Improving Core Engagement in Adult Orthopedic Trauma Patients

The Acute Care C.O.R.E. Approach

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Improving Core Engagement in Adult Orthopedic Trauma Patients

Learning Objectives

1. Apply the concepts of Regional Interdependence Model of assessment to Orthopedic-Trauma patients
2. Implement appropriate evidence-based treatment interventions with a functional approach
3. Explain the four principles of the Acute Care C.O.R.E. Approach

Improving Core Engagement in Adult Orthopedic Trauma Patients

The Interdisciplinary Team

- Creighton University Medical Center - Bergan Mercy (CUMC)
  - The Academic medical center campus and one of Omaha's Level 1 Trauma Center
  - An 18 bed Intensive Care Unit (ICU) dedicated to patients with traumatic injuries including those that are Orthopedic in nature
  - A 55 bed Medical Surgical Ortho-Trauma (MSOT) unit

- Within our system we average approximately 2,000 Orthopedic Trauma Cases annually
  - Diagnosis-related Groups (DRGs)
  - Medical Severity Diagnosis-related Groups (MS-DRGs)
  - Geometric Length Of Stay (GMLOS)
  - Length of stay (LOS)

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The Interdisciplinary Team @ CUMC-BM

Discipline	Total
Trauma Surgeons and APRNs	14
Orthopedic surgeons, PAs, APRNs	15
Neurosurgery Providers	11
ICU & MSOT Nursing	50+
Case Management/Social Work	5

Acute Care Rehab Team	
Occupational Therapists (OTs) and Certified Occupational Therapy Assistants (COTAs)	20
Physical Therapists (PTs)and Physical Therapy Assistants (PTAs)	18
Speech Language Pathologists (SLPs)	12
Rehab Technicians	2

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The Interdisciplinary Team

- The USMC is considered the "**first** to fight and ready to win" within our armed services, as they are often the first on the ground.

- As it relates to healthcare settings, Acute Care professionals are the **first** to help our patients recover. After a serious accident, patients arrive at a hospital and are stabilized, needed surgical procedures performed and the recovery process initiated.

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The Interdisciplinary Team

- What if we could:
  - Decrease length of stay?
  - Improve patient outcomes?
  - Better manage pain?
  - Prevent or decrease readmissions?
- Can Artificial Intelligence help us?

- Those are all great questions and today, for the next few minutes I would like to explain how, helping our Adult Orthopedic Trauma patients in the acute care setting to improve their **core** engagement will improve their functional outcome and decrease their recovery time.

Improving Core Engagement in Adult Orthopedic Trauma Patients

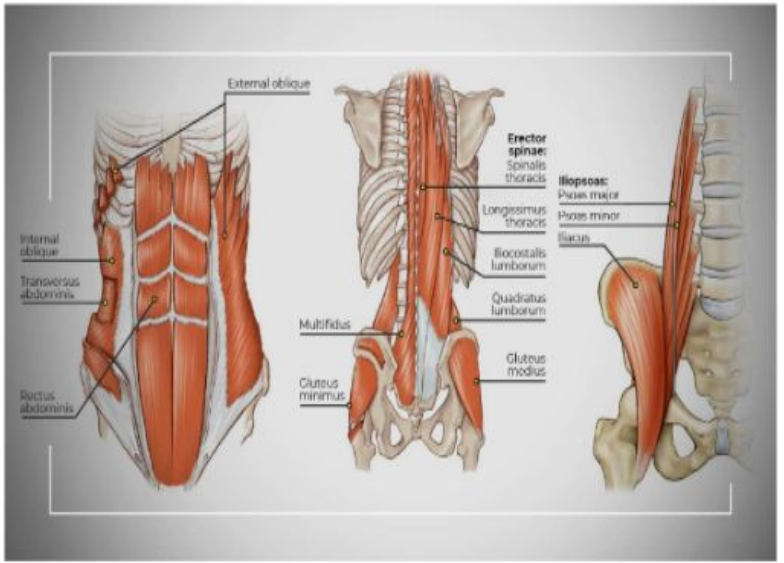
Core Basics 101

- The Core Canister

Our core canister includes the Diaphragm, Abdominal muscles, Back muscles, Pelvic floor muscles. Management of intra-abdominal pressure is important for effective mobilization.

- The Pelvis

The pelvis can be considered as the foundation of movement, stability and balance. The foundation of our core canister. There are 36 muscles that attach to the sacrum or innominates.



Improving Core Engagement in Adult Orthopedic Trauma Patients

Core Basics 101

- Proximal stability before distal mobility.
- The ability to maintain one's center of gravity within their base of support.
- Core stability and upper and lower extremity function
  - In an article by Okada et al, their findings support the theory that movement control and stability are developed in a core to extremity and cephalocaudal progression

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How does the loss of function of an extremity affect one's balance and functional mobility?

- According to an article by Okada et al, functional movement is the ability to produce and maintain balance between mobility and stability along the kinetic chain while perform fundamental patterns with accuracy and efficiency.
- There is a clear connection between core muscle activation and lower extremity mobility
  - In an article by Wilson et al, they suggest that a core deficiency may increase a person's risk for lower extremity injury
- Jha et al, advocates for the use of a core stabilization training program among collegiate athletes to enhance their upper extremity performance.

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How does the loss of function of an extremity affect one’s balance and functional mobility?

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Regional Interdependence (RI)

- The RI examination model in the management of musculoskeletal disorders
  - the concept that a patient's primary musculoskeletal symptom(s) may be directly or indirectly related or influenced by impairments from *various body regions and systems* regardless of proximity to the primary symptom(s)'.
  - For example
    - Interventions aimed at the lumbar spine have been used to treat hip and knee pain as patients who have knee pain more than likely have weak hip muscles compared to persons without knee pain
    - Patients with Low back pain have benefited from interventions aimed at the hip.

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Regional Interdependence (RI)

- During an orthopedic joint assessment of a specific joint, a common approach is to assess the joints *"above and below"* the region of interest.
- The same approach is also applied when a assessing muscle strength and function.
- During the rehabilitation of patients with single limb fractures this principle of assessing joints "above and below" the point of injury is also applied

The RI model of examination for musculoskeletal disorders simply goes a step further by assessing on a segmental level.

How does **core stability** and the **concept of regional interdependence** apply to our Adult Orthopedic Trauma patients?

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- ***This model/concept of RI can be applied to adult patients with traumatic orthopedic injuries.***

- ***Patients with Upper and Lower Extremity injuries can benefit from interventions that aim to strengthen and stabilize the core musculature.***

Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study # 1

A story about Connie, the Physical Therapist

Denzel Washington has starred in over 40 movies, 4 theater productions, nominated for over 30 different awards and directed 2 films to date.

Disclaimer: The names, identities and timelines of all cases have been modified to protect patient's identity.

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Case Study #1

Patient Summary: Male; 40s; Employed; High School; Independent c/ ADLs and IADLs; Above Avg height and normal BMI; MVA - polytrauma, bystanders report the driver was seen driving unconscious into oncoming traffic

Injury Summary:

- Ribs - mildly displaced fractures R anterior 2nd-5th; L lateral 4th-5th; nondisplaced sternal fracture
- Pelvis - comminuted mildly displaced L acetabular fracture ant/post/roof, extending to iliac wing superior/inferior ramus and ischium; hematoma in iliacus muscle
- Left LE - comminuted displaced femoral neck with posterior displacement and distal femur fracture and patella fracture, intramuscular thigh hematoma, minimally displaced spiral fracture of fibula
- Right LE - displaced trimalleolar fracture
- R UE weakness - small subacute infarcts of L cerebral hemisphere

Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study #1

Disciplines Involved: Trauma | Orthopedic Surgery | Neurology | Hematology | Infectious Disease | Physical Medicine & Rehabilitation | Nursing | Case Management | OT/PT/SLP

Surgical interventions:

- Day 1 - Excisional debridement open **L**eft femur, **L**eft open patellar, left leg wound IMN **L**eft femur and ORIF **L**eft open femoral shaft fracture, splinting of **R**ight open ankle fracture
- Day 3 - ORIF **R**ight ankle
- Day 14 - Revision **L**eft hip IMN (broken screw)

Length of Stay: **29** days
PT - **15** sessions
OT - **17** sessions
SLP - **11** sessions

Precautions:
L LE NWB c/ KI, CAM boot and posterior hip precautions
R LE NWB c/ CAM boot
R UE hemiparesis

Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study #1

of days in acute care **29**

days in inpatient rehab **7**

Acute Care Rehab Interventions:

Core: Diaphragmatic breathing and Transverse Abdominus bracing in supine, Static and dynamic sitting balance,

UE: Cervical and Scapular ROM and B UE therex supine and sitting

LE: ROM B LEs in supine, sitting and LEFT/RIGHT sidelying; Muscle Energy Techniques; Kinesio Taping; Constraint induced therapy; Manual therapy (reciprocal inhibition)

Balance: Static and dynamic sitting balance and tolerance

DME: Slide board, drop-arm bedside recliner and manual w/c

Highest Functional level achieved: modified independent for supine<> sit |minimal A for bed <>chair via posterior or lateral entry | minA for w/c propulsion c/one UE

The Acute Care C.O.R.E. Approach

The Acute Care C.O.R.E. Approach

C
Communication

O
Objective Data

R
Resources

E
Evidenced-Based Interventions

+

This is an interdisciplinary approach that has been used primarily by the OT/PTs on the medical-surgical Ortho/Trauma unit for the past two years. We have found once assessed and trained in the methods above patients functional outcomes improve and in some cases discharged directly home.

The Acute Care C.O.R.E. Approach

Communication

- Changing our verbiage is crucial
  - Mental Health vs Mental Illness
  - Positive Psychology

- In February of 2022, the American Academy of Orthopedic Surgeons, Major Extremity Trauma and Rehabilitation Consortium and friends published a Clinical Practice Guideline summary for evaluation of psychosocial factors influencing recovery from Orthopedic Trauma
  - Anxiety, Depression, PTSD, Smoking, less social support, limited self-efficacy and lower education level are associated with increased biopsychological limitations after adult orthopedic trauma
  - Resilience, self efficacy and a strong social support were associated with positive outcomes

The Acute Care C.O.R.E. Approach

Communication

- Changing our verbiage is crucial
  - "You have 6 weeks of non-weight bearing on your involved extremity"
    -
  - "You have 6 weeks to improve your core strength and the strength of your non-involved extremity. This will make for an easier transition when your weight bearing restriction is modified/lifted.
    -
  - Post-mobilization films vs Post-ambulation films
    - A patient may not be able to safely ambulate by hopping on one leg 20'x1 with the use of a walker/crutch.
    - However, they may be able to stand and pivot or use a slide board to transfer out of bed

The Acute Care C.O.R.E. Approach

Objective Data

- Mobility in all positions - supine, sidelying, prone, sitting and standing
  - Level of assistance required to achieve each position
    - Can the patient assume a position and level of assistance required
  - Ability to move each extremity in each position
    - Supine - Manual Muscle Testing (MMT) and Range of Motion (ROM) of extremities and assistance to roll left (L) to right (R) will predict level of assistance for supine to sit
    - Sitting - Static and dynamic balance, seated weight shifting and MMT/ROM of extremities will predict assistance for transfer

The Acute Care C.O.R.E. Approach

Objective Data

- Mobility in all positions - supine, sidelying, prone, sitting and standing
  - Ability to move each extremity in each position
    - Standing - Static and dynamic balance, standing weight shifting and MMT/ROM of extremities will predict assistance need to transfer and ambulate
  - Wheelchair mobility
    - Assessing the patient's ability to maintain static and dynamic balance, sitting tolerance (can be applied to use of a bedside commode)
    - Single-extremity w/c

The Acute Care C.O.R.E. Approach

Resources

What are the most appropriate resources given the patients, height, weight and range of motion restrictions, weight bearing precautions and braces?

- Durable Medical Equipment
  - Walker
  - Hemi-walker
  - Platform walker
  - Eva Walker
  - Crutches
  - Slide board
- Hospital Equipment
  - Overhead Trapeze
  - Waffle Overlay bed/chair
  - Low bed
  - Hoyer lift
  - Post-op or off-loading Shoe
  - CAM boot
- Adaptive Devices
  - Shower chair
  - Commode
  - Leg Lifter
  - Seat Cushions

The Acute Care C.O.R.E. Approach

Evidenced-based Interventions

- Diaphragmatic breathing Transverse Abdominus bracing
  - Management of Intra-Thoracic and Intra-Abdominal pressure when mobilizing
  - Pelvic floor activation during mobility and incontinence
- R.I.C.E. vs R.I.C.E.K.
  - Relative Rest|Ice|Compression|Elevation | Kinesio Tape
    - Use of edema-wear and tubi-grip
    - Ice - location matters
      - Popliteal, cubital
    - K-Tape for swelling has found to be effective

The Acute Care C.O.R.E. Approach

Evidenced-based Interventions

- Functional and Progressive Therapeutic Exercise
  - Beyond your basic in-room home Exercise Program (HEP)
    - Think exercise to improve mobility not for muscle hypertrophy
- Muscle Energy Techniques
  - Manual Therapy in the Acute Care Setting
    - Think improved proprioceptive feedback, strain-counterstrain techniques

Case Studies

Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study # 2

Pt. Summary: Female; 40s; Employed; Bachelors; Independent; Avg height; BMI high; MVA

Injury List:

- **B** SAH, L1-2 transverse process fx,
- **L** distal radius fx
- **L** pubic bone fracture and distal fibula fx c/ talar subluxation
- **R** Acetabular fracture c/ femoral head dislocation, distal fibula and tibia comminuted fractures

Surgical Interventions:

- Day 3 - **L** distal radius ORIF
- Day 4 - **R** femur and acetabular ORIF

LOS: **53** days

Number of sessions:
PT **30** | OT **33** | SLP **20**

Precautions:
R LE NWB and posterior hip precautions;
L LE WBAT c/ CAM boot;
L wrist AROM/PROM and up to 10 lbs lifting restriction

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Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study #2

of days in acute care **53**

days in inpatient rehab **37**

Acute Care Rehab Interventions

Core: Diaphragmatic breathing and Transverse Abdominus bracing in supine, Static and dynamic sitting balance,

UE: Cervical and Scapular ROM and B UE therex supine and sitting

LE: AROM/AAROM/PROM B LEs in supine, sitting and LEFT/RIGHT sidelying; MET; Manual therapy (reciprocal inhibition)

Balance: Static and dynamic sitting balance and tolerance

DME: Slide board, drop-arm bedside recliner and manual w/c

Highest Functional level achieved: minA for rolling L<>R | minA supine<> sit |minA bed <>chair via slide board

Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study # 3

Pt. Summary: Female; 30s; Employed; Associates; Independent; Avg height; BMI high; MVA

Injury Summary:
- R 3rd metacarpal and 3rd and 5th proximal phalanges nondisplaced fx
- R 4th distal metatarsal nondisplaced fx
- Sternal nondisplaced buckle fx anterior body
- C7, T2-4 and T10-11 fractures

Surgical Interventions:
- **NONE**

LOS: **12**

Number of sessions:
PT **8** |OT **7** |SLP **4**

Precautions:
R UE NWB and **R** LE NWB and CAM boot
CTLSO for OOB
Spine Precautions

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Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study #3

of days in acute care **12**

days in inpatient rehab: **n/a**

Acute Care Rehab Interventions

Core: Diaphragmatic breathing and Transverse Abdominus bracing in supine, Static and dynamic sitting balance, Static standing balance and tolerance

UE: Scapular ROM and B UE therex supine and sitting

LE: AROM/AAROM/PROM B LEs in supine and sitting, and R LE in standing

Balance: Static and dynamic sitting balance, Static standing balance and tolerance

DME: unsuccessful attempted use a hemi-walker, R UE Platform walker and single axillary crutch; Mobilized best with a knee scooter

Highest Functional level achieved: minA for bed mobility|SBA for transfers |SBA ambulation c/ knee scooter

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Case Study # 4

Patient Summary: Female; 80s; Retired; High School; Independent; below Avg height; BMI moderate; GLFx2 (5 days apart)

Injury Summary:

- Subdural hemorrhage
- **R** Frykman class VII distal radius fx 8/11
- **L** distal comminuted and angulated radius fx, Ulnar styloid process avulsion fx
- **R** calf Hematoma

Surgical Interventions:

- **NONE**

LOS: **8** days

Number of sessions:
PT **6** | OT **6** | SLP:**1**

Precautions: B
UE NWB

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Improving Core Engagement in Adult Orthopedic Trauma Patients

Case Study #4

of days in acute care **8**

days in inpatient rehab **n/a**

Acute Care Rehab Interventions

Core: Diaphragmatic breathing and Transverse Abdominus bracing in supine, Static and dynamic sitting balance, Static standing balance and tolerance

UE: Scapular ROM and therex supine and sitting

LE: AROM/AAROM/PROM LEs in supine and sitting,

Balance: Static and dynamic sitting balance, Static standing balance and tolerance

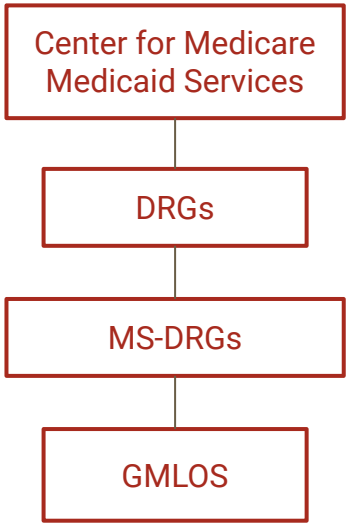
DME: unsuccessful attempted use an Eva walker

Highest Functional level achieved: Moderate assistance for supine <>sit x 2 assist| moderate assistance for sit<>stand x1

Improving Core Engagement in Adult Orthopedic Trauma Patients

GMLOS vs LOS

Case Study	GMLOS	LOS
#1 - 1 involved UE and B LE fxs & CVA	6.1	29
#2 - 1 involved UE and B LE fxs & SAH	9.5	53
#3 - Unilateral UE/LE fxs & T-spine Fxs	3.3	12
#4 - B UEs fx	3.1	8



Why should we adopt the Acute Care C.O.R.E. Approach?

Developing and adopting a new acute care rehabilitation approach, will have a positive impact on our patient outcomes:

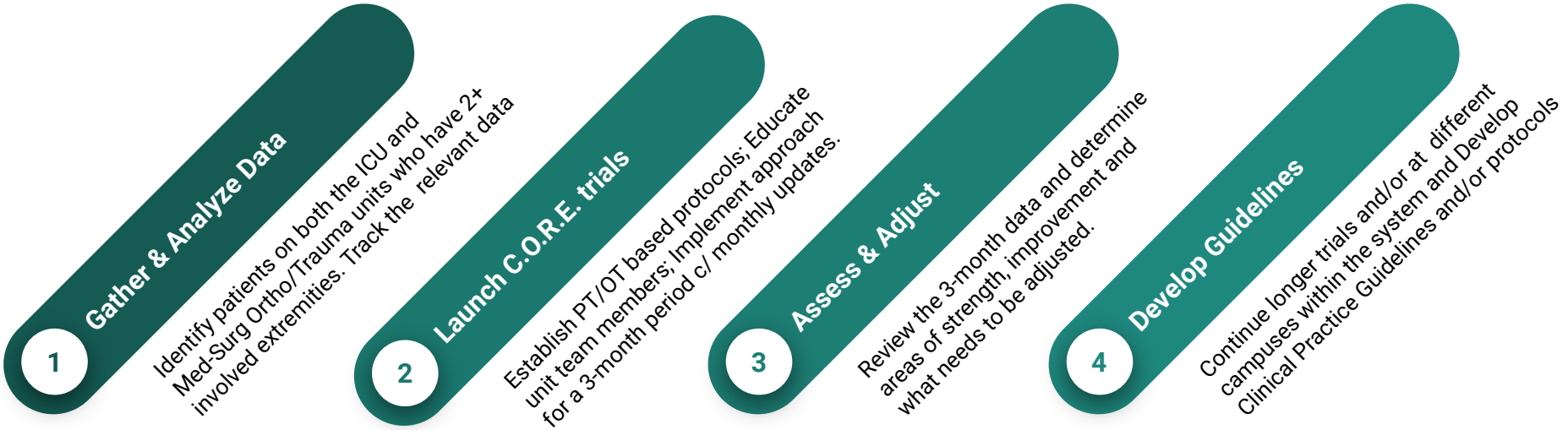
01	Decrease LOS	• Improved core control, stability and mobility = faster transition to next level of care
02	Decreased % pain	• Patient engagement via active muscle recruitment and engagement = less painful mobility
03	**Decrease patient falls**	• Decreased falls transferring patients 2/2 improved balance and use of appropriate DME
04	**Decrease staff injuries**	• Patients able to mobilize more efficiently with nursing staff

Why should we adopt the Acute Care C.O.R.E. Approach?

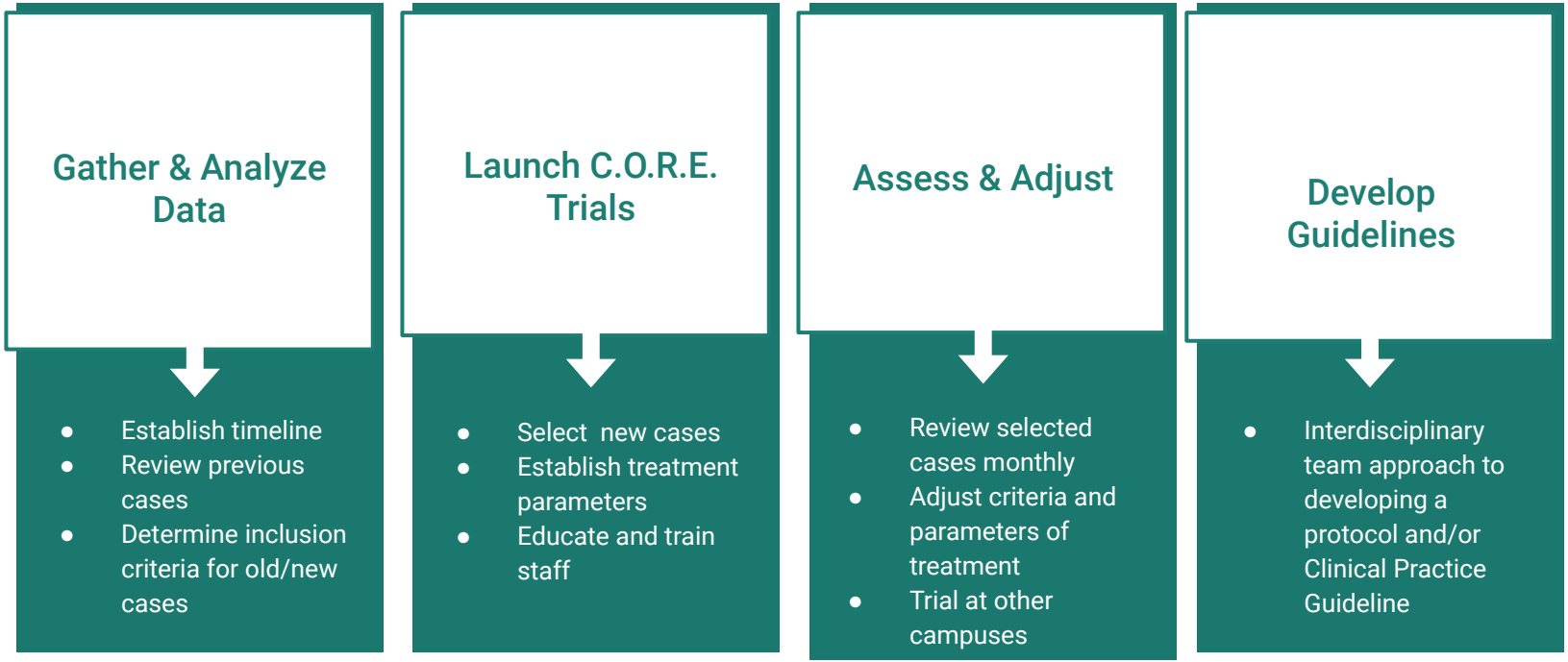
Developing and adopting a new acute care rehabilitation approach, will have a positive impact on our patient outcomes:

05	Improved mental health	• Return to hobbies, work and less financial strain • Return to PLOF or modified PLOF
06	Improve functional outcomes	• Improved core control, improves stability and subsequently mobility. • Increased independent with appropriate DME
07	Decreased re-admission	• Patients will achieve a higher functional level in acute care and decreased burden of care when transitioning to the next setting. Less likely to fall or sustain an injury
08	Improved patient satisfaction	• Patients feel heard, supported and informed • Patients achieve a higher functional level than imagined

How do we adopt the Acute Care C.O.R.E. Approach ?



How do we adopt the Acute Care C.O.R.E. Approach ?



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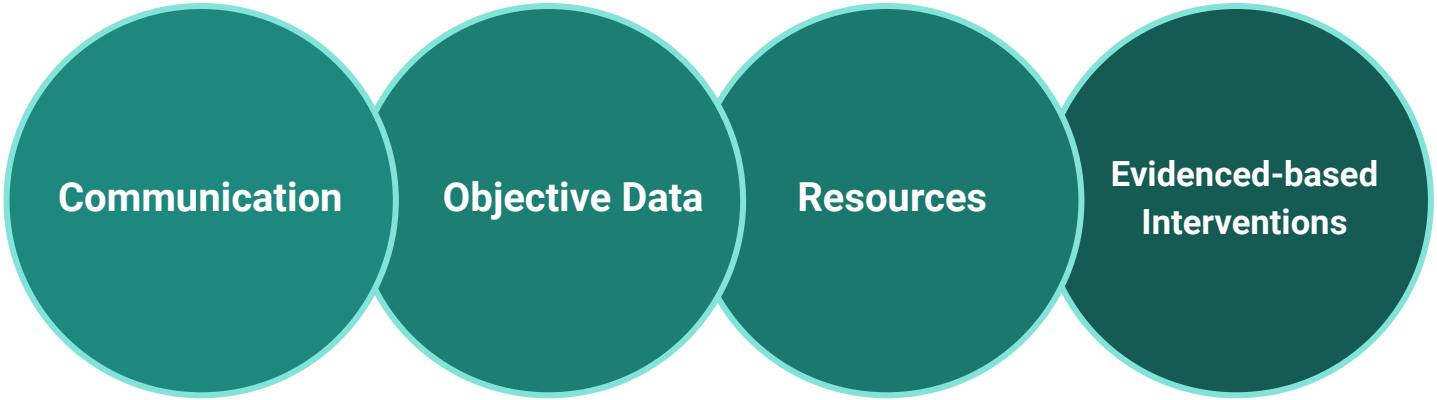
The Acute Care C.O.R.E. Approach



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The Acute Care C.O.R.E. Approach

"There are two kinds of pain in this world.
The pain that hurts, the pain that alters."

– **Denzel Washington**

Thank You

A special thank you to Acute Care Rehab Team at CUMC-BM and our partners at Conifer Health Solutions

Question & Answer

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