Delirium, Multimorbidity and Frailty: Epidemiological Links

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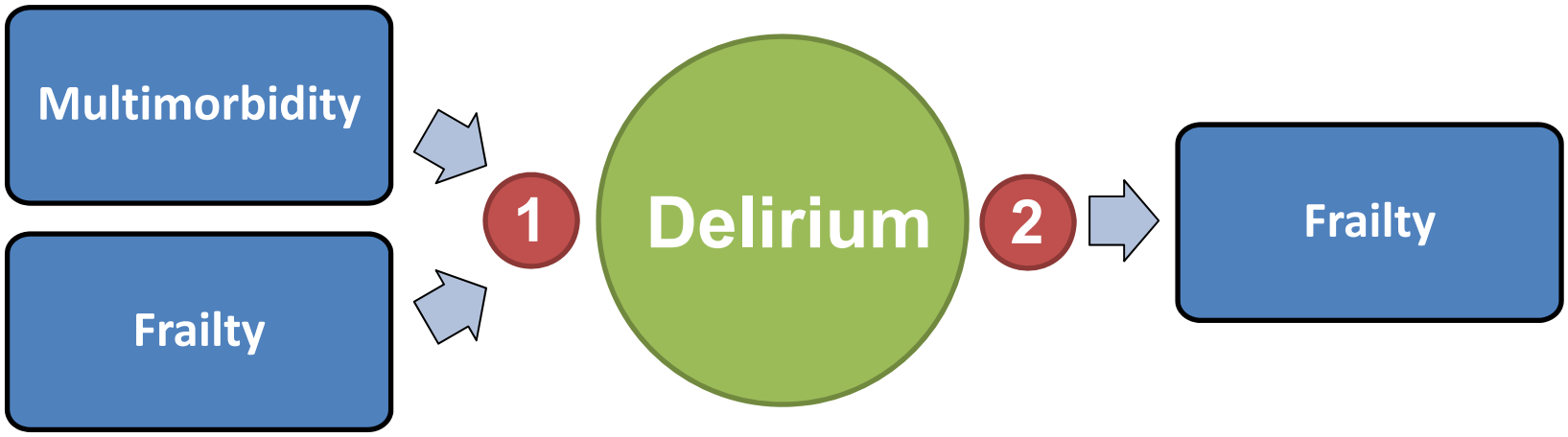
Delirium, Multimorbidity and Frailty

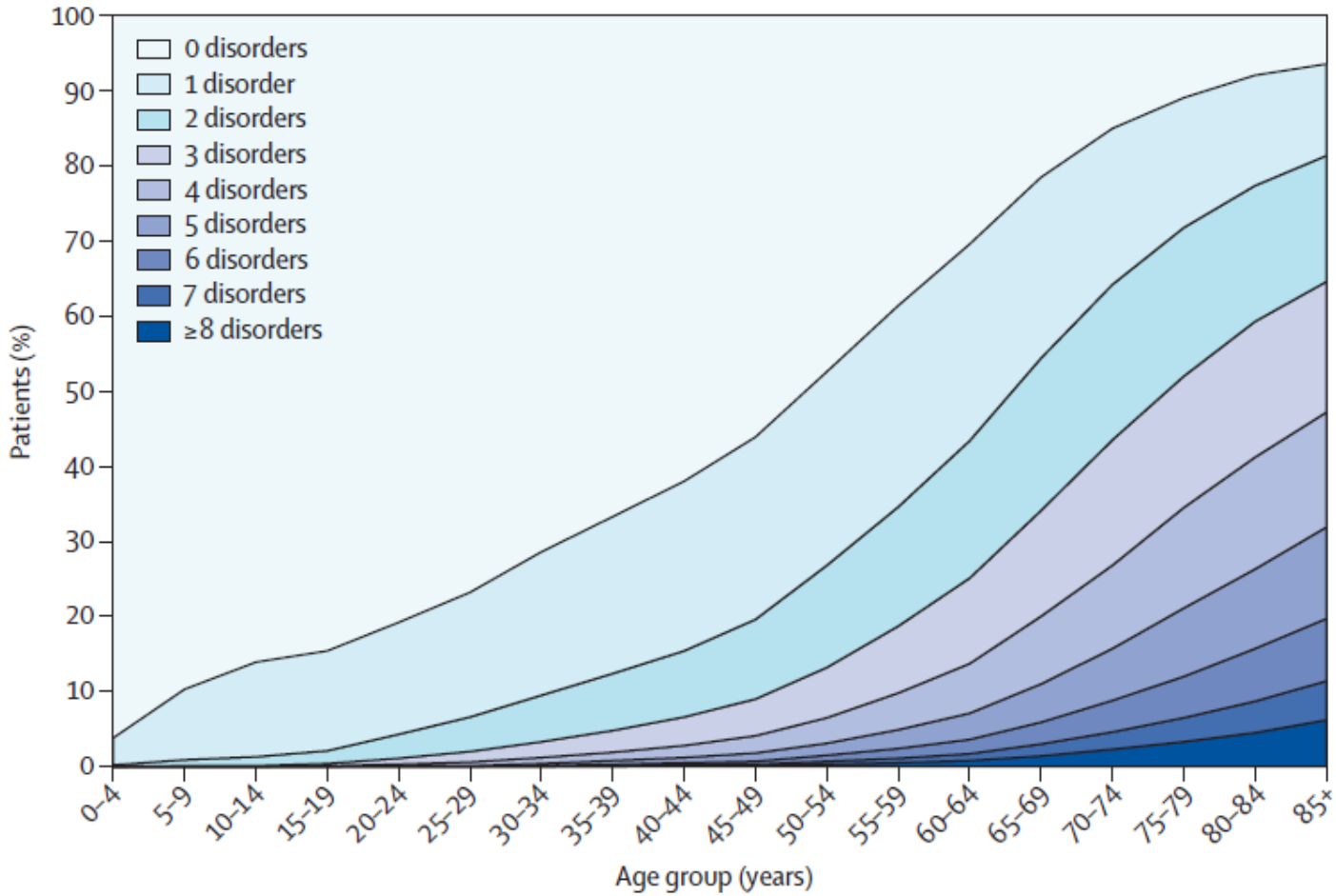


1. **Is there a relationship between frailty & multimorbidity and the development of delirium?**

2. **Is there a relationship between delirium and the development of frailty?**

What Is Multimorbidity?

Multimorbidity is the co-occurrence of two or more diseases in the same individual.



Barnett K, Mercer SW et al. Lancet 2012 380: 37.

Multimorbidity as a Risk Factor for Delirium

Multivariable Models for Delirium Predictors in Hospitalized Older Adults

	Odds Ratio	95% C.I.
Hospitalized Medical Patients		
Cognitive impairment	3.58	2.06 to 6.21
Comorbidity burden	1.66	1.39 to 1.98
Postoperative Hospitalized Delirium		
Cognitive impairment	2.47	1.57 to 3.87
Comorbidity burden	1.96	1.40 to 2.74

Pompei P, Foreman M et al. JAGS 1994 42: 809.
Robinson TN, Raeburn CD et al. Ann Surg 2009 249(1):173.

What Is Frailty?

Frailty is a state of decreased reserves and increased vulnerability to all kinds of stresses, identifies individuals who likely will have low tolerance for any new medical or surgical condition

Phenotypic Frailty	Geriatric Assessment Frailty
Exhaustion	Cognition
Weight loss	Function
Weak grip strength	Social circumstances
Slow walking speed	Comorbidity burden
Low energy expenditure	Geriatric syndromes

Fried LP, Tangen CM et al. J Geront 2001 56A: M146
Rockwood K, Song X et al. CMAJ 2005 173: 489

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Based from: Cardiovascular Health Study

Widely recognized due to: Canadian Study of Health and Aging

Fried LP, Tangen CM et al. J Geront 2001 56A: M146
Rockwood K, Song X et al. CMAJ 2005 173: 489

Frailty as a Risk Factor for Delirium

Study: The relationship of preoperative phenotypic frailty score to postoperative delirium was studied in patients 65 years and older undergoing non-cardiac operations. (n=63)

Table 3. Multivariate Logistic Regression of the Predictors of Postoperative Delirium

Variable	β	Odds ratio	95% confidence interval	*P* value
Preoperative depression score	0.35*	1.42	1.06–1.91	0.018
Preoperative frailty score	0.61	1.84	1.07–3.15	0.028

Conclusion: Phenotypic frailty score is independently associated with the development of postoperative delirium.

Leung JM, Tsai TL et al. Anesth Analg 2011 112(5): 1199.

Frailty as a Risk Factor for Delirium

Study: The relationship of preoperative accumulated deficit frailty score to postoperative delirium was studied in patients consecutive patients undergoing vascular operations. (n=142)

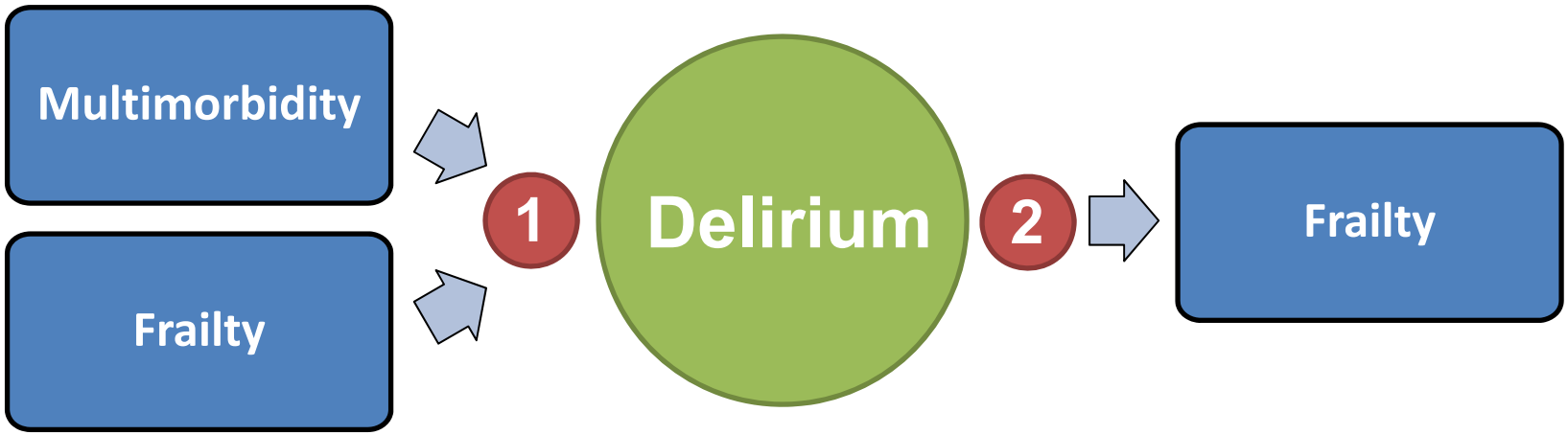
Table 5 Multivariate analysis of risk factors for the development of postoperative delirium.

Variable	Odds ratio	95% Confidence interval	*P*
GFI-score	1.9	0.9–3.7	0.05
Comorbidities (CCI)[a]	0.9	0.5–1.7	0.84
C-reactive protein	1.0	0.9–1.0	0.19

Conclusion: Accumulated deficit frailty score is helpful in the early identification of post-operative delirium.

Pol RA, van Leeuwen BL et al. Eur J Vasc Endovasc Surg 2011 42: 824.

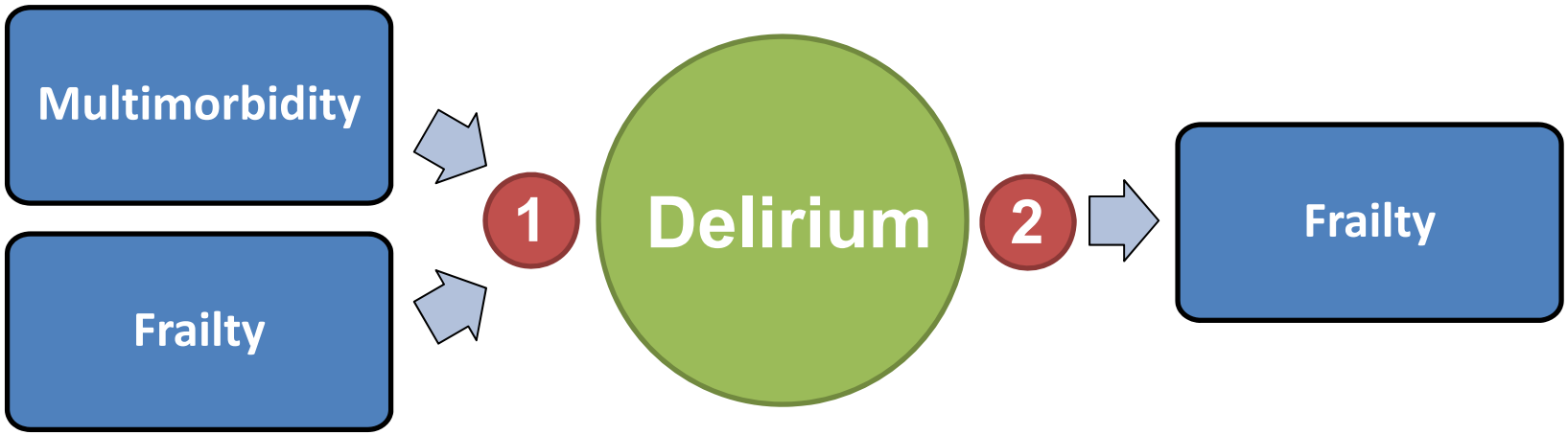
Delirium, Multimorbidity and Frailty



Summary

1 Multimorbidity and frailty are both associated with the development of delirium.

Delirium, Multimorbidity and Frailty

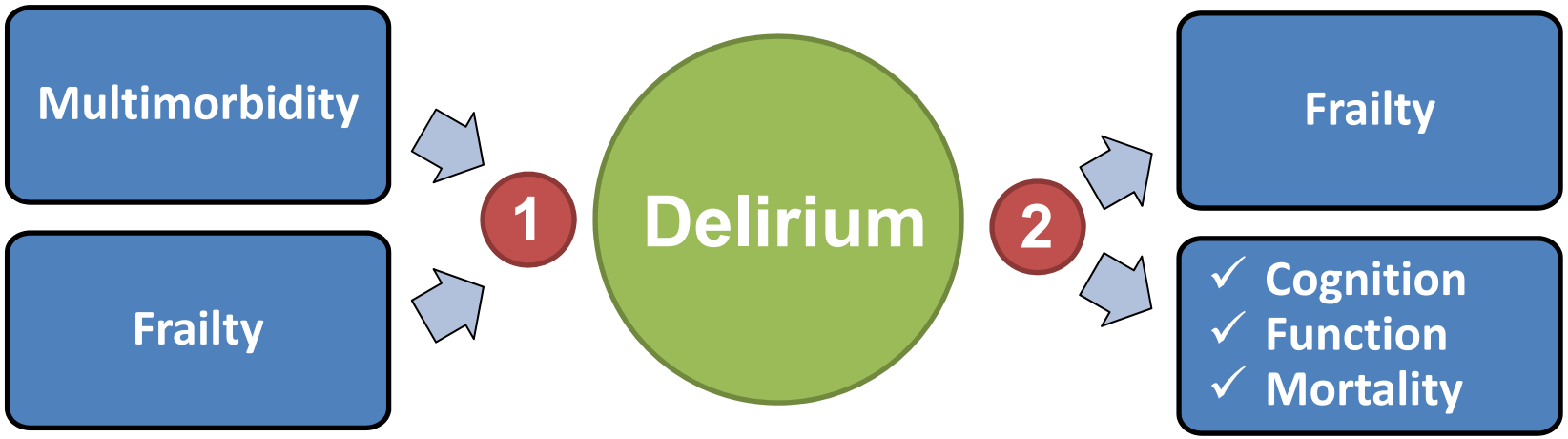


Future Directions

1 Examine the relative strength of various chronic diseases to the occurrence of delirium.

Examine the relative strength of the components of frail scores to the occurrence of delirium.

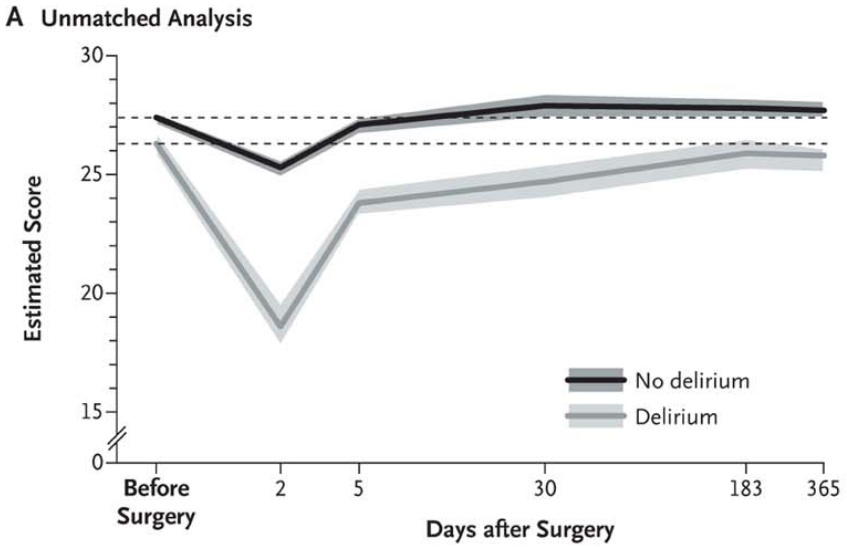
Delirium as a Risk Factor for Frailty



2 Is there evidence to suggest a relationship between delirium and the development of frailty?

COGNITIVE TRAJECTORIES AFTER POSTOPERATIVE DELIRIUM

Study: Cognition was compared in delirious and non-delirious cardiac surgery patients 60 years and older for one year following surgery. (n=225)



Conclusion: Delirium is associated with a significant decline in cognitive ability during the first year after cardiac surgery, with a trajectory characterized by an initial decline and prolonged impairment.

Saczynski JS, Marcantonio ER et al. NEJM 2012 367(1): 30.

Function after Postoperative Delirium

Study: Function was compared in delirious and non-delirious cardiac surgery patients 60 years and older for one year following surgery. (n=190)

Table 3. Delirium and Risk of Functional Decline

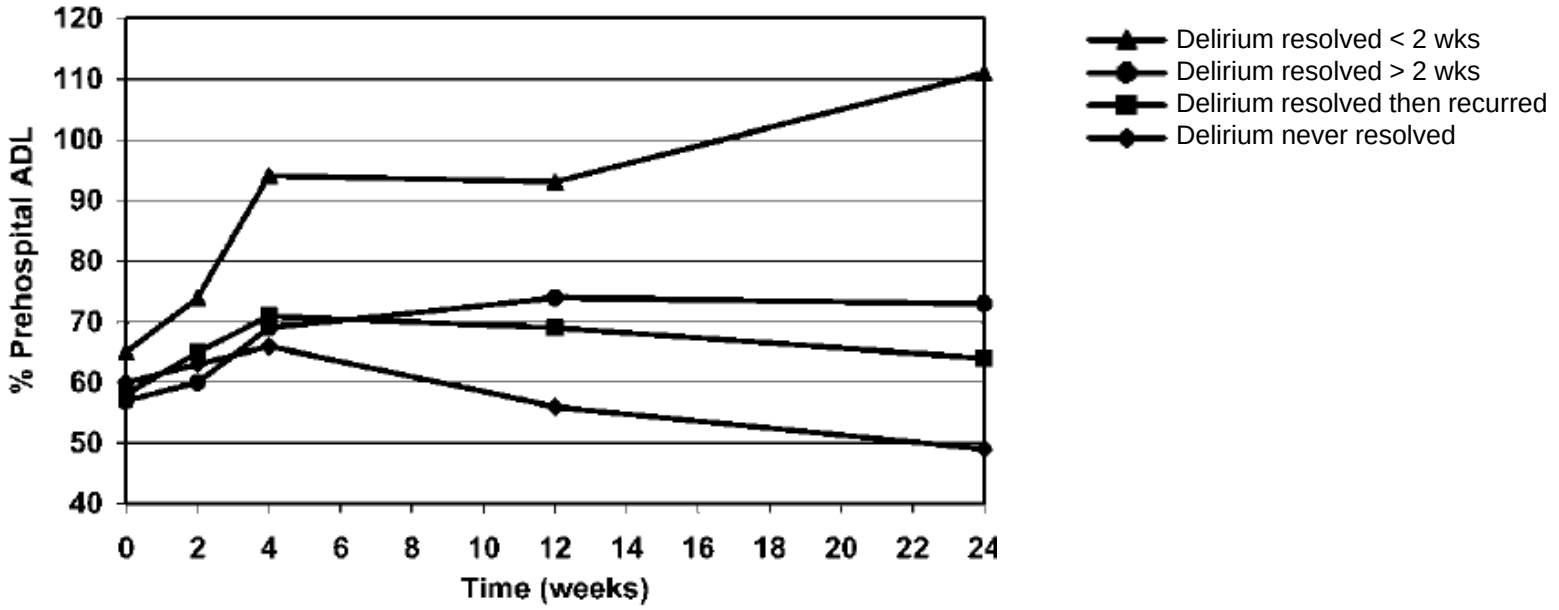
	Functional Decline n/N (%)		Risk of Functional Decline* Relative Risk (95% Confidence Interval)	
Follow-Up	With Delirium	Without Delirium	Unadjusted	Adjusted†
1 month	37/74 (50)	28/105 (27)	1.9 (1.3–2.8)	1.8 (1.2–2.6)
12 months	16/78 (21)	11/100 (11)	1.9 (0.9–3.8)	1.5 (0.6–3.3)

Conclusion: Delirium was independently associated with functional decline at one month and had a trend toward association at 12 months following cardiac operations.

Rudolph JL, Inouye SK et al. JAGS 2010 58(4): 643.

Association of Delirium Resolution and Functional Recovery

Study: Delirious patients admitted to postacute care facilities were enrolled. Association of delirium resolution and functional recovery was assessed. (n=393)



Conclusion: Resolution of delirium among postacute care patient appears to be a prerequisite for functional recovery.

Kiely DK, Jones RN et al. J Geront Med Serv 2006 61A(2): 204.

Delirium and Subsequent Cognitive and Functional Status

Study: One year function and cognition was compared in delirious and non-delirious hospitalized medical patients 65 years and older. (n=315)

Cognition Outcomes:
Adjusted mean difference in Mini-Mental Status Exam scores between patients with and without delirium was:

Patients without dementia: -3.36 (95% CI: -6.15 to -0.58)

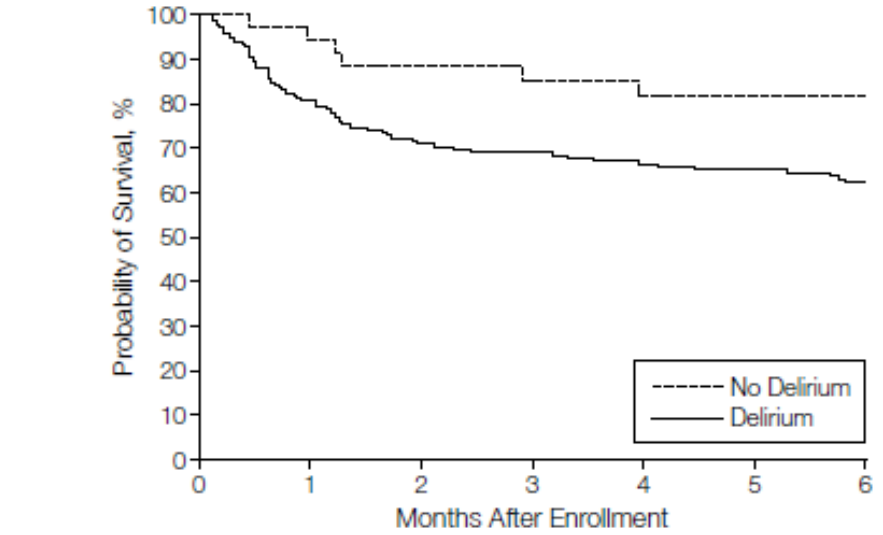
Function Outcomes:
Adjusted admission to long-term care rates: OR 3.18 (95% CI: 1.19 to 8.49)

Conclusion: Delirium is an independent predictor of sustained poor cognitive and functional status during the year after a medical admission to hospital.

McCusker J, Cole M et al. CMAJ 2001 165(5): 575.

Delirium as a Independent Predictor of Mortality

Study: Study enrolled consecutive mechanically ventilated medical and coronary intensive care unit patients. (n=275)



Conclusion: Delirium was an independent predictor of higher six-month mortality.

Ely EW, Shintani A et al. JAMA 2004 291: 1753.

Delirium Motor Subtypes and Outcomes

Study: Mortality was compared in patients based on delirium motor subtype postoperatively in adults 50 years and older. (n=172)

	No Delirium n=98	Mixed n=23	Hypoactive n=50	
6 Month Mortality	3%	9%	32%	p=0.041

Conclusion: Hypoactive delirium is associated with higher six-month mortality in comparison to no delirium or delirium with agitation.

Robinson TN, Raeburn CD et al. Arch Surg 2011 146(3): 295.

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	No Delirium n=98	Mixed n=23	Hypoactive n=50	
6 Month Mortality	3%	9%	32%	p=0.041
Age (years)	60±6	65±9	71±9	p=0.001

Conclusion: Hypoactive delirium is associated with higher six-month mortality in comparison to no delirium or delirium with agitation.

Robinson TN, Raeburn CD et al. Arch Surg 2011 146(3): 295.

Hypoactive Delirium and Age

Study: Delirium motor subtype study in MICU patients. (n=614)

	Age < 65 years	Age ≥ 65 years	
Hypoactive delirium	21%	41%	P<0.001

Older age independently associated with hypoactive delirium
Adjusted Odds Ratio = 3.0, 95% CI: 1.7 to 5.3

Conclusion: Older age is a strong predictor of hypoactive delirium in MICU patients.

Peterson JF, Pu PT et al. JAGS 2006 54:479

Delirium Motor Subtypes and Outcomes

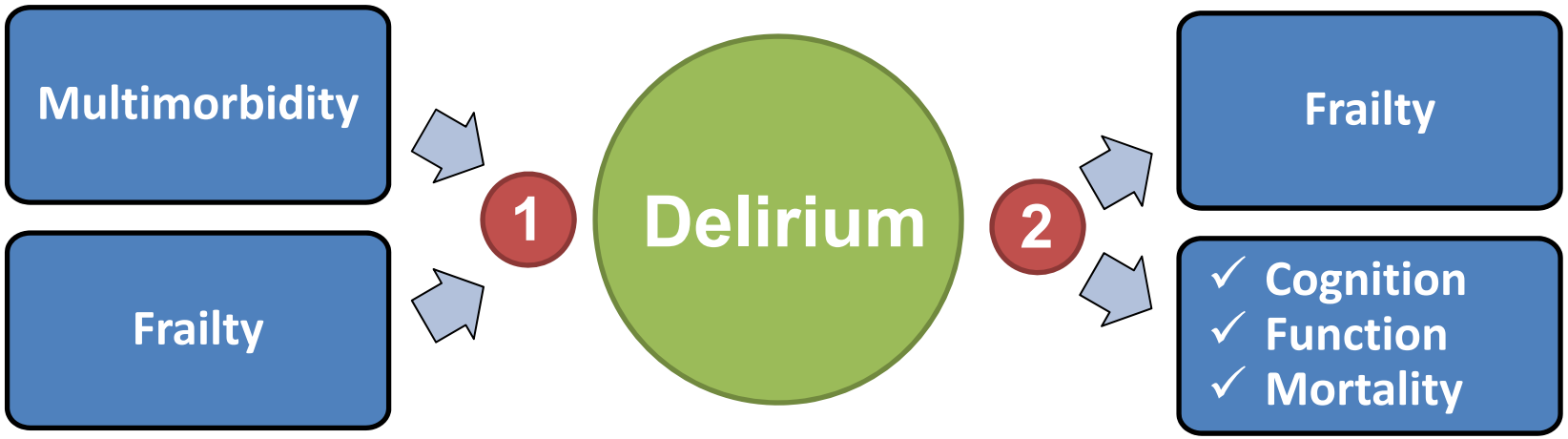
Study: Psychomotor variants of delirium and outcomes following hip fracture surgery in patients 65 years and older. (n=122)

	Hypoactive n=34	Hyperactive n=14	
Length of stay	7.0 ± 5.9	9.9 ± 7.2	p=0.22
Nursing home placement/death	32%	79%	p=0.003

Conclusion: Pure hypoactive delirium was associated with better outcomes.

Marcantonio E, Ta T et al. JAGS 2002 50: 850.

Delirium as a Risk Factor for Frailty



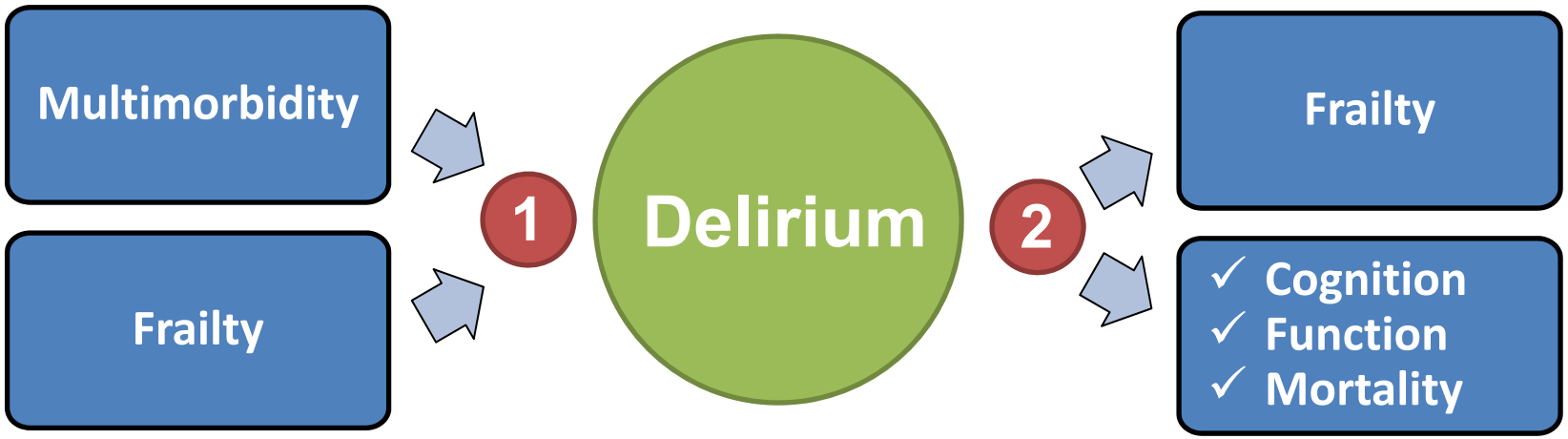
Summary

2

Delirium is associated with subsequent declines in cognition and function.

A causal relationship between delirium and subsequent frailty is unclear.

Delirium as a Risk Factor for Frailty



Future Directions

2 Examine the occurrence of frailty following hospital stays of older adults with and without delirium.

Determine the relationship of the motor subtypes of delirium and the subsequent development of frailty.