Research In Trauma Care

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TRAUMA Program
at Grant Medical Center

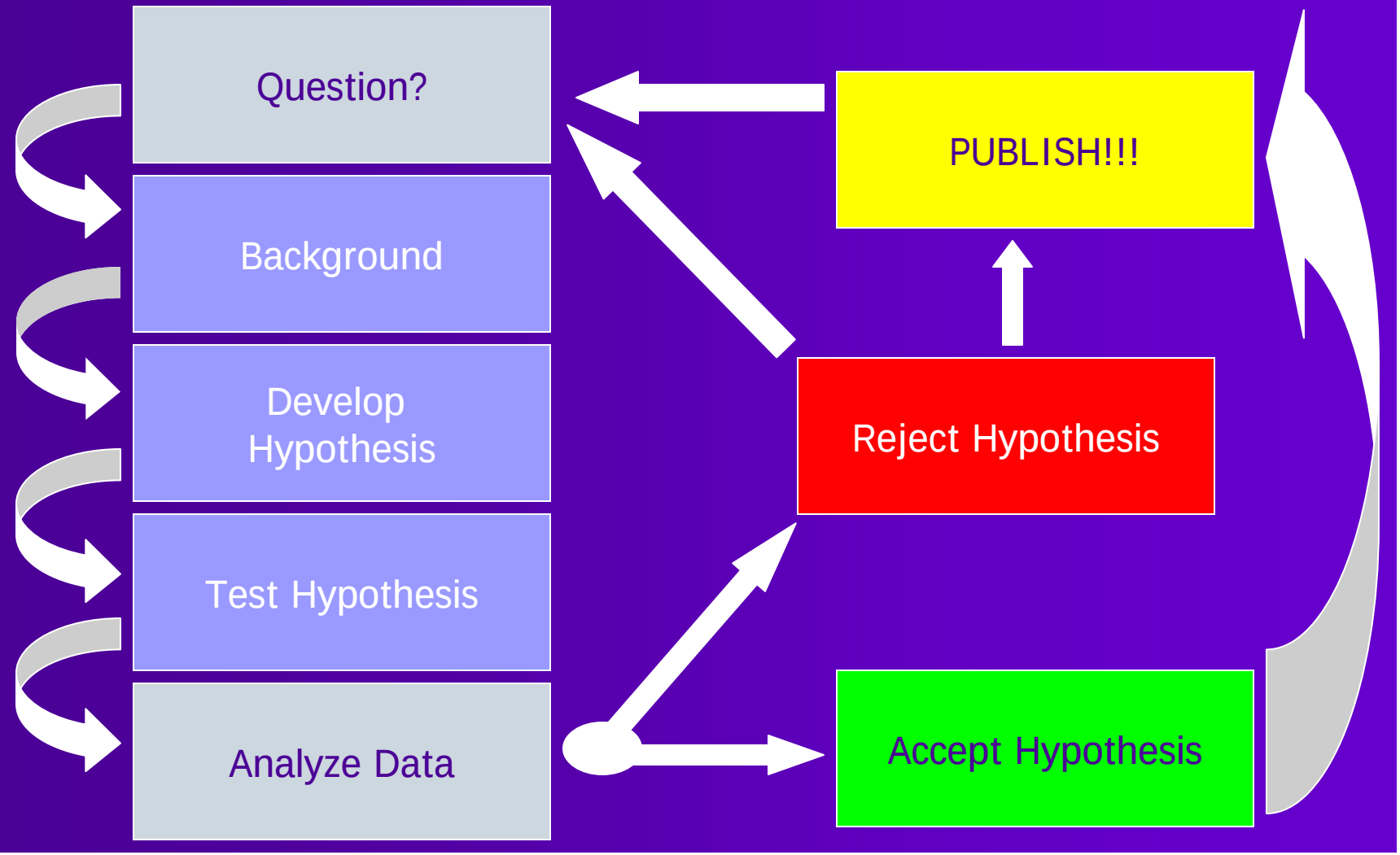
Trauma Research: WHAT?

- *Research* is a systematic approach for collecting and analyzing information to increase our understanding

- Level I: Evidence obtained from at least one ***properly designed randomized controlled*** trial.
- Level II-1: Evidence obtained from well-designed controlled trials without randomization.
- Level II-2: Evidence obtained from well-designed ***cohort or case-control*** analytic studies, preferably from more than one center or research group.
- Level II-3: Evidence obtained from ***multiple time series*** with or without the intervention. Dramatic results in uncontrolled trials might also be regarded as this type of evidence.
- Level III: ***Opinions*** of respected authorities, based on clinical experience, ***descriptive studies***, or reports of expert committees.

(U.S. Preventive Services Task Force)

Trauma Research: WHAT?



Trauma Research: WHY?

- As a Level I Trauma Center, we have an obligation to the community at large to improve care for injured patients through rigorous scientific endeavors
  - We have a large patient base
  - We have experienced clinicians and scientists
- Trauma Center Verification requires a diverse research portfolio
  - Dissemination and scholarly activity are key!

Trauma Research: WHO?

- Trauma Surgeons
- Physicians
- Residents/Students
- Nurses
- Other specialists (respiratory, dietary)
- Staff Members

- Six Disciplines
  - Anesthesia, Emergency Medicine, Neurosurgery, Orthopaedic Surgery, Radiology, Rehabilitation

Trauma Research: WHERE?

- Pre-Hospital
  - Referring Hospitals
  - EMS/MedFlight
- Grant Medical Center
  - Trauma Bay
  - ICU/CCU, Trauma Floor
  - Other Services (radiology, laboratory, respiratory)
- Beyond
  - Collaborations with other hospitals, institutions, outpatient services, follow-up studies

Trauma Research: WHEN?

EVERY

SINGLE

DAY

Trauma Research: HOW?

Trauma Research Initiative

- Trauma Research Specialist (Ph.D.)
  - Scientific/technical expertise/guidance
  - IRB documents, manuscript preparation
  - Manages research program/committees
- Clinical Research Nurse (RN)
  - Hands-on day-to-day study management
  - Patient contact/Study procedures
- RESEARCH PROCESS
  - Research Proposal
  - Research Committee(s)
  - Policies for Research, Authorship
  - Collaborative Efforts


Level I Trauma Center

Thermometry

Temporal artery scanning falls short as a secondary, noninvasive thermometry method for trauma patients. ***Journal of Trauma Nursing*** *(in press)*

Marable, K., Shaffer, L.E.T., Dizon, V.D. and Opalek, J.M.

- WHO: Driven by ICU nurse (Kathleen Marable)
- WHAT: Assessment of TA thermometry for trauma patients
- WHERE: Intensive Care Unit at GMC
- WHY: Peer review identified patients for whom oral thermometry was precluded; wanted to identify secondary thermometry method for those patients
- HOW: Prospective non-randomized study

Thermometry Data

Comparison (vs. oral)	N	Mean Δ[1]	95% CI for Δ[2]	% with Δ >0.5ºF	Fever Agreement
TA, Forehead and Ear	52	0.27ºF	-2.13 – 2.66	60.6%	90.4%
TA, Forehead Only	56	-0.56ºF	-2.65 – 1.54	60.9%	94.6%
TA, Ear Only	50	-0.26ºF	-2.79 – 2.26	65.6%	94.0%
Axillary	57	0.03ºF	-1.97 – 2.03	55.4%	89.5%

1 The average difference in temperature between the two methods across all patients. For each comparison, the oral calibrated temperature was subtracted from the temperature determined by the alternative method.

2 The range in magnitude of differences that apply to approximately 95% of the patients in the study.

Thermometry: Effect of Body Mass Index

Comparison (vs. oral)	N	Mean Δ	95% CI for Δ	P value
TA, Forehead and Ear				
BMI <30	25	0.65ºF3	-1.63 – 2.94	.0313
BMI ≥30	27	-0.09ºF	-2.42 – 2.23	
TA, Forehead Only				
BMI <30	30	-0.32ºF4	-2.23 – 1.60	.2582
BMI ≥30	26	-0.83ºF	-3.04 – 1.38	
TA, Ear Only				
BMI <30	25	0.21ºF5	-2.02 – 2.45	.0065
BMI ≥30	25	-0.74ºF	-3.24 – 1.76	
Axillary				
BMI <30	31	0.03ºF6	-2.04 – 2.10	.9246
BMI ≥30	29	0.03ºF	-1.93 – 2.00	

Thermometry Overview

- Mean differences in temperature for TA scanning are within acceptable limit
- Individual readings show considerable variability (± ~2.5ºF)
  - 35-55% of TA reads were within ±0.5ºF of oral
- Fever agreement generally 90% or above
  - Limitation: few febrile/hypothermic patients

Thermometry Overview

- Body Mass Index influences TA thermometry
  - High BMI → generally lower TA temp
    - Consistent with hypotheses in literature
      - Thick skin/fat insulates TA in adults
      - TA atherosclerosis insulates TA
  - Difficult to quantify the influence of BMI
    - Probably due to variability of TA scanning in general

Thermometry Discussion

- Results do not favor use of TA scans on adult critical care patients
  - Variability of TA scanner is at best, similar to, and possibly more than axillary thermometry
  - TA scanners are additional equipment to purchase and maintain
  - Axillary thermometry was not precluded in any patient
- Temperature is not static; it is multifaceted and non-linear, subject to many sources of endogenous and exogenous variation
  - Temperature trending is paramount, re-evaluation necessary for early recognition and treatment of potential pathologies that impact morbidity and mortality


Level I Trauma Center

Incidental Findings

Incidental Findings in the Cervical Spine – The Impact of CT Evaluation in Trauma.
American Journal of Roentgenology *(in press)*
Barboza, R., Fox, J.H., Shaffer, L.E.T., Opalek, J.M., and Farooki, S.

- WHO: Physician Driven (Shella Farooki)
- WHAT: Over-read and complete analysis of trauma patient cervical spine CT findings (frequency/types)
- WHERE: GMC/ Trauma and Radiology
- WHY: Increased CT use results in greater anatomy scanned and locates "incidental findings." Uninsured patients get comprehensive evaluation.
- HOW: Retrospective chart review and analysis

Incidental Findings

- 1256 patients
- 8 board-certified radiologists with average of 12.6 yrs experience reviewed images and original reports
- Demographic data (age, sex, ISS, etc) from Trauma Registry

Incidental Findings Data

- 230 patients (18.3%; 95% confidence interval 16.2% - 20.5%) with at least 1 incidental finding.

- 197 patients (85.7%) had 1 finding
- 32 patients (13.9%) had 2 findings
- 1 patient (0.4%) had 3 findings
- Approximately 7% of patients had a fracture of the cervical spine

Incidental Findings Data

- Rate of Incidental Findings = 18.3%
  - Lungs (n=84, 6.7%)
  - Spine (n=59, 4.7%)
  - Skull/Face (n=44, 3.5%)
  - Ribs (n=43, 3.4%)

Incidental Findings

Incidental findings in the cervical spine are associated with age (older), ISS (higher), and mechanism (falls)

- TRIF–fractures, pneumothorax
  - Likelihood of incidental findings increases as ISS increase
  - Age and sex have little association
- NTRIF–spinal/foraminal stenosis, osteoporosis/penia, COPD
  - Age was only strongly associated factor
  - For each 10 year increase in age, the odds of having a NTRIF increases by 65%

Incidental Findings

- As imaging technology increases in sensitivity, we will continue to detect and manage unexpected pathology
- Need protocols to manage these findings consistently and appropriately.
- In trauma, non-injury related pathology challenges the traditional trauma service dogma of rapid diagnosis, treatment and transition

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