

# Delirium and Falls

Falls Prevention Network Forum 19 May 2017

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# Delirium and Falls

- Both 'Giants of Geriatric Medicine'
- Significant overlap
- Both cause significant morbidity and mortality
- Delirium is the most common diagnosis affecting older people in hospital, affecting 25% of people over 65 admitted
- Falls are common in hospital and in the community
- Many shared risk factors
- Why think about them together?

# Is there a relationship between falls and delirium in hospital?

- Some things in common
  - Can happen at any age, but more common with older patients
  - Lengthen ALOS
  - ↑ risk of morbidity/mortality/NH placement
- Some differences
  - Diagnosis of falls in hospital usually clear
  - Delirium: 50% of cases are missed, esp hypoactive delirium



# Falls in the General Hospital

Lakatos BE. Psychosomatics 2009; 50: 218-26.

- Chart review of **252 patients who fell** at Massachusetts General Hospital in Boston
- Looked for evidence of delirium (diagnosis; use of a synonym or; criteria for delirium, ie disturbance of consciousness, change in cognition, fluctuations through the day, and evidence of physiological derangements)
- 60% of fallers unable to be discharged home directly
- Patients with delirium
  - 18.7% had diagnosis recorded,
  - 72% of hospital records included  $\geq 1$ : confused, change in mental status, unsteady gait, disorientation, mental status improved, required restraints, memory deficit, dizziness, sundowning, decreased responsiveness, somnolent, and syncope
- **96% of patients who fell showed evidence of delirium**

# Why was delirium not diagnosed?

No charts included the terms:

- 1) disturbance of consciousness;
- 2) change in cognition;
- 3) fluctuations during the day and night; and

**Mentioned:** a change in cognition (33%), encephalopathy (25%), an acute confusion syndrome (14%), hepatic encephalopathy (11%), delirium tremens (6%), a toxic metabolic state (5%), and agitation (2%).

**Terms in the electronic record:** confused, a change in mental status, an unsteady gait, disorientation, mental status improved, required restraints, a memory deficit, dizziness, sundowning, decreased responsiveness, somnolent, and syncope were used by staff to describe the patient who fell and manifested cognitive impairment.



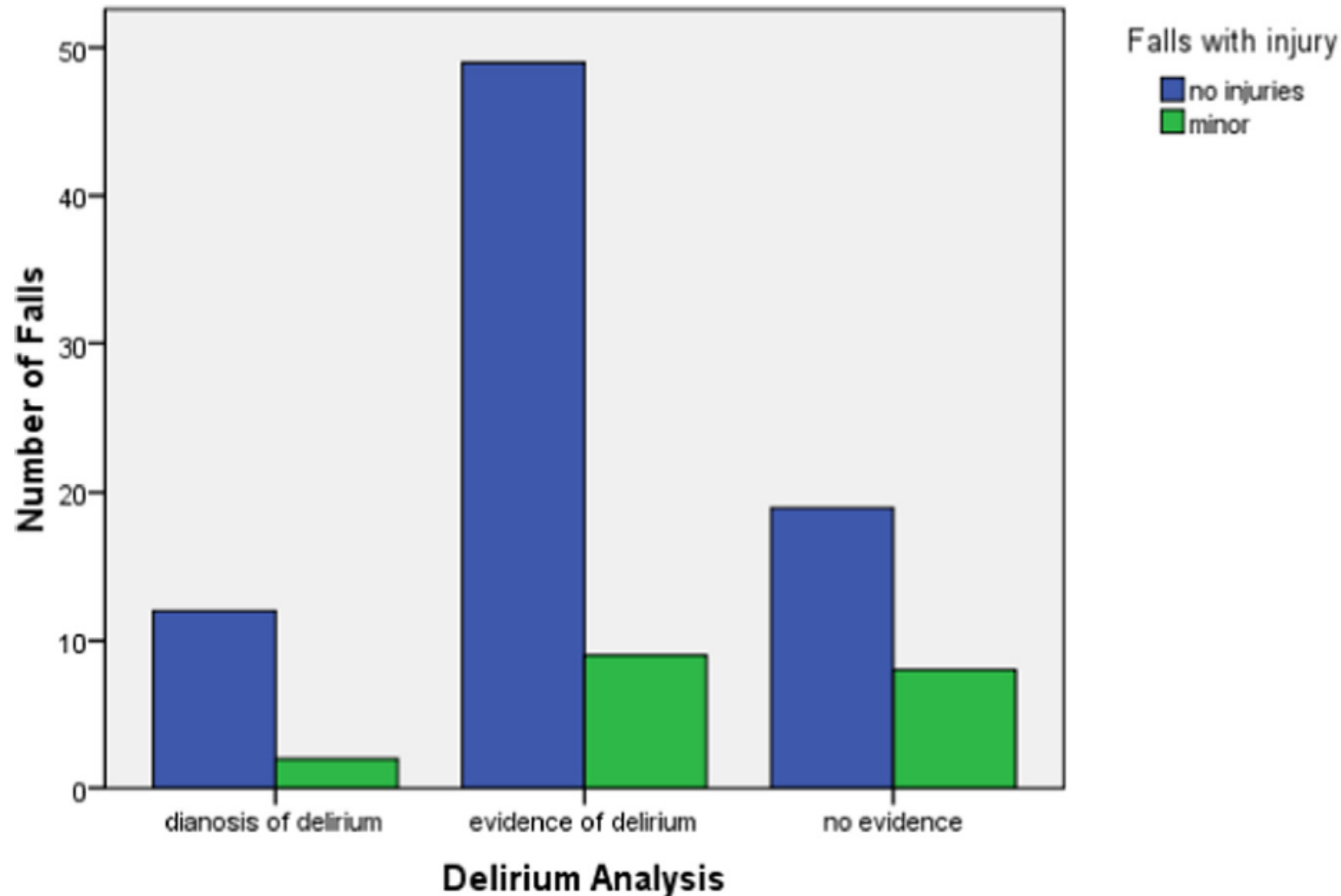
# This study has been replicated

Babine RL. Psychosomatics 2016; 57: 273-82.

- Maine Medical Center which has a HELP delirium prevention program
- Retrospective review of 99 patients who fell
- 73% had evidence or a diagnosis of delirium

# Interaction: delirium + injury from fall

Babine RL Psychosomatics 2016; 57:273-82





# How did falls + delirium interact on ALOS

Lakatos BE. Psychosomatics 2009; 50: 218-26.

Patients with	ALOS (days)
Neither fall nor delirium	5.83
Fall only	15.0
Fall + diagnosis of delirium	17.5
No fall, but evidence of delirium	14.6



# Could therapy for delirium prevent falls?

- We do not have any drugs licensed to treat delirium in ED or on the wards
- Antipsychotics/BZDs will increase falls
- What about multicomponent interventions?
- Two 2015 meta-analyses have examined this question
  - Slightly different protocols: would their results differ?

# Effectiveness of Multicomponent Nonpharmacological Delirium Interventions

## A Meta-analysis

*JAMA Intern Med.* 2015;175(4):512-520. doi:10.1001/jamainternmed.2014.7779

Tammy T. Hsieh, MD; Jirong Yue, MD; Esther Oh, MD; Margaret Puelle; Sarah Dowal, MSW, MPH;  
Thomas Trivison, PhD; Sharon K. Inouye, MD, MPH

- Hospital Elder Life Program: interdisciplinary team + trained volunteers to deliver: reorientation; early mobilisation; therapeutic activities; hydration; nutrition; sleep strategies; hearing + vision adaptations
- Newer multicomponent interventions for surgical patients
- Aim to meet holistic needs of patients and prevent delirium
- Meta-analysis of 14 articles, incl 2 from Australia



# Preventing delirium + falls

Hshieh TS. JAMA Internal Med 2015; 175: 512-20.

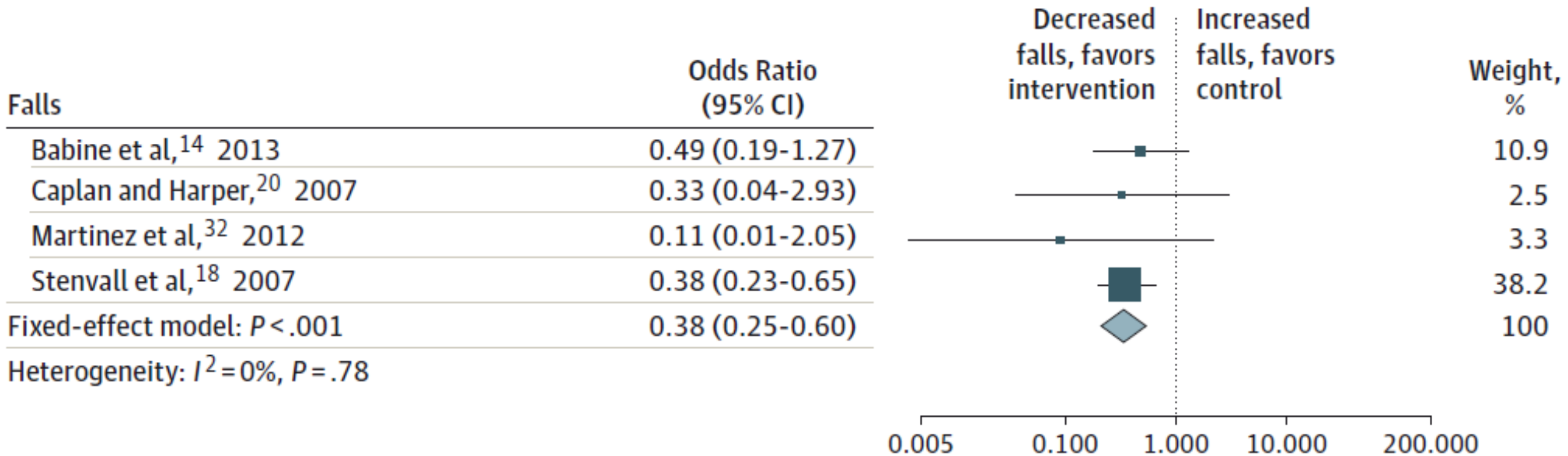
Table 2. Meta-analysis of the Effect of Multicomponent Nonpharmacological Delirium Interventions

Variable	Intervention		Control		Odds Ratio or Mean Difference (95% CI)	<i>I</i> <sup>2</sup> Value, %
	Outcome Events	Total Patients	Outcome Events	Total Patients		
Delirium Incidence						
RMTs <sup>5,17,30,32</sup>	83	977	137	1009	0.56 (0.42 to 0.76)	0
Non-RMTs <sup>16,20,26-29,31</sup>	46	752	164	1013	0.37 (0.27 to 0.53)	20
Combined	129	1729	301	2022	0.47 (0.38 to 0.58)	18
Falls						
RMTs <sup>18,32</sup>	18	245	64	240	0.36 (0.22 to 0.61)	0
Non-RMTs <sup>14,20</sup>	6	274	31	279	0.46 (0.19 to 1.10)	0
Combined	24	519	95	519	0.38 (0.25 to 0.60)	0

Overall, 53% decrease in odds of getting delirium,  
and 62% decrease in odds of falling  
Equivalent to preventing 4.26 falls per 1000 patient days

# Forest plot figure

Hshieh TS. JAMA Internal Med 2015; 175: 512-20.





# Preventing delirium: should non-pharmacological, multicomponent interventions be used?

## A systematic review and meta-analysis of the literature

FELIPE MARTINEZ<sup>1,2</sup>, CATALINA TOBAR<sup>3,4</sup>, NATHAN HILL<sup>5</sup>

*Age and Ageing* 2015; **44**: 196–204

doi: 10.1093/ageing/afu173

Published electronically 25 November 2014

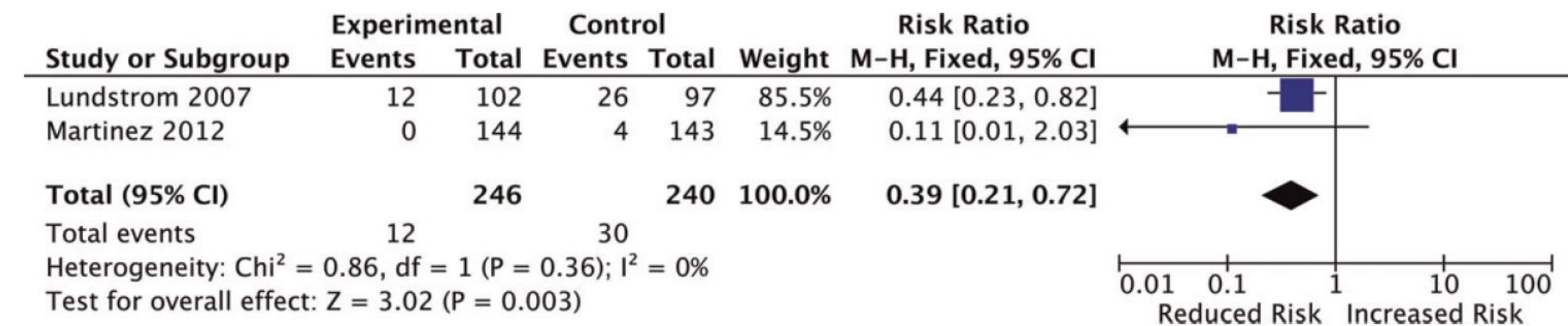


Figure 4. Accidental falls.

# Comparison with other interventions for preventing falls in hospitals

Cameron ID. Cochrane Review 2012 DOI: 10.1002/14651858.CD005465.pub3

## Don't reduce falls

- Additional physiotherapy (supervised exercises) (2 studies)
- Vitamin D supps (1 study)
- Carpet flooring: ↑falls cf vinyl
- Computer based falls prevention toolkit
- Acute Geriatric ward
- Behaviour advisory service
- Educational materials

## Reduced falls

- Educational session by a trained research nurse reduced falls
- Multifactorial interventions (1 targeting falls): education; exercise; falls risk alert card; hip protectors (1 orthogeriatric service)



# Other effects

Hshieh TS. JAMA Internal Med 2015; 175: 512-20.

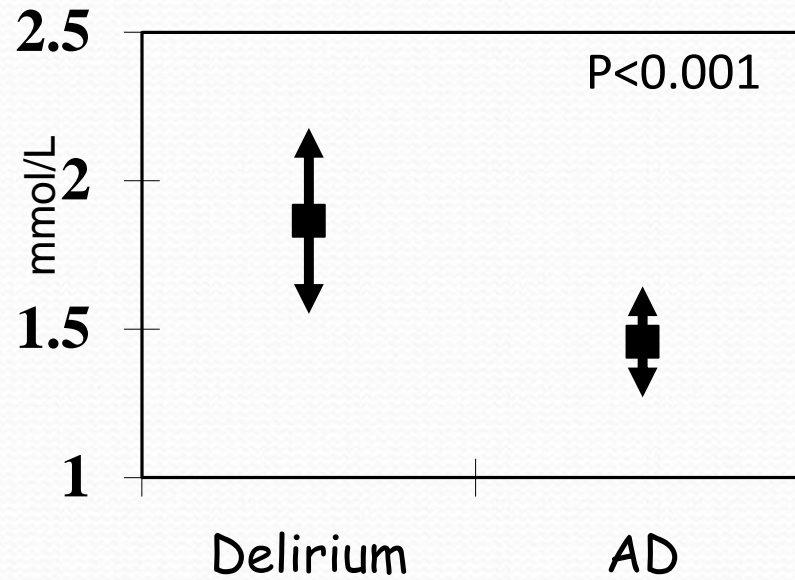
- Multicomponent interventions had no significant effect on institutionalisation, ALOS, change in functional or cognitive status

# Other therapeutic options for delirium?

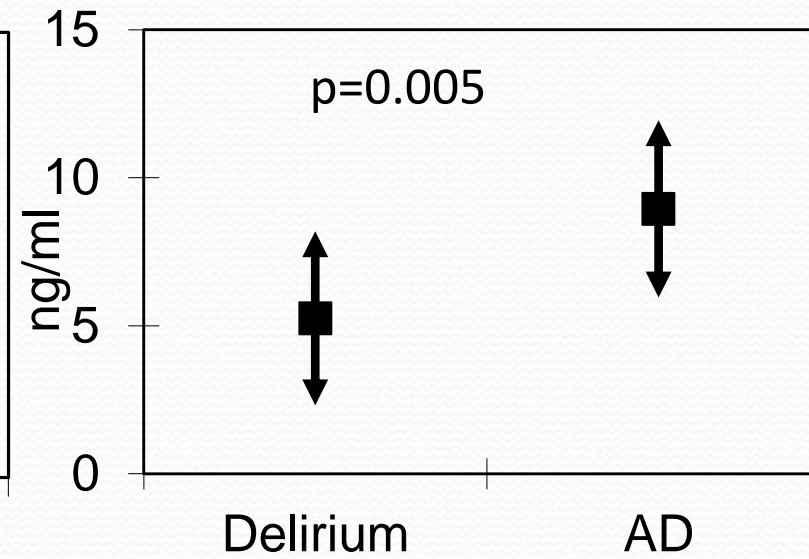
- Research into delirium pathophysiology provides insights to potential therapeutic targets
- Neuroinflammation
- Altered glucose metabolism



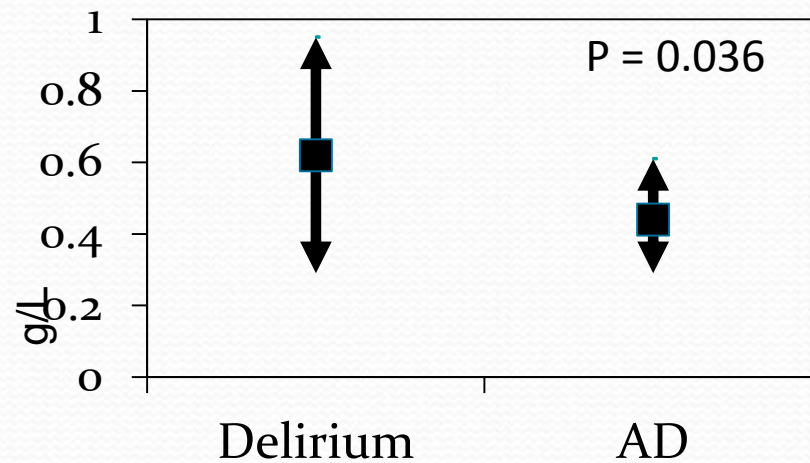
## CSF Lactate



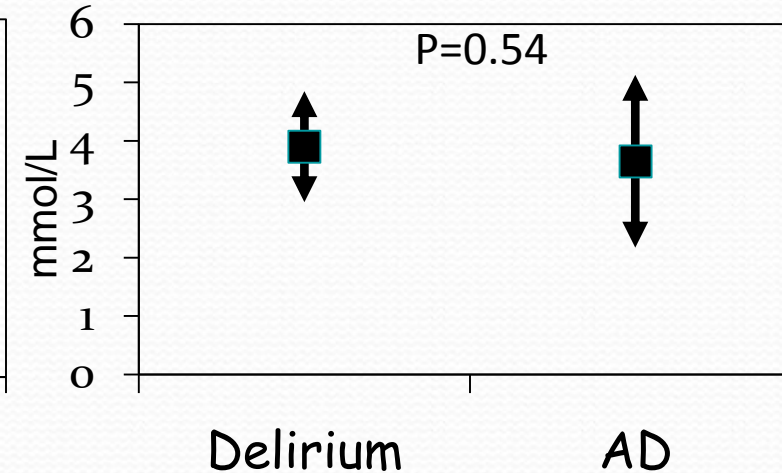
## CSF Neuron Specific Enolase



## CSF Protein

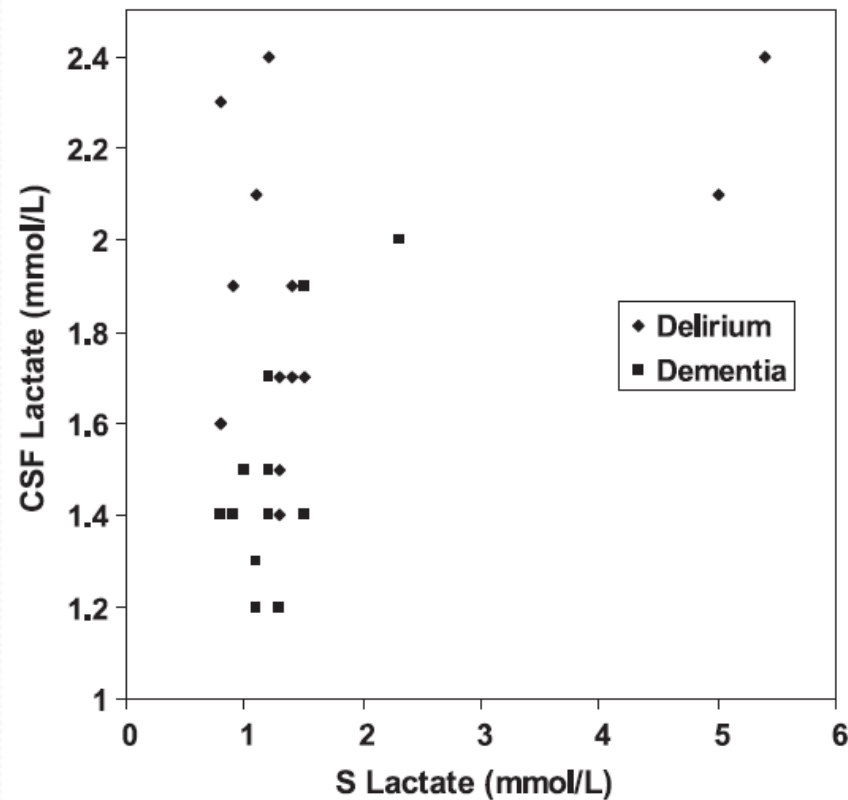


## CSF Glucose

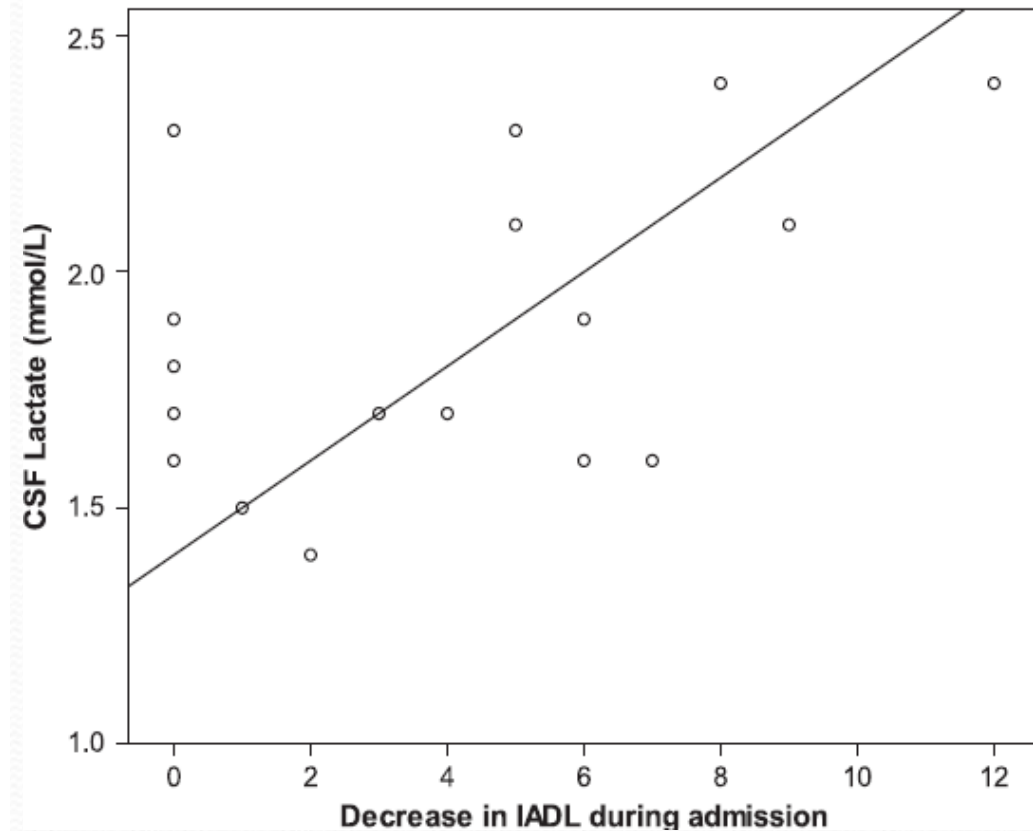


# CSF Lactate

Caplan GA. J Gerontol: Med Sci 2010; 65A: 1130.



Correlation Coefficient = 0.15;  $p = 0.52$

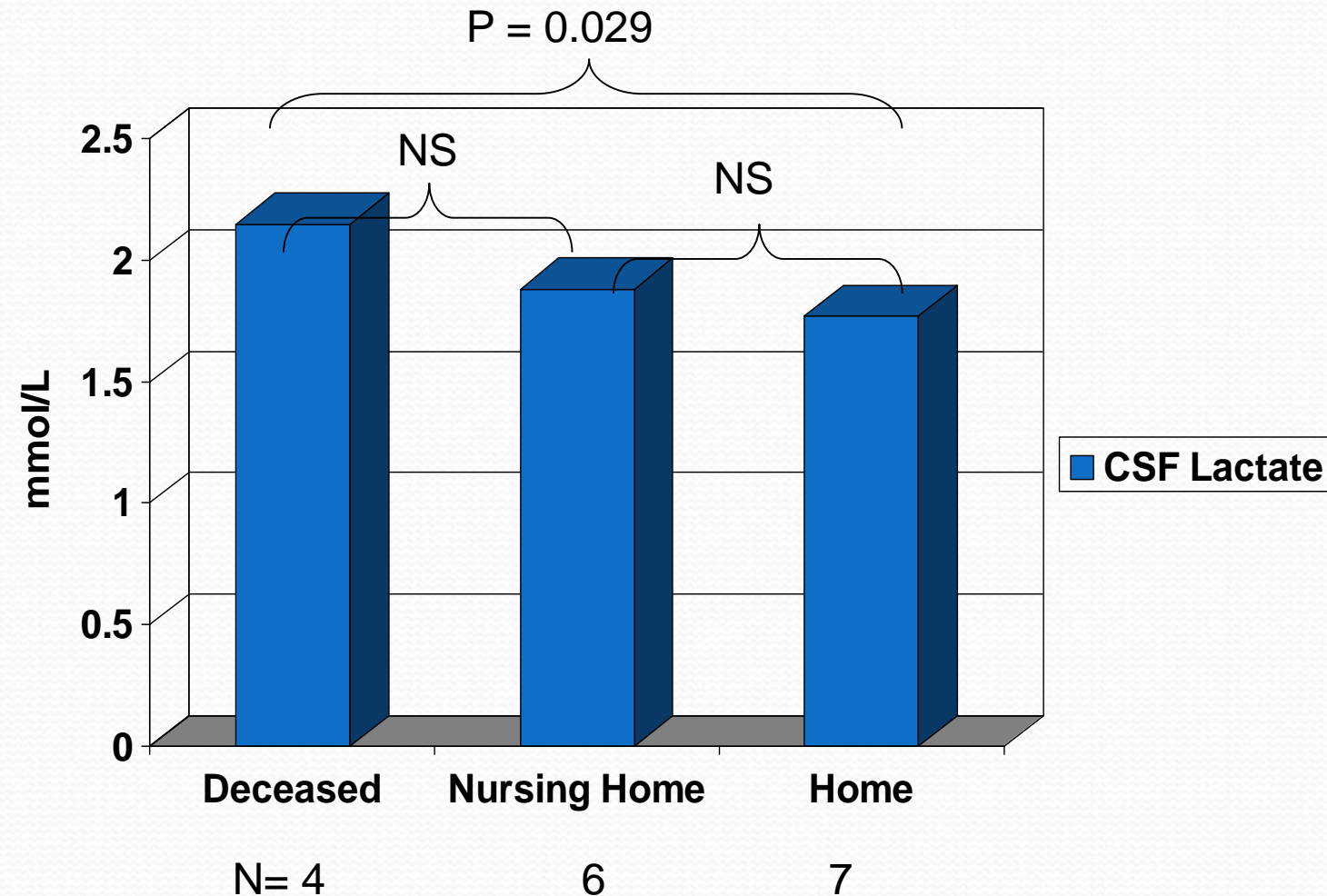


Correlation Coefficient = 0.48;  $p = 0.043$



# Prognostic value of CSF Lactate in delirium

Caplan GA. J Gerontol: Med Sci 2010; 65A: 1130.



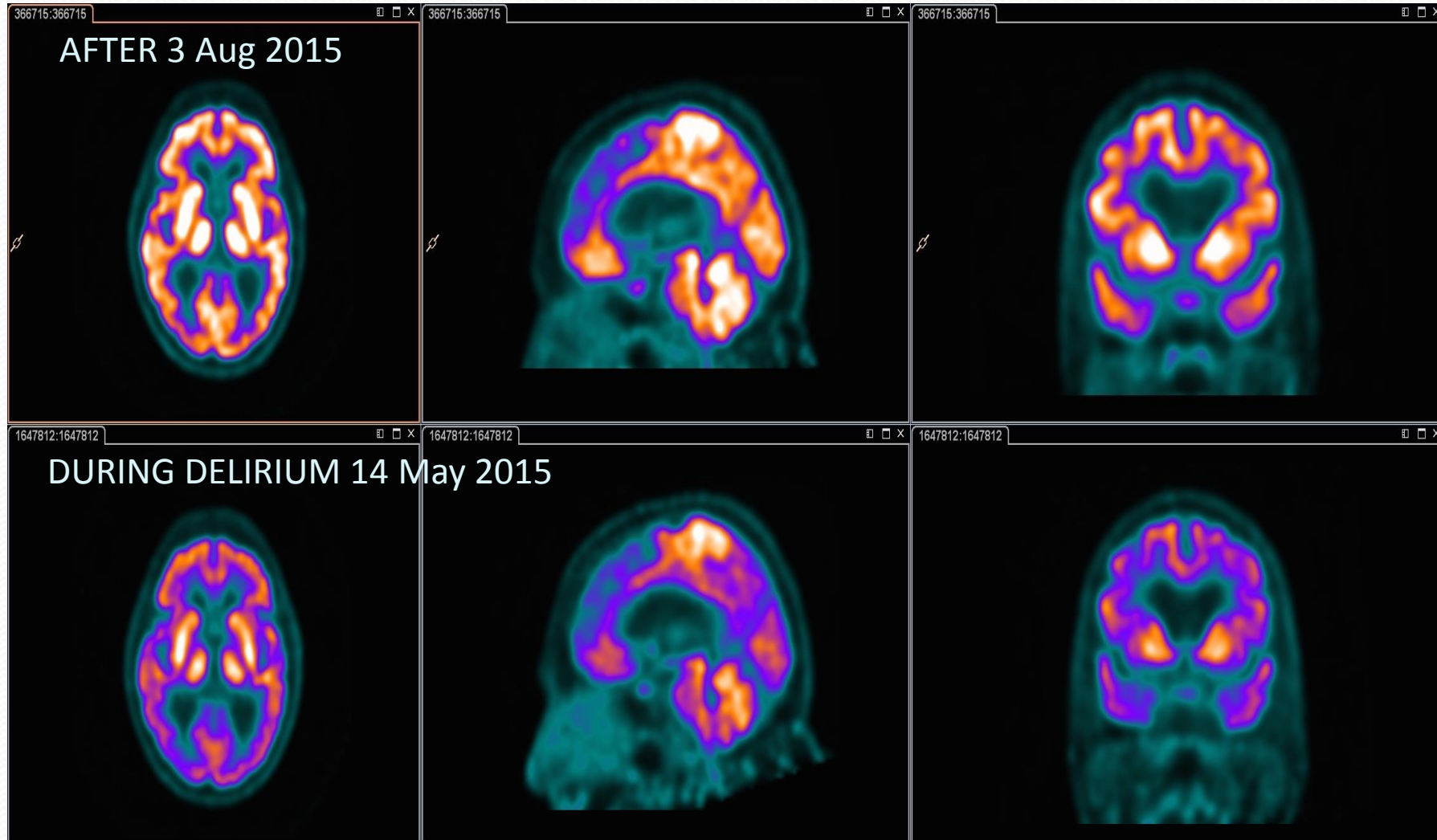
# What does this mean?

- $\uparrow$  lactate indicates  $\uparrow$  anaerobic glycolysis
- $\downarrow$  neuron specific enolase indicates  $\downarrow$  aerobic glycolysis
- Complementary evidence of disordered cerebral metabolism
- Another way to measure cerebral glucose metabolism is with a fluorodeoxyglucose PET brain scan



# 2-18F-fluoro-2-deoxy-D-glucose PET Scans

Haggstrom LR. JCBFM 2017 DOI: 10.1177/0271678X17701764



# Delirium research

- This explains why antipsychotics worsen delirium
- Glucose metabolism a potential target for pharmacological intervention in delirium
- At a critical and exciting juncture
- Stay tuned





*Australasian Delirium Association*  
*proudly presents*

*A Masterclass*  
*with*

*Prof Sharon Inouye*

**Professor of Medicine, Harvard  
Director, Aging Brain Center  
Beth Israel Deaconess Medical Center**



**Monday 23<sup>rd</sup> October 2017**

**Scientia Building UNSW**

**Details on ADA website: [delirium.org.au](http://delirium.org.au)**