Fatigue During and After Treatment for Childhood Cancer; What Do We Know and What Can Help

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What is Fatigue?
A Conceptual Definition

• A distressing, pervasive symptom with physical, mental, and emotional components characterized by a lack of energy (Hockenberry-Eaton & Hinds 2000).

• The definition differs by developmental level.

• The school age children emphasize the physical sensation while adolescents emphasizes mental and emotional tiredness along with the physical sensation of fatigue.
What is Fatigue?
A Typology of Fatigue

• Typical tiredness: a “normal” or expected response to particular events or circumstances that involve the expenditure excess energy

• Treatment fatigue: a “never-ending tiredness” that was not fully relieved by sleep or rest

• Shutdown fatigue: preserve the remaining energy. To survive the loss of energy, children entered a “hibernating” phase - disengaged and faded in and out of sleep, minimizing all interaction and activity.
How Prevalent is Fatigue?

- During treatment
  - Most frequently reported symptom
  - Most distressing symptom (Kestler & LoBiondo-Wood, 2012)
- After treatment (survivorship)
  - Childhood Cancer Survivor Study – adult survivors more likely to be fatigued than sibling (Mulrooney et al., 2007)
  - In ALL survivors, incidence (30% similar to general norms) (Meeske et al., 2005)
Relationship of Fatigue to Other Symptoms/ Functional Outcomes

During treatment fatigue is related to ....

- **Sleep quality** (Orsey et al., 2013) **sleep duration** (Darezzo Rodrigues Nunes, et al., 2015; Crabtree et al., 2015)

- **Sleep disturbance in AYA during the week after chemotherapy** (Erickson et al., 2011); **sleep in children with ALL in maintenance** (Zupanec et al., 2010)

- **Nocturnal awakenings in the hospital** (Hinds et al. 2007)

- **Physical performance** – children who walked greater distance on 6MWT had less fatigue (Hooke et al., 2011)

- **Symptom cluster of fatigue, depression, and sleep disturbance** (Yeh et al., 2008; Hockenberry et al., 2010)
Relationship of Fatigue to Other Symptoms/ Functional Outcomes

After treatment fatigue is related to ....

✓ Sleep disruption and day time sleepiness and lower QOL (Mulrooney et al. 2007)

✓ Survivors of Hodgkin Disease and CNS tumors had higher fatigue (Mulrooney et al. 2007)

✓ Fatigue, sleepiness, sleep quality, and vitality all impacted neurocognitive outcomes in pediatric cancer survivors (i.e. task efficiency, memory) Clanton et al., 2011
Developmental Framework

Hooke, 2009
What Is the Cause of Cancer-Related Fatigue?

- Predisposing (genetic disposition)
- Triggering (disease- and treatment-related factors)
- Maintaining (current health, demographic and life-style factors)
- Modulating (age at diagnosis and gender) factors.

Barsevick et al. 2010
What Does the Research Say About What Works for Decreasing Fatigue?

Searching the Evidence

• Critical reviews – summarize multiple studies on a topic – clear on how they selected studies

• Intervention studies
Review Studies

• Integrative Review of interventions for fatigue and stress (Lopes-Júnior et al., 2015)
  – 7 studies reviewed on fatigue or fatigue & stress; 6 showed significant decrease in fatigue
  – Physical exercise most frequent intervention

• Metanalysis (Chang et al. 2013)
  – 6 studies - most frequently intervention was exercise
  – Significant effect of exercise interventions in reducing general fatigue (effect size = -0.76)
Integrative Interventions

• Healing touch (Wong et al., 2013)
  – RTC: intervention group (n = 6) & control group (n = 3); ALL, AML, other
  – 30 minute HT session once a day; measured before & after session – self report fatigue meter
  – Significantly less fatigue in intervention group

• Massage Intervention (Post-White et al., 2009)
  – Cross-over design – weekly massage for 4 weeks
  – N = 23; ALL, solid tumors, CNS tumors
  – No significant change in fatigue
Integrative Interventions

Ankle foot orthosis for children in treatment for non-CNS cancers (Tanner et al., 2015)

- Pilot study; N = 7
- Children receiving vincristine - wore AFOs for 1 cycle of chemotherapy.
- Gait, strength, ankle ROM, activity, and fatigue all improved
Integrative Interventions

Feasibility of individualized yoga for inpatient children (Diorio et al., 2015)

- Children ages 7-18 hospitalized receiving intensive chemotherapy or HSCT
- Individual yoga sessions 3 X/week, 3 weeks
- Feasibility of completing 60% or more sessions
- 9/10 patients completed feasibility
- Parent proxy report of QOL and fatigue – general fatigue increased day 7, then decreased to baseline day 14 & 21
Integrative Interventions

A Feasibility Pilot Trial of Individualized Homeopathic Treatment of Fatigue (Brule et al., 2016)

- Individualized homeopathy: homeopathic medicine is chosen based on patient’s mental, emotional, and physical symptoms.
- Forms: a. homeopathic medicine embedded in 2.5-mm-diameter lactose/sucrose globules or b. 30% ethanol-based liquid homeopathic remedy
- 9 patients enrolled (20% recruitment rate) over 2 years
- There was a significant improvement in general fatigue (P = .038) and sleep/rest fatigue (P = .004) over 14 days
Pharmacologic Interventions

- Selenium (Wong et al., 2013)
  - Randomized, double-blind, crossover study
  - 39 children – ALL, lymphomas, solid tumors
  - No significant decrease in fatigue during selenium course; decrease with placebo

- EBP on methylphenidate (Ritalin) (Sharp et al., 2013)
  - In children with a brain tumour (subject), is methylphenidate (intervention) useful for treating fatigue (outcome)?
  - No evidence on efficacy of methylphenidate to treat cancer-related fatigue in children
Nursing Interventions

A Sleep Hygiene and Relaxation Intervention for Children with ALL (Zupanec et al., 2017)

- RTC to assess the feasibility and acceptability of a sleep hygiene and relaxation intervention to improve sleep and fatigue in children in maintenance ALL
- 20 children – 11 in intervention group
- Intervention group received a 60-minute parental educational session on sleep and fatigue in children with cancer and strategies to improve sleep, including use of 2 storybooks to teach deep breathing and progressive muscle relaxation.
- After 4 weeks: nighttime sleep & going to sleep improved; fatigue didn’t change; intervention feasible and acceptable
Physical Activity/Exercise Interventions

• What is the difference?
  – **Exercise** is a physical activity that is planned, structured, repetitive, and purposeful.
  – **Physical activity** includes any body movement that contracts your muscles to burn more calories than your body would normally do just to exist at rest.

• Structured exercise improves fitness, it is not the only way to improve fitness.

• Everyday physical activities keep the body moving and still count toward the **recommended amount of weekly physical activity**.
How much physical activity do children need?

This may sound like a lot, but don’t worry! Your child may already be meeting the Physical Activity Guidelines for Americans. And, you’ll soon discover all the easy and enjoyable ways to help your child meet the recommendations. Encourage your child to participate in activities that are age-appropriate, enjoyable and offer variety! Just make sure your child or adolescent is doing three types of physical activity:

1. **Aerobic Activity**
   - Aerobic activity should make up most of your child’s 60 or more minutes of physical activity each day. This can include either moderate-intensity aerobic activity, such as brisk walking, or vigorous-intensity activity, such as running. Be sure to include vigorous-intensity aerobic activity on at least 3 days per week.

2. **Muscle Strengthening**
   - Include muscle strengthening activities, such as gymnastics or push-ups, at least 3 days per week as part of your child’s 60 or more minutes.

3. **Bone Strengthening**
   - Include bone strengthening activities, such as jumping rope or running, at least 3 days per week as part of your child’s 60 or more minutes.
**How much physical activity do adults need?**

Physical activity is anything that gets your body moving. According to the 2008 Physical Activity Guidelines for Americans, you need to do two types of physical activity each week to improve your health—aerobic and muscle-strengthening.

For Important Health Benefits:

**Adults need at least:**

- 2 hours and 30 minutes (150 minutes) of **moderate-intensity aerobic activity** (i.e., brisk walking) every week and

- **muscle-strengthening activities** on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).

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**OR**

- 1 hour and 15 minutes (75 minutes) of **vigorous-intensity aerobic activity** (i.e., jogging or running) every week and

- **muscle-strengthening activities** on 2 or more days a week that work all major muscle groups (legs, hips, back, abdomen, chest, shoulders, and arms).

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**Need more help with the guidelines?**

- [Watch this video: Physical Activity Guidelines: Introduction](#)
Why Are Children With Cancer Less Active?

- Researchers have theorized that physical activity may be negatively:
  - Chemotherapy side effects such as neuropathy and motor function impairment and/or cardiopulmonary toxicity
  - Inpatient environment that restricts activity
  - Loss of exercise capacity, weight gain, and sedentary behaviors enabled by overprotective parents and health care providers

What is the Evidence: Are Interventions Effective in Increasing Activity Levels?

Critical Review found that studies on activity and exercise interventions in children with cancer and have found (Huang & Ness, 2011):

• They are safe
• Effective in decreasing fatigue
• Effective in improving fitness, strength, activity levels, and physical function
Physical Activity/ Exercise Interventions

Home based aerobic exercise program (Yeh et al., 2011)

• 22 children with ALL in maintenance
• Intervention developed by exercise specialist; detailed in a video, specifically designed for the study, 3 days a week, for 30 minutes each session, for 6 weeks
• Intervention group had significantly less general fatigue
Physical Activity/ Exercise Interventions

Clinical Field Testing of an Enhanced-Activity Intervention in Hospitalized Children (Hinds et al., 2007)

- RTC pilot study
- Evaluated enhanced physical activity (EPA) intervention in hospitalized children & teens with solid tumors or AML
- Pedaled stationery bike 30 min. 2X/day for 2 to 4 days
- Intervention was feasible; sleep efficiency improved; fatigue didn’t change
Physical Activity/ Exercise Interventions

Use of a Fitness Tracker to Promote Physical Activity in Children with ALL (Hooke et al., 2016)

• 1 group feasibility study – children with ALL in maintenance
• Explored if children who received daily FitBit coaching for 2 weeks before a steroid pulse had an increase in steps per day and decreased fatigue and determined the relationship
• Fatigue was low and did not decrease
• A significant correlation \( r = -0.66, P = 0.005 \) between the steps per day during week 2 and fatigue after the 5-day steroid pulse with higher steps associated with lower fatigue
Physical Activity/ Exercise Interventions

Impact of Effective Nursing Interventions to the Fatigue Syndrome in Children Receiving Chemotherapy (Genc & Conk, 2008)

- Randomized clinical trial – 30 ages 7 to 12 in each group
- Nursing interventions with family education on sleep hygiene (including limiting naps) and increased physical activity during inpatient hospitalization for newly diagnosed ALL & AML
- Intervention started after 7 to 10\textsuperscript{th} day of chemo-continued for a week
- Experimental group had significantly less fatigue by both child and parent report
Physical Activity/Exercise Interventions in Survivorship

The effect of exercise counselling with feedback from a pedometer on fatigue in adult survivors of childhood cancer: a pilot study (Blaauwbroek et al., 2009)

- 35 survivors (median age 29) & 35 healthy controls
- Over 10 weeks, counselor coached on becoming more active – increasing steps
- Recorded steps in online diary – fatigue measured at 0, 10 and 36 weeks
- Survivor group had significant decrease in fatigue – control unchanged
Physical Activity/Exercise Interventions in Survivorship

Yoga for Children and Adolescents After Completing Cancer Treatment (Hooke et al., 2016)

- 13 survivors average age 12 – average 10 months off tx
- Fatigue, anxiety, sleep, balance measured, 6 week wait period, measured again, yoga 6 weeks measured again
- Only anxiety decreased – others unchanged
- Fatigue and balance were worse than health norms
- Need longer intervention or more intensive?
Physical Activity/Exercise Interventions in Survivorship

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So what are the takeaways?

- Fatigue interferes with the work of childhood & adolescence
- Research on the effectiveness of interventions is emerging with physical activity & exercise providing the strongest evidence
- Larger, multi-site, RTC are needed
American College of Sport Medicine

- Clinicians should advise cancer survivors to avoid inactivity, even for patients with existing disease or who are undergoing difficult treatments.

American Cancer Society

- Exercise is safe and feasible during cancer treatment, but also that it can improve physical functioning and various aspects of quality of life.
- Observational studies survivors of breast, colorectal, prostate, and ovarian cancers demonstrate that higher levels of post-diagnosis physical activity are associated with a lower risk of disease recurrence and improved survival.
So what are the takeaways?

Talk to your health care provider – long term follow up clinic about increasing physical activity

Address barriers to moving
- PT assessment for gait/balance /coordination
- Can help to develop a physical activity plan
Community Resources - Adults

TREC Program for Cancer Survivors

Have you or someone you love been affected by cancer? If so, the Training, Rejuvenation and Exercise Program for Cancer Survivors (TREC) at the Community Center could help. A 10-week small-group program designed specifically for adult cancer survivors, the program improves cardio respiratory endurance and strength through regular aerobic exercise and resistance training. Class meets twice a week for 90 minutes.

Trainers Denise Bunch and Gail Ericson have undergone special training to provide a supportive, safe environment for each class.

COST
Community Center Members: $90
Non-Members: $100

REGISTER AND GET MORE INFORMATION
Advanced registration is required and class size is limited. Call 952-949-6470 to register.

Questions? Contact Megan Munoz

PROGRAM BENEFITS
Scientific research has proven that exercise is safe and beneficial for individuals during and after cancer treatment. Participation may include:

- Reduced fatigue and increased energy levels
- Decreased anxiety and depression
- Improved quality of life

Cancer Rehabilitation

Cancer treatment and surgery can make you tired, both physically and mentally. Rehabilitation can improve your quality of life and help you stay independent. Research shows that physical activity has many benefits for cancer survivors. It reduces side effects of cancer treatment or surgery, it also can help you better tolerate treatment and continue with daily activities. Regular exercise reduces fatigue and enhances mood. It also improves sleep, decreases anxiety, and strengthens your immune system.

SCHOOL OF NURSING
University of Minnesota
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Community Resources -Kids

• Phy-ed in school
• PT programs at treatment sites
• Camps
  – Minnesota – Camp Quality
    http://www.campqualityusa.org/mn
  – Camp Make a Dream – Montana
• Yoga for Kids
Everyone – Keep Moving

- Phone apps
- Activity trackers
- 10 minute intervals

Sleep Hygiene

- If you nap, limit to 30 minutes—quiet room/no media
- Avoid screens (TV, computer, phone) before going to bed
- Don’t sleep with your phone
- Cool room
- Get out in natural light during day
- Exercise

https://sleepfoundation.org/
Tackling fatigue....
To improve health and quality of life during and after treatment and provide energy to engage in positive life experiences that advance children along the developmental continuum to a long and healthy future.
References

References


References


