

Root Cause Analysis

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Background

- ◊ Process to determine why a problem happened in the first place
 - so it won't happen again
- ◊ May seem like you are fixated on failures
- ◊ Correcting the symptom alone is a waste of resources
- ◊ Be aware of bias
 - Intentional and unintentional
- ◊ Finding the root of the problem is not easy work
 - But if the latent source of the problem can be found you can get rid of the problem

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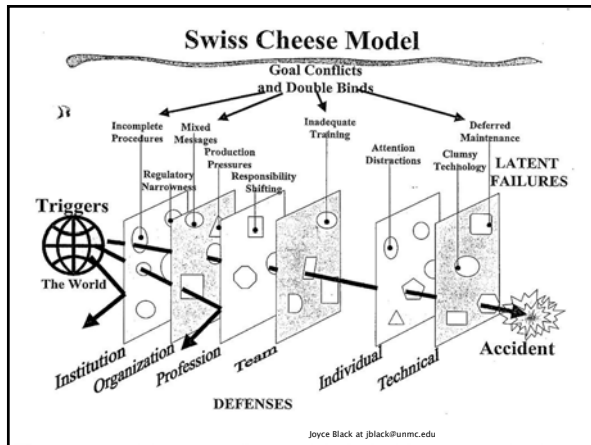
Three Levels of Root Cause

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Principles of RCAs

- ◊ Systematic review with both conclusions and root causes backed up with evidence
- ◊ An independent team is best
 - All causes should be identified
 - If more than one cause is found, solutions are more difficult to sustain
- ◊ A sequence of events is usually effective to understand relationships
- ◊ RCAs can be threatening to many cultures and environments
 - Non-punitive policy for problem identifiers needed

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Swiss cheese and pressure ulcers

- ◊ Incomplete procedures
- ◊ Regulatory narrowness
- ◊ Mixed messages
- ◊ Production pressures
- ◊ Responsibility shifting
- ◊ Inadequate training
- ◊ Distractions
- ◊ Clumsy technology
- ◊ Deferred maintenance

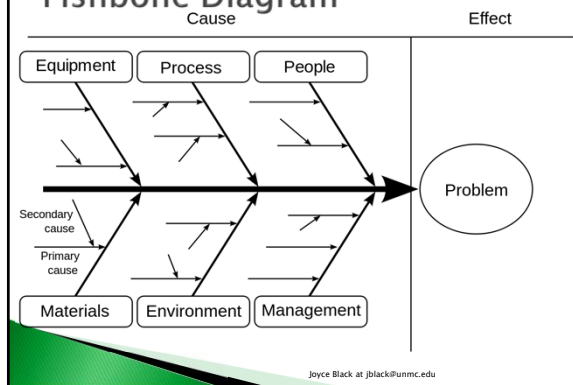
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Steps to RCAs

- ◇ 1. Define the problem or event factually
- ◇ 2. Gather data (chart and interview) as evidence
- ◇ 3. Create a time line of events
 - Ask "why?" with each piece of data and each step in time line
- ◇ 4. Identify all causes of problem
- ◇ 5. Identify all possible solutions for each cause
- ◇ 6. Monitor effectiveness of solutions

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Fishbone Diagram



A case as an example

- ◇ 64 year old female
- ◇ PMH: Diabetes on insulin, hypertension on meds, overweight
- ◇ Had a left total knee done 3 days ago
- ◇ Has been wearing TEDs and using sequentials
- ◇ Purple heel found 2 days after admission



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Defining the Problem

- ◊ Is this wound a pressure ulcer?
 - Was it due to pressure?
 - Was it due to shear?
 - What is the role of poor perfusion?
- ◊ Is this a diabetic foot ulcer?
- ◊ When did it start?

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Digging into the roots

- ◊ What was the condition of the skin on admission?
 - What happens to the RCA if the admission assessment:
 - ... is blank in skin assessment?
 - ... lists skin as intact?
- ◊ Were there any additional assessments?

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Digging into the roots

- ◊ What was admission risk score?
 - Was it accurate?
- ◊ Did a prevention plan stem from the score?
 - Was the heel elevated from the bed?

*However, we are only at the physical roots....The symptoms
What more information is needed?*

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Did this ulcer start in the OR?

- ◊ What leg had surgery?
- ◊ What position was the leg/legs in on the table?
- ◊ What leg has the DTI?

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What has happened to the foot while in bed?

- ◊ What does PT teach the patient to do to strengthen the leg?
- ◊ How is the patient moved in bed?

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Steps to RCAs

- ◊ 1. Define the problem or event factually
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 - ◊ Ask "why?" with each piece of data and each step in time line
- ◊

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Defining the Problem

- ◊ Is this wound a pressure ulcer?
 - Was it due to pressure?
 - Was it due to shear?
 - What is the role of poor perfusion?
 - ◊ Is this a diabetic foot ulcer?
- ◊ *Yes, this is a DTPI*
- ◊ *Yes, it could be pressure from the bed or the TED. Could be shear from doing leg exercises in bed. Her risk could be high due to DM and HPT*
- ◊ *No, DFU occur on walking surfaces of the foot*

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Determining the timing of the ulcer development

- ◊ Stage at time of initial discovery
 - Stage I --- likely began in last 12-24 hours
 - DTI --- purple tissue without epidermal loss likely began 48 hours ago
 - ... Important because
 - ... you might not have had this patient 48 hours ago
 - ... Turning may have been impossible
 - ... OR cases
 - Stage II --- likely began in last 24 hours
 - Stage III-IV --- began at least 72 hours ago

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Consider the location of the ulcer



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Digging into the roots

- ◊ What was the condition of the skin on admission?
 - What happens to the RCA if the admission assessment:
 - ... is blank in skin assessment?
 - ... lists skin as intact?
 - ◊ Were there any additional assessments?
- Intact, it is not possible to determine if the TEDs were removed - Why?*
- No assessments show DTI*
- Did the patient c/o pain in her heel?*
- Care techs thought that nurse would examine the skin*

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Digging into the roots

- ◊ What was admission risk score?
 - Was it accurate?
 - ◊ Did a prevention plan stem from the score?
 - Was the heel elevated from the bed?
 - Were boots used?
- ◊ *Braden*
- *4,4,3,3,4,3 = 21*
 - *Why wasn't the leg immobility and DM captured?*
 - ◊ *No, none was needed per Braden score*
 - ◊ *Boots were still in the bag on window sill*

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What other "why's" do we need?

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Continuing the analysis

- ◊ 4. Identify all causes of problem
 - ◊ Was this ulcer POA? Why did no one see it?
 - ◊ Why did the TEDs stay on?
 - ◊ Why did the boot not get put on?
 - ◊ Was this ulcer less severe yesterday?
 - ◊ What did the patient say about the heel?

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Continuing the analysis

- ◊ 5. Identify all possible solutions for each cause
 - ◊ Day nurse tried to remove TEDs but patient c/o pain in her knee
 - ◊ Tech did not know what the heel boot was for and she did not have time to ask because she was trying to care for other patients
 - ◊ Nurses do not know how serious DTPI can become

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Closing the Loop

- ◊ 6. Monitor effectiveness of solutions
 - ◊ Skin assessment of the heel reviewed,
 - ◊ Mirrors placed on med carts to help "see" the heel
 - ◊ Information on DTPI provided to staff
 - ◊ In-services developed on how to don and doff TEDs and use heel boots

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Case 2

- ◇ 55 year old female
- ◇ MS long-standing now in exacerbation
- ◇ Ambulates with w/c
 - Uses slide board
- ◇ This is the appearance of her buttocks on admission



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Defining the Problem

- ◇ Is this wound a pressure ulcer?
 - Was it due to pressure?
 - Was it due to shear?
 - Was it due to friction?

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Defining the Problem

- ◇ Is this wound a pressure injury/ulcer?
 - Was it due to pressure?
 - Was it due to shear?
 - Was it due to friction?
- ◇ *No, this is not a pressure injury*
- ◇ This wound is from chronic friction

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While it was not an incident ulcer....can it be closed?

- ◊ Will require that friction be reduced
 - Check w/c cushion
 - ... Needs to be high immersion
 - Use clothing to reduce friction
 - Open areas will need treatment

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Pressure injury in OR

- ◊ Injuries that appear within the first 72 hours after surgery in tissues that were subjected to pressure during the operation
- ◊ Incidence
 - 5-53.4%
- ◊ Prevalence
 - 9-21%
 - ... Ganos, Siddiqui, 2012



OR Acquired Ulcers Are Often DTI



DTI also occur on anterior surfaces



Prevention starts prior to surgery

- ◊ Revising pre-op risk assessment to include relevant OR risks
- ◊ Because you can't reduce the duration of pressure, you must reduce intensity
 - Assess the quality of the OR table mattress
 - ... Use root cause analysis to determine which OR/cases are highest cases
 - Pretreat patients with dressings
 - ... Improved OR outcomes in 2 studies
 - ... Brindle (2012) and Castelano (2012)
 - ... Santamaria had patients in OR also
 - Wear prescribed heel offloading devices

Risk Assessment Scales

- ◊ Braden scale has low predictive value
 - Sensitivity = 0.42, Specificity 0.84, ROC = .6921
 - ... (He, Liu, Chen 2012)
- ◊ Munro scale examines patients over time
 - Preop - mobility, nutrition, BMI, weight loss, age, comorbidities
 - Intraop -- ASA score, type of anesthesia, body temp and BP, moisture, surface and position
 - Postop -- length of case, blood loss
- ◊ Scott Triggers
 - Age, ASA, Albumin, Estimated time in OR


Determining PI Risk in OR

- ◊ Anesthesia Severity Assessment Scores (ASA)
 - ASA \geq 3 higher risk ... (O'Brien, 2014)
 - 1 pt increase in ASA increases odds by 149% ... (Fred, 2012)
- ◊ Use of CP bypass
- ◊ Time in OR
 - 2.5 hours of more
 - Every 30" after 4 hours increases risk by 33% ... (Schoonhoven, 2002)
- ◊ Position on OR table
 - Prone
 - Lithotomy
- ◊ Low BMI/High BMI ... (O'Brien, 2014)

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Where and when did it start?

- ◊ Pressure ulcer in loaded body area during case
 - Need to know position for surgery
 - Supine = buttocks in normal weighted patients, heels and occiput
 - Lithotomy = lower pelvis
 - Prone = face, shoulders, ribs, knees



This patient had a 12 hour Whipple done 2 days prior to the onset of purple buttocks tissue

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Timing of DTI in OR

- ◊ Usual time frame of 48 hours still works in most cases
 - Very thin patients or pressure injury on anterior surfaces will appear more quickly
 - Very large patients of pressure injury on well padded tissues will appear later
- ◊ Blistering phase of DTI will often be mistaken for a skin tear or burn

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The rest of the roots

- ◊ Examine the table in the OR
 - Age of mattress?
 - Well padded?
 - Use of overlays?
- ◊ Examine the pads used for additional protection
 - Folded eggcrate? Rolled towels?
- ◊ Examine padding used in prone cases

Unusual OR case?

- ◊ 66 yo male, 252 lbs
- ◊ 5/13 Bilateral ureteroneocystostomy and repair with stents
 - On table 1440 -1839, no low BP
 - In PACU until 2211
- ◊ 5/15 buttock peeling



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OR PI in obese

- ◊ 800 lb patient who lost 400 lbs after gastric bypass
 - DM, OSA
- ◊ Timing of onset was 7 days post TKA
 - It was the only time he was supine and unconscious



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Case for our RCA

- ◇ You will be shown a photograph of a case
 - You can ask me questions to fill in the pieces for RCA

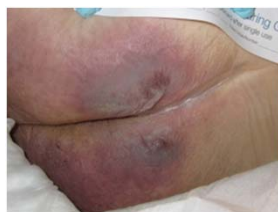
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What Data do you Need to Know?



Facts - PrI found today

- ◇ 62 year old female
- ◇ PMH: CAD failed stress test
- ◇ In post ICU bed (transferred last PM)
- ◇ Was in ICU for past 48 hours
- ◇ Came in for elective CABG 3 days ago
 - OR time was 3.5 hrs



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What's your Conclusion?



What's your Conclusion?



Case 4

- ◆ 88 year old female
- ◆ Advanced dementia, PVD
 - Legs are cool, pulses difficult to palpate, nails thick
- ◆ Doing our RCA..
 - Are these wounds PI/PU?
 - ... What do you need to know?



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Pressure Injury? Or Arterial?

- ◊ The location of the pressure injury is common on the posterior heel and side of foot
 - Was heel on the bed?
 - Was side of foot on the bed?
- ◊ The risk factors for arterial ulcers are present
 - Arterial wounds tend to be in other areas
- ◊ These are pressure injures in a high risk patient

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RCAs continued

- ◊ If due to protein calorie malnutrition
 - Was the patient hydrated and fed at the dietician's recommendations?
 - ... Were supplements consumed?
 - ... Was swallowing addressed?
 - ... If not, was the deviation explained?
 - ... E.g., Advanced Directives

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Considering Nonadherence

- ◊ Pressure ulcer prevention must become a lifestyle for some patients
 - Find ways to help them adapt
- ◊ If nonadherence is present
 - Document it factually
 - Document what you told them and what they did
 - Be certain your awareness of nonadherence and the documentation appears in the record before the ulcer starts

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RCAs in home setting

- ◊ Need to consider
 - Education of patient
 - Education of family who are caring for patient
 - ... Demonstrations?
 - Usual times of little care
 - ... Nighttime
 - Equipment available and used
 - Compliance with prevention processes

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Pitfalls with RCAs

- ◊ Not all problems are linear
- ◊ Lack of independence in the examiners
 - Often a compromise between the depth of data and the accuracy of the investigator
 - Compare to NTSB investigation of plane crashes
- ◊ Little change in the system based on the findings - occurs 45-70% of the time
 - Change may be reminders rather than changing the technology
 - ... Medical device pressure injury
- ◊ Poorly functioning feedback loops
 - Information should be shared with those involved including patients

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Pitfalls with RCAs

- ◊ Unwillingness to identify the person involved
 - What if the "no-blame" culture is not right?
- ◊ RCAs are not combined into common cause analyses
 - Need to examine system issues
 - ... Training, communication, equipment
- ◊ Inability to examine the culture beyond the hospital
 - What if you are using an inferior product?
 - ... Can the RCA team cite that finding?
 - ... Does value analysis receive this information?

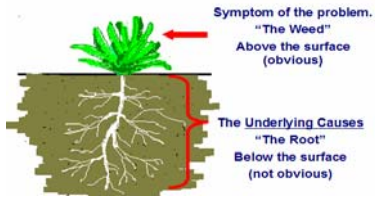
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Using RCA data

- ◊ Classify as quality improvement to reduce discovery
- ◊ Use the location and stage at discovery to find the timing of the ulcer
 - What was happening to patient at that time?
 - ... Was pressure ulcer prevention possible?
 - ... If yes, was it carried out? Documented?
- ◊ Plan education for high risk areas
- ◊ Evaluate/consider new product for high risk areas

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Root Cause Analysis



Much like fall assessments , Root cause analysis provides evidence on the system

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