Effective Rehabilitation Interventions: From Prehabilitation to Survivorship

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Disclosures
Presenter(s) has no financial interest to disclose.

Learning Objectives
At the conclusion of this activity, the participant will be able to:
1. Explore the evidence for rehabilitation in the care for cancer patients before, during and after treatment
2. Describe clinical application of select rehabilitation interventions in oncology
3. Identify future directions for evidence-based practice in cancer rehabilitation

Agenda
1. Evidence-Based Practice in Cancer Rehabilitation: Where Are We?
2. Prehabilitation: The New Buzzword or a Worthwhile Investment?
3. Rehabilitation During Active Treatment: Less Fear, More Evidence
4. The New Survivorship Paradigm
5. Future Directions
6. Q&A

What is Needed?

<table>
<thead>
<tr>
<th>Unmet Need</th>
<th>n</th>
<th>%</th>
<th>Codebook Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Physical</td>
<td>578</td>
<td>38.2</td>
<td></td>
</tr>
<tr>
<td>2. Financial</td>
<td>307</td>
<td>20.3</td>
<td>Related to money, insurance, affordability of services</td>
</tr>
<tr>
<td>3. Education/Information</td>
<td>295</td>
<td>19.5</td>
<td>Lack of knowledge, unanswered questions re: follow up, survivorship, risks</td>
</tr>
</tbody>
</table>

Our Patients

- Genito-urinary
- Breast Ca
- Head and Neck
Treatment Types

Impairments

The Rehabilitation Process

Components of Rehabilitation Interventions

Prehabilitation: The New Buzzword or a Worthwhile Investment?

“The Call It Prehab”

### Pulmonary Rehab Vs Chest PT

**Shintaro et al, 2013**

**Pulmonary Rehab Vs Chest PT**

- **Occurrence**
  - Chest PT
  - Pulm Rehab

- **LOS**
  - Chest Tube
  - Complications

**Time Since Surgery**

- **Chest PT**
- **Pulm Rehab**

**Patients**

**Controls**

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### Lung Cancer Resection Pre-hab

This patient is a 61 yo female international patient, with lung cancer requiring surgical resection as soon as possible, which is conditional on her physical function (which is currently minimal). The patient is referred by her surgeon for prehabilitation to increase patient's endurance and mobility with a goal of being able to walk 1 mile pre-operatively.

- **PMH/PSH:** Current smoker; 1991 MI managed with balloon angioplasty; 2004 open pelvic surgery for uterus sparing fibroid removal; HTN; HLD; Chronic LE swelling; Thyroidectomy 2011; Left acoustic neuroma resected 2013; Myomectomy 1982; Reduction mammoplasty 2007

- **Current Functional Level:** Currently ambulates to appts only; CS to Min A for transfers and IADL; Cane indoors, rollator outdoors. HIGH FALLS RISK, near falls 4-5x daily uses furniture to assist. LE/UE strength grossly decreased

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### Walking and Exercise Capacity

**Chao et al, 2013**

**West et al, 2015**

**Walking and Exercise Capacity**

- **Meters**
  - Baseline
  - Pre-op
  - 4 weeks
  - 8 weeks

- **Prehabilitation**
  - Baseline
  - Pre-op
  - PWKS
  - NWKS

- **Rehabilitation**
  - Baseline
  - Pre-op
  - PWKS
  - NWKS

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### Trismus

**Høgdal et al, 2015**

**Trismus**

- **Mean mouth opening in mm**
  - **Start of PT**
  - Five Months Post PT
  - Twelve Months Post PT

**Usual Care**

**Intervention**
Prehabilitation Interventions

<table>
<thead>
<tr>
<th>Surgery</th>
<th>Impairment</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mastectomy</td>
<td>Shoulder Dysfunction</td>
<td>Screening/PT</td>
</tr>
<tr>
<td>Prostatectomy</td>
<td>Incontinence</td>
<td>Biofeedback/Kegel Exercises</td>
</tr>
<tr>
<td>Thoracic</td>
<td>Pulmonary</td>
<td>Inspiratory Muscle Training/Aerobic/Resistance</td>
</tr>
<tr>
<td>Colorectal</td>
<td>Deconditioning</td>
<td>Aerobic</td>
</tr>
</tbody>
</table>

Rehabilitation During Active Treatment: Less Fear, More Evidence

Early Rehabilitation After Mastectomy

- McNeely et al, COCHRANE REVIEW, 2010
  - Improved ROM BUT increased drainage volume & duration
- Kilbreath et al, 2012
  - Lymphedema: not increased
- Testa et al, 2014
  - QOL better at 6 months
  - No differences in post-op complications
- Travier et al, 2015
  - Physical activity, fatigue, strength better

<table>
<thead>
<tr>
<th>Early Rehabilitation After Mastectomy</th>
<th>Testa et al, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pre-drain removal</strong></td>
<td><strong>Post-drain removal</strong></td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>5x/week</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>40 min</td>
</tr>
<tr>
<td><strong>Mode</strong></td>
<td>GHJ ROM, AROM by Pt, PROM by PT</td>
</tr>
<tr>
<td><strong>Ave LOS</strong></td>
<td>7 days</td>
</tr>
<tr>
<td><strong>Frequency</strong></td>
<td>5x/week</td>
</tr>
<tr>
<td><strong>Duration</strong></td>
<td>60 min</td>
</tr>
<tr>
<td><strong>Exercises</strong></td>
<td>Wall Slides, Chicken Wings</td>
</tr>
<tr>
<td><strong>Ave LOS</strong></td>
<td>4 Weeks</td>
</tr>
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</table>
Early Rehabilitation After Mastectomy

<table>
<thead>
<tr>
<th>Duration</th>
<th>18 weeks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>2 X week</td>
</tr>
<tr>
<td>Instructor</td>
<td>PT</td>
</tr>
<tr>
<td>Session Length</td>
<td>60 min</td>
</tr>
<tr>
<td>Mode</td>
<td>Warm Up 5 min</td>
</tr>
<tr>
<td></td>
<td>Aerobic 25 min</td>
</tr>
<tr>
<td></td>
<td>Strength 25 min</td>
</tr>
<tr>
<td></td>
<td>Cool Down 5 min</td>
</tr>
<tr>
<td>RX</td>
<td>VO2 Max and 1 RM at intake</td>
</tr>
<tr>
<td>Intensity</td>
<td>Aerobic based on ventilatory threshold:</td>
</tr>
<tr>
<td></td>
<td>Strength: 2x10 reps of 65% of 1RM -&gt;1x10 75% -&gt;</td>
</tr>
<tr>
<td>HEP</td>
<td>30 min per day “active” TIW per Dutch FN guidelines</td>
</tr>
</tbody>
</table>

Manual Therapy

- Amaral et al, 2012
  - ROM: significant difference
  - No difference:
    - DASH, MCGPO, HADS
  - No differences ROM or UCLA

Manual Therapy

- Patient A
  - Pain 3-4/10 at the gym
  - Pain in end range
  - Almost full ROM
  - DASH 18%
  - Gym 4-5 times a week, Zumba, cardio, weight
  - 2 sx, RT, no complications
  - No pain meds

- Patient B
  - Pain 7-9/10
  - Pain in early range
  - ROM 50%
  - DASH 69%
  - Walks 3-4 times per week
  - 2nd sx, revision due to infection
  - RT
  - Oxycodone
  - Lyrica

Optimal Exercise Mode

- Courneya et al, 2013
  - SF-36, no difference
  - Pain: high aerobic
  - Strength / endurance: Combined
  - Side effects: no serious

Exercise Safety in Advanced Disease

- Quilst et al, 2012
  - Aerobic Capacity
  - Functional Capacity
  - Strength
  - NO ADVERSE EVENTS

- Henke et al, 2014
  - Functional Capacity
  - QOL
  - NO ADVERSE EVENTS

Exercise Safety in Advanced Disease

<table>
<thead>
<tr>
<th>Henke et al, 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endurance (HRR used for intensity)</td>
</tr>
<tr>
<td>1. 6 minutes walking daily</td>
</tr>
<tr>
<td>2. Stairs 2 min daily</td>
</tr>
<tr>
<td>Strength</td>
</tr>
<tr>
<td>1. Bridging</td>
</tr>
<tr>
<td>2. Bicep curls</td>
</tr>
<tr>
<td>3. Triceps extensions</td>
</tr>
<tr>
<td>4. “Abdominal” exercise</td>
</tr>
<tr>
<td>Breathing technique</td>
</tr>
<tr>
<td>ACBT</td>
</tr>
<tr>
<td>Control group: “conventional PT”</td>
</tr>
<tr>
<td>Provided to both groups per:</td>
</tr>
<tr>
<td>Manual Therapy</td>
</tr>
<tr>
<td>Breathing technique training</td>
</tr>
</tbody>
</table>
Pulmonary Rehabilitation
- Liu et al, 2013
  - Improved FEV1 and QOL
- Shintaru, et al, 2015
  - Improved FVC and FEV1

Rehabilitation After Tumor Resection
- Bartolo et al, 2012
  - Improved:
    - FIM
    - Balance
    - Gait
- Khan et al, 2014
  - FIM At 3 Months:
    » Motor
    » Communication
    » Psychosocial
  - At 6 Months:
    » Communication
    » Cognition

Chemotherapy-Induced Peripheral Neuropathy
- Aerobic and Strength Training During Therapy.
  - Streckmann et al, 2014
    » Improves Side effects and QOL
  - Visovsky et al, 2014
    » Improves Balance
    » Wonders , 2014
    » Improves Troublesome symptoms

Rehabilitation After Tumor Resection
- The patient is a 54 year old woman s/p craniotomy and RT of R temporo-occipital malignant brain tumor in May 2015, presenting with c/o impaired endurance and balance. She demonstrates impairments in right sided LE strength, right sided SLS, delayed hip flexion and ankle DF in walking, LE proprioception, slowed gait speed and altered ability to head turn while ambulating. She’s limited in ambulation distance, steps, transfers and picking things up from the floor, walking on uneven surfaces. She’s approximately 49% disabled based on the AMPAC.

Chemotherapy-Induced Peripheral Neuropathy
- Streckman et al, 2014
  - Duration 36 weeks (BIW)
    - Endurance: Stationary bike (60-70% MHR)
    - Treadmill 10-30 min (70-80% MHR)
  - Balance: 4 progressive postural tasks 3 sets of 20 sec
  - Strength: 2 sets of 10 TB PRE for LE:
    - Hip
    - Knee
    - Ankle
  - Functional: Walking w/head turns
  - Stretch: LE stretches
- Visovsky et al 2014
  - Duration 12 Weeks (BIW)
    - Endurance: Stationary bike (60-70% MHR)
    - Treadmill 10-30 min (70-80% MHR)
    - Balance: 4 sets of 10 TB PRE for LE:
      - Hip
      - Knee
      - Ankle
    - Strength: 2 sets of 10 TB PRE for LE:
      - Hip
      - Knee
      - Ankle
    - Functional: Walking w/head turns
    - Stretch: LE stretches
Interventions During Active Treatment

<table>
<thead>
<tr>
<th>Impairment</th>
<th>Effective</th>
<th>Inconclusive</th>
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</thead>
<tbody>
<tr>
<td>Shoulder ROM</td>
<td>Stretching/Resistance</td>
<td>Manual Therapy</td>
</tr>
<tr>
<td>Pain</td>
<td>Aerobic/Stretching/Resistance/Manual</td>
<td></td>
</tr>
<tr>
<td>Strength/Endurance</td>
<td>Aerobic/Resistance</td>
<td></td>
</tr>
<tr>
<td>Balance</td>
<td>Balance/Gait</td>
<td></td>
</tr>
<tr>
<td>Safety/Advanced disease</td>
<td>Pulmonary/Aerobic/Resistance</td>
<td></td>
</tr>
<tr>
<td>Fatigue</td>
<td>Resistance/Aerobic</td>
<td></td>
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</table>

The New Survivorship Paradigm

Who will develop chronic pain?

Patient is a 51 y/o female with h/o right sided breast cancer status post lumpectomy in 2013, SLNB, XRT(2014) and chemotherapy. + previous shoulder pain. Patient presented with c/o right shoulder pain and right UE forearm/wrist tingling. The patient reports sudden onset of pain 6m ago, no trauma/injury. There's pain at rest, but it's much worse with right UE use and movement. She works in retail which requires UE use for lifting, however the patient has severe limitations d/t pain. She has additional pain with right side lying, opening doors and lifting anything heavier than 4-5 pounds. DASH 79.2%

Vigorous activity after DX may lower risk of progression.
Possible inverse relationship: physical activity and progression.
More research is needed to examine the relationship.

Tumor Inhibition With Exercise

Genetics, Cancer and Rehabilitation

Jones et al, 2014

- Aerobic Exercise
- Increased angiogenesis/Reduced hypoxia
- Decreased vascular invasion/Decreased mets?
Breast Cancer Survivors
  - PT relieves pain in survivors
- Cuesta-Vargas et al, 2014
  - Aquatic Exercise improves fatigue and QOL

Head and Neck Cancer Survivors
- Passchier et al, 2015
  - Multidisciplinary Rehab
    - Feasible
    - Improves QOL
- McNeely et al, 2008
  - Individualized PT
    - ROM
    - Strength
    - Pain

Head and Neck Cancer Survivors
- McNeely et al, 2008
  - Duration: 12 weeks
  - Frequency: BIW (+1 HEP)
  - Exercises:
    - Rhomboids (scapular retraction)
    - Levator scapula (scapular elevation)
    - Biceps (elbow flexion)
    - Triceps (elbow extension)
    - Subscapularis, posterior deltoid (ER)
    - Middle deltoid, supraspinatus and subscapularis (scaption)
  - Intensity:
    - 2x10-15 reps (progress by 2-5#)
    - Starting 25-30% 1RM → 60-70% 1RM
    - BORG RPE <15/20
  - Control Group:
    - Same exercises
    - No 1RM testing
    - No progression

Exercise Prescription
- Scharhag-Rosenberger et al, 2015
  - Use Percentage of HR_max
  - Moderate 65-75%
  - Vigorous 75-94%
- Strasser et al, 2013
  - Frequency: Twice a week
    - Lean body mass, not body fat
    - Volume: No relationship
    - Strength: body fat% and fatigue.
    - Intensity:
      - UE Strength—Negative Impact of intensity
        - Low to moderate <75% of 1RM optimal.
      - LE Strength
        - Low load/high volume <30% 1RM optimal.

Motivating Our Patients
- Sander et al, 2012
  - Concerned about Lymphedema
  - Lack of knowledge about safe exercise
- Bennett et al, 2007
  - High Self-Efficacy Important
Rehabilitation In Survivorship

<table>
<thead>
<tr>
<th>Problem</th>
<th>Yes</th>
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<tbody>
<tr>
<td>Pain</td>
<td>Myofascial Release/Therapeutic Exercise</td>
</tr>
<tr>
<td>Fatigue/QOL</td>
<td>Aquatic Exercise</td>
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<td>Strength/ROM</td>
<td>Individualized Exercise</td>
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<td>Exercise Prescription</td>
<td>%HRmax</td>
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<tr>
<td>Motivation</td>
<td>Motivational Interviewing</td>
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The Challenges

Buffart et al, 2014

Growing Interest


Components

References
References


References


