



Sandra Billinger

Clinical Instructor

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Education

- **University of Kansas University Medical Center (KUMC)**, Kansas City, KS, May 2002 – current
 - PhD Rehabilitation Sciences, anticipated date of graduation – May 2009
 - Master of Science Physical Therapy, May 2004
- **Fort Hays State University (FHSU)**, Hays, KS, August 1997- May 2002
 - Bachelor of Science in Physical Education, Minor in Gerontology, May 2002
- **Exercise Specialist**, Certified by the American College of Sports Medicine, 2003

Career History

- **University of Kansas Medical Center**, Clinical Instructor, June 2008
 - Teaching Responsibilities for Doctor of Physical Therapy students
 - PTRS 825, Exercise Physiology
 - PTRS 826, Cardiopulmonary Rehabilitation
- **SummitCare, Inc**, June 2007-current
 - Physical Therapist (PRN)
 - Responsible for delivery of Physical Therapy services to individuals with cardiopulmonary, and neurological impairments in a skilled nursing facility.
- **Aegis Therapies**, May 2005- 2008
 - Physical Therapist (PRN)
 - Responsible for the delivery of Physical Therapy services to individuals with neurological and psychological impairments in a skilled nursing facility
- **Meadowbrook Rehabilitation Hospital**, May 2004-January 2006
 - Physical Therapist, Head Injury Unit
 - Responsible for the delivery of Physical Therapy services to individuals with neurological impairments from acute to post-acute inpatient rehab (cardiopulmonary, neurological PT)
 - Active member for the Head Injury Team and co-initiated pre-vocational/community re-entry program
 - Appointed to task force for policy and procedure development for Head Injury Program
- **Stroke Dynamics Research and Consulting**, February 2002- current

Owner

- Consulting on various projects regarding stroke and physical activity programs
 - Invited public speaker at various conferences
 - Initiated development of a holding mitt for use with upper extremity deficits
 - Created presentations for Senoh Corporation, Tokyo, Japan; Rehab facilities, Canada
 - Develop educational presentations
- **Stroke Wellness and Research Center**, Fort Hays State University (FHSU), Hays, KS, 2000 - 2002
- #### Program Manager/Research Assistant
- Designed and implemented exercise program for chronic stroke survivors
 - Recruit and retain quality staff and student volunteers to successfully meet the needs of patients
 - Facilitated communication between the Program Director, family, caregivers, and nursing homes
 - Created yearly budget and managed all aspects of finances, budget, and secured external funding
 - Coordinated research projects among fellow staff and faculty
 - Liaison for FHSU to the State of Kansas' Dept. on Aging for research projects
 - Balance assessment with NeuroCom's Balance Master, data collection, scheduling subjects

Research Interests

My research interests focus on cardiorespiratory fitness measures, exercise re-training post-stroke/brain injury and possible limitations associated with decreased levels of aerobic fitness. I have been involved

in research projects examining the changes in upper extremity function using bilateral reciprocal training and physiological responses to exercise in people post-stroke. Our lab has completed a project assessing the feasibility and validity of a novel graded exercise test (mTBRS-XT) for individuals post-stroke using a recumbent stepper. Current dissertation work has used Doppler ultrasound for assessing femoral artery changes after stroke. In addition, we are using single limb exercise training as an intervention to assess changes in femoral artery blood flow velocity and diameter in individuals post-stroke.

Affiliations/Professional Service

- Reviewer, *Archives of Physical Medicine and Rehabilitation*
- American Heart/Stroke Association
 - Fellow (FAHA) American Heart Association Stroke Council, September 2004
 - Abstract grader for the International Stroke Conference, 2004-2007
 - Stroke Council Committee Member, Nursing and Rehabilitation Professionals, February 2004-2006
 - Session moderator, 30th International Stroke Conference, New Orleans, LA, February 2-4, 2005.
- American Physical Therapy Association (APTA), Sections on Cardiopulmonary, Neurology and Geriatrics Kansas City Neuro Study Group
- North American Brain Injury Society
- International Council on Active Aging (ICAA)

- American College of Sports Medicine (ACSM)

Academic Appointments

- Invited Guest Lecture, Components of Clinical Stress Test, PTRS 826, Cardiopulmonary Rehabilitation, February 11, 2008
- Invited Guest Lecture: Cardiovascular Physiology, December 10, 2007, PhD course
- Course coordinator, PTRS 825, Exercise Physiology, Fall 2007
- GTA position, PTRS 825- Exercise Physiology, Fall 2005, 2006
 - Invited Guest Lecture: Cardiovascular Response to Exercise 2-hour lecture, 2005, 2006
- GTA position, PTRS 705 – Physical Therapy Interventions, Spring 2006
- GTA position, PTRS 852- Neuromuscular Therapeutics I, Summer 2006
 - Invited Guest Lecture: Traumatic Brain Injury 2-hour lecture and 4-hour lab, 2006, 2007, 2008
- GTA position, PTRS 853- Neuromuscular Therapeutics II, Fall 2006

Volunteer Work

- Meet the Science Mentor, sponsored by the Science Pioneers, Fall 2005
- Chairperson for Operation Stroke Committee for Ellis County ('01-'02)
- Coordinator for first annual stroke conference (May 11,2002), "Life After Stroke: Picking Up the Pieces"
- Assisted in starting and developing American Heart Association Operation Stroke for Ellis County
- American Heart Association Operation Heartbeat Committee Member for Ellis County ('00-'02)
- American Heart Association Mass CPR Training Volunteer ('01, '02)
- American Heart Association Heart Walk ('99, co-captain '00, captain '01)
- Top Fund Raiser ('00,'01) for Heart Walk
- Volunteer for Northwest Kansas Stroke Support Group

Grants and Funding

- Foundation for Physical Therapy, APTA, PODS II Award, \$15,000.00, Sept 2008-2009, **(unfunded)**.
- American Heart Association Pre-Doctoral Award, Heartland Affiliate, The Effect of Single Limb Exercise Training on Femoral Artery Blood Flow and Oxygen Uptake in Chronic Stroke." January 2008-December 2009, \$25,000.00 **-unfunded**.
- Kansas Partners in Progress, Inc. "The Effect of Single Limb Exercise Training on Femoral Artery Blood Flow and Diameter in People with Chronic Stroke." (Billinger, PI) **\$565.00**. (April 2007- December 2007).
- Sonosite, Inc. Equipment grant. Doppler ultrasound for blood flow pilot project **\$70,000.00**. (February 2007-May 2009).
- American Heart Association Student Scholarship in Cardiovascular Disease and Stroke. (June '03-May 2004), **\$2,000.00**.
- American Stroke Association Research Scholarship in Cerebrovascular Disease, (June '02-Dec. '02), **\$2,000.00**.
- Secured funding for northwest Kansas stroke conference, "Life After Stroke: Picking Up the Pieces," \$4,200.00 with match grant from United Methodist Health Ministry Fund, \$3,000.00. Total monies raised, **\$7,200.00**.

- "The Effectiveness of an Aerobic-Based Exercise Program on Enhancing the Quality of Life of Elderly Chronic Stroke Survivors", (Cho, PI); Medicaid and Kansas Department on Aging, **\$59,000.00**, total direct costs, July 2001- July 2002, research assistant, development of budget, and appointed liaison for FHSU with Kansas Department on Aging (Billinger)
- Secured funding for continuation of Stroke Wellness and Research Center (Billinger), **\$8,265.00**, Northwest Kansas Area Agency on Aging (Oct. '01- Oct. '02)
- Secured funding for continuation of Stroke Wellness and Research Center (Billinger), **\$8,265.00**, Northwest Kansas Area Agency on Aging (Oct. '00- Oct. '01)
- Secured funds from Northwest Kansas Area Agency on Aging for a NuStep total body seated stepper, **\$2,800.00**
- Secured funds from private donation of **\$10,000.00** for equipment
- Establishment of a Rural Stroke Research and Rehabilitation Center for the Improvement in Quality of Life, **\$1,250.00** total cost, (Cho, PI, Billinger, Co-PI), Northwest Kansas Area Agency on Aging

Publications

- **Billinger, SA** and Kluding, PM. The Effect of Single Limb Exercise Training on Femoral Artery Blood Flow and Oxygen Uptake in Chronic Stroke: A Case Study (under review, *Topics in Stroke Rehabilitation*)
- **Billinger, SA** and Kluding, PM. Use of Doppler Ultrasound to Assess Femoral Artery Adaptations in the Hemiparetic Limb in Chronic Stroke (submitted to *Archives of Physical Medicine and Rehabilitation*)
- **Billinger, SA**, Kluding, PM, and Tseng, BY. Modified Total Body Recumbent Stepper Exercise Test (mTBRS-XT) to Obtain VO₂ Peak in People With Chronic Stroke. (accepted with revisions *Physical Therapy*)
- **Billinger, SA**, Loudon, JK, and Gajewski, B. The Validity of a Recumbent Stepper for Obtaining Maximal Oxygen Consumption. (in press, *Journal of Strength and Conditioning Research*.)
- Kluding P, and **Billinger S**. Exercise-Induced Changes of the Upper Extremity in Chronic Stroke Survivors. *Topics in Stroke Rehabil*, 2005; 12(1): 58-68.
- **Billinger, S**. "Physical Fitness and the Stroke Survivor." *Functional U*. vol. 1(3), June 2003; p. 5-13.

Published Abstracts

- **Billinger, SA**, Kluding, PM, and Tseng, BY. Femoral Artery Blood Flow Velocity and Diameter Changes in the Hemiparetic Limb in Chronic Stroke. [abstract]. *Stroke*: 39(2):549.
- **Billinger, SA**, Loudon, JK, and Gajewski, B. The Validity of a Recumbent Stepper for Obtaining Maximal Oxygen Consumption. [abstract]. *Cardiopulmonary Physical Therapy Journal*; 2007: 18(4):28.
- **Billinger, SA**, Kluding, PM, and Tseng, BY. The Effects of Single Limb Exercise Training on Femoral Artery Blood Flow in Chronic Stroke: A Case Study. [abstract]. *Journal of Neurologic Physical Therapy*. December 2007; 31(4): 202.
- Kluding, PM, Tseng, BY, and **Billinger, SA**. (2007). Response to Exercise in People with Both Stroke and Diabetes. [abstract]. *Diabetes*. June 2007; 56(S1):A638.
- **Billinger, SA**, Tseng, B, and Kluding, PM. Use of a Recumbent Stepper to Obtain VO₂ Peak in People with Chronic Stroke. [abstract]. *Journal of Gerontology*. December 2006.

- **Billinger, SA**, Loudon, JK, and Gajewski, B. The Validity of a Recumbent Stepper for Obtaining Maximal Oxygen Consumption. [abstract]. *Medicine and Science in Sports and Exercise*. May 2006; 38(5):S363.
- **Billinger SA**, Cho J, Bouckhout V and Gobert DV. Total body reciprocal training improves hand function in chronic stroke survivors [abstract]. *Stroke*. 2004;35(1):287.
- **Billinger, S**, Gobert, D, Cho, J, Bouckhout, V. "Changes in Upper Extremity Function in Chronic Stroke Survivors Involved in Total Body Reciprocal Training [abstract]. *Arch Phys Med and Rehab*. 2003; 84(10):E11.

Non-Peer Reviewed Articles

- **Billinger, SA**. "The NuStep cross trainer may help elevate cardiorespiratory fitness after stroke. Advance for Directors in Rehabilitation. 2006.
- **Billinger, S.A**. "New Exercise Options in Kansas," Stroke Connection Magazine, July/August 2001.
- **Billinger, S.A**. "Fort Hays Program Changes Lives," Kansas Connections for Rural Health Education and Services, vol. 9, no. 1. Summer 2001.

Presentations

- **Billinger, SA**. The Effect of Single Limb Exercise Training on Femoral Artery Blood Flow in Chronic Stroke. KUMC Student Research Forum, Platform Presentation, April, 2008.
- **Billinger, SA**, Kluding, PM, and Tseng, BY. Femoral Artery Blood Flow Velocity and Diameter Changes in the Hemiparetic Limb in Chronic Stroke. Invited platform presentation, International Stroke Conference, February 2008.
- **Billinger, SA**, Tseng, BY and Kluding, PM. The Effect of Single Limb Exercise Training on Femoral Artery Blood Flow in Chronic Stroke: A Case Study. Invited platform presentation, APTA Combined Sections Meeting, Neurology section, February 2008.
- **Billinger, SA**, Loudon, JK, and Gajewski, B. Use of a Recumbent Stepper to obtain maximal oxygen consumption in healthy adults. Invited platform presentation, APTA Combined Sections Meeting, Cardiopulmonary section, February 2008.
- **Billinger, SA**. Use of Recumbent Stepper to Obtain VO₂ Peak in Chronic Stroke, KUMC Student Research Forum, Platform Presentation, (**Cardiovascular Biology section winner**), April, 2007.
- Tseng, BY, **Billinger, SA**, and Kluding, PM. Relationship between Post-stroke Fatigue, Aerobic Fitness, Motor Control and Depression: A Pilot Study. Poster presentation. 4th Annual Capitol Graduate Research Summit, Topeka, KS, March 2007
- Macko, R, **Billinger, SA**, Rimmer, J. Exercise Prescription and Fitness Post-stroke: "Limitations with Exercise Testing and Prescription in People Post-stroke. Invited Symposium. International Stroke Conference, American Heart Association, Feb. 2007
- **Billinger, SA**, Tseng, BY, and Kluding, PM. Use of a Recumbent Stepper to Obtain VO₂ Peak in People with Stroke. Invited Platform Presentation. Combined Sections, Gerontology Section, APTA, Boston, MA, Feb, 2007.
- **Billinger, SA**, Tseng, BY, and Kluding, PM. A Total Body Recumbent Stepper Exercise Test to Obtain

VO₂ Peak in People with Stroke. Invited Platform Presentation, Student Section, ACSM Central States Meeting, Kansas City, MO, Oct 2006.

- **Billinger, SA.** Aerobic Exercise Training in Individuals Post-Stroke. Invited Platform Presentation. Fifth Annual PT Conference, sponsored by KUMC AHEC, Hays, KS September 2006.
- **Billinger, SA.** Traumatic Brain Injury. Invited Platform Presentation. 5th Annual PT Conference, sponsored by KUMC AHEC, Hays, KS September 2006.
- **Billinger, SA.** Aerobic Exercise Training in Individuals Post-Stroke. Invited Platform Presentation. AACVPR National Meeting, Charleston, WV, September 2006.
- **Billinger SA,** Loudon JK and Gajewski B. Use of a Recumbent Stepper to Obtain Maximal Oxygen Consumption, American College of Sports Medicine, Poster Presentation, ACSM Annual Meeting, Denver, CO, June 2006.
- **Billinger SA,** Loudon JK and Gajewski B. Use of a Recumbent Stepper to Obtain Maximal Oxygen Consumption, American College of Sports Medicine, Platform Presentation, Student Section, Central States Annual Meeting, October 2005.
- **Billinger, S,** Brown, T, and Smith, K. "Community Reintegration: A Transdisciplinary Rehab Program for Individuals with Traumatic Brain Injury." Evidence-Based Practices: Strategies to Improve Healthcare, Hays Medical Center and Fort Hays State University, Hays, KS, May 4, 2005.
- **Billinger, S.** Use of Recumbent Stepper to Obtain Maximal Oxygen Consumption, KUMC Student Research Forum, Platform Presentation, (**Cardiovascular Biology section winner**), April, 2005.
- **Billinger, S.** "Neuroplasticity and Stroke Rehabilitation." Invited Speaker, Nursing and Rehab Professions Roundtable, 30th International Stroke Conference, American Stroke Association. New Orleans, LA, February 2-4, 2005.
- **Billinger, S.** "Brain Injury: The Effects, Rehabilitation, and Exercise Retraining." Invited Platform Presentation. Central States Annual Meeting, American College of Sports Medicine. Kansas City, MO, October 1-2, 2004.
- **Billinger, S.** "Benefits of Total Body Reciprocal Training in Physical Therapy." Invited Platform Presentation. American Retirement Corporation, Dept of Rehabilitation. Nashville, TN, June, 2004.
- **Billinger, S.** "Total Body Reciprocal Training Improves Hand Function in Chronic Stroke Survivors." Invited Platform Presentation. "Evidence-Based Practice: Strategies to Improve Healthcare," sponsored by Hays Medical Center and Fort Hays State University, Hays, KS, May 5, 2004.
- **Billinger, S,** Gobert, D, Cho, J, Bouckhout, V. "Total Body Reciprocal Training Improves Hand Function in Chronic Stroke Survivors," Poster Presentation, American Stroke Association, 29th International Stroke Conference, San Diego, CA, February 2004.
- **Billinger, SA,** "Future of Stroke Recovery Training." Invited Platform Speaker, Communicating the Message of Physical Activity to the Older Adult, sponsored by the International Council on Active Aging, Orlando, FL., December 4-6, 2003.
- **Billinger, S,** Gobert, D, Cho, J, Bouckhout, V. "Changes in Upper Extremity Function in Chronic Stroke Survivors Involved in Total Body Reciprocal Training." Poster Presentation. American Congress of Rehabilitation Medicine, National Meeting, Tucson, AZ October 23-26 2003.
- John E, Gajewski B, Gobert D, Bouckhout V, **Billinger S,** and Cho, J. "Cardiovascular Response of Chronic Stroke Survivors to an Aerobic Exercise Training Program." Poster Presentation, Annual American College of Sports Medicine Conference, San Francisco, CA. June 2003.

- **Billinger, S**, Cho, J, Bouckhout, V, Gobert, D. "Changes in Hand Function in Chronic Stroke Survivors Involved in an Intense Reciprocal Exercise Program." Poster Presentation KUMC Student Research Forum. April 2003.
- Gobert D, Cho J, Bouckhout V, Kim S, **Billinger S**, Santos M, and Kapros I. "Can an Exercise Program with Total Body Reciprocal Training Improve Gait and Balance in the Chronic Stroke Survivor?" Poster Presentation, Conference of the International Society for Postural and Gait Research. Sidney, Australia. March 24, 2003.
- **Billinger, S**, Gobert, D, Cho, J, Bouckhout, V. "Changes in Hand Function in Chronic Stroke Survivors Involved in an Intense Reciprocal Exercise Program." Poster Presentation American Physical Therapy Association Combined Sections Meeting, Tampa, Fl. February 12-16 2003.
- Cho, J, Gobert, D, Bouckhout, V, **Billinger, S**. "Cardiovascular Changes in Stroke Survivors in an Aerobic Exercise Program." Poster Presentation American College of Sports Medicine Central States Meeting. Embassy Suites Hotel, Kansas City, MO. October 11-12, 2002.
- **Billinger, S.A.**: "Stroke Research and Wellness Programming," Invited Clinical Presentation, KU Medical Center Area Health Education Center, Professional Stroke Conference, Hays, KS, May 10, 2002.
- **Billinger, S.A.**: "Stroke Research and Wellness Programming," Invited Presentation, Betsy Johnson Hospital Rehabilitation Department, Dunn, NC, March 2002.
- **Billinger, S.A.**: "Stroke Wellness Programs and Research," Invited Presentation, NuStep Inc., Ann Arbor, MI, October 2001.
- **Billinger, S.A.**: "Stroke Rehabilitation and Research," Invited Presentation and Round Table Discussion, American Heart Association Regional Volunteer Recognition Conference, August 2001.
- **Billinger, S.A.**: "Stroke Rehabilitation," Invited Presentation, Northwest Kansas Area Agency on Aging Annual Board Meeting, August 2001.
- Cho, J.K., **Billinger, S.A.**: "The Effects on Aerobic Training in Chronic Stroke Survivors with Physiological, Sensory Organization, Balance, and Gait Measurements," Invited Clinical Presentation, Central States American College of Sports Medicine (ACSM) Conference, Oct 2000.