

Assessing Physical Function After Organ Transplantation in Adults

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Disclosures

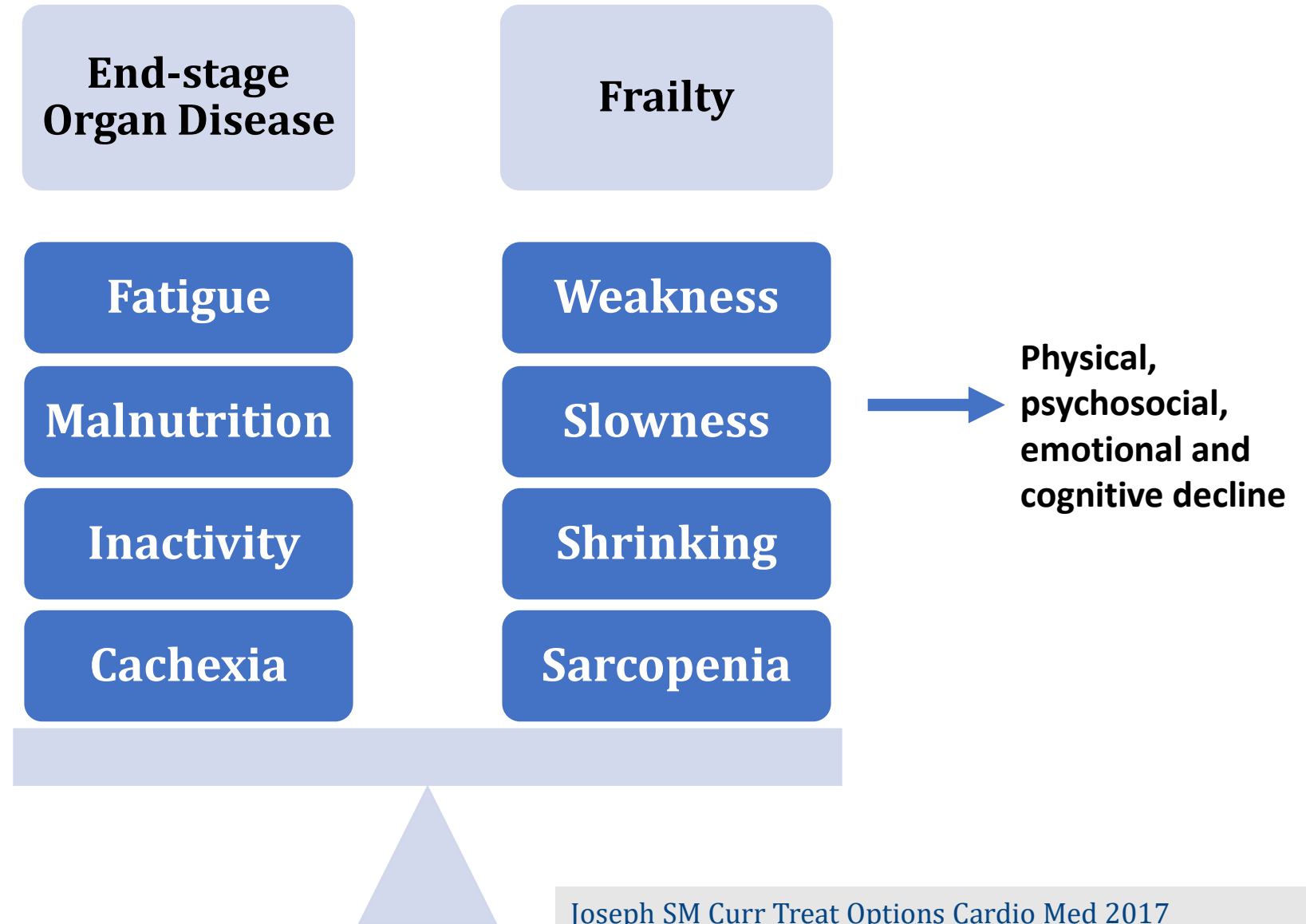
- None

What is Frailty?

- State of increased vulnerability to physiologic stress
- Distinct from aging, comorbidity, disability
- No gold standard
20 assessment tools



Frailty – A Common Problem in Transplantation



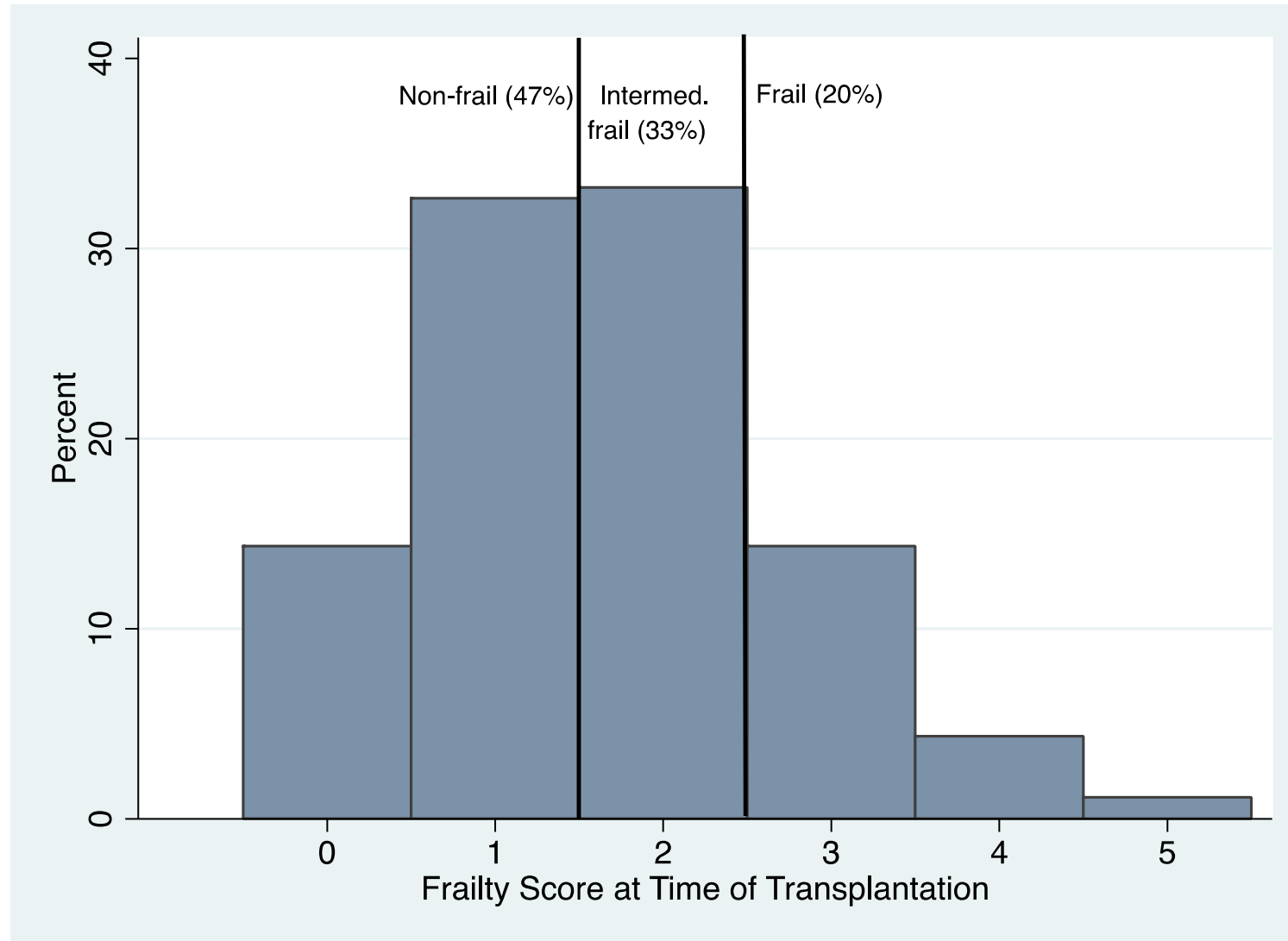
Fried Criteria

- The most extensively validated tool is the Fried Phenotype
- Five Components:
 - Unintentional weight loss
 - Exhaustion
 - Low physical activity
 - Gait speed
 - Hand grip strength
- Each weighted a point
- 3 or more = frail
- 1-2= pre-frail



Grip Dynamometer

Frailty prevalence is high at Kidney Transplant



Frail KT recipients are at increased risk of poor outcomes

Frailty is associated with:

- 1.57-times the odds of 2 week or longer **KT length of stay**
 - McAdams-DeMarco/Segev, Ann Surgery 2016
- 2.20-times the odds of post-KT **delirium**
 - Haugen/McAdams-DeMarco, JASN under review
- 1.61-fold increased risk of **early hospital readmission**
 - McAdams-DeMarco/Segev, AJT 2013
- 1.94-fold increased risk of **delayed graft function**
 - Garonzik-Wang/Segev, JAMA Surgery, 2012
- 1.29-fold increased risk of **drug intolerance**
 - McAdams-DeMarco/Segev, Transplantation 2014
- 2.19-fold increased risk of **mortality**
 - McAdams-DeMarco/Segev, AJT 2013

Mortality Associated with Frailty After Transplant

	Hazard Ratio	
Kidney	2.19	McAdams-DeMarco/Segev, AJT 2013
Lung	2.3	Wilson ME. J Heart Lung Transplant. 2016
Liver	1.84	van Vugt JL, et al. Am J Transplant 2016
Heart	1.92	Jha SR, Transplantation. 2016

The Transition Challenge





HHS Public Access

Author manuscript

Am J Transplant. Author manuscript; available in PMC 2020 April 01.

Published in final edited form as:

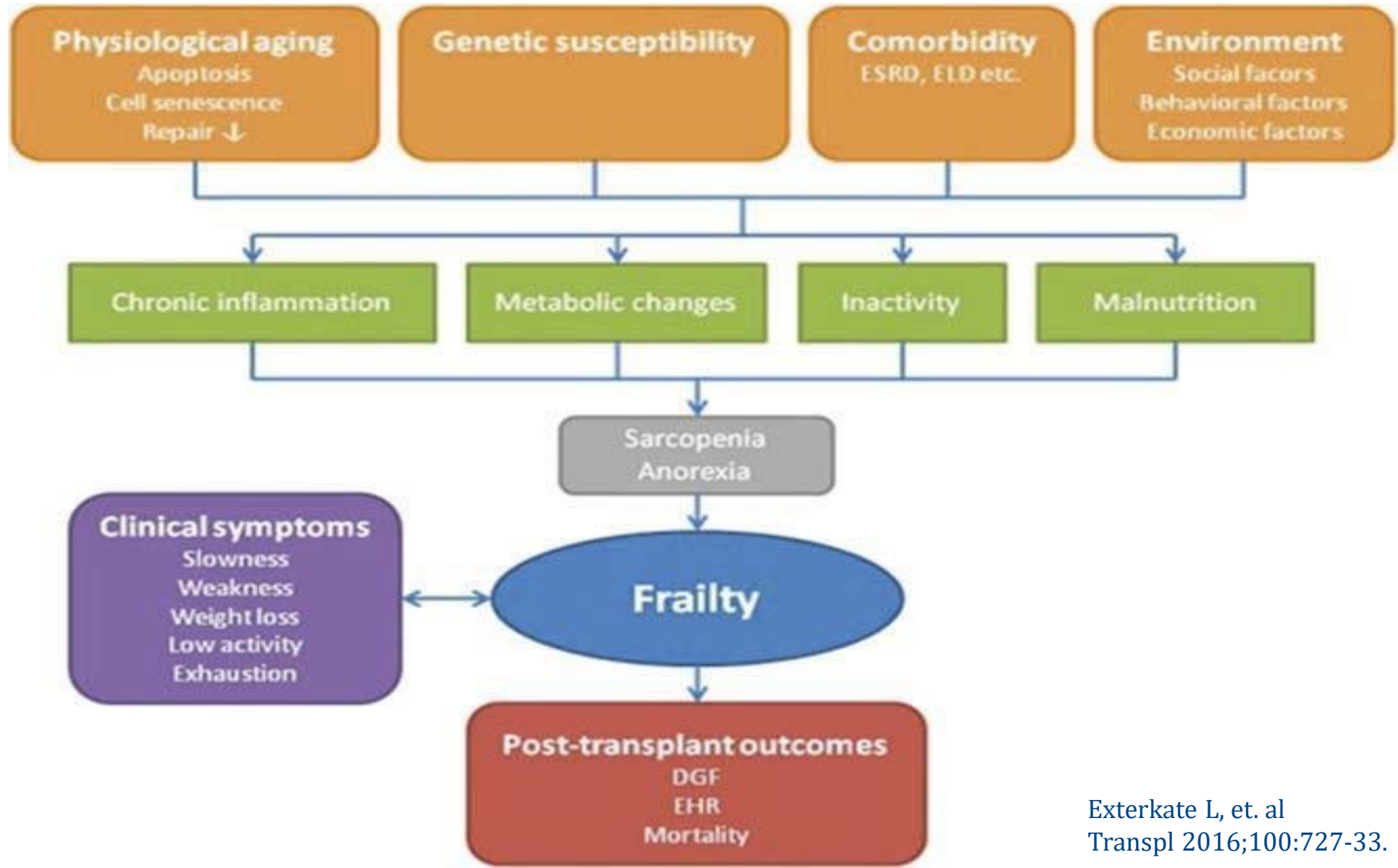
Am J Transplant. 2019 April ; 19(4): 984–994. doi:10.1111/ajt.15198.

Report from the American Society of Transplantation on Frailty in Solid Organ Transplantation

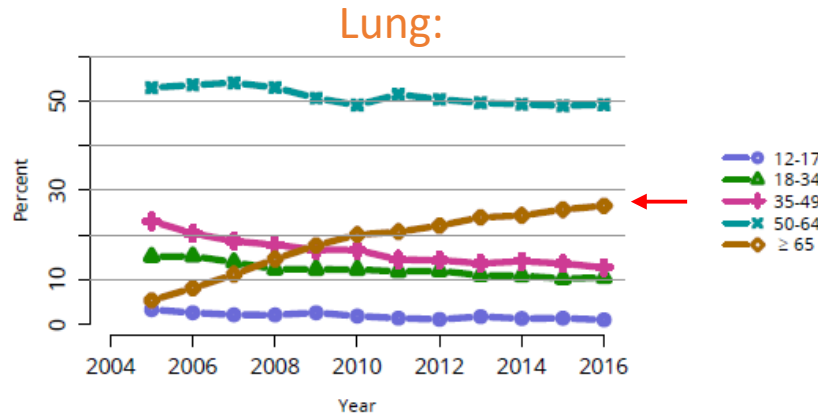
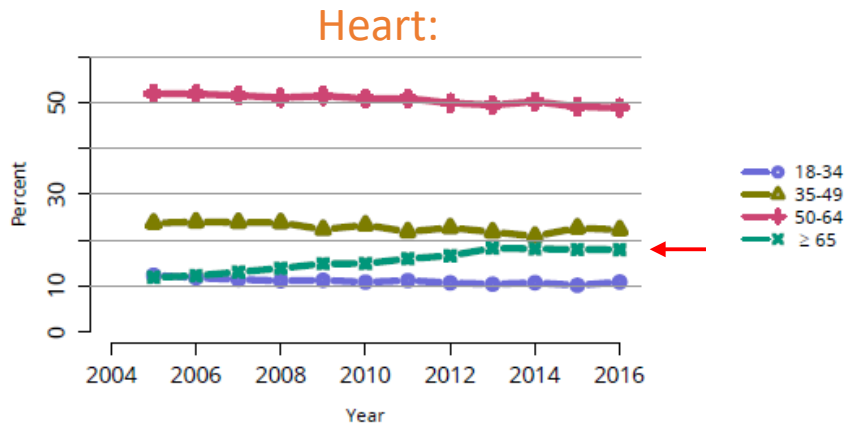
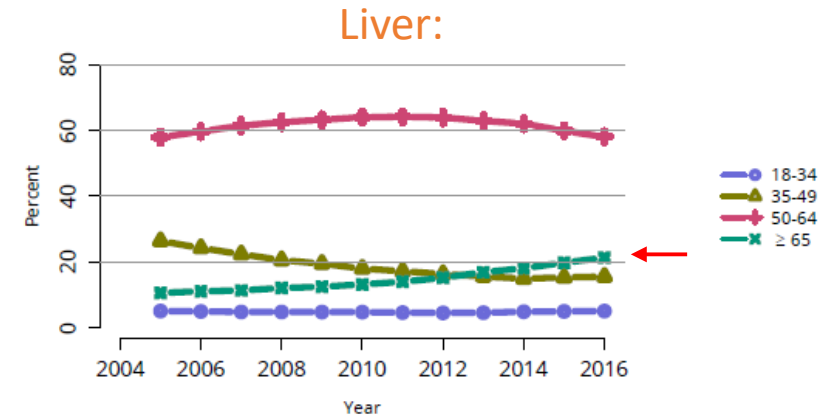
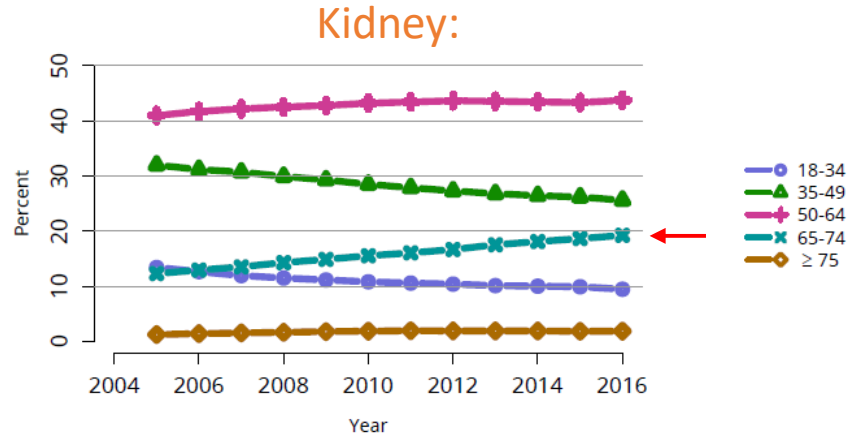
Jon Kobashigawa¹, Darshana Dadhania², Sangeeta Bhorade³, Deborah Adey⁴, Joseph Berger⁵, Geetha Bhat⁶, Marie Budev⁷, Andres Duarte-Rojo⁸, Michael Dunn⁹, Shelley Hall¹⁰, Meera N. Harhay¹¹, Kirsten L. Johansen⁴, Susan Joseph¹⁰, Cassie C. Kennedy¹², Evan Kransdorf¹, Krista L. Lentine¹³, Raymond J. Lynch¹⁴, Mara McAdams-DeMarco¹⁵, Shunji Nagai¹⁶, Michael Olymbios¹, Jignesh Patel¹, Sean Pinney¹⁷, Joanna Schaeenman¹⁸, Dorry L. Segev¹⁵, Palak Shah¹⁹, Lianne G. Singer²⁰, Jonathan P. Singer⁴, Christopher Sonnenday²¹, Puneeta Tandon²², Elliot Tapper²¹, Stefan G. Tullius²³, Michael Wilson¹², Martin Zamora²⁴, and Jennifer C. Lai⁴

- Frailty is a common entity in patients with end-stage organ disease who are awaiting organ transplantation
- Frailty affects mortality on the wait-list and in the post-transplant period.
- The optimal methods by which frailty should be measured in each organ group are yet to be determined.


Frailty Summary



Aging and Transplantation



Prehabilitation for kidney transplant candidates: Is it time?

Xingxing S. Cheng¹  | Jonathan N. Myers^{2,3} | Glenn M. Chertow¹ | Ralph Rabkin^{1,3} |
Khin N. Chan² | Yu Chen³ | Jane C. Tan¹

- The most common intervention was exercise
- Dropout rate, ranged from 5 to 50%
- Overall, exercise intervention appeared to improve physical function, but the magnitude was modest compared to the high level of baseline impairment.
- No data on post-transplant benefits

Controlled Trial of Exercise Rehabilitation after Heart Transplantation

TABLE 3. CHANGES FROM BASE LINE TO SIX MONTHS
IN CARDIOPULMONARY EXERCISE-TEST RESULTS.

VARIABLE	EXERCISE GROUP (N=14)			CONTROL GROUP (N=13)			P VALUE
	BASE LINE	6 MONTHS	DIFFERENCE (% CHANGE)*	BASE LINE	6 MONTHS	DIFFERENCE (% CHANGE)*	
Peak oxygen consumption (ml/kg/min)	9.2	13.6	+4.4 (+49)	10.4	12.3	+1.9 (+18)	0.01
Workload (W)	59	94	+35 (+59)	66	78	+12 (+18)	0.01
Ventilatory equivalent for carbon dioxide	66	53	-13 (-20)	54	48	-6 (-11)	0.02
Ventilatory equivalent for oxygen	79	67	-12 (-15)	64	60	-4 (-6)	0.09
Duration of exercise (min)	6.9	9.0	+2.1 (+30)	7.2	8.3	+1.1 (+15)	0.07
Time to estimated lactic acidosis threshold (min)	1.8	3.3	+1.5 (+83)	2.3	2.3	0	0.09
Resting heart rate (beats/min)	90	100	+10 (+11)	91	109	+18 (+20)	0.06
Peak heart rate (beats/min)	102	125	+23 (+23)	107	134	+27 (+25)	0.25
Systolic blood pressure at rest (mm Hg)	126	121	-5 (-4)	130	114	-16 (-12)	0.20
Peak systolic blood pressure (mm Hg)	141	148	+7 (+5)	139	148	+9 (+6)	0.46
Minute ventilation	38	45	+7 (+18)	46	62	+16 (+35)	0.10
Sitting-to-standing rate (no./min)†	10.6	23.9	+13.3 (+125)	12.3	17.9	+5.6 (+46)	0.02

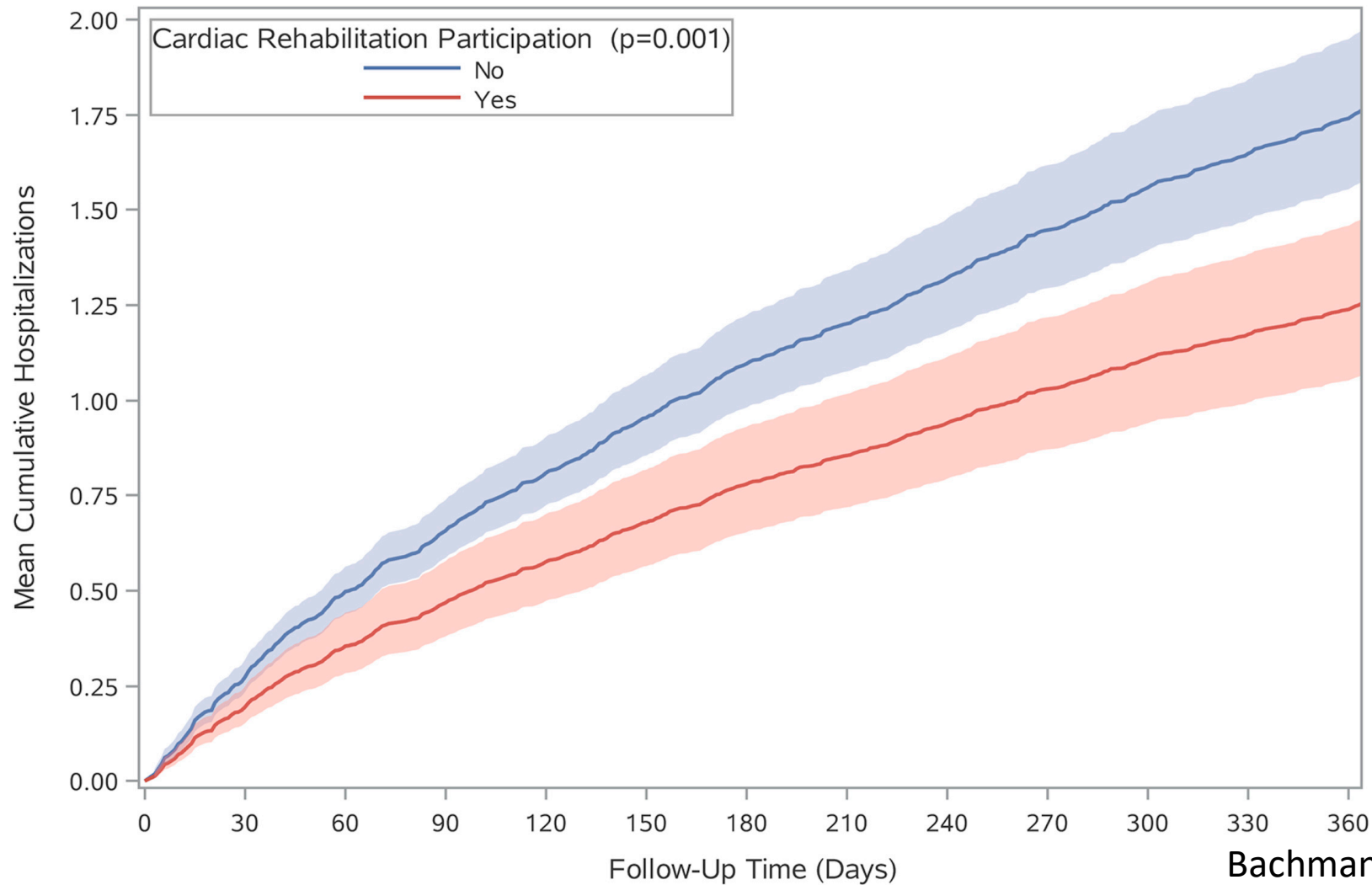
*Plus signs denote an increase, and minus signs a decrease.

†The sitting-to-standing rate is the number of times per minute a patient could rise from a sitting position to a standing position.

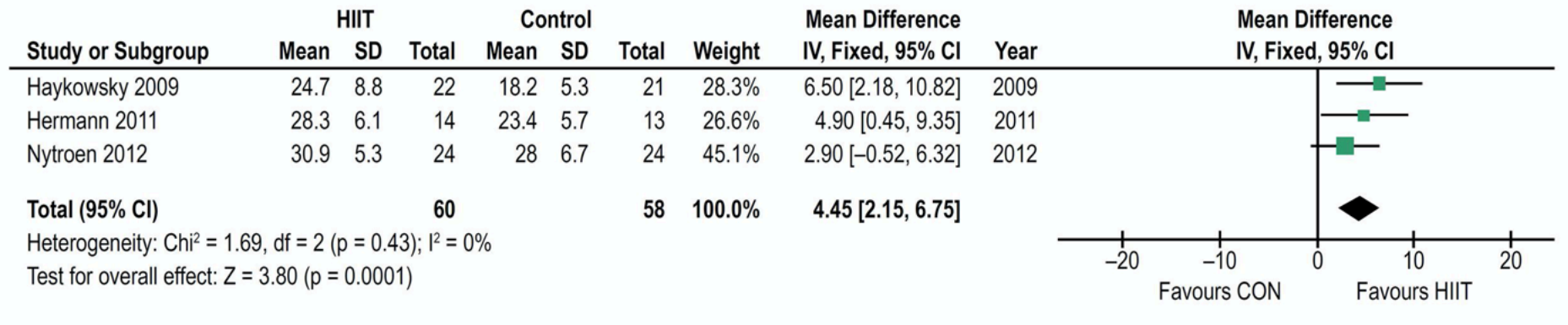


Kobashigawa et al. NEJM 1999

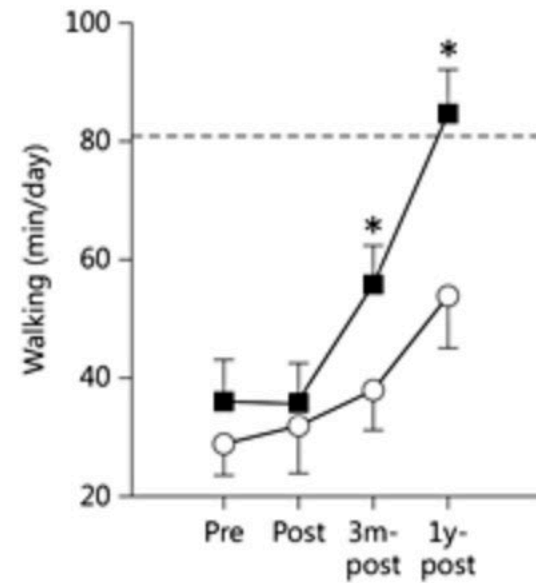
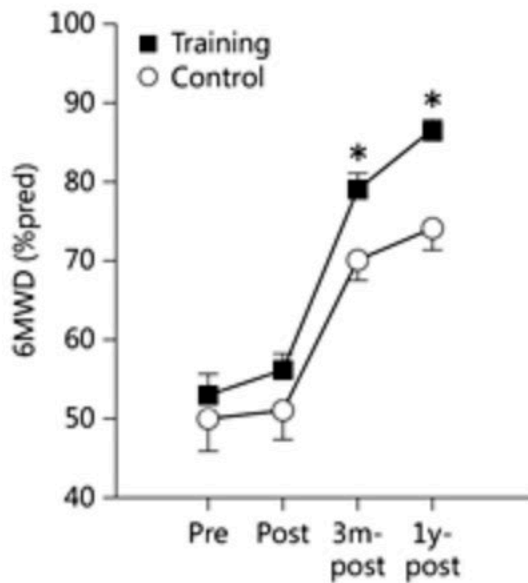
Cumulative readmissions over time for Medicare beneficiaries receiving heart transplants in 2013, stratified by participation in cardiac rehabilitation.



Effect of High Intensity Interval Training After Heart Transplant on VO_2Max

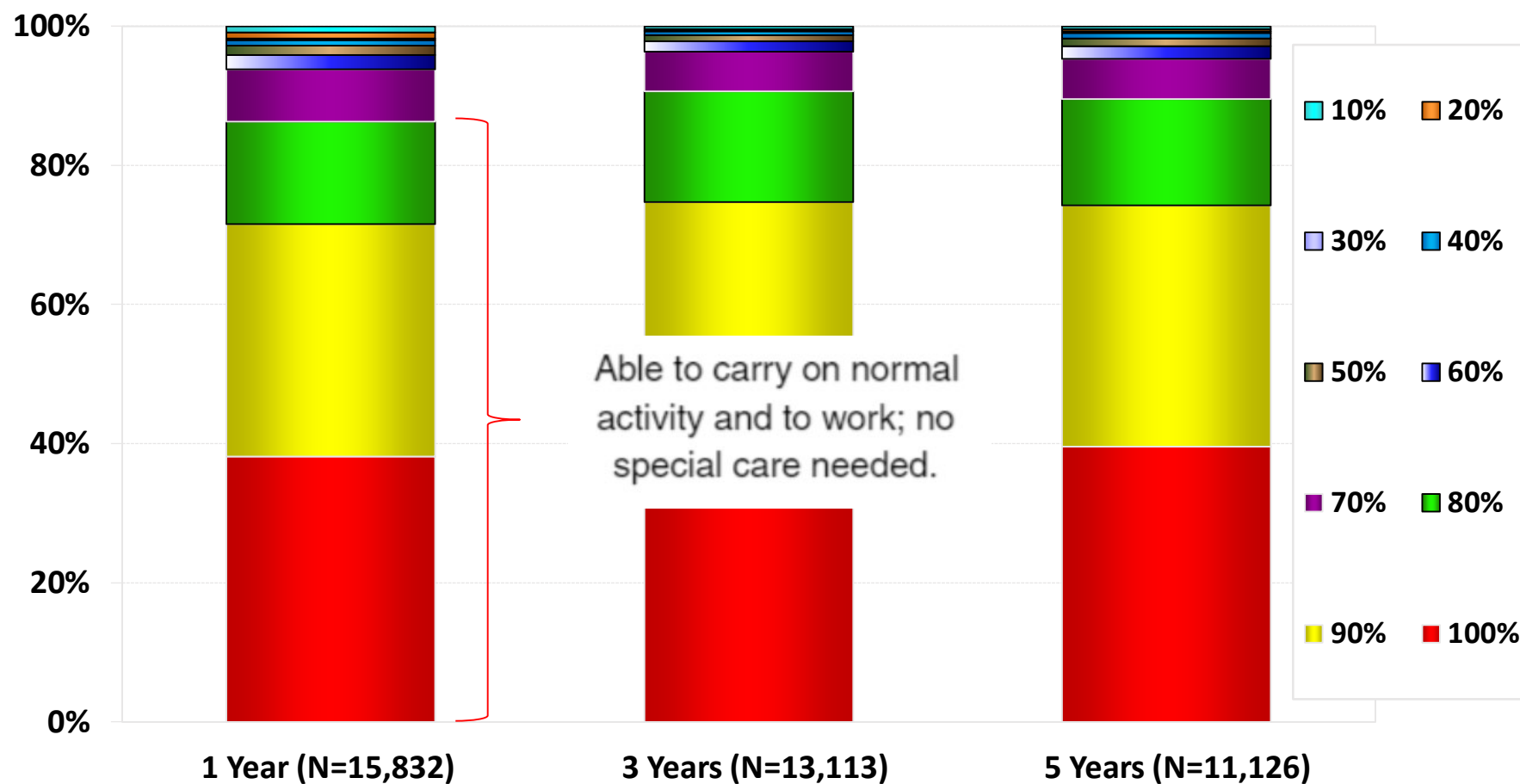


Supervised Exercise Training first 3m after Lung Transplant



Adult Heart Transplants

Functional Status of Surviving Recipients by Karnofsky Score (Follow-ups: January 2009 – June 2017)





The Journal of Heart and Lung
Transplantation

Volume 26, Issue 11, November 2007, Pages 1182-1191



Quality of life

Patterns and Predictors of Physical Functional Disability at 5 to 10 Years After Heart Transplantation

Kathleen L. Grady PhD, RN ^a✉, David C. Naftel PhD ^b, James B. Young MD ^c, Dave Pelegri RN, PA ^c, Jennifer Czerr RN, BSN ^c, Robert Higgins MD ^d, Alain Heroux MD ^e, Bruce Rybarczyk PhD ^f, Mary McLeod RN, MSN ^d, Jon Kobashigawa MD ^g, Julie Chait RN, BSN ^g, Connie White-Williams RN, MSN, FNP ^b, Susan Myers BBA ^b, James K. Kirklin MD ^b

- 34% to 45% of patients reported having no functional disability.
- Physical functional disability was associated with
 - clinical symptoms,
 - depression
 - comorbidities (e.g., more orthopedic problems and diabetes);
 - female
 - older
 - less educated
 - unemployed
 - higher body mass index
 - more hospital readmissions

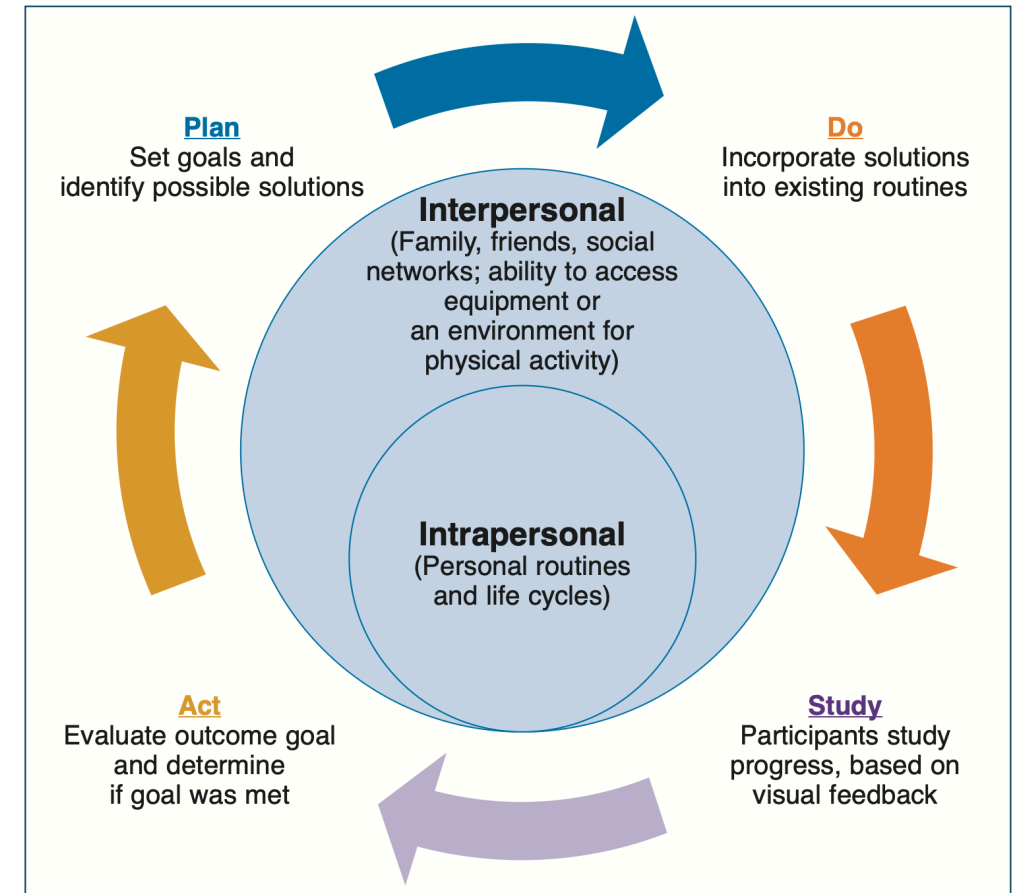
Merging an Activity Tracker with SystemCHANGE™ to Improve Physical Activity in Older Kidney Transplant Recipients

*Tara O'Brien
Donna Hathaway*

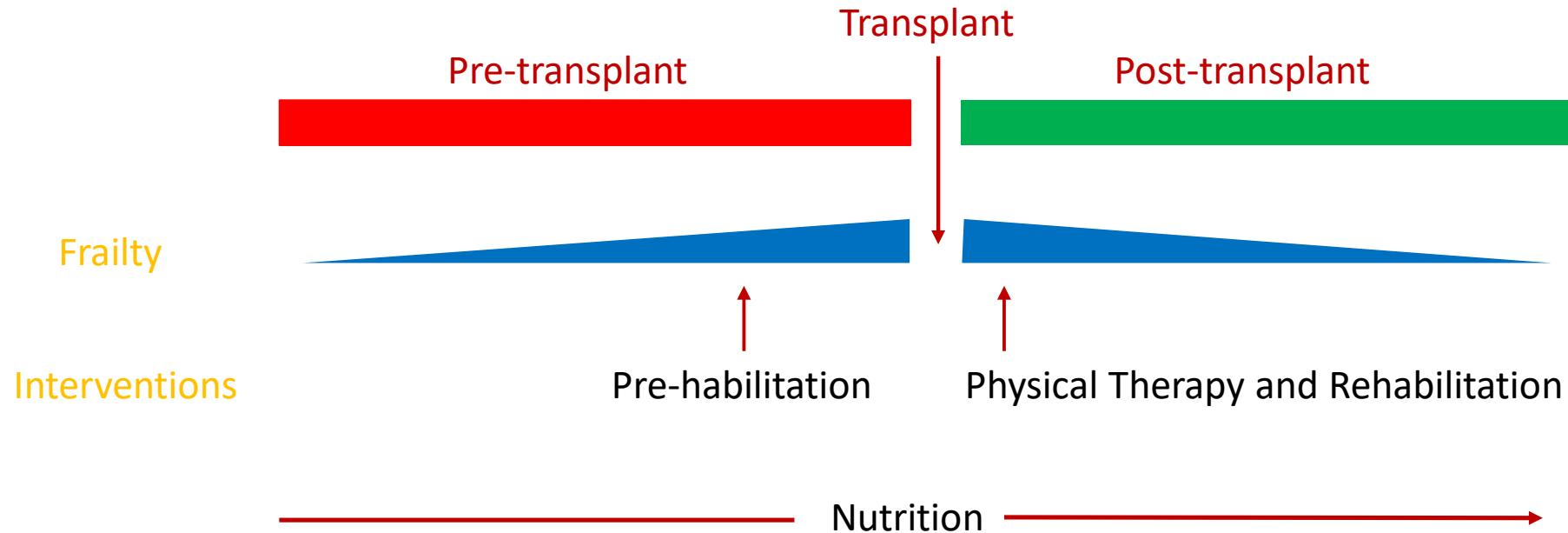
*Cynthia L. Russell
Shirley M. Moore*



SystemCHANGE™ + Activity Tracker Approach Conceptual Framework



Summary –Physical Functioning After Transplant is dependent upon the pre-transplant state



- Assessment of Physical Function:
 - Frailty Scores?
 - Functional capacity- VO_2Max or 6MWT
 - Activity monitoring?

