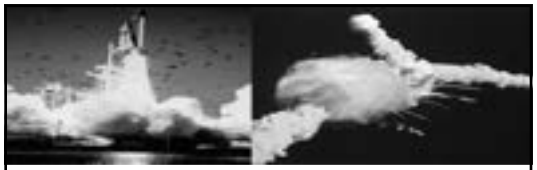

CHALLENGER DISASTER: O-RINGS, NORMALIZATION OF DEVIANCE, & PRODUCTION PRESSURE

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DNP,CRNA,ARNP

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OBJECTIVES

- DESCRIBE NORMALIZATION OF DEVIATION
- RECOGNIZE NORMALIZATION OF DEVIATION AND PRODUCTION PRESSURE
- COMPARE THE CHALLENGER DISASTER WITH ANESTHESIA INCIDENTS
- DETECT NORMALIZATION OF DEVIATION BEHAVIORS THAT ARE POSSIBLY CREATED BY PRODUCTION PRESSURES
- INTEGRATE NORMALIZATION OF DEVIATION PREVENTION BEHAVIORS

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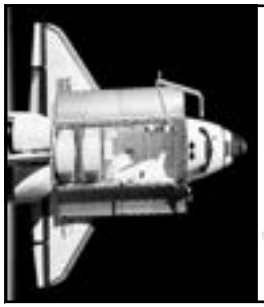

SPACE SHUTTLE CHALLENGER (OV-099)

FIRST FLIGHT: APRIL 4-9,1983
LAST FLIGHT: JAN 28,1986
TOTAL MISSIONS: 10
FLEW 85% OF MISSIONS
FLEW 3 MISSIONS/YEAR 1983-1985

FLEW 1ST AMERICAN WOMAN, AFRICAN-AMERICAN, CANADIAN, & DUTCHMAN

PERFORMED 1ST NIGHT LAUNCH & NIGHT LANDING

3

SPACE SHUTTLE CHALLENGER

MISSION DESIGNATION: STS-51-L
25TH SPACE SHUTTLE MISSION
1ST MISSION WITH CIVILIAN

4

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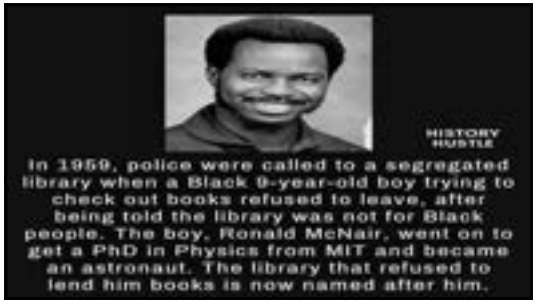

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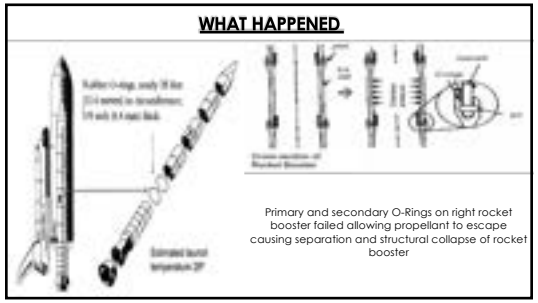
WHAT HAPPENED



Primary and secondary O-Rings on right rocket booster failed allowing propellant to escape causing separation and structural collapse of rocket booster

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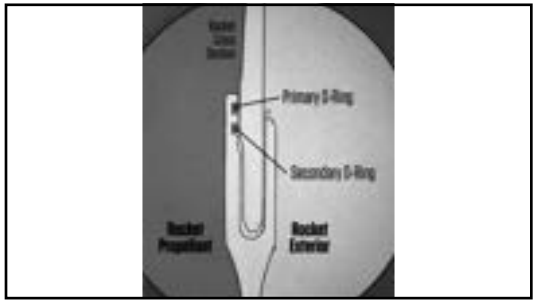

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REASON FOR O-RING FAILURE

Nine shuttle launches prior to year of challenger disaster

7 of those launches showed signs O-Ring erosion

2 of the 7 had damage beyond ever seen before

Concerns raised

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NORMALIZATION OF DEVIANCE

Phenomenon in which individuals & teams deviate from what is known to be an acceptable standard until the adopted way of practice becomes the new norm

Coined by sociologist Dr. Diane Vaughn in 1996

Identified by 3 characteristics

1. A human-based deviation
2. Deviation occurs repeatedly over time
3. Does not cause an immediate incident or noticeable process effect

Murphy's Law is not applicable i.e. everything that can go wrong usually does not, thus normalization occurs

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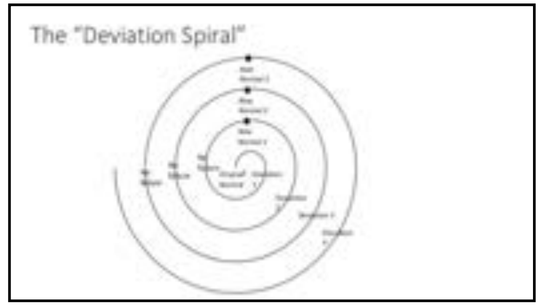

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FACTORS ACCOUNTING FOR NORMALIZATION OF DEVIANCE

- Rules or standards are irrational and drag on productivity
- People might not know a particular rule or standard exists
- New technologies & personnel can disrupt ingrained practice patterns, impose new learning demands or force individuals to devise novel responses or accommodations to new work challenges
  - Tucker & Edmondson, 2003, "Nurses will create a work-around 93% of the time when faced with a problem versus only 7% of the time reporting the process problem to those who could focus on the contributing factors"
- It is for the good of the patient
- Rules don't apply to individual
- Afraid to speak up
- Leadership withholding or diluting findings on system problems (politics triumphing over safety)

Banja, 2010; Price & Williams, 2018; Tucker & Edmondson, 2003

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NORMALIZATION OF DEVIANCE IN HEALTHCARE

AANA Foundation and Continental National American Insurance closed-claims database from 2003-2012 generated by CRNAs (N=245)

Looked at cosmetic procedures

Accounted for 10.2%(N=25)

Normalization of deviance was 1 theme of 3

Involved in 14 of 25 claims

Golinski & Hranchook, 2018

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NORMALIZATION OF DEVIANCE IN HEALTHCARE

Using same closed-claim database in which outcome was death, for secondary analysis

87 claims identified

4 themes emerged

1. Patient Factors
2. Anesthesia Provider Factors
3. Environmental Factors
4. Team/Group Factors
   - normalization of deviance was 1 of 16 subthemes identified

Hranchook, Jordan, Geisz-Everson, Hirsh, & Matthews, 2018

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NORMALIZATION OF DEVIANCE IN HEALTHCARE

Searching for cardiac events in patients undergoing noncardiac procedures produced 34 claims from close claims database

Death in 85% claims

20 claims (65%) had payouts ranging from $15,000 to $1million

Normalization of deviance 1 of 5 themes for claims

Was in 47% of claims (N=16)

Geisz-Everson, Jordan, Wiltse Nicely, & McElhone, 2019

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EXAMPLES OF NORMALIZATION OF DEVIANCE IN HEALTHCARE

Removal of vital monitors at end of general anesthesia before patient is awake

Handoffs of care at vital times

Failure to follow recognized isolation procedures or protocols

Failure to wash hands before and after patient contact

Failure to properly monitor effects of neuromuscular blocking drugs in every patient

Excessive noise in the OR

Failure to examine lab results prior to surgery

Failure to place standard monitors prior to performing peripheral nerve block

Prielipp, Magro, Morell, & Brull, 2010

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CAUSE OF NORMALIZATION OF DEVIANCE

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PRODUCTION PRESSURE

An increased emphasis on the quantity of services provided over the quality in the interest of the generation of revenue

The overt or covert pressures and incentives on personnel to place production over safety as the primary priority (Institute of Medicine)

Overt or subliminal pressure, metrics, and incentives experienced by anesthesia professionals to place production as their foremost priority: do more with less

Placing emphasis on the quantity of healthcare services provided over the quality, for the purpose of increasing revenue

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PRODUCTION PRESSURE

Classified 2 ways

Internal

individuals decide to increase their own productivity in return for financial gain

External

management of an organization decides to increase productivity for financial gain

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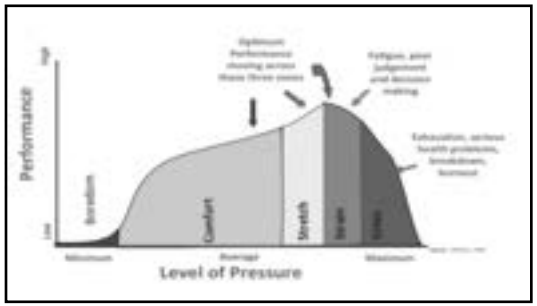

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NASA'S PRODUCTION PRESSURE

Originally conceived launch 60 times/year

Average 1 launch/week

Most launches in a year were 9

Shuttle program was to become self-paying

Launch prior to disaster was delayed 7 times

Christa McAuliffe was to give lesson on 4th day of mission

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HEALTHCARE PRODUCTION PRESSURE

OR culture applauds speed and multi-tasking while also demanding cost-cutting

- classic mantra of NASA & business culture – "better, faster, cheaper"
- adopted stepchild of many operating room managers and admin

1994, 49% of anesthesiologists had observed or felt pressured to conduct anesthesia in a fashion they considered unsafe given the urgency of the situation (N=647)

Avoiding delaying surgery, getting along with surgeons, & avoiding litigation were most intense type of production pressures felt

Connection of enteral feeding tubing to intravenous tubing

Hepatitis outbreak in Las Vegas

Recent report of severe complications after induction of general anesthesia caused by wrongly assembled breathing circuits. 120 surveyed anesthesia providers reported not full compliance completing checklist

Gaba, Howard & Jump, 1994; Kimmel & Biddle, 2012; Simmons, Symes, Guenter & Graves, 2011; Schumacher, Ko & Rothrock, 2006

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PRODUCTION PRESSURE IN HEALTHCARE

Secondary data analysis for a descriptive qualitative study to explore perioperative transfer of care (TOC) events contributing to malpractice claims in AANA Foundation closed-claims database

19 claims identified

6 themes emerged

1. patients should be transferred to appropriate level of care/location that is determined after a thorough patient physical & needs assessment
2. production pressure leads to normalization of deviance
3. healthcare providers need to conduct their own patient assessments & medical chart review during TOC events
4. interdisciplinary team communication failure after the TOC is completed is leading cause of poor patient outcomes
5. inadequate patient monitoring & physical assessment after TOC is completed is leading cause of poor patient outcomes
6. transfer of care should not occur during high-risk patient care events or during periods of patient hemodynamic or respiratory instability

Theme 2 highly related to themes 3,4,& 5 as production pressure was one contributing factor

Wilhoite, Geist-Evenson, Clayton, Routt, 2019

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PRODUCTION PRESSURE IN HEALTHCARE

32 closed claims related to regional anesthesia from the AANA Foundation closed-claim database

10 deemed preventable

3 deemed non-preventable

19 preventability could not be determined

9 injuries resulted in death

15 resulted in some degree of permanent injury

24 claims (75%) resulted in monetary disbursements to claimants ($5803 to $950,000, mean of $278,404)

Production pressure 1 of 3 overarching themes

Factor in 1/3rd of claims

Hirsch, Geist-Evenson, Clayton, Wilhoite, Golinski-Kremer, & Wilhe Nicely, 2019

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PRODUCTION PRESSURE IN HEALTHCARE

7 qualitative studies identified using AANA Foundation closed claims database in which production pressure or normalization of deviance mentioned

3 overarching concepts emerged

1. Impaired culture of safety
2. Violations of standards of care
   - Preop assessment, implementing & adjusting anesthesia care plan, monitoring & evaluating patient's physiologic status, evaluating patient's status to determine when it is safe for transfer of care, & adhering to safety precautions
     - Standards I, IV, V, & VIII; 2019 revised standards, 2, 7, 9, 11 & 14
3. Impaired patient safety and outcomes

Geist-Evenson, Wilhoite, & Routt, 2019

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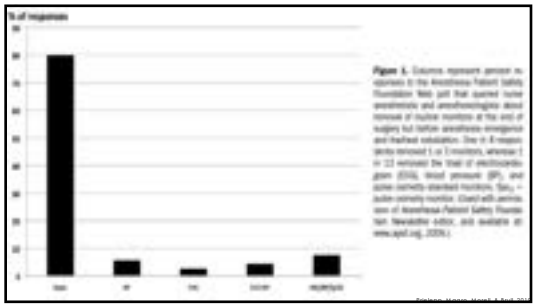

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IMPACT OF PRODUCTION PRESSURE

PRODUCTION PRESSURE & NORMALIZATION OF DEVIANCE HAVE RECIPROCAL RELATIONSHIP IN WHICH THE PRESENCE OF ONE CAN INCREASE THE OTHER

DIRECTLY IMPAIRS CULTURE OF SAFETY

"THE PRODUCT OF INDIVIDUAL AND GROUP BELIEFS, VALUES, ATTITUDES, PERCEPTIONS, COMPETENCIES, AND PATTERNS OF BEHAVIOR THAT DETERMINE THE ORGANIZATIONS' COMMITMENT TO QUALITY AND PATIENT SAFETY" JOINT COMMISSION DEFINITION

DIRECTLY CONTRIBUTES TO POOR PATIENT SAFETY & OUTCOMES

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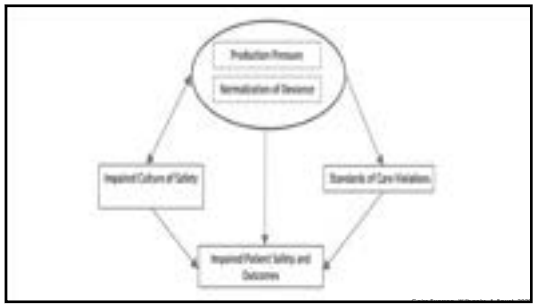

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IMPACT OF PRODUCTION PRESSURE IN HEALTHCARE

210,000 TO 400,000 PATIENTS DIE EACH YEAR FROM MEDICAL ERRORS

IMPAIRS PATIENT OUTCOMES BY

- ENCOURAGING CLINICIANS NOT TO REPORT ADVERSE OUTCOMES OR NEAR MISSES
- INCREASE IN RISK TAKING BEHAVIORS
- PROMOTION OF COMMUNICATION FAILURE BETWEEN HEALTHCARE TEAM MEMBERS
- INCREASED WORKLOAD
- STAFF BURNOUT/TURNOVER

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POSSIBLE REASON FOR PRODUCTION PRESSURE

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NASA'S FINANCIAL PRESSURE?

Financial Concerns

- SPACE SHUTTLE COST $2-3 BILLION TO BUILD
- CONSTRAINED BUDGET
- CONGRESS & NASA DEVELOPED NEW ECONOMIC FINANCE MODEL
- SPACE SHUTTLE WILL BECOME SELF-SUFFICIENT
- DELIVER PAYLOADS FOR DOD, PRIVATE CONTRACTOR'S EXPERIMENTS

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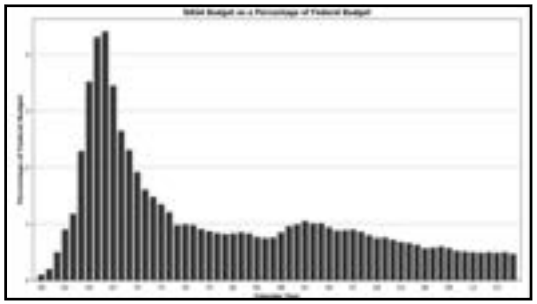

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OPERATING ROOM FINANCIAL IMPACT

- ORS ACCOUNT FOR 40% OF HOSPITAL EXPENSES & 60-70% HOSPITAL REVENUE
- SURGICAL CARE ACCOUNTS FOR 1/3RD OF ALL HEALTHCARE SPENDING
- COSTS FOR INPATIENT HOSPITAL STAYS WITH SURGICAL PROCEDURES TOTALED $187.1 BILLION IN 2014
  - 48% OF ALL AGGREGATE HOSPITAL COSTS
- COSTS $30-100/MIN TO RUN AN OR
- MAXIMIZING USE AND MINIMIZING COSTS PARAMOUNT FOR HEALTHCARE SYSTEMS
- MOST HEALTHCARE SYSTEMS ATTEMPT TO MAXIMIZE OR UTILIZATION RATES & MAINTAIN HIGH THROUGHPUT TO MAXIMIZE REVENUE

Chapman et al 2020; Lee, Dipp, & Guerra 2017; Eichhorn & Fayad 2018; Tsai et al, 202

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BEST TO MAXIMIZE OPERATING ROOM EFFICIENCY & MINIMIZE COSTS

- FIRST CASE ON-TIME START (FCOTS) OPTIMIZING
  - KEY TARGET TO IMPROVEMENT
- FINANCIAL INCENTIVES INCREASED FCOTS FROM 19-61% IN 6 MONTHS
- DECREASING OR TURNOVER TIME
  - PROLONGED TURNOVER LEADS TO INCREASED OVERTIME STAFFING COSTS, WASTED OPPORTUNITY FOR POTENTIAL REVENUE
- SURGEONS INCENTIVIZED BY SURGICAL VOLUME, WHEREAS OPERATING ROOM AND CUSTODIAL STAFF ARE PAID HOURLY

Lee, Dipp, & Guerra 201

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WHY HASN'T SOMETHING HAPPENED THEN?

Major accidents require 4 things:

1. Multiple people
2. Committing multiple, innocuous mistakes
3. Breaching organization's fail-safe mechanisms, defenses, safety nets
4. Resulting in serious harm

Reason's swiss cheese model

Most accidents can be traced to 1 or more of 4 levels of failure

1. Organization influences (organization)
2. Unsafe supervision (controls)
3. Preconditions for unsafe acts (work processes)
4. Unsafe acts themselves (people)

Banja, 2010; Gerstle, 201

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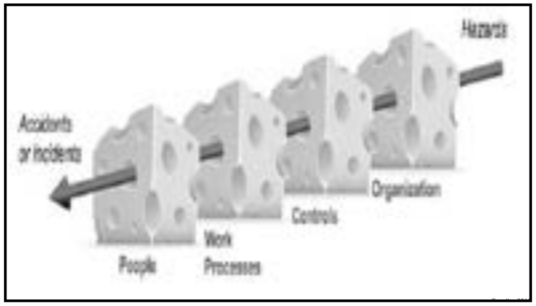

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NORMALIZATION OF DEVIANCE PREVENTION

Pay attention to weak signals

Resist urge to be unreasonably optimistic

Teach employees how to conduct emotionally uncomfortable conversations

Employees need to feel safe in speaking up

Realize that oversight & monitoring for rule compliance are never-ending

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What is Your O-Ring?

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