Mechanical Immobilization

Care of Inactive and Physically Immobile Patients

Causes

• Overall Debilitation
• Trauma to the Musculoskeletal System
• Degeneration of the Musculoskeletal System

Goal of Therapy

• Symptom Relief
• Promotion of Healing
Uses / Benefits

- Relief of Pain & Muscle Spasms
- Support & Alignment of Skeletal Injuries / Fractures
- Restriction of Movement as Injury Heals
- Maintains a Functional Position until Healing Completed
- Allows Some Activity while Restricting Movement of the Injured Area
- Prevents Further Structural Damage & Deformity

Mechanical Immobilizing Devices

- Splints
- Slings
- Casts
- Traction
- External Fixators

Splints

- Immobilize & Protect Injury to Musculoskeletal System
- Used Before or Instead of Traction / Casts
- Applied Short-term or Long-term Use
- Types
  - First Aid Device
  - Commercially Prepared
  - Custom Made
Emergency Splints

- Sprains & Fractures
- Temporary Devices

Nursing Guidelines: Emergency Splints (Pg. 564)

- Do Not Move Injured Area
- Do Not Remove Shoe
- Cover Open Wounds
- Apply Rigid Splint Material to the Joint Above & Below Injury
- Pad Boney Prominences
- Can Use Adjacent, Uninjured Body Part for Splint
- Secure Splint with Wide Tape or Strips of Cloth
- Loosen Splint as Indicated to Facilitate Adequate Circulation
- Elevate Injury
- Keep Patient Warm
- Help for Transporting

Inflatable Splint

- Pneumatic: Rigid as Fills with Air
- Fill Splint: 1/2 Inch Indentation with Fingertips
- Mold / Contour to Injured Area: Prevent Movement
- Frequent Circulatory Checks after Application
- Goal
  - Immobilize area
  - Control bleeding & swelling
  - Prevent circulatory compromise
• Kit includes one each of the following splints: hand/wrist, half arm, full arm, foot/ankle, half leg and full leg
  Simultaneously splint and stop superficial bleeding
  Inflates with simple lung pressure
  Zippers allow quick application
  Can be used on children by resizing half leg or full leg splints
  X-ray translucent

Traction Splint

• Metal Devices
• Immobilize & Pull on Contracted Muscles
• Stabilize Fractures Before Surgery
• Decrease Pain & Swelling
• Bucks Traction / Thomas Splint
• Fractured Hip / Femur

Buck’s Traction
Thomas Splint

![Diagram of Thomas Splint]

- Cloth or Foam Splint
- Limits Motion / Decreases Pain
- Neck or Knee Injuries
- Removed for Hygiene & Dressing Changes

Immobilizer

- Cloth or Foam Splint
- Limits Motion / Decreases Pain
- Neck or Knee Injuries
- Removed for Hygiene & Dressing Changes
Immobilizer

Molded Splint

- Orthotic Device
- More Rigid Materials
- Functions
  - Provide Prolonged Support
  - Limit Movement, Yet Allow Function
  - Prevent Further Injury & Pain
  - Prevent Contractures & Muscle Atrophy
- Chronic Injuries
  - Carpal Tunnel
Cervical Collar

• Foam
  – Mild to Moderate Injury to Neck
  – Strained / Sprained Muscle
  – Whiplash / Sports Injury

Cervical Collar (Cont.)

• Rigid
  – Polyurethane
  – Control Neck Motion & Supports Head
    • Reduces Weight Bearing on Neck
    • Worn Continuously: Day & Night
  – Specific Measurement
    • Neck
    • Distance between Shoulder & Chin
    • Not One Size Fits All
  – Severe Injury or Surgery to Spine
    • Anterior Cervical Fusion

Essential Assessments: Cervical Collars

• Neuromuscular
  – Shrug Shoulders
  – Flex & Extend Elbows & Wrists
  – Demonstrate Strong Handgrips
  – Spread Hand & Touch Fingers with Thumb
  – Report Any Changes / Differences in Strength

• Neurovascular
  – Circulation & Temperature Checks of Extremities When Vital Signs Taken
Philadelphia Collar (Rigid)

Sling

- Cloth Device
- Elevate & Support Body Part
- Arm, Leg, or Pelvis
- After Pacemaker Placement
  - Supports Arm
  - Decreased Stress & Strain on Pocket / Shoulder
  - Reminder Not to Move Arm

Slings
Braces

- Designed to Support Weakened Structures
- Custom-Made / Custom-Fitted
  - Sturdy Materials
    - Leather & Metal: Leg
    - Cloth & Metal: Back
- Worn During Activity
- Improper Fit
  - Deformity
  - Discomfort
  - Pressure Ulcer

Categories of Braces

- Prophylactic
  - Prevents or Reduces Severity of Joint Injury
- Rehabilitative
  - Allows Protective Motion of a Surgically Repaired Joint Injury
- Functional
  - Provides Stability for an Unstable Joint
Casts

- Rigid Mold Surrounds & Immobilizes a Body Part
- Plaster of Paris
  - Inexpensive / Easy Application
  - 24-72 Hours to Dry / Heavy / Crumbling Edges / Delayed Weight Bearing / Soften When Wet
- Fiberglass
  - Lightweight / Dries 5-15 minutes / Immediate Weight Bearing / Unaffected by Water
  - Expensive / Not Use for Severe Injuries or Swelling / Sharp Edges

Types of Casts

- Cylinder
- Body
- Bi-Valved
- Spica

Cylinder Cast

- Fits Around Extremity, Leaving Fingers & Toes Exposed
- Extends from Joint Above & Below Affected Bone
- Maintains Alignment During Healing
Body Cast

- Larger Version of Cylinder Cast
- Fits Around Trunk of the Body
- Extends Nipple Line to Hips
- Used Spinal Conditions: Scoliosis

Body Cast
Bi-Valved Cast

- Length-wise Cut Made Into a Body or Cylinder Cast
- Allows Bathing / Skin Care
- Uses
  - Swelling, Compression of Tissues, Or Circulation Issues Anticipated
  - Cast to be Down-sized at a Later Date
  - More Precise X-ray Needed
  - Infection Monitored
  - Temporary Immobilization of Painful Joints

Spica Cast

- Fits Around Arms or Legs & the Chest or Trunk
- Reinforcement bar for Strength
Application of Cast

• Prepare Patient
• Assemble Supplies
• Help with Positioning During Procedure

Cast Care

• Uncovered Until Dry
  – Hair Dryer on Cool Setting
• Handle Wet Cast with Palms Hand
  – Fingers Form Pressure Points: Potential Ulcer
• Elevate Cast on Pillows
  – Decrease pain & swelling
• Encourage ROM of Fingers / Toes
  – Decrease edema & Stiffness / Increase Circulation
• Apply Ice as Ordered
  – Decrease Swelling
Cast Care

- Apply Petals to Cast Edges
  - Strips of Adhesive Soften & Prevent Chipped Plaster
- Caution Patient not to Stick Anything into Cast to Scratch
  - Order for Benadryl
- Circle, Time & Date Area of Bloody Drainage
  - Monitor Closely
- Secure Windows After Dressing Changes
- Ambulate ASAP
- ROM While in Bed

Cast Care

- Assess Neurovascular Status of Exposed Fingers & Toes
  - Circulation
  - Sensation
  - Temperature
  - Mobility
  - Pain
  - Swelling
  - Drainage

Removal of Cast

- Healed / Cast Change
- Cast Cutter
  - Small Circular Saw
  - Noisy: Vibrates as Cuts
  - Frighten Patients, esp. Children
- Unused Muscle Smaller / Weaker
- Joints may Have Limited Movement
- Skin
  - Pale with Patches of Dead Skin
  - Wash Well with Warm Soapy Water
  - Apply Moisturized Lotion
  - Treat any Skin Breakdown
Traction

- Treatment of Musculoskeletal Trauma & Disorders
- Pulling Effect Exerted on Skeletal System
  - Through Application of Weights
  - Offset by Counter Pull of Patient’s Own Body Weight
  - System of Ropes, Pulleys, & Slings used
  - Overhead Frame & Trapeze Help with Patient’s Mobility

Uses

- Reduce Muscle Spasms
- Realign Bones
  - Before Surgery
  - Stabilize During Healing Postoperatively
- Relive Pain
- Prevent Deformities

Types

- Manual
- Skin
- Skeletal
Manual Traction

- Physician Pulls on Affected Body Part with Hands Using Muscular Strength
- Realign Bone Before Treatment Applied
  - Cast
  - Sling
- Replacing Dislocated Bone
- Shoulder / Hip
  - Dislocated out of Socket
Skin Traction

• Pulling Device Applied to Skin
• Cervical / Pelvic Traction
  – Strained or Pulled Muscle
  – Slipped Disc
• Buck’s / Russell
  – Hip Fracture Before Surgery

Cervical / Pelvic Traction

Buck’s Traction
Russell’s Traction

Skeletal Traction
- Pull is Exerted Directly on the Skeletal System (Bone)
- Wire, Pin, or Tong Placed Into or Through a Bone
- Crutchfield Tongs

Crutchfield Tongs
Maintaining Effective Traction

- Inspect Equipment Every 4 Hours
  - Pulleys, Weights, Slings, Pin Sites, Leg Boot
- Skeletal Traction Applied Continuously
  - Skin Traction May be More Intermittent
- Keep Weights Off Floor
  - Disturbing Pull / Counter Pull
- Avoid Tucking in Top Sheets
  - Interfere With Traction & Pulley System
Traction Care: Guidelines (Pg, 573)

• Keep Patient Up in Bed
  – Traction Not Effective if Feet Touching Foot of the Bed
• Use of Trapeze & Overhead Frame (OHF)
  – Allow Some Independence or Mobility
• Apply Bottom Sheets from Top to Bottom
  – Instead of Side to Side
• Use Pressure Relieving Devices
  – Wedges
• No Pillow Under Head / Neck Unless Ordered
  – Disturb Pull and Counter Pull

Traction Care

• Use Fracture Bedpan
  – Elevating Hips Disturbs Line of Traction
• Encourage Isometric, Isotonic, & ROM Exercises
  – Maintains Muscle Tone, Strength, & Flexibility
• Meticulous Skeletal Pin Care
  – Pin is Foreign Body
  – Soap & Water to Clean
  – Antimicrobial Ointment to Site BID
  – Cover Protruding Pins with Cork etc.

External Fixators

• Metal Device Inserted into & through One or More Bones
• Stabilizes Broken Bones During Healing Process
• Allows Patient More Freedom to be Active & Mobile
• Pin Care Given
• Lengthening
Nursing Implication / Diagnosis

- Pain
- Impaired Physical Mobility
- Risk for Disuse
- Risk for Neurovascular Impairments
- Risk for Altered Tissue Perfusion
- Self-Care Deficit

Gerontologic Considerations

- Hip Fractures Common
- Bones: Brittle, Weak, & Stiff (Joints)
- Need Well-Balanced Diet
- Sun Exposure: Vitamin D
- Weight-Bearing Exercises
- More Susceptible: Adverse Reactions Related to Narcotic Administration

Gerontologic Considerations (Cont.)

- Diminished Tactile Sensations
- Incontinence / UTI from Catheter Insertions
- Some Fracture May be Treated Non-Surgically
- Get Mobile ASAP!!