

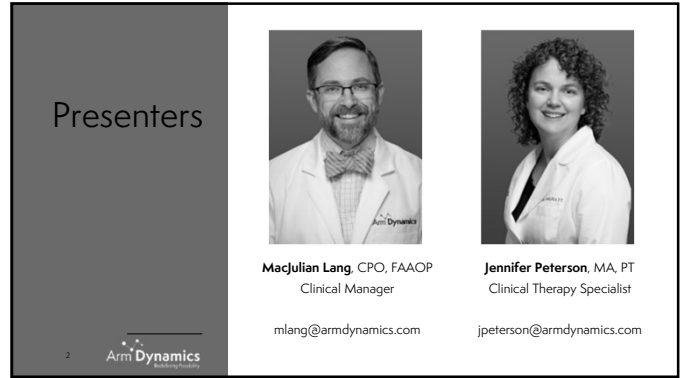
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Redefining Possibility

## Best Practices in Amputee Rehabilitation

CEU Course

January 25<sup>th</sup>, 2024 Workers Compensation Reinsurance Association


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## Presenters



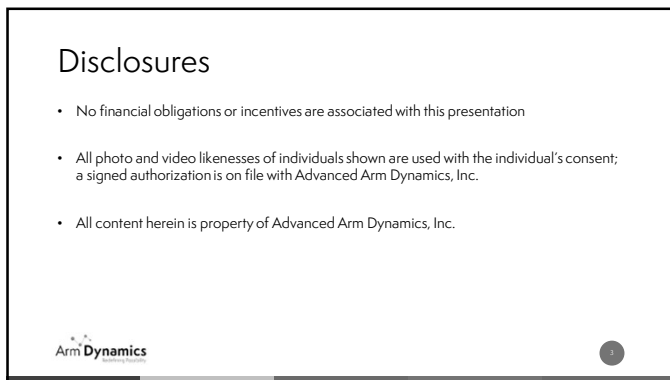
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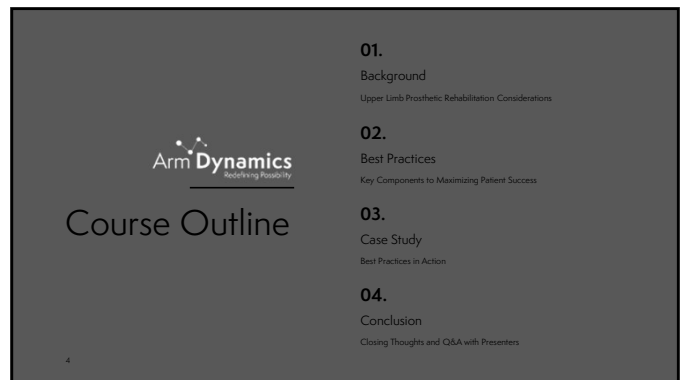


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## Course Outline

- 01.** Background  
Upper Limb Prosthetic Rehabilitation Considerations
- 02.** Best Practices  
Key Components to Maximizing Patient Success
- 03.** Case Study  
Best Practices in Action
- 04.** Conclusion  
Closing Thoughts and Q&A with Presenters


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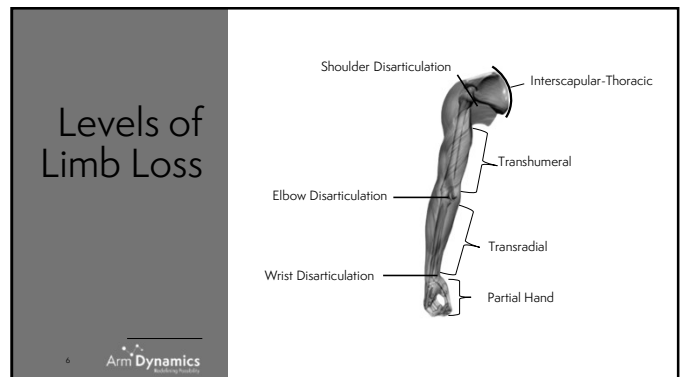


## 01. Background

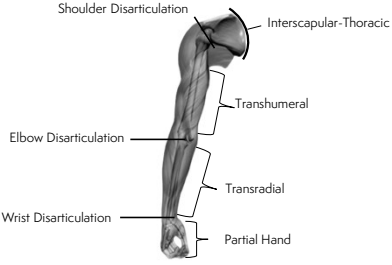
Upper Limb Prosthetic Rehabilitation Considerations


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## Levels of Limb Loss



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## Limb Loss Statistics

Annualized Upper Limb Amputations <sup>1</sup>

18,600 (total)


1,600 (9%)

17,000 (91%)

### Upper vs. Lower Limb

- Upper limb loss is less prevalent than lower limb loss
- There are 15<sup>(1)</sup>-40<sup>(2)</sup> times more lower limb amputations per year than upper limb


1. Dillingham, T. R. (2002)  
2. Ziegler-Graham, K., et al (2008)

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## Common Concerns

1. Timing
2. Justification
3. Patient return to work
4. Device choices
5. Patient training
6. Provider competency
7. Prosthesis abandonment


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## Primary Reasons for Prosthesis Abandonment



- Device does not meet the individual's goals
- Device is uncomfortable
- Device does not function as desired
- Lack of prosthetic training


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## Common Patient Concerns


Factors that influence prosthesis use:

1. Pain
2. Psychological concerns
3. Function
4. Lack of Independence
5. Provider Inexperience

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## Defining Success with a Prosthesis



- Comfortable, functional device
- Ability to complete ADLs
- Positive body image
- Social reintegration
- Return to active employment


1. Minkus, S., Gillingham, P., and Carlson, M. (2008). Identifying successful outcomes and important factors to consider in upper limb amputation rehabilitation: an international web-based Delphi survey. Disability and Rehabilitation, 20(15), 1251-1258. doi: 10.1080/0963828070171118. Each 2007 Jan 25.

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## 02. Best Practices

Key Components to Maximizing Patient Success



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**Best Practices Overview**

Maximizing each patient's prosthetic rehabilitation potential requires:

1. Collaborative team approach
2. Prosthetic options education
3. Interface design considerations
4. Expedited prosthetic fitting
5. Prosthetic therapy & training
6. Tracking and measuring success
7. Regular team communication

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**02.1**

Best Practices

Collaborative Team Approach

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**The Collaborative Team**

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**Engage the Team at First Report of Injury**

- Communicate amputation details / surgical revisions
- Conduct physical and psychological screens
- Grief Management
- Reconstruction options
- Prosthetic options education
- Define & communicate plan

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**Optimal Length of Amputation**

**Factors:**

- Components
- Socket/Suspension Design
- Surgical Techniques

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**Too Short and Too Long**

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Osseointegration

FDA Approval Through "Expanded Access" is Required

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Soft Tissue

Enabling the best fit requires pressure-tolerant skin.

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Neuromas

Residual Limb Pain Management

- 100% chance of neuroma formation
- Best way to manage
  - Medications
  - Injections
  - Excision
- Prevention methods

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Targeted Muscle Reinnervation

Nerve Management & Prosthetic Control

- Pain Control
  - Neuroma prevention
  - Decreased pain
  - Nerve to nerve coaptation vs. standard nerve treatment
  - Earlier is better
- Prosthetic Control
  - Adipofascial flap between muscle bellies
  - Muscle transfer for additional sites

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RPNI

Regenerative Peripheral Nerve Interface (RPNI)

- Muscle graft used to encapsulate nerve endings
- New muscle target encourages nerves to organize and regenerate
- Decrease in pain
- Increase prosthetic control

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Pattern Recognition

Is This the Answer to Adipofascial Flaps?

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### Team Prosthetic Evaluation




- Physical**
  - Strength and ROM
  - Condition of limb
  - Presence of controllable EMG sites
  - Lower limb involvement
  - Presence of Pain
- Psychological Screen**
  - What are the barriers to success?

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## 02.2

### Best Practices

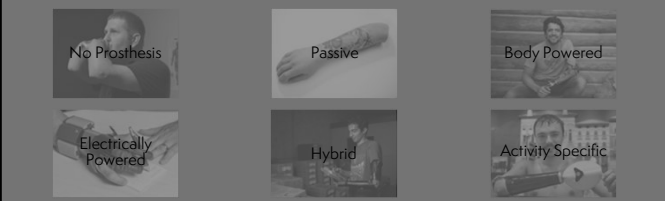
Prosthetic Options Education



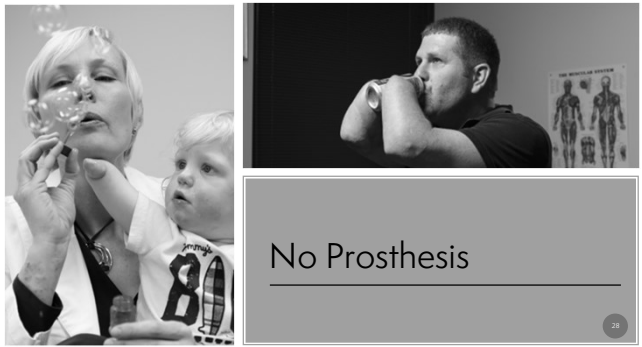
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### Six Prosthetic Options

Limitless Possibilities



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### No Prosthesis

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### Passive Prosthesis

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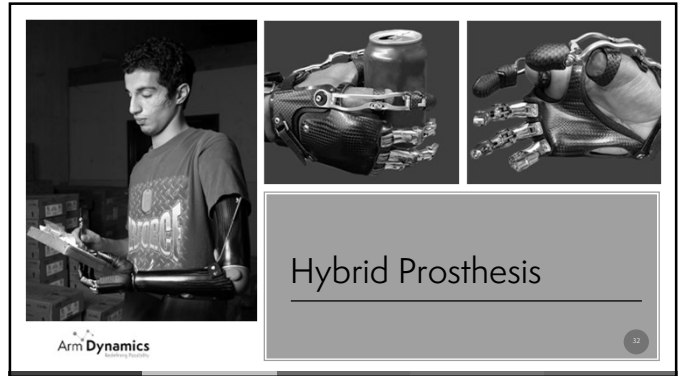


### Body Powered Prosthesis

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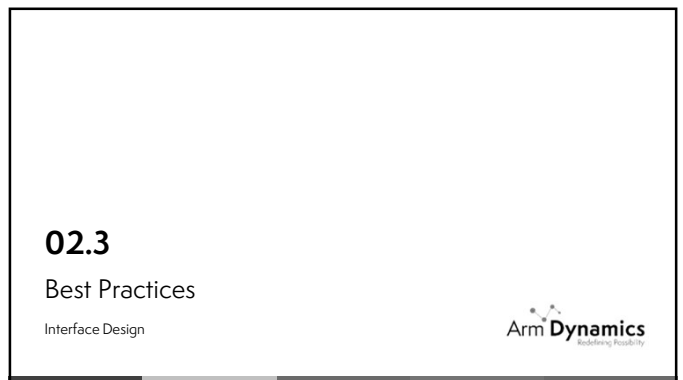
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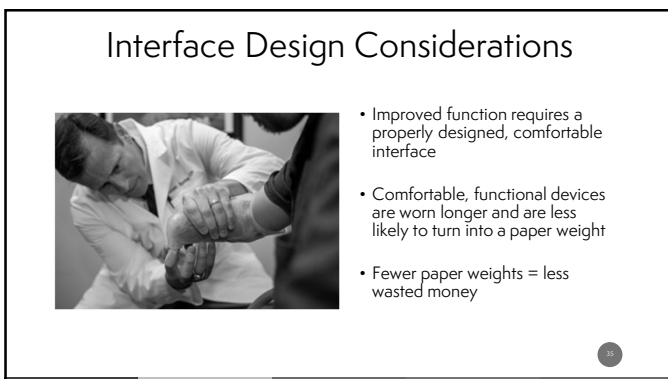
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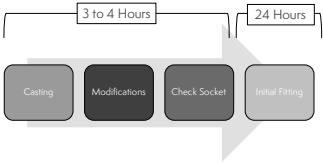


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## Holistic Expedited Prosthetic Fitting




- Optimizes fit & function prior to final prosthesis
- Increases patient engagement
- Therapy & training
- Quickly builds confidence
- Better patient outcomes

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## 02.5

### Best Practices

Prosthetic Therapy & Training




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## Maximizing Patient Success

Four Key Phases:


1. Perioperative
2. Pre-Prosthetic
3. Prosthetic Training
4. Advanced Training & Lifelong Care




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## Phase 1: Perioperative




- Physical
  - Wound care
  - Scar tissue management
  - Limb shaping & Edema control
  - Desensitization
  - Range of Motion
  - Strength & activity tolerance
- Adaptive Strategies
  - One-handed strategies
  - Adaptive or DME
  - Hand dominance retraining
- Psychosocial Needs
  - Psychological screening and support




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## Phase 2: Pre-prosthetic




- ROM still a big consideration
- Continue to monitor wound closure and pain management
- Amputee education
- Rehabilitation interventions
- Continued psychological support
- Myoelectric site testing/training




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## Phase 3: Prosthetic Training



- Prosthesis education
- Proper terminology
- Proper operation
- Control strategy
- Limitations of device
- Precautions
- Appropriate care of prosthesis



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### Phase 3: Prosthetic Training

- Donning and doffing
- Wear schedule

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### Phase 3: Prosthetic Training

- Control training
- Repetitive drills

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### Phase 3: Prosthetic Training

Functional Training

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### Phase 4: Advanced Training & Lifelong Care

- IADL Engagement
  - Shopping, meal prep, driving evaluation, home management and care for others
- Leisure, play and social participation
- Return to education or work
  - Functional Capacity Evaluation (FCE)
- Routine follow-up contact (6-month min.)
- Continuing patient education

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## 02.6

### Best Practices

Tracking and Measuring Success

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By tracking & measuring patient success, we identify:


- Potential psychological roadblocks to rehabilitation
- Self-perceived ability to perform functional activities
- Actual ability to perform functional activities
- Self-perceived symptoms
- Abilities and limitations of a patient's device to inform continued development

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## Maximizing Patient Success



### Outcome Measure Challenges

- Majority of measures do not effectively evaluate function of upper limb prostheses
- More than one type of measure is needed to capture all aspects of prosthetic rehabilitation
- Need for development of measures specific to upper limb prostheses


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## Key Outcome Measures

To maximize a patient's rehabilitation potential and reduce prosthesis abandonment, it's important to include the following types of outcome measures in a patient's prosthetic rehabilitation:

- Psychosocial Screen
  - Identify & address psychological barriers to prosthetic rehabilitation
  - Identify focus areas for social reintegration & return to work
- Self-perception & patient satisfaction
  - Identify if needs/goals are being met
- Prosthesis Performance
  - Understand current functional status with prosthesis
  - Compare to similar presentations to gauge potential
  - Motivate patient to maximize ability

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## Calculating Success

Making data-driven decisions.

Population-specific outcome measures enhance outcomes:

- Wellness Inventory
- CAPROQ®
- CAPPFUL®

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## Psychosocial Screen

### Example: Wellness Inventory

The Wellness Inventory is a short battery of seven validated screening instruments to measure:

- Resilience
- Health-related QOL
- Pain
- Depression
- Post-traumatic anxiety
- Alcohol and drug use

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## Self-Perception Outcome

### Example: CAPROQ® & CAPROQ-S

Patient report questionnaires to address topics specific to upper limb prosthetic rehabilitation:

- Return to work
- Level of independence
- Prosthesis wear time and active use
- Perceived function
- Satisfaction with prosthetic rehabilitation
- Pain and sensation issues

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## Prosthesis Performance

### Example: CAPPFUL®

CAPPFUL is a scientifically validated outcome measure that helps to:


- Determine effectiveness of component & interface design
- Quickly assess functional skill level with prosthesis
  - Component utilization
  - Control skill
  - Assess compensatory movement
- Objectively demonstrate performance with prosthesis
- Provide data to guide the care plan

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## 02.7

### Best Practices

Regular Team Communication




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### Provider Communication

#### Set Expectations: Proactive, Timely and Consistent Communication

- Administrative
  - Case manager and/or adjuster should be included in authorization process
  - Justification documents should provide specifics regarding prosthetic recommendations, therapy/training and medical necessity
  - Regular status updates on authorization status (submission, appeals, etc.)
- Clinical
  - Case manager should be included in patient evaluation
  - Patient progress update videos




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## 03.

### Case Study

Best Practices in Action





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### Jason Koger

Bi-lateral, Transradial Amputee


Jason Koger was driving a four-wheeler on his family's farm in 2008 when he ran into a downed power line that held 7800 volts of electricity. Both hands were severely burned and had to be amputated in order to save his life.

Jason's initial experience with prosthetic care was extremely disappointing due to best practices not being followed.

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Initial Experience	Subsequent Experience
<ul style="list-style-type: none"> <li>• General practitioner working alone</li> <li>• No prosthetic options education</li> <li>• Fitting took nearly two-years</li> <li>• Ill-fitting socket/frame</li> <li>• Inappropriate components</li> <li>• Zero functional training</li> <li>• Wearing PX was painful</li> </ul>	<ul style="list-style-type: none"> <li>• Co-located upper limb prosthetic specialists working as a team</li> <li>• Expedited fitting in 4 days</li> <li>• Comfortable, ergonomic socket/frame replacements</li> <li>• Improved device selection to achieve functional goals</li> <li>• Specialized OT training</li> <li>• Wears device 16hrs/day comfortably</li> </ul>



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### Takeaways




#### Following best practices improves outcomes.

- Reduced lifetime costs associated with prosthetic rehabilitation
- Patient achieves functional independence more quickly
- Increased functional use and wear time of prosthesis



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**04**  
Conclusion  
Closing thoughts and Q&A




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**Best Practices Review**

Maximizing each patient's prosthetic rehabilitation potential requires:

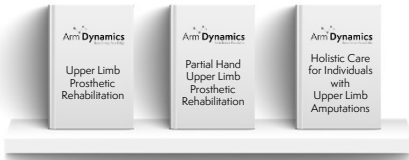

1. Collaborative team approach
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**Continued Educational Opportunities**

Extensive library of presentations to further your knowledge in Upper Limb Prosthetics!

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**Thank You**

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