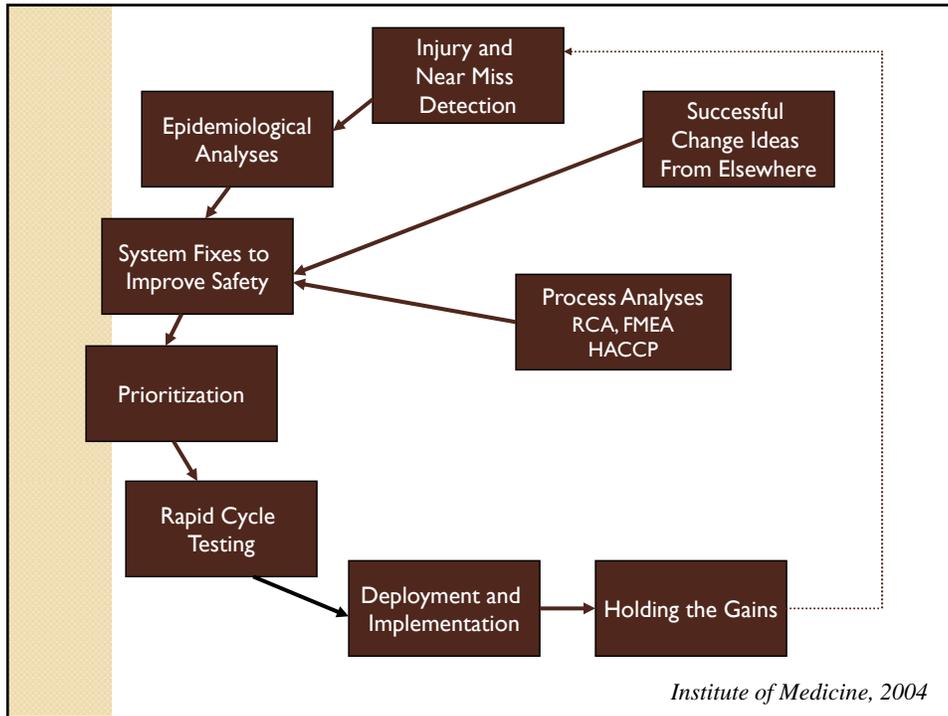
Level of Analysis		Questions	Findings		Root cause?	Ask "Why?"	Take action?
What happened?	Sentinel event	What are the details of the event? (Brief description)					
		When did the event occur? (Date, day of week, time)					
		What area/service was impacted?					
Why did it happen? ---- What were the most proximate factors? (Typically "special cause" variations)	The process or activity in which the event occurred	What are the steps in the process, as designed? (A flow diagram may be helpful here)					
		What steps were involved in (contributed to) the event?					
	Human factors	What human factors were relevant to the outcome?					
	Equipment factors	How did the equipment performance affect the outcome?					
	Controllable environmental factors	What factors directly affected the outcome?					

From VA Root Cause Analysis

Root Cause Analysis

Strengths

- Structured process for examining events
- Overcomes "rush to judgment" by including broad range of issues and questions
- Provides detailed understanding of latent and active sources of error
- Avoids blaming and helps uncover system and organizational issues
- Can be used for sentinel events, clusters, common occurrences, etc.

Root Cause Analysis

Weaknesses:

- Time consuming and resource intensive
- Not clear if selected cases are representative of key problems in organization
- May be tainted by hindsight bias and prominent issues of the day (e.g., focus on staffing issues and information systems rather than device failures)
- RCA is most useful as a complement to other incident identification and exploration tools where qualitative research is required to understand the complex nature of an event

Issues on Root Cause Analysis

- Many different events can be analyzed – which ones should we choose?
- Considerable skills are required to do useful root cause analysis
- Many recommendations that emerge from RCAs are difficult or expensive to implement
- Follow up suggests that the half life of changes that are made may be short

Middleton Study Assessing Recommendations of RCAs

- Most literature on RCAs reports results of the reviews; few studies of the quality and impact of RCAs on care
- Australian study asked 12 physicians and 17 nurses to review 328 recommendations from 59 RCAs conducted in Sydney, Australia
  - 10 of 12 physicians had participated in an RCA, 3 of these had received training
  - 12 of the 17 nurses had participated in an RCA, and 8 had received training

Middleton, et al., Aus Health Rev 2007

Assessment of RCA Recommendations

	Physicians	Nurses
Relevant to causal statement?		
Yes	179 (67.8%)	271 (82.6%)
No	22 (8.3)	14 (4.3)
Unsure	35 (13.3)	26 (7.9)
Measurable?		
Yes	174 (65.9%)	280 (85.4%)
No	45 (17.0)	15 (4.6)
Unsure	24 (9.1)	31 (9.5)
Achievable?		
Yes	157 (59.5%)	261 (79.6%)
No	21 (8.0)	4 (1.2)
Unsure	49 (18.6)	59 (18.0)

Middleton, et al. , Aus Health Rev 2007

Aggregate Root Cause Analyses

- Many events chosen for RCA include factors which may not be broadly relevant
- Higher frequency adverse events may generate a number of similar investigations
- Aggregate RCA may provide more robust recommendations for higher frequency adverse events
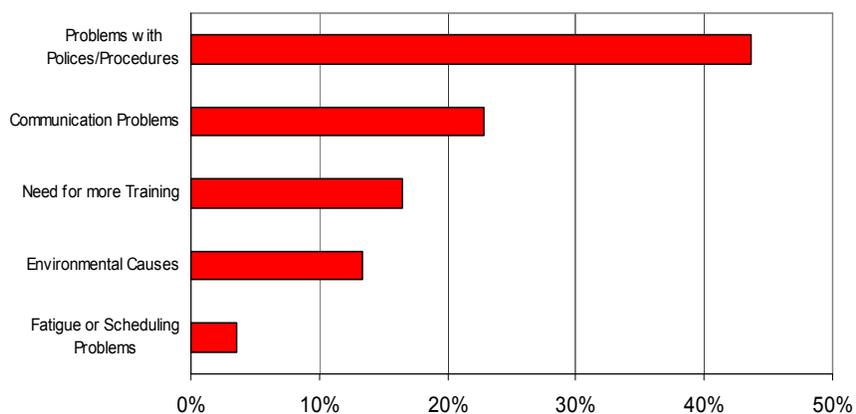
VA Aggregate RCA of Patient Falls

- Patient falls are the most common AE in the Veterans' Health Administration
- Hip fractures resulting from falls have high levels of mortality (17-33% over 1 year)
- Reducing falls is a patient safety goal in many systems
- VA team reviewed 147 RCAs from 97 different facilities over a three year period
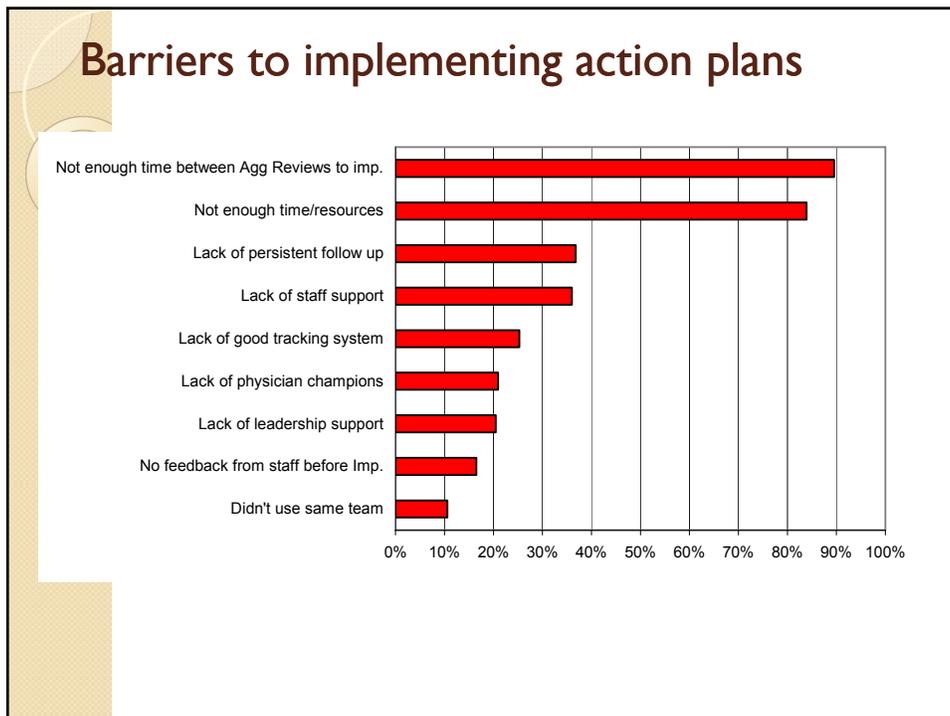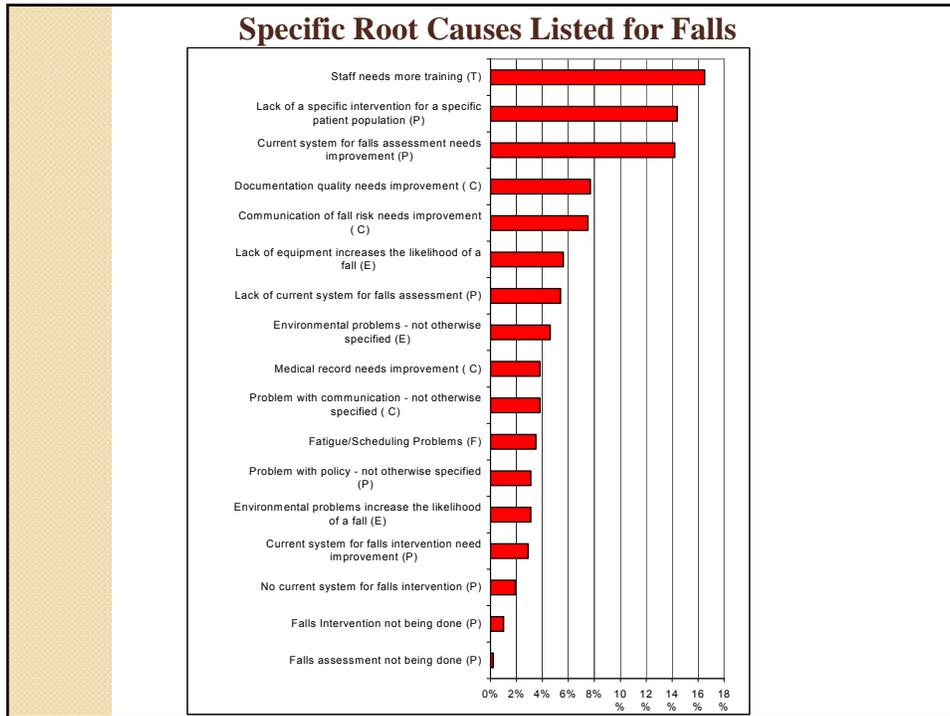
Mills PD, Neily J, Luan D, Stalhandske E, Weeks WB.
Using Aggregate Root Cause Analysis to Reduce Falls and Related Injuries.
Joint Comm J Qual Safety

General categories of root causes falls aggregate reviews

Specific Root Causes Listed for Falls

Root Cause	
Staff needs more training (T)	
Lack of a specific intervention for a specific patient population (P)	
Current system for falls assessment needs improvement (P)	
Documentation quality needs improvement (C)	
Communication of fall risk needs improvement (C)	
Lack of equipment increases the likelihood of a fall (E)	
Lack of current system for falls assessment (P)	
Environmental problems - not otherwise specified (E)	
Medical record needs improvement (C)	
Problem with communication - not otherwise specified (C)	
Fatigue/Scheduling Problems (F)	
Problem with policy - not otherwise specified (P)	
Environmental problems increase the likelihood of a fall (E)	
Current system for falls intervention need improvement (P)	
No current system for falls intervention (P)	
Falls Intervention not being done (P)	
Falls assessment not being done (P)	

(x-axis: 0% 2% 4% 6% 8% 10% 12% 14% 16% 18%)

Barriers to implementing action plans

Barrier	
Not enough time between Agg Reviews to imp.	
Not enough time/resources	
Lack of persistent follow up	
Lack of staff support	
Lack of good tracking system	
Lack of physician champions	
Lack of leadership support	
No feedback from staff before Imp.	
Didn't use same team	

(x-axis: 0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%)

Impact of RCA

IN: Are you pleased on balanced with the amount of change you've seen [as a result of reporting and reviewing incidents]?

RESP: I think there is still a lot of room for improvement...Some of the challenges we find is that while awareness has been heightened, sometimes   action   doesn't necessarily follow....People are aware of system vulnerabilities, and they have a nice list of things   that they promise to do to address them, but then they haven't gotten around to addressing them. So,   ...that's almost a worse   state in that you're more... now I know what's wrong but I'm not fixing it, so...[there is] a need to kind of make sure that the identified vulnerabilities are addressed"

IN: How often do you think the process reaches the ideal conclusion and action is taken in a sustainable way?

RESP: Thirty percent of the time

Examples of High Risk Areas That Deserve Special Attention

- Many and varied interactions with diagnostic or treatment technology; many different types of equipment being utilized
- Multiple individuals involved in the care of individual patients; many handoffs
- High acuity of patient illness or injury
- Ambient atmosphere prone to distractions or interruptions
- Need for rapid care management decisions; care givers subject to time pressures
- High volume and or unpredictable patient flow
- Use of diagnostic or therapeutic interventions having a narrow margin of safety; including high risk drugs
- Communication barriers with patients and/or other coworkers
- Instructional setting for care delivery, with inexperienced caregivers

Institute of Medicine, 2004

Some Alternatives to RCA

- Identify safe practices for critical areas of practice
- Do risk assessments on patients and tailor practices for those at high risk
- Create a more resilient environment through enhanced teamwork and communications, improved technology, and greater support for front line staff

Safer Practice `Care Bundles`

- Identify critical areas of care that have high failure rates or lead to poor outcomes
- Develop and implement practices which reduce hazards (and often identify risk prone patients or clients)
- Create oversight on these key practices

"Care Bundles"

- Ventilator associated pneumonia bundle:
  - Elevation of the head of the bed to between 30 and 45 degrees
  - Daily "sedation vacation" and assessment of readiness to extubate by performing an SBT
  - Use of oral versus nasal tubes for access to the trachea or stomach
  - Use of EVAC tubes for the drainage of subglottic secretions
  - And two "optional elements"
    - Peptic ulcer disease prophylaxis
    - Deep venous thrombosis prophylaxis

www.saferhealthcarenow.ca

Medication Reconciliation

Medication Reconciliation is "a formal process of obtaining a complete and accurate list of each patient's current home medications—including name, dosage, frequency and route—and comparing the physician's admission, transfer, and/or discharge orders to that list. Discrepancies are brought to the attention of the prescriber and, if appropriate, changes are made to the orders. Any resulting changes in orders are documented."

Two major types of discrepancies:
- Undocumented intentional discrepancies
- Unintentional discrepancies

Issues in Using "Care Bundles" or Other Best Practices

- Evidence is often limited on effectiveness of the bundle
- Implementation issues remain crucial to improving safety
- Measurement is needed to ensure ongoing practice and remediate when necessary

Top 5 barriers/challenges identified

- Lack of time/resources for data collection **86.2%**
- Lack of staff engagement **41.5%**
- Lack of internal QI knowledge and technical skill to submit measurement forms **30.8%**
- Other (e.g. insufficient population base, ongoing resource challenges) **29.8%**
- Insufficient senior management/clinical leadership support **21.2%**

Safer Healthcare Now Evaluation
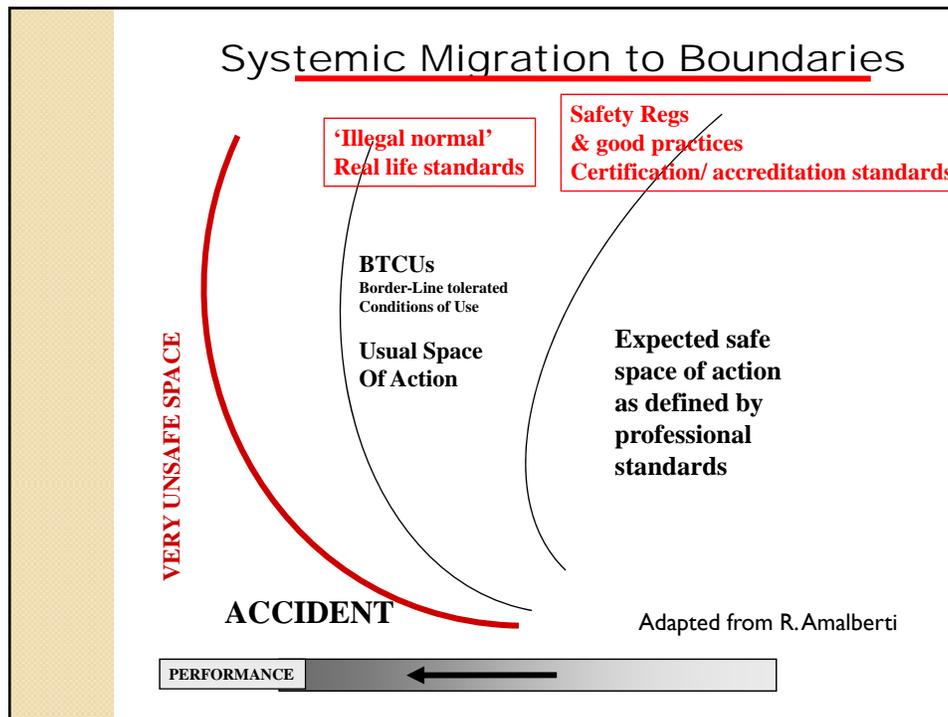
Human Factor Analysis of ADEs

Type of System Failure	% Preventable ADEs
*Poor team communications	48%
*Inadequate handoffs of relevant information	23%
*Supervisory failures	16%
*Inadequately trained staff	16%
*Ergonomic deficiencies	16%
*Failure to appropriately use consultants	10%
*Poor interdisciplinary communications	30%
*Use of substitute or inexperienced professionals	23%
*System complexity (e.g., complicated protocols)	24%
*Deficient automation or technology design	14%

Rothschild, et al. Arch Intern Med. 162, 2002

Focusing on Work Environment and Teamwork

"We have to get smarter at predicting the next accident. The recombinant predictive logic that drives accident prediction today is insensitive to the pressures of normal work by normal people in normal organizations ...[D]etecting drift into failure that happens to seemingly safe systems *before* breakdown occurs is [the key]"

Dekker, 2007

5/27/2008

Systemic Migration to Boundaries

'Illegal normal'
Real life standards

Safety Regs
& good practices
Certification/ accreditation standards

BTCUs
Border-Line tolerated
Conditions of Use

Usual Space
Of Action

Expected safe
space of action
as defined by
professional
standards

VERY UNSAFE SPACE

ACCIDENT

Adapted from R. Amalberti

PERFORMANCE

Some Components of Risk Resilient Systems

- Awareness of risks
- Sensitivity to operations
- Enhanced teamwork and communications
- Flexibility and responsiveness
- Smart design of technology and work systems

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	Simple	*Complicated*	*Complex*
	Following a Recipe	**A Rocket to the Moon**	**Raising a Child**

Simple — **Following a Recipe**

- The recipe is essential
- Recipes are tested to assure replicability of later efforts
- No particular expertise; knowing how to cook increases success
- Recipe notes the quantity and nature of "parts" needed
- Recipes produce standard products
- Known

Complicated — **A Rocket to the Moon**

- Formulae are critical and necessary
- Sending one rocket increases assurance that next will be ok
- High level of expertise in many specialized fields + coordination
- Separate into parts and then coordinate
- Rockets similar in critical ways
- Knowable

Complex — **Raising a Child**

- Formulae have only a limited application
- Raising one child gives no assurance of success with the next
- Expertise can help but is not sufficient; *relationships are key*
- Can't separate parts from the whole
- Every child is unique
- Unknowable

B.Zimmerman 2006

Conclusions

- Root cause analysis has been used effectively in many industries (notably aviation)
- The basic strategy of RCA assumes that operations are well designed and work environments are (largely) predictable
- Healthcare creates many challenges in developing safer care
- Creating a portfolio of strategies to address work processes, teamwork and communication skills and work environment will be more effective than relying on RCA alone