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Amputation Rehabilitation: The Military Experience

Annemarie E. Orr, OTD, OTR/L

Disclaimer

- The views expressed in this presentation are those of the authors and do not necessarily reflect the official policy or position of the Department of Defense, Department of Veterans Affairs, Department of the Army, or Department of the Navy
Learner Outcomes

1. Explain the role of occupational therapy in amputation rehabilitation as it relates to the overall mission of the military.
2. Describe each phase of rehabilitation following upper and lower extremity amputation.
3. Identify the goals of each phase of amputation rehabilitation as they relate to occupational performance.

Military Statistics

- Total of 1,713 service members with amputations from OEF/OIF/OND/OIR/OFS
- From the beginning of 2001 to present, the military treatment facilities have seen rapid increases in conflict related amputations in 2004, 2007, 2011
- 296 (17.3%) of these individuals have upper limb involvement
Conflict Related Amputations

<table>
<thead>
<tr>
<th>OEF/OIF/OND/OIR/OF</th>
<th>Total: 1,713</th>
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<tbody>
<tr>
<td>Return To Duty</td>
<td>325</td>
</tr>
<tr>
<td>Redeployed</td>
<td>67</td>
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<table>
<thead>
<tr>
<th>BRANCH</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Army</td>
<td>1,138</td>
</tr>
<tr>
<td>Marine</td>
<td>502</td>
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<td>Navy</td>
<td>46</td>
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<tr>
<td>Air Force</td>
<td>27</td>
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Conflict and Unaffiliated Statistics

<table>
<thead>
<tr>
<th>Conflict and Unaffiliated</th>
<th>Total: 505</th>
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</thead>
<tbody>
<tr>
<td>Return to Duty</td>
<td>421</td>
</tr>
<tr>
<td>Redeployed</td>
<td>84</td>
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<table>
<thead>
<tr>
<th>Branch</th>
<th>Total: 2,066</th>
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<tbody>
<tr>
<td>Army</td>
<td>1,317</td>
</tr>
<tr>
<td>Marine</td>
<td>561</td>
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<tr>
<td>Navy</td>
<td>112</td>
</tr>
<tr>
<td>Air Force</td>
<td>76</td>
</tr>
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**Delayed Amputation**

- Definition: First amputation “over 90 days” based upon “Injury Date” and “Initial Amputation Date” (first amputation for any limb to include fingers/toes)
- As of April 2017, there have been 328 (15.9%) delayed amputations for conflict and unaffiliated service members

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**Amputation by Cause**

![Bar chart showing amputation by cause: Vascular, Cancer, Trauma, Congenital. The chart compares upper and lower limbs.](chart.png)
Military Mission

- The Military mission is: to restore our wounded service members to the highest functional level to provide them with the best opportunity to return to uniformed service and/or productive civilian life.

OT's Mission

- Occupational therapy is defined as: the therapeutic use of everyday life activities (occupations) with individuals or groups for the purpose of enhancing or enabling participation in roles, habits, and routines in home, school, workplace, community and other settings.

OT’s Military History

- Occupational Therapy’s history is rooted in wartime military efforts
  - WWI: OT reconstruction aides used crafts, habit training and shop work for physical and mental restoration of wounded service members
  - Walter Reed Hospital: Early 20th century, OT reconstruction aides were used on the orthopedic ward
  - WWII: increase in number of surviving service members, creating a need for rehabilitation. OT’s value in this time period was highlighted
OT’s Role

- Primary role of the occupational therapist is to facilitate the client’s return to performance of daily occupations and roles.
- Ultimately leading to participation in a meaningful life.
- Goal: Independence with ADL and IADL performance with and without a prosthesis

Lower Extremity Amputation
- ADL/IADL performance
- DME/AE recommendations
- Functional transfers
- Wheelchair skills
- Community reintegration
- Driving rehabilitation
- Adaptive sports
- Psychological support

Upper Extremity Amputation
- ADL/IADL performance
- DME/AE recommendations
- Pre-prosthetic training
- Prosthetic training
- Functional mobility
- Community reintegration
- Driving Rehabilitation
- Adaptive Sports
- Psychological support
Phases of Rehabilitation

Immediate Post-Op Phase  Pre-Prosthetic Training  Prosthetic Training
Immediate Post-Op Phase

- POD 1 to suture removal
- Goals:
  - Promote Safety
  - Pain Management
  - Facilitate Healing
  - Proper Limb Shaping
  - Early Mobilization

Promote Safety

- Daily care and inspection of residual limb
- Maintenance of precautions
- Equipment needs
- Environmental adaptations
- Comorbidities
- Medication management
Pain Management

- Mirror Therapy
- Pain Medications
- Acupuncture
- Compression, Tapping, Massage

Facilitate Healing

- Items to address at each dressing change:
  - Drainage
    - Quantity and Quality
    - Look at color, odor and thickness
  - Incision
    - Approximation, Dehiscence, Scab, Eschar, Edema
  - Systemic Signs of Infection
    - Fever
    - Smell
    - Redness and Swelling

Frequent Skin Checks!!
Progression to Healing

Proper Limb Shaping

Purpose: edema reduction in the residual limb and limb shaping for optimal fit in a prosthesis

- Distal to Proximal wrapping in figure of 8 configuration
- Limb should be wrapped at all times
- Clean wrap should be used every 2 days
- Use an elastic bandage or an elastic shrinker
Early Mobilization

- Restoration of functional mobility
  - Bed mobility, transfers, ambulation, wheelchair management
- Maintain baseline conditioning
- Contracture prevention
  - Range of Motion
  - Flexibility
  - Therapeutic Exercise
- Promote use of residual limbs for functional tasks and mobility

Pre-Prosthetic Training
Pre-prosthetic Training

- Suture removal to being fit with a prosthesis
- Goals:
  - Independence with functional mobility
  - ADL retraining
  - Strength, ROM, Flexibility
  - Completion of Healing
  - Myoelectric Training for upper limb prosthesis

Independence with Functional Mobility

- Bed Mobility
- Bed to chair or wheelchair transfer
- Functional transfers to toilet and shower
- Recommendations for assistive devices and DME
- Protection of sound limbs

No Hopping!
ADL Retraining

- Progress towards independence with self care activities without prosthesis
- Adaptive equipment
- Environmental modifications
- Compensatory techniques
- CREATIVITY!

Strength, ROM, Flexibility

<table>
<thead>
<tr>
<th>Lower Extremity</th>
<th>Upper Extremity</th>
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<tr>
<td>Common Contracture Sites:</td>
<td>Common Contracture Sites:</td>
</tr>
<tr>
<td>- Hip ER, ABD, Flex</td>
<td>- Elbow Flex</td>
</tr>
<tr>
<td>- Knee Flex</td>
<td>- Shoulder</td>
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<tr>
<td>Areas to Strengthen in Preparation for Prosthesis:</td>
<td>Areas to Strengthen in Preparation for Prosthesis:</td>
</tr>
<tr>
<td>- Hip</td>
<td>- Shoulder</td>
</tr>
<tr>
<td>- Core</td>
<td>- Scapular protractors/retractors</td>
</tr>
<tr>
<td>- Sound Side</td>
<td>- Myosites specific to level of amputation</td>
</tr>
</tbody>
</table>
Completion of Healing

- Staples/Sutures Removed
  - Fit with Shrinker

- Wound Healing Complete
  - Fit with Liner

- Residual Limb Shape Optimized, Cleared by Doctor
  - Initial Fitting of Prosthesis

Myoelectric Training

- Myoelectric prostheses use surface electrodes to read EMG signals from muscles in the residual limbs to control movements of the prosthesis
- Testing and training of myosites can begin during healing phase
- Use of a myotester or biofeedback program for testing and training the myosites
Prosthetic Training

- Begins with prosthetic device fitting and is completed when all client centered goals are met
- Goals:
  - Care of a prosthesis
  - Donning/Doffing prosthesis
  - Operation/Control of prosthesis
  - Functional Use of prosthesis
  - Community Reintegration
Care of a Prosthesis

- Wash liner and sleeve daily using client’s normal body wash
- If skin is in direct contact with socket, clean socket with alcohol 1x/week
- Proper battery charging
- Proper storage of prosthesis
- Maintenance and at home solutions
- Understand susceptibility to environmental factors

Donning/Doffing

- This should be a priority goal and addressed within the first treatment sessions
- Includes all parts of the prosthetic system
- Education on various methods
Operation/Control

- The first step is to learn how to operate and control the individual components of the prosthesis
- Controls training drills are used to teach motor patterns of use with the prosthesis
- Mastery of each operation is shown with combined movements
- Goal: To achieve smooth movements with prosthesis with minimal delay or awkward motions

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Functional Use

- Goal: Use of the prosthesis in a spontaneous, skillful way during occupational performance
- This prepares the client to be confident using the prosthesis in varied environments and situations.
- Create client-centered goals and use functional activities that are:
  1. Intrinsically motivating
  2. Appropriate challenge level
Community Reintegration

- Acceptance of the “New Normal”
- Comfort with completing tasks without assistance
- Social reintegration
- Functional mobility in the community
- Public transportation and travel
- Driving Rehabilitation
- Adaptive Sports and Recreation
- Military Tasks

Case Study

- 19 y/o male, active duty Army s/p traumatic left transradial amputation from RPG while deployed in Afghanistan.
- Social History: Single. Prior to injury client was living in barracks. MOS: combat engineer
- Interests: dirt biking, playing video games, shooting
- Goals: To ride a dirt bike again
Immediate Post Op Phase

- Wound care performed on residual limb
- Daily dressing changes
- Fit with shrinker and educated on wearing schedule
- A/AAROM performed to L elbow, shoulder
- Educated on mirror therapy for phantom pain

Pre-Prosthetic Training

- Myosite training initiated
- Desensitization and massage to residual limb in preparation for prosthesis
- ADL retraining with one handed techniques and education on AE
- Continued progression of UE strengthening
Prosthetic Training

- Initially fit with myoelectric prosthesis
- Secondarily fit with body-powered prosthesis and activity specific prosthesis
- Prosthetic training for speed, accuracy, skilled movement and incorporation into daily tasks
- FATS, mountain bike, prosthesis thesis
Q & A

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<thead>
<tr>
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<tr>
<td>Mon 11/6</td>
<td>The Role of Occupational Therapy Within Military Settings</td>
<td>Erik Johnson, OTR/L</td>
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<td>Tues 11/7</td>
<td>Amputation Rehabilitation: The Military Experience</td>
<td>Annemarie Orr, OTD, OTR/L</td>
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<td>Wed 11/8</td>
<td>Therapy Management of Burn Injuries</td>
<td>Alicia Jordan, PT, DPT</td>
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<td>Fri 11/10</td>
<td>The Unseen Injuries: Mental Health and Cognition Implications for Service Members During and After Their Time in Service</td>
<td>Erik Johnson, OTR/L</td>
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