

Exercise Education and Learning for Breast Cancer Survivors

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## Abstract

**Background:** Breast cancer survivors can experience short, late, and long term symptoms and complications from breast cancer and its treatment. Regular exercise can help reduce both short and long term symptoms and complications of breast cancer and its treatments. Breast cancer survivors are routinely given exercise education after breast cancer related procedures and during the acute phase of their treatment regimen, however, adherence to exercise recommendations is suboptimal. Adherence to exercise may be partially due to lack of knowledge retention concerning the exercise regimen originally educated on. Information retention can decrease as soon as two weeks after the education was provided. Retention of information is very important for breast cancer survivors due to the need for them to continue exercising into survivorship to help prevent complications and prolonged symptoms of breast cancer and its treatments. Reiteration of education may be helpful in long-term information retention and self-efficacy of disease management. The Cancer center where this project takes place has identified non-adherence to exercise in breast cancer survivors as an area of concern and improvement.

**Purpose:** To improve information retention by re-educating breast cancer survivors on the recommended exercises they were taught related to surgery. Improved knowledge, information retention, and exercise demonstration may lead to improved adherence and self-efficacy in performing exercises to reduce late effects of breast cancer related surgery.

**Methods:** A pre-education questionnaire will be distributed to women undergoing treatment for breast cancer. Questions ask about the education they have already received and how much information they have retained about exercising as part of their treatment regimen. A group education session will then be offered, attending either by zoom or in person. The group

education session will include education and demonstration of exercises that are taught after breast cancer procedures and throughout acute care treatment at Portneuf Medical Center and Portneuf Cancer Center. Education will also include the efficacy of exercising in decreasing side effects of breast cancer and its treatment, such as fatigue, and in reducing the risks of complications of breast cancer such as limited upper extremity mobility. A post-education questionnaire will be distributed immediately after the education session and three months after the education session. Assessment of information retention about the exercises will be done through comparing the answers in the questionnaires that are completed.

## **Introduction and Background**

Cancer, overall, is the second leading cause of death globally (World Health Organization (WHO), 2021-a). Breast, colorectal, lung, cervical, and thyroid cancers are the most common cancers in women globally (WHO, 2021-a). In the United States, breast cancer, with exception of skin cancer, is the leading cancer effecting women (CDC, 2020). In 2020, in Idaho, estimated new cases of breast cancer diagnosed are 1,410 and estimated deaths are 250 (ACA, 2018). Exercise has been consistently noted to not only help prevent cancer initially, but also to help prevent cancer recurrence in cancer survivors (American Cancer Society (ACS), 2020; WHO, 2021-b).

Breast cancer is treated more effectively than it used to be with many scientific advances in medicine allowing survival rates for breast cancer patients to increase (Wang et al, 2019). In women in the United States, death rates have declined an average of 1.4% annually between 2009 and 2018, showing an overall increase in breast cancer survivorship (U.S. Department of Health and Human Services et al., n.d.). With the breast cancer survivor population increasing, the research demonstrates that breast cancer survivors can still experience many quality of life altering symptoms including fatigue, anxiety, depression, weight gain, and altered cardiovascular fitness well after breast cancer has been eradicated (Sabiston et al., 2019). Breast cancer survivors are also at risk for secondary cancers as well as breast cancer recurrence (NCI, 2020-a). Other complications that can occur into survivorship are headaches, musculoskeletal symptoms, osteoporosis, cataracts, blood clots, menopausal symptoms or absence of menses, sexual difficulties, infertility, concerns about memory loss and altered cognitive function (Johns Hopkins Medicine, n.d.). Specifically related to breast cancer surgery (e.g. mastectomy, lumpectomy), women experience lymphedema and reduced range of motion and arm strength on

the surgical side. A healthy lifestyle including exercise is a low cost treatment to help alleviate adverse symptoms and helps reduce the risk of complications or recurrence of the disease after breast cancer has been eradicated (NCI, 2020-a).

### **Exercise and inflammation**

Exercise has numerous positive effects on breast cancer survivors. It reduces many adverse symptoms and reduces the risk for complications from treatment and from the disease. Exercise likely plays a role in many of these positive effects by increasing lean body mass and decreasing adiposity which is linked to stronger immunity as well as to a decrease in cancer cell growth (Chumdaeng et al., 2020). Exercise is also suspected to decrease inflammatory markers that play a role in symptoms and risk for complications in breast cancer survivors (Alizadeh et al., 2019). Pro-inflammatory cytokine ratios such as interleukin 6 (IL-6) and interleukin 10 (IL-10) ratios as well as tumor necrosis factor alpha (TNF- $\alpha$ ) and IL-10 ratios were both reduced in breast cancer patients who had undergone a high intensity exercise program when compared to usual treatment groups (Alizadeh et al., 2019). Serum pro-inflammatory ratios, such as the IL-6/IL-10 and TNF- $\alpha$ /IL-10 ratios, are generally observed to be higher in survivors who maintain a sedentary lifestyle and who are thought to be at increased risk for breast cancer recurrence (Alizadeh et al., 2019).

### **Lymphedema & upper extremity mobility**

Breast cancer survivors who have undergone surgical treatment with removal of breast and upper lymph tissue are at high risk of developing lymphedema. Lymphedema caused by surgical disruption of the lymph nodes can result in chronic inflammation and fibro-adipose tissue development and build up (Kataru et al., 2019). The development of fibro-adipose tissue and chronic inflammation can result in pain, furthering the reduction of movement and loss of motion (Kataru et al., 2019). Pain, inflammation, and loss of upper extremity range of motion

can severely effect a survivor's quality of life and ability to function. Upper extremity exercises specifically can reduce the risk of chronic upper extremity inflammation and risk for loss of upper extremity range of motion (Gamee, Shaaban, & Ali, 2019).

### **Exercise education**

The American Cancer Society has a list of standardized upper extremity exercises that are recommended after breast cancer surgery (ACS, 2019). The exercises are considered safe and effective for reducing breast cancer survivors' ability to maintain upper extremity function and to reduce the risks for lymphedema development (ACS, 2019). The American Cancer Society's list of standardized upper extremity exercises are given to many post procedure cancer survivors including the breast cancer survivors treated at Portneuf Cancer Center.

### **Information retention**

Retention of information that has been given to breast cancer survivors is important for their self-management. Successfully providing information regarding the disease and how to manage that disease is one of the main components of therapeutic patient education (Barnason et al., 2021). Throughout breast cancer survivors' treatment at Portneuf Cancer Center, the main component of providing information is met through encounters with the various healthcare professionals and with pamphlets given routinely to patients. Providing information that empowers patients to develop self-management skills and confidence to sustain those skills are the other two components of therapeutic patient education (Barnason et al., 2021). Lack of cancer specific informational support was cited as a barrier for breast cancer survivors in generalized exercise programs (Sabiston et al., 2019). Doing too much exercise and unknowingly reaching a limit were cited fears that breast cancer survivors and other cancer survivors have experienced (Bea et al., 2018; Kim et al., 2019). Perspiration was cited as a trigger of cessation

of exercise sessions due to fear of over-doing it (Kim et al., 2019). Ambiguity on amounts of exercise and amount of weight that could be lifted for strength training have also been cited as creating fears concerning exercise (Kim et al., 2019). Gaps in information such as these could make it difficult for breast cancer survivors to develop the skills to perform upper extremity exercises and inhibit their confidence to maintain the skills of performing upper extremity exercises. Therefore, therapeutic patient education can be lost when gaps in information are not addressed with re-education.

Education follow up and review is helpful for information retention and self-management of disease (Barnason et al., 2021). This can often mean repeated education sessions until mastery of the skills can be observed (Gamee et al., 2019). In one study, information regarding breast cancer, mastectomy and its complications, self-care after mastectomy, and lymphedema prevention that were taught in four different sessions over a two week time span showed a statistically significant difference in overall knowledge in management of breast cancer between the study and control groups (Gamee et al., 2019). In this study, information from the previous education session was summarized and reviewed with each new session (Gamee et al., 2019).

### **Problem Statement**

Long term side effects can include any one of the adverse effects that occurred during treatment and did not end when treatment ended (Johns Hopkins Medicine, n.d.). Late side effects may occur months to years post cancer treatment (NCI, 2016). Both lymphedema and limited upper extremity mobility are included in the list of long term and late side effects that breast cancer survivors can experience (Gamee et al., 2019; NCI, 2016). Reducing the risk of lymphedema and limited upper extremity mobility are essential to breast cancer survivors' quality of life, and upper extremity exercises have been shown to accomplish reducing the risk



(ACS, 2019). However, if breast cancer survivors' knowledge of small elements such as how to do the exercises, how often to do the exercises, and duration of the exercises, is reduced due to lack of information retention, then adherence to those exercises may also be reduced.

Despite education being given to breast cancer survivors on upper extremity exercises, adherence to those exercises remains poor. It has been acknowledged that barriers to exercises such as fatigue, self-image issues, busy schedule, and prevailing myths play a large role in poor adherence (Kim et al., 2019). However, there is little research done to indicate the degree of which information retention contributes to adherence to upper extremity exercises. Literature found on managing other chronic illnesses, such as cardiovascular disease, emphasizes repetition of information as a primary step to therapeutic patient education (Barnason et al., 2017). Repetition of education where the proper movements of upper extremity exercises, how often, and how long to do the exercises are reviewed with breast cancer survivors may aid in knowledge retention of the exercises. Reviewing the importance of performing the exercises and the role that the exercises play in reducing inflammation and in reducing the risk for lymphedema development and limited upper extremity range of motion may also aid in information retention and adherence to those exercises.

### **Project Purpose**

The purpose of this project is to re-educate breast cancer survivors through group education to aid in their knowledge retention and self-efficacy in long term upper extremity exercise therapy. The concept of spaced repetition of education will be used in this project as enhancing breast cancer survivors' ability to master the methods and techniques of upper extremity exercises. Mastering the methods and techniques may contribute to increased

confidence to continue exercise behavior in breast cancer survivors to help them manage their symptoms and prevent complications throughout their survivorship.

### **Clinical Question**

Will a group education program reviewing exercise education improve breast cancer survivors' knowledge retention about short and long term exercise adherence as shown by one pre- and two post-education questionnaires?

P: Breast cancer survivors

I: Reviewing education

C: Pre and post education questionnaires

O: Increased knowledge

T: Before and after education session

## Literature Review

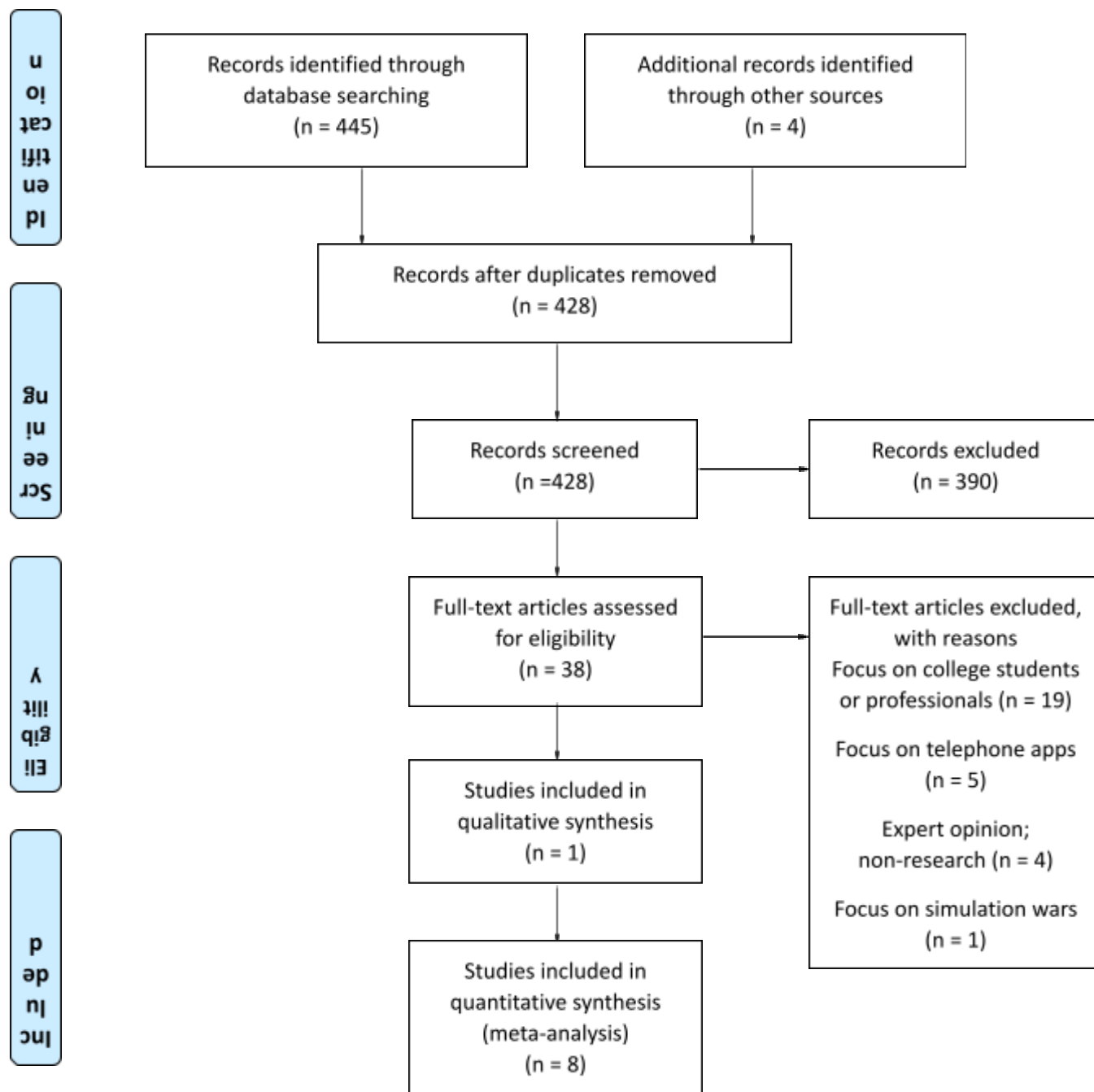
### Search Strategy

A search using key words “spaced repetition,” and “effective learning,” was done in Idaho State University Library’s One Search data base. Two hundred and fourteen articles were found. The search was refined by “Full Text,” “Scholarly (Peer Reviewed) Journals,” and “Geography” within the USA which included “usa, california, and los angeles (calif.).” Three articles resulted. Another search was done in Google Scholar using ““spaced repetition” and “effective learning” not computers and United States.” One hundred sixty nine articles resulted. Another search in Google Scholar was done using ““spaced repetition” and effective patient learning group learning in United States.” Two hundred and thirty four articles resulted after refining the search to since 2017. Another search was done using ““spaced repetition” and effective patient learning group learning in the United States –medical education” was done. Forty two articles and books resulted. The articles were sorted by relevance. Inclusion criteria was research articles that were done in the United States, spaced repetitions, behavior rehearsal, peer reviewed, full text access, and done within the last 5 years. Exclusion were books, expert opinion, medical education/students, professional education, and language learning. Four other articles from other searches and recommendations were also reviewed and included. One of the four articles is from 2011. Databases are *PubMed*, *Clinical Key*, *Springer Link*, *EBSCOhost*, *Frontiers*, and *AHAjournals.com*.

Figure 1



## PRISMA 2009 Flow Diagram



### **Therapeutic Education**

When considering any kind of patient education, the complexity of their diagnosis, the nature of the interventions they will have to undergo, and the possible outcomes they will likely face makes education especially critical and challenging to provide (Dicpinigaitis et al., 2020). Advances and treatment has increased the amount of overall cancer survivors which has in turn increased the need for thorough consideration of methods and implementation of patient education (Champarnaud et al., 2020). Therapeutic patient education is meant to be and has been accepted by the World Health Organization as a lasting component of patient management (Champarnaud et al., 2020). Inadequate therapeutic education can result in patient misconceptions about their diagnosis, treatment, and management which can have negative results on their outcomes (Dicpinigaitis et al., 2020). Multidimensional and tailored therapeutic educational methods are routinely given to patients with chronic diseases, however, there is a lot of heterogeneity in therapeutic education types and methods (Barnason et al., 2017; Champarnaud et al., 2020; Friedman et al., 2011). The heterogeneity in therapeutic education types and methods makes research on efficacy of therapeutic education difficult and sparse (Barnason et al., 2017; Friedman et al., 2011). It also results in a lacking of knowledge about adaptation to specific learning capabilities of chronic disease survivors (Champarnaud et al., 2020). Measuring outcomes is difficult with the heterogeneity of types of therapeutic education and methods that have been researched (Barnason et al., 2017).

### **Information Retention and Therapeutic Patient Education**

Post education follow up should be done to assess knowledge and information retention. Information recall was found positive in 13 out of 14 studies when outcomes were assessed after therapeutic education interventions were done in older adults with cancer (Champarnaud et al.,

2020). The American Heart Association dispersed a scientific statement expressing the critical need for treatment guidelines to focus on patient knowledge in order for survivors to successfully engage in primary and secondary prevention of chronic disease management (Barnason et al., 2017). However, learning and retention of information was found to be greater in people who had undergone a certain minimum of experience distributed over a larger number of days in order for learning to occur and information to be retained (Smith & Scarf, 2017).

### **Repeated/Spaced Education and Skills**

Single-component education is not efficacious for self-management of chronic disease and does not show improved outcomes over time (Barnason et al., 2017). Follow up is crucial in sustained self-management of chronic disease (Banason et al., 2017). Follow up and timing of education can allow reinforcement and reflection for survivors with chronic diseases to aid in their information to help them make decisions in their disease management (Steinberg et al., 2021).

Mastering the techniques of upper extremity exercise after breast cancer procedures is one of the considerations for management for breast cancer survivors (Wang et al., 2019). Repeated exposure to information and educational resources has shown to increase survivors' knowledge and information retention (Dicpinigaitis et al., 2020). In fact, a medium to large efficacy of improvement of complex skills was found when spaced repetitions of education had been done for adults in doing complex tasks (Smith & Scarf, 2017). In fact, rehearsal in addition to standard education or training has shown improvement of knowledge, attitudes, and skills when performing tasks (Cross et al., 2011). Skills can also decline without use over time, and therefore, should be reinforced (Cross et al., 2011). Behavioral skills and knowledge have a large influence on adherence and confidence in rehabilitation for breast cancer survivors and therefore,

need to be further explored for breast cancer survivors' upper extremity exercise adherence (Wang et al., 2018).

### **Health Literacy**

The degree of ability that someone can obtain, process, and understand basic health information is essentially their level of health literacy (Barnason et al., 2017). This contributes to the ability for a survivor to seek out additional information about their disease and management of their chronic disease (Barnason et al., 2017). Level of health literacy should be considered when delivering therapeutic patient education (Barnason et al., 2017). Breast cancer survivors with high health literacy are more likely to seek out additional information when desired or needed than those with low health literacy (Tang et al, 2017). Repetition of interventions, monitoring, and communication with a provider has shown to increase health literacy (Barnason et al., 2017).

### **Discussion**

Mastering the skills and techniques of upper extremity exercises after breast cancer procedures is critical to adherence and continued management. Improving health literacy through repeated therapeutic education may improve information retention, skills, and behaviors to aid in adherence to upper extremity exercises. Increased adherence to upper extremity exercises will improve continued management of breast cancer in decreasing risks of complications like lymphedema and limited upper extremity mobility.

### **Theoretical Framework**

Knowles Adult Learning Theory points out that adult learners are different than child learners in their needs due to differences in their experience and motivation (Mukhalalati & Taylor, 2019). The context and environment can be considered when implementing adult

learning theories, and therefore can be tailored more appropriately to the context and environment where the learning is taking place (Mukhalalati & Taylor, 2019). Tailoring education to fit different levels of health literacy is appropriate for breast cancer survivors in order to meet their educational needs to aid in their information retention and improve their behavioral skills and adherence.

### **Plan of Implementation**

A pre-education questionnaire will be given to adult female breast cancer survivors to assess their knowledge of and adherence to upper extremity exercises. A group education session will be done during a routinely held support group session along with using video-conference for those who cannot attend in-person. One immediate post-questionnaire, and one-three month post-questionnaire will be provided. The three month post-education questionnaire will be sent to survivors by e-mail or paper mail three and six months post education session.

### **Anticipated Participants**

Anticipated participants will include adult female breast cancer survivors 18 years to 70 years of age who have undergone a breast cancer procedure.

### **Anticipated Setting and Tools**

Approval is anticipated to be obtained in order to allow an educational session on exercise adherence for breast cancer survivors during a support group meeting at Portneuf's Cancer Center in Pocatello Idaho. A review of education will be done in order to reinforce information retention and behavioral skills for upper extremity exercises for breast cancer survivors who have undergone a breast cancer procedure. The group setting will allow feedback for breast cancer survivors with different levels of health literacy to improve on their education



and knowledge. One pre- and two post-education questionnaires will be utilized to assess knowledge of upper extremity exercises and the health benefits of those exercises.

### **Anticipated Intervention and Data Collection**

Anticipated intervention is a repeated education session with allowance of participant feedback on upper extremity exercises in a group setting. Using the pre-education questionnaire (please see Appendix C), gaps in knowledge concerning techniques, duration, and frequency of upper extremity exercises will be identified. Using guidelines from Portneuf Cancer Center, the National Cancer Institute, and from local experts, such as physical therapists who work with breast cancer patients, education will be created in a power point format and taught to breast cancer survivors at a group support session. One immediate post-education questionnaire that contains the same questions as the pre-education questionnaire will be distributed to participants to fill out. Another post-education questionnaire will then be mailed or emailed to participants three months after the education session. The answers from the pre-education questionnaire will be compared to the answers to the post-education questionnaires for each participant to assess information retention concerning upper extremity exercises for post procedure breast cancer survivors.

### **Planned Analysis and Interpretation**

Statistical process will be a Wilcoxon Sign Rank test comparing differences on ordinal data for paired samples. Interpretation of statistical significance or no statistical significance of self-reported knowledge will follow the results of the Wilcoxin Sign Rank test accordingly.

### **Anticipated Significance and Implications**

Reinforcing education may help breast cancer survivors retain information about upper extremity exercises and may increase adherence. Increased adherence to upper extremity

exercises will decrease short and long-term post-procedure risks of complications and will help breast cancer survivors decrease many symptoms associated with breast cancer and its treatment. Reducing symptoms and risks for complications will improve breast cancer survivors' quality of life and will help them build confidence in continued management of their health.

### **Anticipated Impact and Insight**

There is limited research on the effects of reinforcement and repeated education on upper extremity exercises for improving information retention and adherence to upper extremity exercises for breast cancer survivors. Assessment of repeated education and its effects on information retention will contribute to knowledge about strategies that may be effective in enhancing information retention and upper extremity exercise adherence for breast cancer survivors.

## References

- Alizadeh, A. M., Isanejad, A., Sadighi, S., Mardani, M., kalaghchi, B., & Hassan, Z. M. (2019). High-intensity interval training can modulate the systemic inflammation and HSP70 in the breast cancer: a randomized control trial. *Journal of Cancer Research & Clinical Oncology*, 145(10), 2583
- American Cancer Society (ACS). (2018). Cancer statistics center: Idaho.  
<https://cancerstatisticscenter.cancer.org/#!/state/Idaho>
- American Cancer Society (ACS). (2019). Exercises after breast cancer surgery.  
<https://www.cancer.org/cancer/breast-cancer/treatment/surgery-for-breast-cancer/exercises-after-breast-cancer-surgery.html>
- Barnason, S., White-Williams, C., Rossi, L. P., Centeno, M., Crabbe, D. L., Kyoung Suk Lee, McCabe, N., Nauser, J., Schulz, P., Stamp, K., Wood, K., & Lee, K. S. (2017). Evidence for therapeutic patient education interventions to promote cardiovascular patient self-management: A scientific statement for healthcare professionals: From the American Heart Association. *Circulation: Cardiovascular Quality & Outcomes*, 10(6), 1–23.  
<https://doi.org/10.1161/HCQ.0000000000000025>
- Bea, J. W., De Heer, H., Valdez, L., Kinslow, B., Yazzie, E., Lee, M. C., Nez, P., Dalgai, S. and Schwartz, A. (2018). Physical Activity among Navajo Cancer Survivors: A Qualitative Study. *American Indian & Alaska Native Mental Health Research: The Journal of the National Center*, 25(2), 54–73. <https://doi.org/10.5820/aian.2502.2018.54>
- Centers for Disease Control and Prevention (CDC). (2020). Breast cancer statistics.  
<https://www.cdc.gov/cancer/breast/statistics/index.htm>

Centers for Disease Control and Prevention (CDC). (2020-c). Staying healthy after cancer treatment.

<https://www.cdc.gov/cancer/survivors/life-after-cancer/staying-healthy-after-cancer-treatment.htm>

Champarnaud, M., Villars, H., Girard, P., Brechemier, D., Balardy, L. & Nourhashemi, F. (2020).

Effectiveness of therapeutic patient education interventions for older adults with cancer:

A systematic review. *Journal of Nutrition, Health and Aging*, 24(7), 772-782.

<https://doi.org/10.1007/s12603-020-1395-3>

Chumdaeng, S., Sethabouppha, S., Chontawan, R. & Soivong, P. (2020). Health Behavior

Changes among Survivors of Breast Cancer after Treatment Completion. *Pacific Rim*

*International Journal of Nursing Research*, 24(4), 472–484.

Cross, W. F., Seaburn, D., Gibbs, D., Schmeelk-Cone, K., White, A. M., & Caine, E. D. (2011).

Does Practice Make Perfect? A Randomized Control Trial of Behavioral Rehearsal on

Suicide Prevention Gatekeeper Skills. *Journal of Primary Prevention*, 32(3/4), 195–211.

<https://doi.org/10.1007/s10935-011-0250-z>

Dicpinigaitis, A. J., Li, B., Ogulnick, J., McIntyre, M. K., & Bowers, C. (2021). Evaluating the

Impact of Neurosurgical Educational Interventions on Patient Knowledge and

Satisfaction: A Systematic Review of the Literature. *World Neurosurgery*, 147, 70–78.

<https://doi.org/10.1016/j.wneu.2020.11.144>

Friedman, A. J., Cosby, R., Boyko, S., Hatton-Bauer, J. & Turnbull, G. (2010). Effective

teaching strategies and methods of delivery for patient education: A systematic review

and practice guideline recommendations. *J Canc Educ*, 26(12), 21.

<https://doi.org/10.1007/s13187-010-0183-x>

Gamee, H. M., Shaaban, A. E. A. & Ali, W. G. M. (2019). Effect of pre-discharge educational interventions on womens' knowledge and self-care practices related to arm lymphedema prevention post mastectomy. *International Journal of Novel Research in Healthcare and Nursing*, 6(3), 319-331.

[https://www.researchgate.net/profile/Wafaa\\_Ali4/publication/337183202\\_Effect\\_of\\_Pre-discharge\\_educational\\_Interventions\\_on\\_Womens'\\_Knowledge\\_and\\_Self-Care\\_Practices\\_Related\\_to\\_Arm\\_Lymphedema\\_Prevention\\_Post\\_mastectomy/links/5dca0c03458515143503caaf/Effect-of-Pre-discharge-educational-Interventions-on-Womens-Knowledge-and-Self-Care-Practices-Related-to-Arm-Lymphedema-Prevention-Post-mastectomy.pdf](https://www.researchgate.net/profile/Wafaa_Ali4/publication/337183202_Effect_of_Pre-discharge_educational_Interventions_on_Womens'_Knowledge_and_Self-Care_Practices_Related_to_Arm_Lymphedema_Prevention_Post_mastectomy/links/5dca0c03458515143503caaf/Effect-of-Pre-discharge-educational-Interventions-on-Womens-Knowledge-and-Self-Care-Practices-Related-to-Arm-Lymphedema-Prevention-Post-mastectomy.pdf)

Johns Hopkins Medicine. (n.d.). Side effects from breast cancer treatment. *The Johns Hopkins University, The Johns Hopkins Hospital, and Johns Hopkins Health System.*

[https://www.hopkinsmedicine.org/kimmel\\_cancer\\_center/cancers\\_we\\_treat/breast\\_cancer\\_program/treatment\\_and\\_services/survivorship/side\\_effects.html](https://www.hopkinsmedicine.org/kimmel_cancer_center/cancers_we_treat/breast_cancer_program/treatment_and_services/survivorship/side_effects.html)

Kataru, R. P., Baik, J. E., Park, H. J., Wiser, I., Rehal, S., Shin, J. Y., & Mehrara, B. J. (2019).

Regulation of Immune Function by the Lymphatic System in Lymphedema. *Frontiers in immunology*, 10, 470. <https://doi.org/10.3389/fimmu.2019.00470>

Kim, S., Han, J., Lee, M. Y., & Jang, M. K. (2019). The experience of cancer-related fatigue, exercise and exercise adherence among women breast cancer survivors: Insights from focus group interviews. *Journal of Clinical Nursing (John Wiley & Sons, Inc.)*, 29(5/6), 758

Mukhalalati, B. A., & Taylor, A. (2019). Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators. *Journal of medical education and curricular development*, 6, 2382120519840332. <https://doi.org/10.1177/2382120519840332>

National Cancer Institute (NCI). (2016). Late side effects of cancer treatment.

<https://www.cancer.gov/about-cancer/coping/survivorship/late-effects>

National Cancer Institute (NCI). (2020). For women with breast cancer, regular exercise may

improve survival. *U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, and USA.gov.*

<https://www.cancer.gov/news-events/cancer-currents-blog/2020/breast-cancer-survival-exercise>

National Cancer Institute (NCI). (2020-b). Physical activity and cancer.

<https://www.cancer.gov/about-cancer/causes-prevention/risk/obesity/physical-activity-fact-sheet>

National Cancer Institute (NCI). (n.d.). Cancer survivorship. *U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, and USA.gov.*

<https://www.cancer.gov/about-cancer/coping/survivorship>

Sabiston, C. M., Fong, A. J., O'Loughlin, E. K., & Meterissian, S. (2019). A mixed-methods evaluation of a community physical activity program for breast cancer survivors. *Journal of Translational Medicine*, 17(1), N.PAG. [http://doi: 10.1186/s12967-019-1958-4](http://doi:10.1186/s12967-019-1958-4)

Smith, C. D. & Scarf, D. (2017). Spacing repetitions over long timescales: A review and a reconsolidation explanation. *Frontiers in Psychology*, 8.

<https://doi:10.3389/fpsyg.2017.00962>

Steinberg, A. G., Beavis, J., Sobey, B & Holt, S. G. (2021). Individual versus group chronic kidney disease education. *Renal Society of Australasia Journal*, 17(1), 17-23.

<https://doi:10.33235/rsaj.17.1.17-23>

Tang, W., Li, Z., Tang, C., Wang, X & Wang, H. (2017). Health literacy and functional exercise adherence in postoperative breast cancer patients. Dovepress.

<https://doi:10.2147/PPA.5127925>

U.S. Department of Health and Human Services, National Institutes of Health, National Cancer Institute, & USA.gov. (n.d.). Cancer stat facts: Female breast cancer: Trends in rates.

<https://seer.cancer.gov/statfacts/html/breast.html>

Wang, X., Jia, M., Li, Y., Bao, Y., Zhang, C., Zhou, C., Wang, L., Cao, X., Jiang, R., & Li, F. (2019). Validation of an information-motivation-behavioral skills model of upper limb functional exercise adherence among Chinese postoperative patients with breast cancer.

*Breast Cancer (Tokyo, Japan)*, 26(2), 198–205. [http://doi: 10.1007/s12282-018-0911-3](http://doi:10.1007/s12282-018-0911-3)

World Health Organization (WHO). (2021-a). Cancer: Overview.

[https://www.who.int/health-topics/cancer#tab=tab\\_1](https://www.who.int/health-topics/cancer#tab=tab_1)

World Health Organization (WHO). (2021-b). Cancer: Prevention.

[https://www.who.int/health-topics/cancer#tab=tab\\_2](https://www.who.int/health-topics/cancer#tab=tab_2)

## Appendix A

### Citi Training Certificates

#### COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM) COMPLETION REPORT - PART 1 OF 2 COURSEWORK REQUIREMENTS\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

• Name: Elizabeth Combs (ID: 8314398)  
• Institution Affiliation: Idaho State University (ID: 1264)

## COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

### COMPLETION REPORT - PART 1 OF 2 COURSEWORK REQUIREMENTS\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- Name: Elizabeth Combs (ID: 8314398)
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- Institution Email: dahlitz@isu.edu
- Institution Unit: Student
- Phone: 208-705-4630
- Curriculum Group: CITI Health Information Privacy and Security (HIPS)
- Course Learner Group: CITI Health Information Privacy and Security (HIPS) for Students and Instructors
- Stage: Stage 1 - Basic Course
- Record ID: 37096753
- Completion Date: 18-Aug-2020
- Expiration Date: 18-Aug-2021
- Minimum Passing: 80
- Reported Score\*: 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Health Privacy Issues for Students and Instructors (ID: 1420)	18-Aug-2020	5/5 (100%)
Idaho State University (ID: 12693)	18-Aug-2020	No Quiz
Basics of Health Privacy (ID: 1417)	18-Aug-2020	5/5 (100%)

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## COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

### COMPLETION REPORT - PART 1 OF 2 COURSEWORK REQUIREMENTS\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Elizabeth Combs (ID: 8314398)
- **Institution Affiliation:** Idaho State University (ID: 1264)
- **Institution Email:** dahlellz@isu.edu
- **Institution Unit:** Student
- **Phone:** 208-705-4630
- **Curriculum Group:** Social and Behavioral Responsible Conduct of Research
- **Course Learner Group:** Same as Curriculum Group
- **Stage:** Stage 1 - RCR
- **Description:** This course is for investigators, staff and students with an interest or focus in Social and Behavioral research. This course contains text, embedded case studies AND quizzes.
- **Record ID:** 33558512
- **Completion Date:** 30-Sep-2019
- **Expiration Date:** 29-Sep-2023
- **Minimum Passing:** 80
- **Reported Score:** 100

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Authorship (RCR-Basic) (ID: 16597)	30-Sep-2019	5/5 (100%)
Collaborative Research (RCR-Basic) (ID: 16598)	30-Sep-2019	5/5 (100%)
Conflicts of Interest (RCR-Basic) (ID: 16599)	30-Sep-2019	5/5 (100%)
Data Management (RCR-Basic) (ID: 16600)	30-Sep-2019	5/5 (100%)
Mentoring (RCR-Basic) (ID: 16602)	30-Sep-2019	5/5 (100%)
Peer Review (RCR-Basic) (ID: 16603)	30-Sep-2019	5/5 (100%)
Research Misconduct (RCR-Basic) (ID: 16604)	30-Sep-2019	5/5 (100%)
Using Animal Subjects in Research (RCR-Basic) (ID: 13301)	30-Sep-2019	5/5 (100%)
Research Involving Human Subjects (RCR-Basic) (ID: 13566)	30-Sep-2019	5/5 (100%)

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## COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

### COMPLETION REPORT - PART 1 OF 2 COURSEWORK REQUIREMENTS\*

\* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

• Name: Elizabeth Combs (ID: 8314398)  
• Institution Affiliation: Idaho State University (ID: 1264)  
• Institution Email: dahlzell@isu.edu  
• Institution Unit: Student  
• Phone: 208-705-4630

• Curriculum Group: CITI Conflicts of Interest  
• Course Learner Group: Conflicts of Interest  
• Stage: Stage 1 - Stage 1

• Record ID: 37929400  
• Completion Date: 20-Aug-2020  
• Expiration Date: 19-Aug-2024  
• Minimum Passing: 80  
• Reported Score\*: 95

#### REQUIRED AND ELECTIVE MODULES ONLY

	DATE COMPLETED	SCORE
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules (COI-Basic) (ID: 15070)	20-Aug-2020	4/5 (80%)
Institutional Responsibilities as They Affect Investigators (COI-Basic) (ID: 15072)	20-Aug-2020	5/5 (100%)
Conflicts of Commitment and Conscience (COI-Basic) (ID: 15073)	20-Aug-2020	5/5 (100%)
Institutional Conflicts of Interest (COI-Basic) (ID: 15765)	20-Aug-2020	5/5 (100%)

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Appendix B

Anticipated letter of approval from facility (will fill in when received).

Appendix C

Pre and Post Education Questionnaire

## Disclaimer:

Please ask your doctor if you are healthy enough to start an exercise routine before beginning an exercise routine. Please observe any and all medical restrictions that you have been given prior to undertaking an exercise routine.

1. Did you understand that exercises are part of the treatment regimen for breast cancer, both during cancer treatment and long term throughout survivorhood?
  - a. Yes
  - b. No
2. Select all that are true
  - a. Regular exercise helps reduce both short term and long term symptoms such as fatigue
  - b. Regular arm exercises help reduce my short and long term risk for decreased range of motion, or limited ability for arm movement
  - c. Regular arm exercises help reduce my short and long term risk for lymphedema development
  - d. Regular exercise helps reduce my risk for breast cancer recurrence or other cancer development
3. Do you understand the exercises?
  - a. Yes
  - b. No
4. Do you have additional questions about the exercises?
  - a. Yes
  - b. No
  - c. Circle all that apply
    - i. Duration-how much time to perform the exercises
    - ii. Amount – how many times per week to do the exercises
    - iii. How to do them correctly
5. Do you have concerns about the exercises?
  - a. Yes
  - b. No
  - c. Circle all that apply
    - i. Safety of the exercises
    - ii. Access to a facility to do exercises
    - iii. Appearance
    - iv. Pain
    - v. Fatigue

6. Do you know who to ask if you had questions or concerns about the exercises?
  - a. Yes
  - b. No
7. Do you feel the information and education about the exercises are consistent?
  - a. Yes
  - b. No
8. Do you feel you have the appropriate amount of support to do the exercises?
  - a. Yes
  - b. No
9. Do you feel like you can maintain an exercise regimen for long term throughout survivorhood?
  - a. Yes
  - b. No
  - c. If no, select all that apply
    - i. I don't believe I can fit exercise into my schedule
    - ii. I believe my risk for complications decrease once my cancer is eradicated and without continued exercise
    - iii. I believe my symptoms such as fatigue will decrease once my cancer is eradicated and without continued exercise
    - iv. I don't believe I will have enough support to maintain an exercise regimen
    - v. Appearance related concerns
    - vi. Financial related concerns