The Road to Scholarship and Team Science in Pediatric TBI

Innovations in Clinical Inquiry

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Karin Reuter-Rice, PhD, CPNP-AC, CCRN, FCCM, FAAN
Associate Professor
Duke University
School of Nursing
School of Medicine, Dept. of Pediatrics
Division of Pediatric Critical Care
Duke Institute for Brain Sciences
Robert Wood Johnson Foundation Scholar Alumna

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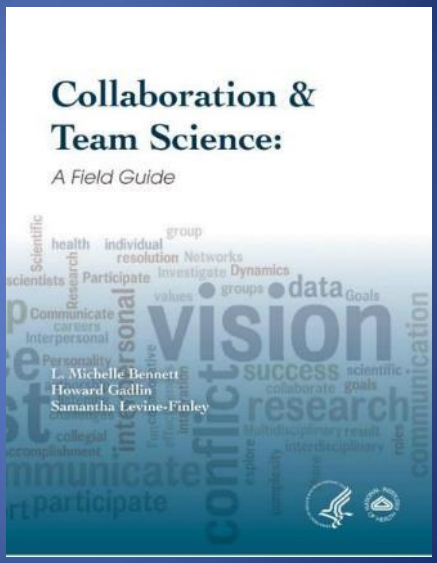
Disclosures/Conflicts

- I have no financial relationships to disclose.
- I will not discuss off label use and/or investigational use in my presentation.

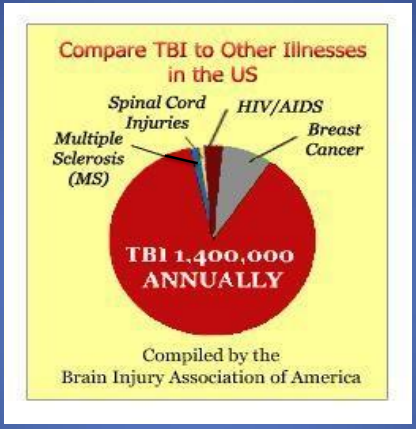
Objectives

1. List approaches that allow for successful scholarship.
2. Describe key features of team science.
3. Identify healthcare challenges associated with pediatric TBI.

Understanding what makes great collaborations and teams successful



Why Traumatic Brain Injury



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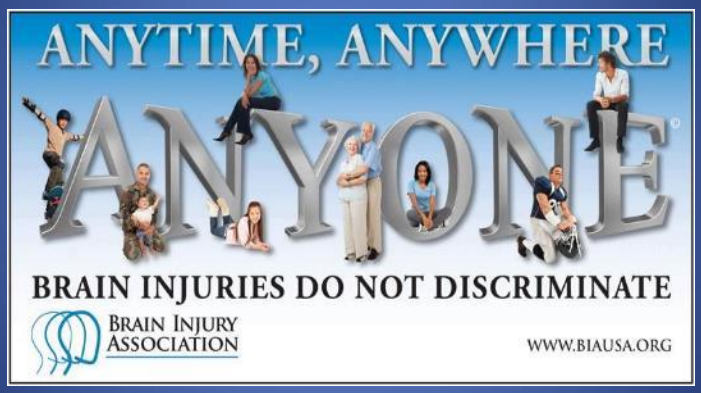
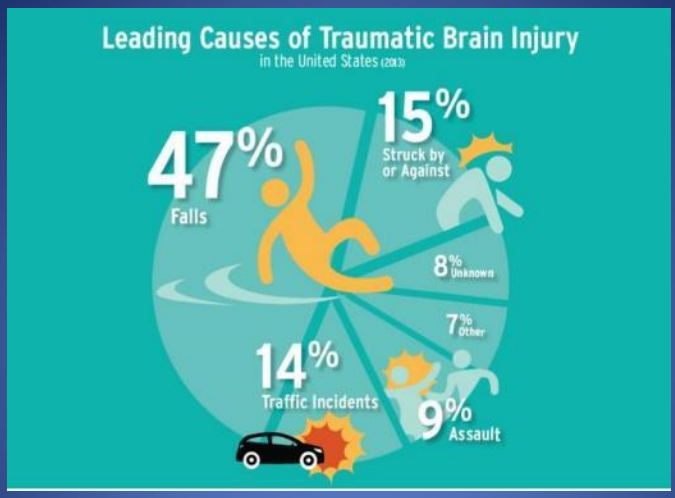
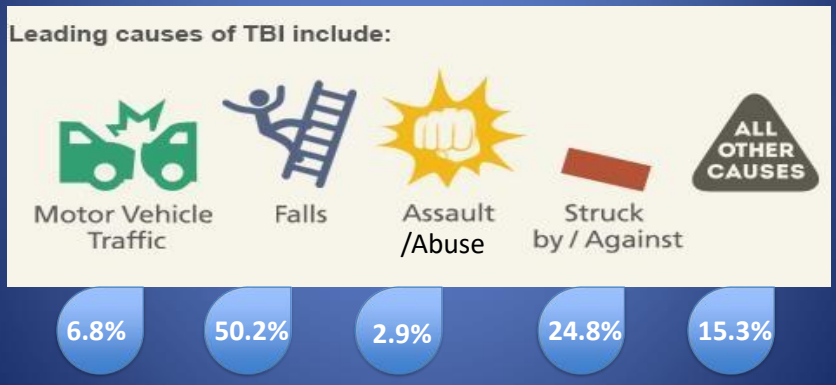


Incidence of TBI



https://www.brainline.org/slideshow/infographic-leading-causes-traumatic-brain-injury

Mechanisms of Injury in Children …



ww.cdc.gov

Causes of Brain Injury





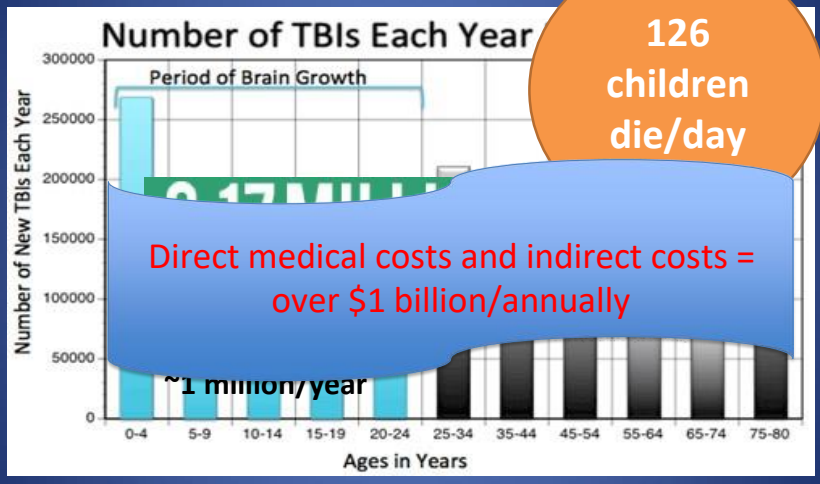



Who is at the Highest Risk of TBI?

https://www.vectorstock.com/royalty-free-vector/health-card-with-boy-having-head-injury-vector-7972276

- Males > Females
  - But females are quickly balancing the scale
- Two age groups most at risk:
  - 0-4 years
  - 15-24 years

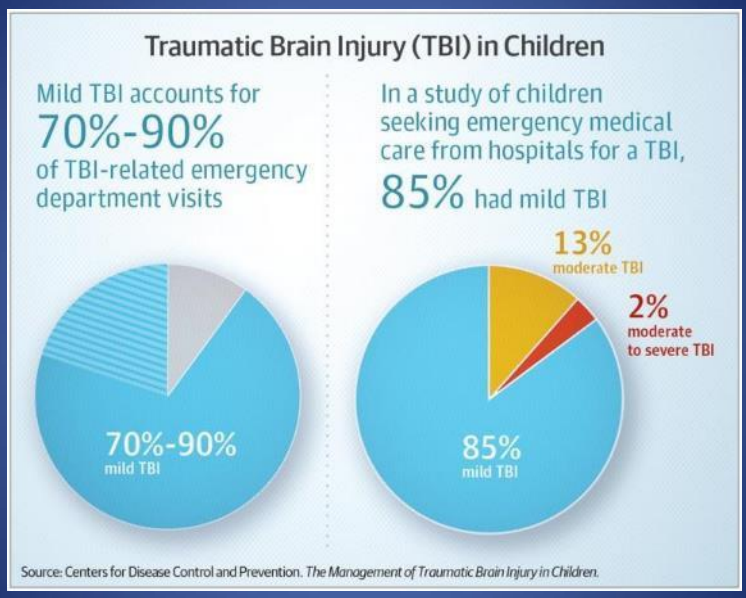
TBI is the #1 cause of death and disability among children



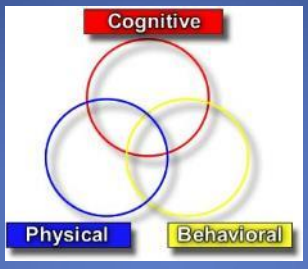
126 children die/day

Direct medical costs and indirect costs = over $1 billion/annually

The latest data: Taylor CA, Bell JM, Breiding MJ, Xu L. Traumatic Brain Injury-Related Emergency Department Visits, Hospitalizations, and Deaths - United States, 2007 and 2013. Morb Mortal Wkly Rep Surveill Summ Wash DC 2002. 2017 17;66(9):1–16.



Impact of TBI



9 Days of Absence 1 Week and 4 Days of Learning Missed
19 Days of Absence 3 Weeks and 4 Days of Learning Missed
28 Days of Absence 5 Weeks and 3 Days of Learning Missed
38 Days of Absence 7 Weeks and 3 Days of Learning Missed
46 Days of Absence 9 Weeks and 1 Day of Learning Missed

Health related costs $600,000 to $1,875,000/per child's life time

The Invisible Injury Impact

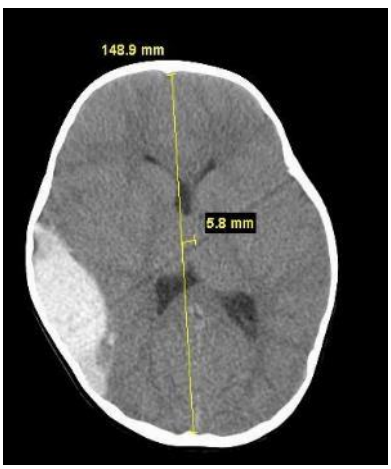
- Impact on identity
  - Restricted from preferred activities
  - Academic stressors

What do we know?

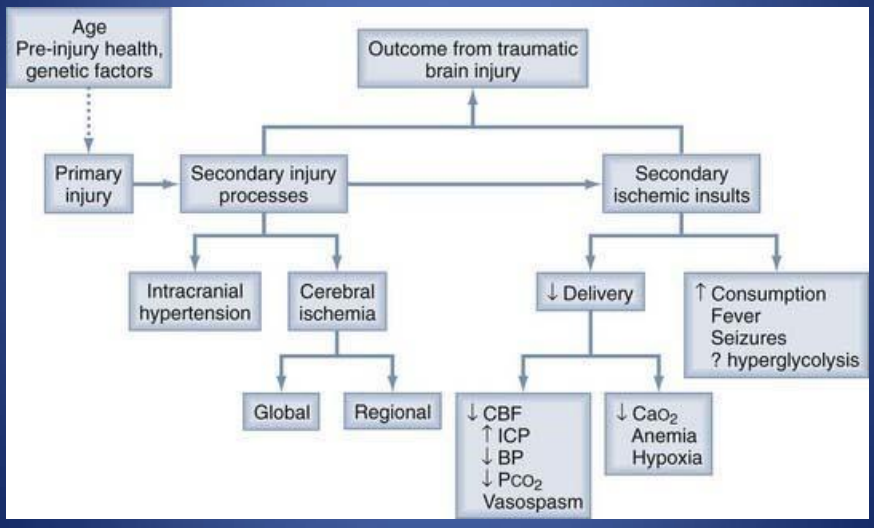
Primary Brain Injury

- Kinetic energy translated into instantaneous parenchymal damage
- Immediate injury

Secondary Brain Injury



Primary and Secondary Injury



Authors Claudia Robertson, Leonardo Rangel-Castilla https://neupsykey.com/critical-care-management-of-traumatic-brain-injury/

My interest in Pediatric TBI

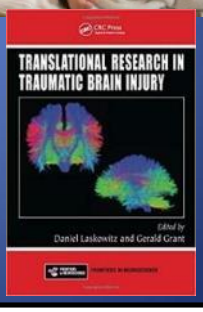
Novel Signatures

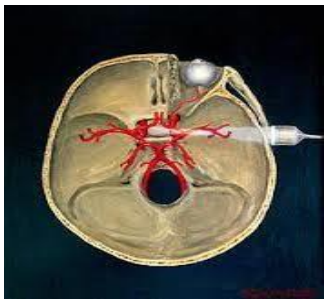
Can….

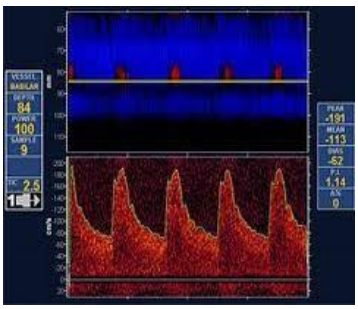
- Identify / predict those at risk for poor recovery
- Adapt plan of care to promote improved outcomes
- Develop therapeutic targets
- Promote recovery with precision healthcare

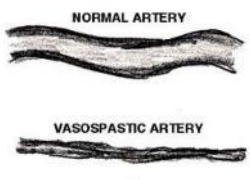
Scholarship: Practice

1. Focused on knowledge generation, within & cross-discipline collaboration, within and across education and practice sites
2. Volunteer service in community orientations that require professional expertise
3. A mentor experience between the clinical expert and the novice nurse
4. The design of cutting-edge models of nursing practice
5. Scientific Translation



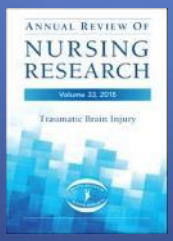


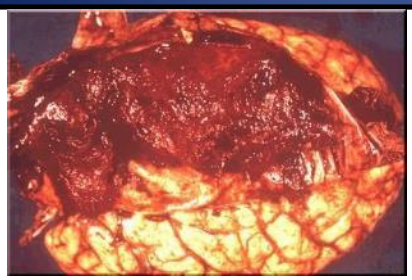


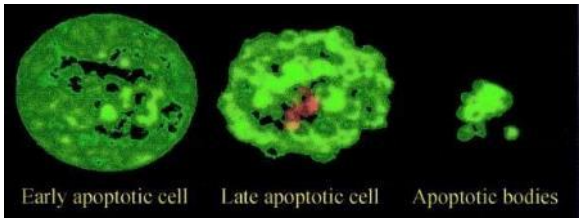


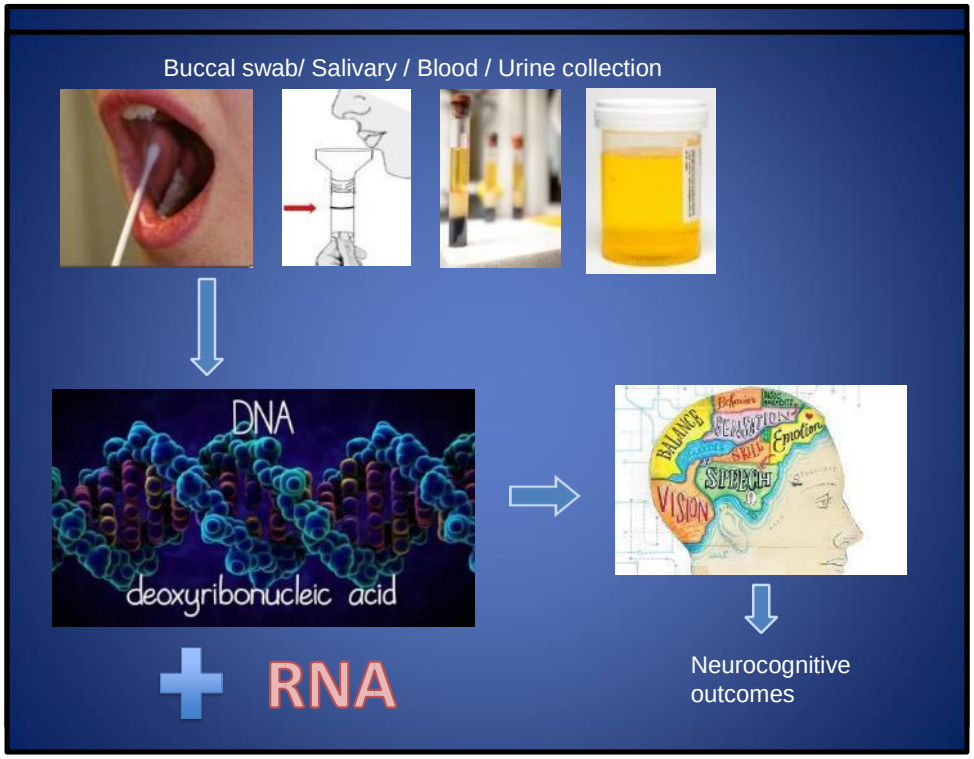
Scholarship: Discovery

1. All aspects of research and investigation
2. It is the pursuit of knowledge through original research that contributes to the general knowledge and clinical practice of the nursing profession









Biologic Markers

Scholarship: Integration

1. By connecting knowledge and discovery into larger patterns and contexts
2. Creating new perspectives
3. The scholarship of integration may transcend disciplinary boundaries to give meaning to isolated facts
4. Integration is important in nursing because *nursing is an applied science* whose members work in interdisciplinary teams and who work to establish policies to promote the health of the entire community

Scholarship: Teaching-Mentorship

Pediatric Traumatic Brain Injury Needs Team Science

Group vs Team

Group vs Team

	Groups	Teams
Members	Independent	Interdependent
Goals	Individual	Shared
Identity	Individual (me)	Shared (we)
Leadership	Often single	Shared
Products	Individual	Collective
Reward	Individual	Collective
Cohesion	None/limited	Esprit
Conflict	Reactive	Expected/proactive

Why Team Science ?

The Increasing Dominance of Teams in Production of Knowledge

Stefan Wuchty,[1]* Benjamin F. Jones,[2]* Brian Uzzi[1,2]*†

We have used 19.9 million papers over 5 decades and 2.1 million patents to demonstrate that teams increasingly dominate solo authors in the production of knowledge. Research is increasingly done in teams across nearly all fields. Teams typically produce more frequently cited research than individuals do, and this advantage has been increasing over time. Teams now also produce the exceptionally high-impact research, even where that distinction was once the domain of solo authors. These results are detailed for sciences and engineering, social sciences, arts and humanities, and patents, suggesting that the process of knowledge creation has fundamentally changed.

18 MAY 2007 VOL 316 **SCIENCE** www.sciencemag.org

DIMENSIONS OF TEAM SCIENCE THAT CREATE UNIQUE PROFILES & CHALLENGES

DIMENSION	RANGE	
Diversity	HOMOGENEOUS	HETEROGENEOUS
Integration	UNIDISCIPLINARY	TRANSDISCIPLINARY
Size	SMALL (2)	MEGA (1000S)
Proximity	CO-LOCATED	GLOBALLY DISTRIBUTED
Goal alignment	ALIGNED	DIVERGENT OR MISALIGNED
Boundaries	STABLE	FLUID
Task interdependence	LOW	HIGH

Dr. K. Hall Director TeamSci, NCI

A Continuum of Disciplinary Integration

Transdisciplinary

Researchers from *different disciplines work jointly* to develop & use a shared conceptual framework that synthesizes & extends discipline-specific theories, concepts, & methods to create *new approaches* to address a common problem

Multidisciplinary

Researchers from *different disciplines work sequentially,* each from their own discipline-specific perspective, with a goal of eventually combining results to address a common problem

Across Disciplines

Interdisciplinary

Researchers from *different disciplines work jointly* to address a common problem. Some integration of perspectives occurs, but contributions remain anchored in their own disciplines

Unidisciplinary

Researchers from a *single discipline* work together to address a common problem

r. K. Hall Director TeamSci, NCI; Adapted from: Rosenfeld, 1992; Hall et al., 2008; Falk-Krezsinski, 2012; Austin et al., 2008; Nissani, 1995

Why Team Science ?

Diverse Teams

Team Science & NIH Funding

The multiple PI model was adopted in 2006 in response to –

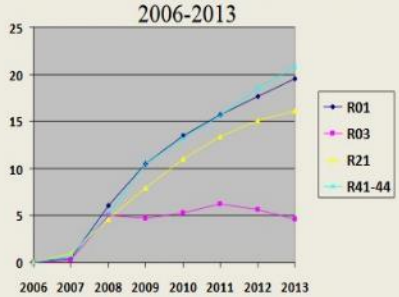
- recommendations from the NIH Bioengineering Consortium (BECON), an NIH Roadmap Initiative to stimulate interdisciplinary science, and
- A directive from the White House Office of Science and Technology Policy (OSTP).

Allows applicants to identify more than one PI on a single grant application.

Recognizes that the single PI grant model does not optimally support multidisciplinary collaborations.

Since 2006, **7,224 multiple PI awards have been funded. The vast majority (81.5%) include two PIs.**

Percent of new NIH grants funded by R-mechanisms that use the multiple PI model, 2006-2013



Team Science = Culture Shift

All of Us℠

THE FUTURE OF HEALTH BEGINS WITH YOU

- $215 million initiative
- Create a cohort = 1 million participants

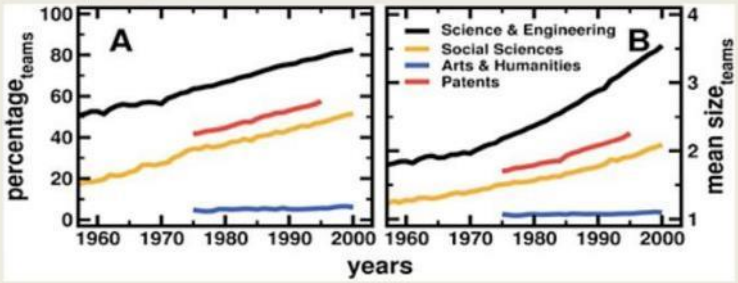
- Support research at the ***intersection of human biology, behavior, genetics, environment, data science and computation, and much more*** to produce new knowledge with the goal of developing more effective ways to prolong health and treat disease.

The goal of the PMI Cohort Program is to set the foundation for:

- a ***new way of doing research that fosters open, responsible data sharing*** with the highest regard to participant privacy,
- and that puts ***engaged participants at the center of research*** efforts.

Dr. K. Hall Director Sci Team, NCI; https://allofus.nih.gov

Team Science = Greater Impact



- Research is increasingly conducted in teams across virtually all fields
- ~90% of all work in science & engineering disciplines is done in teams
- **Teams produce more highly cited research & patents than individuals**

Team Science Looks Like…

- PICU Nurse Champions
- Students (all)
- PICU, Pediatric Units, Peds ED
- Neurologist-Intensivists
- Pediatric Neurosurgery
- Genetic Epidemiologist
- Microbiologist
- Physiologist
- Engineering
- Biostats
- Brain Injury Translational Research Center
- Duke Molecular Physiology Institute
- NC Governors Brain Injury Advisory Council: Children & Youth Committee

Don't take out the 'I' in 'We'

"I" represents belief in self & quest for accomplishment.
'We' represents commitment & allegiance to team effort.

Team Science & Team Behavior

- Be objective • ○ unbiased judgment •
- Be tactful & respectful • ○ 'Do unto others'… •
- Interactive - 2-way • street •
- Appreciate diversity

- Overly critical
- Not listening
- Hogging all attention
- Talking down
- Emotional outbursts
- Interpersonal prejudice

Team Science & Sustaining Engagement

Why E-mail is Imperfect for Team Science

- Not group memory (comes from one person's outbox)
- Fragmented conversation
- Poor contextualization
- Assumes common needs same for all members
- Exclusion of people who are 'left off' the list
- Poor support for creative processes
- Huge volume of non-urgent information

What Makes Good Team Science Meetings

Team Science & Dissemination

We have the ability to:

We are in the privileged position to:

Thank you

karin.reuter-rice@duke.edu