

VA/DoD CLINICAL PRACTICE GUIDELINE

Rehabilitation of Upper Extremity Amputation

KEY ELEMENTS OF THE GUIDELINE

- » Defines the phases of rehabilitation care and the steps included in each phase
- » Emphasizes the importance of an interdisciplinary amputation care team approach, including the patient, family and/or caregiver(s)
- » Recognizes the importance of comprehensive interdisciplinary assessment of the patient during each of the first three phases of care
- » Emphasizes a shared decision making model incorporating patient goals to ensure patient-centered care
- » Recommend a comprehensive, interdisciplinary, patient-centered rehabilitation plan based on patient's progress, changes in functional status, emerging needs, and goals
- » Addresses strategies for pain management across all phases of the rehabilitation process
- » Addresses postoperative management of the residual limb to maximize healing and functional outcome
- » Identifies key elements of the rehabilitation treatment and prosthetic training across all phases of the rehabilitation process
- » Recognizes the importance of achieving the patient's highest level of functional independence without a prosthesis
- » Recognizes the importance of appropriate patient education
- » Recognizes the importance of continuity of care and coordination of patient transition into the lifelong care
- » Emphasizes the need for life-long follow-up care

Access to full guideline and toolkit:
<http://www.healthquality.va.gov> or
<https://www.qmo.amedd.army.mil>
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ALGORITHM: REHABILITATION OF UPPER EXTREMITY AMPUTATION

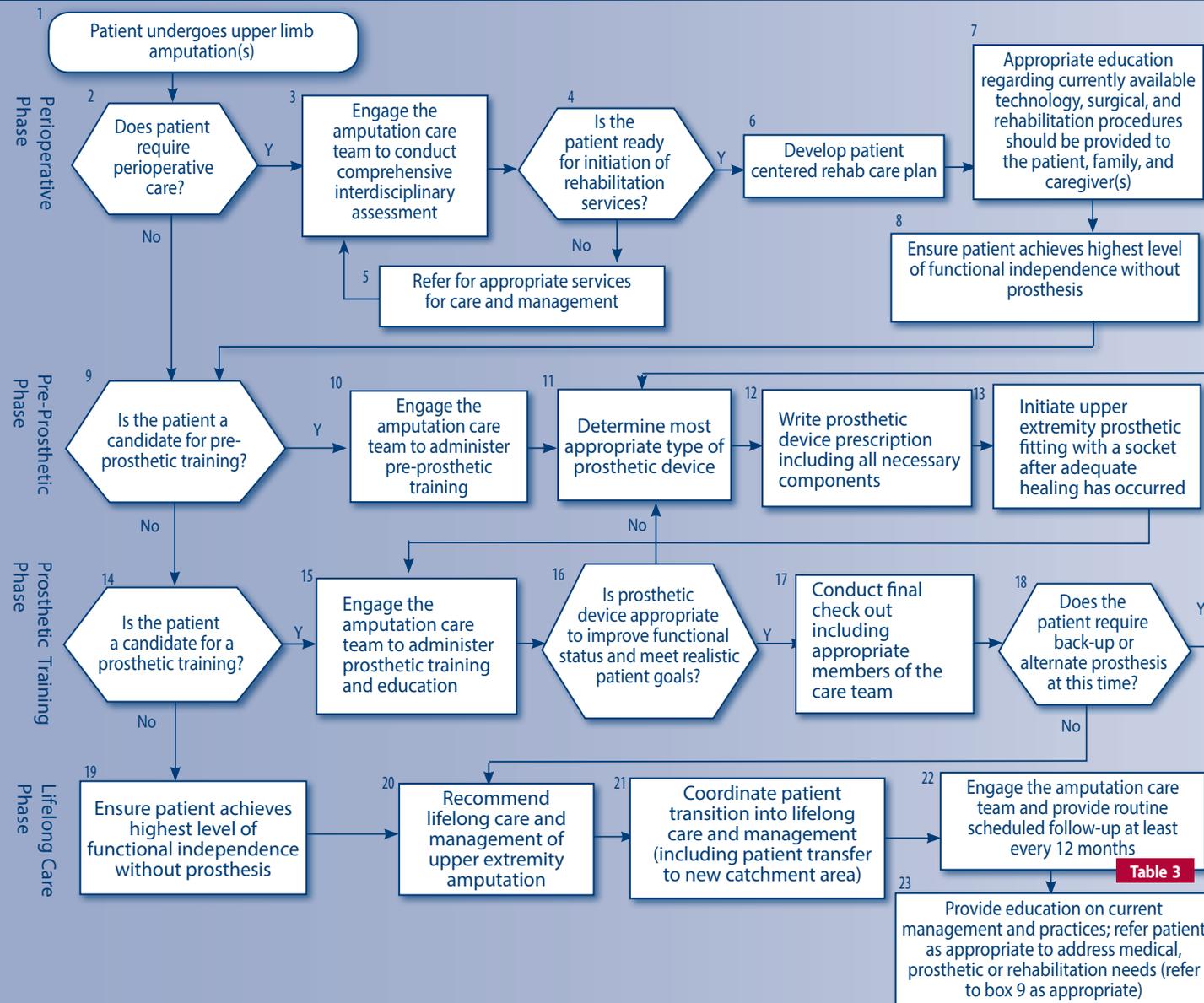


TABLE 1 Rehabilitation Care and Goals

- Postoperative Pain**
- Reduce residual limb pain, improve effectiveness of coping, and reduce interference with daily function
 - Reduce phantom limb pain
 - Minimize complications and side-effects associated with the use of narcotic pain medications
- Physical Health**
- Reduce the risk of adverse effects due to use or non-use of an artificial limb
 - Prevent and decrease impact of overuse injuries in remaining extremities and residual limb
 - Improve and maintain physical health (e.g., residual limb care and tolerance; improve and maintain range of motion proximal to the amputation and throughout the body; core strengthening, postural stability, and balance; cardiovascular health, and increase strength and endurance) to maximize efficient use of a prosthesis
- Function**
- Improve functional independence with and without a prosthesis (e.g., independence and safety in self-care, work, recreational/leisure activities and mobility activities)
 - Improve quality of life and decrease activity restriction (e.g., optimize self-care, community integration, return to home and productive work environments)
- Psychological support and wellbeing**
- Reduce psychological comorbidities (e.g., depressive and anxiety disorders)
 - Improve quality of life
 - Decrease the mental/emotional disease burden
 - Enhance adjustment to disability through healthy body image and self-esteem development
- Patient satisfaction**
- Improve satisfaction with the level of skills and independence
 - For patients receiving prostheses, improve satisfaction with the prosthesis (comfort, functionality, and cosmesis)
 - Improve satisfaction with healthcare services and care providers
- Community Integration**
- Improve the discharge outcome (discharge to the least restrictive environment)
 - Improve vocational outcomes
 - Improve recreational participation
 - Maximize community participation
- Healthcare utilization**
- Optimize the length of rehabilitation stay
 - Optimize the time between prosthetic fitting and patient goal attainment
 - Optimize Lifelong care and minimize the effects of long-term prosthesis use

TABLE 2 Residual Limb vs. Phantom Limb Pain

Residual Limb Pain (RLP)	Phantom Limb Pain (PLP)
<ul style="list-style-type: none"> • Pain occurs in the portion of the amputated limb that is still physically present • May have allodynic qualities (pain from non-noxious stimuli such as touch), particularly near the skin flap scar or neuromas • Is expected from the surgical trauma and should be aggressively managed perioperatively • Later, can be due to: <ul style="list-style-type: none"> » Mechanical factors including <ul style="list-style-type: none"> - Poor prosthetic socket fit - Bruising of the limb - Chafing or rubbing of the skin » Poor perfusion, ischemia » Heterotopic ossification » Neuromas (common cause) • Can be managed by addressing the cause(s) and adding multimodal analgesic therapy if necessary 	<ul style="list-style-type: none"> • Pain is perceived in the amputated or absent part of the body • Has been reported to occur in 60 percent to 70 percent of patients and to be significantly bothersome at one year after amputation in up to 40 percent of patients • Is uncommonly experienced immediately after surgery • Can be episodic, lasting from seconds to days, or continuous • Has unclear mechanism(s) that may include: <ul style="list-style-type: none"> - Abnormal regeneration of primary afferent neurons - Abnormal central somatosensory processing or central sensitization - Ectopic peripheral nerve activity - May be triggered or exacerbated by various factors including <ul style="list-style-type: none"> - Chronic pre-amputation pain - Phantom limb sensations • May be related to the intensity and duration of preoperative pain • Is often managed with multimodal pharmacologic and non-pharmacologic therapies • Is more difficult to control than residual limb pain

Table 3 Essential Elements of the Annual Contact

<ul style="list-style-type: none"> • Level of functional independence and physical activity level • Daily time utilization with functional and leisure activities • Fit and function of the prosthesis • Emotional and adjustment issues including attitude toward wearing prosthesis • Residual limb skin condition • Pain issues (residual limb, phantom limb, musculoskeletal pain issues, i.e., neck, shoulder, back) • Environmental modification or assistive technology needs • Family or caregiver support • Risk factors for secondary amputation 	<ul style="list-style-type: none"> • Social work and case management support • Amount of prosthesis use and barriers to greater use • Nutritional status • Vocational, recreational, community resources and support • Changes in medical comorbidities/ status • Changes in the home environment and required adaptations • Changes in functional goals • Driver's training if not previously addressed
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Table 4 Upper Limb Prosthesis Prescription

A comprehensive prescription for an upper limb prosthesis should include:
Design (e.g., preparatory vs. definitive)
Control Strategy (e.g., passive, externally powered, body powered, task specific)
The anatomical side and amputation level of the prosthesis
Type of socket interface (e.g., soft insert, elastomer liner, flexible thermoplastic)
Type of socket frame (e.g., thermoplastic or laminated)
Suspension mechanism (e.g., harness, suction, anatomical)
Terminal device (TD)
Wrist unit (if applicable)
Elbow unit (if applicable)
Shoulder unit (if applicable)

TABLE 5 Type of Prostheses

Advantages	Disadvantages
No Prosthesis	
<ul style="list-style-type: none"> + No maintenance + Tactile sensation or proprioceptive feedback 	<ul style="list-style-type: none"> - Lack of active prehension or mechanical grasp - Limited ability to do tasks that require both hands - Limb is unprotected from environmental hazards - Increased potential for overuse injuries due to awkward body mechanics or using sound hand for all tasks
Electrically Powered Prosthesis	
<ul style="list-style-type: none"> + Proportional grip force + Ease of electric TD / wrist operation + Can be fit early in rehabilitation + Natural appearance + Can be applied to high amputation levels + Simultaneous control of elbow and TD or wrist + Larger functional work envelope than body-powered prosthesis + Decreased shear forces and distal end bearing to operate terminal devices. 	<ul style="list-style-type: none"> - Battery maintenance - Overall weight consideration - Repairs may be more complex - Susceptible to damage from moisture or excessive vibration
Body Powered Prosthesis	
<ul style="list-style-type: none"> + Durable and can be used in tasks or environments that could damage an electric prosthesis (i.e., conditions involving excessive water, dust, or vibrations caused by some motorized vehicles and power tools) + Secondary proprioceptive feedback + Lower maintenance costs than electric options 	<ul style="list-style-type: none"> - Restrictive harness - Decreased grip force compared with electric options - Forces exerted on residual limb - Difficult to control for high amputation levels - Limited function of typical body-powered hands - Appearance of hook and cables

TABLE 5 Type of Prostheses (Cont.)

Advantages	Disadvantages
Hybrid Prosthesis	
<ul style="list-style-type: none"> + Simultaneous control of elbow and TD or wrist + Lighter than fully electric elbow prosthesis + Increased grip force compared with body-powered options + Ease of electric TD/wrist operation 	<ul style="list-style-type: none"> - Requires a harness for elbow - The force needed to fully flex the elbow may be difficult to generate for short transhumeral and higher amputation levels
Passive Prosthesis	
<ul style="list-style-type: none"> + Lightweight + Minimal harnessing + Low maintenance + No control cables + Cosmetics, positive body image + Silicone products resist staining 	<ul style="list-style-type: none"> - Difficult to perform activities that require mechanical grasp - Latex and PVC products stain easily
Task-Specific Prosthesis	
<ul style="list-style-type: none"> + Enhanced function in particular activity + Minimal harnessing + Limited or no control cables + Durable, low maintenance + Protects primary prosthesis from damage 	<ul style="list-style-type: none"> - Not appropriate for a broad range of functions

Table 6 Indication for Prosthesis Problems

Patients who use a prosthesis should be advised to report any of the following symptoms:
<ul style="list-style-type: none"> • Ongoing pain in the residual limb or pain associated with a prosthetic harness • Skin breakdown • Change in the ability to don and doff the prosthesis • Change in limb volume (weight gain or loss) • Change in pattern of usage