



Standard of Care: Wound Care/Integumentary Management

Physical Therapy management of the patient at risk for or with an integumentary disorder.

Case Type / Diagnosis:

This standard of care will provide guidelines for the management of patients who are at risk for integumentary disruption or who present with partial or full thickness wounds and would benefit from physical therapy intervention. Integumentary management utilizes prevention techniques, as well as direct wound care interventions to promote wound healing. Wound management is a comprehensive team approach that includes procedures used to achieve a clean wound bed and eliminate infection, promote a moist wound healing environment, facilitate autolytic debridement, enhance perfusion and nutrient delivery to the tissues, and protect the wound bed during the healing process. Studies suggest that “the more frequent the debridements, the better the healing outcome”¹ therefore active intervention is crucial. This may involve care during one or all three phases of wound healing (inflammatory, proliferative, maturation), including the management of resulting scar tissue.

This standard will focus on patients at increased risk for impaired skin integrity as well as the following types of integumentary disorders (with ICD-10 codes):

- L89.90 Pressure ulcer, unspecified site and stage
- I83.009 Varicose veins of unspecified LE with ulcer at unspecified site
- I83.209 Varicose veins of unspecified. LE w/ulcer at unspecified site with inflammation
- I87.01 Postthrombotic syndrome with ulcer
- I87.31 Chronic venous hypertension (idiopathic) with ulcer
- I70.25 Atherosclerosis of native arteries of other extremities with ulceration
- L97.909 Nonpressure chronic ulcer of unspecified LE and severity (includes arterial ulcers)
- L76.82 Other postprocedural complications of skin and subcutaneous tissue (includes nonhealing surgical wounds)
- L98.49 Nonpressure chronic ulcer of the skin
- L08.9 Local infection of skin and subcutaneous tissue
- L95.9 Vasculitis of the skin
- L98.8 Other specified disorder of skin and subcutaneous tissue
- L98.9 Disorder of skin and subcutaneous tissue

For detailed information regarding the management of a burn or an amputation patient, please refer to the respective Burn or the Lower Extremity Amputation Standard of Care (SOC) as neither diagnosis will be specifically covered in this document.

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Indications for Treatment:

The specific practice pattern identified in this SOC is the complete Integumentary Practice Pattern.² This encompasses the primary prevention and risk reduction for integumentary disorders and impaired integumentary integrity associated with superficial, partial-thickness, and full-thickness skin involvement. The APTA's Section on Clinical Electrophysiology and Wound Management and Guide for Integumentary/Wound Management Content in Professional Physical Therapist Education³ is an excellent and comprehensive resource that will certainly help both the novice and more experienced clinician cultivate his/her skills during this process. This document from the APTA provides an outline of the necessary contextual background to assist with fully understanding tissue healing and expected outcomes as well as determining and performing appropriate tests and measures, suitable interventions, and complete assessments for this patient population.

Contraindications / Precautions for Treatment:

Depending on the etiology of the integumentary disorder, the specific contraindications and precautions may vary. Please refer to the specific orders in the computer/patient chart or discuss with the appropriate/consulting service (e.g. Plastic Surgery, Vascular Surgery) if questions arise regarding the details of an individual patient's care.

For patients with an elevated International Normalized Ratio (INR) of greater than or equal to 3.5, please consult the physician or nurse practitioner prior to initiating mobility.⁴

The following precautions and/or contraindications have been identified and discussed with the BWH medical staff and stand as the general precautions for the below noted patient situations. These guidelines should be maintained unless otherwise stated in the physician orders.

- *For split thickness skin graft (STSG) or full thickness skin grafts (FTSG) that involve the lower extremity, a patient will remain on bedrest for 3-5 days. To prevent shearing or injury to the new graft, no range of motion of the affected limb is allowed until notified by a physician or nurse practitioner. The above information is applicable whether or not a graft crosses a joint. It is likely that a graft that does cross a joint will warrant further immobilization of the involved joint (i.e. with a knee immobilizer or resting foot splint) to prevent any ROM. Specific weight bearing precautions should be identified with the primary team prior to mobilization. Depending on the site of the graft or the wound, the patient may be non-weight bearing, partial weight bearing, heel weight bearing, forefoot weight bearing, or even weight bearing as tolerated.*
- *For donor sites, there are no activity, ROM or weight bearing restrictions, although some pain can limit tolerance for activity. Generally, the donor sites will be dressed with Xeroform™; the dressing remains in place until it falls off or is taken off by a physician. Occasionally VACS are used for larger donor sites*

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- *Vacuum assisted closure (VAC)* therapy can be used over grafts and directly on wounds to promote healing. If over a graft, the same precautions as listed above are applicable unless otherwise specified by the surgical team. Check with a physician prior to initiating mobility and/or ROM as well as for specific weight bearing precautions (if any). If the VAC is used over a wound, then there should not be any additional activity precautions except for the identified weight bearing precautions. It is critical to ensure that the VAC remains on suction during mobility.

Please note: At this time, the current VAC system used at BWH automatically transitions to battery power when unplugged from the outlet.

In this acute care setting, it is important to note that guidelines may differ among surgeon/physician based on his/her preferred technique or preference. It is necessary to clarify and follow orders for a specific physician or patient.

Precautions with modalities: Please refer to the Pulsed Lavage Procedural Guidelines for contraindications/precautions with that particular modality as well and the Surgical Standard of Care for considerations with surgical incisions.

Evaluation:

Chart Review

History of Present Illness (HPI) and Past Medical History (PMH)

- Reason for admission
- Onset and duration of symptoms including mechanisms of injury
- Previous or current medical and/or surgical treatments
- PMH with specific attention to a history of diabetes, peripheral vascular disease, coronary artery disease, congestive heart failure, spinal cord injury, malnutrition, and a history of smoking

Social History

- Prior functional level, use of assistive devices and/or adaptive equipment
- Home environment and current/potential barriers to returning home
- Family/caregiver support system
- Family, professional, social, and community roles
- Patient's goals and expectations of returning to previous life roles

Hospital Course

- New or ongoing medical intervention
- Pertinent lab values (e.g. White Blood Count (WBC), Hematocrit (Hct), INR, albumin, glucose)⁵
- Diagnostic testing (e.g. X-ray or MRI for osteomyelitis, angiography for circulation, doppler ultrasound)
- Overall nutritional status^{6,7}

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- Other Consults: Plastics, Vascular, Ostomy Nurse, Nutrition

Medications

Given that integument issues can arise in any patient determined to be at risk for skin breakdown or potential healing issues, patients may be treated with numerous pharmacological agents that may vary greatly among the individual patients. Common medications can include antibiotics for local or systemic infections, topical medications, narcotics for pain management, nutritional supports such as total parenteral nutrition (TPN), or possibly insulin for optimal diabetic management should diabetes exist as a comorbidity.

Examination

This section is intended to capture the most commonly used assessment tools for this case type/diagnosis. It is not intended to be either inclusive or exclusive of assessment tools.

- **Anthropometric Characteristics** including edema (circumferential measurement versus pitting edema scale)
- **Vitals signs**- Heart Rate, Blood Pressure, Respiratory Rate, Oxygen Saturation
- **Circulation** including capillary refill, Ankle-Brachial Index (ABI)⁷, superficial vascular responses. The ABI may be documented in the physician's admission note or in the patient's history but if not available in the chart this measurement may be done by a therapist.
- **Sensory integrity** including light touch, sharp/dull, deep pressure, vibration, temperature, presence of paresthesias or neuropathy. Semmes-Weinstein monofilament testing is especially useful in assessing a diabetic wound¹⁷.
- **Skin integrity**⁸- presence of skin breakdown and full wound assessment that includes location, size, shape, odor, drainage, presence of tunneling or undermining, exposed anatomical structures, presence of devitalized tissue or granulation tissue; should also include stage of the wound if a pressure sore or characteristics of the incision (if a surgical patient). Please refer to Appendix 1 "Wound Assessment Handout/Worksheet" in the Integument Resource Manual for further details.
- **Skin Characteristics**- trophic changes such as thickened nail beds, calluses, shiny or dry skin, skin color, hair growth, texture, pliability, temperature, recent or old scarring from prior/healed ulcers, evidence of infection
- **Pain**⁹- location, type, intensity, use of visual analog scale (VAS), pain at rest, pain with dependent positioning
- **Range of Motion** including passive/active assisted and active range of motion (P/AA/AROM) as well as presence of contractures or deformities
- **Strength**
- **Neurological function** including abnormal tone
- **Postural alignment and bony prominences**
- **Gait**

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- **Functional Mobility:** bed mobility, transfers, ambulation, stairs
- **Mental Status/Cognition:** level of consciousness/alertness, orientation, ability to follow commands, knowledge of pathology, safety awareness
- **Risk Assessment Scales:** Braden Scale^{10,11,12,13}, Norton Scale^{12,13}
Please note: At BWH, the Braden Scale is usually completed by a nurse for all patients upon admission on the Nursing Assessment Form.

Assessment:

The primary goal when addressing this population is to provide an individualized and integrated plan of care which minimizes risk for further integumentary disruption, promotes wound healing, and maximizes mobility, thus allowing patients to return to their highest level of functioning in home, work, and community environments. Secondary goals are to serve as a resource for both patient and family and to assist with the discharge and referral process.

Potential impairments include, but are not limited to:

- Impaired skin integrity
- Impaired sensation
- Impaired circulation
- Edema
- Impaired ROM
- Impaired strength
- Impaired balance
- Impaired motor function
- Impaired tone
- Impaired functional mobility including bed mobility, transfers, ambulation
- Impaired endurance and activity tolerance
- Impaired mental status (cognition, arousal, attention, memory, barriers to learning)
- Pain

The predicted outcome for this patient population is to maximize their skin integrity and ability to return to their previous life roles as well as the reduced risk of developing integumentary disorders. The ability to achieve this outcome is shared by a team and the steps taken may include the debridement of devitalized tissue, infection and inflammation control, nutrient delivery to the tissues as well as the body's overall nutritional status and the promotion of wound healing¹⁴. This will also involve using the appropriate physical therapy intervention, modality, assistive device, orthotic, and/or adaptive equipment, as each patient's individual needs dictate.

The rehabilitation prognosis may be modified by any of the following factors:

- Nature and extent of pathology
- Ongoing and/or active medical treatment or surgical intervention
- Presence of comorbidities or secondary impairments
- Overall health and nutritional status

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- Barriers to returning to previous living environment
- Patient compliance or adherence to the intervention program
- Patient's coping mechanisms to altered functional status, anticipated disease process, cosmetic/body image issues, and pain issues
- Teaching and learning considerations
- Patient's own goals

Goals should be measurable and individualized for each patient, taking into consideration the patient's status and their own goals. Timeframes will vary based on the extent of the integumentary disruption and the patient's current status and functional level. Suggested goals may include:

- Reduce the risk/prevent skin breakdown
- Reduce necrotic tissue in the wound bed (i.e. debridement)
- Promote wound granulation
- Reduce edema in the extremities
- Promote good circulation
- Promote sensory awareness and good skin care habits
- Maximize ROM of upper and lower extremities
- Maximize strength
- Maximize independence with functional mobility
- Maximize patient knowledge, participation, and compliance with the prescribed program

Treatment Planning / Interventions

Interventions most commonly used for this case type/diagnosis.

This section is intended to capture the most commonly used interventions for this case type/diagnosis. It is not intended to be either inclusive or exclusive of appropriate interventions.

Prevention of integument issues is in itself as much of an active intervention as the below noted hands-on techniques. Identifying those patients at risk based on past or current medical history and educating them on the principles of good skin care is paramount in the primary prevention of developing a wound that will ultimately require medical attention.

Once a disruption in skin integrity occurs, no matter the etiology, successful healing is largely based on the ability to relieve pressure from the affected area, ensure and/or restore adequate arterial blood flow to the area, and treat infection of the soft tissue via debridement and/or antibiotics¹⁵.

Physical Therapy intervention is focused on the following:

- Improve/Prevent Alteration in Skin Integrity
 - Positioning to prevent excessive/prolonged pressure
 - Mobility techniques to minimize shearing and friction on the skin

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- Provide recommendations for use of air mattresses, seating cushions, and resting splints to relieve pressure. For example, Rolyan™ foot drop splints can be obtained directly in the PT department.
- Prescription of splints/orthotics for appropriate weightbearing and pressure relief/off-loading of an involved limb. Although BWH readily stocks post-op shoes for both heel and forefoot weight bearing, the key to reducing repetitive trauma and pressure on an existing wound to allow healing is use of total contact casting (TCC)¹⁶. In some cases, the use of a reinforced walking boot rendered irremovable or use of a posterior walking splint can be used instead of a full cast¹⁶. All 3 of these devices do need to be applied by a trained and knowledgeable clinician (i.e. PT, ortho tech, physician, nurse practitioner). To date, the gold standard for sustainable off-loading and treatment of diabetic neuropathic foot ulcers is total contact casting^{15,17,18}. However, appropriate consideration needs to be given in the acute care environment prior to use of TCC given the nature of acute wounds, prevalence of infection and potential for increased edema. The wound may need to be more accessible than total contact casting allows for frequent assessment and/or treatment.

Please refer to Appendix 2 “Splints available for use on Inpatients” and Appendix 3 “Algorithm in lower extremity splinting in patients with potential for active skin issues” to assist in the decision-making process when choosing an appropriate device. The main issues to consider when choosing a splint include level of functional mobility and the need for protection, pressure relief, and joint/limb immobility.

- Edema Management
 - Exercise/AROM/PROM
 - Positioning/elevation (especially for venous stasis ulcers)
 - Compressive bandaging (i.e. TEDS, ace wrap)- for venous stasis ulcers^{16,19}
- Therapeutic Exercise
 - Exercise program to include supine, sitting, standing P/AA/AROM for bilateral upper and lower extremities, as appropriate
 - Progress intensity, frequency, and duration
- Endurance Training
 - Increase out of bed tolerance
 - Progress time, distance, frequency of ambulation
 - Recommend appropriate activity schedule to patient, other healthcare providers, and family members
- Gait Training
 - Pre-gait activities
 - Gait training for patients with weight-bearing restrictions
 - Gait training for patients with gait abnormalities

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- Assistive device prescription, as appropriate
- Functional Mobility Training
 - Bed mobility: rolling side-to-side, supine-to-sit, sit-to-supine
 - Transfers: bed to chair, wheelchair, commode
 - Ambulation
 - Stair training
- Pain Management⁹
 - ROM
 - Positioning
 - Relaxation
 - Pain medications as prescribed by physician
- Modalities- for mechanical debridement and direct woundcare^{13,16,20,21,22,23}
 - Currently pulsed lavage is the only modality the BWH physical therapists use on a regular basis. This procedure has been shown to increase healing rates of pressure ulcers using measurements of length, width, depth and volume.²⁴ Please refer to the Rehabilitation Department's procedure for full details on performing pulsed lavage on inpatients. This modality replaces its hydrotherapy predecessor, the whirlpool, as it has shown itself to be a more beneficial, efficient, and cost-effective form of hydrotherapy intervention in the acute care setting²². Other modalities that have been used are whirlpool, ultrasound (used for the reduction of inflammation and the promotion of the proliferative phase of healing including scar management), electrical stimulation/Iontophoresis and hyperbaric oxygen. Although ultrasound^{7,20,23} and electrical stimulation^{7,20,21} may have demonstrated some laboratory results, further clinical evidence and well-controlled studies specifically addressing efficacy in the acute care population may be needed for selected use of these modalities. It is possible that these modalities may be more beneficial in the later stages of healing and thus not often selected at BWH given our primary goals of eliminating infection and promoting a clean wound bed via debridement. VAC is widely used at BWH as a reliable form of adjuvant therapy but is under the direct responsibility of the physicians. Hyperbaric oxygen may also be effective for the healing of certain wounds but overall is a very costly modality and not widely used given the lack of availability or accessibility to the hyperbaric chamber.²⁰

There are wound management interventions that our physical therapy department is not directly involved in but are performed in the acute care setting by other team members (i.e. physicians and nurses). These include appropriate dressings, autolytic debridement, sharps or surgical debridement, and use of the VAC. Other than iontophoresis, any other type of medicated wound care is done by a nurse or a physician. For specific wound care products and dressings used at BWH for pressure sores please refer to the Nursing Care Practice Manual.²⁵ For a more general guide to topical antiseptics, antifungals, and antibiotics as well as a reference guide to wound

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care product categories please refer to Appendix A and B in Sussman and Bates-Jensen's book entitled *Wound Care*.⁷

Patient / Family Education

- Instruct patient/family/caregiver in following:
 - Pressure relief and appropriate positioning
 - Appropriate skin care and frequent skin checks
 - Smoking cessation
 - Independent therapeutic exercise, ROM, and endurance programs
 - Safe mobility techniques (including precautions), activity progression, encouraging maximal independence
- Discuss realistic expectations regarding wound healing, functional level, appropriate level of assist required by patient, anticipated rehabilitation progression
- Provide emotional support to patient and family as needed
- Consider a patient's learning style for most effective communication and instruction

Frequency & Duration

Patients will have follow-up physical therapy treatments based on individual need. The frequency of treatment for each patient will be determined by the acuity of his/her impairments, functional limitations and the intervention chosen. Please refer to the *BWH Guidelines for Frequency of Physical Therapy Patient Care in the Acute Care Hospital Setting*⁴ as well as the Pulsed Lavage Procedural Guidelines for further direction, taking into consideration that frequency and duration will be dependent upon the chosen intervention and goal(s) of intervention.

A patient may benefit from intervention from the following services or clinician:

- Occupational Therapy
- Nutritionist
- Ostomy Nurse
- Care Coordination
- Social Work

Re-evaluation

Re-evaluations are to be performed under the following circumstances: all physical therapy goals are met, a significant change in medical status occurs, the patient is discharged from services or the facility, and/or the patient fails to respond to physical therapy intervention. A re-evaluation should be performed at least once every ten days. Ongoing wound assessment will determine the necessity of pulsed lavage intervention but please refer to the Pulsed Lavage Procedural Guideline for tips on when the discontinuation of the above modality may be warranted.

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Discharge Planning

Discharge planning occurs on an individual basis, depending on the patient's medical, physical, and social needs. Discharge planning is a coordinated effort that occurs with the physician, nurse practitioner, nursing staff, care coordinator, physical and occupational therapists, and the patient and his/her family.

If the patient continues to have significant impairments and functional limitations and/or ongoing medical or wound care needs at the time of discharge from the acute care facility, the patient may be discharged to an extended care facility (i.e. an acute or sub-acute rehabilitation facility or skilled nursing facility). The patient will continue to progress towards the physical therapy goals at this inpatient facility, as appropriate.

If the patient has met all inpatient physical therapy goals and the wound care needs can be managed in a home setting, the patient may then be discharged home with or without services. Consider the following resources for continued wound care management, therapy and/or services:

- Visiting Nurse Association (VNA) to include home nursing and home PT
- Outpatient PT

Documentation

When assessing a wound, areas to assess are (See appendix 1 for details on language):

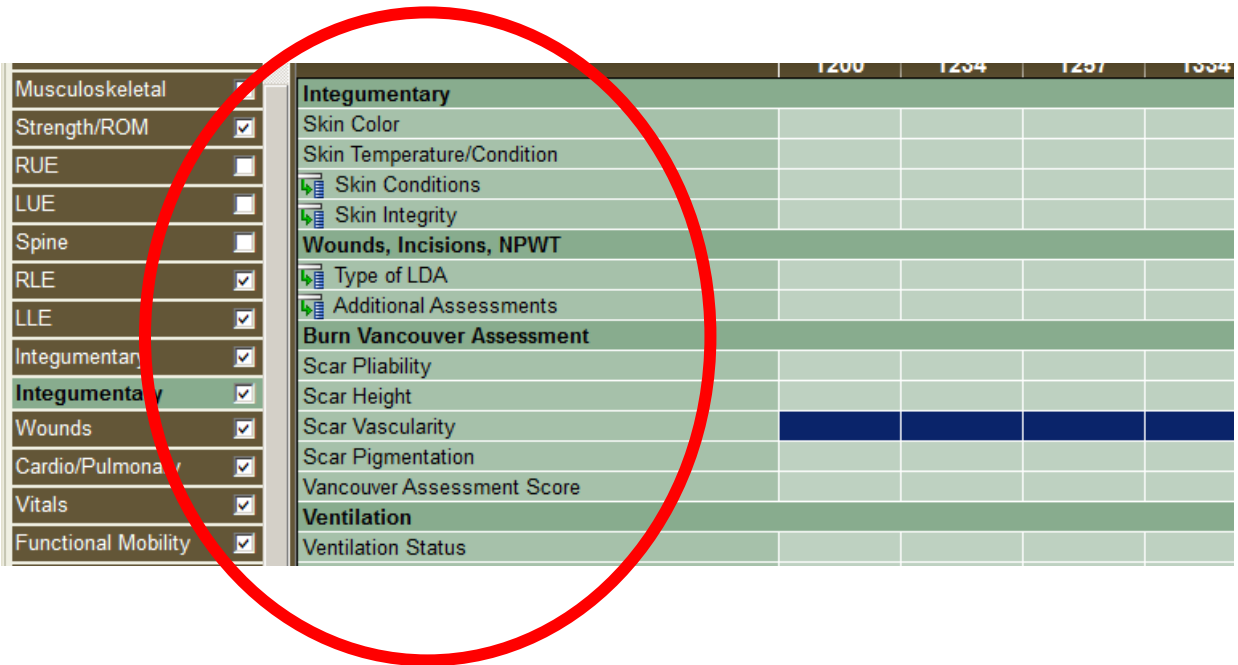
- Shape
- Size (length, width, depth in centimeters)
- Depth as in what tissues are included (e.g. skin, subcutaneous fat, muscle, fascia, bone)
- Edges
- Presence of undermining
- Type of necrotic tissue
- Type/amount of exudate
- Condition of surrounding skin
- Peripheral tissue edema
- Extent of granulation tissue
- Extent of epithelialization
- Photograph of wound at initial intervention and at reassessment

Documentation in Epic (images obtained from BWH/EPIC documentation program):

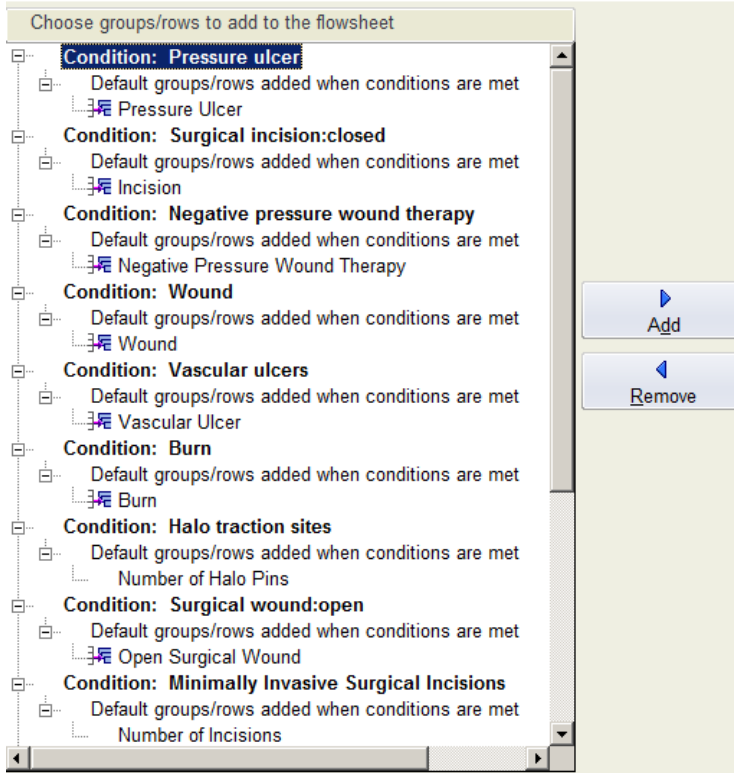
In addition to typical Physical Therapy documentation of ROM/Strength, functional mobility, balance, an assessment of a patient's wound may be a component of our documentation in EPIC. If there is already a section for a particular wound in the EPIC flowsheet that should be used. If not, you will have to add a distinct section for each wound you assess.

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- A. To add a new section for a particular wound, click on the integument section in the flowsheet and click on the “Cascade for “Type of LDA”. You will need a distinct section for each wound you are addressing, even if there are multiple wounds in the same region.



- B. You will then choose the type of wound and add it to the flow sheet



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- C. In the next window that pops up, fill in pertinent information and press the ACCEPT button

Pick an Existing

Date First Assessed	Time First Assessed	Is this a device related pressure ulcer?	Device type	Locati
** New **				

Define Properties

Pressure Ulcer

Show: Row info All Choices

Date First Assessed

Time First Assessed

Is this a device related pressure ulcer? Yes No

Device type

Catheter: condom Catheter: Urinary Cervical collar

Location Orientation

Right Left Anterior Posterior Proximal Distal Lateral

Location

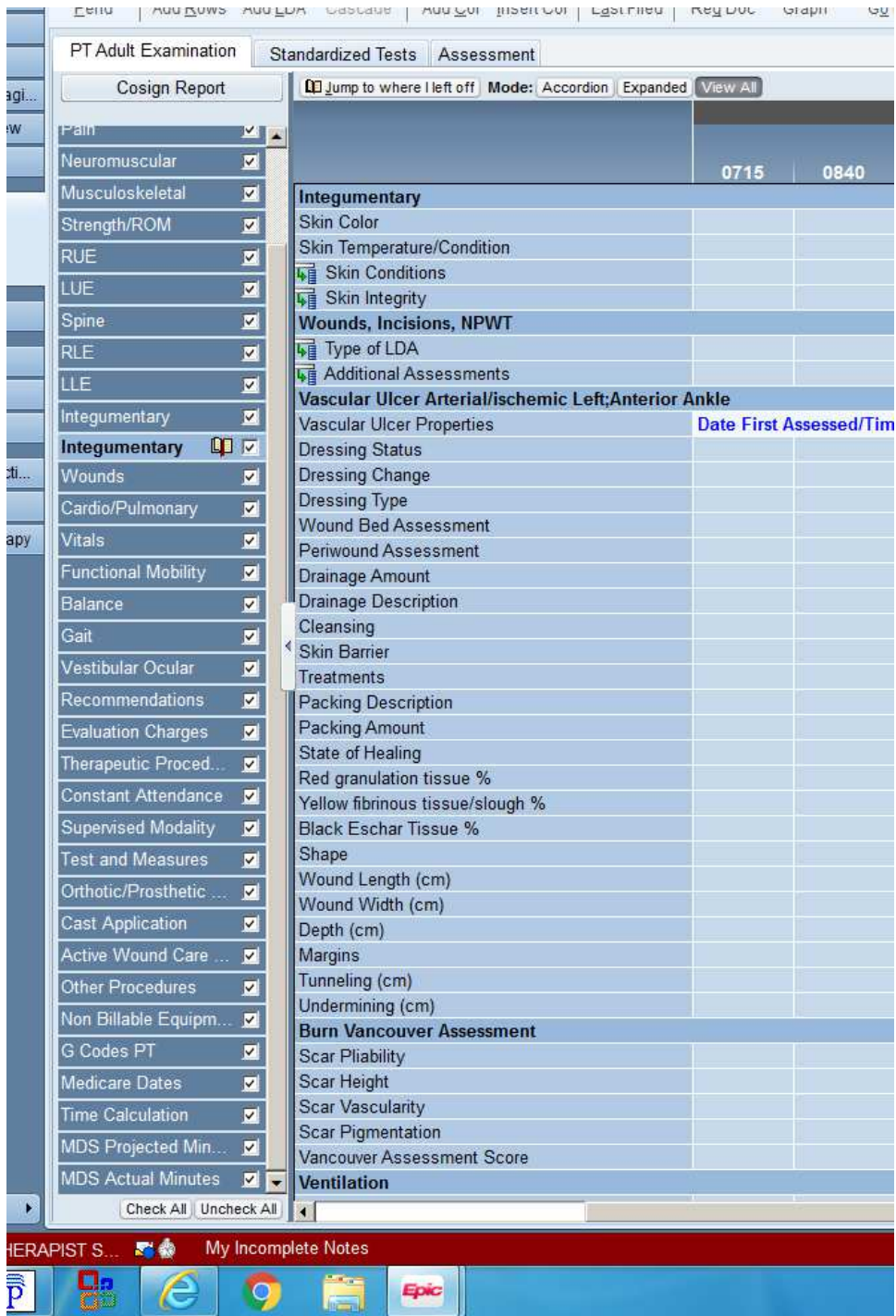
Value	Comment	Time Recd	User Taken	User Recd	Show Audit
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Next Accept & Stay Accept Close

Accept Cancel

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D. The section will then be added to the flowsheet



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Appendix 1: WOUND ASSESSMENT

Clinical Parameter	Maceration:		Shape:			Size (cm):		
	Yes	No	Slight	Mild	Moderate	Moderate/Severe	Severe	
Depth		intact skin	partial thickness skin loss	full thickness (or mix of partial and full) skin loss, not through underlying fascia	obscured by necrosis	full thickness skin loss with extensive destruction/damage to muscle/bone		
Edges		none clearly visible	outline visible, attached, even with wound base	well defined, not attached to wound base	as previously, edges rolled under thickened	well defined, fibrotic, scarred, hyperkeratotic		
Undermining		<2cm	2-4cm involving <50% of wound	2-4cm involving >50% of wound	>4cm any area	tunneling &/or sinus track formation		
Type of Necrotic Tissue		none	white/gray or yellow slough	loosely adherent yellow slough	adherent soft black eschar	firmly adherent hard black eschar		
Extent Necrotic Tissue		none	<25% wound bed	25-50% wound bed	51-74% wound bed	75-100% wound bed		
Exudate Type		none or bloody	serosanguinous, thin, watery, pale, red/pink	serous, thin, watery, clear	purulent, thin or thick, opaque, tan/yellow	purulent, thick, opaque, yellow/green with odor		
Exudate Amount		none	scant	small	moderate	large		
Surrounding Skin Color		pink/normal	bright red or blanches to touch	white or gray, pallor or hypo-pigmented	dark red or purple and/or non-blanchable	black or hyper-pigmented		
Peripheral Tissue Edema		minimal firmness around wound	non-pitting edema extends <4cm around wound	non-pitting edema extends >4cm around wound	pitting edema extends <4cm around wound	crepitus &/or edema extends >4cm around wound		
Extent Granulation Tissue		skin intact or partial thickness	bright beefy red, 75-100% of wound filled &/or tissue overgrowth	bright beefy red, <75% and >25% wound filled	pink &/or dull, dusky red &/or fills <25% of wound	no granulation tissue present		
Epithelialization		100% wound covered	75-100% covered &/or epithelial extends >.5cm into wound bed	50-75% covered epithelial tissue extends <.5cm into wound bed	25% to less than 50% wound covered	<25% wound covered		

Brigham and Women's Hospital. 2006

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Appendix 2: Splints available for use on inpatients:

The four main goals of splinting include maintaining a specific level of functional mobility and the need for protection, pressure relief, and joint/limb immobility. Each of the below noted splints used at BWH focuses on one or more of these goals.

1. Is the splint used in bed only?
 - Rolyan™ foot drop splint
 - Indications: **Pressure relief and positioning**; used to prevent foot drop in the sedated and/or weak patient by keeping the foot in a neutral position. A resting foot splint, not for mobility
 - Pros: stocked in the PT department, comes in 2 widths: regular and extra wide to accommodate for a large extremity, significant edema, extensive dressings, etc; blue padding can be cut or modified, prevents internal/external rotation of the LE
 - Also comes as an *adjustable foot drop splint* to accommodate patients who cannot get into neutral right away whether from a plantarflexion contracture or have ROM precautions (i.e. no dorsiflexion) following a surgical procedure
 - Cons: splint is bulky, difficult to use in sidelying, cannot be used for standing or ambulation, difficult to use in patients with hypertonicity and/or spasms
 - How to Obtain: order in computer under “Ortho Tech” if just need splint; can also go under PT order if active PT is needed
 - Tib-Fib Splint
 - Indications: **Pressure relief**; a resting foot splint, not for mobility
 - Pros: edges can be modified with a cast saw
 - Cons: runs narrow so not good for a larger or edematous LE, not as much padding as the Rolyan splint and does not prevent internal/external rotation of the LE
 - How to Obtain: order in computer for Ortho Tech
 - Prevalon Boot
 - Indications: **Pressure relief**; a resting foot splint, not for mobility
 - Pros: soft, forgiving on the skin
 - Cons: sometimes challenging to put on effectively, does not have to support to optimally position foot
 - How to Obtain: stocked on the nursing floors or can be ordered from Central Supply

2. Is your patient ambulatory (with or without weightbearing precautions)?

- Post-op Shoe (flat)
 - Indications: **Protection, Activity**; often used in patients with ulcers or who have undergone vascular surgery and/or toe amputation and need protective footwear to ambulate; promotes heel weightbearing
 - How to Obtain: Ortho tech or PT order in computer; you will need to know a patient's weightbearing status
- Heel Weightbearing Boot (post-op shoe with significant heel lift)
 - Indications: **Protection, Activity**; as above with post-op shoe but strongly promotes heel weightbearing during ambulation
 - Precautions: given the height of the heel lift, need to assess a patient's balance as this can cause a discrepancy in leg length affecting patient's balance and gait
 - How to Obtain: as above with Post-op shoe
- Forefoot Weightbearing Boot
 - Indications: **Protection, Activity**; as above with post-op shoe but promotes forefoot weightbearing
 - How to Obtain: as above with post-op shoe
- Aircast Walking Boot
 - Indications: **Immobility, Activity**; used to immobilize ankle in neutral while allowing weightbearing, generally used in orthopedic injuries.
 - Pros: comes in 2 lengths: short (mid-calf), and long (just below the knee), can adjust the air cushions inside the splint for more/less contact
 - Precautions: Skin issues/pressure sores due to total contact
 - How to Obtain: ortho tech order in computer
- Pre-fab Ankle Foot Orthotic (AFO)
 - Indications: **Activity**; Used to assist/support the foot for ambulation; generally used for a patient with foot drop (from nerve damage, stroke, etc.) or LE weakness
 - Pros: stocked in the PT department, can begin gait training inhouse if patient has the appropriate footwear to use with this orthotic
 - Cons: These are minimal resistance AFOs (trimline posterior to the malleoli) and do not usually provide sufficient inversion/eversion control if this is lacking. If hypertonia is present this may not provide sufficient support in maintaining neutral position. If inadequate knee control is present, they may not prevent knee buckling
 - Precautions: should do frequent skin checks in patient with existing skin integrity issues or with impaired sensation.
 - How to Obtain: PT Consult- BWH stocks pre-fabricated ankle foot orthotics. If the in-stock version does not accommodate the patient, first consult the orthotist for an upgraded version of the pre-fab splint. If significant issues are present and the patient is not able to be properly fit with a pre-fab or an upgraded version of the pre-fab then a

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custom fit may be required by the outside orthotist. This requires casting of the LE to make a custom molding of a splint.

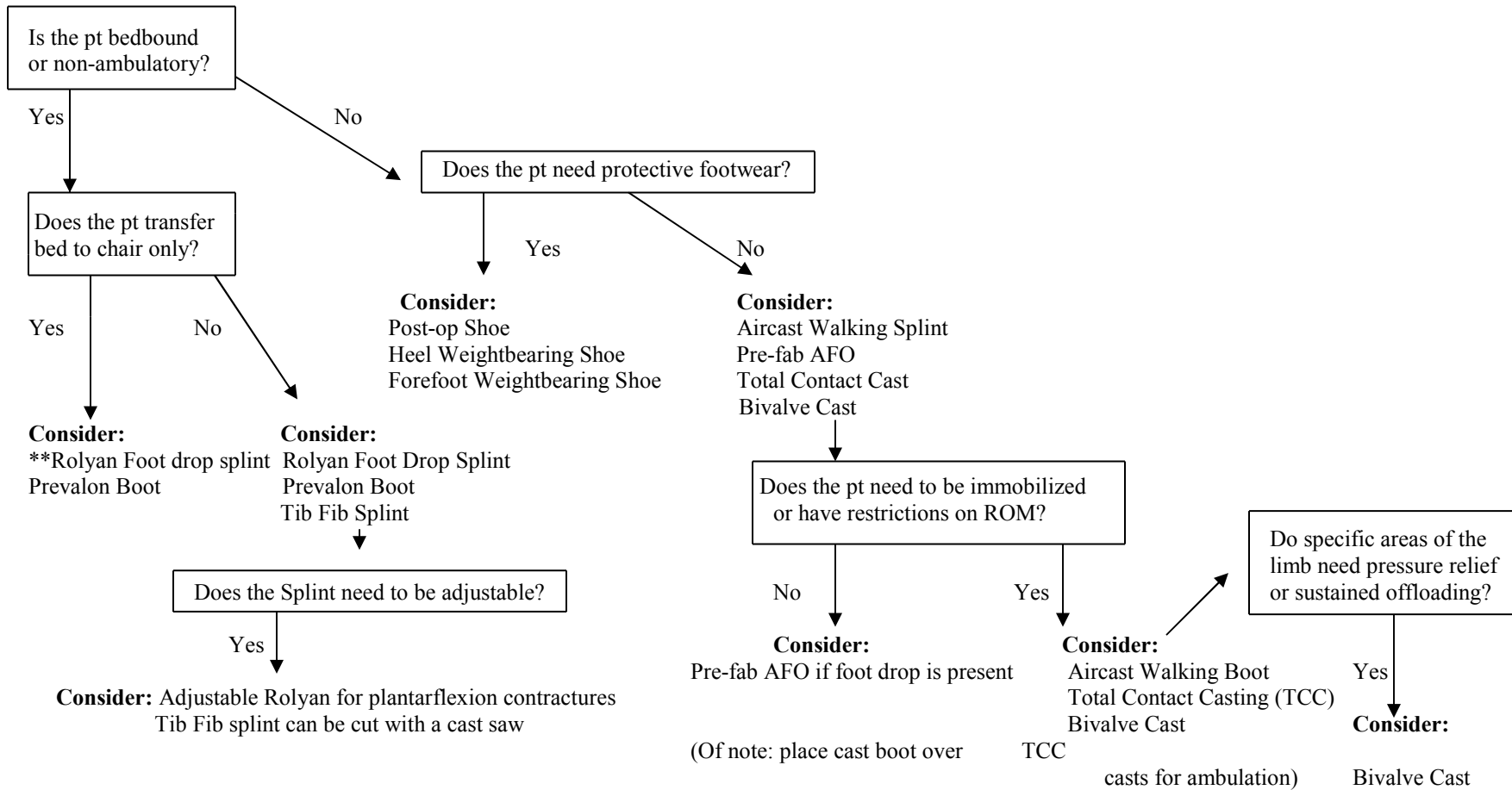
- Total Contact Casting (TCC)
 - Indications: **Immobility, Pressure Relief**; use for pressure relief and/or sustained off-loading of an involved limb (especially in the treatment of diabetic neuropathic foot ulcers)
 - Pros: gold standard for the treatment of diabetic neuropathic foot ulcers to allow for healing; can ambulate with this cast if a cast boot is applied over the cast itself
 - Cons: limited access to the wound since it should stay in place 5-7 days for maximal effect
 - How to Obtain: must be applied in conjunction with ortho tech or MD as a cast is placed on the patient

- Bivalve Cast
 - Indications: **Immobility, Pressure Relief**; as above with total contact casting except that the cast can be removed for dressing changes, etc; the posterior portion of the cast can also be used as a resting splint in supine
 - How to Obtain: Ortho tech order to place bivalve cast

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Appendix 3: Algorithm for Lower Extremity splinting in patients with the potential for or with active skin issues



****Foam lining of the Rolyan splints can be trimmed as needed with the electric knife (kept in the inpatient rehab department)
Of Note: Consider these potential weightbearing orders: FWB/WBAT, PWB, NWB, heel weightbearing, forefoot weightbearing**

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