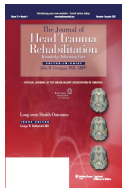
BRAIN INJURY AS A CHRONIC CONDITION: IMPROVING OUTCOMES THROUGH PROACTIVE MANAGEMENT

Flora Hammond, MD & John Corrigan, PhD

1

2009 Institute of Medicine Report *Gulf War and Health Volume 7: Long-Term Consequences of Traumatic Brain Injury*



2

JOURNAL OF NEUROTRAUMA 27:1529–1540 (August 2010)
© Mary Ann Liebert, Inc.
DOI: 10.1089/neu.2010.1358

Traumatic Brain Injury: A Disease Process, Not an Event

Brent E. Masel[1] and Douglas S. DeWitt[2]

ACRM
AMERICAN CONGRESS OF REHABILITATION MEDICINE

Archives of Physical Medicine and Rehabilitation
journal homepage: www.archives-pmr.org
Archives of Physical Medicine and Rehabilitation 2013;■:■■■-■■■

SPECIAL COMMUNICATION

Traumatic Brain Injury as a Chronic Health Condition

John D. Corrigan, PhD,[a,*] Flora M. Hammond, MD,[b,*]

3

Chronic Brain Injury

2012 Galveston Brain Injury Conference

"Injury to the brain can evolve into a lifelong health condition termed chronic brain injury (CBI). CBI impairs the brain and other organ systems and may persist or progress over an individual's life span."

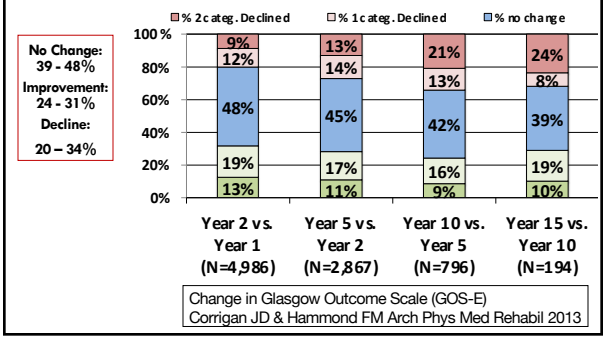
4

Traumatic Brain Injury as a Chronic Disease Process: Looking Back on a Decade of Research

Eric Watson, PhD • Raj G. Kumar, MPH, PhD • Brent Masel, MD • John D. Corrigan, PhD • Kristen Dams-O'Connor, PhD

5

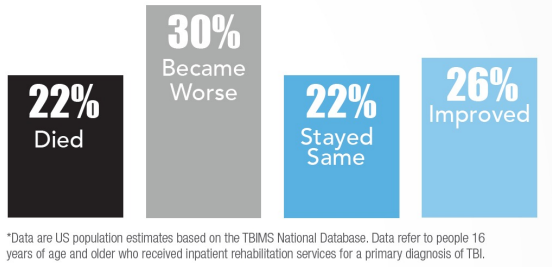
TBI is a Dynamic Condition: Change in Function over time



Change in Glasgow Outcome Scale (GOS-E)
Corrigan JD & Hammond FM Arch Phys Med Rehabil 2013

6

Five-year outcomes of persons with TBI

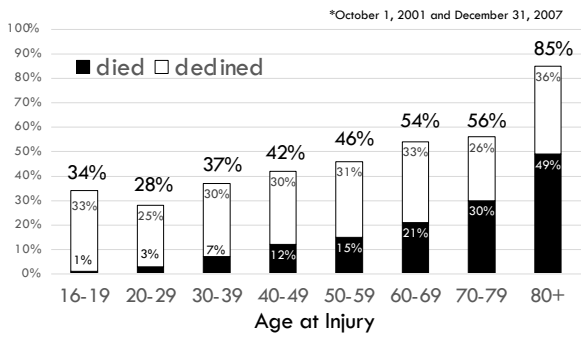


*Data are US population estimates based on the TBIMS National Database. Data refer to people 16 years of age and older who received inpatient rehabilitation services for a primary diagnosis of TBI.

GG Whiteneck, CB Eagye, JP Cuthbert, JD Corrigan, JM Bell, JK Haarbauer-Krupa, A. Cate Miller, JM Ketchum, FM Hammond, K Dams-O'Connor, C Harrison-Felix. One and Five Year Outcomes After Moderate-to-Severe Traumatic Brain Injury Requiring Inpatient Rehabilitation. Traumatic Brain Injury Report. Executive Summary. CDC. NIDILRR. ACL. 2018.

7

U.S. Estimates at 5 Years After Acute Rehab* for TBI



8

TBIMS Evidence for Chronic Brain Injury: TBI has Significant Long-term Negative Effects

In addition, people with moderate to severe TBI typically face a variety of chronic health problems. These issues add costs and burden to people with TBI, their families, and society. Among those still alive 5 years after injury:

- **57%** are moderately or severely disabled.
- **55%** do not have a job (but were employed at the time of their injury).
- **50%** return to a hospital at least once.
- **33%** rely on others for help with everyday activities.
- **29%** are not satisfied with life.
- **29%** use illicit drugs or misuse alcohol.
- **12%** reside in nursing homes or other institutions.

9

Current state of care with brain injury?

Infrastructure for optimal living long-term

- Sparse data on aging with TBI & interventions
- Lack consistent self-management & CM
- Not risk-based
- Lack of markers, infrequent use of measures, diagnostic challenges
- Many don't connect symptoms to BI
- Lack access (awareness, expertise, $, providers)
- Inconsistent & different approaches
- Incorrect information, beliefs, & lack expertise: self-limiting outcomes
- Fractured care: Disconnected with PCP
- Lack full integration of health care, policy, self-management, and community living into a strategy to improve outcomes

10

Vision for Chronic Brain Injury

2012 Galveston Brain Injury Conference

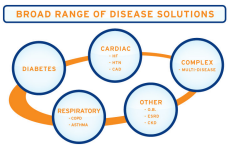
Brain injury will be *identified* and proactively *managed* as a life-long chronic disease that will result in improvements in longevity, level of disability, expense to society, and quality of life. This will be achieved through modification of our medical and psychosocial health care delivery systems, health care education curricula, research agenda, and legislative/health care policy.

Could a chronic disease management approach help reach this vision?

11

Chronic Disease Management Programs

- People with chronic conditions generally use more health care services
- Health plans, employers, & government wanting ways to reduce health care use & costs have designed **structured disease management** for chronically ill to:
  - Improve health
  - Reduce health care service
    - avoiding complications, ED visits & hospitalizations
  - Reduce costs of caring for chronically ill
- Long-term impacts of chronic disease models not known

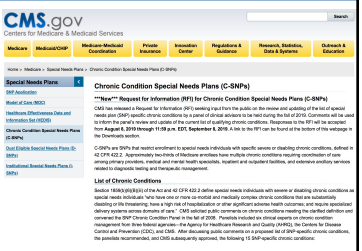


12

21 CMS-recognized Chronic Conditions

21 CMS recognized Chronic Conditions

1. Alcohol Abuse
2. Alzheimer's Disease and Related Dementia
3. Arthritis (Osteoarthritis and Rheumatoid)
4. Asthma
5. Atrial Fibrillation
6. Autism Spectrum Disorders
7. Cancer (Breast, Colorectal, Lung, and Prostate)
8. Chronic Kidney Disease
9. Chronic Obstructive Pulmonary Disease
10. Depression
11. Diabetes
12. Drug Abuse/ Substance Abuse
13. Heart Failure
14. Hepatitis (Chronic Viral B & C)
15. HIV/AIDS
16. Hyperlipidemia (High cholesterol)
17. Hypertension (High blood pressure)
18. Ischemic Heart Disease
19. Osteoporosis
20. Schizophrenia & Other Psychotic Disorders
21. Stroke

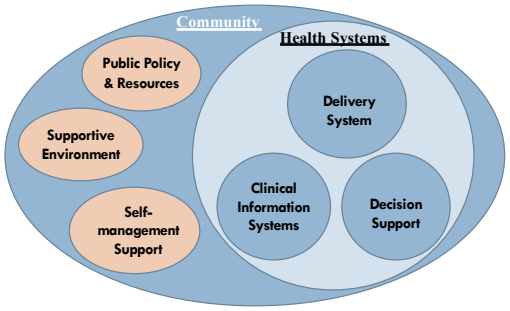


- State Medicaid dz mgmt programs with some evidence of improved care quality & cost-savings
- CMS has conducted series of dz mgmt programs for Medicare beneficiaries with chronic conditions in traditional (fee-for-service) Medicare

13

Integrated Care

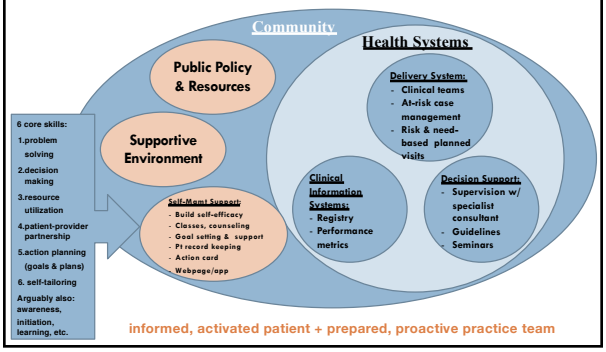
Wagner Chronic Care Model



informed, activated patient + prepared, proactive practice team

14

Components of Chronic Care Management



informed, activated patient + prepared, proactive practice team

15

Systematic Review of Integrated Care Models

Reynolds R, et al: BMC Family Practice 2018;19(11):1-13.

- 157 studies reviewed
- Most studies showed improved professional & patient outcomes
- Elements included:
  - **Self Management (45.8%)**
  - Delivery System Designs (22.6%)
  - Decision Support (21.3%)
  - Clinical Information Systems (8.9%)
  - Health Care Organization (1.9%)
  - Community Resources (0.6%)

16

Self-Management

Lorig KR, Halstead RH: Self-Management Education: History, definition, outcomes, & mechanisms. Annals Behav Med 2003;26(1): 1-7.

- **Given the usual limited time with health professionals, …. need to provide infrastructure, activate, empower, & build self efficacy**
- Intensive, individualized, performed away from healthcare contacts
- Education, activation, goal setting & support, action plans for health-promoting activity, self-monitoring
- Based on a **patient-perceived problem**
- **Improves self-efficacy and thus health** thru: goal attainment, vicarious experiences, verbal persuasion, activity linked to physiological & emotional status
- **6 core skills: Problem solving; decision making; resource utilization; patient-provider partnership; action planning (goals & plans); & self-tailoring**
- Models exist for some issues encountered after brain injury
  - e.g., depression, pain, substance & alcohol use

17

Common Elements of Chronic Disease Models

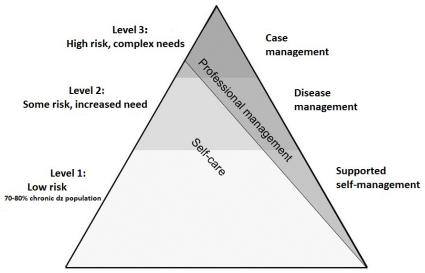
details of the management depend on condition

- Evidence-based
- Specific screening
- Comprehensive work up
- Clear treatment priorities
- Established goals
- Written care plans
- Protocol driven care
- Stepped care
- Active & defined follow up schedule
- Specific target measures with defined adjustments in response to measures
- Assessment of adherence to treatment
- Collaborative care
- Pt goals & values
- Tailored education
- Supported self management
- Risk stratified

18

Risk Stratification for Chronic Disease Management

Target the right people with the right intensity



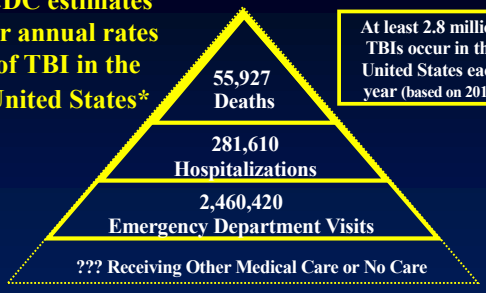
19

Designing a "Disease Management" approach to Chronic Brain Injury

1. Which brain injuries increase risk for negative outcomes?

20

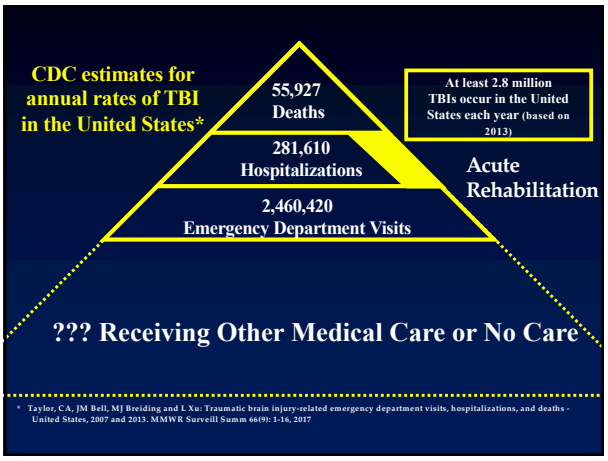
CDC estimates for annual rates of TBI in the United States*



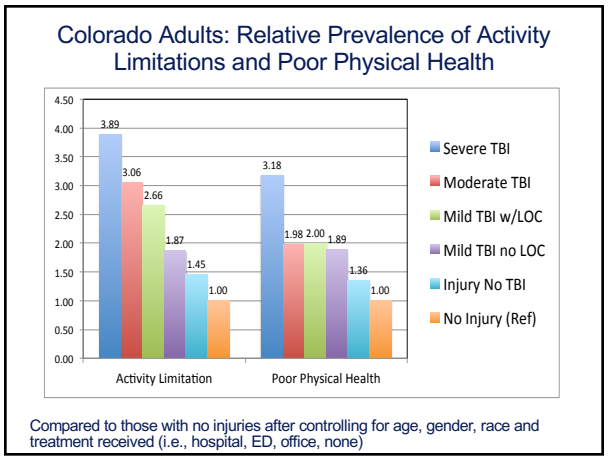
At least 2.8 million TBIs occur in the United States each year (based on 2013)

* Taylor, CA, JM Bell, MJ Breiding and L Xu: Traumatic brain injury-related emergency department visits, hospitalizations, and deaths - United States, 2007 and 2013. MMWR Surveill Summ 66(9): 1-16, 2017

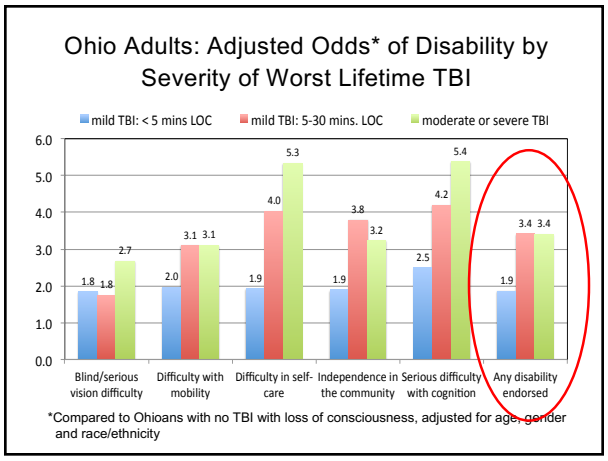
21


CDC estimates for annual rates of TBI in the United States*
55,927 Deaths
281,610 Hospitalizations
2,460,420 Emergency Department Visits
At least 2.8 million TBIs occur in the United States each year (based on 2013)
Acute Rehabilitation
??? Receiving Other Medical Care or No Care
* Taylor, CA, JM Bell, MJ Breiding and L Xu: Traumatic brain injury-related emergency department visits, hospitalizations, and deaths - United States, 2007 and 2013. MMWR Surveill Summ 66(9): 1-16, 2017

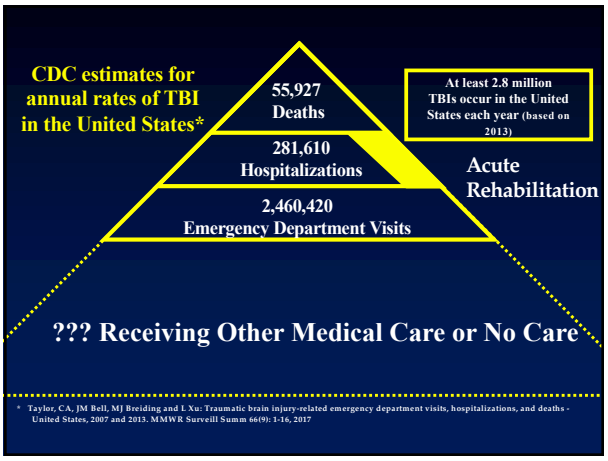
22


Colorado Adults: Relative Prevalence of Activity Limitations and Poor Physical Health
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
3.89
3.06
2.66
1.87
1.45
1.00
3.18
1.98
2.00
1.89
1.36
1.00
Activity Limitation
Poor Physical Health
Severe TBI
Moderate TBI
Mild TBI w/LOC
Mild TBI no LOC
Injury No TBI
No Injury (Ref)
Compared to those with no injuries after controlling for age, gender, race and treatment received (i.e., hospital, ED, office, none)

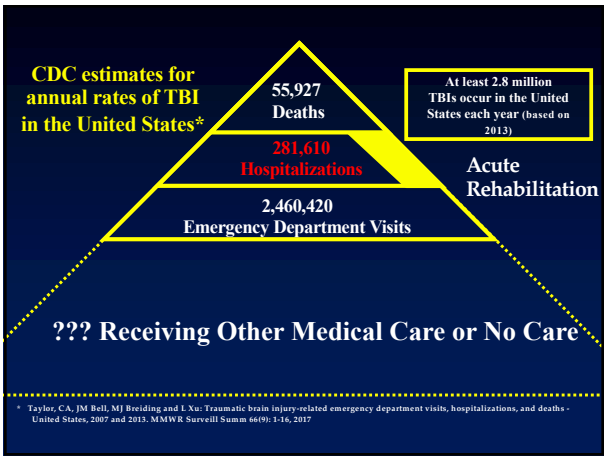
23


Ohio Adults: Adjusted Odds* of Disability by Severity of Worst Lifetime TBI
mild TBI: < 5 mins LOC
mild TBI: 5-30 mins. LOC
moderate or severe TBI
6.0
5.0
4.0
3.0
2.0
1.0
0.0
1.8
1.8
2.7
2.0
3.1
3.1
1.9
4.0
5.3
1.9
3.8
3.2
2.5
4.2
5.4
1.9
3.4
3.4
Blind/serious vision difficulty
Difficulty with mobility
Difficulty in self-care
Independence in the community
Serious difficulty with cognition
Any disability endorsed
*Compared to Ohioans with no TBI with loss of consciousness, adjusted for age, gender and race/ethnicity

24



25



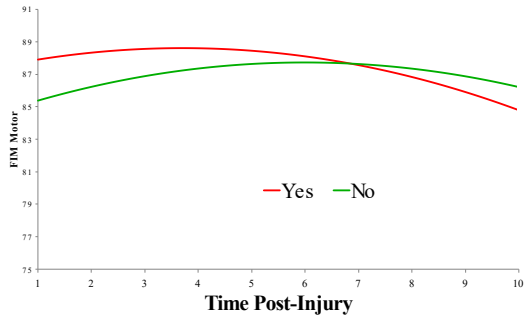
26

Designing a "Disease Management" approach to Chronic Brain Injury

1. Which brain injuries increase risk for negative outcomes?
2. What pre-existing conditions require management?
3. What conditions develop post-injury that could be prevented or detected early?

27

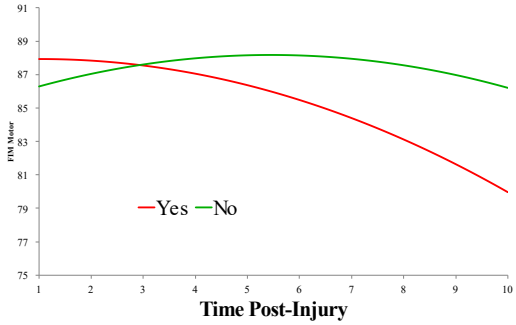
Hypertension Ever & FIM Motor



Significant differences for Year 1 and Year 2 only

28

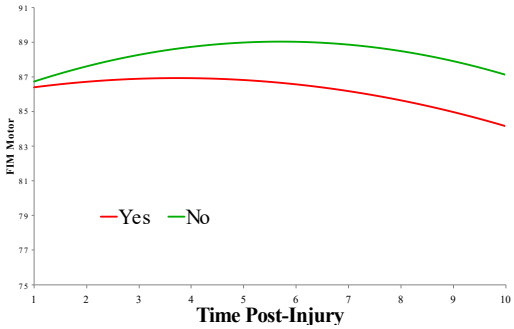
Myocardial Infarction Ever & FIM Motor



Significant differences at Year 10 only

29

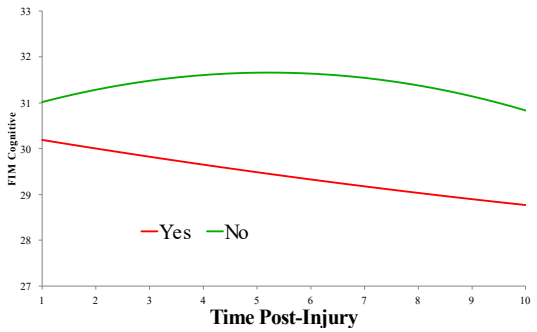
Depression Ever & FIM Motor



Significant differences for Year 5 and Year 10 only

30

Depression Ever & FIM Cognitive



Significant differences for Years 1, 2, 5 and Year 10

31

Designing a "Disease Management" approach to Chronic Brain Injury

1. Which brain injuries increase risk for negative outcomes?
2. What pre-existing conditions require management?
3. What conditions develop post-injury that could be prevented or detected early?
4. How can the individual participate in their self-management?

32

A brain healthy lifestyle!

- Avoid any more TBIs
- Eat well
- Exercise regularly
- Get at least 7 hours sleep
- Don't drink alcohol or use illicit drugs
- Stop smoking
- Be engaged with people & projects
- Seek to minimize the stress in your life
- Seek to increase restfulness with relaxation training, meditation or other practices

33

Designing a "Disease Management" approach to Chronic Brain Injury

1. Which brain injuries increase risk for negative outcomes?
2. What pre-existing conditions require management?
3. What conditions develop post-injury that could be prevented or detected early?
4. How can the individual participate in their self-management?
5. How can access to medical and rehabilitation care be used to reduce negative outcomes?

34

Designing a "Disease Management" approach to Chronic Brain Injury

1. Which brain injuries increase risk for negative outcomes?
2. What pre-existing conditions require management?
3. What conditions develop post-injury that could be prevented or detected early?
4. How can the individual participate in their self-management?
5. How can access to medical and rehabilitation care be used to reduce negative outcomes?
6. How can community-based resources be accessed to improve function and reduce institutionalization?

35

Designing a "Disease Management" approach to Chronic Brain Injury

1. Which brain injuries increase risk for negative outcomes?
2. What pre-existing conditions require management?
3. What conditions develop post-injury that could be prevented or detected early?
4. How can the individual participate in their self-management?
5. How can access to medical and rehabilitation care be used to reduce negative outcomes?
6. How can community-based resources be accessed to improve function and reduce institutionalization?

36

BeHEALTHY: Building a Self-directed Chronic TBI Management Model

37

National Institute on Disability Independent Living & Rehabilitation Research

NIDILRR call for grant applications April 10,2020

Overall goal: Develop chronic disease model for TBI.

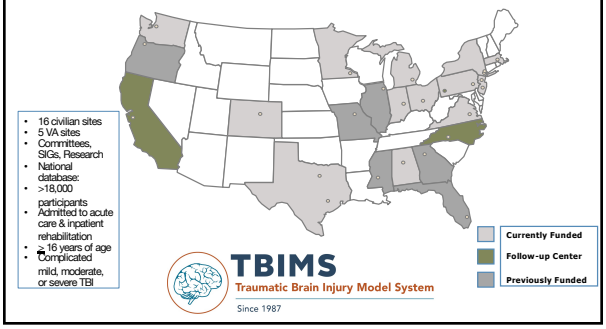
Long-term outcomes: decreased mortality and improved health, function, and quality of life for people with TBI through

- prevention and/or reduction in the rates of new onset co-morbid disease and disability after TBI
- extended rehabilitation services that better integrate with community-based supports
- creation of evidence-based recommendations for healthy longevity

38

National Institute on Disability Independent Living and Rehabilitation Research

TBI Model Systems Program Infrastructure



39

Structure & Input

Leads	Steering Committee	Stakeholder Comm	Workgroups
2x Monthly	Every 2 months	Twice yearly	Once – Twice Monthly
PI & Co-PI	PI, Co-PI, TBIMS National Data & Statistical Center, TBIMS co-Investigators	PI, Co-PI, Stakeholders	PI, co-PI, selected Steering & as needed stakeholder committee members

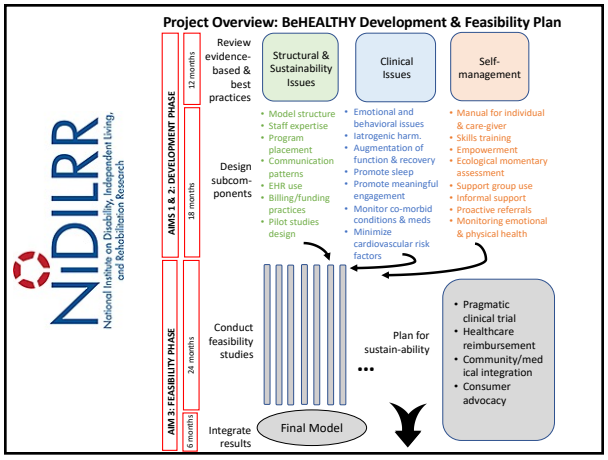
- Principle investigators: Flora Hammond & John Corrigan
- Consultants: Kurt Kroenke, Angelle Sander
- Steering Committee: PIs at 16 TBIMS sites, 1 VA, & NDSC
- **Stakeholders:**
  - Individuals with TBI, family members, physicians, psychologists, case managers, 3rd party payers, Brain Injury Association and Alliance state & national leaders, National Association of State Head Injury Administrators (NASHIA) leaders, Self-Management Resource Center (Kate Lorig), National Council on Aging, Commission on Accreditation of Rehabilitation Facilities, and City, County, State, and Federal civic leaders; public health professionals, implementation scientists, NIDILRR MSKTC.

40

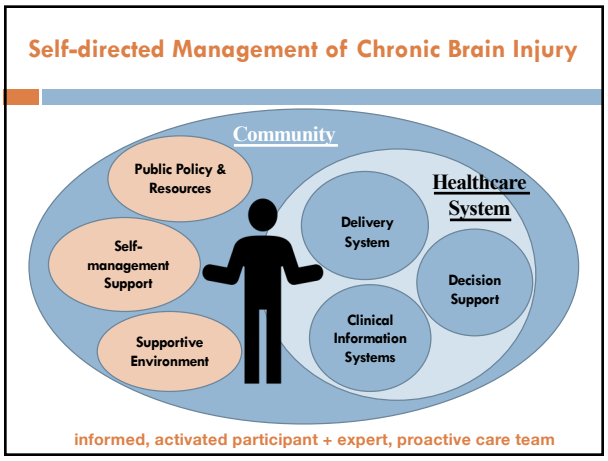
Project Objectives

1. Develop new knowledge and information about potential characteristics and adaptability of evidence-based CDM models for people with TBI. **– literature review**
2. Develop a CDM model (BeHEALTHY) designed specifically for TBI based on available evidence and best practices for optimizing long-term outcomes after TBI. **– develop a model**
3. Develop new knowledge about a TBI CDM model, including its active components, feasibility for implementation, measures of impact, sustainability, and potential for knowledge translation. **– feasibility testing**
4. Develop new knowledge among people with TBI, care providers, and policy makers about the characteristics of the emerging TBI CDM model. **– dissemination**

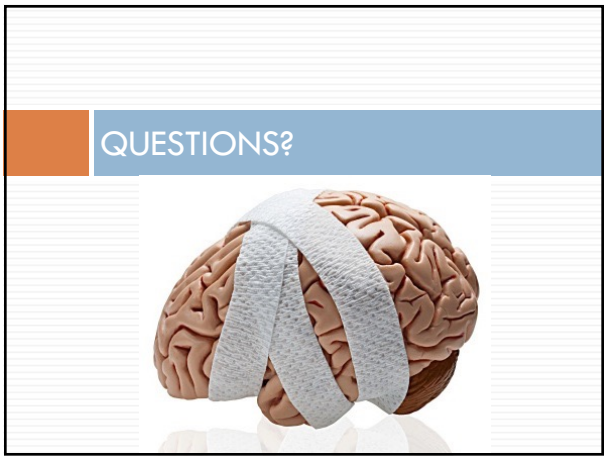
41



42


Self-directed Management of Chronic Brain Injury
Community
Public Policy & Resources
Self-management Support
Supportive Environment
Healthcare System
Delivery System
Decision Support
Clinical Information Systems
informed, activated participant + expert, proactive care team

43


QUESTIONS?

44