

Virtual Reality Intervention for Chemotherapy Symptoms

Susan M. Schneider, PhD, RN, AOCN

Linda E. Hood, MSN, RN, AOCN

Mathew Ellis, MD

Isaac Lipkus, PhD

Lawrence Richard Landerman, PhD

This study was funded by the Oncology Nursing Foundation through an unrestricted grant from Ortho Biotech Products, L.P. and Duke University Medical Center

Purpose

- The aim of this study is to explore the use of virtual reality as a distraction intervention to relieve symptom distress in 123 adults receiving chemotherapy treatments for cancer.

Problem Statement

- Treatments for cancer are intensive and difficult to endure
- Chances of survival are enhanced if patients receive all of the recommended chemotherapy treatments
- Distraction interventions provide effective relief for a variety of symptoms
- By decreasing chemotherapy related symptom distress, virtual reality has the potential to increase compliance with treatments, impact survival, and enhance quality of life

Review of Literature: Virtual Reality

- “Experience of presence in an environment by means of a communication medium”
- Most literature to date describes applications for surgery, physical therapy, education, or anxiety disorders
- Lack of consistent information regarding “Cybersickness” or side effects
- One of the first researchers nationally to explore the recreational or distraction qualities of virtual reality as a possible therapeutic intervention



Organizing Framework

- Stress and Coping Model
 - Lazarus and Folkman (1984)
 - Stress
 - Appraisal
 - Coping
 - Problem-focused coping
 - Emotion-focused coping

Research Questions

- 1)) Is virtual reality an effective distraction intervention for reducing chemotherapy-related symptom distress levels in individuals with cancer?
- 2) Does virtual reality have a lasting effect?

Study Variables

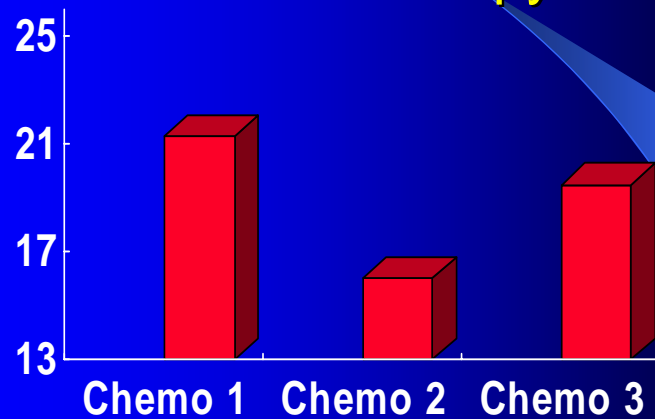
- Explanatory Variable:
Virtual Reality
- Response Variable:
Symptom Distress
(General symptom distress, fatigue & anxiety)

Background Studies

- Rowe K. & **Schneider, S.** (2005). Profile of Cancer-Related Symptoms Prior to Chemotherapy. *The Journal of Supportive Oncology* 3 (6, Suppl.4) 32-33.
- **Schneider, S.M.**, Prince-Paul, M., Allen, M., Silverman, P., & Talaba, D. (2004) Virtual reality as a distraction intervention for women receiving chemotherapy. *Oncology Nursing Forum* 31(1) 81-88.
- **Schneider, S.M.**, Ellis, M., Coombs, W.T., Shonkwiler, E.L., and Folsom, L.C. (2003) Virtual reality intervention for older women with breast cancer. *Cyberpsychology and Behavior* 6 (3).
- **Schneider, S. M.**, & Workman, M. L. (2000). Virtual reality as a distraction intervention for children receiving chemotherapy. *Pediatric Nursing* 26(6), 593-597.
- **Schneider, S. M.** (1999). I look funny and I feel bad: Measurement of symptom distress. *Journal of Child and Family Nursing*, 2(5), 380-384.
- **Schneider, S. M.**, & Workman, M. L. (1999). Effects of virtual reality on symptom distress in children receiving cancer chemotherapy. *Cyberpsychology & Behavior*, 2(2), 125-134.



Symptom Distress Scale: Immediately Following Chemotherapy



Qualitative Evaluation of Virtual Reality Intervention

Evaluation of Overall Experience

- 82% indicated that this treatment was better than previous treatments
- No subjects indicated that the virtual reality experience made them feel worse
- 100% liked the virtual reality intervention
- 100% indicated that they would like to use the virtual reality again during another chemotherapy treatment

Using Virtual Reality to Help Women Cope with Breast Cancer Treatment

Purpose

- To determine if using virtual reality makes chemotherapy more tolerable for younger women with breast cancer



Design

	Chemo 1			Chemo 2		
	Pre	Post	48hr	Pre	Post	48hr
Group 1		X				
Group 2					X	
	O ₁	O ₂	O ₃	O ₄	O ₅	O ₆
O ₁	Demographic Data, SDS, SA, & Piper Fatigue Scale					
O ₂ -O ₆	SDS, SA, & Piper Fatigue Scale					
X	Virtual Reality Distraction Intervention					
O ₂ or O ₅	Evaluation of Intervention Questionnaire					

Demographics of Sample (n=20)

- Age 27-55 M = 42.6 SD=7.9
- Stage 1-3 M = 2
- Diagnosis
 - Adenocarcinoma 15 (75%)
 - Ductal Carcinoma insitu 3 (15%)
 - Metastatic 1 (5%)
- Ethnic Identification
 - Caucasian 16 (80%)
 - African American 3 (15%)
 - Other 1 (5%)

88% participation rate



Data Analysis: Research Question 1

Paired T-test Immediately Following Chemotherapy

Instrument	t	p-value
Symptom Distress Scale	-1.36	.095*
Piper Fatigue	-1.82	.04*
State Anxiety	-.77	.23

*p < .10

Data Analysis: Research Question 2

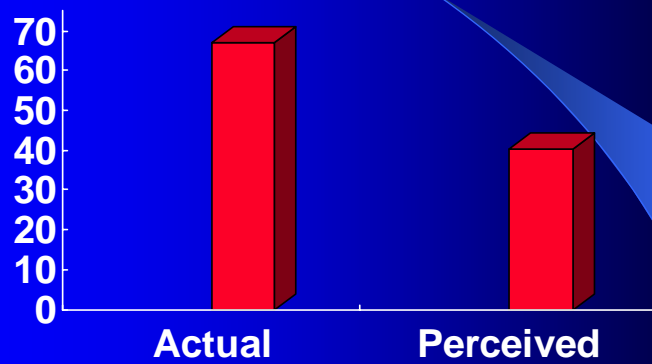
Paired t-test 48 hours Following Chemotherapy

Instrument	t	p-value
Symptom Distress Scale	-.90	.19
Piper Fatigue	-.466	.32
State Anxiety	-.71	.24

Effect Size

- Symptom Distress .30
- Fatigue .41
- Anxiety .17

Perception of Time



- $t = 3.69$ $p < .001$



Fox News, 2000

Virtual Reality Intervention for Chemotherapy Symptoms

Susan M. Schneider, PhD, RN, AOCN

Linda E. Hood, MSN, RN, AOCN

Mathew Ellis, MD

Isaac Lipkus, PhD

Lawrence Richard Landerman, PhD

This study was funded by the Oncology Nursing Foundation
through an unrestricted grant from Ortho Biotech Products,
L.P. and Duke University Medical Center

Sample

- Convenience N=120-144
- Inclusion Criteria
 - Diagnosis of breast, colon or lung cancer
 - first diagnosis of cancer
 - age 18 years or older
 - treatment regimen that includes at least two matched cycles of intravenous chemotherapy
 - Both treatments at DCCC
 - Not receiving concurrent radiation therapy
 - ability to read and write English
 - No clinical evidence of primary or metastatic disease to the brain
 - No history of seizures
 - No history of motion sickness
 - Able to give informed consent.

Demographics of Sample (n=123)

- Age: 32-78 (m = 53.97 SD=10.89)
- Diagnosis:
 - Breast 64 (52%)
 - Colon 19 (15.5%)
 - Lung 40 (32.5%)
- Gender:
 - Female: 77%
 - Male: 23%
- Race:
 - White 91%
 - Other: 9%
- Participation Rate: 64%

VR INTERVENTION

- Participants chose from four CD-ROM based scenarios;
 - *Oceans Below* ®
 - *A World of Art* ®
 - *Titanic: Adventure Out of Time* ®
 - *Timelapse PC CD Game* ®
- Subjects used the Virtual Reality for an average of 58 minutes (range 15-202 minutes SD 31.97)
- Participants wore i-glasses® SGVA head mounted display during their intravenous chemotherapy treatment.



Design

	Chemo 1			Chemo 2		
	Pre	Post	48hr	Pre	Post	48hr
Group 1		X				
Group 2					X	
	O ₁	O ₂	O ₃	O ₄	O ₅	O ₆
O ₁	Demographic Data, ASDS, SA, & Piper Fatigue Scale					
O ₂ -O ₆	ASDS, SA, & Piper Fatigue Scale					
X	Virtual Reality Distraction Intervention					
O ₂ or O ₅	Evaluation of Intervention Questionnaire					

Instruments

- **Adapted Symptom Distress Scale**
(Rhodes et al., 2000)
- **State-Trait Anxiety Inventory for Adults**
(Spielberger, 1983)
- **The Revised Piper Fatigue Scale**
(Piper et al., 1988)
- **Presence Questionnaire (PQ)**
(Witmer & Singer, 1998)
- **The Immersive Tendency Questionnaire (IQT)**
(Witmer & Singer, 1998)

Data Analysis

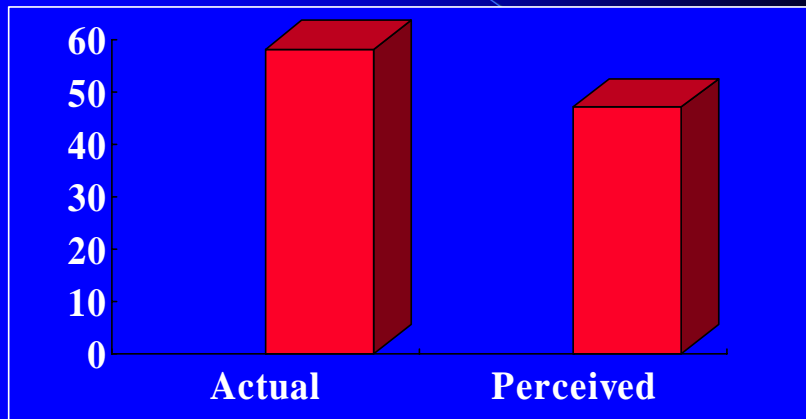
- ◆ Descriptive Statistics
- ◆ Inferential Statistics
 - ◆ sequence group equivalency
 - ◆ VR-Control group differences

Results

Significance Tests: intervention vs control

- No Significant Differences any of the outcomes (Symptom Distress Scale, State Anxiety, or Piper Fatigue Scale) between the control condition and VR condition immediately following and 48 hours following chemotherapy.
- An cross over effect was noted in that individuals who received the VR intervention during the first chemotherapy treatment had significantly ($p < .01$) less anxiety immediately following chemotherapy as compared with the second treatment.

Perception of Time



$t = 4.722$ $p < .0001$

Evaluation of Virtual Reality Intervention

Overall Experience

- 100% indicated that this treatment was better than the previous treatments
- No subjects indicated that the virtual reality experience made them feel worse
- 86% liked the virtual reality intervention
- 82% indicated that they would like to use the virtual reality again

Secondary Analysis

- Correlations between Symptom measures immediately following chemotherapy and score on Presence Questionnaire (Witmer & Singer, 1998)
 - State Anxiety -.308**
 - Fatigue -.296**
 - Symptom Distress -.141

Correlation is significant at $p \leq .01$



Effect of VR on Symptoms following Chemotherapy

	Kids 10-17	Women 26-55	Women >50	Adults M/F
Sample size	N=11	N=20	N=16	N=123
Symptom Distress	.06*	.095*	.63	.43
Anxiety	.11	.23	.10*	.14 (.01)*+
Fatigue	-----	.04*	.91	.52
Altered time perception	-----	.001*	.001*	.001*

* Significant outcomes

+ Subjects who used VR during first chemotherapy treatment

Evaluation of VR Intervention

	Kids 10-17	Women 27-55	Wome n >55	Adults M/F	Total
Sample size	N=11	N=20	N=16	N=123	N=170
Better than previous Chemotherapy treatment	82%	100%	100%	100%	99%
Made me feel worse	0%	0%	0%	0%	0%
Liked using the VR	100%	95%	100%	86%	89%
Would use VR again during chemotherapy	100%	95%	100%	82%	86%

Results and Recommendations for Clinical Practice

- Results of these studies support the use of virtual reality with older children and adults receiving chemotherapy
- The virtual reality intervention was well received
- The virtual reality intervention did not require practice to be effective
- In some cases, symptom distress, fatigue, and anxiety levels improved when using the intervention
- Use of virtual reality significantly altered time perception
- Monitor patients using the virtual reality and discontinue if any untoward reactions (headache)
- In all studies, measures of symptom distress demonstrated that this population did not experience any signs of cybersickness

Recommendations for Research and Future Plans



- Explore the effect of repeated use of the VR distraction intervention
- Test intervention with different samples and different response variables
- Compare virtual reality to other distractors
- Explore how coping style or immersive tendency effects the use of distraction interventions
- Examine how age or gender influence outcomes following use of VR.