

Research &  
Quality Improvement:  
**High Yield Pearls**

(I hope.)

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# RESEARCH AND QI

## Belmont Report (1979)

- Respect for persons
- Beneficence
- Justice

## Principles of Biomedical Ethics (Beauchamp & Childress)

- Autonomy
- Non-maleficence
- Beneficence
- Justice

# RESEARCH AND QI

## Ezekiel Emmanuel – allocation

- Focus on improving health
- Patients should be informed
- Consent
- Minimize conflicts of interest

# RESEARCH AND QI

## Ezekiel Emmanuel – scarcity

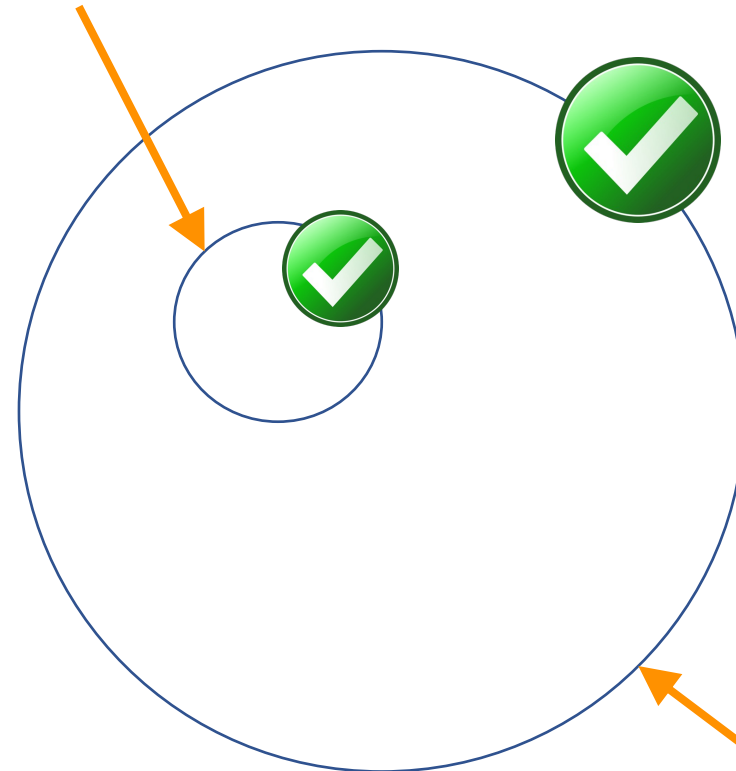
- Maximize benefit
- Treat people equally
- Reward instrumental value
- Give priority to the worst off

*Not mutually compatible!*

## Validity

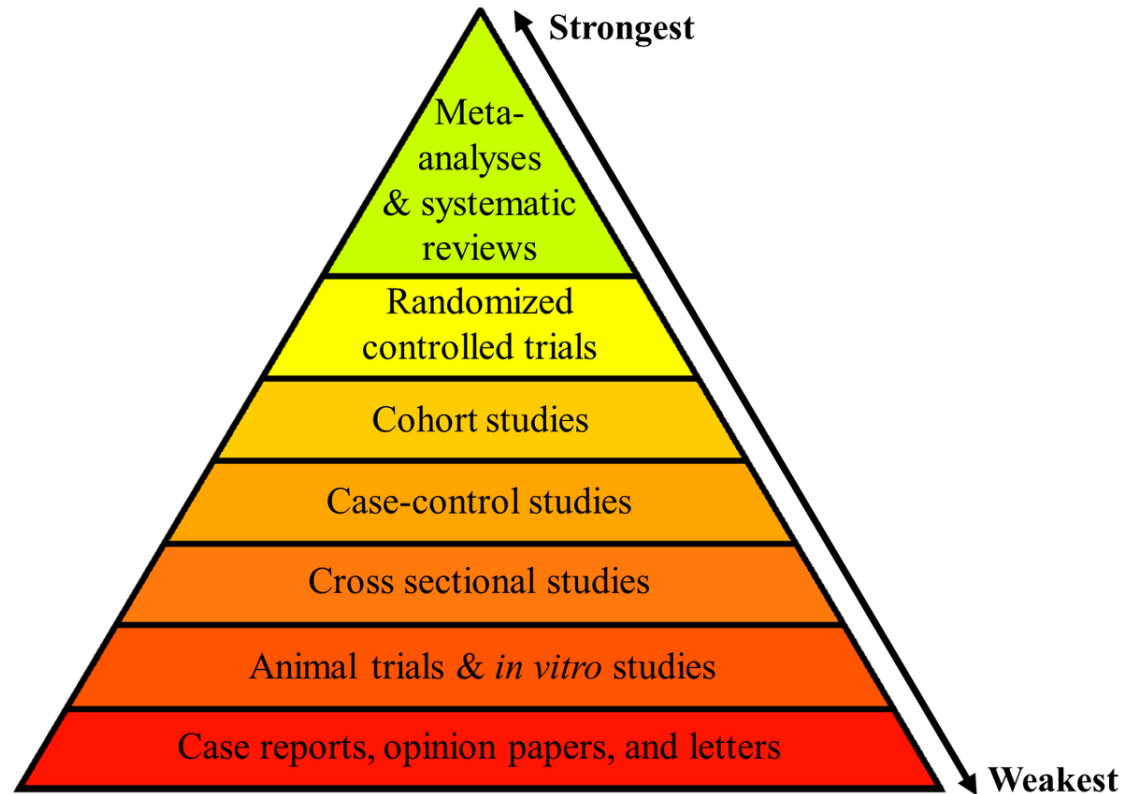
- Internal
- External

Your study sample



Entire patient population

## Hierarchy of Scientific Evidence



thelogicofscience.com

## Errors

- Type 1:  
saying it works when it doesn't
  - **alpha (0.05)**
  
- Type 2:  
saying it doesn't work when it does
  - **beta (0.2)**

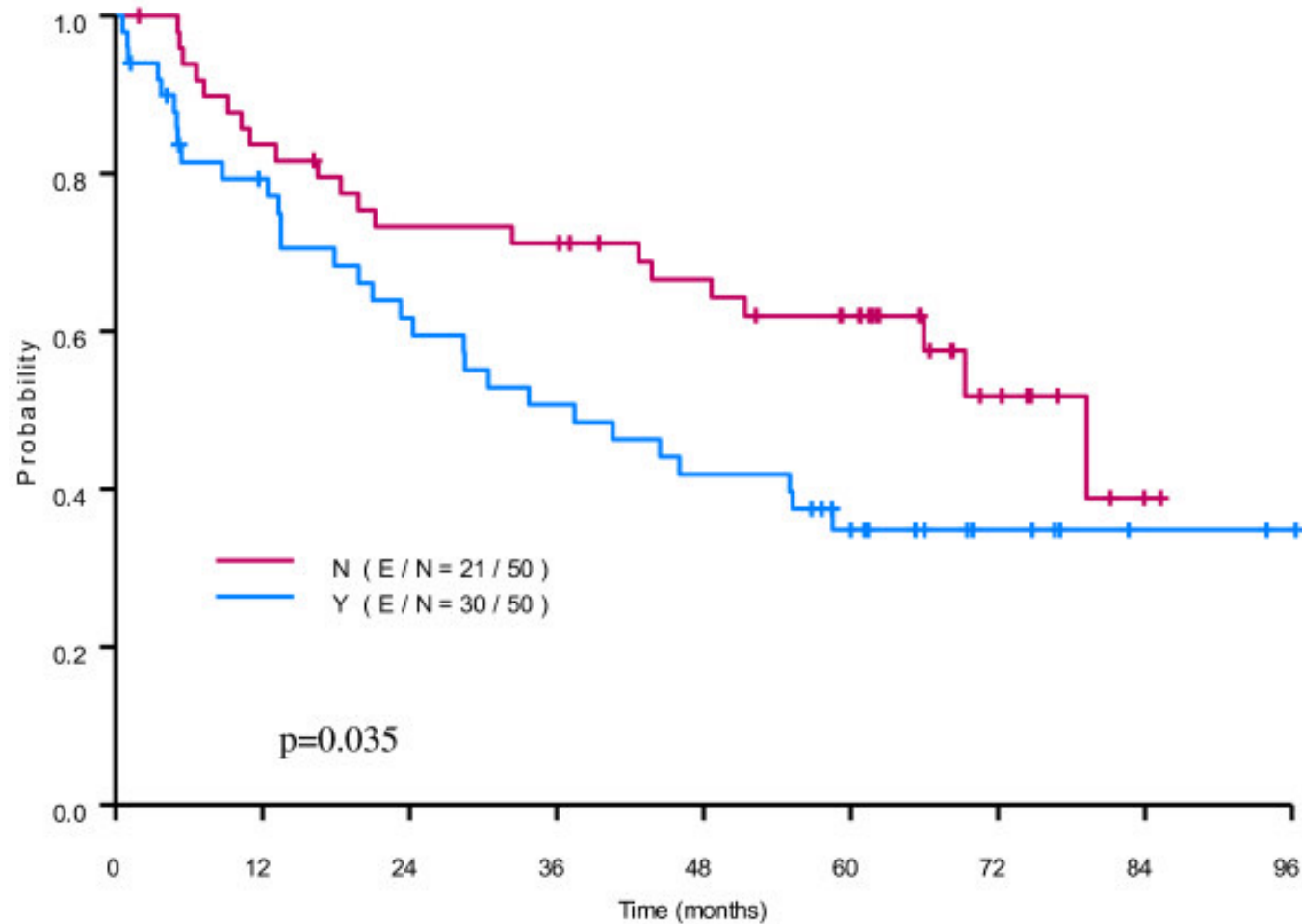


# RESEARCH AND QI

## UNIVARIATE Statistical Tests

- Two continuous variables:  
Pearson correlation coefficient
- One continuous and one categorical variable (two groups):  
t-test
- One continuous and one categorical variable (> two groups):  
ANOVA, then pairwise t-tests
- Two categorical variables:  
Chi-square
- Time variable and categorical variable:  
Kaplan-Meier curves and log-rank test

# RESEARCH AND QI



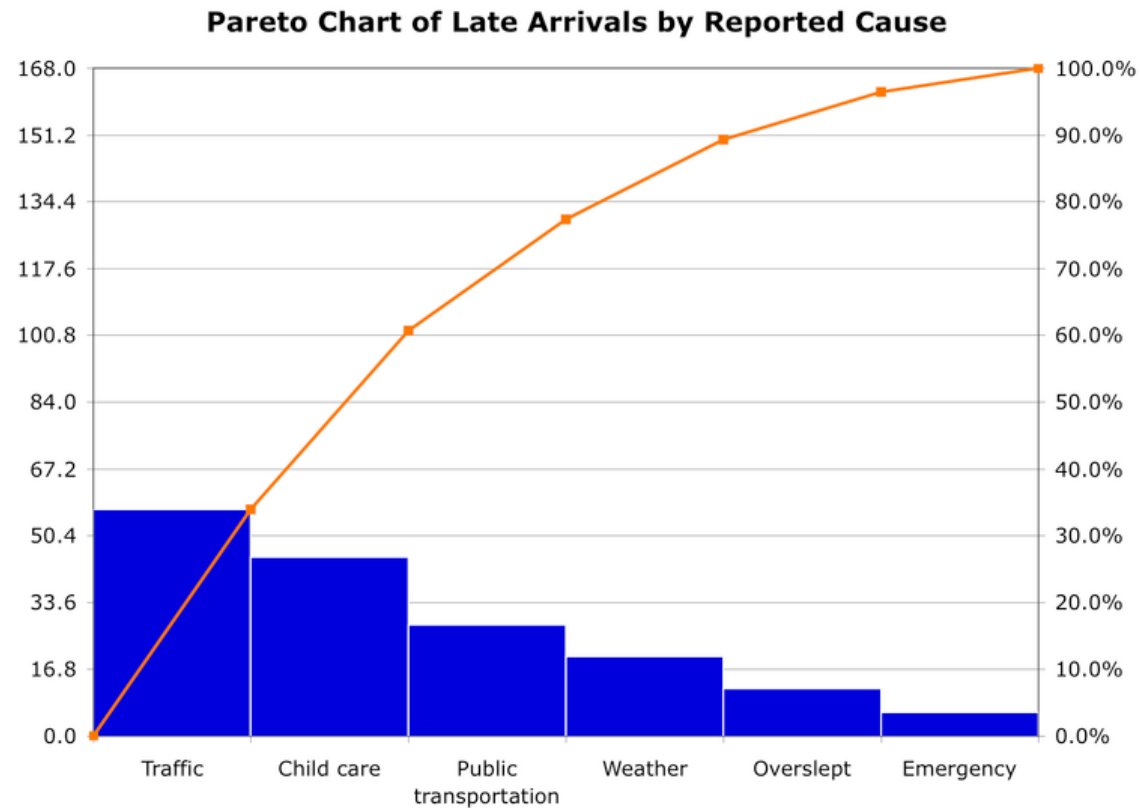
Cata, Juan et al. Perioperative blood transfusions and survival in patients with non-small cell lung cancer: A retrospective study. BMC anesthesiology. 13. 42. 10.1186/1471-2253-13-42.

# RESEARCH AND QI

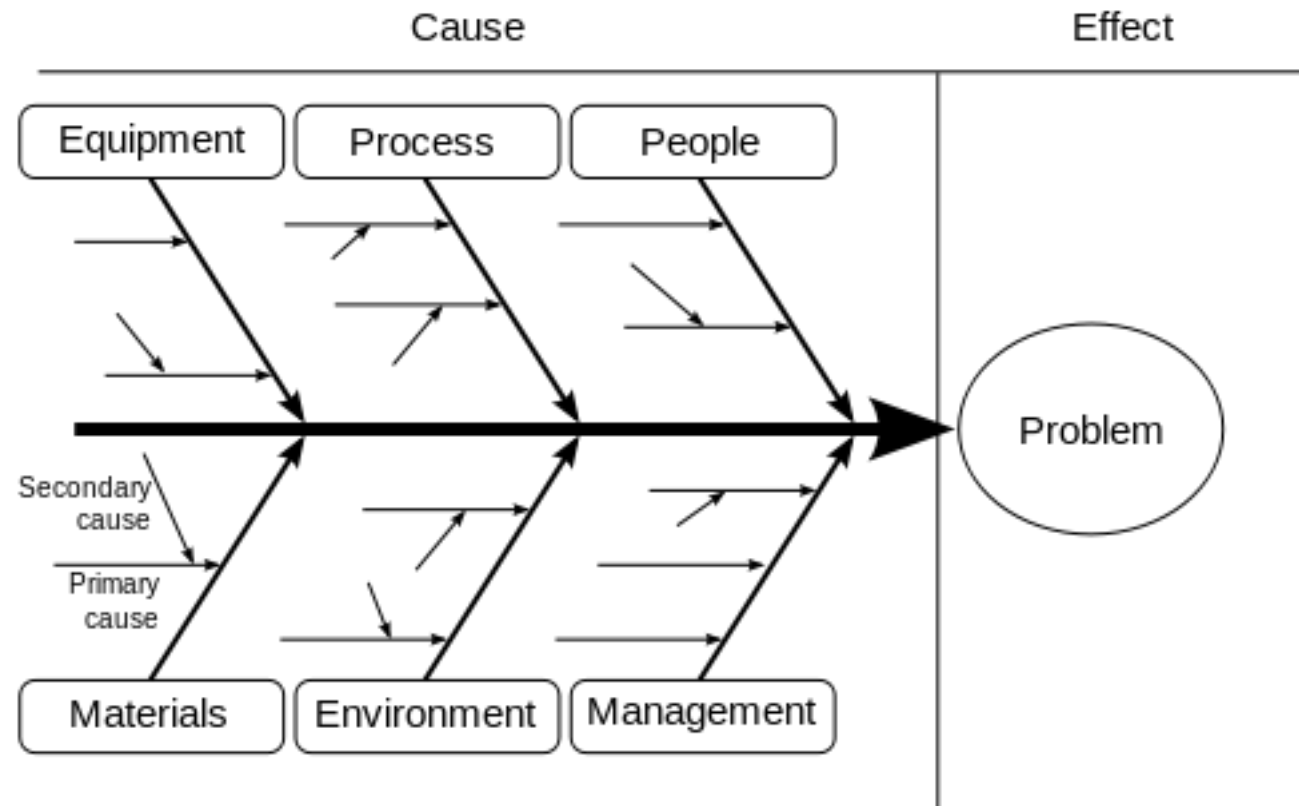
## MULTIVARIATE Statistical Tests

- Continuous dependent variable:  
**Multivariate linear regression**
- Categorical dependent variable:  
**Logistic regression**
- Time dependent variable  
**Cox proportional hazards regression**

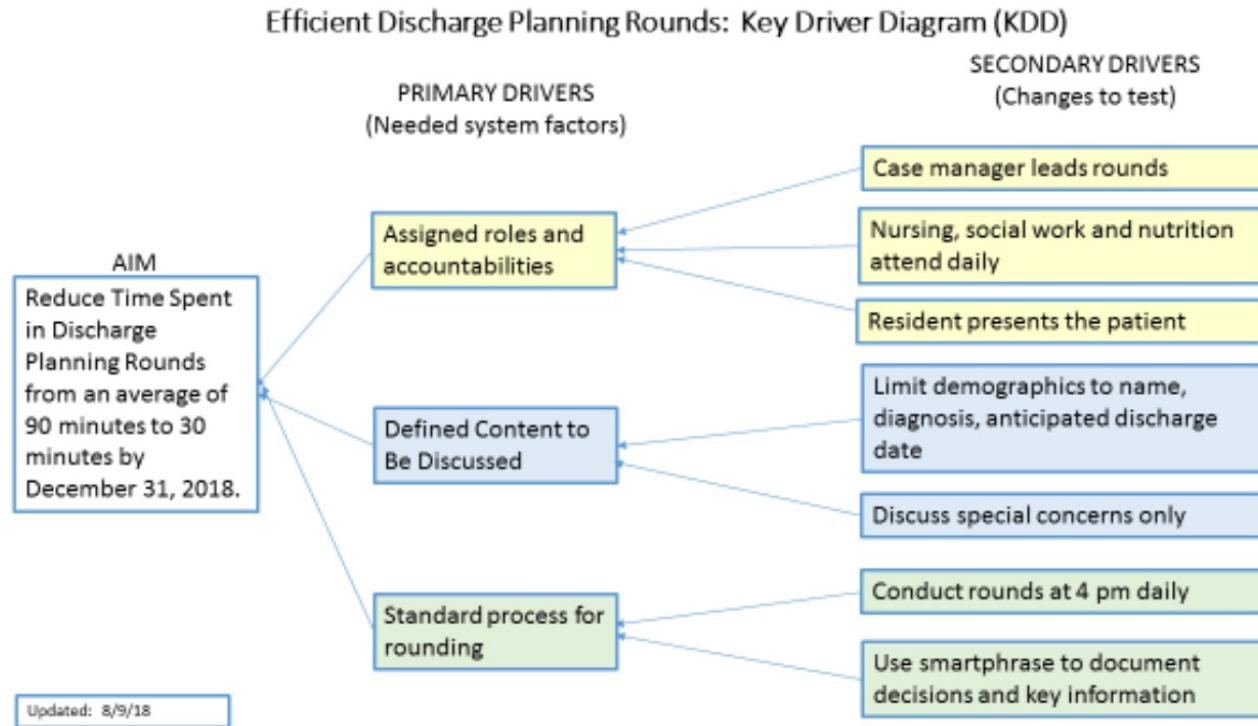
# Pareto Chart



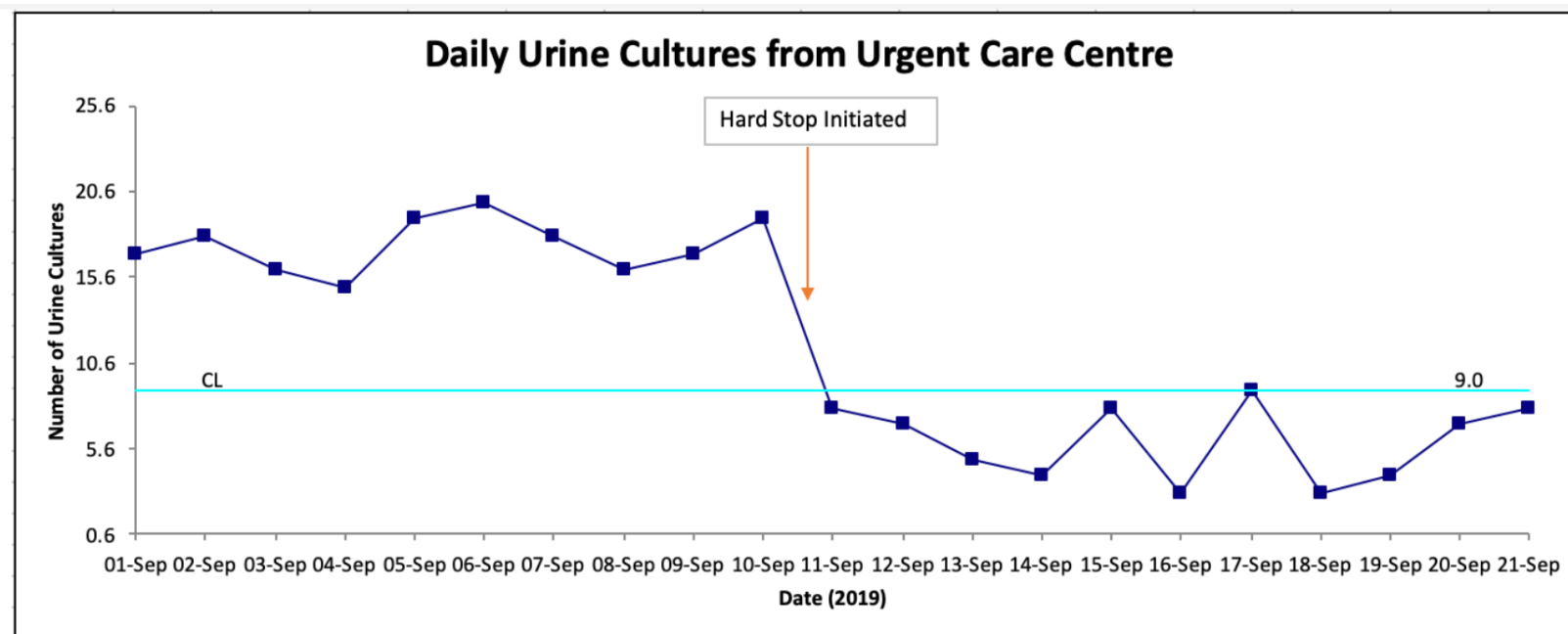
# Cause and Effect (fishbone) chart



# Key driver diagram



## Run chart



# RESEARCH AND QI

## QI / QA frameworks

- Six sigma
  - Data, tight controls
- LEAN
  - Value stream mapping
  - Reduce waste