



Celebrating Research on Aging:

Building Collaborations for the Future

Date: Tuesday, April 19, 2011

Location: William Pitt Union Ballroom, University of Pittsburgh

Sponsor: Aging Institute of UPMC Senior Services and the University of Pittsburgh

*Aging Institute
of UPMC Senior Services and the University of Pittsburgh*

Presenter: Gustavo J. Almeida, PT, MS
Education: Centro Universitario do Triangulo – UNITRI (Brazil)
Current Position: Research Physical Therapist
Principal Area of Research Interest: Measures of Physical Activity
Current Research Support: none
Mentor(s): Sara R. Piva, PT, Ph.D

Validity of Portable Devices to Assess Physical Activity in Patients with Total Knee Arthroplasty

Almeida GJ, Brower KS, Celik D, Chang HC, Piva SR
 University of Pittsburgh, School of Health and Rehabilitation Science, Dept. of Physical Therapy

Study: Total knee arthroplasty (TKA) is known to reduce pain, improve function, and health-related quality of life in end-stage knee osteoarthritis. Patients expect to be more active after surgery, thus valid measures of physical activity (PA) are needed to monitor these changes. Information on the validity of portable monitors in TKA is limited. We aimed to: 1) compare measures of energy expenditure (EE) given by the SenseWear armband (SWA) (Bodymedia, Pittsburgh, PA) and the Actigraph (ACT; Pensacola, FL), against measures given by indirect calorimetry; and 2) characterize PA in TKA using the SWA and ACT in a free-living condition.

Methods: EE (kcal/min) was estimated by indirect calorimetry (MedGraphics VO2000), and by the SWA and ACT simultaneously. Patients performed several standardized activities for 7min each in a laboratory setting, while concurrently wearing the SWA on the arm, the ACT on the waist, and the facemask of the indirect calorimeter. To characterize PA in a free-living condition, patients wore the SWA and ACT over 8 consecutive days. Pearson correlation or Spearman coefficients were calculated according to data distribution.

Results: 21 patients, 14 females (67%), with unilateral TKA underwent one testing session. Mean age and BMI were 68±7 and 29±4 respectively; time after surgery was 3.3±0.3 years; and physical function measured by the Western Ontario and McMaster Universities Osteoarthritis Index 14.6±9.6, indicating only moderate functional limitations. During the standardized activities (Table) the correlations between EE measured by VO2000 and SWA ranged from moderate to high (r=.22 to .82), and between VO2000 and ACT, ranged from weak to moderate (r=-.18 to .69). In a free-living condition, patients wore the SWA and ACT for 97% of the time each day (23:20hr/24hr). Daily values of physical activity EE (PAEE) measured by the SWA (124 [88-251]kcal/day) was lower than the one measured by the ACT (163.5 [138-168]kcal/day). The correlation between these two measures was weak (rho=.26, p=.29).

Conclusion: Our results support the validity of the SWA and ACT to measure EE in patients with TKA in a laboratory setting. The SWA was more accurate in measuring EE during non-walking activities, whereas the ACT was more accurate in measuring EE during walking activities. Measures of PA EE given by the SWA and ACT in a free-living condition did not agree.

Significance: When assessing EE in patients with TKA, it is essential to consider type of PA monitor to use according to type of activity performed. Studies are warranted comparing SWA and ACT to a reference standard measure of PA in free-living condition.

Funding Source: School of Health and Rehabilitation Sciences Research and Development Fund (Honor’s College at the University of Pittsburgh), and Pepper P30 AG024827.

TABLE . Correlation coefficients between energy expenditure in kcal/min measured by indirect calorimetry and the Sensewear Armband (SWA) and the Actigraph (ACT).

	Indirect Calorimetry								
	Lying down	Sitting Reading	Seating Typing	Standing Talking	Standing Moving Arms	Mopping	Usual walk	Slow walk	Fast walk
SWA	.82**	.69**	.72**	.75§**	.49§*	.61§**	.22	.39	.42
ACT	---	.22§	-.18§	.36§	.24§	.03§	.66**	.69**	.55**

§ Spearman’s rho; * p ≤ .05; ** p ≤ .01

Presenter: Carolyn M. Amspaugh, LCSW
Education: University of Michigan School of Social Work
Current Position: Social Work Interventionist
Principal Area of Research Interest: Medication Adherence
Current Research Support: P01NR010949
Mentor(s): Judith A. Erlen

Medication Reconciliation: A Critical Element in Managing Medications

CM Amspaugh, JA Arida, LK Tamres, R Kaufman, MB Happ, F Tang, J Lingler, JA Erlen
University of Pittsburgh School of Nursing

Study: Assessment of medication taking practices is necessary to ensure that patients are taking their medicines correctly as prescribed prior to intervention to promote medication adherence. The purpose of this project is to describe the process of medication reconciliation used in a randomized control trial designed to improve the medication management skills of informal caregivers who are assisting community dwelling patients with varying levels of memory loss.

Methods: At the baseline assessment, the names of all medications, as well as dosage, frequency, mode of delivery, and prescriber for each are recorded directly from the patient's medication bottles. Additionally caregivers are interviewed to assess actual practice. After a medical information release is signed, the information is transcribed to a simplified form and transmitted to the primary prescribing physician. Physicians are asked to confirm medication regimens and identify any discrepancies. Confidentiality of the patient is protected during this process. Should the reconciliation form not be returned within 5 business days or contain unclear information, we follow-up by phone. We track the number of days to receive the completed form from the physician, the number of prompts required, and the number and nature of any medication discrepancies identified. In cases with discrepancies, follow-up letters are sent to both the physician and the caregiver-patient dyad.

Results: To date we have reconciled 12 baseline medication assessments. All of the physicians have been cooperative and most (8) have returned the forms within 1 to 3 business days. With prompts, all have responded within 11 business days. Three physicians required prompts to complete the reconciliation. Results showed that 3 of 12 cases had discrepancies. One discrepancy was a medication reported by caregiver not listed in the medical record. Two additional discrepancies were differences in dosages reported by caregiver vs. medical record.

Conclusion: Even though our sample is small to date, discrepancies have been identified that needed to be resolved prior to intervention.

Significance: Regimen clarification is important to ensure that patients are taking medicines as prescribed to avoid adverse outcomes such as hospitalizations or untoward events.

Funding Source: NIH/NINR #P01NR010949

Presenter: Mark E. Bernard

Education: University of Pittsburgh School of Medicine

Current Position: Medical Student

Principal Area of Research Interest: Osteoporotic and Radiation effects Upon The Bone Marrow

Current Research Support: NIA T32AG21885

Mentor(s): Joel S. Greenberger, M.D.

Osteoporotic Effects Upon The Bone Marrow

ME Bernard, H Kim, MW Epperly, J Goff, JS Greenberger

University of Pittsburgh Cancer Institute, Department of Radiation Oncology

Study: Osteoporosis is a pathological condition characterized by low bone mass with microarchitectural disruption and skeletal fragility seen in the elderly population. We determined the effect osteoporosis has upon hematopoiesis and the rate of bone healing by using the Samp6 mice model of osteoporosis.

Methods: Long term bone marrow cultures were established from Samp6 osteoporotic mice and control SamR1 mice and cobblestone islands of hematopoietic cells, nonadherent cells, and bone marrow stromal cells were counted and recorded. To measure the rate of healing, the right femur was irradiated to 20Gy. Twenty-four hours after, holes were drilled into both the right femur and tibia. Mice were sacrificed 21 or 35 days later, their respective bones were fixed, the holes were X-rayed, and the diameter of the hole was measured.

Results: The Samp6 cultures stopped producing cobblestone islands and nonadherent cells at week 25. The SamR1 cultures were still active at week 30. Samp6 bone marrow stromal cells had a decreased rate of growth compared to the SamR1 bone marrow stromal cells. The nonirradiated Samp6 bones had a decreased rate of healing with significantly larger holes when compared to the SamR1 mice seen at day 21 ($p = 0.0318$). Irradiation reduced bone healing in both Samp6 and SamR1 mice ($p = 0.0240$ and $p = 0.0015$, respectively) evidenced by larger hole diameters seen at day 21. At day 35, the irradiated Samp6 bone still had decreased bone healing also evidenced by a larger diameter hole ($p = 0.0003$) when compared to the nonirradiated bone, which was not seen in SamR1 mice.

Conclusions: Osteoporotic cultures showed reduced hematopoietic and bone marrow activity which may be due to increased aging of the Samp6 cultures. This model for osteoporosis also showed a decrease rate of bone marrow repair and healing response to irradiation.

Significance: These findings could explain the increased risk of anemia and rate of infection seen in the elderly and may lead to a treatment variable for radiation therapy for the elderly population with osteogenic tumors. Testing the effect of antioxidant free radical scavengers, Tempol and JP4-039, upon the rate of healing on both osteoporotic and normal bones is being evaluated.

Funding Source: National Institute of Aging, grants T32AG21885.

Presenter: Lottie Brewer, Gloria Enright, Courtney Estep, Vanessa O'Neill, Shannon Shipe, Ali Williamson

Education: University of Pittsburgh

Current Position: Family nurse practitioner students

Principal Area of Research Interest: Pressure ulcers in the geriatric population

Current Research Support: Not applicable

Mentor: Kathy Puskar RN, PhD, FAAN

Repositioning to Prevent Pressure Ulcers in the Geriatric Population

L Brewer, G Enright, C Estep, V O'Neill, S Shipe, A Williamson

University of Pittsburgh, School of Nursing

ABSTRACT: Our purpose was to perform a thematic analysis of the literature in order to determine if turning and repositioning every two hours is effective in preventing pressure ulcers, decubiti in the geriatric population. Healthy People 2010 lists reducing pressure ulcer incidence as an objective for all health care providers. They can cause substantial harm to patients, hindering functional recovery, frequently causing pain and the development of serious infections, and mortality. Nearly 60,000 US hospital patients are estimated to die each year from complications due to hospital-acquired pressure ulcers. It can cost up to \$70,000 to manage and treat a single full-thickness ulcer and the total cost for treatment in the US is estimated at \$11 billion per year. Furthermore, Medicare is no longer providing reimbursement to health care facilities for the care of patients who have developed stage 3 and 4 decubiti. In our review of the literature, we found that only 1 out of 8 articles recommended a more frequent turning interval than the current standard of every two hours. However, the remaining articles demonstrate a lack of evidence defining optimal frequency of repositioning of either two or four hours. Despite this, the literature has indeed validated that regular movement of the at-risk geriatric population is imperative. Consequently, more research is needed on this topic.

Presenter: Michelle Cain, BSN

Current Position: Assistant Nurse Clinical Manager

Principal Area of Research Interest: Nursing Education and Quality Improvement in Elderly Mental Health Care Services

Mentor(s): Cami Herisko; LalithKumar K. Solai, MD

Reduction of Restraint use in Elderly Inpatient Mental Health Unit

Michelle Cain, RN; LalithKumar K. Solai, MD; Cami Herisko

University of Pittsburgh Medical Center, Department of Psychiatry

Study: Restraint use in elderly patients is a major concern as it has been related to functional decline and overall poorer outcomes. We in our 42 bed inpatient geriatric psychiatry unit had seen a gradual increase in the number of restraints over the few years prior to the intervention. There are several steps that have to be taken prior to placing a patient in restraint. Though there were several reasons for the increase in these restraint uses, we identified one particular intervention to have the potential to decrease the use of restraints in our inpatient geriatric psychiatry unit.

Methods: Starting March 2010, we implemented a policy to have the unit nurse (nurse requesting restraint) to contact the nurse clinical manager by phone to discuss the need for the restraint before contacting the physician for an order for restraint.

Results: Prior to the intervention, the no. of episodes of restraints in FY2009 was 731. This was predominantly for medical safety n=720 (vs behavioral n=11). Post intervention, the no. of episodes of restraints went down to 267 (Medical n= 246 vs behavioral n = 21). The no. of falls over the period of decrease in restraint did not change despite decrease in the restraint use.

Conclusion: The simple intervention to contact the nurse clinical manager prior to placement of restraints significantly decreased the no. of episodes of medical restraints in our inpatient geriatric psychiatry unit. This created the opportunities to explore more options and approaches and provided ongoing education on the appropriate use of restraints to the immediate clinical team.

Significance: This data suggests that discussing with a knowledgeable nurse manager may be an effective way to decrease the use of medical restraints in elderly patients.

Funding Source: None

Presenter: Nicholas Castle, Ph.D.

Education: The Pennsylvania State University

Current Position: Professor of Health Policy & Administration

Principal Area of Research Interest: Long-term care

Current Research Support: 1R01HS017532-01A1 (Agency for Healthcare Research and Quality)

The Influence of Consistent Resident Assignment on Nursing Home Deficiency Citations

NG Castle, J Engberg

University of Pittsburgh School of Public Health, Department of Health Policy & Administration

Study: The association of consistent resident assignment of Nurse Aides (NAs) with quality of care and quality of life of nursing home residents is examined (using five groups of deficiency citations).

Methods: Data used came from a survey of nursing home administrators, the Online Survey Certification and Reporting data, and the Area Resource File. The information including consistent resident assignment and staffing variables of Registered Nurses, Licensed Practical Nurses, and NAs were measured in 2007, and come from 3,941 facilities. Negative binomial regression and multivariate logistic regression models were used.

Results: An average of 68% of nursing homes in this sample reported using consistent resident assignment. However, the actual level of NA consistent resident assignment used varied substantially. Only 28% of nursing homes using NA consistent resident assignment did so at the often recommended level of 85% (or more). In the multivariate analyses, Quality of Life deficiency citations (Resident), Quality of Life deficiency citations (Staffing), Quality of Life deficiency citations (Facility), and Quality of Care deficiency citations were significantly ($p < .01$) lower in facilities with the highest levels of consistent NA resident assignment. Few significant findings were found in nursing homes using lower levels of consistent resident assignment.

Conclusion: Consistent resident assignment has developed as a preferred practice in nursing homes based on little empirical evidence. The findings presented here provide some justification for the use of this staffing practice for NAs.

Significance: Many quality initiatives have advocated consistent resident assignment (e.g., the Advancing Excellence in America's Nursing Homes Campaign goals and objectives). Nevertheless, the rationale in advocating for this preferred practice is weak. Few empirical analyses have shown the benefits of this approach to care.

Funding Source: Agency for Healthcare Research and Quality

Presenter: April Chambers, Ph.D.

Education: Swanson School of Engineering

Current Position: Laboratory Manager and Research Coordinator

Principal Area of Research Interest: Slips and Falls in Older Adults

Current Research Support: NIOSH (R03 OH007533)

Mentor(s): Rakié Cham, Ph.D.; Arash Mahboobin, Ph.D.

Insights Into the Role of Proactive Strategies in Postural Responses to Slips Using Gait Simulations

A Chambers, R Cham, A Mahboobin

University of Pittsburgh School of Engineering, Department of Bioengineering

Study: Maintaining balance during walking in challenging environments requires two types of postural strategies: reactive and proactive. Reactive strategies are generated in response to a perturbation, such as a slip or trip. Proactive strategies are generated when expecting the risk of being perturbed. The objective of this study was to explore, through simulations, the differences in lower extremity muscles utilized during proactive strategies.

Methods: Normal walking kinematics and bilateral ground reaction forces were collected from a healthy young subject and an older subject to examine age-related differences in proactive strategies in normal walking trials immediately preceding (baseline dry) and following (anticipation dry) an unexpected slip trial. A 3-D musculoskeletal model was developed and used to obtain a kinematically consistent set of joint angles and muscle excitations using the measured motions and ground reaction forces.

Results: The simulated muscle excitations of several lower extremity muscles were different between the baseline and anticipation dry trials. Age-related differences were seen in the left anterior gluteus medius muscle excitations. Specifically, the older subject had elevated left anterior gluteus medius excitation levels when anticipating a slippery floor (i.e., in the anticipation dry trial), while the young subject did not.

Conclusion: It is likely that the increased hip extensor muscle excitations observed during anticipation trials would be associated with reduced slip risk.

Significance: Differences found in simulated excitations of the lower extremity muscles likely reduce slip risk when anticipating a slippery floor.

Funding Source: National Institute for Occupational Safety and Health (R03 OH007533)

Presenter: Lichun (Rebecca) Chia

Education: School of Nursing, University of Pittsburgh

Current Position: Post-doctoral Associate

Principal Area of Research Interest: Health Information Technology and diabetes care management and health disparities in diabetes related care and outcomes

Current Research Support: AHRQ T32

Mentor: Howard Degenholtz, PhD

Health Disparities among Medicare Beneficiaries with Diabetes and Other Chronic Conditions

L.,Chia, PhD, RN, Center for Research on Health Care H., Degenholtz, PhD, Graduate School of Public Health

Study: The overall health of the American population has gradually improved in recent decades, however, racial and ethnic minorities still experience higher morbidity and mortality than non-minorities. In patients with diabetes, inadequate treatment and management of the conditions can result in complications. Racial and ethnic minorities have disparities in access to and use of primary care. Evidence-based studies have shown that complications of diabetes can be prevented with appropriate monitoring and management; however, there are disparities in quality for diabetes care. The purpose of this study was to compare access to care and diabetes related care management and outcomes between whites and racial minorities with diabetes and additional comorbid conditions.

Methods: This was a secondary data analysis using 2002 and 2004 data from the nationally representative Medicare Current Beneficiary Survey. Univariate and bivariate, and regression analyses were used to examine the racial differences in access and utilization of health care services, as well as health related outcomes. Medicare Beneficiaries 65 and older who have diabetes were included in the study. The final analytic sample had 3441 observations.

Results: In bivariate analyses, whites were more likely to have private insurance, shorter duration of having diabetes, and are less likely to be prescribed insulin ($p = .000$ -.002). Whites are more likely to report having adequate knowledge for managing their diabetic conditions (76% vs. 62%; $p = .000$). Blacks with no comorbid conditions have fewer diabetes related complications than Whites ($p = .000$), but blacks with 3 or more comorbid conditions have more diabetes related complications than whites ($p = .027$). Whites report greater knowledge about diabetes self-management ($p = .000$). In multivariate regression models that adjust for socio-demographic characteristics and health status, race did not have a consistent direct effect on diabetes related complications, however, knowledge about diabetes self-management was associated with fewer diabetes related complications ($p = .000$).

Conclusions: After adjusting socio-demographic characteristics and health status, race did not have a consistent direct effect on diabetes related complications. Diabetes related knowledge was associated with fewer diabetes related complications.

Significance: Interventions that improve patients' care management knowledge seem to have a positive impact on health outcomes. Longitudinal studies are necessary to assist policy makers in tracking the improvements.

Funding Resource: AHRQ T32

Presenter: Becky Clarkson, PhD

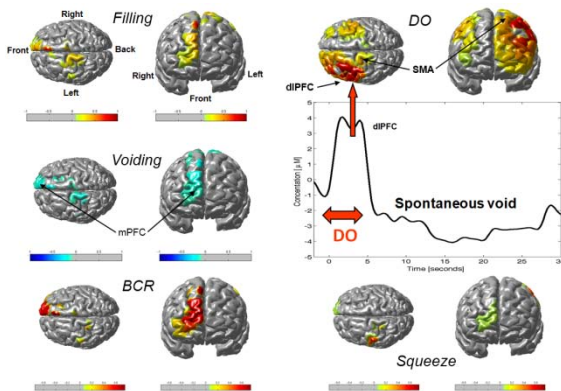
Current Position: Research Associate, Research Associate in Urinary Incontinence, Supported by Division of Geriatric Medicine, Mentor: Stasa Tadic, MD

Research Support: Some salary support from NIH R03 grant (not BC/TH)

Functional near infrared spectroscopy during comprehensive urodynamic testing **B Clarkson, W Schaefer, N Resnick, D Griffiths, T Huppert, S Tadic**

Study (Purpose/Relevance): Urge urinary incontinence (UI) is prevalent, morbid and costly in the older population. The cause of the underlying pathology is not understood; little progress has been made for decades, but now there is increasing evidence that the cause is loss of the brain's control of the bladder. Our team has studied central control of the bladder using fMRI but, as knowledge progresses, a more flexible technique is required. PET and fMRI can only investigate simple repetitive event in a restricted environment. Here we report on our first attempt to measure brain activation using functional near infra-red spectroscopy (fNIRS), a non-invasive neuroimaging technique which can be used in a clinical environment, and gives information comparable to fMRI during comprehensive bladder testing.

Methods: As a feasibility study of fNIRS to image brain activity during bladder testing, 6 subjects aged >60 years with >5 episodes of UI per week were recruited to undergo comprehensive, testing with simultaneous fNIRS of the pre-frontal cortex (PFC) and supplementary motor area (SMA). IRB approval and informed consent was obtained. Testing included pelvic floor muscle contractions (PFMC), bulbocavernosus reflex (BCR) and repeated filling and voiding, carried out with simultaneous fNIRS. Comparison of fNIRS baseline data to spontaneous events was used to map activation and deactivation of brain areas for comparison with fMRI data.



Results The figure shows regional activity (averaged over three successful fNIRS subjects) which is: increased in PFC and SMA during filling; decreased in these regions during voiding; increased in the medial PFC during BCR; and increased in the dorsolateral prefrontal cortex during detrusor overactivity (a cause of UI).

Conclusions When mapping activity in specific brain regions, fNIRS shows activation and deactivation in regions of interest similar to our fMRI studies. Although these results have not yet reached statistical significance (due to the small number of participants), this preliminary work is suggestive that fNIRS and fMRI are in agreement. Confirmatory work to compare simultaneous fMRI and fNIRS is planned.

Significance fNIRS can be used in a clinical environment and has potential to extend the work of our previous brain/bladder studies to more extensive clinical testing without the restrictions of a conventional, restrictive brain scanning environment such as fMRI.

Research Support: *Some salary support from NIH R03 grant (not BC/TH)*

Presenter: Kyaien O. Conner, PhD, LSW, MPH
Education: University of Pittsburgh
Current Position: Assistant Professor
Principal Area of Research Interest: Late Life Depression
Current Research Support: NIMH K23 MH090151-01
Mentor(s): Charlotte Brown, PhD; Charles F. Reynolds, III, MD

Giving Back to Their Communities: Peer Education as Productive Engagement for Depressed Elders of Color

Author(s): Conner, K1, Reynolds, C1, Morrow-Howell, N2, Brown, C1
Affiliation(s): 1Department of Psychiatry, University of Pittsburgh School of Medicine, 2Department of Social Work, Washington University of St. Louis

Study: Research suggests that individuals who have personal experience with the mental health treatment system gain unique and potentially valuable insight from their treatment experiences. By sharing concrete and practical skills learned during their own experience with mental illness, Peer Educators (PEs) can act as positive role models for individuals currently in a state of mental distress. PE and support services also offer a mechanism for working with vulnerable populations, such as older adults and racial/ethnic minorities, who are in need of mental health services, but may feel alienated from the traditional mental system. However, little research has examined the impact of participating in these activities on the PEs themselves.

Methods: Participants included 10 African American older adults currently working as Peer Educators. Surveys were completed by participants to attain information about their perceptions of being in the project and how it has impacted their views on mental health, mental health treatment and productive engagement. In addition, semi-structured interviews were conducted at 6 and 12 months into the program to attain a more in depth understanding of their experiences.

Results: Peer Educators (PEs) identified that they have personally benefited from being in the project, and 100% self-reported improved self-esteem, self-confidence and self-efficacy. In addition, 100% of participants stated that since their participation as a PE they are more positive about seeking mental health treatment, that they are more interested in learning about mental health, and that their outlook about mental health treatment has significantly improved.

Conclusion: Peer Education has potential value toward engaging depressed clients in treatment; reinforcing effective self-management strategies through peer modeling; reducing stigma through exposure to others who have been through depression treatment; and serving as a model for community-based depression education and productive engagement efforts for African American older adults.

Significance: These findings highlight the importance of developing productive engagement roles for older adults that can be incorporated into research and mental health practice.

Funding Source: NIMH grant K23MH090151-01 (PI: Kyaien Conner, PhD), Staunton Farm Foundation

Presenter: Jayme Day, RN, BSN

Current Position: Graduate Student/Professional Staff Nurse School of Nursing

Principal Area of Research Interest: Acute Care

Current Research Support: University of Pittsburgh School of Nursing

Mentor: Kathryn Puskar RN, DrPH, FAAN

Open versus Restrictive Hours in ICU: Effects on Aged Patient, Family, and Staff Satisfaction

Dalia Alhasanat RN, BSN; Jayme Day RN, BSN; Larry Goisse RN, BSN; Heba Khalil RN,BSN
Shannon Moore RN, BSN; Miranda Moskal RN, BSN; Julie Seifert RN, BSN

Admission to an intensive care unit (ICU) is very stressful and overwhelming to aged patients, families, & nurses. Approximately 55% of all days spent in the ICU are by patients over the age of sixty-five. It is believed that the presence of a patients' family has an effect on their outcomes. Several studies have been conducted to show variability in patient, family, & nurses' perception of visiting hours. The purpose of this poster is to investigate perceptions and develop a visitation policy that meets the needs of patients, families, and nurses. A brief literature review was conducted and revealed numerous studies addressing visiting hours in the ICU. Results suggest: The majority of nurses believe that unrestricted visiting hours are beneficial for patients; however, many feel unrestricted visiting hours interfere with nursing care. The majority of patients and families perceive open visiting hours as a positive aspect to their ICU experience. Implementing open visiting hours is challenging for nurses, yet rewarding for patients and families. An open visiting hour policy is recommended with circumstantial guidelines.

Presenter: Howard B. Degenholtz, PhD

Co-Authors: Abby Resnick, MA; Natalie Bulger, BSW

Education: University of Minnesota

Current Position: Associate Professor of Health Policy and Management

Principal Research Area: Long-Term Care, Quality of Life

Current Research Support: The Commonwealth Fund

Improving Quality of Life in Nursing Homes: From Innovation to Implementation

The recent introduction of MDS 3.0 and the changes to the nursing home inspection system (survey and certification) have increased attention to resident quality of life (QOL). However, nursing home operators face a lack of practical tools for assessing and improving resident (QOL). We previously developed and demonstrated the efficacy of an assessment and care planning system for improving resident QOL: the Quality of Life Structured Resident Interview and Care Plan (QOL.SRI/CP). The key elements of the QOL.SRI/CP are the generation of quarterly quantitative QOL scores that can be used to track individual and facility level change and feasible, concise QOL related care plan tasks. Residents are shown to experience improvements in QOL over 90 days. We have developed an organizational-level program to disseminate the QOL.SRI/CP. The materials have been produced in a format that is compatible with the MDS 3.0, facilitating adoption and minimizing the training necessary. The implementation model involves commitment from top management, staff training and iterative implementation. We tested our training and implementation materials with four facilities and conducted three large group training sessions using a train-the-trainer model. This approach is compatible a range of quality improvement techniques. The materials are also available on the project website. Results show that facilities that staff are able to incorporate the additional QOL questions into their routine with limited additional time commitment.

Specific and measureable objective: After attending this session, participants will be able to describe the QOL.SRI/CP system for improving quality of life in nursing homes as well as be able to describe the implementation strategy for a typical nursing home.

Presenter: Nivedita Deshpande

Education: University of Pittsburgh

Current Position: Graduate Student of Health Policy & Administration

Principal Area of Research Interest: Long-term care

Current Research Support: None

Mentor(s): Nicholas Castle, Ph.D.

Continuum of Resident Centered Care in Nursing Homes

Deshpande, N. & NG Castle,

University of Pittsburgh School of Public Health, Department of Health Policy & Administration

Study: In the 1990s, some providers transitioned from a regimented, institutionalized model of nursing home care towards a more homelike approach in which residents could have a say in their day-to-day lives. This became known as resident centered care and the movement was termed "culture change." In this research, we examined how embedded this care has become in nursing homes.

Methods: A survey was developed from the existing literature on culture change. This identified 32 different areas of resident centered care (e.g., do residents have a choice when they want to go to bed?). The survey was sent to 4,000 randomly selected nursing homes (Response Rate =67%).

Results: Results indicated that 22% of nursing homes are fully providing resident centered care. However, 16% do not use any resident centered approaches to care. Most nursing homes fall along a spectrum of providing this care, and most (>90%) indicated that they are actively planning to use additional approaches.

Conclusion: Resident centered care is an innovative approach to the planning and delivery of care, and may influence a resident's health outcomes and quality of life. Clearly, we have a long way to go until resident centered care replaces institutional approaches to care (use of over-head pages, set meal times, etc) in nursing homes.

Significance: Quality health care is every patient's right and becoming resident centered is a socially just and ethically responsible approach to care.

Funding Source: None

Presenter: Chetachi Akunna Emeremni

Education: University of Pittsburgh

Current Position: PhD Student

Principal Area of Research Interest: Geriatric Mood Disorders

Mentor(s): Mazumdar Sati, PhD; Benoit Mulsant, M.D

How Best to Quantify Response in the Treatment of Behavioral Disturbance with Dementia

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Motivation: Behavioral and psychological symptoms of dementia (BPSD) are non-cognitive neuropsychiatric symptoms. There is no consensus on the best instrument that accurately assesses and measures treatment response for BPSD in patients with dementia.

Objective: To compare the Empirical behavioral Pathology in Alzheimer's Rating Scale (EBEHAVE AD), Neurobehavioral Rating Scale (NBRS), and the Neuropsychiatric interview (NPI) in assessing BPSD and detecting clinical improvement using data from the clinical trial 'A Double Blind Comparison of Citalopram and Risperidone for the Treatment of Behavioral and Psychotic Symptoms Associated with Dementia'.

Methods: We compared improvement over time for both behavioral and psychotic syndromes in patients with moderate or higher BPSD severity.

Results: The detection of syndromes and their response to treatment differed between instruments. The NPI best detected clinical improvement in response to treatment for the behavioral syndrome ($Q = 33.84$, $p < 0.0001$). There was no difference between instruments for detecting clinical improvement for the psychotic syndrome ($Q = 1.8462$, $p = 0.40$). The areas under the curve (s.e) did not differ significantly: 0.77 (0.05) for the EBEHAVE AD, 0.85 (0.04) for the NBRS and 0.80 (0.048) for the NPI.

Conclusion: There was no statistically significant difference in ROC curves for the E-BEHAVE-AD, NBRS, and NPI. The NPI was superior at detecting clinical improvement for the behavioral syndrome of BPSD target symptoms.

Significance: Optimizing the assessment of response to treatment of BPSD may prove useful in future clinical trials.

Funding Source: National Institute of Mental Health, grants T32 MH 73451-5

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Presenter: Annabel Ferguson

Education: B.S. in Chemistry, University of Pittsburgh

Current Position: Lab Technician and Graduate Student

Principle area of research: Aging and Stress

Current research support: AG028977

Mentor: Alfred L. Fisher, MD, PhD.

Identification of a Novel Role for Tyrosine Aminotransferase in Insulin Signaling

Annabel A. Ferguson¹, Kaitlyn Kormanik¹, Patrick Hu², and Alfred L. Fisher¹.

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In *C. elegans*, the *daf-2* insulin-like signaling pathway is linked to determination of lifespan and formation of dauer larvae, which is an alternative larval stage triggered to avoid adverse conditions. The kinases *akt-1*, *akt-2*, and *sgk-1* act within the *daf-2* pathway to prevent the FOXO transcription factor DAF-16 from initiating dauer formation. Inhibition of *akt-1* alone produces dauer formation only at high temperature, while loss of both *akt-1* and *akt-2* always results in dauer arrest. An additional pathway that determines dauer formation includes the *eak* (*enhancer of akt-1*) genes, including *eak-3*, *eak-4*, *hsd-1*, *sdf-9*, and *eak-7*, which augment the effects of *akt-1* on dauer formation. In an RNAi screen, the worm tyrosine aminotransferase homolog *tatn-1* was identified as an enhancer of dauer formation in *eak-4* mutants. Tyrosine aminotransferase is the first enzyme in the tyrosine degradation pathway and has been extensively studied as an insulin target gene. We have found that increased levels of tyrosine enhance *eak-4* dauer arrest as mutations in either *tatn-1* or the immediate downstream gene *hpd-1*, or an increase in dietary intake of tyrosine lead to dauer formation in *eak-4* mutants. We found that tyrosine levels also determine lifespan, as *tatn-1* mutants are longer lived in either a wild type or *eak-7* background. Further, increased tyrosine levels augment the *daf-c* phenotype of *daf-2* mutants, while *daf-2* itself appears to positively regulate the expression of *tatn-1*. The *tatn-1 eak-4* interaction occurs upstream of *daf-16* and *daf-12*, but downstream of *pdk-1*. Neither an *akt-1* nor *akt-2* null allele interacts with *tatn-1*, but loss of the AMP kinase *aak-2* or *akt-1* gain of function mutants block dauer formation by an *eak-4/tatn-1* double mutant. Together these results suggest that insulin signaling controls the cellular level of tyrosine through modulating the expression of *tatn-1*, and that high levels of tyrosine act through *akt-1* and *aak-2* to antagonize insulin signaling. *eak* genes act to reduce *daf-16* transcriptional activity and inhibit activation of *daf-16* target genes. Tyrosine may interact with *eak* genes by promoting *daf-16* phosphorylation or trafficking by effects on *akt-1* and *aak-2*.

Presenter: Shawn Flanagan

Education: University of Pittsburgh

Current Position: Graduate Student of Health Policy & Administration

Principal Area of Research Interest: Long-term care

Current Research Support: None

Mentor(s): Nicholas Castle, Ph.D.

A Model for Lower Cost, Higher Access, and Better Quality Disease Prevention in America

Flanagan S. & NG Castle,

University of Pittsburgh School of Public Health, Department of Health Policy & Administration

Study: The objective of this research was to develop a wellness delivery model to address chronic diseases in America in order to prevent and better manage chronic disease and improve quality of life.

Methods: In order to create a wellness benefit management model, we examined the costs, consequences, and benefits of wellness using public information. A pharmacy benefit management (PBM)-based structure was used to create a model that would purchase and manage lower cost, higher quality wellness benefits. We used market and financial data to assess structure, conduct, and growth in the wellness sector.

Market forces in health care were analyzed to better understand value propositions for participants and the plausibility of our model. A balanced scorecard was then created to communicate key operational and financial drivers that we derived from our research. Initial funding opportunities were then identified.

Results: Fitness facilities are expecting revenue increases of 5% from 2010 to 2011. The number of providers is increasing rapidly, with 29% growth from the 2008 level of 260,000. Current provider growth is associated with a number of factors, including baby boomer-related demand and rising chronic disease prevalence. Despite widespread organizational restructuring as a consequence of the economic downturn, 93% of sponsors reported no planned reduction in health promotion programs.

Conclusion: The environmental factors surrounding wellness benefit management are dynamic and uncertain, but the potential impact is large. The model would take years to reach productive capacity, and would be unlikely to benefit the underserved initially. Nonetheless, this model could deliver high quality wellness benefits to the majority of Americans through their employers, and play a critical role in the creation of a healthy America.

Significance: Chronic conditions consume 75 cents of every health care dollar, and at least 18% of these costs are directly attributed to wellness problems (including physical inactivity, poor nutrition, chronically-elevated stress, and smoking). This represents over 330 billion dollars, and is responsible for over one-third of potential life lost before age 65. Wellness problems have large economic consequences, costing employers 400% more than disease treatment.

Funding Source: None

Presenter: Jason D. Flatt, MPH, CHES

Education: Doctoral Student

Current Position: Graduate Student Researcher

Principal Area of Research Interest: Psychosocial influences on aging and cognition.

Current Research Support: Department of Behavioral and Community Health Sciences, Graduate School of Public Health

Mentor: Steven M. Albert, PhD, MS

Title: Comorbid chronic diseases and mental health disorders in older adults: Risk and protective factors.

Authors: Jason D. Flatt¹, Steve M. Albert¹, Donald Musa², Myrna Silverman¹ & Richard Schulz^{2,3}

¹Department of Behavioral and Community Health Sciences, Graduate School of Public Health ²University Center for Social & Urban Research, ³Department of Psychiatry, University of Pittsburgh.

Study: Guided by the life-span theory of control, we explored risk and protective factors for comorbid depression and anxiety in older adults with two chronic diseases: osteoarthritis and ischemic heart disease. The life-span theory suggests that optimal primary and secondary (OPS) control strategies help older adults with managing their health problems.

Methods: Data are based on a population-based sample of older African Americans (N=443) and whites (513) who reported on self-care practices. Multiple linear regression analysis was used to assess whether constructs of the life-span theory of control were associated with depression and anxiety symptomatology independently and conjointly.

Results: Those with ischemic heart disease and females were at greater risk for comorbid depression and anxiety. After adjusting for age, race, and health conditions, memory impairment and pain remained significant risk factors for depression, whereas memory impairment was not a significant risk factor for anxiety or comorbid depression-anxiety. Higher levels of OPS control strategies were associated with less risk for depression, anxiety, and comorbid depression-anxiety (B=-1.53, p<.001; B= -2.16, p<.001; B=-3.69; p<.001, respectively).

Conclusions: Research has suggested that control strategies are important for managing health threats and quality of life. Our findings suggest that older adults with higher levels of control strategies are at a decreased risk of mood disorders. Interventions for increasing self-care strategies in older adults with comorbid chronic illness and depression-anxiety may help to alleviate these psychological problems, improve adaptation to health stresses and increase overall quality of life.

Presenter: Nicole R. Fowler, PhD, MHSA

Education: University of Pittsburgh, GSPIA, Department of Public Policy

Current Position: Assistant Professor of Medicine and Clinical and Translational Science

Principal Area of Interest: Medical decision making for older adults with cognitive impairment

Current Research Support: AHRQ K12 HS019461-01

Mentor(s): Amber Barnato, MD, MS, MPH and Judy Saxton, PhD

Impact of Prescription Drug Coverage on use of Anti-dementia Drugs

NR Fowler, Y Chen, JM Donohue

University of Pittsburgh, Department of Medicine, Division of General Internal Medicine

Study: Dementia is an incurable disease. The most promising advances in treatment include cholinesterase inhibitors and memantine. Use of these expensive medications is controversial due to limited evidence in achieving clinically meaningful improvements. While use has substantially increased, the relationship between insurance for drugs and uptake of anti-dementia drugs is unknown.

Methods: A retrospective cohort study of pharmacy and medical claims from Medicare managed care beneficiaries ≥ 65 years old who were alive and continuously enrolled in one of the largest Medicare Advantage plans in Pennsylvania from 2003-2007 (n=35,102). The primary independent variable in the generalized estimating equation (GEE) with negative binomial distribution is the type of pharmacy benefit group: no quarterly pharmacy benefit limits (no cap) (n=9,487); pharmacy benefit limits [quarterly limits of \$150 (n=2,662) or \$350 (n=19,104)]; or no drug coverage (n=3,939). The interaction of group and pre-post Medicare Part D explored the relationship.

Results: Use of any anti-dementia drugs across all insurance groups ranged from 2.39% in 2004 to 5.26% in 2007. The group with no coverage for drugs experienced the largest growth in use with 1.85% of the population using at least one anti-dementia drug in 2004 and 5.26% in 2007. Among all beneficiaries, 1,197 (3.4%) had at least one prescription for a ChEI or memantine before Medicare Part D, and 1,846 (5.3%) had at least one prescription after Part D. Unadjusted increases in uptake among those with at least one prescription before Part D did not differ by insurance group. Multivariable analyses show that the increasing use within each insurance group is significant, and the increasing rate between the intervention groups for no drug coverage and quarterly limits of \$150 are statistically different compared to the control group that had no cap on drug coverage.

Conclusion: Despite weak evidence, anti-dementia drugs have experienced increased use from 2004-2007. Our findings show that uptake has occurred over time despite Medicare coverage or price. We believe that these results are partly based on the hopelessness and fear that this disease invokes in patients and their families and physicians continue to prescribe these drugs and patients are willing to pay for them.

Significance: Our findings show a significant increase in use of anti-dementia drugs over time despite insurance coverage, price or evidence of effectiveness.

Funding source: Agency for Healthcare Research and Quality K12 HS019461-01

Presenter: Nicole R. Fowler, PhD, MHSA

Education: University of Pittsburgh, GSPIA, Department of Public Policy

Current Position: Assistant Professor of Medicine and Clinical and Translational Science

Principal Area of Interest: Medical decision making for older adults with cognitive impairment.

Current Research Support: AHRQ K12 HS019461-01

Mentor(s): Amber Barnato, MD, MS, MPH and Judy Saxton, PhD

Who Refuses a Diagnostic Assessment for Dementia in Primary Care?

NR Fowler, M Boustani, A Frame, AJ Perkins, S Gao, P Monahan

University of Pittsburgh, Department of Medicine, Division of General Internal Medicine

Study: Screening for dementia in primary care increases recognition and treatment of reversible causes of cognitive impairment and may delay of disease progression. Following a positive screen for dementia, patients may delay or decline a diagnostic assessment due to a variety of concerns. The purpose of this study is to compare the perceptions of screening between patients who screened positive for dementia but subsequently refused further diagnostic assessment for dementia with those who agreed to diagnostic assessment following a positive screening test.

Methods: Cross-sectional survey of 554 primary care patients ≥ 65 years old attending urban primary care clinics in Indianapolis, Indiana, in 2008-2009. Perceptions of dementia screening were measured with the Perceptions Regarding Investigational Screening for Memory in Primary Care (PRISM-PC) instrument. Refusing diagnostic assessment for dementia was determined by the percentage of patients who screened positive on at least one of two written screening instruments (MMSE or CSI-D) but subsequently refused a diagnostic assessment at a specialty clinic. Associations were assessed between scores on the domains of the PRISM-PC questionnaire, screening performance, and behavior regarding diagnostic assessment.

Results: 497 individuals completed the PRISM-PC and agreed to dementia screening. Of those, 63 (12.6%) screened positive and, among those, 42 (66.6%) refused diagnostic assessment. Those who refused diagnostic assessment did not differ in age, race, sex, education or income. Individuals who refused diagnostic assessment following a positive screening test were more likely to live alone ($p=0.008$). Bivariate comparison of the mean PRISM-PC scores of participants who refused a diagnostic assessment compared to those who accepted showed that there was a significant difference in the domain score for stigma of dementia screening (35.2 vs. 42.0; $P=.045$) but not in the other domains (benefits, loss of independence, and suffering related to dementia screening).

Conclusion: In order to improve acceptance of diagnostic assessments for dementia, development of a decision aid that describes the components of what a diagnostic assessment entails as well as emphasizing potential benefits of early identification and acknowledgment of the perceived stigma may reduce patient reluctance to undergo a diagnostic assessment for dementia following a positive screening test.

Significance: Intervening on patients and caregivers perceptions toward dementia diagnosis and treatment could potentially increase the number of patients seeking diagnostic assessment of dementia.

Funding source: Agency for Healthcare Research and Quality K12 HS019461-01

Presenter: Nicole R. Fowler, PhD, MHSA

Education: University of Pittsburgh, GSPIA, Department of Public Policy

Current Position: Assistant Professor of Medicine and Clinical and Translational Science

Principal Area of Interest: Medical decision making for older adults with cognitive impairment.

Current Research Support: AHRQ K12 HS019461-01

Mentor(s): Amber Barnato, MD, MS, MPH and Judy Saxton, PhD

Patients' Attitudes and Acceptance of Dementia Screening in Primary Care

NR Fowler, S Gao, A Frame, AJ Perkins, P Monahan, M Boustani .

University of Pittsburgh, Department of Medicine, Division of General Internal Medicine

Study: Beginning in January 2011, the Centers for Medicare and Medicaid Services began covering the cost of an annual wellness visit for beneficiaries. This visit will include screening for cognitive impairment. We studied primary care patients' perceptions of the risks and benefits of dementia screening and evaluated the association between these attitudes and patients' refusal or acceptance of screening.

Methods: Cross-sectional survey of 554 older patients attending urban primary care clinics in Indianapolis, IN. Perceptions of dementia screening were measured with the Perceptions Regarding Investigational Screening for Memory in Primary Care (PRISM-PC) instrument. Dementia screening refusal was determined by the percentage of patients who refused a cognitive performance screening for dementia after completing the PRISM-PC.

Results: After adjusting for age, attitudes of accepting other screening (e.g., cancer and depression), and perceptions regarding the availability of an effective treatment for dementia, those who refused screening had a lower perceived benefits mean score (67.3 ± 12.4) compared to those who accepted screening (73.0 ± 10.5) ($p = 0.001$). Patient age was significant. Compared to patients 65-69 years old, the ORs for refusal were 5.65 (95% CI 2.27 – 14.09) for those 70-74 years old; 3.63 (95% CI 1.32 – 9.99) for those 75-79 years old; and 2.44 (95% CI 0.78 – 7.66) for those ages ≥ 80 .

Conclusion: Patients who perceived lower benefits of early dementia screening were more likely to refuse the screening. Patients were also more likely to refuse screening.

Significance: In order to improve acceptance of dementia screening, development of a decision aid emphasizing the potential benefits of screening may reduce patient reluctance to be screened.

Funding source: Agency for Healthcare Research and Quality K12 HS019461-01

Presenter: Jessica Furnier

Education: University of Pittsburgh

Current Position: Graduate Student of Health Policy & Administration

Principal Area of Research Interest: Long-term care

Current Research Support: None

Mentor(s): Nicholas Castle, Ph.D.

Impact of Education of Nursing Home Administrators on Quality

Furnier, J. & NG Castle,

University of Pittsburgh School of Public Health, Department of Health Policy & Administration

Study: The top manager of most nursing homes is the Nursing Home Administrator (NHA). These top managers have a potentially important influence on the effectiveness of their organizations. In the research presented here, the relationship between NHA education and quality of care is examined.

Methods: One component of becoming a NHA is licensure. The qualifications for licensure are determined by individual state licensing agency. The components are highly variable from state to state and include differences in prior educational background, time in residency, and time in training. Primary data on NHA education was linked with nursing home quality information representing measures coming from a federal report card (Nursing Home Compare). The primary data came from a survey of 3,941 NHAs.

Results: Multivariate regression analyses were used for analyses. Four quality measures representing better quality were associated with better education. Moreover, the regression point estimates show that moving NHA education levels from a High School Diploma to a Bachelors degree would be associated with: 45% reduction in Physical Restraint Use; 40% reduction in residents with Moderate to Severe Pain; 27% reduction in incidence of Pressure Sores in Low-Risk Residents; and, 24% reduction in incidence of Pressure Sores in High-Risk Residents.

Conclusion: NHA licensure can be used as a policy option to potentially improve the quality of care in nursing homes.

Significance: 3.5 million elders per year receive care in nursing homes. Much of this care is sub-standard, and can cause considerable harm for elders. Improving management of nursing homes through NHA education may be of considerable benefit.

Funding Source: None

Presenter: Amanda L. Gentry

Education: University of North Carolina at Chapel Hill Gillings School of Global Public Health

Current Position: Project Director

Principal Area of Research Interest: Alzheimer's disease and other dementias

Mentor(s): Jennifer Lingler, Ph.D.

Health behaviors among older adults with Mild Cognitive Impairment.

AL Gentry, G Morgan, JH Lingler

University of Pittsburgh School of Nursing, Department of Health and Community Systems

Purpose: Although no specific interventions have been shown to prevent progression from Mild Cognitive Impairment (MCI) to dementia, anecdotal evidence suggests that clinicians may make various recommendations to affected individuals at the time of diagnosis. The purpose of this investigation was to characterize the range of health-related activities adopted by persons with MCI following diagnostic disclosure.

Methods: Sixty MCI participants were recruited from a memory disorders clinic and completed a one-time interview. Participants were asked about their intention to adhere to clinical recommendations and to report if they planned to adopt any further health-related activities as a direct result of their MCI diagnosis.

Results: Clinical recommendations included returning for yearly follow-up cognitive testing (96.7%) and pharmacologic (73.3%) and nonpharmacologic (20.0%) treatments. Patients invariably reported a high degree of intention for adherence. Most patients (61.7%) also reported planning to adopt health-related activities that exceeded clinical recommendations. These included behaviors to minimize the impact of symptoms (e.g., cognitive stimulation or cueing and reminder systems) (55.0%), health promotion activities (e.g., physical activity and nutritional adjustments) (20.0%), and increasing general activity (e.g., socialization) (16.7%). Participants who were more likely to report adopting health behaviors that went beyond clinical recommendations were college educated ($p < 0.05$), and had greater perceived control over their memory problems ($p < 0.001$).

Conclusion: Many MCI patients report intention to adopt protective behaviors in response to their clinical diagnosis in lieu of known therapies.

Funding Source: Alzheimer's Association

Presenter: Arjumand Ghazi, Ph.D

Education: University of California, San Francisco (UCSF)

Current Position: Assistant Professor of Pediatrics, Assistant Professor of Cell Biology and Physiology

Principal Area of Research Interest: Genetics of Aging in *Caenorhabditis elegans*

Current Research Support: Department of Pediatrics Start-up Funds

TCER-1, A Transcription Elongation Factor that Extends Lifespan in Response to Signals from the Reproductive System

Arjumand Ghazi^a, Sivan Henis-Korenblit^b and Cynthia Kenyon^c

^aCurrent address: University of Pittsburgh School of Medicine, Department of Pediatrics; ^bCurrent address: Bar-Ilan University, Israel; ^cUniversity of California, San Francisco;

Study: In worms and flies, the loss of germline-stem cells (GSCs) extends lifespan, thereby linking aging and reproduction, two central features of an animal's life history. The mechanism by which somatic tissues respond to reproductive signals and loss of the GSCs is not well understood.

Methods: We performed a large-scale RNAi screen to identify the genes essential for GSC removal to extend lifespan in *C. elegans*. Here, we report the function of TCER-1, a predicted transcription elongation factor, in promoting longevity. TCER-1 is required for loss of the GSCs to increase lifespan, and it acts as a regulatory switch in the process. When the GSCs are removed, the levels of TCER-1 rise in somatic tissues. This increase is sufficient to trigger key downstream events, as overexpression of *tcer-1* extends the lifespan of normal animals that have an intact reproductive system. Our findings suggest that TCER-1 promotes longevity by increasing the expression of a set of genes regulated by the conserved life-extending transcription factor DAF-16/FOXO. In addition to being required for loss of germ cells to extend lifespan, DAF-16/FOXO is required for reduction of insulin/IGF-1 signaling to increase lifespan. However, TCER-1 does not act in the insulin/IGF-1 pathway. Thus, TCER-1 specifically links the activity of a broadly deployed transcription factor, DAF-16/FOXO, to longevity signals from reproductive tissues.

Significance: This study begins to elucidate the molecular mechanisms that underlie the dialogue between aging and reproduction. Almost nothing is known about such genes in any system. The TCER-1/DAF-16/FOXO molecular model can lead to insights into how reproduction and aging intersect in other species. With a burgeoning global population of the elderly, and increasing trends towards delayed child-bearing, this research has relevance for many aspects of human health, especially those relating to procreation and longevity

Presenter: Nancy W. Glynn, PhD

Education: University of Pittsburgh

Current Position: Research Assistant Professor

Principal Area of Research Interest: Measurement of fatigability and fitness in older adults

Mentor(s): Anne B. Newman, MD, MPH

Physical Activity Plus Weight Loss Improves Fat Distribution, Lipids and Physical Function in Older Adults: A Randomized Clinical Trial

Glynn NW, Santanasto AJ, Goodpaster BH, Newman AB.

University of Pittsburgh GSPH/Epidemiology and School of Medicine, Department of Medicine

Study: Little is known about changes in fat distribution in older adults during a PA +WL intervention and their effect on cardiovascular risk and function. This study aims to examine the risks and benefits of WL in the context of a PA program designed to optimally preserve body composition and improve function.

Methods: Thirty-six overweight /moderately obese (BMI 28.0- 39.9 kg/m²), sedentary adults (mean 70.3 ± 5.9 yrs) were randomized into a 12-month PA+WL or PA plus successful aging health education workshop program (PA+SA). PA was ≥150 min/wk center-based and home treadmill or over-ground walking plus lower extremity resistance, balance and stretching. WL goal was 7% with calorie and fat gram goals based on the Diabetes Prevention Program. Body composition was measured by computed tomography and bone density by dual-energy x-ray absorptiometry. Blood pressure, triglycerides, fasting glucose, HDL-cholesterol and function (short physical performance battery, SPPB) were also obtained.

Results: PA+WL decreased body weight by 5.5% and BMI by 5.2% over 12 months, but were unchanged for PA+SA. Gluteofemoral subcutaneous adipose tissue, thigh intermuscular adipose tissue, thigh total fat and visceral adipose tissue all declined significantly for those in the combination PA+WL compared to PA only (Table 1). Total body and total hip BMD, systolic as well as diastolic blood pressure was unchanged for both. Triglycerides declined by 17.5% for PA+WL, but not for PA+SA. HDL-cholesterol increased by 8.4% in PA+WL. SPPB score improved 10% for PA+WL (p<0.05) and 2% for PA+SA (ns).

Conclusion: Weight loss in addition to physical activity significantly improved fat distribution, triglycerides and function compared to the PA intervention alone and bone mass was preserved.

Significance: These data suggest that the benefits of a weight loss program for older adults outweigh the potential risks.

Funding Source: CDC 1 U48 DP000025 and the Center for Aging and Population Health

Presenter: Siobhan Gregg, B.S.

Education: Bachelor's of Science, Cell Biology, from State University of NY at Binghamton

Current Position: Graduate Student Researcher, University of Pittsburgh

Principal Area of Research Interest: The contribution of DNA damage to cellular aging

Mentor(s): Laura J. Niedernhofer, MD PhD

Aging-related functional and histopathological changes in liver and kidney of DNA repair-deficient mice.

Gregg, S.Q., Robinson, A.R., Gutierrez, V., Woodell, T., Nakeo, A., Ross, M., Rigatti, L., Stolz, D.B., Niedernhofer, L.J.

Study: XPF-ERCC1 functions as a structure-specific endonuclease involved in the repair of helix-distorting DNA lesions, interstand crosslinks and some double-strand breaks. Mutations in *XPF* that reduce expression of XPF-ERCC1 lead to a progeroid syndrome, a disease of accelerated aging. Based on this, we hypothesize that endogenous DNA damage, if unrepaired, accumulates over time and drives the aging process.

Methods: To test this, we systematically compared tissues of 4 month-old, progeroid *Ercc1*^{-/-} mice, which express 10% of the normal level of XPF-ERCC1 to 30+ month-old wild-type (wt) mice to determine if there are significant parallels between rapid aging caused by DNA damage and normal aging.

Results: Analysis of serum from *Ercc1*^{-/-} mice revealed increased liver enzymes and reduced albumin, indicative of liver damage and dysfunction. Similarly, *Ercc1*^{-/-} mice displayed increased blood urine nitrogen and proteinuria, indicative of renal damage and dysfunction. These are common clinical findings in elderly humans as well as mice. Liver sections from old wt and progeroid *Ercc1*^{-/-} mice displayed necrosis, foci of hepatocellular degeneration and acute inflammation. Loss of hepatic architecture, periportal fibrosis, steatosis and heterogeneity of nuclear size were more exaggerated in *Ercc1*^{-/-} mice compared to old wt mice. Kidney sections revealed chronic progressive nephropathy (CPN), loss of renal tubular epithelia, hyaline casting, periglomerular fibrosis and glomerulosclerosis, which was again more exaggerated in the *Ercc1*^{-/-} mice than old wt mice. DNA base lesions were significantly increased in liver and kidney tissue from 21-week old *Ercc1*^{-/-} mice compared to 10 week-old *Ercc1*^{-/-} mice and littermate controls. Markers of cellular senescence, such as SA- β galactosidase and p16^{INK4a}, were increased in *Ercc1*^{-/-} and old wt liver compared to young wt controls. In concordance, the fraction of proliferating cells was significantly reduced in *Ercc1*^{-/-} mice following partial hepatectomy.

Conclusion: Collectively, these results demonstrate strong functional and histopathological parallels between accelerated aging driven by unrepaired DNA damage and normal aging.

Significance: The data demonstrate that unrepaired DNA damage accelerates the onset of senescence and loss of regenerative capacity characteristic of aging.

Funding Source: NIH/NIEHS RO1ES016114, The Ellison Medical Foundation (AG-NS-0303-05) and The University of Pittsburgh Claude B. Pepper Center (P30AG024827).

Presenter: Patricia M. Griffin

Education: B.S. Biology, University of Dayton

Current Position: Research Specialist IV

Principal Area of Research Interest: Immunobiology of Healthy Ageing and Longevity

Current Research Support: NIH

Mentor(s): Abbe N. de Vallejo, Ph.D.

Assessment of effector function of natural killer cells in highly functioning elders

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Study: Natural killer (NK) cells comprise the first line of host defense. Because of the myriad of NK-related receptors, there is controversy as to the biological relevance of varying degrees of prevalence of certain NK cell subsets in different elderly populations. Here, we focused on NK cells expressing CD56, the canonical NK receptor of yet unknown function. We examined whether prevalence of CD56⁺ NK cells in old age correlate with health and performance, and examined whether CD56 itself is a functionally competent signaling NK receptor.

Methods: We recruited community-dwelling elders aged ≥ 85 years (n=146) who are survivors of a longitudinal study of aging being recalled for their 21st year of clinical follow up. Blood samples were collected for NK cell analysis by flow cytometry. Transformed and primary NK cells were used in receptor crosslinking bioassays to evaluate CD56-driven cellular outcomes.

Results: By performance testing, categories of physically and/or cognitively impaired and unimpaired elders were identified. Cognitively, but not physically, unimpaired elders carried significantly higher numbers of CD56^{high} and CD56^{low} NK cells. Cellular bioassays showed that direct ligation of CD56 induced NK cell activation and effector differentiation as demonstrated by protein phosphorylation, by increased expression of activation antigens, cytotoxic granules, and vesicle degranulation molecules, and by specific cytokine production.

Conclusion: In line with the idea that immunity is a determinant of fitness and survival, our data demonstrate a unique NK cell signature of favorable health and performance in old age. Our data embody the first experimental evidence for the functionality of CD56 as an NK receptor.

Significance: Correlation between CD56⁺ NK cells and cognitive ability suggests a novel neuro-immune connection of longevity.

Funding Source: NIH grant R01 AG030734.

Presenter: Steven M. Handler, MD, PhD

Education: University of Medicine and Dentistry of New Jersey- New Jersey Medical School

Current Position: Assistant Professor of Biomedical Informatics

Principal Area of Research Interest: Medication and patient safety

Current Research Support: AHRQ R01HS018721

Suboptimal Laboratory Monitoring of Chronic Medications in Older Veterans Administration Nursing Home Patients.

SM Handler¹⁻³, X Wang³, SL Aspinall³, RA Stone³, MJ Pugh³, TP Semla³, JT Hanlon^{2,3}.

¹University of Pittsburgh School of Medicine, Department of Biomedical Informatics; ²University of Pittsburgh School of Medicine, Department of Medicine, Division of Geriatric Medicine; and ³VA Pittsburgh Health System

Objective: To estimate the prevalence and identify factors associated with suboptimal laboratory monitoring of certain chronic medications prescribed to older Veterans Administration (VA) Nursing Home Care Unit (NHCU) patients.

Design: Longitudinal study.

Setting: 133 VA NHCUs.

Participants: Cohort of 1,059 patients ≥ 65 years old, admitted between January 1, 2004 and June 30, 2005, who were prescribed ≥ 1 of the 9 chronic oral medications of interest for a period of ≥ 90 days.

Main Outcomes Measure: Frequency of suboptimal laboratory monitoring of these chronic medications defined as less than that recommended by consensus guidelines developed by a national panel of nursing home clinicians.

Results: Overall, 19.0% (201/1,059) of patients had suboptimal laboratory monitoring for chronic medications of interest. Few (26/201) had problems with ≥ 2 medications. Narrow therapeutic index medications commonly had suboptimal laboratory monitoring (i.e., 53.6% for theophylline, 26.5% for warfarin, 20.0% for lithium, 17.5% for phenytoin, and 14.3% for valproate). Suboptimal laboratory monitoring was also common for NSAIDs (39.1%) and corticosteroids (16.2%). Fewer laboratory monitoring problems were seen with diuretics (10.0%) or ticlopidine (0%). Only patients ≥ 85 years old (Adj. OR 0.52; 95%CI 0.31-0.88), and those who were prescribed ≥ 13 medications (Adj. OR 0.49; 95%CI 0.31-0.78) were less likely to have suboptimal laboratory monitoring.

Conclusions: Suboptimal laboratory monitoring of medications is common in VA NHCU patients and frequently involves narrow therapeutic index medications. Future research is needed to estimate the association between suboptimal laboratory monitoring on health outcomes.

Presenter: Susan E. Hardy, M.D., Ph.D.

Education: University of Pittsburgh School of Medicine; Yale University Graduate School

Current Position: Assistant Professor of Medicine

Principal Area of Research Interest: Functional recovery after medical illness

Current Research Support: NIA K23 AG030977

Mentor(s): Stephanie Studenski, MD, MPH

Medical Instability, Delirium, Depression and Participation in Rehabilitation among Older Adults in Post-acute Care

SE Hardy, SA Studenski

University of Pittsburgh School of Medicine, Department of Medicine, Division of Geriatrics

Study: Older adults in post-acute care must participate in rehabilitation to maximize the chance of functional recovery. Discharge from the hospital “quicker and sicker” may limit the ability of patients to participate in therapy. We examine the association of medical instability, delirium, and depressive symptoms with participation in therapy among 90 previously community-dwelling older adults admitted to skilled nursing facilities for post acute care.

Methods: Respiratory instability was defined as a new requirement for supplemental oxygen or hypoxia with rest or activity. Cardiac instability was defined as abnormal blood pressure or pulse or orthostatic changes. Symptom instability, assessed at rest and with simple activities, included fatigue, chest pain, other pain, and dizziness. Delirium was assessed with the Confusion Assessment Method and Depressive symptoms with the PHQ-9.

Results: Participants had mean \pm SD age of 82 \pm 8; 79% were female and 84% were non-Hispanic White. 22 participants (24%) were classified as having no, poor, or fair participation by therapists (versus good, very good, or excellent). Poor participation was significantly associated with delirium (23% vs. 6%, $p=0.04$) and greater ADL dependence (mean 5.2 vs. 4.2 of 7 ADLs, $p=0.046$). There were no significant differences between poor and good participants in age (83 vs. 81, $p=0.26$), female sex (86% vs. 76%, $p=0.37$), white race (86% vs. 84%, $p=0.84$), cognitive impairment (68% vs. 74%, $p=0.63$), depressive symptoms (5% vs. 10%, $p=0.40$), cardiac instability (23% vs. 19%, $p=0.71$), respiratory instability (23% vs. 15%, $p=0.38$), or symptom instability (86% vs. 78%, $p=0.39$).

Conclusion: Delirium and poor functional status are associated with poor participation in rehabilitation among older adults receiving SNF-based post-acute care.

Significance: Poor rehabilitation participation may mediate the relationship between delirium and poor functional outcomes. In addition to treating the underlying causes of delirium, post-acute care providers should develop methods to increase participation in rehabilitation by delirious patients.

Funding Source: K23AG030977, P30AG024827, UL1RR024153

Presenter: Swathi Hemachandra

Education: Indiana University, B.S. Psychology

Current Position: Research Specialist

Principal Area of Research Interest: Late-life Depression and Suicide

Current Research Support: NIMH R01 MH05436

Mentor(s): Katalin Szanto, MD and Alexandre Dombrovski, MD

Impaired executive functioning in contemplated and attempted suicide in late life

S Hemachandra, AY Dombrovski, M Butters, K Szanto

University of Pittsburgh Medical Center, Western Psychiatric Institute and Clinic

Study: We report findings from a case-control study examining the cognitive correlates of late-life suicide. The Mattis Dementia Rating Scale (DRS) and the Executive Interview (EXIT) were used to identify differences in global cognition and executive functioning, respectively, across four groups of older adults: suicide attempters, suicide ideators, nonsuicidal depressed older adults, and non-psychiatric controls.

Methods: Participants for this study include 228 older adults (mean age=70): 83 depressed suicide attempters, 43 depressed individuals with suicidal ideation, 54 non-suicidal depressed participants, and 48 non-psychiatric controls. Depressed participants were recruited from an inpatient psychogeriatric unit or late-life depression research clinic and met DSM-IV criteria for major depression. Participants were assessed within two weeks of inpatient admission or at the beginning of treatment as outpatients. Neuropsychological assessment took place in one or two sessions over 1-3 days.

Results: All four groups were comparable in terms of age, burden of physical illness, gender, and race, and the depressed groups were comparable with regard to severity of depression. Elderly suicide attempters and suicide ideators both performed significantly worse on the EXIT than both the nonsuicidal depressed and non-psychiatric control groups, (total score $p < 0.01$), while there was no difference in executive functioning performance between attempters and ideators (attempters: mean=10.6, SD= 5.3; and ideators: mean=10.6, SD= 6.4). The group differences in the EXIT total score remained significant after accounting for differences in Mini-Mental Status Examination (MMSE) score and years of education. The two suicidal groups performed worse than the non-psychiatric control group but not the nonsuicidal depressed group on the DRS.

Conclusion: Both elderly suicide attempters and suicide ideators suffer from impaired executive functioning compared to nonsuicidal depressed and nondepressed elderly.

Significance: Impairments in executive functioning represent a diathesis for both suicidal ideation and behavior in late-life depression, most probably by causing an accumulation of stressful life events due to deficits in problem solving.

Funding Source: National Institute of Mental Health Grant MH-05436

Presenter: Daniel Hochbaum

Education: Ph.D.

Current Position: Post-Doc

Areas of Interest: Molecular mechanisms of aging

Support: UPIA Pilot Program

Mentors: Alfred L. Fisher, MD Ph.D.

DAF-12 regulates a connected network of genes to ensure robust developmental decisions.

Daniel Hochbaum, PhD and Alfred L. Fisher, MD, PhD.

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The nuclear receptor DAF-12 has roles in normal development, in the decision to pursue dauer development in unfavorable conditions, and in the modulation of adult aging. Despite the importance of DAF-12, target genes for this receptor are largely unknown. To identify DAF-12 targets, we performed chromatin immunoprecipitation followed by hybridization to whole genome tiling arrays. We identified 1175 genomic regions as being bound in vivo by DAF-12, and these regions are enriched in known DAF-12 binding motifs and act as DAF-12 response elements in transfected cells and in transgenic worms. The genes near these binding sites include an extensive network of interconnected heterochronic and microRNA genes as DAF-12 targets. We also identified the genes of the miRISC complex, which are required for the control of target genes by microRNA, as putative DAF-12 target genes. During reproductive development, null alleles of *daf-12* produce mis-regulation of many of these genes, but only infrequently result in developmental phenotypes. In contrast, we and others have found that null *daf-12* mutations enhance the phenotypes of many miRISC and heterochronic target genes. We also found that environmental fluctuations significantly strengthen the weak heterochronic phenotypes of null *daf-12* alleles. Further in diapause, DAF-12 represses the heterochronic and miRISC target genes, and prior work demonstrates that dauer formation can often suppress the heterochronic phenotypes for many of these target genes in post dauer development. Together these data are consistent with *daf-12* acting to ensure developmental robustness to ensure commitment to adult or dauer developmental programs despite variable internal or external conditions.

Presenter: Victoria Hornyak, PT, DPT, GCS

Education: Doctor Of Physical Therapy, Temple University , 2009

Current Position: Instructor, Department of Physical Therapy, University of Pittsburgh

Areas of Interest: Translating Research to Best Practices in Geriatric PT

Support: Geriatric Academic Career Award (GACA) HRSA – K01HP20478

Mentors: Jessie VanSwearingen, PhD, PT; Jennifer Brach, PhD, PT

Title: Informing Fall and Fear Reduction Interventions: Gait, Physical and Cognitive Function and White Matter Disease by Falls and Fear of Falling Status.

Hornyak V, Brach JS, Wert DM, VanSwearingen J.

University of Pittsburgh, Department of Physical Therapy

Purpose: Fall history and fear of falling (FOF) relate to physical function and exercise. The relation of combined fall history and FOF with cognitive and physical performance and white matter disease (WMD) has not been examined. The purpose of this study is to describe gait, physical and cognitive function and WMD across groups defined by combined fall/FOF status.

Methods: Older adults, n=50 (mean age 76.8 ± 5.4 years), with slow and variable gait participated in a RCT of interventions to improve gait. Baseline measures were gait speed and stance time variability; Gait Efficacy Scale (GES); Survey of Fear of Falling in the Elderly (SAFFE – activity restriction scale); the Late-Life Function and Disability Instrument; Mini Mental State Examination (MMSE) Trail-Making B Test and Digit-Symbol Substitution Test (DSST), and WMD from structural MRI of the brain. Four categories of fall/FOF status were established. Measures of gait, function, cognition and WMD across fall/FOF groups were examined using one-way ANOVA, with post hoc tests for multiple comparisons.

Results: Differences across fall/FOF groups were found for gait variability ($F= 3.09$, $p=.04$), confidence in walking ($F=3.27$, $p=.03$), restriction of activity ($F=4.13$, $p=.01$) MMSE ($F=3.12$, $p=.04$) and WMD ($F=2.88$, $p=.05$). Fall/FOF status was not related to age, gait speed or physical function (all $p>.05$). Post hoc comparisons showed that falls/non-fearful (mean MMSE, 27.3) were different than two or more of the groups for MMSE (mean MMSE, 29.1, 28.8 and 28.9), $p<.02$, and WMD ($p \leq .03$). Unlike the other groups, the falls/non-fearful group's mean scores on Trails B (154.1s) and DSST (39.4) were below the age-adjusted norms for the tests.

Conclusions: For the older adults studied, groups defined by combined fall and FOF status primarily differed in cognitive function and WMD. Some aspects of cognition may contribute to a lack of fear, for example, poorer judgment may be a major factor in fall risk.

Significance: Physical therapists who work with older adults who are not fearful of falling, yet report a history of falls may adjust treatments accordingly, for example providing a safer physical environment vs. attempting to improve gait alone.

Support: The University of Pittsburgh OAIC (P30 AG024827);Geriatric Academic Career Award (HRSA – K01HP20478); Paul B. Beeson Career Development Award (K23 AG026766); Einstein Aging Study (AG03949-15); National Institutes of Health (TG32 AG00181) Cardiovascular Health Study (NIH contracts N01-HC-85079 through 85085 and HL 87079 through 87086)

Presenter: Tiffany F. Hughes, Ph.D., M.P.H.

Education: University of South Florida

Current Position: Postdoctoral Scholar in Geriatric Psychiatry

Principal Area of Research Interest: Modifiable risk factors for cognitive decline and dementia

Current Research Support: NIH T32 award #MH019986

Mentor: Mary Ganguli, M.D., M.P.H.

Title: Social Relationships and Mild Cognitive Impairment in a Community-Based Sample of Older Adults: The MYHAT Study

Authors: T.F. Hughes¹, J.D. Flatt², and M. Ganguli^{1,3,4}

¹Department of Psychiatry, ²Department of Behavioral and Community Health Sciences, ³Department of Neurology, ⁴Department of Epidemiology, University of Pittsburgh

Study: Various dimensions of social relationships are associated with better cognitive health outcomes in older adults. Structural dimensions of relationships consist of the size of the network and frequency of contact while functional characteristics include social connectedness (or social engagement) and social support. Social networks provide a context that allow for social engagement and feelings of connectedness. These characteristics are important because they can potentially be intervened upon to benefit cognitive function. We examined the association between these characteristics of social relationships and mild cognitive impairment (MCI).

Methods: Participants were 1,777 older adults (mean age 77.43, range 65-98 years) who completed the baseline assessment of a community-based study of mild cognitive impairment known locally as the Mon-Yough Healthy Aging Team (MYHAT) study. Social network was measured by the 1) number of confidants and 2) frequency of contact with family and friends; social engagement was measured by 3) group membership and 4) attending group activities; and connectedness was measured by 5) satisfaction with frequency of contact with family and friends and 6) feelings of loneliness. Cognitive status was defined using the Clinical Dementia Rating (CDR) scale, with a score of 0 equating to normal cognition and 0.5 for MCI. The odds of MCI versus normal cognition in relation to each of the six items were examined using logistic regression analyses adjusting for potentially confounding factors.

Results: A total of 1,293 participants were classified as normal cognitive status and 484 were classified as MCI. Older adults with 2-3 (OR=0.63, CI: 0.42-0.95) or more (OR=0.57, CI: 0.38-0.84) confidants compared with one or less, or who reported seeing family and friends once a month (OR=0.32, CI: 0.17-0.58) or more (OR=0.33, CI: 0.18-0.60) compared with rarely, were significantly less likely to be classified as MCI. The other social relationship measures were not associated with cognitive status.

Conclusions: Older adults who have more confidants and who see family and friends more often are less likely to have MCI, suggesting that enhancing structural features of social relationships may be beneficial for cognition and a target for cognitive interventions.

Presenter: Amanda Hunsaker, MPH

Education: Rollins School of Public Health of Emory University

Current Position: Doctoral Student, School of Social Work

Principal Area of Research Interest: Dementia and caregiving

Current Research Support: School of Social Work Tuition Scholarship

Mentor(s): Ellen Whyte, MD

Stroke and orthopedic patient adherence to discharge instructions following inpatient rehabilitation

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¹University of Pittsburgh School of Social Work, ²School of Medicine, Department of Psychiatry, ³UPMC Mercy, Department of Physical Medicine and Rehabilitation

Study: Adherence to discharge instructions following inpatient rehabilitation is critical for continued recovery, yet the discharge process is complex, involving many actors and points of negotiation regarding care. Older adults comprise a significant percentage of individuals undergoing inpatient rehabilitation following stroke or orthopedic surgery. This quality assurance study examines adherence to discharge instructions three months post discharge from inpatient rehabilitation.

Methods: In this quality assurance project semi-structured interviews were completed with stroke survivors and orthopedic patients or their family members to explore barriers to discharge plan adherence. Chart review was also conducted to abstract the content of discharge instructions for each patient in order to compare it to patient and family report of care post discharge. The sample (n=15) was predominantly white, 60 % female and had a mean age of 74 (range, 48 - 89).

Results: Based on preliminary results of this ongoing quality assurance project, survey participants reported high adherence to home nursing, primary care visits, home therapy and outpatient therapy. Less adherence was reported for specialist visits, including appointments for neurology, physical medicine and rehabilitation, and orthopedics. Survey respondents were unaware of the discharge instruction to schedule a specialist visit, experienced miscommunication with office staff in appointment scheduling or had transportation issues. Respondents reported high satisfaction with their inpatient rehabilitation stay and felt a sense of involvement in discharge decision-making.

Conclusion: Adherence for specialist visits was less predominant than home nursing, therapy and primary care visits, warranting further exploration of the reasons for non-adherence and what opportunities exist for increasing adherence.

Significance: These preliminary findings point to the need to improve patient understanding of the importance of specialist follow-up following discharge and for increased assistance in appointment scheduling.

Funding Source: School of Social Work Tuition Scholarship

Presenter: Jelena Jovancevic- Mistic MD, PhD, Post-doctoral scholar

Principal Area of Research Interest: Mobility and aging

Current Research Support: T32

Mentor(s): Dr. Stephanie Studenski

Effects of two forms of exercise on visual attention: preliminary findings

J. Jovancevic-Mistic, S. A. Studenski, Y. Zheng, S. Perera. *Geriatric Medicine, University of Pittsburgh, Pittsburgh, PA.*

Purpose: Physical exercise has the potential to affect cognitive function, but most evidence to date focuses on cognitive effects of fitness training. There is also evidence that video games may induce cognitive improvement and may generalize to daily function, but mostly do not involve physical exercise. Little is known of how combining these two types of training might impact cognition, especially visual attention. The purpose of this study was to evaluate the effect of two forms of exercise (Video based dancing (V), brisk walking (W) versus wait- list control (C-)) on a performance measure of visual attention, the useful field of view (UFOV).

Methods: We collected UFOV data from 31 post-menopausal women with normal or corrected to normal vision (9 V, 10 W, 12 C). UFOV was measured at baseline and 6 months. Participants performed three UFOV sub-tests designed to measure speed of processing (SP), divided attention (DA) and selective attention (SA). The main outcome was change in reaction time scores, the more negative results indicating greater improvement.

Results:

	Speed of processing	Divided attention	Selective attention
Wait-list	-2.5ms SE (1.3)	-12.8.ms SE(6.2)	-6.9ms SE(6.7)
Walkers	0.7ms SE(3.5)	-47.1ms SE(35.7)	-12.8ms SE(26.4)
Dancers	-3ms SE(6.1)	-79.2ms SE(48.2)	-20.9ms SE(27.5)

Both exercise groups tended to improve in DA and SA tasks, but wait-list control did not change. Dancers tended to improve more than both walkers and controls.

Conclusions: Preliminary results indicate that exercise and in particular video based dancing might improve visual attention. While limited by small number, the sample size will continue to increase as this is an ongoing study.

This research is supported by NIH- Claude D Pepper Older Americans Independence Center Grant, P30 AG024827.

Presenter: Jelena Jovancevic- Mistic MD, PhD, Post-doctoral scholar

Principal Area of Research Interest: Mobility and aging

Current Research Support: T32

Mentor(s): Dr. Stephanie Studenski

Improving navigational skills using DDR

J. Jovancevic-Mistic, S. A. Studenski, S. Perera. *Geriatric Medicine, University of Pittsburgh, Pittsburgh, PA.*

Purpose: Mobility problems in adults in midlife and beyond can involve difficulty reacting to distractors and maneuvering around obstacles in the environment by initiating steps in a timely manner. The purpose of this study is to evaluate the effect of two forms of exercise on planning and step-initiation as a response to a visual cue using a Step Reaction Test (SRT).

Methods: Preliminary data was collected from 12 participants as a part of an ongoing study investigating the effect of form of exercise on adherence. Participants were post-menopausal women with normal to corrected to normal vision divided into 2 exercise groups: video-based dancing- Dance, Dance Revolution (DDR) and brisk walking with 6 participants in each group. To measure reaction times in step-initiation the Step Reaction Test was used. In SRT participants step on the floor (front, back, left or right) in response to a visual (arrow pointing in those four directions) cue from a computer screen in front of them. The reaction times were measured at baseline, and following the exercise regimen (3 months) for both groups of participants.

Results: Change in SRT reaction times was analyzed. Both groups improved following the exercise regimen, however this improvement was not significant for the walkers ($p=0.9$). The change in reaction times was: -41.5ms and -14.6 ms for dancers and walkers respectively. The negative sign indicates improvement in performance, the greater the absolute value the greater the improvement. The dancers were significantly better than walkers $p=0.02$.

Conclusions: Preliminary results indicate that video based dancing improves reaction times in step-initiation in response to visual cues. Consequently video based dancing can be used for rehabilitation of older adults suffering from mobility problems leading to an improvement in navigational skills through better planning and timely initiation of steps while negotiation objects in natural environments.

This research is supported by NIH- Claude D Pepper Older Americans Independence Center Grant, P30 AG024827.

Presenter: Peter Kang

Education: SUNY College at Geneseo: BA, Psychology

Current Position: Medical Student, University of Pittsburgh School of Medicine

Principle Area of Research Interest: Cognitive impairment and depression in the elderly

Current Research Support: NIMH T32, C.F. Reynolds, MD

Mentor: Meryl Butters, PhD

Potential mechanisms underlying cognitive dysfunction in late-life depression: In vivo measures of hippocampal volume, β -amyloid and cerebrovascular pathology

Peter Kang, B.A.¹, Meryl A. Butters, Ph.D.², Julie C. Price, Ph.D.³, Howard J. Aizenstein, M.D., Ph.D.², William E. Klunk, M.D., Ph.D.², Christopher Carosella, B.S.⁴, Carolyn C. Meltzer, M.D.⁵, Charles Reynolds, M.D.², James T. Becker, Ph.D.²

University of Pittsburgh School of Medicine (1), Department of Psychiatry, University of Pittsburgh (2), Department of Radiology, University of Pittsburgh (3), Drexel University College of Medicine, (4), and Department of Radiology, Emory University (5)

Introduction: Individuals with late-life depression (LLD) may be at increased risk of developing dementia. The relationships among the various pathophysiologic pathways linking depression to dementia are both poorly understood and complex and likely involve cerebrovascular disease (CVD), β -amyloid deposition and glucocorticoid neurotoxicity. We examined imaging markers of pathology in remitted depressed and never-depressed older adults with normal cognition and Mild Cognitive Impairment (MCI) to determine the relative distribution of depression-associated CVD, reduced hippocampal volume, and AD pathology.

Methods: We examined the level of the β -amyloid, using 11C-6-OH-BTA-1 [Pittsburgh Compound B (PiB)]-PET imaging, CVD, using white matter hyperintensity volume (WMHV) and hippocampal volume on MRI, in 29 participants with remitted LLD (17-cognitively normal, 12-MCI) and 27 participants without depression history (17-cognitively normal, 10-MCI).

Results: There were no differences between the remitted LLD and never-depressed groups in age ($p=0.889$), education ($p=0.442$), or other demographic factors. Neither WMHV ($p=0.139$) nor PiB retention ($p=0.862$) differed across mood groups. Remitted LLD participants had significantly lower hippocampal volume compared with never-depressed participants ($p=0.002$). Pearson correlation coefficients were not significant for either hippocampal volume ($r = 0.108, p = 0.429$) or PiB retention ($r = -0.108, p = 0.427$) with WMHV. However, hippocampal volume and PiB retention were significantly associated with each other ($r = -0.310, p = 0.020$).

Conclusions/Significance: This is the first *in vivo*, contemporaneous examination of multiple pathophysiologic markers hypothesized to link depression with dementia. These preliminary findings suggest that the depression-related neurotoxic pathway involving hippocampal atrophy, possibly related to hypercortisolemia, may contribute to the overall neuropathologic burden in depressed individuals, thereby lowering brain reserve capacity, leading to MCI in some individuals and increased risk of developing AD.

Grant Support: United States Public Health Service grants R01 MH080240, R01 MH072947, P30 MH071944, and P50 AG05133

Presenter: Jordan F. Karp, MD

Education: University of Pittsburgh School of Medicine

Current Position: Associate Professor of Psychiatry, Anesthesiology, and Clinical and Translational Science

Principal Area of Research Interest: Treatment of comorbid pain and mood disorders in older adults.

Mentor(s): Charles F. Reynolds III, MD and Debra K. Weiner MD

Treatment Preferences and Attitudes Towards Care: Congruence Between PCPs And Older Adults With Musculoskeletal Pain And Minor Depression

JF Karp and CM Farmer

University of Pittsburgh School of Medicine, Department of Psychiatry and RAND, Pittsburgh

Introduction: Primary care patients living with chronic musculoskeletal pain comorbid with minor depression present unique treatment challenges to primary care physicians (PCPs). These patients are at high risk of conversion to major depression and pain-related disability. In addition, treatment non-adherence (associated with sub-optimal outcomes) may result if non-preferred treatments are prescribed. To reduce the risk of side effects associated with traditional analgesics and address comorbid symptoms of depression, non-analgesic treatments which have antidepressant properties (e.g., cognitive behavioral therapy, antidepressant pharmacotherapy, complementary and alternative medicine [CAM], and physical therapy) that are frequently prescribed require exploration.

Methods: Using an iterative approach, we sequentially conducted qualitative interviews with PCPs and older patients living with comorbid chronic musculoskeletal pain and minor depression. As planned, we interviewed 5 PCPs, then 20 patients, and then another 5 PCPs. Atlas.ti and a professional qualitative coding service were utilized to extract themes.

Results: There was incongruence between PCP and patient attitudes towards using CAM and CBT for treating pain. In general patients were open to these treatments while PCPs thought they would reject them. While both PCPs and patients were ambivalent about the utility of physical therapy for treating pain, PT was consistently selected it as a first-line intervention. Both PCPs and patients identified similar barriers to effective care such as finances, transportation, and other clinical problems competing for time. While PCPs thought they were effective in describing possible side effects and including patients in the treatment planning process, patients often did not feel this way. PCPs were unanimous in wanting pain and depression care management on-site.

Conclusions: PCPs and older patients often do not agree on preferred treatments for pain with comorbid depression. Noted barriers to care were in general agreed upon. On-site care management, consistent with the concept of the medical home, was frequently endorsed by PCPs as a way to improve care. The subsequent quantitative project resulting from this qualitative work is presented.

Funding Source: Funded by KL2 RR024154 (Reis, Karp: scholar), CTSI/RAND/University of Pittsburgh Health Institute (Karp, Farmer), and AG033575 (Karp).

Presenter: Luv Kashyap

Education: Current Position: Post-Doctoral Associate

Principle Area of Research Interest: Sarcopenia and muscle aging

Current Research Support: 2010 Ellison Medical foundation AFAR Grant

Mentor: Alfred Leo Fisher

An RNAi based screen identifies a role for genes involved in ubiquinone synthesis in the prevention of sarcopenia

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Advancing adult age is associated with significant changes in body composition, the principal component of which is a decrease in skeletal muscle mass. This age-related loss in skeletal muscle has been referred to as sarcopenia. This decline in muscle mass and function is a major contributor to disability and mobility issues that affects the older people worldwide. Much like humans, the tiny nematode *C.elegans* also experiences sarcopenia during aging. Interestingly, in *C.elegans* mutations in the *daf-2*/insulin signaling pathway are able to delay this process. In the work presented here, we have identified 18 novel genes which are essential for the delay in onset of sarcopenia in *C.elegans*. Specifically, we have also identified the ortholog of the human gene MEVALONATE KINASE (MVK) as having a novel and considerable affect on muscle function and mobility. Using a transgenic strain which only responds to RNAi in the body wall muscle, we have also shown that mevalonate kinase is required specifically in muscle to delay the onset of sarcopenia. Mevalonate kinase is the next enzyme downstream of the HMG-CoA reductase which is the target of the widely used statin medications. Consistently, we have also found that the commonly used cholesterol lowering drugs like pravastatin also impairs mobility. Interestingly, an important product of the mevalonate pathway is ubiquinone, and statin medications have been proposed to produce muscle pain and weakness, termed statin myopathy, via blocking ubiquinone synthesis. We also find that inhibition of ubiquinone production leads to accelerated muscle aging and disrupts protein homeostasis in myocytes. Together, our work suggest that a number of genes including ones involved in the mevalonate and ubiquinone metabolism act to ensure successful muscle aging.

Presenter: Hyun Kim, BS

Education: University of Pittsburgh, School of Medicine

Current Position: Research Fellow

Principal Area of Interest: Radiation dose modification

Current Research Support: NIH T32AG21885

Mentor: Joel S. Greenberger, MD

The Autophagy Inducing Drug Carbamazepine is a Radiation Protector and Mitigator

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Purpose: Carbamazepine (CBZ), currently used to treat mood disorders, epilepsy and trigeminal neuralgia, has recently been shown to promote autophagy. We hypothesized that CBZ would be radioprotective in vitro and in vivo by upregulating autophagy and reducing apoptosis in cultured cells and in tissue. This may provide insight into anti-aging agents since diminished autophagic activity, resulting in the accumulation of damaged proteins and organelles, is implicated in aging.

Materials and Methods: In vitro radiation dose modification by CBZ was assessed by clonogenic assay of murine hematopoietic progenitor cell line (32D cl 3) using 1, 10 or 100 μ M CBZ treatment for 1 hour prior to or immediately after irradiation (0 – 8 Gy). The effect of CBZ on apoptosis was evaluated by JCI stain and TUNEL assay. To determine the effect of CBZ on autophagy, 32D cl 3 cells were irradiated to 5 or 10 Gy, incubated with 50 μ M CBZ for 24 hours and then collected and assayed by immunoblot with anti-LC3 antibody. C57BL/6NHsd mice received intraperitoneal injections (IP) of CBZ (10 mg/kg) 10 min before or after 9.25 Gy total body.

Results: CBZ concentrations of 1, 10 and 100 μ M for 1 hour before irradiation increased the Do from 1.5 ± 0.1 to 2.1 ± 0.1 ($p = 0.012$), 2.3 ± 0.1 ($p = 0.010$), and 3.6 ± 0.7 ($p = 0.003$), respectively. CBZ after irradiation increased the shoulder (\bar{n}) on the survival curve from 1.5 ± 0.3 to 10.1 ± 4.2 ($p = 0.011$), 5.5 ± 1.7 ($p = 0.019$), or 3.6 ± 0.8 ($p = 0.014$), respectively. JCI stain and TUNEL assay revealed that CBZ had no effect on mitochondrial membrane potential or apoptosis, respectively, following 5 or 10 Gy. Immunoblot for LC3 in 32D cl 3 cells 24 hours after irradiation revealed a 3.3x (5 Gy) and 6.2x (10 Gy) increase in LC3II/LC3I when cells were incubated in 50 μ M CBZ. Mice receiving IP injections of 10 mg/kg CBZ immediately before or after 9.25 Gy irradiation demonstrated increased survival ($p = 0.014$ and 0.006, respectively).

Conclusion/Significance: CBZ may be a valuable radiation protector and mitigator; its utility as an anti-aging agent requires further investigation.

Acknowledgment: This project was supported in part by NIH T32AG21885 and NIH/NAID U19A168021.

Presenter: Hyun Kim, BS

Education: University of Pittsburgh, School of Medicine

Current Position: Research Fellow

Principal Area of Interest: Radiation dose modification

Current Research Support: NIH T32AG21885

Mentor: Joel S. Greenberger, MD

Intraesophageal Administration of GS-Nitroxide (JP4-039) and p53/MDM2/MDM4 Inhibitor (BEB55) Ameliorates Radiation Esophagitis

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Purpose: Esophagitis is a significant toxicity of radiation therapy of thoracic cancers. We evaluated radiation dose modification in the mouse esophagus by GS-nitroxide (JP4-039) and p53/MDM2/MDM4 inhibitor (BEB55). Radiation dose modifying compounds may be useful anti-aging agents.

Materials and Methods: JP4-039 was administered to C57BL/6Hnsd mice by tube-feed swallow of a novel F15 liposome formulation. The esophagus was excised and esophageal progenitors (SP) and differentiated (NSP) cells separated by cell sorting. The nitroxide uptake was quantified by electron paramagnetic resonance (EPR). C56BL/6Hnsd mice were treated with BEB55 or JP4-039 swallow immediately prior to 28 Gy upper body irradiation. JP4-039 uptake in esophagus, liver and peripheral blood at 10, 30 and 60 minutes after intraesophageal administration was quantified by EPR.

Results: JP4-039 nitroxide was detected in higher concentrations in SP cells (275 fmole / 1×10^5 cells) compared to NSP cells (221 fmole / 3.3×10^6 cells). Mice that received BEB55 or JP4-039 prior to 28 Gy upper body irradiation showed increased survival compared to mice that received irradiation only ($p = 0.033$ and $p = 0.0001$, respectively). JP4-039 nitroxide content in excised esophagus, liver and peripheral blood had a peak value 10 minutes after swallow (430.1 ± 21.5 , 122.2 ± 49.6 , 39.0 ± 9.7 , 169.5 ± 67.0 pmol / mg protein, respectively).

Conclusion/Significance: Swallowed JP4-039 and BEB55 in F15 liposome formulation ameliorates radiation-induced esophagitis. JP4-039 uptake by SP and NSP cells indicate that the nitroxide may be useful in protecting stem cells and somatic cells from environmental insult and maintain the regenerative properties of tissue.

Acknowledgment: This project was supported in part by NIH T32AG21885 and NIH/NCI R01CA83876.

Presenter: Claudia M. Kregg-Byers, BA, BSN, RN

Education: University of Pittsburgh School of Nursing

Current Position: PhD Student

Principal Area of Research Interest: Geriatric Nutrition

Mentor(s): Elizabeth A. Schlenk, PhD, RN; Lauren Terhorst, PhD

Predictors of Food Security in Older Adults From the Ecological Model of Health Behavior

CM Kregg-Byers, L Terhorst, EA Schlenk

University of Pittsburgh School of Nursing

Study: Describe levels of food security (FS) and identify variables from the Ecological Model of Health Behavior (EMHB) that correlate with and are indicators of FS in community-dwelling older adults. EMHB describes associations between environmental factors (intrapersonal, interpersonal or sociocultural, policy, and physical) and health behavior. Research questions: What is the level of FS from the Food Security Supplement (FSS) for older adults? Which Current Population Survey (CPS)/FSS characteristics significantly predict FS? Hypothesis: Variables based on the EMHB correlate with and significantly predict FS.

Methods: A descriptive correlational design was used for this secondary analysis of data from CPS/FSS, 12/2008. The sample was 1,246 adults ≥ 65 years old from Northeast U.S. Annual CPS interviews occurred between decennial censuses in selected areas generating demographic statistics. Late fall respondents completed FSS interviews for four consecutive months, which were repeated one year later. FSS examines food expenditure, minimum food spending needed, participation in food assistance programs, concerns about FS, and coping strategies. The FS score was dichotomized as Food Security (high/marginal FS) and Food Insecurity (low/very low FS). Level of FS was analyzed using descriptive statistics. Predictors of FS were analyzed with correlation matrix, Chi Square, simple and multivariable binary logistic regression with 2-tailed testing and significance level set at $p < .05$.

Results: Race ($OR = .410$, $CI .244-.689$), education ($OR = 1.957$, $CI 1.198-3.198$), and participation in food assistance programs ($OR = .473$, $CI .321-.697$) significantly predicted FS.

Conclusion: Persons who were non-white and those participating in food assistance programs were 59%, and 53% less likely to have FS, respectively, whereas those with greater than high school education were 2 times more likely to have FS.

Significance: These results suggest that interventions to ameliorate less than ideal FS status in older adults in this region should consider race, education, and participation in food assistance programs.

Funding Source: None

Presenter: Yeonjung Lee, M.S.W.

Education: University of Pittsburgh School of Social Work

Current Position: PhD Student

Principal Area of Research Interest: caregiving, labor force participation in later life

Current Research Support: University of Pittsburgh School of Social Work

Mentor(s): Fengyan Tang, Ph.D.

Who Cares for the Elderly? Comparison of Recent Trends and Reports on Informal Caregiving Between the U.S. and South Korea

Yeonjung Lee, M.S.W. University of Pittsburgh School of Social Work

Study: Considering the population aging, the demand for informal care will increase exponentially in the next few decades both in the U.S. and Korea. Though there are some similarities regarding how elder parents are cared between countries, there are also differences. The purpose of this study is to identify the characteristics of informal caregivers and to compare them between the U.S. and Korea.

Methods: Content analysis was used to identify the characteristics and differences of informal caregivers in the U.S. and Korea. We reviewed the recent survey results from “Caregiving in the U.S.” (National Alliance for Caregiving, 2009) and “National Survey of the Life and Welfare Needs of Older People” (Korea Institute for Health and Social Affairs, 2005). The US data were collected based on telephone interviews with 1,397 caregivers aged 18+. The Korea data were surveyed by visiting nationally representative sample of 3,278 elderly aged 65+.

Results: Commonly, the primary caregivers for elderly parents were female in the US (67%) and Korea (80%). While most of informal caregiving was provided by adult child in both countries, spousal caregivers were 6% in the US and 29.7% in Korea, respectively. While among 61% of child caregivers, adult children consisted of 50% and children-in-law took 11% in the U.S., in Korea the eldest son and daughter-in-law took most of caregiving responsibility, daughter and son-in-law, and other son and daughter-in-law. Given that 55% of the primary caregivers were daughters-in-law in Korea, whereas only 8.6% in the US, caregiving by son in Korea was actually done by their wife.

Conclusion: Comparisons of Korea and the United States underscore the importance of the cultural difference in elderly caregiving.

Significance: Findings imply underdevelopment of formal caregiving system in Korea because of cultural values on family responsibility and informal care as a substitute for formal care system in the U.S.

Funding Source: University of Pittsburgh School of Social Work

Presenter: Kira Leishear, M.S.

Education: University of Pittsburgh

Current Position: Predoctoral Trainee

Principal Area of Research Interest: Nutrition and aging

Current Research Support: R01-AG 028050 (Strotmeyer); NIA Training Grant: T32-AG-000181

Mentor: Elsa S. Strotmeyer, PhD MPH

Low vitamin B12 levels and 6-year decline in information processing speed in older adults

Kira Leishear,¹ Caterina Rosano,¹ Stephanie A. Studenski,² Robert M. Boudreau¹, Luigi Ferrucci,³ Denise K. Houston,⁴ Eva Hogervorst,⁵ Kristine Yaffe,⁶ Tamara B. Harris,³ Anne B. Newman,¹ Elsa S. Strotmeyer¹

¹Department of Epidemiology, GSPH, University of Pittsburgh; ²Department of Medicine, Division of Geriatric Medicine, University of Pittsburgh; ³National Institute on Aging; ⁴Department of Internal Medicine, Wake Forest University School of Medicine; ⁵Department of Human Sciences, Loughborough University; ⁶Psychiatry, Neurology & Epidemiology, University of California, San Francisco

Study: Vitamin B12 deficiency may cause demyelination, resulting in white matter damage and slower information processing speed. The purpose of this analysis is to examine whether low B12 levels [<260 pmol/L] or 7-year change in B12 levels are associated with a greater decline in processing speed, and to detect whether there is a threshold effect of serum B12 on processing speed decline. Participants were from the Health, Aging, and Body Composition Study.

Methods: 1033 participants [mean age: 76.0 ± 2.8 years; 47.9% male; 31.4% black] had serum B12 levels at the 2000-01 and 2007-08 visits and Digit Symbol Substitution Test [DSST] scores at the 2001-02 and 2007-08 visits. Low B12 levels were defined as <260 pmol/L.

Results: Low initial B12 ($n=173$; 16.7%) was associated with greater annualized DSST decline, adjusting for initial DSST scores, demographics, socioeconomic/lifestyle factors, CES-D score, medication, and chronic health conditions ($\beta=-0.267$; $p=.04$). Improving to normal B12 ($n=82$) was associated with greater annualized DSST decline compared to sustained normal B12 ($n=792$), after adjustment ($\beta=-0.465$; $p=.01$). Similar associations were found for decline defined as $>1SD$ from mean change. A serum B12 threshold level of 410 pmol/L was found to be associated with lower DSST decline ($p=.01$).

Conclusions: B12 <260 pmol/L was associated with greater DSST score declines in older adults.

Significance: Maintaining adequate B12 levels is critical and higher levels (~ 410 pmol/L) may be optimal, because cognitive impairments associated with low B12 potentially may not be reversible.

Funding source: The Health ABC Study: NIA Contracts N01-AG-6-2101, N01-AG-6-2103, N01-AG-6-2106, R01-AG 028050 (Strotmeyer); University of Pittsburgh Claude D. Pepper Older Americans Independence Center (P30 AG-024827) Pilot Grant (Strotmeyer)

Presenter: Jennifer Lingler

Education: Case Western Reserve University (BSN), University of Pittsburgh (MSN, MA, PhD)

Current Position: Assistant Professor

Principal Area of Interest: Psychosocial implications of mild cognitive impairment

Current Research Support: NIA, NINR, and the Steven Manners Faculty Development Award

Mentor: Richard Schulz, PhD

What do Patients and Family Members Think and Feel about a Diagnosis of MCI?

Jennifer H. Lingler, PhD, RN^{1,2,3}, Lauren Terhorst, PhD¹, Amanda Gentry, MPH¹, Richard Schulz, PhD³
Department of Health and Community Systems, School of Nursing¹; Alzheimer Disease Research Center² and
Department of Psychiatry³, School of Medicine

Study purpose/relevance: Research suggests that health threats, like experiencing symptoms or receiving a diagnosis, trigger individuals to form thoughts and feelings (illness perceptions) which ultimately influence the health behaviors adopted in response to that threat. The purpose of this study was to characterize illness perceptions among patients with Mild Cognitive Impairment (MCI) and their immediate family members; and to describe the relationship between cognitive and emotional dimensions of illness perception in MCI.

Methods: Using patient and relative versions of the Revised Illness Perception Questionnaire (IPQ-R), emotional and cognitive features of illness perception in MCI were assessed along 5 dimensions. The IPQ-R was separately administered to 60 patients and 60 family members several months following diagnostic disclosure (mean 3.6 months). The Wilcoxon sign-rank test was used to test for differences between pairs of patients and family members along each dimension of illness perception. Within each group, Spearman's rank coefficients were used to understand the relationship between cognitive and emotional dimensions of illness perception.

Results: Patients and care partners both regarded MCI as having a chronic timeline and moderately emotionally distressing as assessed by the IPQ-R. Discordant perceptions were noted on ratings of the controllability ($p = .01$) and potential seriousness of MCI ($p = .01$), with patients perceiving themselves to have more personal control over their MCI symptoms, and family members being more inclined to view MCI as having serious consequences. When present, perceived seriousness of the potential consequences of MCI was the only dimension to be significantly correlated with emotional distress among patients ($\rho = .569$; $p < .01$). For care partners, however, emotional distress was significantly associated with viewing MCI as serious ($\rho = .502$; $p < .01$), permanent ($\rho = .273$; $p < .05$) or confusing ($\rho = .294$; $p < .05$).

Conclusions: Patient with MCI and their family care partners have both concordant and discordant perceptions of the nature of MCI, and they differ markedly in the extent to which their perceptions about MCI are associated with emotional distress.

Significance: Because patients and care partners exhibit different patterns of thinking about MCI, education and support interventions should be tailored for each of these audiences.

Funding Sources: Alzheimer's Association (PI: Lingler), Brookdale Leadership in Aging Fellowship (PI: Lingler), and National Institutes of Health grant P50 AG05133 (PI: Lopez)

Presenter: Tao Liu, B.S.

Education: Massachusetts Institute of Technology

Current Position: Medical Student, University of Pittsburgh School of Medicine

Principal Area of Research Interest: Causes of subject memory complaints

Mentor(s): Susan Hardy, M.D., Ph.D.

Subjective Memory complaints and chronic illnesses

University of Pittsburgh School of Medicine

Study: The inclusion of subjective memory complaints (SMC) as part of the diagnostic criteria for mild cognitive impairment has become increasingly controversial as research suggests that factors other than neurological deficits may contribute to SMC. The aims of our project are to describe the prevalence and characteristics of older adults who report having SMC and to assess the associations between SMC and common chronic systemic illnesses.

Methods: Using data from the 2004 Medicare Current Beneficiary Survey, we examined SMC in community-dwelling adults who were over the age of 65, who did not report having a diagnosis of Alzheimer's disease or dementia and whose answers were not provided by a proxy.

Results: Of the 192 beneficiaries excluded for Alzheimer's disease or dementia, 122 (63.54%) reported having SMC. Of the 10,788 beneficiaries included in our study, 782 (6.59%) reported having SMC. The patient characteristics and illnesses significantly associated with SMC in a multivariable logistic regression model are shown in the Table. Chronic lung disease, coronary artery disease, congestive heart failure and cancer were included in the model but were not significantly associated with SMC. Contrary to previous studies, women were less likely to have SMC.

Conclusion: Multiple chronic systemic illnesses (diabetes, cardiac diseases, arthritis, osteoporosis) are associated with SMC independent of demographics, socioeconomic status, depressive symptoms, neurological and other systemic illnesses.

Significance: The effect of chronic diseases on cognition and the potential need to distinguish SMC caused by neurological deficits from SMC secondary to a systemic condition warrant further research.

Funding Source: NIA Beeson Award, Pittsburgh Pepper Center, T32 AG21885

Association of patient characteristics and chronic diseases with subjective memory complaints.			
Characteristic	OR (95% CI)	Disease	OR (95% CI)
Age (per year)	1.06 (1.05-1.07)	Depressive symptoms	3.64 (3.05-4.34)
Female	0.69 (0.58-0.81)	Neurological disease	2.37 (1.80-2.85)
Education (reference= completed high school)		Diabetes mellitus	1.39 (1.15-1.67)
Less than high school	1.26 (1.04-1.54)	Non-ischemic cardiac disease	1.59 (1.27-2.01)
Post-high school education	0.79 (0.65-0.97)	Hypertension	0.80 (0.68-0.94)
Race/Ethnicity (reference=non-Hispanic White)		Arthritis	1.37 (1.15-1.63)
Non-Hispanic Black	1.35 (1.00-1.82)	Osteoporosis	1.40 (1.15-1.72)
Hispanic	1.30 (0.96-1.77)		
Other	1.75 (1.12-2.71)		
Annual income < \$25,000	1.22 (1.01-1.47)		

Presenter: Kristin Lowry PhD, PT

Education: Iowa State University

Current Position: Postdoctoral Scholar

Principal Area of Research Interest: Gait control in aging and neurologic disorders

Current Research Support: T32 Training Grant AG021885

Mentor(s): Stephanie Studenski, MD, MPH

Use of Harmonic Ratios To Examine the Effect of Cueing Strategies on Gait Stability in Persons With Parkinson's Disease

Kristin A. Lowry, PhD, PT, Andrew J. Carrel¹, MS, Jessica M. McIlrath¹, BS, Ann L. Smiley-Oyen, PhD¹

¹ Iowa State University

Study: There is considerable empirical support for the use of sensory cues (rhythmic auditory cueing via a metronome, visual cues via lines on the floor) and instructional sets ('think big', concurrent verbal cues) to improve spatiotemporal parameters in gait in people with PD. Though cueing strategies positively affect spatiotemporal parameters, it is not known if global walking stability is improved. Harmonic ratios (HRs), derived from trunk acceleration measures, provide information on ability to control the trunk smoothly during walking (higher HRs correspond to greater smoothness), indicating whole body balance during gait. An important question is whether improvements in spatiotemporal parameters correspond with improved HRs, and if so, whether improvements are directionally-specific.

Methods: Seven persons with Parkinson's disease (HY stage 2: 4 men, mean age, 71.89_8.3y; HY stage 3: 2 men, 1 woman, mean age, 68.28_10.19y) participated. Walking occurred at a preferred pace without cueing (control condition) and then walking as fast as possible. The following amplitude-based cueing conditions were then counterbalanced across participants: (1) visual cue, approximately matching step length to blue strips spaced orthogonally on the ground 20% longer than preferred step; (2) cognitive cue, thinking "big step" while walking and focusing on taking longer steps; and (3) verbal cue, taking longer steps with the experimenter saying the words "big step" during the swing phase of every third step. Preferred pace without cueing was measured again at the end. A triaxial accelerometer secured to a gait belt was positioned over the lower trunk. Anterior-posterior (AP), vertical (VT), and mediolateral (ML) HRs were derived from the trunk accelerations using frequency decomposition through Fourier analysis. Spatiotemporal parameters assessed were walking speed, stride length, cadence, and the coefficient of variation for stride time.

Results: Of the amplitude-based cues, verbal and cognitive resulted in the largest improvements in the AP-HR ($p = .018$), as well as the largest improvements in both stride length and velocity. None of the cues positively affected stability in the ML direction. Descriptively, all participants increased speed and stride length, but only those in Hoehn and Yahr stage 2 (not Hoehn and Yahr stage 3) showed improvements in HRs.

Conclusion: Cueing for "big steps" is effective for improving gait stability in the AP direction with modest improvements in the vertical direction, but it is not effective in the ML direction.

Significance: These data support the continued use of accelerometry/HRs together with spatiotemporal parameters to provide a holistic gait assessment. The descriptive evidence that disease severity affects the ability to respond to cueing indicates that it is critical for future gait cueing research to take this into consideration.

Funding Source: N/A

Presenter: Arash Mahboobin, Ph.D.

Education: Swanson School of Engineering

Current Position: Research Assistant Professor

Principal Area of Research Interest: Computational Biomechanics

Current Research Support: NIOSH R01 OH008986-01A2

Mentor(s): Mark Redfern, Ph.D.; Patrick Loughlin, Ph.D.; Rakié Cham, Ph.D.

A Model-Based Approach to Attention and Sensory Integration in Postural Control of Older Adults

A Mahboobin, MS Redfern, PJ Loughlin

University of Pittsburgh School of Engineering, Department of Bioengineering

Study: We conducted a dual-task experiment that involved information processing (IP) tasks concurrent with postural perturbations to explore the interaction between attention and sensory integration in postural control in young and older adults.

Methods: Ten healthy young adults and ten older adults participated in this study. A dual-task paradigm was performed that combined postural perturbations with concurrently performed IP tasks (no IP, auditory choice reaction task (CRT), and auditory vigilance task (VT)). A postural control model incorporating sensory integration and the influence of attention was fit to the data, from which parameters were then obtained to quantify the interference of attention on postural control.

Results: The time delay of the postural control model increased during concurrent IP tasks and postural perturbations for both the CRT and VT tasks in the older adults; young adults exhibited an increased time delay for only the more cognitively challenging VT IP task. Older subjects, unlike younger subjects, also exhibited changes in sensory re-weighting during concurrent IP tasks, as manifest by a decrease in proprioceptive weight relative to no IP condition.

Conclusion: The model implies that the time for sensorimotor processing involved in maintaining balance is impacted by dual-task interference.

Significance: The similarities and differences between age groups in time delay changes suggest that healthy older adults have similar postural control function as young adults during mild postural challenges without concurrent IP tasks, but different postural control function during dual-task conditions.

Funding Source: Pittsburgh Claude D. Pepper Older Americans Independence Center (P30AG024827 (NIA)) and National Institute of Health (R01 AG29546, P30 DC005205)

Presenter: Zachary A. Marcum, PharmD

Education: Butler University College of Pharmacy & Health Sciences

Current Position: T32 Postdoctoral Fellow

Principal Area of Research Interest: Drug-related problems in older adults

Current Research Support: NIA T32 AG021885

Mentors: Joseph T. Hanlon, PharmD, MS; Stephanie A. Studenski, MD, MPH

Analgesic Use for Knee and Hip Osteoarthritis in Community-Dwelling Elders

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University of Pittsburgh, School of Medicine (Geriatrics; Rheumatology & Clinical Immunology); Graduate School of Public Health (Biostatistics; Epidemiology; Health Policy & Management); School of Pharmacy (Pharmacy & Therapeutics)

National Institute on Aging, Intramural Research Program

University of California, San Francisco, School of Medicine (General Internal Medicine)

University of Tennessee Health Science Center (Preventative Medicine)

Study: To examine the prevalence and correlates of non-opioid and opioid analgesic use and undertreatment in a sample of community-dwelling elders with symptomatic knee and/or hip osteoarthritis (OA).

Methods: Design: Cross-sectional; **Setting:** Health, Aging and Body Composition Study; **Sample:** 652 participants attending the year 6 visit (2002-03) with symptomatic knee and/or hip OA; **Outcome Measures:** Analgesic use was defined as taking ≥ 1 non-opioid and/or ≥ 1 opioid receptor agonist. Non-opioid and opioid doses were standardized across all agents by dividing the daily dose used by the minimum effective analgesic daily dose. Inadequate pain control was defined as severe/extreme OA pain in the past 30 days from a modified Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).

Results: Just over half (51.4%) reported taking at least one non-opioid analgesic and approximately 10% were taking an opioid, most (88.5%) of whom also took a non-opioid. One in five participants (19.3%) had inadequate pain control, 39% of whom were using < 1 standardized daily dose of either a non-opioid or opioid analgesic. In adjusted analyses, severe/extreme OA pain was significantly associated with both non-opioid (adjusted odds ratio [AOR]=2.44; 95% confidence interval [95% CI]=1.49-3.99) and opioid (AOR=2.64; 95% CI, 1.26-5.53) use.

Conclusion: Although older adults with severe/extreme knee and/or hip OA pain are more likely to take analgesics than those with less severe pain, a sizable proportion take less than therapeutic doses and thus may be undertreated.

Significance: In community-dwelling older adults, severe pain from knee and/or hip OA is common and may be frequently undertreated. This finding is consistent with studies of pain management in other conditions in older adults.

Funding Source: National Institute on Aging (R01AG027017, P30AG024827, T32 AG021885, K07AG033174, R01AG034056, N01-AG-6-2101, N01-AG-6-2103, and N01-AG-6-2106), National Institute of Mental Health (R34 MH082682), National Institute of Nursing Research (R01 NR010135), Agency for Healthcare Research and Quality (R01 HS017695), and VA Health Services Research (IIR-06-062).

Presenter: Judith T. Matthews, PhD, MPH, RN

Education: University of Pittsburgh

Current Position: Assistant Professor of Nursing

Principal Area of Research Interest: Technology for Everyday Health among Older Adults

Current Research Support: National Science Foundation

Mentor: Richard Schulz, PhD

Usability of First-person Vision among Older Adults and Their Spouses

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University of Pittsburgh, School of Nursing and University Center for Social and Urban Research; Carnegie Mellon University, Robotics Institute

Study: First-person vision technology (FPV), known as “inside-out” perception, offers a novel method for gathering objective audio and visual data depicting individuals’ performance of activities of daily living. To evaluate preliminary usability of FPV, we visited 15 older adults, 7 of whom lived with spouses, for data collection during a single session.

Methods: The older adults wore a FPV eyeglass clip while performing randomly-ordered, household tasks (e.g., retrieving items from a cupboard, setting the table, showing where daily medications were kept). During a post-session interview, participants were asked about ease of use, attractiveness, acceptability, and potential usefulness of the FPV device and their views about situations in which they or others would or would not be willing to wear the device.

Results: On a scale from 1 to 10, older adults found the FPV device easy ($M=7.73$; $SD=2.43$) and not exceptionally confusing ($M=3.27$; $SD=2.60$) or anxiety-producing ($M=4.47$; $SD=3.48$) to learn to use. They considered the eyeglass clip moderately attractive ($M=4.40$; $SD=2.56$), and few would be embarrassed to be seen using it ($M=3.47$; $SD=3.09$). Study participants expressed little reservation about wearing the device at home, but they were largely unwilling to wear it outside the home. Fewer than one-third of household tasks performed were detectable on video, and audio capture was poor.

Conclusion: This study demonstrated modest support for the usability of the FPV eyeglass clip at home and inadequate sound and image quality for data collected in the home environment. The latter finding prompted redesign of the FPV device to include a fisheye camera and upgraded audio components, which markedly improved its field of view and audio capture.

Significance: FPV may be acceptable for assessing older adults’ need for in-home assistance.

Funding Source: National Science Foundation EEC-0540865

Presenter: Andrea L. Metti, MPH

Education: University of Michigan, BS (Brain Behavior and Cognitive Science; Sociology)

University of Michigan, MPH (Epidemiology)

Current Position: Graduate Student Research Assistant, PhD Student

Principal Area of Research Interest: Cognitive Aging

Current Research Support: Graduate Student Research Assistant, Testosterone Trial (NCT00799617)

Mentor(s): Jane Cauley, DrPH and Kristine Yaffe, MD

The Demographic and Medical Correlates of Plasma Amyloid Beta 42 and 40

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Study: Plasma amyloid-beta 42 (A β 42) and A β 42/A β 40 are increasingly recognized as biomarkers for cognitive decline and Alzheimer's disease (AD), with low levels carrying increased risk. Surprisingly, little is known about the demographic and medical correlates of plasma A β 40 and A β 42 level, especially in non-demented older adults.

Methods: 997 community-dwelling older adults from the Health, Aging and Body Composition (Health ABC) study with measured A β 40 and A β 42 were included in this cross-sectional study. We determined the association between a wide range of demographic and medical variables with A β 40 and A β 42 level.

Results: The mean \pm SD (pg/ml) A β 40 level was 191.6 \pm 50.3, and of A β 42 was 33.9 \pm 9.6. Low A β 40 was significantly associated with younger age (73.6 \pm 3.0 years for low tertile vs. 74.5 \pm 2.9 for high tertile, p=0.0001), Black race (60.4% vs. 44.1%, p<0.0001), \leq high school education (67.2% vs. 59.5%, p=0.03), and lower creatinine (mg/dl, 1.0 \pm 0.2 vs. 1.2 \pm 0.5, p<0.0001), but was not associated with: gender; literacy; history of stroke, myocardial infarction (MI), diabetes, depression, or smoking; body mass index (BMI); APOE e4 status; or c-reactive protein (CRP) level. Low A β 42 was significantly associated with Black race (65.2% vs. 45.4%, p<0.0001), \leq high school education (71.1% vs. 58.2%, p=0.003), a history of diabetes (29.6% vs. 21.1%, p=0.04), \geq 1 APOE e4 allele (37.9% vs. 23.2%, p=0.003), and lower creatinine (mg/dl, 1.0 \pm 0.22 vs. 1.1 \pm 0.55, p<0.0001), but did not differ on: age; gender; literacy; history of stroke, MI, depression, or smoking; BMI; or CRP level.

Conclusion: There are many demographic and medical correlates of plasma A β 40 and A β 42; these should be considered as potential confounders in future studies of investigating plasma A β as biomarkers of cognitive aging.

Significance: A critical step in fully realizing the potential role of any biomarker is understanding the correlates of the biomarker, and how it changes in the general population.

Presenter: Luigi Aurelio Nasto

Education: M.D., Catholic University of Rome, Italy

Current Position: Research Scholar

Principal Area of Research Interest: Intervertebral disc degeneration and back pain

Current Research Support: NIH/NIA 1R21 AG033046

Mentor(s): Nam Vo, Ph.D

The Role of Genotoxic Stress in Intervertebral Disc Aging

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Study: Age-dependent loss of matrix proteoglycan (PG) is a universal hallmark of intervertebral disc degeneration (IDD). Humans affected by genetic syndromes of defective DNA repair show many signs of accelerated aging. Similarly the DNA repair deficient *Ercc1*^{-Δ} mouse model has many signs of accelerated aging, including disc degeneration. Thus we hypothesize that DNA damage, when not repaired, can promote aging-associated disc matrix loss.

Methods: *Ercc1*^{-Δ} mice (n=6) and their wild-type littermates were chronically exposed to genotoxic stress beginning at 8 wks of age by either subcutaneous administration of a subtoxic dose of MEC (8 μg/kg once per week for 6 weeks) or ~10% radiotherapeutic dose of ionizing irradiation (0.5 Gy 1x per week for 10 weeks). Histological staining for proteoglycan (Safranin O) and collagen (Masson's Trichrome), PG synthesis (³⁵S-sulfate incorporation), disc ADAMTS4, aggrecan and its fragments terminating in NITEGE-³⁷³ (immunohistochemistry (IHC)) were analyzed.

Results: Histological staining revealed substantial reduction in matrix collagen, proteoglycan, and endplate cellularity in the discs of MEC-exposed and irradiated mice. IHC analysis showed decreased aggrecan and increased levels of ADAMTS4 and NITEGE-³⁷³ containing aggrecan proteolytic fragments. Disc PG synthesis was reduced 2-3 folds in MEC-treated mice. The overall effect of the treatment on disc matrix and endplate cartilage was more severe in *Ercc1*^{-Δ} mice than wild-type mice.

Conclusion: MEC and IR treatment resulted in loss of disc matrix proteoglycan and collagen in adult wild-type and *Ercc1*^{-Δ} mice through a combination of decreased matrix synthesis and increased breakdown. The finding that loss of matrix proteoglycan was greater in the DNA repair deficient mice strongly supports the conclusion that DNA damage can drive disc degeneration.

Significance: The *Ercc1*^{-Δ} mice, a novel and rapid murine model of age-related disc degeneration, are useful for exploring the molecular mechanisms by which DNA damage promotes age-related disc matrix loss and degeneration. More specifically, the results of this work may have important implications for long-term cancer survivors patients, treated with genotoxic agents.

Funding Source: National Institute of Aging, grants NIH/NIA 1R21 AG033046

Presenter: Kevin Ngo

Education: B.S, University of Pittsburgh

Current Position: Student Researcher

Principal Area of Research Interest: Intervertebral disc degeneration and back pain

Current Research Support: NIH/NIA 1R21 AG033046

Mentor(s): Nam Vo, Ph.D.

p38 α and p38 β MAPK repress inflammatory stress-induced expression of MMP-1 and MMP-3, respectively, in human nucleus pulposus cells

Kevin Ngo, W Witt, G Sowa, E Christian, J Lee, J Kang, R Studer, N Vo

University of Pittsburgh Medical Center, Department of Orthopedic Surgery

Study: Chemical inhibitors of p38 mitogen activated protein kinase (MAPK) block the induction of MMP expression by pro-inflammatory cytokines in disc cells. Thus a proposed mechanism of inflammation-induced MMP expression is through the p38 MAPK pathway. However given the existence of four mammalian p38 MAPK isoforms (α , β , γ , δ) and that most chemical inhibitors block the activity of multiple p38 isoforms, it is unclear whether different p38 isoform controls expression of specific MMP subsets. Here we focused on investigating how p38 α and p38 β individually controls the expression of MMP1 and MMP3 in TNF- α stimulated disc cells.

Methods: Human nucleus pulposus (hNP) cells were transduced with lentiviral particles expressing ShRNA to silence either p38 α or p38 β , and exposed to TNF- α (5 ng/ml) for 3 days. MMP1 and MMP3 mRNA levels were determined by semi-quantitative RT-PCR.

Results: hNP cells transduced with ShRNA targeting p38 α and p38 β selectively reduced their mRNA and protein expression (~40% of control). TNF- α exposure stimulated MMP1 (114x) and MMP3 (245x) expression compared to untreated control. TNF- α exposure with p38 β silencing further increased MMP3 (804x) while reduced MMP1 (42x) expression. TNF- α exposure with p38 α silencing drastically increased MMP-1 (860x) expression. These findings were confirmed using a dominant negative p38 α protein.

Conclusion: These results suggest that p38 α and p38 β perform the vital function to prevent excessive induction of two key MMPs implicated in disc matrix destruction, MMP1 and MMP3, respectively, in hNP cells under inflammatory stress.

Significance: The current therapeutic strategy of using inhibitors to block multiple p38 isoforms indiscriminately could potentially be detrimental to disc matrix homeostasis. Further studies are needed to dissect the roles of the different p38 isoforms in regulating disc MMP expression and matrix degradation.

Funding Source: National Institute of Aging, grants NIH/NIA 1R21 AG033046

Presenter: Lolita S. Nidadavolu, B.A.

Education: Johns Hopkins University

Current Position: MD/PhD student

Principal Area of Research Interest: MicroRNAs and aging

Current Research Support: UPCI pilot grant, NIA T32 training award

Mentor(s): Saleem Khan, Ph.D, Laura Niedernhofer, MD, Ph.D

The role of microRNAs in promoting cellular senescence using a progeroid mouse model system

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Purpose: MicroRNAs (miRNAs) are ~22 nt, single-stranded RNAs that dysregulate cellular pathways by post-transcriptional regulation of their targets. Many human diseases demonstrate differential expression of miRNAs, including cancers and heart disease, however, the role of miRNAs in cell senescence and aging is poorly understood. We are measuring miRNA expression in cells and tissues from Excision Repair Cross-Complementing 1 (ERCC1) deficient mice modeling the human Xeroderma Pigmentosum F-ERCC1 (XFE) progeroid syndrome. Individuals with XFE progeroid syndrome exhibit degenerative changes seen in normally aged individuals. *Ercc1*^{-/-} mice have shortened lifespan and their livers exhibit nuclear aberrations and cellular senescence similar to normally aged mice. We hypothesize that altered miRNA expression in *Ercc1*^{-/-} primary mouse embryonic fibroblasts (MEFs) compared to wild-type (WT) MEFs contributes to cellular senescence through changes in the expression of miRNA target genes.

Methods: We used Agilent mouse miRNA microarrays (V2) to look at miRNA expression profiles in *Ercc1*^{-/-} and WT MEFs grown in low (3%) or high (20%) oxygen conditions. We next confirmed the Agilent microarray data via individual Mature Taqman® MicroRNA qRT-PCR (Applied Biosystems) in MEFs and mouse livers. Functional studies were performed on WT MEFs that were transfected with miRNA antagonists for miR-497, miR-455*, miR-10b and miR-450B-3p (Applied Biosystems). Following RNA extraction, qRT-PCRs were performed looking at microRNA expression, and total protein was extracted to look at p53, pRb, γ -H2AX, and p16 expression changes.

Results: Microarray analysis showed nine downregulated and four upregulated miRNAs in *Ercc1*^{-/-} MEFs compared to wild-type MEFs, grown at 3% oxygen and cultured to passage seven. Also, when comparing passage seven versus passage three *Ercc1*^{-/-} MEFs grown at 3% oxygen, 14 upregulated and 22 downregulated miRNAs were significantly altered. These microarray data were validated using quantitative RT-PCR analysis. Five of the downregulated miRNAs (miR-455*, miR-497, miR-450B-3p, miR-10b, and miR-449a) were also downregulated in liver tissues of *Ercc1*^{-/-} mice and WT old mice, compared to the livers of young wild-type mice. Functional studies are in progress to test whether knocking down these specific miRNAs in wild-type MEFs promotes cellular senescence

Conclusions: MicroRNA profiling of *Ercc1*^{-/-} MEFs versus WT MEFs demonstrates significant miRNA expression changes between these primary cells. There are also significant expression changes comparing early versus late passage *Ercc1*^{-/-} MEFs grown at 3% oxygen. A subset of differentially expressed miRNAs from the MEFs analysis is confirmed to be similarly dysregulated in mouse livers.

Significance: These data show that there is indeed a dysregulation of miRNA expression in the *Ercc1*^{-/-} mouse model compared to WT mice. Five of these dysregulated miRNAs have similar expression patterns in normally aged mice tissues, and these miRNAs are promising targets for further study. The overall goal of this project is to identify miRNAs that regulate cellular senescence and the mechanism of regulation of such miRNAs.

Funding Sources: University of Pittsburgh Cancer Institute Pilot Grant; National Institute on Aging, T32 AGAG21885. (PI: Studenski)

Presenter: Marci Lee Nilsen, MSN, RN

Education: University of Pittsburgh, School of Nursing

Current Position: PhD Student

Principal Area of Research Interest: Acute and Critical Care of Older Adults

Mentor(s): Mary Beth Happ, PhD, RN, Susan Sereika, PhD

Nurse and Patient Characteristics Associated with Nurse Talk Time in the ICU

ML, Nilsen MB Happ, S, Sereika

University of Pittsburgh, School of Nursing

Study: Communication interactions between intensive care unit (ICU) nurses and mechanically ventilated patients are typically brief (1-5 minutes). Factors associated with length of nurses' verbal communication (talk time) have not been investigated. This secondary data analysis explored the association between nurse/patient characteristics on nurse talk time.

Methods: We utilized data on 89 nurse-patient dyads from the *Study of Patient-Nurse Effectiveness with Communication Strategies* (SPEACS), a clinical trial to test nurse-patient communication interventions in the ICU. Data included twice daily video-recorded observations over 2-days (AM/PM) for each dyad, and nurse/patient characteristics obtained from medical charts, observation records, and nurses' self-report. Nurse talk time was measured as the time a nurse talked during a 3-minute period. Data were analyzed using exploratory, group comparative, and repeated measures analyses.

Results: Patients were 29-82 (Mean=56.8, SD=5.68) years old; 37% ≥ 60 years. Nurse talk time generally increased over the 2-day period ($F(3, 238)=4.12, p=.007$). Patients' age was not significantly associated with talk time. Days intubated prior to observation, Glasgow Coma Score (GCS), and the nurse's years of ICU experience were jointly associated with talk time. The longer the patient was intubated prior to observation and $GCS \leq 14$ were negatively associated ($t=-2.67, p=.01$; $t=-2.35, p=.02$ respectively). Nurse's years of ICU experience had a curvilinear association with talk time (Linear: $t=1.95, p=.05$; Quadratic: $t=-2.37, p=.02$).

Conclusion and Significance: Length of time intubated, GCS, and a nurse's years of ICU experience may be moderators of communication, important considerations for future studies of communication with older ICU patients.

Funding: National Institute of Child Health and Human Development (5R01-HD043988) (Happ), National Institute of Nursing Research (K24-NR010244) (Happ)

Presenter: Trevor Nissley

Education: University of Pittsburgh School of Nursing

Current Position: Research Assistant/Undergraduate Student

Principle Area of Research Interest: Alzheimer's Disease Research

Mentors: Jennifer Lingler, Ph.D. and Amanda Gentry, MPH

Factors associated with Willingness to Participate in Medical Research among Cognitively Impaired Older Adults and their Family Caregivers

Study: Researchers face many challenges when recruiting patient participants for clinical research. Little is known about the factors that influence willingness to participate in clinical research, especially among those diagnosed with cognitive impairment. The purpose of this study is to identify factors associated with willingness to participate in medical research among cognitively impaired individuals and their family caregivers.

Methods: Forty patient-family caregiver dyads were recruited from a memory clinic and were asked to complete a one-time interview. Participants were presented with three hypothetical research scenarios of varying risk: A) simple blood draw, B) investigational drug trial, and C) surgical intervention. Patients rated their willingness to participate in each type of research using a 4-point Likert scale ranging from 1 (Not Likely) to 4 (Extremely Likely). Caregivers rated how likely they would be to involve their loved one in each research scenario. Participants also completed assessments of clinical research experience, motivations for participating, trust in medical research, and hopefulness. Nonparametric analyses were conducted to identify potential correlates of willingness to pursue each type of research.

Results: Ratings of willingness to participate among patients and caregivers were highest for Scenario A and lowest for Scenario C. Among patients, willingness to pursue a simple blood draw study was significantly associated with Motivation to Help Others ($\rho=0.489$, $p<0.01$) and Social Support ($\rho=0.442$, $p<0.05$). Willingness to pursue an investigational drug trial was positively associated with Trust in Medical Research ($\rho=0.458$, $p<0.01$), Motivation to Help Others ($\rho=0.339$, $p<0.05$), and Social Support ($\rho=0.364$, $p<0.05$). Among caregivers, willingness to pursue an investigational drug trial was significantly associated with Trust in Medical Research ($\rho=0.567$, $p<0.01$) and Social Support ($\rho=0.460$, $p<0.05$). No factors were identified as significantly associated with willingness to pursue a surgical intervention.

Conclusions: Overall, no factor consistently correlated with willingness to participate in the scenarios presented. Although patients and caregivers displayed different patterns of thinking when considering research participation, trust in researchers and social support appeared to influence both parties when considering a clinical drug trial.

Significance: When recruiting patient-caregiver dyads for research it is important to consider the multiple factors that may influence both the patient's and caregiver's willingness to participate.

Research/Grant Support: Alzheimer Disease Research Center Pilot Studies Program (PI: Lingler)

Presenter: Meenal Patel, B.S.

Education: University of Pittsburgh

Current Position: Graduate Student

Principal Area of Research Interest: Using neuroimaging to study associations between structural anatomy and functional activation in the elderly.

Current Research Support: NIMH R01 MH076079-04S1

Mentor(s): Howard J Aizenstein, MD, PhD

Association of Small Vessel Ischemic White Matter Changes With BOLD fMRI Imaging in The Elderly

M. J. Patel, B.S.(1); F. E. Boada, Ph.D.(1,4); J. C. Price, Ph.D.(4); L. K. Sheu, Ph.D.(2); C. F. Reynolds III, M.D.(2,5,6); H. J. Aizenstein, M.D., Ph.D.(1,2)

From: (1) Department of Bioengineering, University of Pittsburgh; (2) Department of Psychiatry, University of Pittsburgh School of Medicine; (3) Department of Psychology, University of Pittsburgh (4) Department of Radiology, University of Pittsburgh Medical Center (5) Department of Neurology, University of Pittsburgh (6) Department of Neuroscience, University of Pittsburgh

Study: White matter hyperintensities (WMH) on T2-weighted MR images are generally associated with small vessel ischemic or pre-ischemic changes. Neuroimaging studies have shown that WMH burden is associated with cognitive changes of aging. However, the association of WMH with BOLD fMRI is underexplored. The goal of this study was to characterize how the BOLD signal is associated with WMH burden in the elderly.

Methods: Depressed (n=33) and non-depressed (n=41) elderly individuals (70±14 years old) were scanned on a 3T Siemens TIM TRIO scanner. T2-weighted FLAIR images were obtained for WMH segmentation and EPI BOLD images were obtained during a finger-tapping task for determining BOLD signal change. A whole brain voxel-wise regression analysis studying the relationship between BOLD signal change and WMH volume was performed using Statistical Parametric Mapping software (SPM5, <http://www.fil.ion.ucl.ac.uk/spm/software/spm5/>).

Results: There were no significant task-related fMRI differences found between the depressed and non-depressed subjects. Thus, the groups were pooled to examine the effect of WMH on BOLD signal change. Whole brain voxel-wise regression analysis revealed a significant negative correlation between WMH burden and BOLD signal change during finger-tapping in the parietal white matter (Peak coordinate MNI -22 -50 30, $t = -5.09$, DOF = (1,71), corrected p (SPM Family Wise Error correction) < 0.05).

Conclusion: In this study, we found that WMH burden in the elderly was inversely correlated with the BOLD fMRI signal on a finger-tapping task. Individuals with higher WMH burden showed decreased BOLD signal change in the parietal white matter area during tapping (relative to fixation). It is not clear whether WMH are associated with a global decrease of BOLD signal, or whether WMH have local effects where the WMH are most prominent.

Significance: These data show that WMHs (a marker of cerebrovascular burden) are associated with decreased BOLD fMRI activity. This underscores the importance of considering cerebrovascular burden when interpreting fMRI studies in the elderly.

Funding Source: NIMH R01 MH076079

Presenter: Jason Sanders, BA

Education: Boston University

Current Position: MD/PhD Candidate, School of Medicine & Graduate School of Public Health

Principle Area of Interest: Biology of aging; biomarkers of longevity

Current Research Support: NIA 1F30AG038093-01

Mentor: Anne B. Newman, MD, MPH

Understanding the physiologic basis of frailty is enhanced by noninvasive measurement of organ structure and function in multiple physiologic systems

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Study: Chronic disease is a risk factor for frailty. Previous studies typically consider individual diagnosed diseases, but disease builds over time, possibly in several organs simultaneously. We hypothesize that noninvasively measured disease burden is associated with frailty independent of diagnosed chronic disease and other risk factors and that noninvasive measurements provide greater understanding of the etiology of frailty.

Methods: Cross-sectional study using the 1992-93 exam of the Cardiovascular Health Study (N=2445, mean (SD) age 74.8 (4.8) years, 43.4% male, 95.8% white). Disease burden and frailty were tabulated using 10-point scales (0=healthy, 10=unhealthy). Disease burden was the sum of noninvasive measurements characterizing the vasculature, brain, kidneys, lungs, and glucose metabolism. Frailty was assessed with Fried frailty components. Multivariate linear models were used to determine the association of disease burden (predictor) to frailty (outcome). Covariates included age, gender, race, smoking, BMI, education, C-reactive protein (CRP), fibrinogen, Factor VIII, and diagnosed chronic conditions.

Results: Unadjusted, 1 point higher disease burden was associated with a 0.28 point higher frailty score ($p<0.0001$). White matter grade, forced vital capacity, and cystatin-C were particularly strongly and significantly associated with frailty. Disease burden attenuated the association of frailty with age by 29%, and disease burden and age had equivalent effects on frailty. Disease burden attenuated the association of frailty with fibrinogen, Factor VIII, and CRP by 32%, 56%, and 83%. Frailty was associated with diagnosed depression, stroke, arthritis, and pulmonary disease but not coronary heart disease, diabetes, or kidney disease in the presence of a summary of disease burden. In the adjusted model disease burden remained significantly associated with frailty ($\beta=0.11$, $p<0.0001$).

Conclusion: Noninvasively measured disease burden was independently and significantly associated with frailty.

Significance: These results emphasize that noninvasively measured disease is a major contributor to frailty and suggest frailty may be prevented earlier by interventions targeting typically unrecognized physiologic changes.

Funding: R01-AG-023629, 5-P30-AG-024827, N01-HC-35129, N01-HC-45133, N01-HC-75150, N01-HC-85079 through N01-HC-85086, N01 HC-15103, N01 HC-55222, and U01 HL080295 from NHLBI; additional support from NINDS. See <http://www.chs-nhlbi.org>.

Presenter: Adam Santanasto, MPH

Education: University of Pittsburgh, Graduate School of Public Health

Current Position: Graduate Student Researcher

Principal Area of Research Interest: Prevention of mobility disability in older adults

Current Research Support: LIFE study GSR – NIH/NIA #UO1 AG22376

Mentor(s): Anne B. Nemman, MPH, MD, Nancy W. Glynn, PhD

Validation of Energy Expenditure Using a Multisensor Body Monitor in Older Adults

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Study: Better assessment of non-active and activity-related energy expenditure (EE) in older adults would likely provide important information about the effects of physical activity on their health. The SenseWear (SW) Pro armband (BodyMedia Inc., Pittsburgh, PA) is a novel multisensor device used to measure EE during free-living activities. It is considerably less expensive than doubly labeled water, more accurate than simple accelerometers, easy to use in free-living environments and comfortable to wear. However, validation is needed in older populations. We examined the validity of the SW Pro armband to assess EE in older adults.

Methods: Ten older adults (mean age 70.4 ± 6.4 yrs) participating in an exercise (>150 min/wk of walking) and weight loss pilot study were recruited. Participants wore the SW Pro armband and a validated portable oxygen consumption device (COSMED K4b2) concurrently during 2 walking bouts done over ground on a flat surface: a usual pace (gait speed: 1.1 ± 0.1 m/s) 40m walk and a fast pace (1.4 ± 0.2 m/s) 400m walk, both at a self-selected speed. Gold standard MET values were obtained from breath-by-breath sampling using the COSMED. The SW Pro armband recorded data in 1-minute epochs and METs were derived from a proprietary algorithm. Comparisons between mean METs obtained from both devices were made for each bout.

Results: METs from SW were highly correlated with METs from COSMED, but only for the fast paced walk (ICC = 0.908, $p < 0.001$). SW slightly over estimated METs for the fast walk by 6% (4.31 vs 4.05), while SW overestimated METs for the usual paced walk by nearly 17% (2.91 vs 2.49).

Conclusion: The SW Pro armband overestimated EE during both walking bouts. The over-estimation was 3-fold greater during the usual paced compared to the fast paced walk.

Significance: The SW activity monitor can be a valuable tool to assess EE during low-level activities, specifically walking, in older adults. However, a better estimate of 1 MET, resting metabolic rate (RMR), is needed in older adult populations to obtain more accurate EE estimates from the SW activity monitor, particularly during low intensity activities.

Funding Source: Pittsburgh Claude D. Pepper Older Americans Independence Center NIH P30 AG 024826

Presenter: C. Elizabeth Sarles, MPH

Education: University of Pittsburgh Graduate School of Public Health

Current Position: Neuropsychology Program Coordinator, Alzheimer Disease Research Center, University of Pittsburgh

Principal Area of Research Interest: Detection, diagnosis, and treatment of Alzheimer's disease and related cognitive disorders

Current Research Support: NIA P50 AG05133

Mentor(s): N/A

Exploring the Reasons African American and Rural-Dwelling Elders Participate in Memory Research

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Study: African Americans and rural-dwelling older adults have been historically underrepresented in both community and university-based memory research, leading to a lack of normative data for these populations. Yet, both African Americans and rural-dwelling individuals may represent a large percentage of those who develop dementia in later life. This study examines how older African Americans and rural-dwelling individuals conceptualize the reasons for study participation, particularly in mild cognitive impairment and dementia studies that employ recruitment programming to enhance study participation from these populations.

Methods: Nine focus groups were held with African Americans and rural-dwelling older adults (N=55) who had participated in a community-based memory screening study. Forty-two percent of focus group participants had additionally participated in a comprehensive memory assessment at a university-based Alzheimer Disease Center. Content analysis was employed using an inductive method of coding.

Results: The benefits of research participation were a predominant theme in all focus groups and were comprised of benefits to the participant, the participant's family and society. Participation in memory research was believed to lead to an understanding of memory function. Findings revealed that transportation to university-based study appointments was a key element in sustaining research participation for rural-dwelling elders, while financial compensation was important to African American participants.

Conclusion: Focus group participants expressed an active interest in research on dementia, and viewed research participation as a way to address memory concerns and provide a benefit to society.

Significance: In light of recruitment mandates from the NIH, enhancing awareness of research opportunities among historically underrepresented communities will be a gain for both the participant and the advancement of effective dementia assessment and treatment strategies in our increasingly diverse population.

Funding Source: Commonwealth of Pennsylvania [# SAP 4100027294; PI: Saxton] and the National Institute on Aging [P50 AG05133; PI: Lopez]

Presenter: Nehal R Shah, M.D.

Education: University of Pittsburgh

Current Position: Clinical fellow in Rheumatology

Principal Area of Research Interest: Osteoarthritis

Current Research Support: Ancillary analysis study of Osteoarthritis Initiative study

Mentor(s): C Kent Kwok, MD

Relationship of Specific Pain Patterns in Knee Osteoarthritis with Severity of Pain and Functional Disability

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Introduction: Osteoarthritis is one of the most common causes of disability. Knee pain is the main reason for patients to seek care for knee osteoarthritis, but the cause for knee pain is unclear. Several studies have identified specific pain patterns associated with knee OA and there has been a suggestion that different pain patterns may be associated with differences in pain severity and disability. This study seeks to the relationship of specific knee pain patterns in knee osteoarthritis (OA) with both pain severity and disability.

Design: This is an ancillary analysis of data from 4796 participants in the Osteoarthritis Initiative (OAI), a population-based cohort study designed to identify biomarkers of the development and/or progression of knee OA. Pain patterns in knee OA were characterized into localized, regional or diffuse using the Knee Pain Map, an interviewer-administered assessment of knee pain patterns based on pain in the past 30 days. Data on severity of pain and disability was obtained using Western Ontario and McMaster Universities (WOMAC)_knee pain scale, including the scale scores, and individual WOMAC items, from the OAI dataset at the 24 -month visit (Release 3.2.1). Data was analyzed using pain patterns as the dependent variable in multinomial logistic regression models, controlled for demographic characteristics, risk factors for OA and for clustering by knee.

Results: Of the 9383 knees studied, 19% had localized pain, 14.3% had regional pain, 8.8% had diffuse pain, and 58 % had no pain. Controlling for demographic factors and participant characteristics, WOMAC knee pain, disability, and total scores were significantly different among no pain vs local, local vs diffuse and regional vs diffuse pain patterns ($p < .001$). For local vs regional pain, only WOMAC disability ($p = 0.013$) and the total WOMAC scores ($p = 0.02$) were different. In multivariate analysis that added an adjustment for OA risk factors, the WOMAC knee pain score was different among those with no pain vs. those with only local pain ($p < .001$); regional pain vs. diffuse pain ($p = 0.02$); and the WOMAC disability score was different among those with no pain vs. those with only local pain ($p < .001$) and those with regional vs. diffuse pain ($p = 0.02$). In bivariate analysis, individual items in the WOMAC differed among the various pain patterns, but this was not the case in the multivariate analyses.

Conclusions: WOMAC pain and disability scores varied among the different knee pain patterns. Higher scores were associated with the diffuse pain pattern followed by regional and then the localized pain patterns.

Significance: These data suggest that, knee osteoarthritis is heterogeneous condition and various pain patterns are associated with different level of pain and disability.

Funding Source: Ancillary analysis of data from Osteoarthritis Initiative study.

Presenter: Susan E. Simms, MSN, RN

Education: University of Pittsburgh School of Nursing

Current Position: PhD Student

Principal Area of Research Interest: Self-Management of Chronic Disorders

Current Research Support: Secondary Analysis, NIH, National Institute of Nursing Research, Grant #5 K01 NR00083, Principal Investigator: Pat Bohachick

Mentor(s): Elizabeth A. Schlenk, PhD, RN; Susan M. Sereika, PhD

Age, Gender, Social Support, Medication Adherence, and Health-Related Quality of Life of Older Adults with Heart Failure

SE Simms, SM Sereika, PhD, EA Schlenk

University of Pittsburgh School of Nursing

Study: The purpose was to examine interrelationships among medication adherence and health-related quality of life (HRQOL) and certain predictors of medication adherence and HRQOL. The Wilson and Cleary model was used, which proposes causal relationships with HRQOL as the outcome.

Methods: This study was a secondary analysis of cross-sectional data of 171 university-affiliated older heart failure (HF) clinic patients who were prescribed ACE inhibitors and used electronic event medication monitoring by Medication Event Monitoring System (MEMS). The variables were age, gender, social support measured by Interpersonal Support Evaluation List (appraisal [AS], tangible [TS], self-esteem [SS], belonging [BS] support), medication adherence measured by MEMS (days adherence and on-time adherence), and HRQOL measured by Short Form-36 (physical [PCS] and mental [MCS] component scores). Linear regression analyses were used to test predictors. Interaction terms were created to test two-way interactions. Sequential (hierarchical) regression analysis was used to examine the interactions. The significance level was set at $p < .05$.

Results: SS predicts days adherence ($p = .025$). The interaction of age and gender predicts on-time adherence ($p = .035$). TS ($p = .001$), SS ($p < .001$), BS ($p = .022$), and days adherence ($p = .020$) predict PCS. Age ($p = .039$), gender ($p = .003$), AS ($p < .001$), TS ($p < .001$), SS ($p < .001$), BS ($p < .001$), the interaction of gender and BS ($p = .019$), and the interaction of age and on-time adherence ($p = .043$) predict MCS.

Conclusion: Those with increased SS have higher days adherence. Older females have better on-time adherence. Those with increased TS, SS, BS, and days adherence have higher PCS. Older age; females; increased AS, TS, SS, and BS; females with BS; and older adults with on-time adherence have higher MCS.

Significance: Healthcare professionals should consider age, gender, and social support when evaluating medication adherence and HRQOL in HF.

Funding Source: Secondary Analysis, NIH, National Institute of Nursing Research Grant #5 K01 NR00083, Principal Investigator: Pat Bohachick.

Presenter: Judith Ann Tate, PhD, RN

Education: University of Pittsburgh, School of Nursing

Mentor: Mary Beth Happ, PhD, RN

Current Position: Post-doctoral Fellow

Principal Area of Interest: Geriatric Psychiatry and Critical Illness

Current Research Support: Clinical Research Training Program in Geriatric Psychiatry (T32 MH19986; PI: Reynolds)

Title: Recognition and Management of Anxiety and Agitation in Critical Illness

J Tate, A Devito-Dabbs, L Hoffman, MB Happ

University of Pittsburgh, School of Nursing

Study: Reliable symptom identification in critically ill older adults is problematic due to presence of medical and psychiatric co-morbidities. Anxiety and agitation are symptoms that are difficult to identify and manage reliably because of overlap with other states such as delirium or pain. The aim of this study is to describe processes clinicians use to recognize and manage anxiety and agitation in critically ill patients.

Methods: Qualitative secondary analysis was performed using data from an ethnographic study of ventilator weaning. Thirty adult patients who received mechanical ventilation for ≥ 4 days and failed at least 2 weaning attempts were observed in a 28 bed Medical Intensive Care Unit. Data were collected by field observation, interview and medical record review over 16 months representing 655 days of observation. Formal interviews were conducted with patients, their families and clinicians who cared for them. Data were analyzed to identify patterns, qualitative themes and dimensions of anxiety and agitation associated with critical illness.

Results: The *Anxiety and Agitation in Critical Illness Model* depicts the complex, multi-dimensional features of anxiety and agitation recognition and management. Strategies to prevent, relieve, or control anxiety and agitation were instituted based on assessment of responses exhibited by the patient, attributions about anxiety and agitation by clinicians, and “knowing the patient”.

Conclusions: The model illustrates a wide range of patient responses and clinician interpretations associated with everyday critical care experiences and describes additional processes clinicians use to identify and manage symptoms experienced by critically ill patients.

Significance: The model may pinpoint issues crucial to reliable interpretation and management of anxiety and agitation and serve as a basis for development and testing of interventions to improve care of older adults in the ICU.

Funding Sources: National Institute of Nursing Research (RO1-NR07973)
Clinical Practice Grant from the American Association of Critical Care Nurses.

Presenter: Jennifer M. Tomlinson, Ph.D.

Education: Stony Brook University

Current Position: Postdoctoral Fellow in Psychology

Principal Area of Research Interest: Close Relationships and Emotion

Current Research Support: NIA 1F32AG03726201

Mentor(s): Brooke Feeney, Ph.D.

Benefits of Partner Support for Personal Growth During the Transition to Retirement

JM Tomlinson and BC Feeney

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Study: The transition to retirement is often a difficult time in which people must navigate the changes in their identity from ending a career and beginning a new phase of life. During this life transition, some retirees adjust better than others. Little research has considered the importance of the marital relationship in easing the transition to retirement, which is surprising because older adults depend on their spouses even more so than people in other age groups. The current study seeks to investigate a mechanism, “support for personal-growth,” that may help explain why some people flourish after retirement and others falter. Personal growth might occur from experiencing new things and enhance one’s ability to accomplish goals. Prior research has shown that (a) personal growth is beneficial for relationships and (b) a partner’s support for personal growth has positive effects on the recipient and on the relationship. The current research aims to demonstrate the importance of personal growth during the transition to retirement. Partner support for personal growth may help not only to counteract the potentially negative effects of retirement, but also to promote positive adjustment and development during this critical period for both retirees and their spouses.

Methods: Data collection is currently in progress for a three part study (a) a moderately large-scale survey administered to a representative community sample of just retired individuals and their spouses, (b) a longitudinal follow-up assessing partner support for personal growth and adjustment to retirement and (c) an observational study in which retirees are videotaped as they discuss with their spouses the opportunities that they hope to take advantage of during retirement and researchers code for partner support for personal growth.

Results: The current research has three goals. First, to determine if, among individuals who have recently retired, partner support for personal growth is associated with adjustment to retirement as indexed by better physical and mental health and satisfaction with retirement, both initially and over time. Second, it will examine whether partner support for personal growth is associated with, and predicts change over time in, relationship satisfaction, actual personal growth, and stress. Third, it will consider the role of two individual difference variables, attachment security and dispositional need for personal growth, on the links between partner support for personal growth and relationship satisfaction, actual personal growth, and stress.

Conclusion: This research would have two important benefits (a) it suggests a way in which relationship partners might help retirees adjust to the difficulty that many individuals experience as they transition from the workplace to retirement and (b) it suggests ways in which a person might experience enhanced personal and relationship well-being, thus developing healthy patterns that will be beneficial later in life.

Significance: The knowledge gained from this research has the potential to inform public policy and could be influential in developing interventions to help retirees adjust to this life phase.

Funding Source: National Institute on Aging, grant 1F32AG03726201

Presenter: Pamela E. Toto, PhD, OTR/L, BCG, FAOTA

Education: University of Pittsburgh

Current Position: Adjunct Instructor, University of Pittsburgh Department of Occupational Therapy

Principal Area of Research Interest: Physical Activity and Aging

Mentor(s): Joan Rogers, PhD, OTR/L

Effects of an Older Adult Multi-Component Physical Activity Program on ADL Performance

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Study: Participation in physical activity is an evidence-based strategy for improving health in older adults. However, less than 30% of older adults engage in any form of regular physical activity. Despite the development of best practice recommendations, the impact of physical activity programs on older adult participation in everyday life and the performance of activities of daily living (ADL) is not well understood. This study examined the effect of "First Step to Active Health," an older adult, best practice physical activity program, on ADL performance, physical performance, physical activity, and depression.

Methods: Sedentary, older adults age 60 years and older residing in a low-income senior apartment building participated in a 10 week, group-based, physical activity program that incorporated endurance, strength, balance, and flexibility exercises, and self-efficacy activities. Subjects were assessed at baseline, posttest (10 weeks) and post-post-test (14 weeks).

Results: Comparison of pretest and posttest scores ($N = 15$) using a one-tailed paired samples t-test resulted in improvement ($p < .05$) for 2 [Daily Activity and Applied Cognition] of 3 ADL domains on the Activity Measure-Post Acute Care and on all 6 physical performance measures of the Senior Fitness Test [Sit and Reach, Back Scratch, Arm Curl, Chair Stand, 2 Minute Step, 8ft. Up-and-Go]. Repeated measures ANOVA revealed significant main effects ($p < .05$) for 3 [Total Time, Total Energy Expenditure, Leisurely Walking Index] of 8 measures using the Yale Physical Activity Scale. Retention rate was 78.9%, and the adherence rate for group sessions was 89.7%.

Conclusion: Implementation of a multi-component, best practice physical activity program with sedentary, community-dwelling older adults is well tolerated and may positively impact ADL performance, physical performance, and physical activity.

Significance: These data support the feasibility and effectiveness of best practice physical activity recommendations to improve ADL performance, physical performance, and increase physical activity in older adults.

Funding Source: University of Pittsburgh, School of Health and Rehabilitation Sciences Research Development Fund

Presenter: Rachel E. Ward, BS

Education: Duke University

Current Position: Predoctoral Fellow

Principal Area of Interest: Aging and muscle and nerve function

Current Research Support: Strotmeyer ES, NIH/NIA R01-AG 028050-01; R Ward, Univ. of Pittsburgh, Dept. of Epidemiology, Small Grant

Mentor(s): Elsa S. Strotmeyer, PhD, MPH

Peripheral Nerve Function and Lower Extremity Muscle Power in Older Men

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Study: Decline in muscle power with age may be partly due to lower peripheral nerve (PN) function, particularly number and firing rate of motor units. We examined cross-sectional relationships between sensorimotor nerve function and weight-adjusted lower extremity muscle power in the Osteoporotic Fractures in Men (MrOS) Study.

Methods: Muscle power (Nottingham power rig), motor (peroneal nerve conduction) and sensory nerve function (sural nerve conduction/monofilament detection/symptoms) were measured in 568 men in Pittsburgh (age=77.2±5.1, BMI=28.2±4.0, power=156.4±54.1 watts). Using multivariable linear regression, we compared power/kg to each measure of nerve function. Covariates included age, body composition, comorbidities (e.g. diabetes/peripheral vascular disease), lifestyle factors (e.g. smoking/physical activity), and grip strength.

Results: For an average weight participant, one higher standard deviation compound muscle action potential (CMAP) and 1.4g monofilament detection were associated with 5.9 and 11.8 watts greater power (both p<0.05). Having ≥2 neuropathic symptoms (numbness/ tingling, stabbing/burning pain, open/persistent sores/gangrene) was associated with 26.9 watts lower power (p<0.01). Sural nerve conduction and motor latency were not associated with power.

Conclusion: In these older men, motor nerve amplitude, monofilament detection and symptoms were associated with weight-adjusted power.

Significance: Simple screening for monofilament detection and neuropathic symptoms may identify muscle function problems (and potentially future disability) in late-life, which has implications for disability prevention in older adults.

Funding Source: The MrOS Study is supported by National Institutes of Health (NIH) funding

Presenter Name: David M. Wert

Education: MPT, PhD Candidate

Current Position: Research Physical Therapist, Research Assistant

Principle Area of Interest: Geriatric physical therapy, gait, energy cost

Current Research Support: Pepper Junior Scholars Pilot Funding

Mentors: Jennifer Brach PhD, PT and Jessie VanSwearingen PhD, PT, FAPTA

The Energy Cost of Walking Savings of Improving Gait Biomechanics in Older Adults with Mobility Disability

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Study Relevance: Certain biomechanical components of gait have been shown to contribute to the energy cost of walking in older adults with mobility disability. Purpose of Study: To describe the change in energy cost of walking related to a change in the biomechanics of gait

Methods: Seventeen older adults with slow and variable gait participated. All participants received a protocolized exercise intervention, led by a physical therapist, 2 times per week for 12 weeks. Energy cost of walking and gait biomechanics were measured pre and post intervention. Analysis of variance was performed to assess mean change in energy cost of walking between older adults who had a one point or greater change in biomechanics versus older adults who had no change.

Results: Older adults who had improved hip extension had a .10 ml/kg m greater mean reduction in energy cost of walking than older adults who had no change in hip extension ($p=.059$). Similar differences were also seen for improved versus no change in foot angle contact and the hip-foot-trunk combination variable. Although differences in mean change in energy cost of walking failed to reach statistical significance for foot angle at heelstrike and hip-foot-trunk combination variable ($p=.16$ and $p=.19$, respectively), the differences in cost between the improved and no change groups exceeded a clinically meaningful change. Changes in trunk position did not result in changes to energy cost of walking in this sample of older adults ($p=.9$).

Conclusion: A reduction in the degree of gait biomechanical abnormality versus no change in gait biomechanics yields a greater mean 'savings' (change) in energy cost of walking in older adults with slow and variable gait.

Significance: Improving the gait biomechanics of older adults with reduced mobility may reduce the effort required for walking which could potentially lead to a greater reserve for additional functional and physical activities.

Research Support: Pittsburgh Claude D. Pepper Older Americans Independence Center, AG024827 and Paul Beeson Career Development Award, K23 AG026766.

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Education: Kochi University Medical School

Current Position: Research Assistant Professor of Orthopaedic Surgery

Principal Area of Research Interest: Regeneration Medicine and Tissue Engineering

Current Research Support: NIH AR049921 and AR049921S2 (JHW)

Mentor(s): James H-C. Wang, Ph.D.

Characterization of aging mouse tendon stem cells

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Study: Aging is complex and can be influenced by many factors, of which the most important are the proliferation and differentiation of stem cells. Unfortunately, the aging effects on tendon stem cells (TSCs) are unknown. We have characterized the changes in TSCs isolated from mice of different ages, including the differences in proliferation and stem cell marker expression.

Methods: TSCs were cultured from patellar tendon (PT) and Achilles tendon (AT) tissues of mice of different ages (2.5, 5, 9 and 24 months) using a previously established method (Zhang and Wang, 2010). Briefly, tendon tissues were cut into small pieces and digested in collagenase type I and dispase at 37°C for 1 h. The resulting cell suspension was centrifuged at 3,000 rpm for 15 minutes and the cell pellet was re-suspended in growth medium consisting of DMEM supplemented with 20% FBS. TSCs were characterized by measuring cell population doubling time (PDT), and performing immunostaining on stem cell markers and qRT-PCR for gene expression.

Results: We found that TSCs proliferation significantly decreased in an age-dependent manner (**Fig. 1A, B**). Specifically, the TSCs isolated from 24 month old mice had the longest PDT, and the stem cells from 2.5 month old mice had the shortest PDT. By immunostaining we also found that the percentage of stem cells also decreased in an age-dependent manner (**Figs. 2-8**). The cells isolated from younger mice expressed higher levels of stem cell markers (e.g. Oct-4 and nucleostemin) and tenocytes-related genes (e.g. collagen type I); however, the cells isolated from older mice expressed higher levels of non-tenocytes-related genes (**Fig. 9**).

Conclusion: The results of this study showed that aging has detrimental effects on mouse TSCs in terms of decreased cell proliferation and stemness of TSCs.

Significance: These data may explain why aging people have problems in the repair of injured tendons and tend to develop tendinopathy, or degenerative changes in tendons. In addition, the aging effects on TSCs must be taken into account when injured tendons are treated in clinical settings.

Funding Source: NIH AR049921 and AR049921S2 (JHW)

Presenter: Kate Zmijewski

Education: University of Pittsburgh

Current Position: Graduate Student of Health Policy & Administration

Principal Area of Research Interest: Long-term care

Current Research Support: None

Mentor(s): Nicholas Castle, Ph.D.

Pay for Performance and Nursing Homes

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Study: Improving quality of care provided in nursing homes has been at the forefront of many policy initiatives. Pay for performance (P4P), also known as Value Based Purchasing (VBP), is gaining the attention of policy makers as a further option to promote quality improvements. In the research presented here, we provide some descriptive information of nursing home P4P initiatives and examine Nursing Home Administrators (NHAs) opinions of P4P.

Methods: A survey was developed from the literature on P4P. This identified 46 different areas of P4P. This included opinions on the measures used, efficiency, reliability, and potential behavior changes. The survey was sent in 2010 to 2,000 NHAs working in nursing homes with P4P systems and 2,000 NHAs working in nursing homes without P4P systems (Response Rate =65%).

Results: Overall, NHAs did not view P4P favorably. Most did not understand the metrics used. Moreover, the quality metrics used were viewed as weak and often not associated with actual quality. The reimbursement given for performance improvement was seen as very inadequate. Some differences did exist across provider types and experience with P4P. The highest quality providers were least opposed to P4P. And, NHAs with the most experience with p4P were least opposed.

Conclusion: This information is important, for NHAs responses to P4P likely influence outcomes of these programs.

Significance: Quality health care is poor in nursing homes. P4P gives an incentive for providers to improve care. This can impact the health of residents.

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