Clinical and Health Services Discovery and Health Care Improvement

Rescuing the Injured Mind: A New Frontier in Medicine

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Director, Geriatric Research, Education and Clinical Center
Vanderbilt University, Nashville, TN
VA Tennessee Valley Healthcare System
Clinical and Health Services Discovery and Health Care Improvement

Seminar Objectives:

• Describe a framework for and the context of research from bench - bedside - practice – policy – health
• Describe Vanderbilt’s support infrastructure
  – Cores
  – Studios
• Understand the application in specific examples
• Learn the detailed discovery journey that integrates the research continuum
  – Cognitive Impairment following critical illness
Improving Health Through Clinical and Translational Science

- Bench – Bedside – Practice – Policy - Health
- Personalized Medicine
- Safe, Effective & Efficient Systems of Care
- Optimize individual health
- Optimize community health
Features, News & Highlights

Dr. Matthew Weiner elected fellow of Human Factors and Ergonomics Society.

Dr. Sten Vermund elected to the Institute of Medicine.

Dr. Melissa Wellons featured in the New York Times: “Early Menopause Is Linked to Heart Risk.” See also VUcast: Which Women Are More at Risk for Heart Attacks?

Vanderbilt Evidence-based Practice Center publishes reviews of quality improvement interventions to address health disparities, interventions for adolescents and young adults with autism spectrum disorders, and nitrous oxide for the management of labor pain. View all Vanderbilt EPC projects.

Dr. Peter Buerhaus named to Institute of Medicine’s GME Committee. Read more.

Read more about The Institute’s centers, people, and research in News or view recent highlights.
T2-Focused Grants

# Investigators

# Grants Submitted

- 2008
- 2009
- 2010
- 2011
- 2012
FY 2012: T2 Grant $ Activity

- Awarded $60M
- Pending $55M
- Unfunded

Total: $59,573,396
$54,646,605
Center for Health Services Research

- Center for Quality Aging (Schnelle)
- Center for Surgical Quality and Outcomes Research (Penson)
- Effective Health Communication Program (Rothman)
- Center for Research and Innovation in Systems Safety (Weinger)
- VA Health Services Research Center (Speroff, Murff)
- Center for Asthma and Environmental Health (Hartert)
- Evidence-Based Practice Center (Hartmann)
- Center to Develop Evidence to Inform Decisions about Effectiveness (Griffin)
- ICU Delirium and Cognitive Impairment Study Group (Ely)
- Center for Interdisciplinary Health Workforce Studies (Buerhaus)
- Center for Professional Health (Dewey)
- Women’s Health Research (Hartmann)
- Center for Health Behavior and Health Education (Elasy)
Comparative Effectiveness Laboratory
Shared Core Resource

- Qualitative Research Core (Schlundt)
- Database Analysis Core (Penson, McPheeters)
- Systems Safety/Human Factors Core Core (Weinger)
- Effective Health Communication Core (Kripalani, Mulvaney)
- Shared: Administration Budget, Finance Informatics Evaluation
- Patient-Centered Measurement Core (Elasy)
- Decision Analysis Analysis Core Core (Speroff, Dittus)
- Community Engaged Research Core (Rothman)
- Implementation Science/QI Core (Speroff, Dittus)
Native American Research Center for Health (NARCH)

- Partnership between United South and Eastern Tribes and Vanderbilt
- 26 federally recognized tribes in Nashville Area
- Over 75,000 American Indians
- First NARCH serving NA in Eastern US
- NIH/IHS study focused on using health information technology tools to improve diabetes care in MS Band of Choctaw Indians
Qualitative Research for NARCH Study

- Community listening sessions
- Focus groups
- Cognitive interviews
- Photo-voice studies

to understand barriers to optimal diabetes self-management and role of Health IT tools to improve care
Volume Outcomes of Cystectomy—Is it the Surgeon or the Setting?
(Morgan….Penson. J Urol 2012;188:2139)

- 7,127 patients with bladder cancer
Comparative effectiveness of treatments for localized prostate cancer

- AHRQ RO1; $7.5M; PI: Penson
- Compare effectiveness of surgery and radiation for localized prostate cancer
- Focus on modern technologies and control for differences in patients and treatments that may affect outcomes
- Merging multiple datasets
AHRQ DECIDE

• Comparative effectiveness studies of:
  – diabetes treatments and outcomes
  – drugs used for rheumatoid arthritis
• Assembled database cohort of >200,000 veterans receiving initial medical treatment for diabetes.
  – cardiovascular and kidney outcomes
  – diabetes drugs and cancer incidence and mortality
• Assembling database cohort of veterans with rheumatoid arthritis:
  – relationship between specific treatments, including biologics, anti-arthritis drugs and opioids and serious infections
Database Analyses Informing Health Policy

- Better methods will be needed to project incomes to estimate eligibility for subsidies in health insurance exchanges.

- Balancing coverage affordability and continuity under a basic health program option.

- Health care reform and the dynamics of insurance coverage – lessons from Massachusetts.

- Medicaid expansion opt-outs and uncompensated care.
PRIDE Study

- 5 year NIDDK R18 study; Rothman
- PaRtnering to Improve Diabetes Education
- Collaboration between Vanderbilt, Meharry, & TN Dept. of Health
- Health communication to improve diabetes care in middle TN
- Cluster RCT with 10 Clinics and 400 diabetes patients
- Develop a sustainable model for improved diabetes care
<table>
<thead>
<tr>
<th></th>
<th>If Your Patient needs help with:</th>
<th>Consider these handouts:</th>
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<tbody>
<tr>
<td>1</td>
<td>General Information For all Patients with Diabetes:</td>
<td>● What is Diabetes&lt;br&gt;● Low Blood Sugar</td>
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<tr>
<td>2</td>
<td>Glucose Monitoring</td>
<td>● Blood Sugar Checks&lt;br&gt;● Blood Sugar Log Sheet - Simple&lt;br&gt;● Blood Sugar Log Sheet - Advanced</td>
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<td>3</td>
<td>Nutrition Information</td>
<td>● Nutrition for Diabetes&lt;br&gt;● Using your Plate to Manage your Carbs&lt;br&gt;● Counting your Carb grams&lt;br&gt;● What Can I Eat for a Snack?&lt;br&gt;● What Should I Eat When I Eat Out?</td>
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<td>4</td>
<td>Oral Diabetes Medication</td>
<td>● Diabetes Pills&lt;br&gt;● Taking Your Medicines</td>
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<td>5</td>
<td>Insulin and Byetta</td>
<td>● Drawing and Self-Injecting Insulin (BD)&lt;br&gt;● Mixing Insulin for Self-Injecting (BD)&lt;br&gt;● How To use an Insulin Pen&lt;br&gt;● Set Dose Insulin&lt;br&gt;● Insulin for Set Dose Plus Correction&lt;br&gt;● Long Lasting Insulin Dose Chart&lt;br&gt;● How To Take Byetta&lt;br&gt;● Taking Your Medicines</td>
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<td>6</td>
<td>Lifestyle Management and Behavior Change</td>
<td>● Be Active&lt;br&gt;● How Can Losing Weight Help Me?&lt;br&gt;● Smoking and Diabetes</td>
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<td>7</td>
<td>Foot Care</td>
<td>● Foot Care Do’s and Don’ts (BD)</td>
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<td>Cardiovascular Risk Factors</td>
<td>● Blood Pressure Control&lt;br&gt;● Cholesterol&lt;br&gt;● Taking Your Medicines</td>
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<td>9</td>
<td>Coping with Stress and Depression</td>
<td>● Stress and Depression</td>
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<td>10</td>
<td>Oral Health</td>
<td>● Problems With Your Teeth and Mouth</td>
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<td>11</td>
<td>Women’s Health</td>
<td>● How Diabetes Can Affect Women</td>
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Implementation Science/QI Core

- Study designs, methods, measurements, analyses
- Education/Training
  - Quality Scholars Program
  - Geri-Scholars Program
- Projects:
  - NIH: ICU Delirium
  - National Neurosurgery Quality & Outcomes Registry
  - CMS: MyHealthTeam Innovation Grant
N2QOD

- AANS - IMPH; 2012; McGirt, Speroff, Dittus
- National Neurosurgery Registry
- Lumbar spine, cervical spine, carotid, tumors
- Current enrollment:
  - 168 surgeons; 41 hospitals; >2,000 patients
  - Clinical & QOL data; >98% complete
CMS Innovation Project

- MyHealthTeam; Patient-Centered Medical Home
- $18.8M; July, 2012; Dittus, Frisse, Speroff, ........
- Spread & evaluation of pilot program at VUMC
- Outpatients with HTN, CHF, DM, COPD
- Readmission reduction – AMI, CHF, COPD, Pneumonia
- Evidence-based
- Process improvement
Studio Program

- Successful as perceived by participating investigators and expert consultants
- Embraced by faculty and trainees at all levels and continue to expand
- Benefits have been judged worth the costs by leadership
- *Academic Medicine* 2012;87(8):1052-1059
- 2012 AAMC Innovation with Distinction in Research Training and Education Award
- Outcome evaluation under design
### Translational Research Studios

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<th>Studio Type</th>
<th>2006</th>
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## Studios by Research Phase

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<td>Evaluation</td>
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INVESTIGATORS
1. I was satisfied with Studio session
2. Scheduling was timely & efficient
3. Studio improved quality of science
4. Studio was worth my time

Strongly Disagree – Disagree – Agree – Strongly Agree

Recommend Studio to colleague (Yes: 100%)
EXPERTS
1. Studio improved quality of science
2. Studio was worth my time

Strongly Disagree – Disagree – Agree – Strongly Agree

Willing to participate in future Studios (Yes: 99%)

Over 350 faculty from 8 schools and 70 departments have participated
Monitoring and Support of Organ Dysfunction

Cardiovascular

Pulmonary

Renal
Weaning protocol

SBT reduced weaning time by = 2 days

Confusion Assessment Method (CAM-ICU)

1. Acute onset of mental status changes or a fluctuating course

and

2. Inattention

and

3. Disorganized Thinking

or

4. Altered level of consciousness

= Delirium

Ely, Dittus et al, Crit Care Med 2001;29:1370-79
Ely, Dittus et al, JAMA 2001;286:2703-2710
Delirium in Mechanically Ventilated Patients
Validity and Reliability of the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)
CONSCIOUSNESS IN THE ICU...

arousal or wakefulness

Instruments include GCS, Ramsay, SAS, and RASS

content of consciousness or the sum of mental function

CAM-ICU

Plum and Posner, 30 years ago
Richmond Agitation Sedation Scale (RASS)

**+4** Combative

**+3** Very agitated

**+2** Agitated

**+1** Restless

**0** Alert / calm

**-1** Drowsy  eye contact > 10 sec

**-2** Light sedation  eye contact < 10 sec

**-3** Moderate  no eye contact

**-4** Deep  physical stimulation required

**-5** Unarousable  no response even with physical

Sessler et al, AJRCCM 2002;166:1338-44

Ely, Dittus et al, JAMA 2003;289:2983-91

(\(\sigma = 0.96 - 0.98\))
Monitoring Sedation Status Over Time in ICU Patients
Reliability and Validity of the Richmond Agitation-Sedation Scale (RASS)

Ely EW, ...Dittus RS, Bernard GR JAMA 2003;289:2983-91
Prevalence of ICU Delirium

- 183/224 (82%) in this study
- 60-80% of ventilated patients across studies
- 20-50% of lower severity ICU patients
- ~30,000 to 40,000 ICU pts in U.S are delirious
- Hypoactive or mixed forms most common

Ely EW ICM 2001;27:1892-900
Ely EW JAMA 2001;286,2703-2710
McNicoll L, JAGS 2003;51:591-98
Ely EW CCM 2001;29,1370-79
Bergeron N, ICM 2001;27:859-64
Thomason J, AJRCCM 2003;167:A968
Ely EW CCM 2004;32:106-112
Peterson et al, AJRCCM 2003;167:A968
Is delirium associated with adverse clinical outcomes in ICU patients?
Delirium as a Predictor of Mortality in Mechanically Ventilated Patients in the Intensive Care Unit

Post-ICU
Patient Clinic Follow-up

Presentation of 3 Cases
Long-Term Cognitive Impairment
Chronic Cognitive Impairment after ICU survival

- 11 cohorts
- 90-100% at hospital discharge
- 20-70% have chronic impairment that equates to mild/moderate dementia (sometimes severe)
- No association between severity of illness and severity of chronic cognitive impairment
Chronic cognitive impairment

- Executive dysfunction:
  - Planning, judgment, reasoning, attention
  - Problem solving, organization, abstraction
- Memory
- Personality
Initial Studies for Prevention

• Reduce the incidence of delirium through choice of sedation agent.

• Reduce overall exposure to intensive care and sedatives.
Effect of Sedation With Dexmedetomidine vs Lorazepam on Acute Brain Dysfunction in Mechanically Ventilated Patients
The MENDS Randomized Controlled Trial

Pratik P. Pandharipande, MD, MSCI
Brenda T. Pun, RN, MSN, ACNP
Daniel L. Herr, MD
Mervyn Maze, MB, ChB
Timothy D. Girard, MD, MSCI
Russell R. Miller, MD, MPH
Ayumi K. Shintani, MPH, PhD
Jennifer L. Thompson, MPH
James C. Jackson, PsyD
Stephen A. Deppen, MA, MS
Renee A. Stiles, PhD
Robert S. Dittus, MD, MPH
Gordon R. Bernard, MD
E. Wesley Ely, MD, MPH

Context Lorazepam is currently recommended for sustained sedation of mechanically ventilated intensive care unit (ICU) patients, but this and other benzodiazepine drugs may contribute to acute brain dysfunction, i.e., delirium and coma, associated with prolonged hospital stays, costs, and increased mortality. Dexmedetomidine induces sedation via different central nervous system receptors than the benzodiazepine drugs and may lower the risk of acute brain dysfunction.

Objective To determine whether dexmedetomidine reduces the duration of delirium and coma in mechanically ventilated ICU patients while providing adequate sedation as compared with lorazepam.

Design, Setting, Patients, and Intervention Double-blind, randomized controlled trial of 106 adult mechanically ventilated medical and surgical ICU patients at 2 tertiary care centers between August 2004 and April 2006. Patients were sedated with dexmedetomidine or lorazepam for as many as 120 hours. Study drugs were titrated to achieve the desired level of sedation, measured using the Richmond Agitation Sedation Scale (RASS). Patients were monitored twice daily for delirium using the Confusion Assessment Method for the ICU (CAM-ICU).

Main Outcome Measures Days alive without delirium or coma and percentage of days spent within 1 RASS point of the sedation goal.
MENDS II Prevention

• Comparison of sedatives in ventilated ICU patients with sepsis
• Dexmedetomidine (alpha2 agonist) vs. Propofol (GABA-ergic)
• Large multi-site RCT; NHLBI RO1
• Underway
Efficacy and safety of a paired sedation and ventilator weaning protocol for mechanically ventilated patients in intensive care (Awakening and Breathing Controlled trial): a randomised controlled trial

Modifying the Impact of ICU-Associated Neurological Dysfunction

- Test alternative sedation protocols for severely ill patients with sepsis
- RCT – Haldol vs. Ziprasidone vs. Placebo
- 876 ICU ventilated sepsis patients
- Endpoints:
  - Delirium
  - 3-mos mortality
  - Long-term cognitive impairment
Bringing to light Risk factors And Incidence of Neuropsychological dysfunction in ICU survivors
Changing ICU Management Worldwide
Delirium Monitoring in ICUs Worldwide - 2012 (over 20 languages)
Rethinking Critical Care: Reducing Patient Harm from Sedation, Immobility, and Delirium

Session Details

Many ICU patients require sedation, mechanical ventilation, and other life-saving interventions that can lead to complications. Oversedation, immobility, and delirium are a triple threat – separate yet reinforcing complications that can lead to long-term patient harm. They are also strong predictors of length of stay, increased morbidity and mortality, long-term cognitive impairment, and high cost of care.
Delirium overview and how to diagnose it

Delirium is confusion that comes on very fast, sometimes in just a few hours. When someone becomes delirious, it means that they can not think clearly, have trouble paying attention and are not aware of what is going on around them. Sometimes they may even see or hear things that are not really there but seem very real to them.

ABCDEs of Prevention and Safety

ABCDE is a standard bundle of ICU measures that include spontaneous Awakening and Breathing Coordination, attention to the Choice of Sedation, Delirium monitoring, and Early mobility and exercise. All individual components of this bundle are evidence based and can help standardize communication, improve interdisciplinary patient care, reduce mortality, and improve long-term cognitive and functional outcomes.

- ABCDE Basics/Checklist
- ABCDE Pocket Reference
- ABCDE Education Slides
- ABCDE Bundle
- ABCDE Chest Article
- ABCDE Crit Care Med Article
- WALL STREET JOURNAL covers ABCDE
- CAM-ICU Training Slides

Video: Some common sedatives could negatively affect the brain
Video: 10 Key Points Tutorial
Video: Dr. Valerie Page - Delirium in ICU
Video: Using the CAM-ICU
Video: Improving the lives of people we will never meet
Clinical and Translational Science

Lab Science

- In vitro studies
- In vivo/animal models
- Potential Clinical Application

Content of Care

- Comparative Effectiveness
- Efficacy and safety

Process of Care

- Health Services Research
- Patient-Centered Equitable Efficient

Structure/Barriers

- Health Policy
- Insurance
- Behaviors and satisfaction
- Cost
- Morbidity and mortality

Outcomes

- T4 Outcomes Research
- T3 Implementation Science
- T2 Effectiveness and safety

Mechanisms of Disease

Epidemiology: Risk Factors for Disease Incidence Surveillance of System & Outcomes

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ICU Delirium and Cognitive Impairment Study Group: selected local members

Pratik Pandharipande  Leanne Boehm  Tim Girard
Jim Jackson  Joyce Okahashi  John Gore
Jin Han  Cayce Strength  Baxter Rogers
Ed Vasilevskis  Brenda Pun  Stephan Heckers
Chris Hughes  Lauren Hardy  Cathy Fuchs
Alessandro Morandi  Amy Lipsey  Heidi Smith
Paula Watson  Ryan Black  Ty Berutti
Lorraine Ware  Jessica McCurley  Brad Strohler
Gordon Bernard  Michael Santoro  Elizabeth Card
Bob Dittus  Carrie Jones  Jennifer Thompson
Ted Speroff  Morgan Crawford  Ayumi Shintani
Wes Ely  Mayur Patel  Stephanie Hamilton