



AT THE FOREFRONT
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Medicine**



**JOHNS HOPKINS
MEDICINE**

Oncology Research- A Year in Review

Combined Sections Meeting
Washington, D.C.- January 2019

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1



Disclosures

- Cynthia Barbe, Annie Bruce, and Lauren Miller have no disclosures regarding the material presented in this educational series.
- We love working in the Acute Care setting with the Oncology Population, especially as we can provide evidenced based therapy interventions across the continuum of care and through their survivorship.

2

2



Objectives

- 1. Report and interpret new literature surrounding the examination of or treatment for oncology health conditions.
- 2. Compare prior knowledge and practice to ideas and concepts in current literature.
- 3. Discuss with peers the application and impact these studies can have on current and future practice.

3

3



Statistics

- January 2016- 15.5 million Americans with Cancer
- Expected 2018- estimated >1.7 million new diagnoses (excludes in situ and BCC/SCC of the skin)
- Approximately 609,640 will pass away = 1, 670 deaths per day
- 42% of new diagnoses can be prevented = 729 thousand potential avoidable in 2018
- Cancer- 2nd leading cause of death in the US

4

4

Statistics

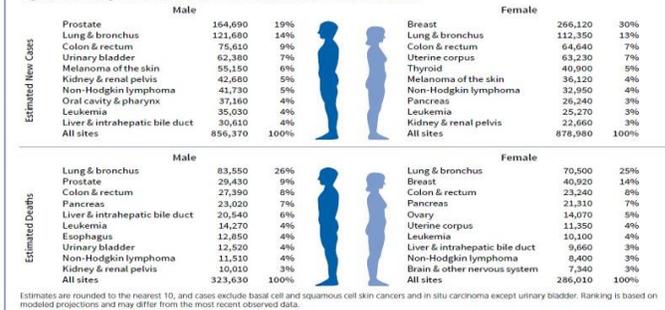


- 2018- most common cancers
 - Female- breast, lung & bronchus, colon & rectum
 - Male- prostate, lung & bronchus, colon & rectum
- 87% of cancer diagnoses are in those >50 years of age
- Direct medical costs in 2015- \$80.2 billion
- 40 of 100 men and 38 of 100 women will develop cancer

Statistics



Figure 3. Leading Sites of New Cancer Cases and Deaths – 2018 Estimates



Cancer Awareness Ribbon Colors



All Cancers	Lung Cancers
Bladder Cancer	Lymphoma
Brain Cancer	Melanoma
Breast Cancer	Multiple Myeloma
Cervical Cancer	Ovarian Cancer
Childhood Cancer	Pancreatic Cancer
Colon Cancer	Prostate Cancer
Esophageal Cancer	Sarcoma/Bone Cancer
Head & Neck Cancer	Stomach Cancer
Kidney Cancer	Testicular Cancer
Leiomyosarcoma	Thyroid Cancer
Leukemia	Uterine Cancer
Liver Cancer	Honors Caregivers
Honors Caregivers	Flum

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TOPICS OF DISCUSSION



1. Physical Activity/Therapy and Cancer
2. Breast Cancer
3. Cognitive Behavioral Therapy, Motivational Interviewing, Telehealth



Physical Activity/Therapy and Cancer

“By failing to prepare, you are preparing to fail.”

Benjamin Franklin

9



Early initiated postoperative rehabilitation reduces fatigue in patients with operable lung cancer: A randomized trial

Morten Quist^{a,*}, Maja Schick Sommer^b, Jette Vibe-Petersen^b, Maja Bohlbro Stærkind^a, Seppo W. Langer^c, Klaus Richter Larsen^d, Karen Trier^b, Merete Christensen^e, Paul F. Clementsen^{f,g}, Malene Missel^e, Carsten Henriksen^e, Karl Bang Christensen^h, Christian Lillilund^a, Henning Langbergⁱ, Jesper H. Pedersen^a

Lung Cancer. 2018; 126: 125-132.

10

10

Introduction



- **Purpose:** To investigate the effectiveness of early versus late initiated postoperative rehabilitation on patients with lung cancer on CRF, QoL, muscle strength, exercise capacity, and functional capacity.
- **Patients:** Those with verified stage I-IIIa NSCLC who will be undergoing surgery as curative intent as well as those with strong clinical suspicion of lung cancer undergoing exploratory surgery.

Quist, et al.

11

11



• **Methods:**

- Randomized controlled trial: Early- 14 days versus Late- 14 weeks post-operative
- N= 119 ERG and 116 LRG
- Both with supervised 12 week program- 24 group exercise sessions, 3 individualized sessions, 3 group health sessions
- Strength & Cardiovascular sessions, 2x/week- not back to back days, 60 mins/session
- Assessors and data analysts were blinded

Quist, et al.

12

12



- Data Points:**
 - Primary- change in VO2peak from baseline to intervention
 - Measured at baseline (preop), 14 weeks post-op, 26 weeks post-op, 52 weeks post-op
 - 6MWD, spirometry, FACT-L also 2 and 8 weeks after baseline
 - Secondary-
 - EORTC QLQ C-30 plus lung specific LC13
 - FACT-L, SF-36
 - HADS
 - MSPSS
 - 6MWD
 - Spirometry
 - MMT- chest and leg press via 1 RM
 - Change in VO2max

Quist, et al.

13



Hospital Depression & Anxiety Scale

Question	Yes, definitely	Yes, sometimes	No, not much	No, not at all
I awake early and then sleep badly for rest of night	3	2	1	0
I get very frightened or have panic feelings for apparently no reasons	3	2	1	0
I feel miserable and sad	3	2	1	0
I feel anxious when I go out of house on my own	3	2	1	0
I have lost interest in things	3	2	1	0
I get palpitations or sensations of "butterflies" in my stomach and chest	3	2	1	0
I have good appetite	0	1	2	3
I feel scared and frightened	3	2	1	0
I feel life is not worth living	3	2	1	0
I still enjoy the things I used to	0	1	2	3
I am restless and I cannot keep still	3	2	1	0
I am more irritable than usual	3	2	1	0
I feel as if I have slowed down	3	2	1	0
Worrying thoughts constantly go through my mind	3	2	1	0

Anxiety 2, 4, 6, 8, 11, 12, 14, Depression 1, 3, 5, 7, 9, 10, 13, Scoring 3, 2, 1, 0 (for items 7 and 10 scoring is reversed), Grading: 0-7= non case 8-10= borderline case 11+= case

Jadhav, SA. *Indian Jour Urol.* 2010. 26; 490-493.

14



- Results:**

	0-14 weeks	0-26 weeks	14-26 weeks	0-52 weeks
VO2peak	both ↓ & ↔	both ↓	↑ ERG; ↑ LRG; ↔	both ↑
Fatigue	↑ ERG; ↑ LRG; ↔	both ↓	↓ ERG; ↓ LRG; ↔	both ↓
6MWT		both ↑		
Res Cap		both ↓ & ↔		
QoL		both ↑		
	Bold-significant	↑ - increase	↓ - decrease	↔ - between

Quist, et al.

15



- Discussion:**
- Both groups responded to the intervention with changes in VO2peak and 6MWD.
- LRG higher decrease in VO2peak from baseline to 14 weeks- most likely due to the later start of rehabilitation.
- ERG- maintained fatigue levels throughout; LRG- significant increase in fatigue from baseline to 14 weeks, yet completed the intervention with resultant significant decrease in fatigue- maintained at 52 weeks; and both had fatigue lower than baseline

Quist, et al.

16

- **Limitations:**
 - Low recruitment
 - High dropout rate- 40% for each group
 - Symptom burden, activity preferences, prior activity levels
- **Conclusion:**
 - Both groups responded with an increase in VO₂peak, thus indicating with this study there is no difference as to when to begin a rehabilitation program- early versus late. However, to reduce post-operative fatigue, early rehabilitation is recommended.

Quist, et al.

17

17

ORIGINAL ARTICLE

WILEY European Journal of Cancer Care

Low-intensity exercise therapy with high frequency improves physical function and mental and physical symptoms in patients with haematological malignancies undergoing chemotherapy

Takuya Fukushima^{1,2} | Jiro Nakano³ | Shun Ishii² | Ayumi Natsuzako² | Junya Sakamoto³ | Minoru Okita¹

Eur J Cancer Care. 2018; 27:e12922.

18

18

Introduction

- **Purpose:** To investigate the effectiveness of low intensity exercise therapy (LIET) on both physical and mental symptoms as well as function with patients undergoing chemotherapy for haematological malignancies.
- **Patients:** Forty-four patients hospitalized for inpatient chemotherapy as treatment for leukemia, lymphoma, and multiple myeloma.

Fukushima, et al.

19

19

- **Methods:**

- Longitudinal, observational study
- Data collected at initiation of rehabilitation and discharge
- Exercise performed on weekdays- from initiation of rehabilitation to discharge
- LIET- <40% predicted HRmax; modified Borg score of “4”
- Frequency- intervention days/total weekdays from initiation to discharge

Fukushima, et al.

20

20

• Methods:

- Rehabilitation
 - Aerobic- Ergometer at low load for 5-10 minutes, plus 20-40 minutes 1x/day-walking to tolerance plus 1-2 sets of stair negotiation
 - Resistance- 1 set of 10-20 repetitions of hip, knee, elbow flexion, then adding 0-2 kg weights for 1-2 sets of 10-20 repetitions; calf raises (standing or sitting) and squats
- Measurements
 - Muscle Function
 - Physical function
 - ADLs
 - Psychological distress
 - Quality of Life

Fukushima, et al.

21

21

Eastern Cooperative Oncology Group (ECOG)

ECOG	Description
0	Fully active, able to carry on all pre-disease performance without restriction.
1	Restricted in physically strenuous activity but ambulatory and able to carry out work of a light or sedentary nature, e.g., light house work, office work.
2	Ambulatory and capable of all selfcare but unable to carry out any work activities. Up and about more than 50% of waking hours.
3	Capable of only limited selfcare, confined to bed or chair more than 50% of waking hours.
4	Completely disabled. Cannot carry on selfcare. Totally confined to bed or chair.
5	Dead

http://www.msdbooks.com/Eop_assessment/Exercise_files/PastedGroup.png

22

22

Results:

High frequency- 0.93

- Significant increases:
- 10MWT and TUGT
- ECOG PS & FIM
- Improvement in anxiety score
- Global health, physical health, cognitive function, insomnia, fatigue, pain

Low frequency- 0.66

- Significant decrease in knee extension MMT and muscle thickness
- Significant improvement of anxiety score

Fukushima, et al.

23

23

• Discussion:

- It is possible that LIET is able to maintain muscle function when performed more frequently while in the hospital receiving chemotherapy treatment.
- Improvements demonstrated with ease of gait and gait ability with more frequent exercise/activity.
- Muscle strength and gait ability can be assessed by TUGT in this setting easily with improvements in higher frequency exercise.
- Improvements of HF group can assist with battling the negative effects of psychological distress on muscle function and physical activity.

Fukushima, et al.

24

24

- **Limitations:**
 - Small sample size
 - Generalizability
 - Should have including 6MWT and number of steps
 - Unable to clarify the effect of the LIET- would be better as randomized controlled trial
- **Conclusion:**
 - LIET at a higher frequency is effective in improving QoL, ADLs, physical functioning, as well as maintaining leg muscle function

25

ORIGINAL ARTICLE

Physiotherapy programme reduces fatigue in patients with advanced cancer receiving palliative care: randomized controlled trial

Anna Pyszora¹ · Jacek Budzyński² · Agnieszka Wójcik³ · Anna Prokop⁴ · Małgorzata Krajnik¹

Supportive Care Cancer. 2017; 25: 2899-2908.

26

Introduction

- **Purpose:** To assess the effects of a physical therapy program on cancer related fatigue, as well as other symptoms in patients with advanced cancer.
- **Patients:** Those with advanced cancer who were receiving palliative care as a component of their care plan.

27

- **Methods:**

- Randomized controlled trial: Treatment versus Control
- N= 30 in each group
- Therapy- 3x/week for 2 weeks; Control- no exercise
 - Same therapist, licensed in PNF, & MF trained

- **Data Points:**

- BFI
- ESAS
- Satisfaction scores

28

- **Results:**

- TX- significant decrease in BFI- severity & impact on function
- TX- improved QoL/well-being & decreased pain, depression, appetite, & drowsiness
- TX- significant reduction in severity of fatigue & drowsiness
- TX- positive satisfaction scores

Pyszora, et al.

29

29

- **Discussion:**

- Palliative care includes physical therapy in care plan to manage symptoms in those with advanced cancer.
- It's main goal and focus is on improving the quality of life for the length of the patients' life.
- Uncertainty of how long should the sessions last and what exercises should the sessions incorporate, yet this study resulted in statistically significant changes on day 8 in fatigue severity as well as positive patient satisfaction.

Pyszora, et al.

30

30

- **Limitations:**

- Patients may be reluctant to begin with physical activity due to limited activity tolerance
- Limited generalizability
- Group assignment, although randomized, demonstrated a significant association with gender

- **Conclusion:**

- Physical Therapy is safe and effective to assist with management of severity of cancer related fatigue and thus improving general well-being

Pyszora, et al.

31

31

Thank you for your time & attention!
Tara & Sami (Samantha)



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32

32




Breast Cancer

- Lymphedema Management
- Exercise, Cardiac Rehab
- Limb function

33



ORIGINAL RESEARCH ARTICLE

Outcome Trends of Adult Cancer Patients Receiving Inpatient Rehabilitation

A 13-Year Review

Vanessa Gallegos-Kearin, MD, Sasha E. Knowlton, MD, Richard Goldstein, PhD, Jacqueline Mix, PhD, MPH, Ross Zafonte, DO, Michael Kwan, MD, Julie Silver, MD, and Jeffrey C. Schneider, MD

34



Discussion

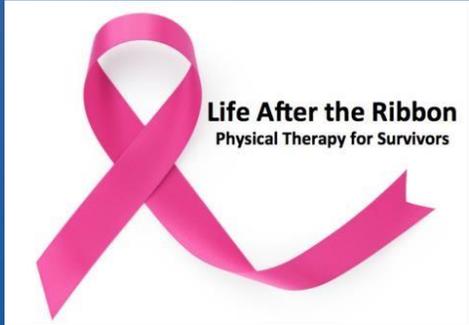
- Cancer patients experienced **significant positive functional gains** over an average 2 week stay, and most (>70%) were **discharged back to the community**.
- Greatest gains observed in self care and transfers (decrease of 1 point on FIM = 2.19 minutes of help needed per day) → **decreased caregiver burden**
- **Transfer rate back to acute care = 17%**

35



Breast Cancer

1. Lymphedema
2. Exercise
 - a. Cardiac Rehab
3. Limb function



36

SURVEILLANCE

NCCN National Comprehensive Cancer Network
NCCN Guidelines Version 2.018
Lymphedema

SURVIVOR AT RISK FOR LYMPHEDEMA
 Inquire about swelling or feeling of heaviness, fatigue, or fullness

SYMPTOM ASSESSMENT
 Symptoms present → [Red X] → Surveillance (See SLYMPH-4) or If no response, but persistent symptoms, consider reviewing adherence to treatment plan and/or self care management

SYMPTOMS NOT PRESENT
 Re-evaluate and inquire about symptoms at each visit

WORKUP IF LYMPHEDEMA IS SUSPECTED
 • Survivor lymphedema education, including self-care management (See SLYMPH-A)
 • Refer to certified lymphedema therapist (if available) for consideration of the following:
 ◦ Compression garments¹
 ◦ Review fit of garments
 ◦ Review use of garments
 • Progressive resistance training under supervision^{m,n}
 • Manual lymphatic drainage^o
 • Refer to physical therapy for range-of-motion exercises

TREATMENT

*Certified lymphedema therapists can be located using the following resource: <https://www.ccl-iana.org/search/therapists/>

37

Original Article

Early Surveillance Is Associated With Less Incidence and Severity of Breast Cancer-Related Lymphedema Compared With a Traditional Referral Model of Care

Louise A. Koelmeyer, BAppSc (OT)¹; Robert J. Borotkanics, MPH, MS, DrPH²; Jessica Alcorso, MPH, PhD¹; Philip Prah, MSc²; Caleb J. Winch, M Psychol (Clin)¹; Kristine Nakhel, B Human Sc¹; Catherine M. Dean, BAppSc, MA, PhD³; and John Boyages, MBBS, FRANZCR, PhD¹

Cancer Month 0, 2018

38

Introduction

- Breast Cancer Related Lymphedema (BCRL) is estimated to affect 21% of those diagnosed with Breast Cancer
- 80% of patients with breast cancer will attain full life expectancy - important to minimize the physical functional, and financial burden on survivors
- Bioimpedence spectroscopy (BIS) has allowed for subclinical detection of BCRL
- Early treatment intervention = better outcomes

Koelmeyer, et al.

39

<https://www.mcgadget.com/2016/01/impedimed-release-1-day-non-invasive-lymphedema-assessment-walk-through.html>

40

Purpose



Comparing two models (traditional vs surveillance) over time in relation to the following:

1. Difference in time to first measure of lymphedema and duration of follow up
2. Difference in health system use
3. Difference in the incidence and severity of lymphedema for those dx with lymphedema
4. Difference in evolution of BIS measurement over time for those dx with lymphedema

Koelmeyer, et al.

41

Methods



- Retrospective Cohort Study – 753 women, private clinic
- **Early surveillance group (n 188)** = women assessed before their surgery or within 90 days and were routinely referred from multidisciplinary breast cancer team
- **Traditional referral group (n 285)** = assessed more than 90 days after surgery, typically referred from external health centers

Both groups received lymphedema education, monitoring using BIS, clinical management of potential complications, as well as exercises and psychosocial support

Koelmeyer, et al.

42

Outcome Measures



- Time of first BIS measurement from 90 days post surgery in **DAYS**
- Median follow up duration
- Total number of visits/year = health care utilization
- BIS measurements taken in supine with Impedimed L-Dex U400
- Repeated measures, mixed-effects models were created to evaluate progression in BIS values

Koelmeyer, et al.

43

Early Surveillance for Lymphedema/Koelmeyer et al

TABLE 1. Baseline Characteristics of Participants

Characteristic	No. of Participants (%)			P ^a
	All, n = 473	Early Surveillance Group, n = 188	Traditional Referral Group, n = 285	
Age: Mean ± SD, y	55 ± 11	54 ± 12	56 ± 11	<.05
Arm at risk				
Right	216 (46)	84 (45)	132 (46)	.621
Left	257 (54)	103 (55)	154 (54)	
Sentinel lymph nodes dissected ^b				
No	217 (46)	55 (29)	162 (57)	<.001
Yes	256 (54)	133 (71)	123 (43)	
Axillary lymph nodes dissected ^b				
No	173 (37)	68 (36)	105 (37)	.799
Yes	301 (64)	121 (64)	180 (63)	
Medical intervention		n = 186	n = 94	
Nil adjuvant	31 (11)	19 (10)	12 (13)	<.001
RT only ^c	47 (17)	34 (18)	13 (14)	
CT only, without taxane	16 (6)	11 (6)	5 (5)	
CT only, with taxane	25 (9)	22 (12)	3 (3)	
RT + CT, without taxane ^c	161 (58)	100 (53)	61 (65)	
RT + CT, with taxane ^c	95 (34)	73 (39)	21 (22)	

Abbreviations: CT, chemotherapy; RT, radiotherapy.

^aP values were determined with 2-sample t test or a chi-square test.

^bValues for this characteristic were based on those who had a date of procedure recorded; it was assumed that all those without a date did not undergo dissection.

^cSpecific data on radiation fields were not available from therapy clinical files.

44

TABLE 2. Time to First Bioimpedance Spectroscopy Measure and Health System Use

Outcome	Median (IQR)		P ^a
	Early Surveillance Group, n = 188	Traditional Referral Group, n = 285	
Time to first BIS measurement, y	0.34 (0.28-0.51)	2.15 (0.97-5.41)	<.001
Follow-up duration, y	0.74 (0.12-2.17)	0.17 (0.0-1.5)	<.001
Health system use: No. of visits/y ^b	n = 108 4.1 (2.9-6.0)	n = 108 3.9 (2.5-5.9)	.238

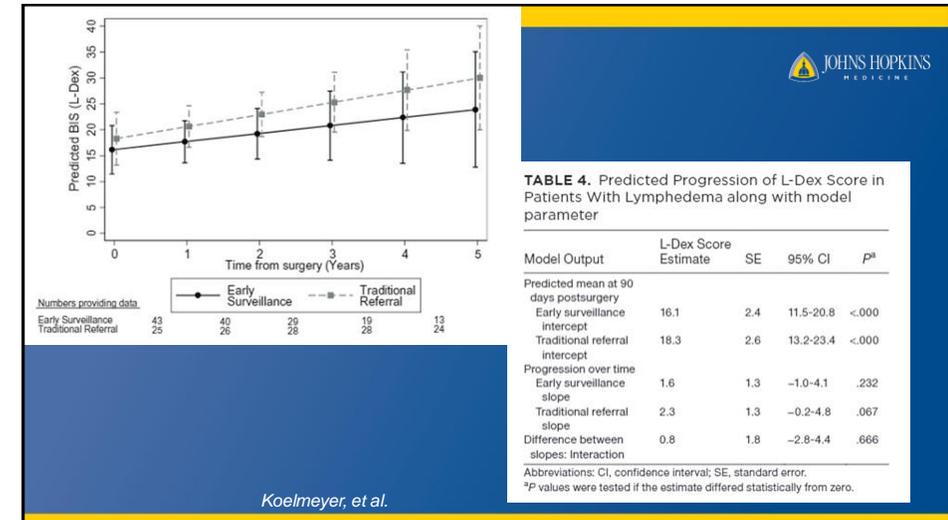
Abbreviations: BIS, bioimpedance spectroscopy; IQR, interquartile range.
^aP values were determined with a nonparametric Wilcoxon rank-sum test.
^bHealth system use was measured only among 108 women in each group who attended clinic for ≥6 months.

TABLE 3. Lymphedema Stage at Diagnosis by Patient Group

Outcome	No. of Women (%)		P ^a
	Early Surveillance Group, n = 188	Traditional Referral Group, n = 285	
Stage of lymphedema			
No lymphedema	142 (76)	173 (61)	<.001
Stage 0	19 (10)	3 (1)	
Stage I	19 (10)	43 (15)	
Stage II	8 (4)	53 (19)	
Stage III	0 (0)	13 (5)	

Koelmeyer, et al.

45



46

Discussion

- Greater proportion of women in early surveillance group accessed early intervention to prevent progression to clinical lymphedema
- Fewer woman in the early surveillance group were diagnosed with moderate or severe lymphedema
- Although clinic visits per year may have been the same, the actual cost of the intervention could have been different based on the treatment provided

Koelmeyer, et al.

47

Limitations

- Groups were not randomly assigned
- Women who never developed lymphedema are likely under represented in the traditional referral group
- No data available for women who discontinued visits
- Recent literature supports that earlier detection may be even more beneficial using a threshold of 6.5 rather than 10 L Dex unit change

Koelmeyer, et al.

48

Conclusion



- This study supports the use of BIS as part of early prospective surveillance model of care that results in significantly earlier detection of lymphedema over time
- The early detection of lymphedema → lower health care costs if it results in the effective management of symptoms and prevents progression to severe clinical lymphedema



Koelmeyer, et al.

<https://glassgowmidlandclinic.com/lymphoedema/>

49

Other surveillance studies



- With prospective BRCL surveillance and the use of BIS, out of 93 patients who received ALND, only 3% of patients developed chronic BCRL after 24 months. (Whitworth, et al).
- Early, self-directed home-based interventions prescribed for breast cancer patients at high risk for BCRL (ALND + radiation and/or taxane), who were prospectively monitored by utilizing BIS, and significantly lowered rates of BCRL. 6% had persistent BCRL after ~21 months (Kilgore, et al).
- At 12 months post surgery, 49% of all women had arm morbidity, with more complexity in the education group as compared to the “prospective surveillance targeted physiotherapy” group (Rafn, et al).

50

Lymphedema Risk Factors/Incidence



- ALND associated with earlier onset lymphedema, regional lymph node radiation associated with late onset lymphedema (McDuff et al).
- BCRL can be diagnosed at 1 month post surgery and the incidence rates increase over time (especially within the first year). ALND, radiation, modified radical mastectomy, # positive lymph nodes, and BMI were independent risk factors (Zou, et al).

51

Lymphedema Risk Factors/Incidence



- After neoadjuvant chemo and axillary dissection, lymphedema incidence gradually increased over 36 months post surgery, but symptom incidence were much lower (Armer, et al).
- In 342 patients over 5 years, BCRL was persistent in 2/3. More lymph node mets, weight gain, and larger circumferential difference since the onset have increased likelihood of developing persistent BCRL (Penn, et al).

52

52

Lymphedema intervention



- Manual lymph drainage (2x/week for 4 weeks) adds no further volume reduction at 7 month follow up when added to skin care, bandaging, and guidance on physical activity. (Tambour, et al).
- Manual lymph drainage, in addition to guidelines to prevent BCRL and exercise therapy, for 6 months may not have preventative effect in the short or long term (60 months) (Devoogdt).

53

Lymphedema intervention (cont.)



- Acupuncture (2x/week, 30 minutes, 6 weeks) is safe and well tolerated, but did not significantly reduce BRCL in patients receiving concurrent lymphedema treatment (Bao, et al).

54

54

Other lymphedema information...



- Bone mineral density is lower in the forearm of an arm with lymphedema as compared to the arm without (Vural, et al).
- Circumference difference between arms of 4% measured at 30 cm proximal to the styloid process can be used as a surveillance site. Feelings of heaviness or swelling have moderate relationship with lymphedema (Hidding, et al).

55

Other lymphedema information...



- Breast cancer survivors with lymphedema may experience up to 112% more out of pocket costs than those without lymphedema (Dean, et al).
- Biceps muscle stiffness as measured with shear wave electrography increases with increase in lymphedema severity (Aslan et al).



<https://lymphnodetransplant.wordpress.com/2014/04/30/always-look-at-the-funny-side-of-life/> 56

56

Circulation

AHA SCIENTIFIC STATEMENT

Cardiovascular Disease and Breast Cancer: Where These Entities Intersect
A Scientific Statement From the American Heart Association

Ideal breast cancer outcomes are reliant on coexisting cardiovascular health along the entire journey of breast cancer treatment. At the time of initial presentation, cardiac risk factors and preceding CVD can impact cancer treatment options. During breast cancer treatment, surveillance, prevention, and secondary management of cardiotoxicity are crucial; thereafter, long-term posttreatment monitoring for late cardiotoxicity and even non-treatment-related development of CVD is essential. With the evolving intersection of the cardiovascular and oncologic fields, comprehensive care is an essential element in the management of cancer patients to maximize gains in cancer treatment while minimizing the potential deleterious impact on cardiovascular health.

Circulation. 2018;137:e30–e66

57

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58

58

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Feasibility, Safety, and Efficacy of Aerobic Training in Pretreated Patients With Metastatic Breast Cancer: A Randomized Controlled Trial

Jessica M. Scott, PhD^{1,2}; Neil M. Iyengar, MD^{1,2}; Tormod S. Nilsen, PhD³; Meghan Michalski, MS¹; Samantha M. Thomas, MB⁴; James Herndon II, PhD⁴; John Sasso, MS⁵; Anthony Yu, MD¹; Sarat Chandarlapaty, MD^{1,2}; Chau T. Dang, MD^{1,2}; Elizabeth A. Comen, MD^{1,2}; Maura N. Dickler, MD^{1,2}; Jeffrey M. Peppercorn, MD⁶; and Lee W. Jones, PhD^{1,2}

Cancer June 15, 2018

59

Introduction

- There is a wealth of evidence to support exercise training in early-staged breast cancer
- The investigation of exercise in advanced or metastatic cancer has received minimal attention, but may mitigate treatment and disease related symptoms and potentially improve disease outcomes
- Purpose: to determine the feasibility and safety of aerobic training in this population
 - Explore the effects on symptom control outcomes
 - Identify a subgroup of patients for whom aerobic training was feasible

Scott, et al.

60

Methods

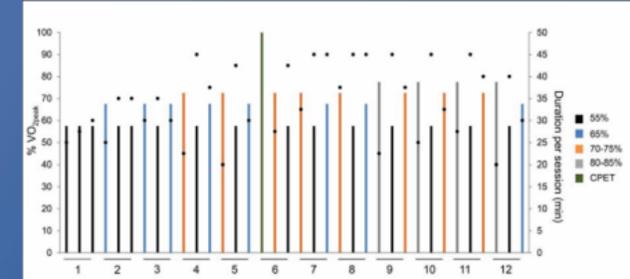
- Randomized clinical trial, patients from Duke University Medical Center and Memorial Sloan Kettering Cancer Center
- Randomly allocated, stratified by prior lines of therapy and menopausal status
- Neither patients nor exercise physiologists were blinded

Scott, et al.

61

Methods

- Intervention group
 - Treadmill walking sessions, 3x/week, 12 consecutive weeks. Dosed at 55%, 65%, 75%, 80%



Scott, et al.

62

Data Points

Primary:

Feasibility as evaluated by composite endpoint of lost to follow up rate and attendance

Secondary:

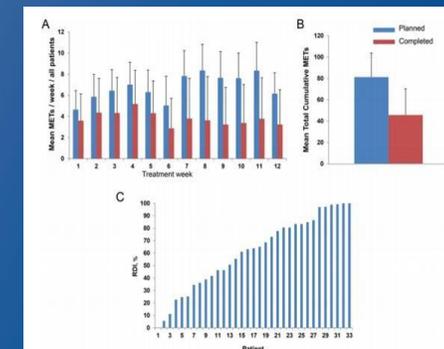
Safety, hematological profile, VO₂peak, functional capacity, and patient reported outcomes

Scott, et al.

63

Results

- Baseline characteristics of the two groups were not significantly different, n=65
- Primary endpoint: 1 of 33 intervention patients were lost to follow up, and mean attendance rate was 64% +/- 30%



Scott, et al.

64

Results

- Aerobic training permanently discontinued in 9 of 33 patients
- Dose interruption = 46%
- Dose modification = 49%
- Dose reduction = 12%
- 12 patients required at least 1 session to be ended early due to non-serious health event

TABLE 2. Adverse Events During Aerobic Training Sessions

Variable	No. of Patients (n = 33)	%
Any adverse events	24	73
Serious adverse events (hospitalizations/life-threatening)	0	0
All other adverse events*		
Abnormal heart rate response ^a	10	30
Pain in extremity	9	27
Fatigue	8	24
Back pain	6	18
Dizziness	2	6
Diarrhea	2	6
Abnormal blood pressure response ^b	1	3
Acute polyneuropathy	1	3
Anemia	1	3
Dyspnea	1	3
Metastatic bone pain	1	3
Nausea	1	3

Scott, et al.

65

Results

- Between groups:
 - VO2Peak, and PROs maintained in both groups (P>.05)
 - FACT-G and FACT- Social Well Being (P=.04) with **control group favored**
 - All functional capacity endpoints improved in both groups, with no significant difference between groups (P>.05)

Scott, et al.

66

Results

- Aerobic training feasible (RDI > 70%) in 14 of 33 patients
 - Associated with significant improvements in functional capacity and cardiorespiratory fitness endpoints but, not PRO's
 - Had higher Vo2Peak values and received fewer than 3 lines of prior treatment in comparison with patients with RDI <70%.
 - There was a decline in Vo2peak of 11% in patients with RDI <70%

Scott, et al.

67

67

Discussion

- Lack of serious adverse events indicates an acceptable safety profile
- Aerobic training was NOT associated with improvements in cardiorespiratory fitness or PROs, but may mitigate the decline in VO2peak
- Improvement in QOL metrics for control group highlight the beneficial impact of the control intervention

Scott, et al.

68

Conclusions

- Supervised aerobic training at dose and schedule tested is safe but NOT feasible
- This acceptable tolerability and promising benefit of aerobic training warrants further evaluation



Scott, et al.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5444444/>

69

Program Models

The Cardiac Rehabilitation Model Improves Fitness, Quality of Life, and Depression in Breast Cancer Survivors

Lianne B. Dolan, PhD; Danielle Barry, BSc; Teresa Petrella, MD; Lindsay Davey, MSc, PT; Ann Minnes, RN; Allison Yantzi, MD; Susan Marzolini, PhD; Paul Oh, MD

Journal of Cardiopulmonary Rehabilitation and Prevention 2018;38:246-252

70

Very Briefly...

The Health, Exercise, Active, Living, Therapeutic lifestyle (HEALTH) program is a clinical exercise program based on cardiac rehab model, customized for female breast cancer survivors.

Purpose: To assess the effects of a cardiac rehab program on cardiorespiratory fitness, QOL, Depressive symptoms

Methods: Retrospective chart review. 1 weekly supervised session and 22 group sessions (unsupervised sessions encouraged). Customized aerobic and resistance exercises plus 12 group educational sessions to encourage adaptations to health lifestyle.

Dolan, et al.

71

Results: 152 (out of 274) files were analyzed. Early stage, female, BC. Baseline cardiorespiratory fitness and QOL were below population norms. Program adherence was 66.6%. Cardiorespiratory fitness improved by 14%, with significant improvements in QOL and depression scores.

Conclusion/Relevance: This model improved physical and mental health in breast cancer survivors. This provides support for future collaboration between cardiology and oncology to improve patient care across continuum.

Dolan, et al.

72

Other exercise studies



- Women with advanced breast cancer who were engaged in 1 hour or more of physical activity a day at baseline, had an increased likelihood of survival (Palesh, et al).
- An exercise bout (30 minutes, vigorous on treadmill) performed 24 h prior to every doxorubicin treatment (4 total) did not have an effect on markers of subclinical cardiotoxicity, but had a positive systemic effect on hemodynamics, musculoskeletal symptoms, mood, and body weight in women with breast cancer (Kirkham, et al).

73

Other exercise studies (cont.)



- A yoga-based DVD could be a simple booster to an oncologist's advice that motivates breast cancer patients, even those with advanced disease and/or in treatment, to engage in self-care, e.g., exercise, to manage fatigue (Winters-Stone, et al).
- Behavioral strategies and individualization in exercise prescriptions to improve adherence are especially important for later chemotherapy cycles, after treatment, and for resistance exercise (Kirkham, et al).



<https://www.jco.org/journal/35/16/2311>
exercise-to-prevent-it

74

Article

Effect of myofascial techniques for treatment of persistent arm pain after breast cancer treatment: randomized controlled trial

An De Groef^{1,2}, Marijke Van Kampen^{1,2}, Nele Vervloesem^{1,2}, Evi Dieltjens^{1,2}, Marie-Rose Christiaens^{3,4}, Patrick Neven^{3,5}, Lore Vos^{1,2}, Tessa De Vrieze^{1,2}, Inge Geraerts^{1,2} and Nele Devoogdt^{1,2}

CLINICAL REHABILITATION
2018, Vol. 32(4) 451-461
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DOI: 10.1177/0269215517730863
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SAGE

75

Introduction



- Exercises and exercise + stretching has been shown to be effective, but there are also studies that have shown the presence of persistent arm pain after intervention.
- Myofascial pain syndrome = 45% one year after surgery
- Efficacy of myofascial release techniques have been demonstrated in other populations
- **PURPOSE:** Determining the effectiveness of myofascial therapy in addition to standard PT

De Groef, et al.

76

Methods

- Double blinded randomized control trial
- **All patients:** 12 weeks (2x/week 1-8, 1x/week 9-12), 30 minutes. Passive mobilizations, stretching of pec muscles, scar tissue massage, exercise.
- **Intervention group:** 12 weeks (1x/week), 30 minutes. Myofascial release techniques on active myofascial trigger points at upper body and on myofascial adhesions in the pectoral, axially, and cervical region, diaphragm and scars.
- **Control group:** static bilateral hand placements

De Groef, et al.

77

Methods

- Data points -before and after 12 week program, along with 6 and 12 months
 - PRIMARY
 - Pain intensity - VAS
 - Pain prevalence - "Have you had pain during the past week?"
 - Local pressure hypersensitivity - digital Wagner FPX algometer
 - Pain quality - McGill pain questionnaire
 - Secondary
 - Shoulder function - DASH
 - Quality of life - SF-36



De Groef, et al.

78

Results

	Intervention group	Control group	P-value	Effect size (95% CI)
	n	n		
Pain intensity (VAS 0-100)				
Baseline	67 (15)	25 (64 (16))	25	
At 3 months	23 (30)	23 (40 (36))	25	0.046 20.1 (0.4 to 39.7)
At 6 months	31 (31)	23 (34 (30))	25	0.555 5.4 (-12.8 to 23.5)
At 12 months	33 (30)	23 (43 (28))	25	0.147 13.2 (-4.8 to 31.2)
Pain prevalence rate				
Baseline	25 (100%)	25 (100%)	25	n/a
At 3 months	10 (44%)	23 (64%)	25	0.246 32% (-18 to 61)
At 6 months	13 (57%)	23 (68%)	25	0.552 17% (-30 to 47)
At 12 months	15 (65%)	23 (80%)	25	0.335 19% (-17 to 43)
Impaired shoulder function				
Baseline	20 (87%)	22 (96%)	24	0.348
At 3 months	18 (81%)	21 (83%)	24	1.000 -3% (-32 to 20)
At 6 months	15 (82%)	21 (91%)	22	0.414 25% (0 to 44)
At 12 months	17 (81%)	21 (82%)	22	1.000 1% (-32 to 26)
Shoulder function (DASH 0-100)				
Baseline	36 (16)	22 (40 (19))	24	
At 3 months	30 (17)	21 (33 (21))	24	0.894 -0.6 (-8.8 to 7.7)
At 6 months	27 (18)	21 (32 (18))	22	0.834 0.7 (-6.0 to 7.4)
At 12 months	30 (19)	21 (31 (19))	22	0.867 0.5 (-5.5 to 6.5)
Quality of life (SF-36 0-100) (physical functioning)				
Baseline	55 (24)	23 (54 (24))	24	
At 3 months	54 (25)	22 (63 (22))	24	0.017 9.6 (1.8 to 17.4)
At 6 months	57 (23)	22 (61 (25))	23	0.122 6.5 (-2.0 to 15.1)
At 12 months	51 (22)	21 (64 (26))	22	0.018 11.6 (2.1 to 21.1)
Quality of life (SF-36 0-100) (mental functioning)				
Baseline	59 (19)	23 (65 (16))	24	
At 3 months	62 (18)	22 (70 (17))	24	0.444 2.4 (-8.0 to 12.9)
At 6 months	69 (16)	22 (65 (20))	23	0.019 -10.3 (-18.8 to -1.8)
At 12 months	69 (18)	21 (65 (22))	22	0.033 -9.9 (-20.0 to 0.1)

De Groef, et al.

79

Discussion/Conclusion

- Are more sessions of myofascial release needed?
- Pain mechanisms other than myofascial pain
- Standard physical therapy effective for shoulder mobility and strength = both groups improved.
- False positives for QOL? Since in favor of control?
 - Pain intensity improvement may not be enough to influence quality of life
- Clinical value
 - 57% of patients in intervention group and 36% in control group became pain free

De Groef, et al.

80

Other shoulder/arm studies...



- Following mastectomy/axillary dissection, AAROM, AROM, and strengthening exercises reduced pain, increased ROM, lowered ADL impairment, and lower lymphedema incidence as compared to “free hand” exercises when they had shoulder discomfort. No effect on strength (Das et al).
- 5 years after surgery, 44 ALND patients demonstrated shoulder IR weakness - increased % of patients as well as increased lymphedema incidence when compared to SLNB patients. Both groups = loss of strength of ER, loss of shoulder ROM, and dec HRQL in physical and arm domains persisted (Belmonte, et al).

81

Other shoulder/arm studies...



- Axillary web syndrome occurs in approximately 50% of women (in a group of 36 women) following breast cancer surgery. It can persist for 18 months and potentially longer, develop beyond the early post-operative time period, and reoccur after resolution (Koebler, et al).
- Hatha Yoga (2x/week, 1 hour, 10 weeks) was safe and effective for alleviating shoulder and arm pain in those s/p breast cancer treatment. Benefits were maintained for 2.5 months (Eyigor, et al).

82

Other shoulder/arm studies...



- More severe pain quality and pain catastrophizing contribute to higher levels of central sensitization in a group of women with pain 1 year after surgery (De Groef, et al).

83

83



THANK YOU!

Lauren.miller@uchopsitals.edu

84

84



Motivational Interviewing, Cognitive Behavioral Therapy (CBT), Telehealth

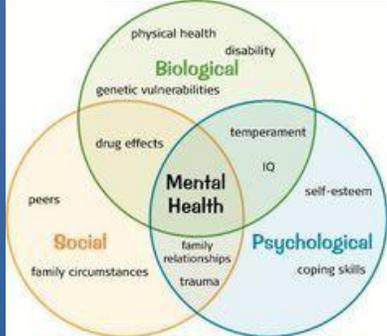
85



Motivational Interviewing

86

Oncology Psychosocial Health Dynamics



The diagram consists of three overlapping circles:

- Biological:** physical health, disability, genetic vulnerabilities
- Mental Health:** drug effects, temperament, IQ, self-esteem
- Psychological:** coping skills, family relationships, trauma
- Social:** peers, family circumstances

87



Motivational Interviewing

Used to decrease resistance against behavioral change in the oncology population by facilitating decision making

No clear theoretical framework, assumption stems from the belief that the human has an innate ability to individually develop through psychological aspects

MOTIVATIONAL INTERVIEWING

R	RESIST telling them what to do: <i>Avoid telling, directing, or convincing your friend about the right path to good health.</i>
U	UNDERSTAND their motivation: <i>Seek to understand their values, needs, abilities, motivations and potential barriers to changing behaviors.</i>
L	LISTEN with empathy: <i>Seek to understand their values, needs, abilities, motivations and potential barriers to changing behaviors.</i>
E	EMPOWER them: <i>Work with your friends to set achievable goals and to identify techniques to overcome barriers.</i>

88

Maturitas 116 (2018) 66–72

Contents lists available at ScienceDirect

Maturitas

journal homepage: www.elsevier.com/locate/maturitas

Physical activity and breast cancer survivors: Importance of adherence, motivational interviewing and psychological health

Supa Pudkasam^{a,b}, Remco Polman^c, Meron Pitcher^d, Melanie Fisher^d, Nanthaphan Chinlumprasert^b, Lily Stojanovska^a, Vasso Apostolopoulos^{a,*}

^a Institute for Health and Sport, Victoria University, Melbourne, VIC, Australia
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^d Breast Cancer Services, Western Health, Melbourne, VIC, Australia



89

Introduction



Aims to identify the effectiveness and limitations of concepts related to behavioral change for physical adherence in breast cancer survivors

- Theory of planned behavior
- Social cognitive theory
- Self-determination theory
- Transtheoretical model
- **Motivational interviewing**

Pudkasam, et al.

90

Summary of MI Interventions Utilized



Intervention Technique	Determinants	Research Study	Participants and Care type	Exercise adherence	Additional findings
MI – 15 min phone session every 2 weeks	Barrier to exercise	RCT, 12 weeks of multimodal activity	AA breast cancer survivors – 6 months to 5 years post initial treatments	70% exercise adherence of participants	6 calls total impacted exercise participation and diet control
MI - 3 months counselling and weekly telephone calls	Motivational readiness Self-report Self-monitoring Self-efficacy	RCT; 12 weeks home-based exercise program	Colorectal cancer survivors	3 months - 64.7% adherence 6 months – 38.9% 12 months – 31.6% (Higher than control group)	Physical activity outcome is strongly associated with motivational readiness
MI – counselling; 1 time in-person and 2 times phone call	Self-efficacy	Pilot study over 16 weeks of a home-based approach combining aerobic and weight training	Breast cancer survivors 42 months after completed treatments	Increase exercise intensity, exercise time, and quality of life intervention group	Improvements in self-efficacy

Pudkasam, et al.

91

Clinical Relevance



Motivational interviewing aids in improving physical activity behaviors in the oncology population.

MI is a client centered approach to prompt health behavioral change.



Pudkasam, et al.

92



Cognitive Behavioral Therapy

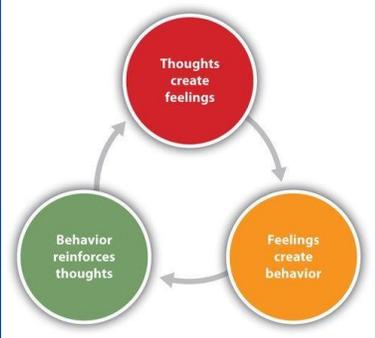
93



Cognitive Behavioral Therapy (CBT)

- Helps a person learn to change thoughts, feelings and behaviors to feel better
- Learn to react more effectively in challenging situations
- Learn to feel better when unable to change situations around you

Goal Oriented
Present-Focused
Active
Brief
Well-Researched
Supportive



```

graph TD
    A(Thoughts create feelings) --> B(Feelings create behavior)
    B --> C(Behavior reinforces thoughts)
    C --> A
  
```

Ye, et al.

94



Received: 10 September 2017 | Revised: 15 February 2018 | Accepted: 16 February 2018
DOI: 10.1002/pon.4687

REVIEW WILEY

A meta-analysis of the efficacy of cognitive behavior therapy on quality of life and psychological health of breast cancer survivors and patients

Mengfei Ye^{1,2} | Kanghui Du¹ | Jingying Zhou¹ | Quanqian Zhou¹ | Mengna Shou³ | Baiqi Hu¹ | Panruo Jiang¹ | Nan Dong¹ | Luying He¹ | Shenglin Liang² | Chaoyang Yu¹ | Jian Zhang¹ | Zhinan Ding^{1,4} | Zheng Liu^{1,4} 

95



Introduction

Breast cancer survivor population

- Depression, anxiety, insomnia compounded by symptoms such as fear, stress negatively impacting psychological symptoms and quality of life

CBT:

- Use of motivational strategies
- Activation of social support networks
- Improvement of self-awareness encouraged by CBT

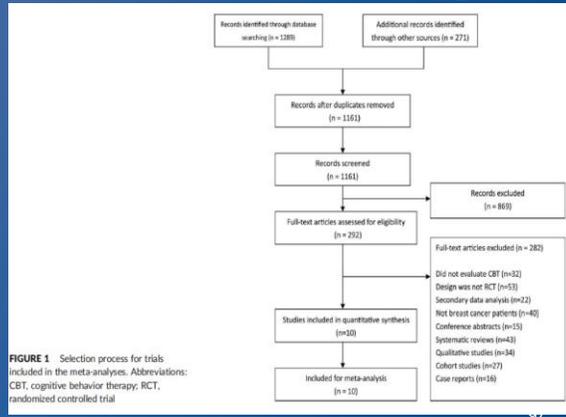
Pharmacological vs. nonpharmacological treatment options

Ye, et al.

96

Methods

- P: female breast cancer survivors
 I: cognitive behavior therapy
 C: comparison to control conditions
 O: outcome measures of QoL, depression, anxiety, and stress using
- Functional Assessment of Cancer Therapy-Breast Center for Epidemiologic Survey Depression Scale
 - Impact of Event Scale: Revised
 - Self-Rating Anxiety Scale
 - Perceived Stress Scale
- S: RCTs
 Ye, et al.



97

Results

Pooled effect size for CBT on

- QoL: 0.57 – statistically medium effect sizes
- Depression: -1.11 – significantly large
- Stress: -0.40
- Anxiety: -1.10 – significantly large
- Hyper arousal cluster of symptoms: -0.18

Effect sizes may be conservatively interpreted with Cohen's convention of small (0.2), medium (0.5), and large (0.8) effects.

P-value <.001

Ye, et al.

98

Discussion

CBT improves QoL and psychological health by reducing rumination of past events and worry about the future

- Web and telephone as other delivery formats

Advantages over pharmacology

Limitations:

- Assessment methods of CBT need to be more objective and accurate due to the wide range of treatments
- Population

Ye, et al.

Nonpharmacologic Approaches

- Modify environment
- Optimize stimulation
- Use consistent routines
- Assess/adapt to aggravating factors
- Behavior management principles
- Education
- Support of patient and caregivers

30

99

International Journal of Nursing Studies 78 (2018) 52–60

Contents lists available at ScienceDirect

International Journal of Nursing Studies

journal homepage: www.elsevier.com/locate/ijn

Effects of nurse-led home-based exercise & cognitive behavioral therapy on reducing cancer-related fatigue in patients with ovarian cancer during and after chemotherapy: A randomized controlled trial

Qi Zhang^a, Feng Li^a, Han Zhang^b, Xiuli Yu^c, Yunfeng Cong^{c,*}

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^b School of Public Health, Jilin University, Changchun, Jilin Province, China
^c Department of Obstetrics and Gynecology, First Hospital of Jilin University, Changchun 130021, Jilin Province, China

100

Introduction



72 eligible women who recently had surgery and completed their first cycle of adjuvant chemotherapy were randomly assigned to groups

- Experimental – exercise and CBT
- Comparison – services as usual

Primary & secondary outcomes

- Subjective questionnaires

Zhang, et al.

101

Interventions



Exercise

- Aerobic and resistance activities
 - Warm up, aerobic exercise, muscle strength exercise, resistance training, stretches, deep relaxation and cool down
 - 3-5 times/week for 25-60 minutes per session
 - Intensity based on max heart rate

CBT

- Internet sessions with CBT trained nurses
- 1x/week for 12 weeks lasting 1 hour each
- Three phases

Zhang, et al.

102

CBT – Three Phases



First phase- establish a trusting relationship and identify the patient's thought patterns and negative feelings

Second phase – assessment of fatigue and recognizing negative thinking

Third phase – focused on setting up new goals and improving problem-solving strategies, as well as reinforcing physical, emotional and spiritual coping strategies

Zhang, et al.

103

Results



After the interventions –

- Total fatigue scores significantly reduced
- Decrease in behavioral fatigue score, cognitive fatigue score
- Lower symptoms of depression
- Improved sleep duration, sleep dysfunction, daytime dysfunction, total sleep quality

Nurse-delivered home based exercise and CBT have measurable benefits in helping women with ovarian cancer to decrease CRF, depressive symptoms, and improving their quality of sleep.

Zhang, et al.

104

JOHNS HOPKINS
MEDICINE

DOI:10.22034/APJCP.2017.18.12.3207
The Effect of Cognitive Behavioral Therapy on Depression

RESEARCH ARTICLE

Positive Effects of Cognitive Behavioral Therapy on Depression, Anxiety and Stress of Family Caregivers of Patients with Prostate Cancer: A Randomized Clinical Trial

Milad Borji¹, Hassan Nourmohammadi², Masoumeh Otaghi¹, Amir Hosein Salimi³, Asma Tarjoman^{3*}

105

JOHNS HOPKINS
MEDICINE

Introduction

Supporting caregivers of patients with cancer

- Program teaching problem-focused coping strategies to be effective in reducing depression, stress, and anxiety
 - Physical, mental, spiritual difficulties
 - Changes in family dynamics, marital life
 - Poor health



Borji, et al.

106

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MEDICINE

Materials and Methods

Inclusion

- Patient – diagnosis of cancer
- Caregivers – being a family member of the patient and having full responsibility for treating and supporting him/her

80 caregivers of patients with prostate cancer

- 40 experimental – 1.5 hour sessions, 2x/week for 8 weeks + 2 additional sessions
- 40 control

Data collected before intervention, 4 weeks and 8 weeks after intervention

- 21-item Depressive Anxiety Stress Scales (DASS-21)

Borji, et al.

107

JOHNS HOPKINS
MEDICINE

Intervention - CBT

Meichenbaum's method of cognitive behavior modification

- Stress inoculation training protocol
 - Combination of providing information, Socratic evaluation plans, cognitive restructuring, problem solving, relaxation training, behavioral training, self-monitoring, self-education, strengthening sense of self, and modifying environmental factors.

Clinical Relevance

- Integrated into anger and stress management training
- Assertiveness training
- Improvement of creative thinking
- Treatment of depression and various health problems

Borji, et al.

108

Results



Table 2. Repeated Measure ANOVA at Two Times Measures

Outcome Measure	group	Depression		Anxiety		Stress	
		Mean (SD)	P value	Mean (SD)	P value	Mean (SD)	P value
Before	Experimental	7.50 (3.76)	0.74	11.32 (5.59)	0.26	12.45 (5.04)	0.09
	Control	7.80 (3.82)		11.87 (4.84)		13.12 (4.08)	
4 week After	Experimental	6.37 (3.50)	0.001	8.47 (3.78)	0.001	7.07 (4.80)	0.59
	Control	8.10 (3.77)		11.90 (4.55)		13.62 (4.19)	
8 week After	Experimental	5.53 (3.30)	0.001	7.40 (3.36)	0.001	5.37 (3.37)	0.15
	Control	8.47 (3.52)		12.27 (4.22)		13.77 (3.74)	

Statistically significant difference in the mean scores of depression, stress, anxiety between before and after the intervention in the experimental group

Borji, et al.

109

Discussion



Mean depression score

- DASS-42, SCL-90-R, Beck's Depressive Inventory all show that **CBT reduces depressive scores**

Mean anxiety score

- Self-Rating Anxiety Scale, Self-Rating Anxiety Sensitivity Scale all show that **anxiety decreased after implementation of CBT**

Mean stress score

- DASS-42, Perceived Stress Scale all show that **level of stress decreased significantly after CBT**

Borji, et al.

110

Medical Hypotheses 121 (2018) 42–43

Contents lists available at ScienceDirect

Medical Hypotheses

journal homepage: www.elsevier.com/locate/mehy

The swinging effect intervention: CBT based guided imagery and breathing technique integrated with mindfulness therapy for cancer patients

Comprehensive psycho-oncological clinical intervention

- Mindfulness CBT to treat anxiety, depression, stress
- Breathing technique treats oxygen saturation levels

Ozan Balciyan^a, Tania Borji^b, Jose Gutierrez Maldonado^c
^aPHD Clinical and Health Psychology, University of Barcelona, Spain,
 MD, Health Psychology, GE Psychological Consultancy, Izmir, Turkey
^bPsycho-Social Oncology, FFOC Foundation, Barcelona, Spain
^cDepartment of Clinical Psychology and Psychobiology, University of Barcelona, Spain

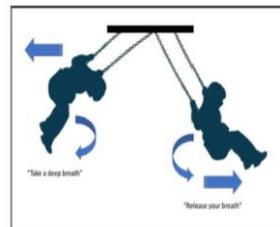


Fig. 1. The demonstration of breathing technique integration into the "Swinging Effect" intervention.

111

Telehealth



112

Telehealth

Telehealth defined by the World Health Organization as “the delivery of health care services, where distance is a crucial factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment, and prevention of disease and injuries, research and evaluation.”



MHealth defined as the use of mobile and wireless technologies to contribute to the achievement of health objectives.

JOHNS HOPKINS MEDICINE

113

TELEHEALTH, MOBILE APPLICATIONS, AND WEARABLE DEVICES ARE EXPANDING CANCER CARE BEYOND WALLS

CAROL CANNON

Telemedicine in Cancer Care

S. Joseph Sirintrapun, MD, FASCP, FCAP, and Ana Maria Lopez, MD, MPH, FACP

JOHNS HOPKINS MEDICINE

114

TABLE 1. Examples of telehealth services provided by oncology sub-specialties

Radiation oncology	Radiotherapy treatment planning
Medical oncology	Patient consultations
	Remote supervision of chemotherapy
	Acute care management
Palliative care	Patient consultation
	Home management
Hematology/bone marrow transplantation nursing	Patient consultation
	Patient education
	Supervision of oral and intravenous administration of chemotherapy
Adjunct patient care services	Swallow assessment
	Lymphedema management
	Psychosocial counseling

Data from Sabesan.⁶

Cannon

115

115

TABLE 4. Examples of available current oncology apps

Application	Audience	Developer	Description
AboutHerbs	Health care providers	Memorial Sloan Kettering Cancer Center	Guide to Botanicals, Supplements, Complementary Therapies and more. Includes mechanism of action and herb-drug interactions
Ask the Nutritionist: Recipes for Fighting Cancer	Patients	Dana-Farber Cancer Institute	Developed by registered dietitians, provide recipes for specific diets, and specific needs (constipation, diarrhea, mouth sores, nausea)
CTCAE (Common Terminology Criteria for Adverse Events)	Health care providers	Children’s Hospital of Philadelphia Research Institute, Center for Biomedical Informatics	Provides information to accurately categorize adverse reactions; can search by problem or organ class
MyLively	Caregivers	Lively, Inc.	Allows family members to monitor the safety of a relative in their home through strategically placed and wearable sensors that transmit motion and location data
MyQuit Coach	Patients	LIVESTRONG	Creates a personalized plan to quit smoking, including inspirational photos, motivational tips, and progress charts

Adapted from Lively Inc., 2017.²⁰

Cannon

116

116

Telemedicine



Diabetes – monitored through constant streaming data on blood glucose level to guide insulin regimens
 Movement conditions such as Parkinsons – accelerometer or motion based sensor to capture movements and vital signs
 Temperature –continuously or intermittently through skin sensors that may provide early clues to neutropenic fever
 Weight assessments
 Medication ingestion, dose timing and psychological responses
 Digital images after abnormal screening
 Wearable devices in clinical trials
 Texting and messaging efforts to provide patients with ongoing engagement, support, and coaching - iPad based group therapy visits for young adults with cancer

Sirintrapun, et al.

117

Limitations



Technology costs
 Inconsistent billing and reimbursement regulation
 Data security risk
 State licensure requirements for clinicians

Cannon; Sirintrapun, et al.

118

Clinical Relevance



High patient satisfaction –lower costs, time savings
 Improved access to clinical cancer services
 Improved coordination of cancer care – efficient communication
 Early disease detection
 Increased access to education
 Increased access to individualized care
 Increased oncology care in rural areas



Cannon; Sirintrapun, et al.

119

Efficacy of Mobile Health Care Application and Wearable Device in Improvement of Physical Performance in Colorectal Cancer Patients Undergoing Chemotherapy

In Yae Cheong,¹ So Yeon An,² Won Chul Cha,³ Mi Yong Rha,⁴ Seung Tae Kim,⁵ Dong Kyung Chang,⁶ Ji Hye Hwang¹

Clinical Colorectal Cancer, Vol. 17, No. 2, e353-62

120

Patients and Methods



Participants

- Inclusion
- Exclusion

Application

- To-do list
- Health Information
- In-app-chat service

Cheong, et al.

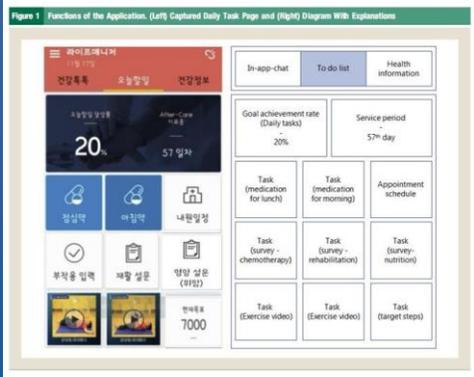


Figure 1 Functions of the Application. (Left) Captured Daily Task Page and (Right) Diagram With Explanations

121

Intervention

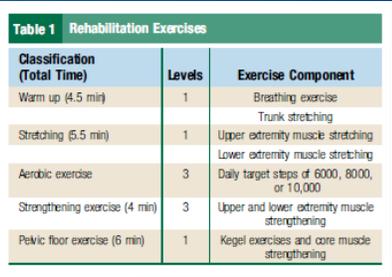


Smartphone Aftercare Program

- 12 weeks

Rehabilitation Exercises

- Warm up
- Aerobic exercise
- Muscle strengthening
 - Pelvic floor



Cheong, et al.

122

Measures



Outcomes assessments were measured 3 times:

- Physical Activity – International Physical Activity Questionnaire
- Nutritional Status – Patient-generated Subjective Global Assessment
- General health-related quality of life – European Organization for Research and Treatment of Cancer Quality of Life Questionnaire C30
- Physical performance
 - UE strength – grip strength
 - LE strength – 30 second chair-stand test
 - Cardiorespiratory endurance – 2MWT
- Patient distress – National Comprehensive Cancer Network Distress Thermometer

Cheong, et al.

123

Results

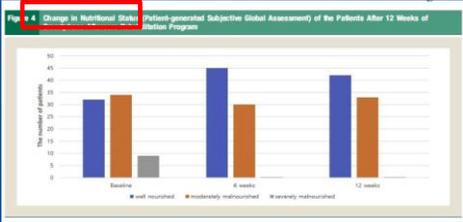


102 enrolled, 75 completed all 12 weeks

- LE strength (P < .001) significantly improved
- Cardiorespiratory (P < .001) significantly improved
- Fatigue (P < .007) significantly relieved
- Nausea/Vomiting (P < 0.40) significantly relieved



*P < .05, significantly different between baseline and 6 weeks.
 **P < .05, significantly different between 6 and 12 weeks.
 ***P < .05, significantly different between baseline and 12 weeks.



Cheong, et al.

124

Discussion



Significant improvement occurred in physical function

- Lower extremity muscle strength & cardiorespiratory endurance

Significant alleviation of cancer- and cancer treatment-related symptoms

Improvement in nutritional status

Participants showed good compliance as high as 84%

A tailored rehabilitation exercise program provided through a comprehensive mobile health care application was effective in improving patients' physical capacity and treatment-related symptoms even during active chemotherapy.

Cheong, et al.

125

Clinical Relevance



Colorectal cancer patient continuum of care

Supervised exercise improved physical function and fatigue symptoms

Mobile application and wearable devices are effective and positive results from study will encourage future application in rehabilitation of cancer patients undergoing active treatment

Cheong, et al.

126

THANK YOU!



127

127

IN SUMMARY:



128

128

Physical Activity/Therapy and Cancer



1. Physical activity/therapy

- Although there exists no perfect prescription or protocols for Physical Activity/Therapy for the Oncology population, starting a program earlier has greater effects on fatigue, and performing the exercise more frequently can yield improvements in physical functioning- both leading to improvements in QoL.
- Physical therapy is a beneficial part of the care plan for patients receiving palliative care in reducing the severity of fatigue in patients with advanced cancer.

129

129

Breast Cancer



- The use of an early surveillance program for lymphedema management, when compared to traditional referral process, detects lymphedema earlier, lowering healthcare costs and preventing progression to severe clinical lymphedema.
- Supervised exercise training at a fairly high intensity is safe but not feasible for pretreated metastatic breast cancer patients.
- When compared to traditional physical therapy, the use of myofascial techniques did not have a significant effect on persistent arm pain after breast cancer treatment

130

Motivational Interviewing, Cognitive Behavioral Therapy, Telehealth



- MI has been shown to be an effective approach to support behavioral change, and to motivate cancer survivors to continue an exercise program.
- CBT improves QoL and psychological health by reducing rumination of past events and worry about the future.
- Nurse-delivered home based exercise and CBT have measureable benefits in helping women with ovarian cancer to decrease CRF, depressive symptoms, and improving their quality of sleep.
- CBT reduced depression, anxiety, and stress among oncology caregivers.
- A tailored rehabilitation exercise program provided through a comprehensive mobile health care application was effective in improving patients' physical capacity and treatment-related symptoms even during active chemotherapy.

131



THANK YOU!

132

132

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133

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155

Image Hyperlinks



- <http://www.sccsset.org/services/psychosocial-assessment/>
- <https://www.evidenceinmotion.com/blog/2016/05/25/pleasant-dont-lecture/motivational-interviewing/>
- <https://www.health.harvard.edu/blog/physical-therapy-as-good-as-surgery-and-less-risky-for-one-type-of-lower-back-pain-201504097863>
- <https://www.moveforwardpt.com/Children>
- https://news.emory.edu/stories/2018/04/hspub_pt_in_the_icu/campus.html
- <http://cogbtherapy.com/about-cbt/>
- https://www.medscape.org/viewarticle/508618_9
- <https://www.cancer.gov/news-events/cancer-currents-blog/2016/caregivers-needs-challenges>
- <https://wahospitality.org/blog/the-future-of-telehealth-is-closer-than-you-think/>
- <https://www.researchitaly.it/en/news/stroke-tele-rehabilitation-is-being-tested-in-sardinia/>

156