Reimagining Exercise and Mobility Interventions for Older Cancer Survivors

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The Graying of America

--The US is undergoing a major population transformation

--77 M Baby boomers (born 1946-1964), turning 65 years at a rate of 10,000 people per day (Pruchno, 2012), starting in 2011

--More older people at risk for age-related conditions, including cancer, and mobility limitations.
Prevalence from 1975 to 2040 by Age

Source: Bluethmann, Mariotto and Rowland, CEBP 2016
Aging Competes with Cancer Recovery

Early effects – Fatigue, insomnia, depression, cognitive impairment

Late effects – Heart disease, diabetes, osteoporosis, pulmonary (treatment toxicities) (Bellury et al., 2012)

Age-related co-morbidities increase symptom burden – arthritis, asthma, dementia (Anatoli et al., 2009)
Healthy Aging After Cancer Lab (PI Bluethmann)

The primary goal of the Healthy Aging After Cancer lab is support older adults with cancer (ages 60 years and older) especially after the completion of cancer treatment. The lab will lead development, testing and implementation of evidence-based lifestyle programs (including physical activity and age-appropriate technology) to promote health, mobility, and quality of years.
Exercise is Medicine® is a global initiative to establish physical activity as a standard in healthcare.

EIM’s Goal is **Transformational Change**
- To institutionalize physical activity *assessment & prescription* into Global Healthcare Systems
Benefits of Exercise for Symptom Management in Older Cancer Survivors

• Enhanced function and recovery
• Reduced risk of cancer recurrence
• Demonstrated benefits of PA for common treatment symptoms
  – Fatigue, Cognitive impairment, phys. dysfunction, sleep disturbances, quality of life
  – Bone loss and joint pain
(Mustian et al, 2012; Irwin et al, 2014)
Exercise Underutilized

• Most Older adults 65+ do not achieve recommended PA
  – 27% NHANES 2011-2012

• Doctors don’t routinely recommend exercise for symptom management

• Patients don’t believe that it is for them

• In the 2008 Barriers to Physical Activity for People with Disabilities survey
  – 40% of educated adults with disabilities do not exercise because they do not believe it will improve their condition
  – 50% exercise because they do not know how to do so safely with their condition(s)
Using Exercise to Relieve Arthralgia (Joint Pain) and Improve AI Adherence (REJOIN): A Pilot Study
Who is at risk?

• Half of BCS are Post-menopausal, 70% have hormone-sensitive disease (ER+).
• Standard of care for ER+ patients is adjuvant hormonal therapy (known to reduce recurrence and mortality risk if taken as prescribed)
• So? 50% of eligible women do not take as prescribed. Most discontinue within 2 years. (Burstein et al., 2014)
• **2010 Recommendation:** Previous ASCO guidelines recommended treatment of women who have hormone receptor–positive breast cancer and are premenopausal with 5 years of tamoxifen, and those who are postmenopausal with a minimum of 5 years of adjuvant therapy with an aromatase inhibitor or tamoxifen...

• **Updated 2014 Recommendation:** If women are pre- or perimenopausal and have received 5 years of adjuvant tamoxifen, they should be offered 10 years total duration of tamoxifen. If women are postmenopausal and have received 5 years of adjuvant tamoxifen, they should be offered the choice of continuing tamoxifen or switching to an aromatase inhibitor for 10 years total adjuvant endocrine therapy.
Why don’t women take AIs as prescribed?

- One modifiable reason is Medication side effects – 50% of women experience joint pain
- Options for controlling side effects are limited, esp for older patients
- Effective strategies (pain medication) provide only short-term relief

**Source: Breast Cancer Index**
How can this be addressed?

-- Exercise is Medicine! Beneficial for many cancer symptoms as well as chronic diseases

-- Exercise is a non-pharmacological, sustainable method of managing symptoms, esp for AI joint pain (Irwin, 2014)
Research Question and Aims

REJOIN -- does a self-management approach (education + exercise) improve joint pain management better than standard care?

• **Aim 1:** Adapt an evidence-based PA intervention for older cancer survivors planning to take AIs.

• **Aim 2:** Test the effect of a pilot intervention on arthralgia and behavioral predictors for AI medication adherence (e.g., knowledge and self-efficacy).

• **Aim 3:** Test the effect of a pilot intervention on adherence to aromatase inhibitors.
Eligibility (n=76):

- Female BCS
- 65 years +
- ER+
- Not exercising
- Not yet taking AIs
- Stages I-III
Overview of Study Design –

Two-armed randomized trial – Treat = Education plus Exercise,
-- Enhanced Standard Care=ACS informational material only
-- Recruitment goal, N=76
-- Recruiting through PSCI, Andrews Patel, community clinics
Primary Outcomes

• Joint Pain
  – Brief Pain Inventory (modified)
  – Grip Strength (4x)
  – WOMAC (upper body)
  – Quick DASH (lower body)

• Adherence to AIs
  – Self-reported at 4 assessments
  – Comparison with prescription refill records

• Behavioral Predictors
  – Exercise self-efficacy and TINQ knowledge assess.
Secondary Outcomes

• Physical Activity
  – Self-report (CHAMPS) and accelerometer

• Geriatric Assessment (Modified CARG survey)
  – Physical function, cognitive screen, polypharmacy, frailty

• Blood draw – inflammatory biomarkers (CRP, IL-6, Tnf-alpha) plus future analyses indicated by trial results
The Best Laid Plans

- IRB approval Feb 20, 2020
- But then COVID...
Institutional Safeguards

• Recruitment impossible – patients too scared to come to hospital, exercise not priority
• All in-person research was paused and could not be continued unless redesigned in a remote delivery format
• Many older adults, especially in rural areas, did not have broadband or experience with video platforms
• Pew Report describes the new normal as “tele-everything” but this leaves older adults behind.
Digital Divide

• Outdated assumptions about older adults and tech*
  – As of 2016, 67% of US Adults 65+ use the internet, up from 7% in 2000
  – Increases in smartphones, tablets, cellphone use
  – After age 75, internet and broadband use drops off
    (GI Generation, born 1936)

*Older Adults and Internet Use, Pew Center, 2016
Original Class Design

• Original Plan:
  -- 2x weekly 60-min session held at the Mohler Senior Center
  – Use exercise equipment and practice stretching together with trainers
Revised Exercise Class Design

• Changes to meet new research guidelines
  – Remote program using Zoom
  – Mail manual plus exercise equipment to each home
  – Use exercise equipment and practice stretching
  – Household member present during exercise
  – Camera facing the exercise area
Pre-test with Eligible BCS

Rate of Perceived Exertion (RPE) Scale

- Too much strain
  - 10: Maximal Effort
  - 9: Very Hard
  - 8: Moderately Hard
  - 7: Hard
  - 6: Somewhat Hard
  - 5: Moderate
  - 4: Somewhat Easy
  - 3: Easy
  - 2: Very Easy

- Too easy for effective exercise
Acceptability of Adapted Format

-- Collected feedback from 6 BCS, 3 in phone interviews, 3 for live pretest with adapted materials

-- Participants gave the adapted format a mean score of 9.2/10 for satisfaction

-- Quotes:

“I thought it was going to be tedious, and it went fast” (Participant 1-5).

“I thought was (good and) pretty well rounded” (Participant 1-6).

“It gave me some confidence and, and it established in my mind that, you know, this is what I need to do to move forward” (Participant 1-7).
Documenting Progress and Lessons Learned


Under Review -- Adapting an Evidence-based Exercise and Education Program for Older Breast Cancer Survivors for the REJOIN Trial
Increased Mobility Impairment Risk for Cancer Survivors

• Cancer treatment increases mobility impairments for cancer patients (neuropathy, pain, musculoskeletal issues)

• Yet, extent of mobility impairment or device use specifically among older cancer survivors is **UNKNOWN**

• Physical activity is recommended for everyone, including cancer survivors (PAG 2018, ACS, NCCN) but functional status varies
Not Just Science Fiction

Smart Cane for the Aging

고령계층의 생활지원을 위한 스마트 카프(도구)

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Tel: 042-484-0000 Fax: 042-484-1111

What
노인의 보행조건평가 및 다양한 인터페이스

When
정상시보행기 및
먼저보행기

Where
보행장성사용

Who
보행능력의 감소시
및

Health

Banking

Calendar

Telephone

Mail

SNS

Map

Music

Multimedia

Camera


주요기능

Health : 사전적 건강상태, 혈압측정을 확인할 수 있습니다.
Banking : 은행이나 은행시스템으로 연결이 가능합니다.
Telephone : 다음 어플리케이션이 가능합니다.
Mail : 메일송신, 및 응답이 가능합니다.
Music : 음악, 팝송, 음악기기 및 음악기기 설정을 확인할 수 있습니다.
Multimedia : 양방향 음성, 영상, 비디오 등 다양한 데이터를 볼 수 있습니다.
Camera : 사진, 동영상을 활용할 수 있으며, 간단히 제작할 수 있습니다.
SNS : 페이스북, 트위터 등 소셜미디어의 관심사를 제공받을 수 있습니다.
Questions

• What is the prevalence of mobility device use among cancer survivors in the US?

• What are the predictors of mobility disability among older cancer survivors?

• Is there an opportunity for innovation in clinical approaches to support recovery in these older survivors and caregivers?
Mixed Methods Design

Quantitative data collection and analysis ➔ Follow up with ➔ Qualitative data collection and analysis ➔ Interpretation

Aim 1 ➔ Point of interface ➔ Aim 2 ➔ Aim 3
NHATS -- Nationally representative data from community-dwelling, Medicare beneficiaries (all 65 +), n=6080
  – Administered by NIA/NIH

Includes claims data, co-morbidities, cancer diagnosis, use of mobility devices (cane, walker, wheelchair, scooter)
Distribution by Site (n=1203)

- Breast, 26%
- Prostate, 28%
- Other, 19%
- Colon, 10%
- Gynecologic, 9%
- Kidney, 4%
- Bladder, 4%
Prevalence of Mobility Device Use by Cancer History

Gait Speed Test and Mobility Disability

- Gait speed test robust predictor of mobility disability based on three large cohort studies (Miller, 2018)
- All NHATS clinical tests conducted at Johns Hopkins labs
- Each test was graded on a scale of 0-4, Higher score = better function, scoring protocol provided by NIA
- Mean scores: CS=2.39 (2.34–2.45), .027; Non-CA= 2.27 (2.18–2.35), variability by cancer site
Adjusted Odds of Mobility Disability

• In regression models, survivors were 23% less likely than non-cancer adults to perform well on the gait speed test (OR=0.77, p<.01).

• Older survivors (75+ years) were 57% less likely (OR=0.43, p<.001) and the oldest (85+ years) were 83% less likely (OR=0.17, p<.001) to achieve the highest score on the gait speed test compared to adults 65-74 years.

• Being underweight, overweight, Black, having ≥3 medical conditions and experiencing pain that limited activity were also all associated with worse performance on the gait speed test (all p<.05).
Limitations

• NHATS data did not include key cancer variables (treatment received, time since diagnosis)

• Not all cancer sites represented (e.g., lung not described)

• Not all ethnic/minority groups represented

• Limited data on duration of mobility device use, restricted interpretation
Mixed Methods Design
Conduct Focus Groups

• Assess acceptability and perceived usefulness of various intervention approaches (including technology) to address mobility barriers as part of cancer recovery in older survivors.

• Explore opportunities for technology-enabled mobility devices in supportive care for survivors at multiple stages of recovery, with an end goal of independence and longevity.

• **We recruited older survivors and caregivers for focus groups**
  – Groups conducted via zoom, pre-survey conducted with Senior Technology Acceptance Scale, also reflected in Focus Group script
  – Participants recruited from support groups, advocacy groups, including Cancer and Aging Research Group (CARG)
Smart Cane Focus Group Participants

- 12 participants (5 M, 7 F) ages 68-86 (mean age 74), mainly from the east coast (NC, PA, NY, VA, CT and CA).
- 8/12 were both survivors and caregivers for their partner.
- All participants were educated (college, grad ed).
- 10 White, 1 African-American, and 1 Asian-American.
- All but one participant reported fed insurance (Medicare, Medicaid, TRICARE).
Smart Cane Focus Group Participants

- Participant cancer diagnoses included: breast (4), colon (2), prostate (1), thyroid (1), skin (basal and melanoma) (2), lymphoma (1), and lung (1).

- Surgery, Chemotherapy, Radiation, Immunotherapy and/or Hormonal therapy were received by participants more than 5 years ago (8), 2-4 years ago (2), within the last year (2).

- Participants co-morbidities included high blood pressure (8), heart condition (5), arthritis (3), and diabetes (2).

- Overall, participants ranked their health as being Excellent (4), Very Good (6), Good (1) and Fair (1) and only two participants indicated that their physical health “moderately” limited their activity.

- 3 participants had previous experience with mobility devices.
Attitudes Toward Technology and Device Use (Senior Technology Acceptance Model (Chen, 2014))

• 75% surveyed, responded (agreed or strongly agreed) that a technology-enhanced mobility device would enhance their effectiveness in daily activities.

• 100% strongly agreed that they could complete a task or use a device if there was demonstration provided and they also felt confident that they could be skillful at device use.
Preliminary Results from Groups

• Overall, participants were excited about idea in concept
  – “I love this cane. I think it's very well done.”
  – “I would use (this smart cane)-- I would use it in a heartbeat.”

• But there was some trepidation about new tech
  – “But I feel like the technology moves faster than we are able, actually, legitimately, to adopt it. And so I do believe some people are absolute whizzes at technology, and some people have to grapple with it. And I am actually somebody who has to grapple with it.”
Who would teach survivors?

- “I think PTs and OTs are it because your doctors, when you go through hip or knee surgeries, you go to physical therapy. So who better to give it to you? I mean, you do want to run it by orthopods because they're the ones who, you know, do the surgeries, and it'd would be interesting to get their input. But I think the ones that really need to teach it is the PT and the OT.”
Next Steps

• Much more analysis and manuscript
• In-person research, gait analysis lab
• Testing with broader range of participants (more diversity, less tech experience)
• Input from clinical providers
Thank You

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