

Traumatic Brain Injury In New Mexico: Epidemiology and Needs for Prevention and Treatment

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Associate Professor of Neurosurgery with Tenure

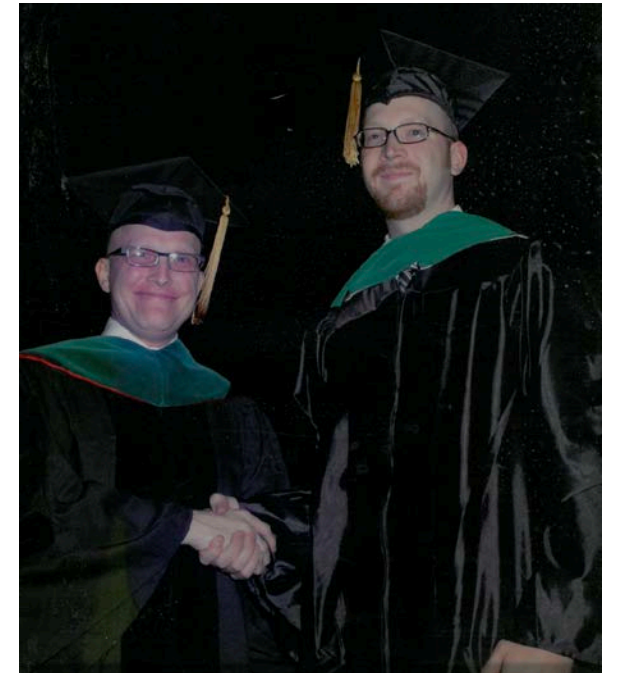
University of New Mexico

New Mexico Legislative Health and Human Services Committee

October 26, 2021

My Background

- No disclosures/ COI to report
- Board Certified Neurosurgeon with subspecialty certification in Neuro-critical Care and Vascular Neurosurgery
- Born and raised in Los Alamos, NM
- Medical School at UNM
- Neurosurgery Residency at UNM
- Fellowships in Endovascular Neurosurgery (Chicago) and Complex Cranial Neurosurgery (Florida)
- Returned to UNM as faculty in 2013



Med School in New Mexico

**Practical Immersion Experience-
Española ED**

Rural rotation- Mountainair clinic



- Initiated community engagement projects focused on brain injury related to ATV use and bicycle helmet use
- Gained appreciation for the perspective on both acute and chronic injury managements in community practices

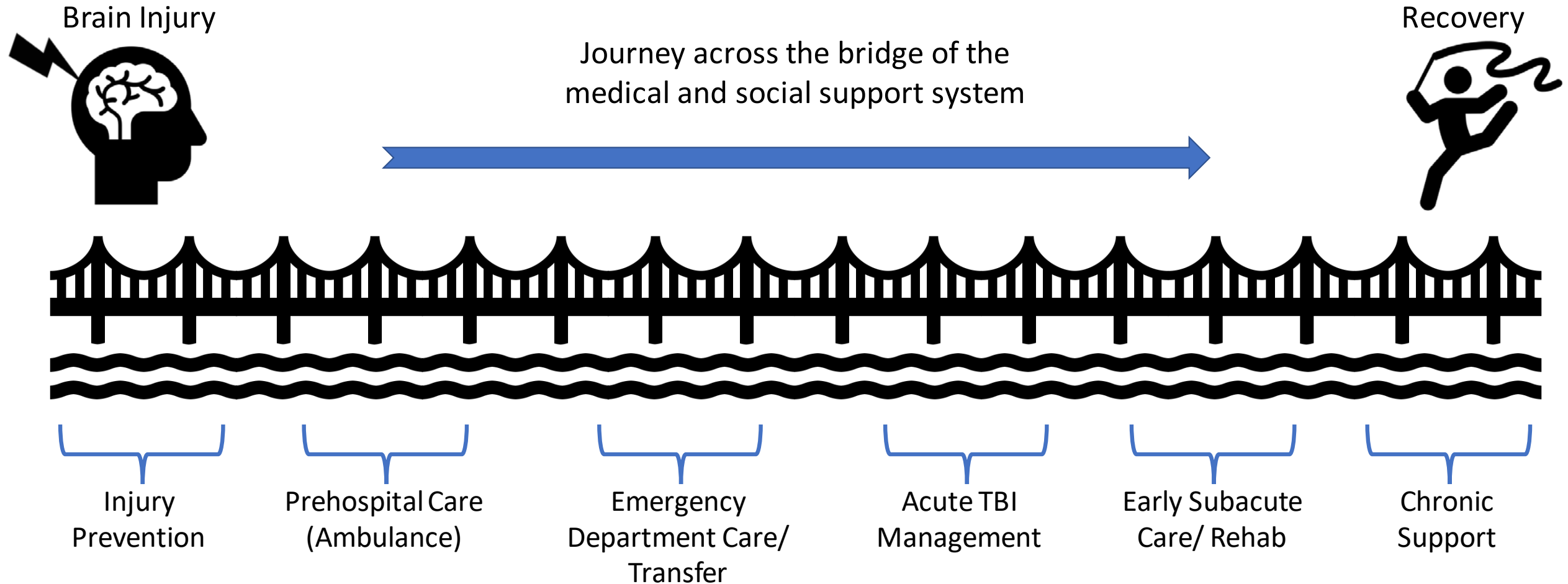
Me and New Mexico

- 1) New Mexico is my home and I love New Mexico, It's Culture, Diversity, and Geography
- 2) There is an enormous **need** across the state for the specialized care I can provide
- 3) I have been supported through an excellent **public schools** and **medical education** and want to give back to the people of the state

Objectives

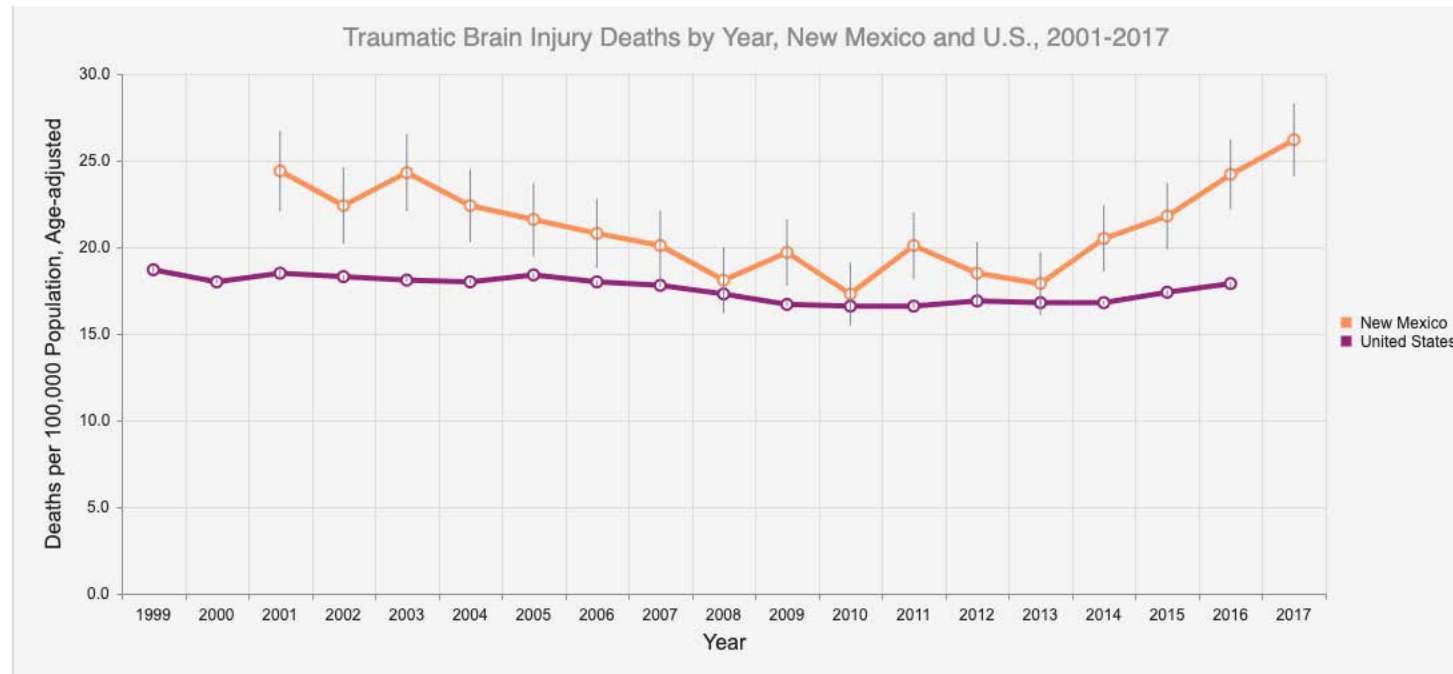
- Understand the epidemiology of TBI in NM
- Describe the implications for the care of NM patients
- Describe strengths and areas for improvement in TBI care for NM

Longitudinal Care of TBI Patients



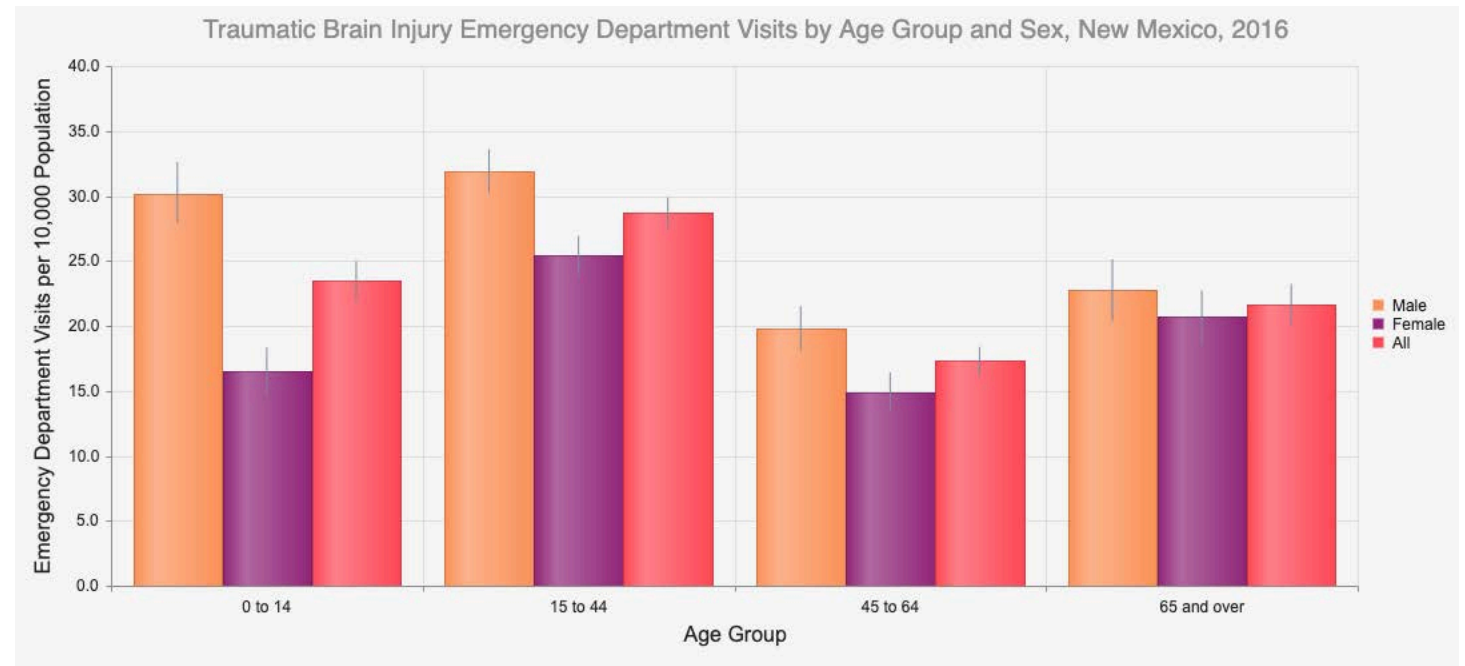
Scope of the Problem

- **Deaths** per 100,000 (Age adjusted) 2017 = 26.2 (95%CI=24.1-28.3)
 - 587/2,102,521
- Higher than national average and targets

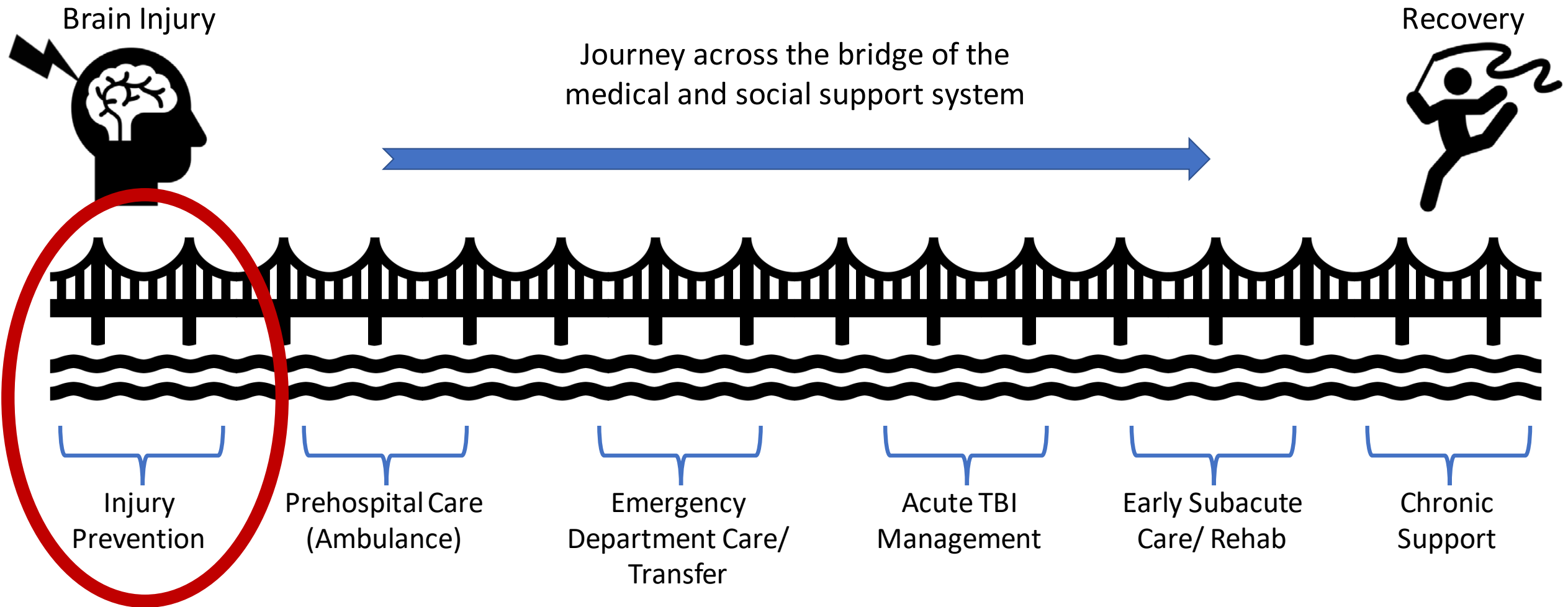


TBI death is just the tip of the iceberg

- ~300 ED visits per 100,000
 - >6000 ED visits per year in NM
 - Many TBIs don't seek medical attention (concussion)
- TBI occurs across the age spectrum



Longitudinal Care of TBI Patients

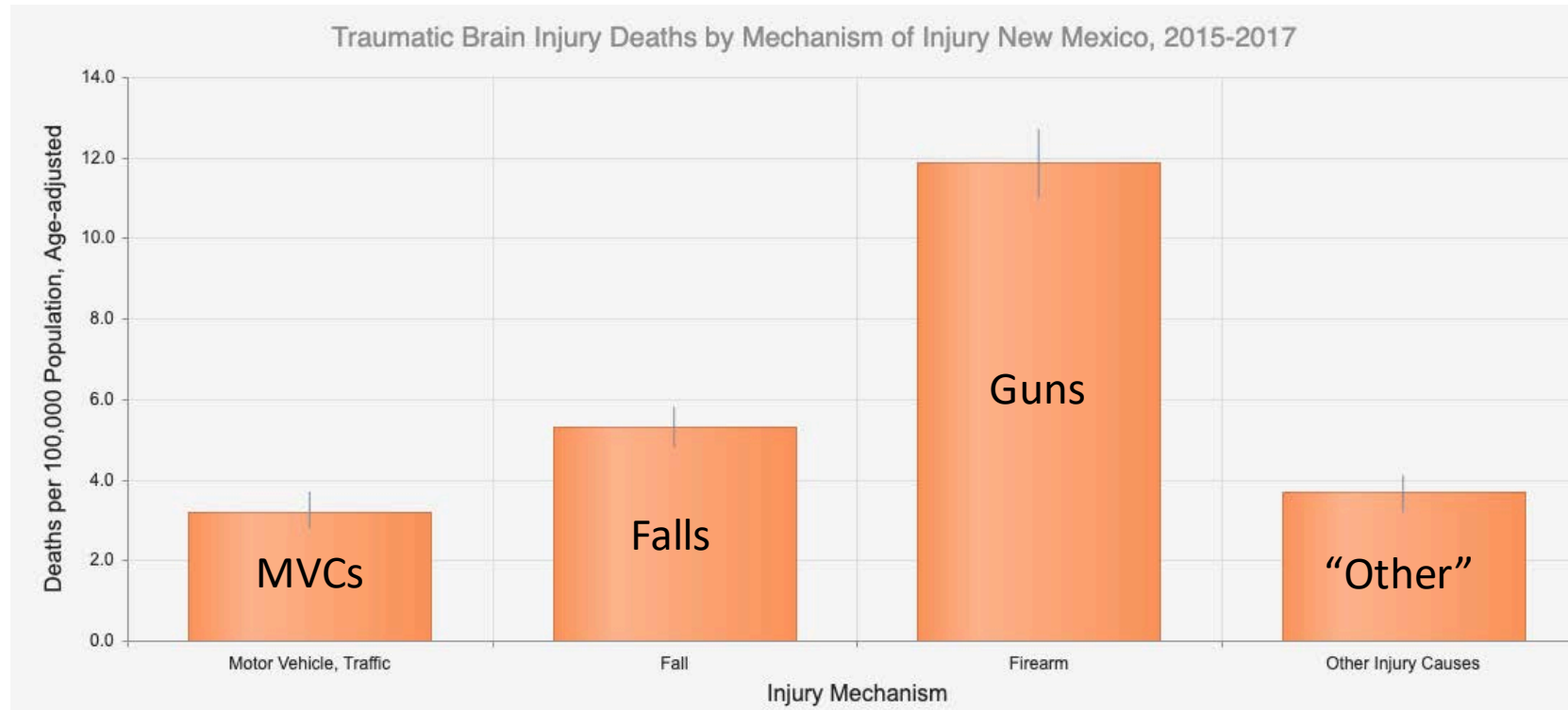


Injury prevention

- Minor TBI are an extremely diverse group
- Focus on TBI **deaths** will potentially have the highest impact on population health
- Targeting reducing TBI death would also be expected to reduce severe injuries, which lead to the most long term disability

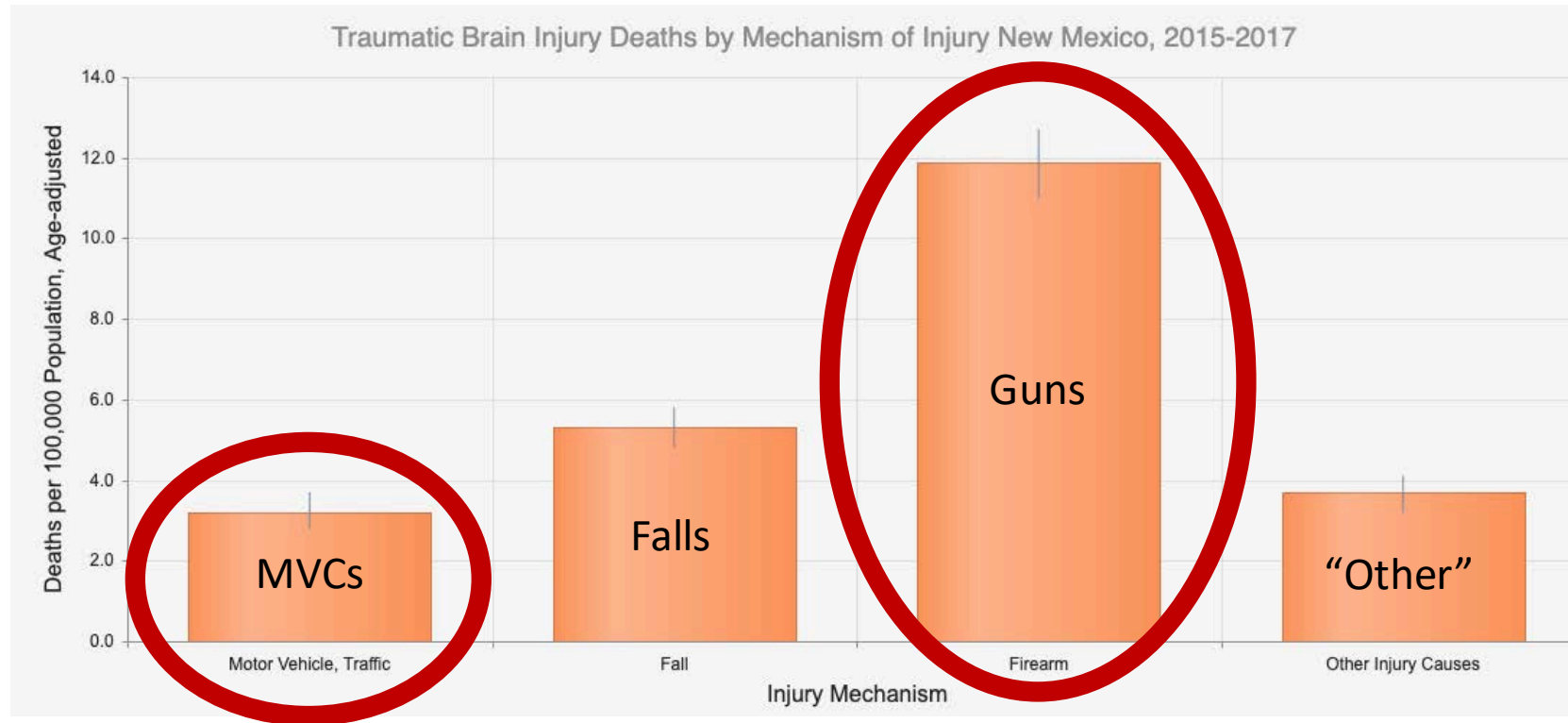
Targets for Prevention

- Causes of death from TBI

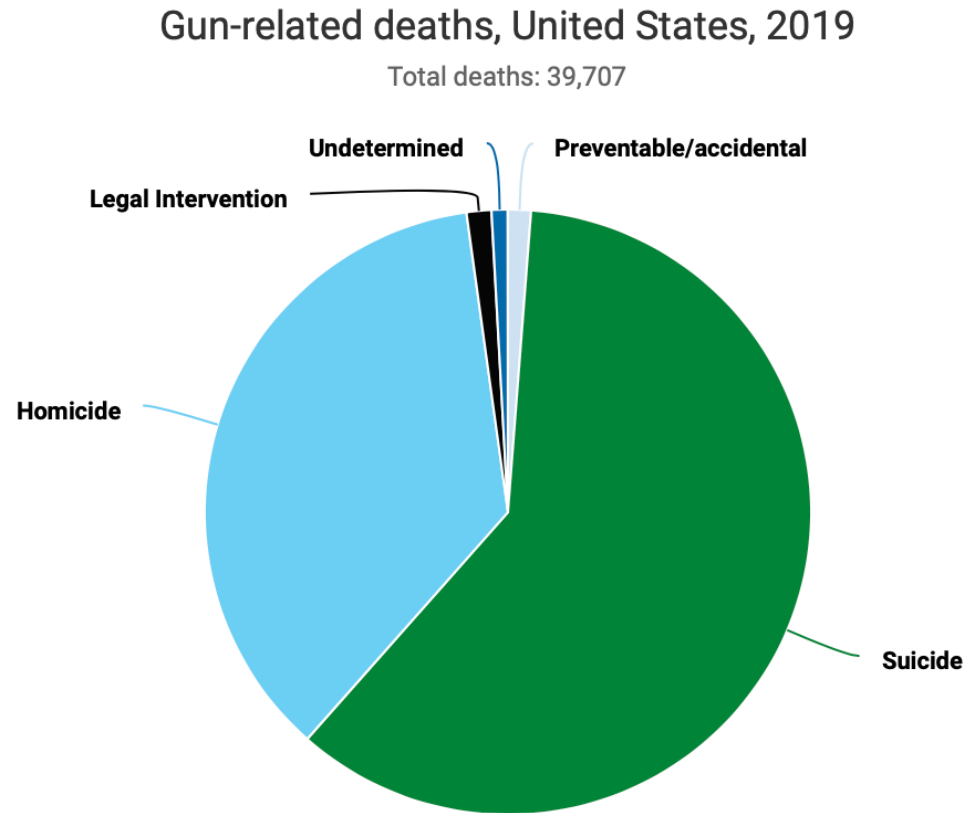


Targets for Prevention

- Causes of death from TBI



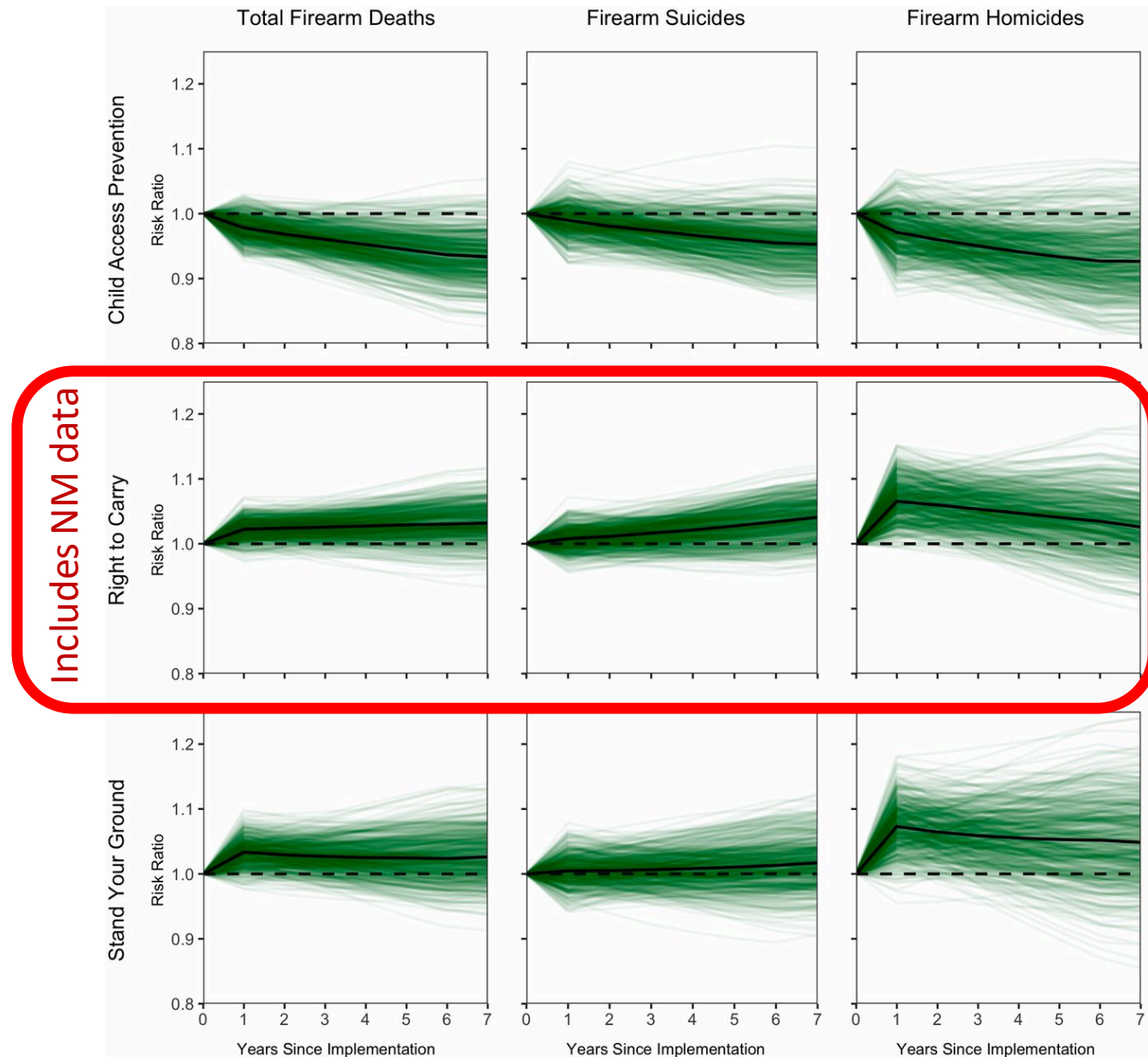
Overall Gun Deaths are mostly from Suicide and Homicide.
Suicide is almost entirely GSW to the head/ brain.



- In New Mexico
 - Firearm injury death rate=22.3/100,000 in 2019
 - 4th worst in the US

Preventing Gun Deaths

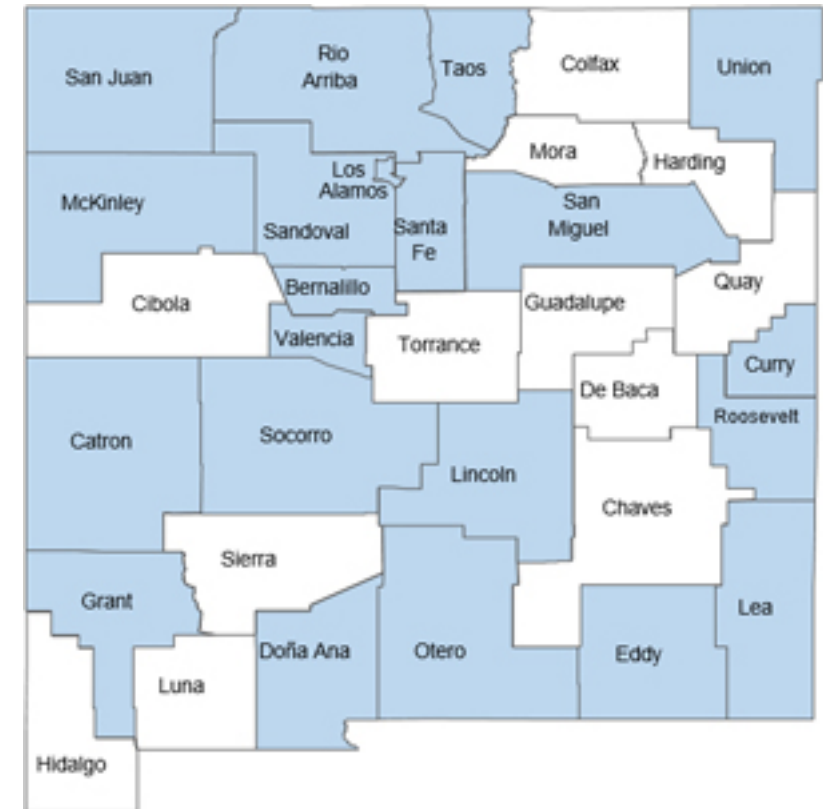
- 1) Better scientific data is needed
- 2) Available data supports that limiting **child access** and **waiting periods** are the most effective approaches
- 3) Available data supports that “**stand your ground**” and “**right to carry**” laws *increase* gun deaths
- 4) Limiting access to **domestic violence perpetrators** decreases intimate partner homicide



Preventing Falls: NM making great progress

- Multiple evidence based interventions can reduce risks of falls
- NMDOH "older adult falls prevention program"
 - In 2018, reached 21 counties and 14 native nations, tribes, and pueblos
- Gov. Susanna Martinez declared the first day of fall "Adult Falls Prevention Awareness Day in New Mexico"

NMDOH Fall prevention Program reach



Preventing Falls

- Gerald Champion (Alamogordo)
 - Regional leader in best practices coordinating follow-up care for patients after falls to prevent secondary falls
- Model to expand to other community hospitals



Develops the network of evidence-based interventions and trains community members



EVIDENCE-BASED INTERVENTIONS

Tai Ji Quan
Tai Chi for Arthritis
A Matter of Balance
OTAGO
STEADI



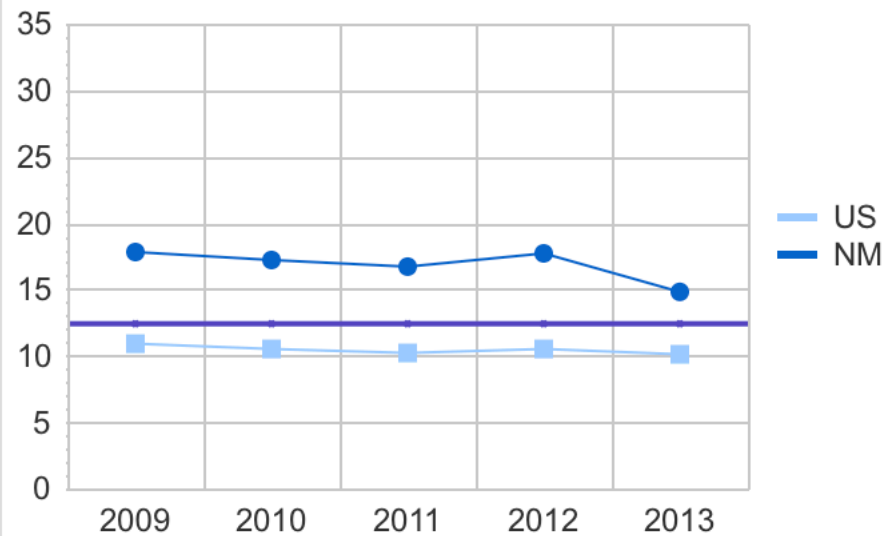
Integrates hospital-patient referrals into the intervention network



Preventing MVC deaths

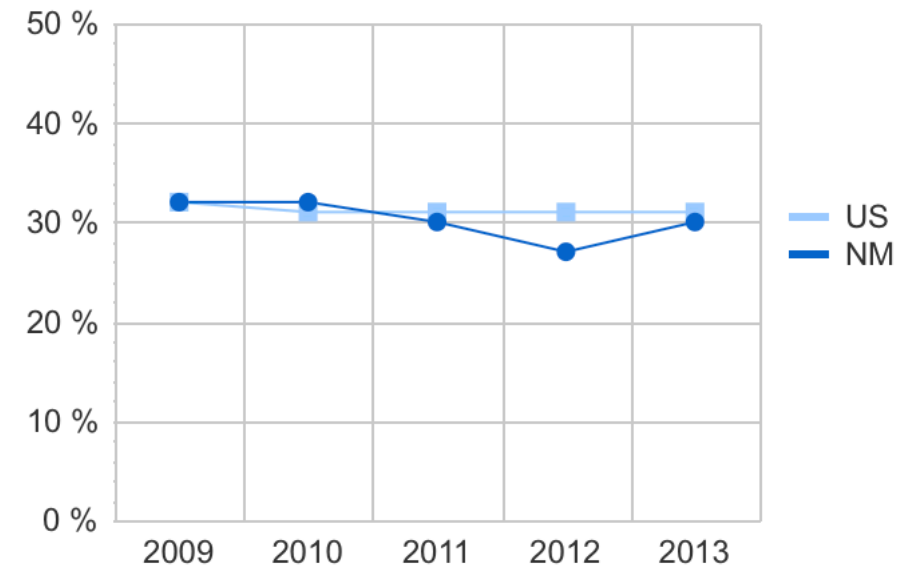
NM has a higher rate of MVC fatalities than the US average but similar rates of Alcohol-related

Age-adjusted motor vehicle-related death rate
(per 100,000 population)



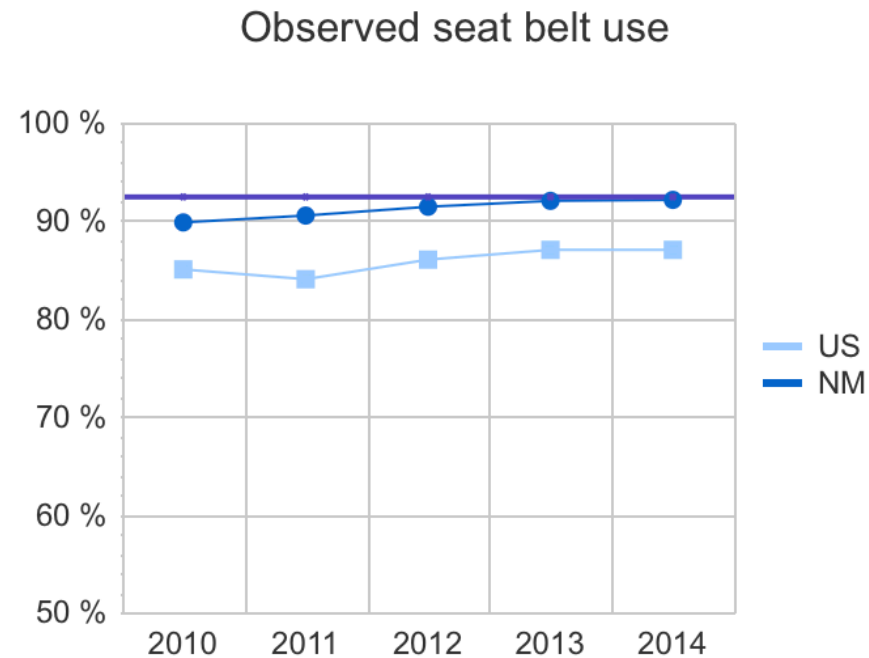
Source: National Highway Traffic Safety Administration (4).
IHS Healthy People 2020 Target: 12.4/100,000 (purple line) (5)

Percentage of crash-related deaths that
involved alcohol-impaired drivers



Source: National Highway Traffic Safety Administration (8)

Preventing MVC deaths: some areas to be proud of

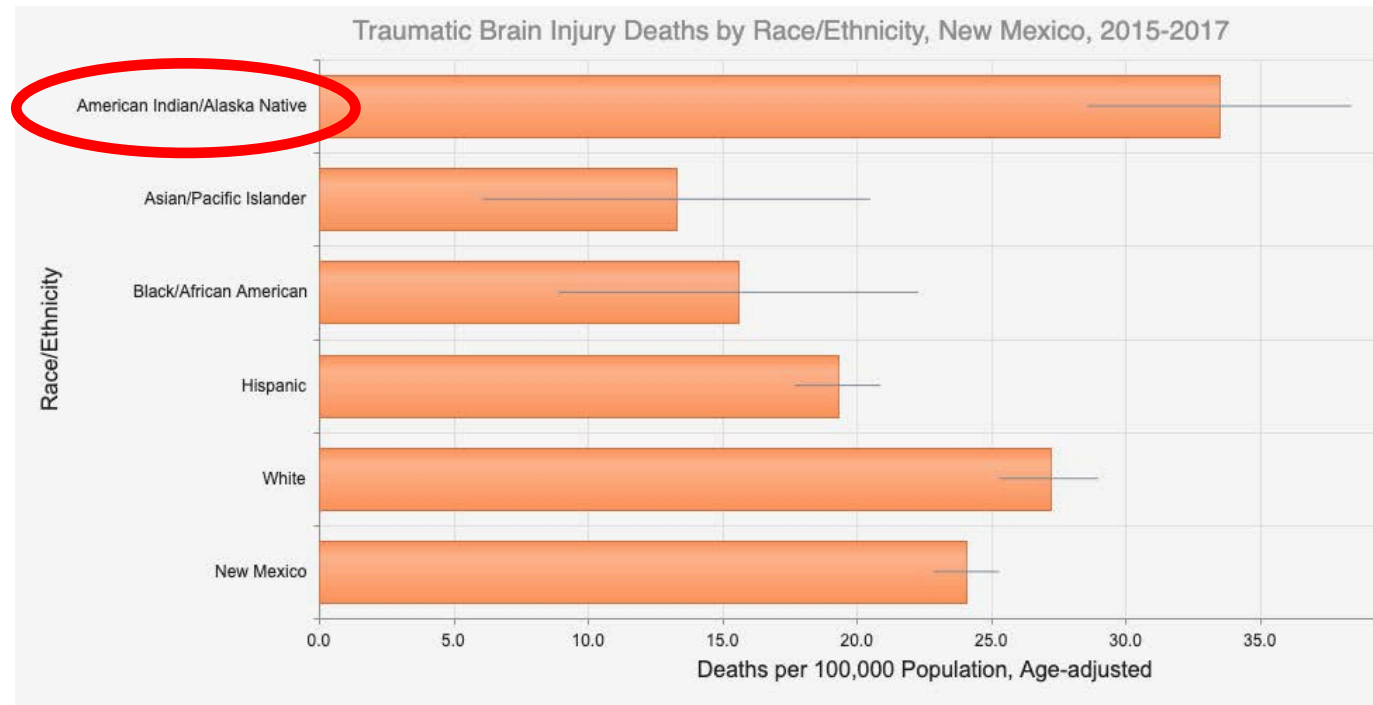


Motor Vehicle Injuries	2015
Seat belt law	Green
Child passenger restraint law	Yellow
Graduated driver licensing: learner's permit age	Yellow
Graduated driver licensing: learner's permit holding period	Yellow
Graduated driver licensing: nighttime driving restriction	Red
Graduated driver licensing: young passenger restriction	Green
Graduated driver licensing: unrestricted licensure age	Red
Ignition interlock law	Green

Targets for prevention- Racial disparity

Native populations are at **higher risk** of death from TBI in NM compared to other groups

- Better data in NM is needed to understand these reasons
- Possible causes include
 - Disparities in access to care
 - Suicide

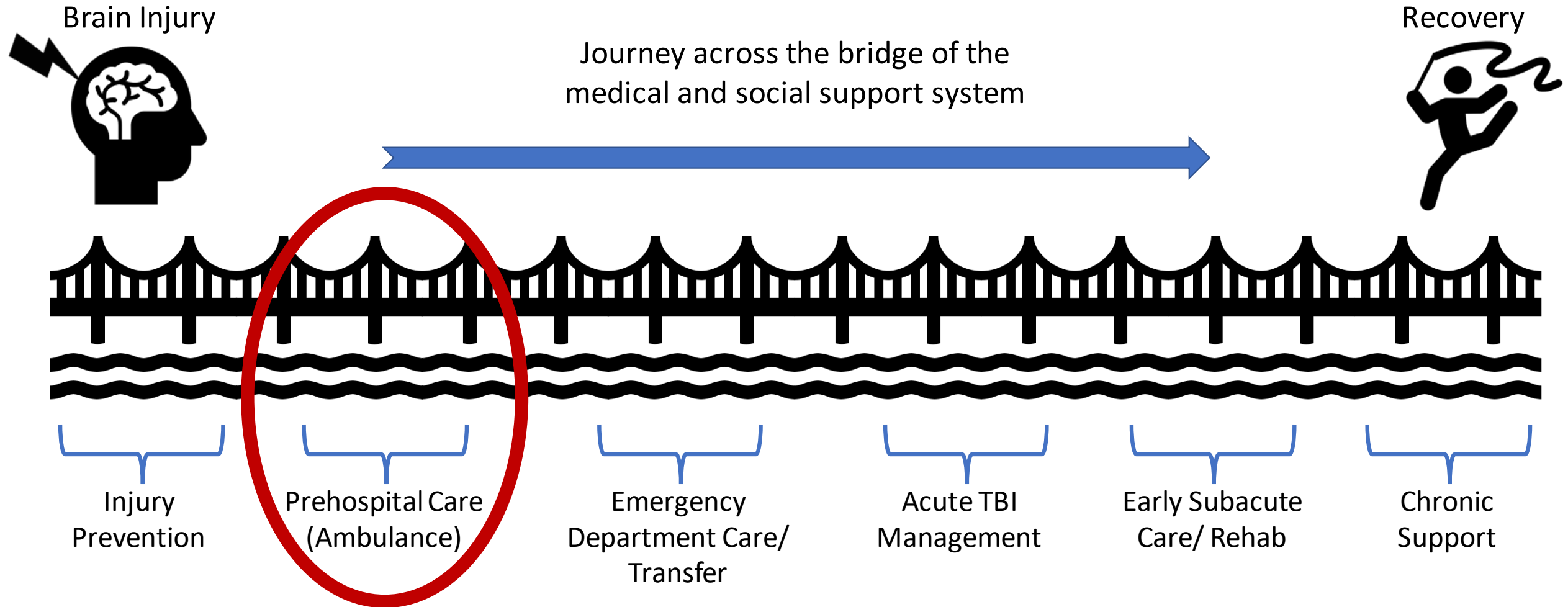


New Mexico Indicator Based Information System (NM-IBIS)

CDC: Health Disparities and TBI

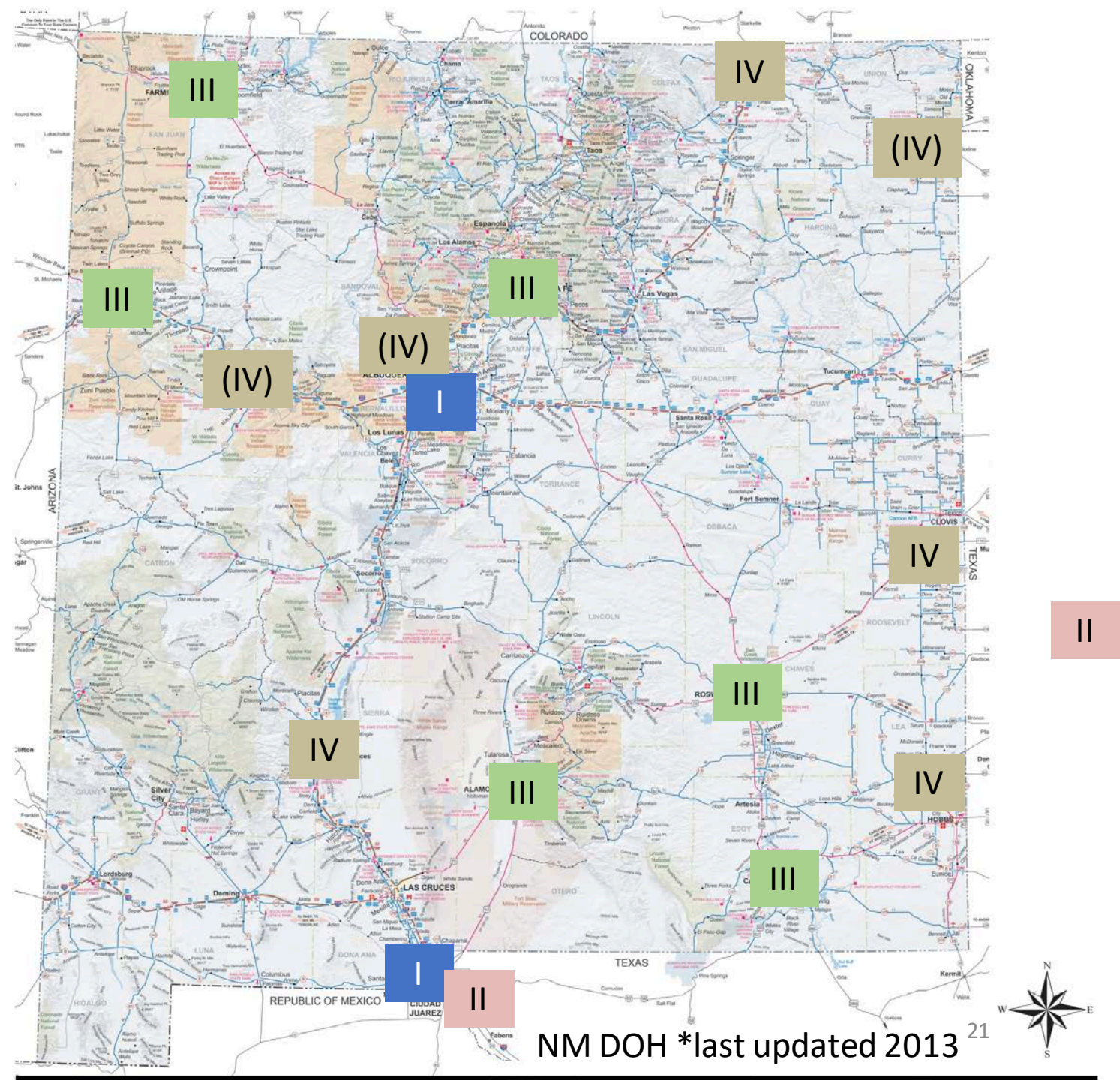
Paskus and Furlow. Native American youth face higher suicide risk. New Mexico In Depth, 2015

Longitudinal Care of TBI Patients

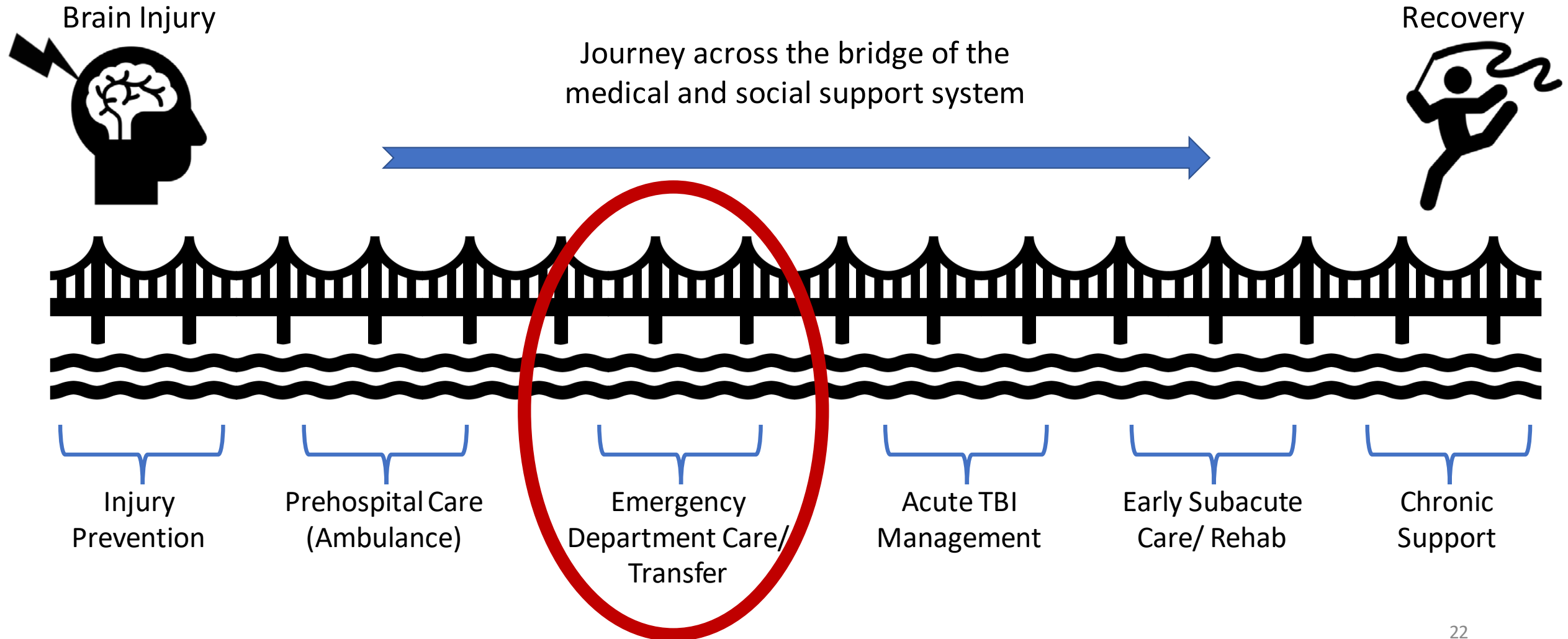


Prehospital Care: Trauma systems of care

- Regionalized trauma systems are standardized across the US through the ACS
- Guide EMS to the appropriate level of care
- Direct access to Level I trauma centers is inherently limited being **rural** and **large** state.



Longitudinal Care of TBI Patients



ED Care and Transfer

- TBI Patients outside of Albuquerque will be initially evaluated at the **regional hospital**
- Many providers are understandably uncomfortable keeping patients with TBI since if they need surgery, transfer would delay care



This subdural hematoma needs emergency surgery



This subdural hematoma does not need any acute intervention

ED Care and Transfer

- Patients who are awake without major deficits with minor imaging findings very rarely need transfer
- A neurosurgeon needs to be able to assess the patient and the imaging to determine this

Low rate of delayed deterioration requiring surgical treatment in patients transferred to a tertiary care center for mild traumatic brain injury

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Opportunity to Decrease Unneeded Transfers

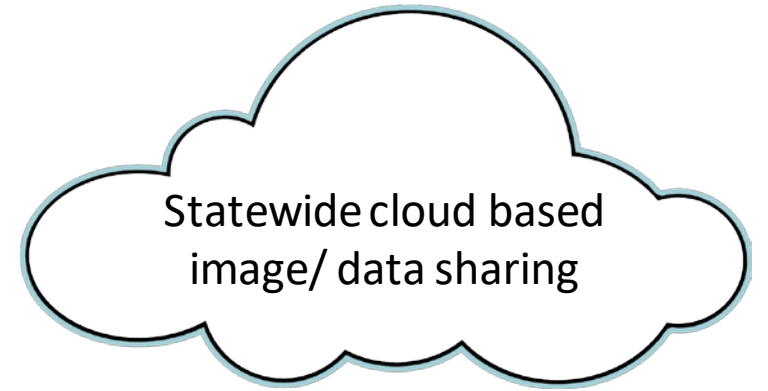
- Keeps patients and families closer to **home**
- Avoids **costs** of transfers
- Allows regional hospitals to care for patients

ACCESS to neuro-emergent care

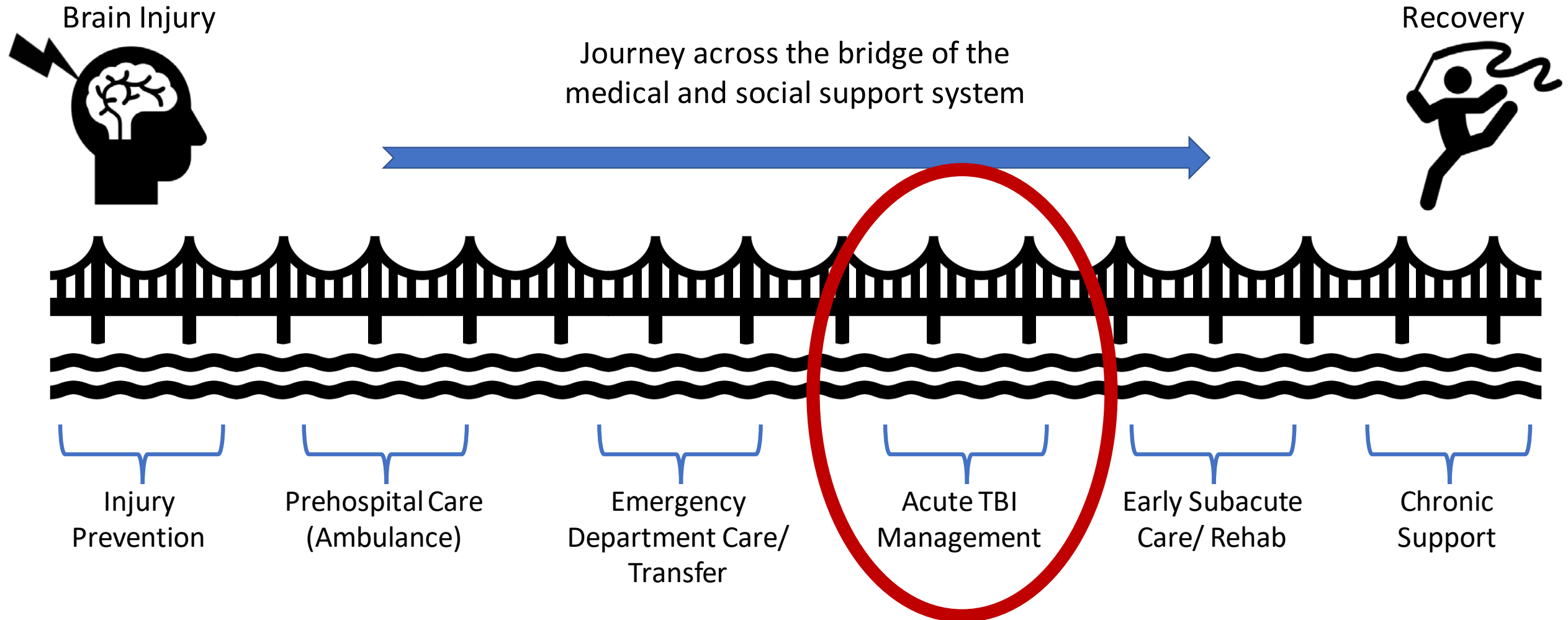
- Telemedicine program, established by Howard Yonas through stimulus grant
- Now self sustaining with over >20 hospitals in NM participating
- Allows for video conferencing and film review to reassure patients, families, and physicians when it is safe to avoid transfer
- In two years, a **70% decrease in patient transfers** was achieved without increase risk
- There was a projected reduction in 618 metric tons of **CO2 emissions** from transportation

ACCESS to **neuro-emergent** care

- Model system that can be applied to other conditions and other rural geographic areas
- Opportunities for improvement
 - Expand participation (~40 hospitals in NM)
 - Image/ and EHR sharing across systems (medical care and redundant imaging)
 - Communication tools to facilitate transfer/ stay at home processes



Longitudinal Care of TBI Patients

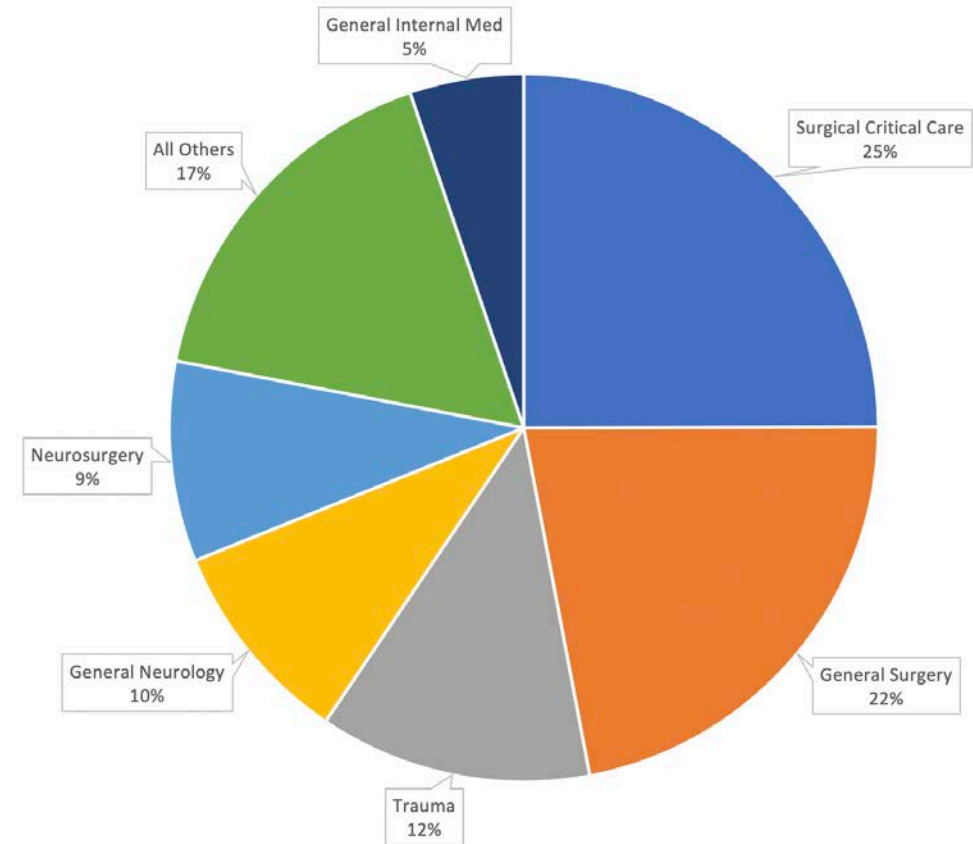


Clinical and Research components

Acute TBI Management- Clinical

- Most volume falls on UNM **trauma** and **neurosurgery** services
- Very high trauma volume with **need for more midlevel (APP/ NP) support**
- One contributor to challenges in maintaining neurosurgery residency (and faculty)

FY 21 Non-Elective Neurosurgery, Vizient Trauma Service Line only, by Discharge Service



Total= **1,078** neurotrauma inpatients in 2021!
Principal procedure was neurosurgery in **259** of these

Acute TBI Management-Research

- Multiple federally funded, nationally respected investigators in TBI in New Mexico



Shuttleworth:
Pre-clinical TBI
mechanisms



Mukundan:
Biomarkers in
TBI



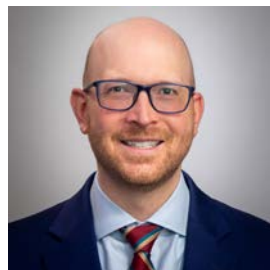
Mayer:
Biomarkers in
TBI



Bragin: Pre-
clinical models
of TBI



Morton-
Concussion



Carlson: New
therapies for
severe TBI



Ford: Early
mechanisms of
TBI

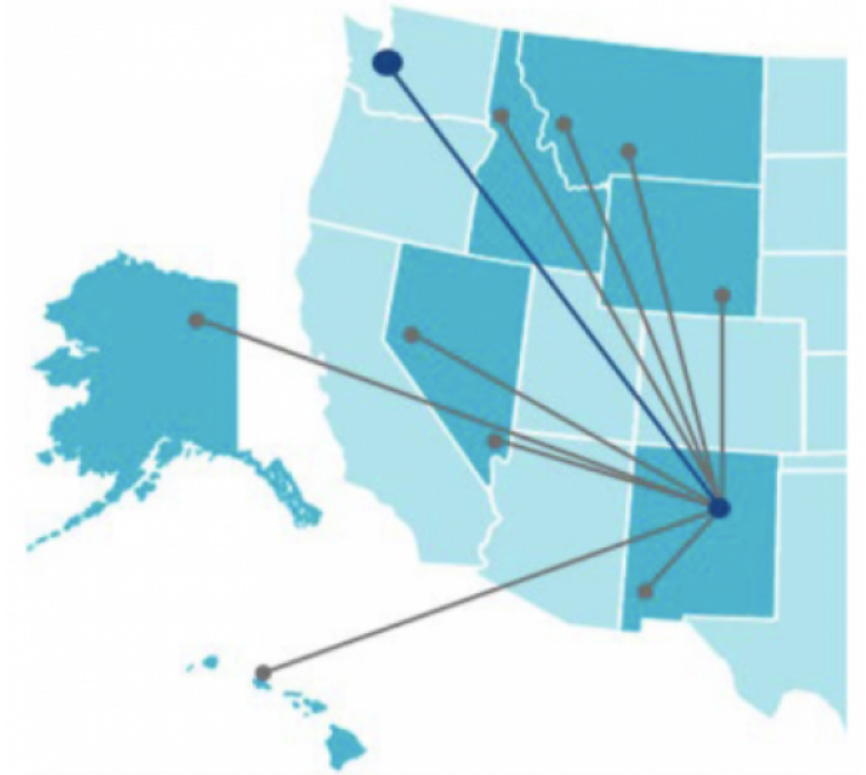


Quinn: Chronic
TBI recovery

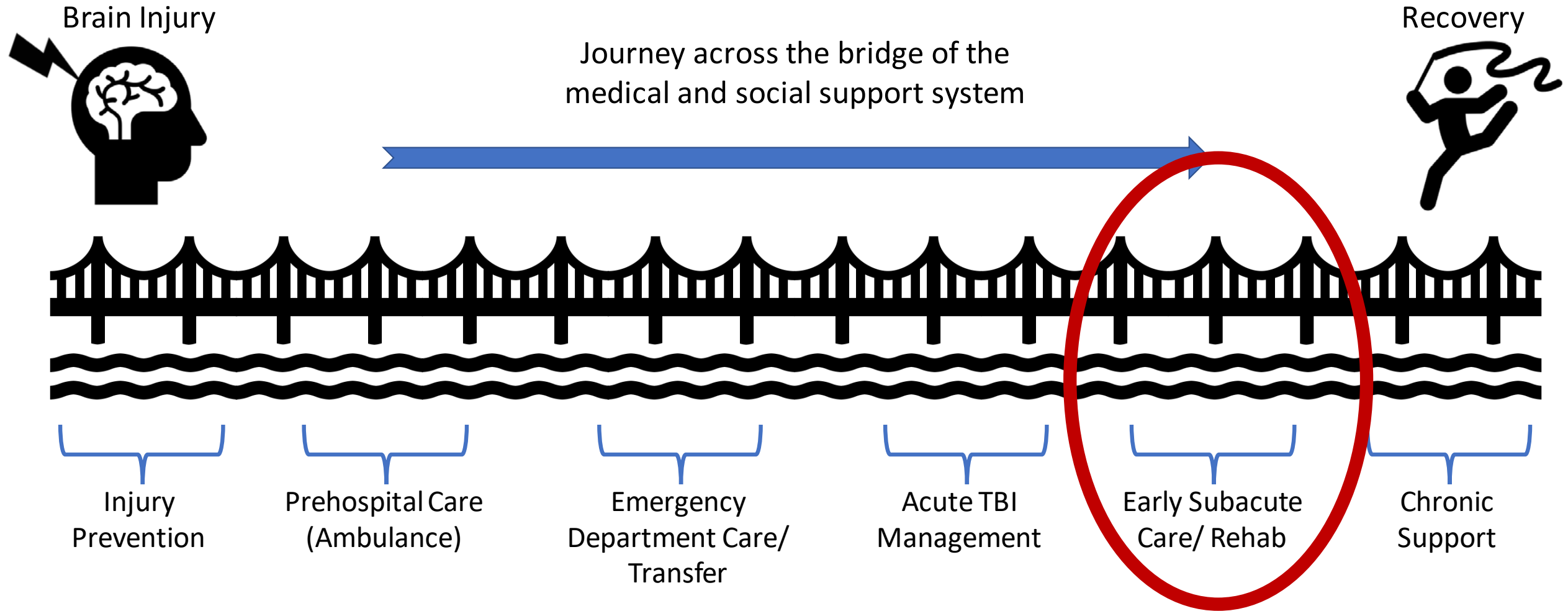
Acute TBI regional leader in Research

- Institutional Development award from NIH
- New Mexico is a regional leader in the IDeA network in translational research related to TBI
 - Provided keynote talk to the 2011 IDeA meeting on Effective translational research in Brain injury

Western Region IDeA states



Longitudinal Care of TBI Patients

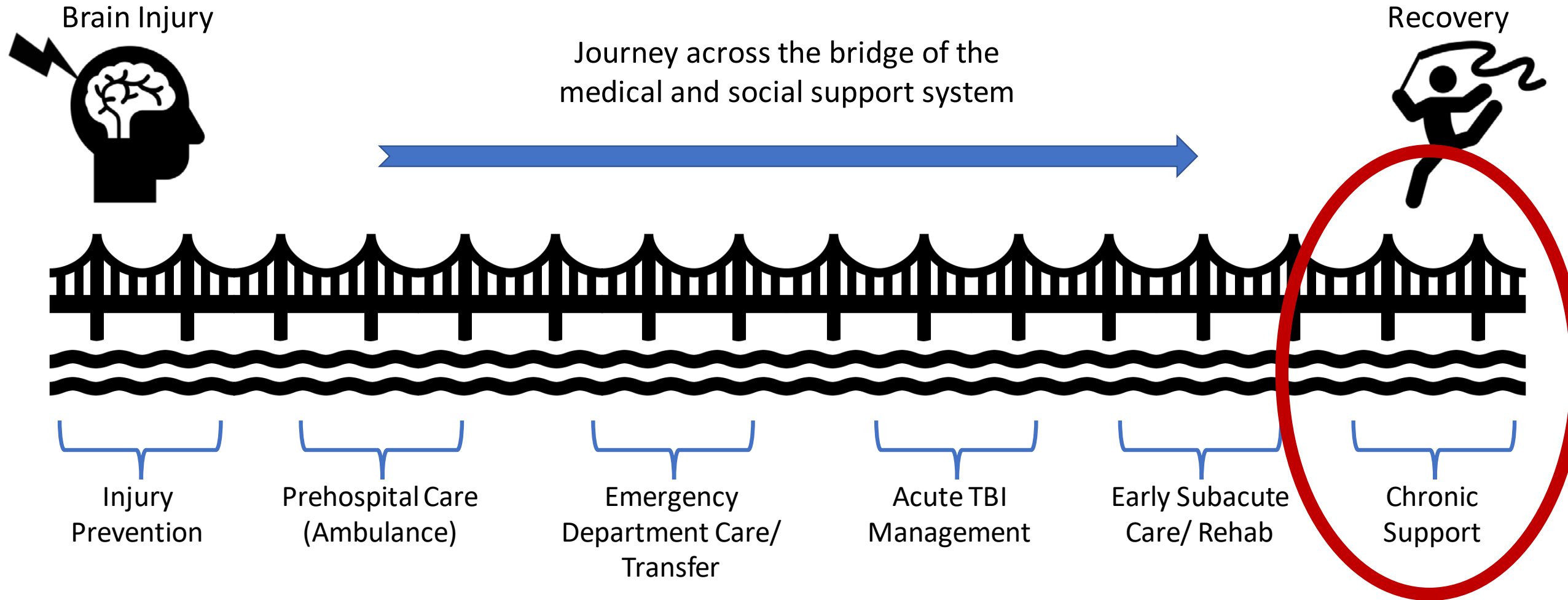


Early Subacute TBI care

- Most patients with TBI (especially severe) will need specialized rehabilitation
- Very limited options (Lovelace, Encompass) and only in Albuquerque
- Waits for transfer to any rehab can be exceedingly long
- General rehabilitation facilities may not provide the specialized care TBI patients should receive
 - “TBI patients should receive an individualized rehabilitation program based upon the patient's strengths and capacities and rehabilitation services should be modified over time to adapt to the patient's changing needs”



Longitudinal Care of TBI Patients



Chronic TBI scope of the problem

- TBI can be a lifelong problem
- Brain Injury is the **leading cause** of death and disability in children and young adults
- Over **5 million people** in the US live with chronic symptoms of TBI

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.

Chronic TBI scope of the problem

- *“In New Mexico, surviving a brain injury is just the beginning”*
- But a sense of peace is hard to come by for Atherton, who suffers from the effects of a severe brain injury. Her mind isn't as sharp as it was before the accident, and her memory is sometimes muddled. Her behavioral symptoms often are perceived as mental illness. Misunderstandings and emotional outbursts have led to tangles with police.



Kathryn Townes, recovering from TBI

Resources for chronic TBI care in NM

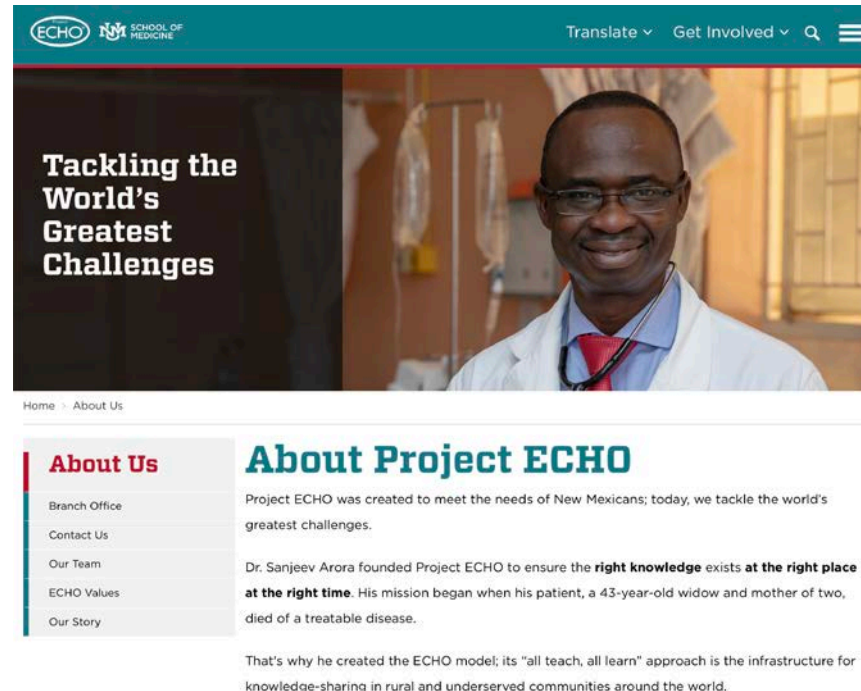
- Generally fragmented
- No “Roadmap” for recovery
- Few resources outside Albuquerque



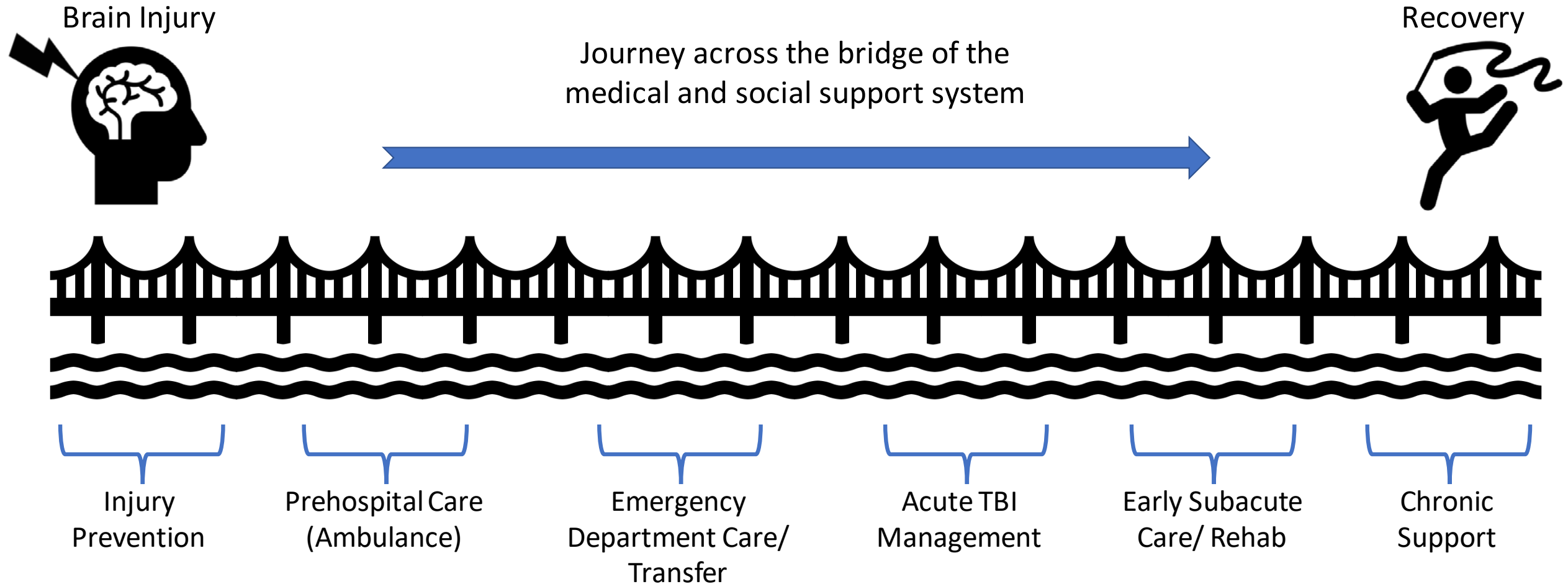
Your NMBIRC is now open to the public **by appointment only.**

Potential opportunities for this need

- Regionalized Chronic TBI care models
- Telemedicine models such as ACCESS and Project ECHO to help community physicians access chronic TBI experts without making patients travel



Longitudinal Care of TBI Patients



Objectives

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Thank you



Cox Canyon Arch: Aztec, NM