

THE JOHNS HOPKINS  
**Center on  
Aging and Health**



*Together with*  
The School of Public Health Gerontology Interest Group  
*and*  
The School of Medicine Division of Geriatric Medicine & Gerontology

*Present*

***Research on Aging Showcase***

FRIDAY, MAY 9<sup>TH</sup>, 2008  
2-4PM  
ANNA BAETJER ROOM (W1030), JHSPH



Friday, May 9, 2008

We are excited to welcome you to the Research on Aging Showcase, featuring current work by students, post-doctoral fellows, faculty, and research associates at Johns Hopkins. We thank you for joining us, and hope that today's session will help spark connections and promote additional cooperation among researchers across the university's diverse departments and schools.

We're grateful to the Center on Aging and Health and the Division of Geriatric Medicine and Gerontology at the School of Medicine for supporting our student initiative. We'd also like to thank the School of Public Health's Event Planning and Housekeeping teams for their assistance with the organization of the session.

Finally, we'd like to thank our esteemed panel of judges, including:

Emily Agree, PhD  
Karen Bandeen-Roche, PhD  
Chad Boulton, MD, MPH, MBA  
Paulo Chaves, MD, PhD  
Bruce Leff, MD  
Elizabeth (Ibby) Tanner, PhD, RN  
Qian-Li Xue, PhD

We hope you enjoy today's poster session, and look forward to seeing you at future events.

Sincerely,

The Gerontology Interest Group

Jennifer Deal  
(Epidemiology)

Michal Engelman  
(Population, Family, & Reproductive Health)

Alden Gross  
(Mental Health)

Jennifer Schrack  
(Epidemiology)

## ABSTRACTS

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SANDY S. CHANG, MD  
MHS CANDIDATE, POSTDOCTORAL FELLOW EPIDEMIOLOGY  
SCHOOL OF PUBLIC HEALTH

**Patterns of multi-morbid inflammatory diseases associated with frailty: findings from the Women's and Health and Aging Studies (WHAS) I and II.**

S. S. Chang, C. O. Weiss, Q. Xue, and L. P. Fried

**Background:** Developing interventions to prevent frailty in older adults is a priority as it increases the risk for functional decline, institutionalization, and death. The identification of combinations of inflammatory diseases that are associated with frailty would lead to improved understanding of causal pathways and, perhaps, enhanced treatment before the development of frailty.

**Objective:**

- (1) To characterize whether there are specific combinations of inflammatory multi-morbid diseases associated with frailty.
- (2) To determine whether the likelihood of frailty from inflammatory diseases is affected by synergistic interactions between these diseases.

**Methods:** Data were from WHAS I and II, a cohort of community-dwelling women aged 70-79 years old from Baltimore, MD (n=620). Pattern analyses were employed as an adjunct tool to identify the most common disease pairs among 11 chronic inflammatory diseases. Multivariable logistic regression analyses were performed to evaluate the relationships among these diseases and frailty.

**Results:** Among the frail, 19.0% had cardiovascular disease (CVD) and pulmonary disease and 18.7% had chronic kidney disease (CKD) and anemia. CVD and pulmonary disease (unadjusted OR=4.55, 95%CI 2.04-10.14) and CKD and anemia (OR=4.59, 2.10-10.01) were also associated with frailty. The observed joint effects of these inflammatory disease pairs were greater than their expected effects, although the Wald tests for interaction were insignificant.

**Conclusions:** Inflammatory multi-morbidity appears to increase the risk of frailty. There was suggestion of potential physiologic synergistic interactions for CVD and pulmonary disease, as well as for CKD and anemia. These findings indicate that co-management of multi-morbid inflammatory diseases may lead to a reduction in the risk of frailty in community-dwelling older women.

LUKE F. CHEN, MBBS(HONS) FRACP  
M.P.H. STUDENT  
SCHOOL OF PUBLIC HEALTH

**Risk Factors for Bloodstream Infections in Older Hospitalized Patients: A Multi-Center Study**

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K. S. Kaye<sup>a</sup>

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c. GRECC Durham VAMC

**Aims:** Bloodstream infections (BSIs) in older adults are associated with high morbidity and mortality but little is known about predictors of BSI in older populations. The objective of this study is to determine risk factors for BSI in older patients in tertiary care and community hospitals.

**Methods:** This case-control study was conducted at 7 community hospitals and one tertiary-care hospital in North Carolina. Patients > 64 years old with a BSI during the admission were identified between 1/1994-6/2002. Controls > 64 years old were randomly chosen from hospital admission data and were matched to cases by hospital, location, length of stay, and admission date. Variables studied included demographics, co-morbidities, independence with activities of daily living, indwelling medical devices and the proportion of primary BSIs (including catheter-related BSIs).

**Results:** 802 cases of BSI were matched to 802 uninfected controls. *S. aureus* was the most common cause of BSI, occurring in 35% of all cases; 67% of these were methicillin-resistant (MRSA). Other infecting organisms included enterococci (11.5%), *E. coli* (5.5%), *K. pneumoniae* (5.9%), and coagulase-negative staphylococci (5.5%). 79% of the BSIs were considered primary bloodstream infections. Cases were generally similar to controls except that cases were more likely to be male (54% v. 46%,  $p < 0.04$ ). Cases were more likely to have a McCabe score of 1 at the time of hospital admission (23.7% v. 19.4%,  $p = 0.04$ ), have a history of malignancy (30.4% v. 26%,  $p = 0.05$ ), have a central venous catheter in-situ at the time of admission (16% v. 8.7%,  $p < 0.001$ ), have bowel incontinence (18.5% v. 14.7%,  $p = 0.04$ ) and were more likely to be admitted from long term care facilities (LTCF) than controls (8.2% v. 5.4%,  $p = 0.03$ ). In multivariate analysis, independent predictors of BSI included male gender (Odds Ratio [OR] 1.3, 95% Confidence Interval [CI] 1.1-1.6), admission from a LTCF (OR 1.8, 95% CI: 1.1-2.8) and presence of a central venous catheter at the time of admission (OR 2.1, 95% CI 1.5-2.9).

**Conclusion:** MRSA was the most common BSI pathogen in our study population. Male gender, presence of an indwelling central venous catheter and admission from a long term care facility were independent predictors of increased risk for BSI among older hospitalized patients.

ALAN A. COHEN, PH.D  
POST-DOCTORAL FELLOW, EPIDEMIOLOGY  
SCHOOL OF PUBLIC HEALTH

### **Female post-reproductive lifespan: a general mammalian trait**

Traditional explanations for the evolution of menopause and post-reproductive lifespan in human females have been based on the benefits of maternal or grand-maternal care outweighing the cost of lost reproduction. These explanations assume an evolutionary origin of menopause since human divergence with the most recent common ancestor. In this study, I conduct a literature survey of studies of 42 mammal species from eight orders, showing that post-reproductive lifespan appears to be widespread among mammals. I then propose an alternative to traditional hypotheses: following accepted theories of trade-offs and senescence, I suggest that the cost of extending reproductive lifespan might be relatively high in female mammals. Somatic and reproductive senescence appear to follow separate trajectories, so it is not surprising that the two processes should occur on different schedules. The timing of each process is probably determined by maximization of reproductive performance and survival early in adulthood, with consequent trajectories resulting in a post-reproductive lifespan. The early end of reproduction relative to lifespan may be due to the cost of production and/or maintenance of oocytes, which decline exponentially over time. Oocyte number below a threshold may trigger an end to normal hormonal cycling.

FRANK CORRIGAN  
M.D CANDIDATE (MSII)  
SCHOOL OF MEDICINE

## Bone Mineral Density as an Index of Arterial Health

**Purpose:** Recent evidence suggests that both osteoporosis and atherosclerotic disease share some common pathophysiologic mechanisms. Since low bone mineral density (BMD) at middle age predicts future fracture risk in the geriatric population, low BMD at middle age may also predict cardiovascular risk later in life. Arterial elasticity, a determinant of arterial function, and endothelial progenitor cells (EPCs), which contribute to vascular repair, are both considered markers of cardiovascular health and predictors of outcome. We hypothesized that reduced BMD corresponds with impaired arterial function manifested as increased arterial stiffness and lower circulating EPCs.

**Methods:** BMD of the femoral neck (f-BMD) and the greater trochanter (t-BMD) was determined in 61 healthy non-obese subjects free of cardiovascular disease and risk factors by DEXA. Using flow cytometry, bone marrow-derived CD34+ hematopoietic progenitors and the subpopulation of CD34+VEGF+ cells, considered enriched for EPCs, were measured in peripheral blood. In all subjects, the aortic augmentation index (AIx), a composite marker of arterial stiffness, was measured with a validated non-invasive technique (Sphygmocor).

**Results:** We observed a positive correlation of f-BMD with the CD34+ cell count ( $r=0.321$ ,  $p=.022$ ) and a negative correlation of t-BMD with AIx ( $r=-0.311$ ,  $p=.020$ ), indicating a relationship of low BMD with impaired arterial health. Furthermore, independent of age, subjects with low BMD (those with osteopenia as defined by the WHO) had a significantly lower CD34+ cell count ( $2.1\pm 0.9$  vs.  $2.7\pm 1.0$  cells/ $\mu$ L,  $p=.040$ ) as well as a lower percentage of CD34+VEGF+ cells present amongst the CD34+ cell population ( $41.7\pm 26.1\%$  vs.  $55.8\pm 22.4\%$ ,  $p=.042$ ). We also observed a significantly higher AIx with increasing age in the low BMD group ( $r=0.483$ ,  $p=.007$ ), but not in the normal BMD group ( $r=0.157$ ,  $p=.443$ ).

**Conclusions:** In healthy subjects, decreased BMD is related to a higher arterial stiffness and lower levels of circulating EPCs. It appears that aging related arterial stiffness is not observed in individuals with normal BMD. Whether bone health is a marker of vascular health needs to be further investigated.

MELISSA DATTALO  
M.D/M.P.H CANDIDATE  
SCHOOL OF MEDICINE AND SCHOOL OF PUBLIC HEALTH

## **Individual and Contextual Factors that Influence Older Adults' Participation in Chronic Disease Self-Management Programs**

**Purpose:** The goal was to quantify individual and contextual influences on participation in a chronic disease-self management (CDSM) courses within a population of multi-morbid older adults.

**Design and Methods:** Participants in a Guided Care cluster-randomized controlled trial had the option of participating in local, cost-free, six-session CDSM courses. Logistic regression with Generalized Estimating Equations was used to build an explanatory model of the relationship between CDSM participation and multi-morbid older adults' characteristics.

**Results:** 36.5% of RCT participants attended at least one CDSM session. Individual characteristics independently associated with attendance included having a high school diploma (1.64[1.29-2.10]), having any difficulty with and activity of daily living (1.57[1.02-2.42]), and exercising in the past week (1.83[1.40-2.40]). Contextual factors independently associated with CDSM attendance included receiving health care through an HMO practice (1.61[1.34-1.94]), rating the self-care emphasis of one's provider highly (0.47[0.33-0.67]), and being invited to participate by a nurse who values patient interactions highly (2.18[1.20-3.98]).

**Implications:** Individual and contextual factors influence multi-morbid older persons' participation in CDSM courses. Awareness of those factors may assist researchers in adjusting for the effects of selection bias, and it may help practitioners to target subpopulations of multi-morbid older adults for CDSM course recruitment.

JENNIFER A. DEAL, MHS  
PHD STUDENT, EPIDEMIOLOGY  
SCHOOL OF PUBLIC HEALTH

## Anemia and 9-Year Domain-Specific Cognitive Decline in Community-Dwelling Older Women

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**Background:** Cognitive decline is associated with risk for dementia and physical disability in older populations. Identification of modifiers of this decline may help in efforts to prevent these adverse outcomes.

**Methods:** Linear random effects models were used to test the hypothesis that anemia, defined as hemoglobin <12 g/dL, is associated with poorer baseline cognitive function and with a faster rate of 9-year cognitive decline in a community-dwelling sample of 374 women aged 70-80 years at baseline, in the cognitive domains of immediate verbal recall, delayed verbal recall, psychomotor speed, and executive function.

**Results:** Declines were observed in all domains over 9 years of follow-up. At baseline and after adjustment for age, gender, race, cardiovascular disease, and number of comorbidities, women with anemia were slower to complete a test of executive function than women without anemia, making 2.5 (95% CI: -4.3, -0.8) fewer connections/minute on the Trail Making Test, Part B (TMTB). During follow-up, anemia was associated with a faster rate of decline in memory. Between baseline and year 3, women with anemia declined at a rate of 0.9 more words/year (95% CI: -1.5, -0.3) than women without anemia on the Hopkins Verbal Learning Test (HVLT) and by 0.4 more words/year (95% CI: -0.7, -0.1) on the Hopkins Verbal Learning Test-Delayed (HVLT-Delayed).

**Conclusions:** Anemia was associated with poorer baseline performance on a test of executive function and with faster rates of decline on tests of immediate and delayed verbal recall. Clinical trials of anemia correction and cognitive decline in older adults may be warranted.

**ALDEN L. GROSS, MHS**  
PHD STUDENT, MENTAL HEALTH  
SCHOOL OF PUBLIC HEALTH

**Effect of Strategy Usage on Functional Ability in Elderly Adults: Results from the  
ACTIVE Cognitive Intervention Trial**

A. L. Gross and G. W. Rebok

Memory training can enhance cognitive outcomes, but training effects tend not to transfer to more general activities of daily function. Specific mnemonic strategies, which are malleable to cognitive training interventions, have not been studied with respect to cognitively demanding functional abilities. This study analyzed associations between specific strategies used in verbal memory tests with functional ability outcomes using data from the ACTIVE trial, a multi-center, randomized, controlled trial, where 2,832 community-dwelling elderly adults were randomly assigned to receive cognitive training interventions. Analyses included 916 participants who either completed memory training or were controls. Verbal memory was assessed using the HVLТ and the AVLT, which both allow retrospective calculation of serial and subjective strategy clustering scores. The HVLТ also provides a semantic clustering score. A composite function outcome was constructed from tests of function including the MDS-HC, OTDL, and EPT. GEE marginal models showed that more education, white ethnicity, and younger age were associated with increased strategy use (all  $p < 0.01$ ), while self-rated health status and gender were not. In separate GEE and random effects models controlling for age, gender, race, self-rated health status, and education, each strategy clustering score was positively associated with functional ability, though training group did not moderate the effect of strategy on functional ability. Results indicate that strategies people use in tests of memory may be more proximal to functional ability and a more relevant measure of the mechanisms of age-related cognitive decline. This may inform future cognitive training efforts.

CHANDRA L. JACKSON, MSc  
PHD STUDENT, EPIDEMIOLOGY  
SCHOOL OF PUBLIC HEALTH

## **A Pilot Study for Neighborhoods and Cardiovascular Health in Urban and Rural Chile**

**Background:** There is a great need for effective interventions to curb the increasing prevalence of cardiovascular disease in many Latin-American countries, and investigating the health effects of neighborhood characteristics among the next generation of older individuals is a promising avenue.

**Methods:** We conducted a pilot study of urban and rural low-income neighborhood perceptions in Santiago, Chile by recruiting participants from two public health centers. Between neighborhood differences in indicators of cardiovascular health were also explored.

**Results:** Of the 52 participants, 69% were female, the mean age was 38 years, the mean monthly income was \$350, most had less than a high school education, and 52% lived in an urban neighborhood. Seventy-four percent reported crowding in their neighborhood, 56% had inadequate access to public transportation and approximately the same reported the presence of trash/litter. Eighty-two percent of the participants had stray animals in their neighborhood, a little over half reported violence, and almost one-third reported crime. Although there were no differences in body mass index, blood pressure, and waist-hip circumference between urban and rural neighborhoods, there were significant differences in neighborhood characteristics shown to impact cardiovascular health. Furthermore, 71% of the participants had fair/poor self-reported health, and both neighborhoods had good social capital.

**Conclusion:** These data demonstrate that neighborhood characteristics shown to impact cardiovascular health differ between urban and rural environments. To implement neighborhood-level interventions that improve the cardiovascular health profile of aging individuals, more rigorous research is needed.

**BRYAN D. JAMES, M.BIOETHICS**  
PHD CANDIDATE, EPIDEMIOLOGY  
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## **Association of Social Engagement with Brain Volumes Assessed by Structural MRI**

B. D. James, T. A. Glass, B. S. Schwartz

The ‘use it or lose it’ hypothesis is often invoked to explain the association between social engagement and better cognitive function in later life, but the biological mechanisms are rarely investigated. The association may be mediated through structural changes in the brain such as attenuated neuronal loss, or change in cellular architecture. We examined whether social engagement was associated with larger brain volumes in 348 older men from the Former Lead Workers Study: retired factory workers and population based controls. Social engagement was measured using the Enacted Function Profile; confirmatory factor analysis was used to compute a summary scale. The volumes of twenty regions of interest (ROIs), ranging from total brain volume to smaller regions such as the hippocampus, were derived from T1-weighted magnetic resonance images. Linear regression models were adjusted for height, age, education, race, hypertension, diabetes, and study visit number (adjustment for control status or lead levels did not affect results). Social engagement was associated with volumes of total gray matter (GM) ( $p=0.013$ ), parietal GM ( $p=0.037$ ), temporal GM ( $p=0.010$ ), and occipital GM ( $p=0.030$ ). Despite lack of statistical significance in other regions, persons with higher social engagement consistently had larger volumes across all ROIs. Although cross-sectional in nature, this is the first study to our knowledge showing associations between social engagement and structural features of the aging brain.

**JAE HYUNG KIM, PhD**

POSTDOCTORAL FELLOW, ANESTHESIOLOGY AND CRITICAL CARE MEDICINE AND  
BIOMEDICAL ENGINEERING, JOHNS HOPKINS MEDICAL INSTITUTIONS

### **Arginase Inhibition Restores NOS Coupling and Reverses Endothelial Dysfunction and Vascular Stiffness in Old Rats**

J. H. Kim, L. Bugaj, T. Bivalacqua, S. Ryoo, Y. J. Oh, A. Camara, G. Sikka, and D. E. Berkowitz

**Introduction:** Vascular and ventricular stiffness is a hallmark of the aging cardiovascular system. Impaired endothelial NO bioavailability is a consistent finding in aging vessels and contributes to this phenotype despite a increase in the abundance of eNOS protein. Furthermore vascular reactive oxygen species (ROS) production is also enhanced in vascular tissue from aging rats. We have recently demonstrated that the upregulation of arginase 1 contributes to endothelial dysfunction in old rat blood vessels and that both pharmacologic inhibition and antisense knockdown of arginase 1 restores endothelial NO production and endothelial function ex-vivo. We hypothesized that arginase upregulation leads to NOS uncoupling and that in vivo chronic inhibition of arginase restores nitros-redox balance, endothelial function and vascular stiffness in old rats to that of the young phenotype.

**Methods:** Using the NO sensitive dye, DAF, we measured fluorescence ex vivo in segments of rat aorta en face. A similar technique was used for ROS measurement in vascular strips using the ROS sensitive dye DHE. Endothelial function was determined on vascular rings in organ chambers and vascular stiffness was determined by pulse wave velocity using high frequency Doppler. For chronic treatment of rats with the arginase inhibitor, ABH was administered in the drinking water at 20ug/ml.

**Results:** The slope of the DHE fluorescence was significantly greater in old endothelialized rings than young. Both L-NAME (100uM) and ABH (10uM) significantly reduced ROS production in old but not young vessels suggesting NOS uncoupling as a mechanism. ABH significantly increased NO production in old rat vessels compared with young. The administration of the arginase inhibitor ABH to old rats significantly reduced ROS production and enhanced endothelial dependent vasorelaxation to ACh such that it was not significantly different from young. Finally ABH significantly reduced vascular stiffness (as measured by pulse wave velocity) in old rats toward that of young rats.

**Conclusion:** Arginase upregulation with the resultant substrate depletion leads to eNOS uncoupling and contributes the nitroso-redox imbalance observed in vascular aging. Arginase inhibition increases NO, decreases ROS, improves endothelial function and large artery compliance suggesting that arginase is a tempting target for therapy in age-dependent vascular stiffness.

AMY MATTEINI, PHD  
POST-DOCTORAL FELLOW, DIVISION OF GERIATRICS  
SCHOOL OF MEDICINE

### **Inflammatory Endophenotypes in Genetic Studies of Older Adults**

A. Matteini, R. Varadhan, K. Bandeen-Roche, D. Fallin, L. Ferrucci, and J. Walston

Chronic inflammation, as measured by serum inflammatory cytokines, is a heritable trait that is highly predictive of adverse health outcomes and chronic disease in older adults. We hypothesize that aggregate measures of inflammatory biomediators that are part of the NFkB signal transduction pathway are more predictive of outcomes and better serve as endophenotypes of inflammation for future genetics studies than single biomarkers of inflammation studied in the past. We utilized previously studied baseline biomarkers from 1300 participants in the Italian longitudinal cohort study, In CHIANTI. Principal components analysis was used to gain insights into the multivariate correlational structure of the 15 biomarkers. The first three principal components (PCs) explained 74% of the covariance between the biomarkers. PCA identified 3 distinct dimensions of inflammation: a proinflammatory axis that included CRP, IL-1B, IL1RA, IL-6, IL6R, IL-18, TNFa, TNFa-r1, and TNFa-r2; an anti-inflammatory axis that included DHEAS and IL-10; and an independent third axis that was orthogonal to the pro- and anti-inflammatory axes, and which included IFNg, IL8, MCP1 and IL-12. Our candidate endophenotypes of inflammation will be the 3 PCs simplified by inclusion of only the biomarkers that were associated with age. We plan to perform a statistical model-based cluster analysis to evaluate whether we can obtain a scalar endophenotype by combining the 3 PCs using appropriate cut-points, and determine how well the 3 PCs and the scalar endophenotype predict mortality. Our final endophenotype will be selected based on: (a) biological interpretation, (b) association with age, and (c) strength of mortality prediction.

DEBRAJ MUKHERJEE, M.D.  
M.P.H. STUDENT  
SCHOOL OF PUBLIC HEALTH

**National disparities in access to high-volume or academic medical centers for aging brain tumor patients undergoing craniotomy, 2001-2005**

**Background:**

Craniotomies to treat/cure brain tumors demonstrate better outcomes when performed at teaching or high-volume centers. It remains unclear which patients are more likely to be admitted to these centers. We hypothesized that age influenced admission.

**Methods:**

A retrospective analysis of the NIS (2001-2005) was conducted. Patients were identified using ICD-9 codes (Table 1). Patients <18 years old were excluded. Primary outcomes were admission to a teaching or high-volume (>50 craniotomies/year) center. Covariates included age, gender, race, Charlson comorbidity score, income, wealth (home value), and insurance. Our reference groups were: 18-24 year olds, males, whites, Charlson score=0, income <\$35,999/year, home value <\$104,000, and uninsured status. Multivariate analysis was performed using multiple logistic regression models. A p-value of <0.05 was considered statistically significant.

**Results:**

167,102 patients were identified in total.

*High-Volume Centers*

142,888 (85.51%) patients were admitted to high-volume centers. Patients >35 years old were less likely to be admitted. ORs ranged from 0.88 (0.58-0.83 p<0.001) in 35-44 year olds to 0.13 (0.11-0.16, p<0.001) in those > 85 years old.

*Teaching Hospitals*

111,537 (66.75%) patients were admitted to teaching hospitals. Patients >35 years old were also less likely to be admitted. ORs ranged from 0.88 (0.80-0.98, p=0.019) in 35-44 year olds to 0.21 (0.19-0.24, p<0.001) in those >85 years old.

**Conclusion:**

Aging significantly decreased the odds (up to 87%) of admission to academic or high-volume centers for life saving/prolonging treatment. The most significant factors in determining access were, in order: age, wealth, race, and income. Renewed effort should be focused toward easing such disparities.

**BRUCE SWIHART**  
PHD STUDENT, BIostatISTICS  
SCHOOL OF PUBLIC HEALTH

### **Compression of multi-state morbidity**

The Compression of Morbidity philosophy is a motivation behind many studies involving aging. Recent studies by Guralnik in the area of disability and Gill in frailty have brought to light the multiple states (i.e. Not Frail, Pre-Frail, Frail, Death) and multiple transition (i.e. going from Pre-Frail to Not Frail to Pre-Frail to Death) nature of morbidities that are prevalent in aged populations being followed longitudinally. The discovery of the underlying multi-state system raises new considerations and opportunities in the compression of morbidity. The theme of "rectangularization" is generalized to maximizing the time spent in the less severe states of morbidity while addressing temporal trends on a group level and individual level. Time of health is maximized (equivalently, morbidity is compressed) by seeking interventions that encourage transitions from more severe to less severe states of morbidity as often as possible as well as discouraging transitions from less severe to more severe states of morbidity. To explore and assess these considerations and opportunities, a new visualization method for longitudinal data is utilized. Traditionally, in discussions of compressing morbidity, two survival curves were sufficient for systems of irreversible morbidity and inevitable subsequent mortality. In multi-state, multi-transition morbidity, survival curves obscure transition behavior due to the summarization of subject level information for group level presentation. The Lasagna plot method is a more interactive, informative, and saucy alternative to multiple survival curves or traditional spaghetti plots, and aids nicely in the campaign of compressing morbidity that can be modeled as multi-state systems.

**JAMES R. WILLIAMS, MHS**  
DOCTORAL STUDENT, MENTAL HEALTH  
SCHOOL OF PUBLIC HEALTH

## **Identifying Domain Specific Associations between Instrumental Activities of Daily Living (IADL) Disability, Cognition, & Mobility**

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Disability research often treats IADL disability as a unitary outcome, however distinct domains may exist. This study tested the hypothesis that the relationship between IADL disability, cognition, and mobility differs by IADL domain (mobility versus cognitive). Additionally, cross-sectional evidence suggests that IADL disability is more strongly associated with measures of executive function (EF) than verbal memory. These hypotheses were tested using baseline data from 3070 participants who completed a comprehensive battery of EF, memory, attention, language, and psychomotor speed tests in the Ginkgo Evaluation of Memory study, a randomized double-blind, placebo-controlled trial of ginkgo biloba for the prevention of dementia in community-based non-demented elderly ages 72-96. Controlling for age, sex, education, and depressive symptoms, self-reported difficulty in cognitive IADLs (finances, medications, & telephone use) was associated with two measures of EF [Odds Ratios (OR) for test performance one standard deviation below group mean: Trails B=1.2, 95% CI: 1.0-1.4, Block Design=1.6, 95% CI: 1.1-2.2], in addition to self-reported mobility difficulty (OR=1.3, 95% CI: 1.1-1.5). Self-reported difficulty in mobility IADLs (housework, driving, shopping, & meal preparation) was associated with mobility difficulty (OR=2.0, 95% CI: 1.7-2.4) and Trails A, a measure of psychomotor speed, (OR=1.3, 95% CI: 1.1-1.4). The selective association between cognitive IADLs and EF was corroborated by similar results when the Hopkins Medication Schedule was used as a performance IADL measure. These results strengthen the categorization of distinct IADL domains and highlight the need to address both EF and mobility when attempting to prevent and delay the IADL disablement process.

JINCHUN YAN, MD, MS  
PH.D STUDENT, BIOCHEMISTRY & MOLECULAR BIOLOGY  
SCHOOL OF PUBLIC HEALTH

### **Increased androgenic sensitivity during aging contributes to the prostate proliferative potential**

Benign prostatic hyperplasia (BPH) is a prevalent condition in aging men. Spontaneous epithelial cell hyperplasia in the dorsal and lateral lobes of old Brown Norway rats is analogous to BPH in humans. Therefore, the Brown Norway rat represents an excellent model to investigate the mechanisms that regulate cell proliferation and prostate hyperplasia. The majority of cells in the adult prostate are quiescent in the  $G_0$  phase and in order for hyperplasia to occur, cells must escape from cell cycle arrest and enter S phase through  $G_1/S$  restriction. In the androgen withdrawn-replenished Brown Norway rats, proliferation rate quantified by BrdU labeling index of all three lobes in response to androgens is time and dose dependent, and peak at day 3. Under the similar serum testosterone levels monitored by radioimmunoassay, aging dorsal and lateral prostates have higher proliferation rate than the young animals, while there is no age dependent difference in proliferation rate of ventral lobes. Immunoblots demonstrated the abundance of cyclinD1, cdk6, cyclin E, cdk2 was significantly upregulated, and P27<sup>Kip1</sup> abundance was significantly downregulated, affected by androgens. Rb phosphorylation was also affected by androgens. Immunostaining demonstrated changing patterns of cdk4 subcellular localization and probability of cyclinD1 nuclei localization corresponded to the time frame of cell proliferation affected by androgens. These data suggested increased androgenic sensitivity and its effect on the key cell cycle regulators (especially those related to  $G_1/S$  transitions) may be one of the multiple mechanisms leading to BPH, which develops during aging while the serum testosterone levels decrease.

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## Patterns of Complexity of Conditions among People with Coronary Heart Disease (NHANES)

C. M. Boyd, C. O. Weiss, J. Wolff, Q. Yu, J. Zhou, B. Leff

**Background:** Treatment of coronary heart disease (CHD) may be complicated by conditions that modify or interact with CHD therapies or influence the feasibility of CHD therapies.

**Purpose:** To estimate the prevalence of conditions that increase the complexity of implementing CHD clinical practice guidelines.

**Methods:** We used National Health and Nutrition Examination Survey 1999-2004, with an analytic Sample of n=1259 with CHD aged 45 and older. Health status complexity relevant to implementing therapy for CHD was examined across 3 dimensions: 1) self-reported chronic diseases (arthritis, diabetes, heart failure, lung disease, and/or stroke); 2) self-reported and laboratory-based clinical measures (anemia, high ALT, dizziness or falls, 4+ low glomerular filtration rate (GFR), number of medications, urinary incontinence (UI), and/or use of warfarin); 3) self-reported and observed function (frequent mental distress, mobility difficulty, cognitive, hearing and/or visual impairment). Frequencies were estimated using NHANES sampling weights and masked variance units. We compared estimated prevalences by gender and age (45-64 vs. 65 and older), and tested the significance of differences using p-values adjusted for multiple comparisons. Mutually exclusive patterns of health status complexity were examined.

**Results:** The prevalences of comorbid chronic diseases were: stroke (14%), diabetes(25%), lung disease (26%), congestive heart failure (29%), and arthritis (57%); clinical conditions adding to complexity of clinical decision-making for CHD were: ALT(6%), anemia (10%), use of warfarin (10%), low GFR (24%), dizziness or falls (35%), UI (49%), use of 4+ meds (55%); and functioning were: frequent mental distress (14%), visual impairment (17%), hearing impairment (18%), cognitive impairment (for those 65+)(30%), and/or mobility difficulty (40%). While some conditions were significantly more common in the 65+ population (UI, low GFR, anemia, mobility difficulty, visual and hearing impairment), many were equally common among those 45-64 (4+ meds, dizziness or falls, arthritis). 70 % of people with CHD are captured by top 6 (none + top 5) complexity patterns for diseases, 58% for clinical measures, and 44% for function.

**Conclusions:** The high prevalence of health status complexity suggests the need for recognition of these co-existing conditions among both middle aged and older adults with CHD.

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RESEARCH ASSOCIATE, HEALTH POLICY AND MANAGEMENT  
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## **A Cluster Randomized Controlled Trial of Guided Care: Baseline Data and Initial Experience**

“Guided Care” (GC) is designed to improve the quality of life and the efficiency of resource use for medically complex older adults by applying the principles of the “chronic care model” to primary care and is currently being tested in a randomized trial. GC is delivered by seven specially trained nurses working within primary care practices in the Baltimore-Washington region in partnership with 2-5 physicians, facilitating the care for 50-60 of their highest-risk patients. For each patient, the nurse 1) assesses the patient and caregiver at home, 2) creates an evidence-based Care Guide, 3) promotes patient self-management, 4) monitors the patient monthly, 5) coaches the patient to practice healthy behaviors, 6) coordinates the patient’s transitions between sites and providers of care, 7) educates and supports family caregivers, and 8) facilitates access to community resources.

Consenting patients (n=933) have a mean age of 77.7 years; 54.8% are female. 45.2% of participants have at least a high school diploma or equivalent; 50.0% are white, 45.4% African-American, and 4.6% reported themselves to be another race. All are insured by fee-for-service Medicare (33.0%) or managed care (67.0%). At the baseline interview, Self-Reported General Health was 3.3 on a scale of 1 (“Poor”) to 5 (“Excellent”) and 46% of respondents had functional limitation or a need for help with health care tasks. Consenting caregivers (n=319) are patients’ spouses (45.5%), children (44.2%), other relatives (7.2%), or non-relatives (3.1%). Caregiver mean age is 61.5 years. During the first 6 months of the RCT, the nurses devoted approximately half their time to assessing patients and caregivers and developing Care Guides.

**SARA PALMER, PhD**  
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### **The Guided Care Program for Families and Friends: Development of a Caregiver Intervention**

**Purpose:** Describe the Guided Care Program for Families and Friends (GCPFF), a caregiver intervention developed for Guided Care, delivered by specially trained nurses in a coordinated community-based chronic care model.

**Research Method:** Intervention development and pilot study; participatory action research (PAR) methods were used in focus and pilot groups. The GCPFF was developed using focus groups, self-management principles, existing programs, and expert consultation. The workshop was piloted with volunteer caregivers.

**Results:** The GCPFF consists of individualized coaching; a 6-week group workshop; and support group meetings. Workshop topics include problem-solving, self-care, social supports, communication, and planning for future needs. A Participant Workbook includes information, worksheets and activities for each session. A Leader's Guide includes sample scripts for facilitating the sessions. Lectures, role plays and mock sessions were used in training Guided Care Nurses (GCNs) to conduct the workshop and to coach individual caregivers. Currently, 308 caregivers are enrolled in a randomized trial of Guided Care, including the GCPFF. Their average age is 62. Most are spouse/partners (46.1%) or adult children (44.5%), female (71.4%) and married (68.5%); 40.6% are employed. At baseline, 62.6% reported that they helped patients at least daily.

**Conclusions:** The GCPFF is feasible and is currently being implemented in a randomized trial of Guided Care, a new model of chronic care. The GCPFF is a novel caregiver intervention, incorporating group learning and support with individualized coordination between caregiver, care-recipient and health care providers.

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## **Design and Implementation of a Registry to Promote Research on Older Adults.**

P. Patel and C. Weiss

Conducting research on older adults presents many challenges due to the prevalence of health issues like frailty, disability, episodes of acute illness, dependence and the heightened risk of death. In addition, several logistical and ethical issues act as barriers to recruiting study participants from this age group. Sponsored by the Johns Hopkins Older Americans Independence Center, a new registry aims to overcome barriers in recruitment by creating and managing a list of health information on frail and non-frail individuals who are willing to be involved in future research projects. The objectives of this poster are to:

- 1) describe the advantages and importance of a registry of older adults who may be willing to participate in new research
- 2) explain the process of setting up a frailty registry in a an ambulatory geriatric medicine clinic, and challenges faced that are relevant to using the information for research
- 3) provide data on the current registry status
- 4) summarize the strengths, limitations and future directions of the registry

We have successfully enrolled 120 (48%) of 248 patients approached and screened them for frailty and other major health conditions. The strength of this electronic registry is that it will integrate data collection and provide query-enabled access to a unique dataset. However selection bias, informative censoring are some issues that remain to be fully addressed. Our experience reinforces previous recommendations and describes a model that may be replicated in other research arenas.

**CINDY N. ROY, PH.D.**

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### **Mouse models for investigation of anemia as a comorbidity of aging**

O. Prince, MD; H. Yang; J. Walston, MD; C. N. Roy, PhD

Anemia is an independent risk factor for morbidity in older adults. Between 1/3 and 2/3 of anemia in the elderly occurs in the context of chronic disease. More specifically, the anemia associated with aging and the geriatric syndrome, frailty, has recently been linked to the immune response, suggesting an aging immune system negatively regulates erythropoiesis.

The current understanding of the pathogenesis of the anemia of inflammation (AI) is certainly consistent with the hypothesis that elevated pro-inflammatory cytokine levels in older or frail adults could lead to anemia. Several pro-inflammatory cytokines including TNF $\alpha$ , IL-6, and IFN $\gamma$  are strongly associated with anemia, though their mechanisms of action are not conserved.

To elucidate how the activation of an aged immune system inhibits erythropoiesis, we have turned to the use of in vivo mouse models. Only in an in vivo system can the signaling between the immune system and sites of red blood cell development be adequately investigated. We are currently characterizing three mouse models of immune-induced anemia in young adult and aged mice.

**LISA REIDER, MHS**

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### **Guided Care for Members with Chronic Conditions**

Guided Care (GC) is primary care in which a specially trained registered nurse works within a primary care practice in partnership with 2-5 physicians, facilitating the care for 50-60 of their highest-risk patients. We are conducting a cluster-randomized trial of GC (versus Usual Care, UC) in the community-based practices of 49 primary care physicians in the mid-Atlantic United States. Participants are patients age 65 years or older who have a twice-average probability of using health services heavily during the following year, according to the claims-based Hierarchical Condition Category (HCC) predictive model. Participants' health care is insured by Tricare, Kaiser-Permanente, or fee-for-service Medicare. Here we compare the GC and UC groups' quality of care and use of inpatient health services (for Tricare and Kaiser-Permanente members,  $n = 546$ ) through the first six months of the study. Data on Medicare beneficiaries will become available later. Quality of care was measured at baseline and six months later using the Patient Assessment of Chronic Illness Care (PACIC). Use of hospital and skilled nursing facilities (SNF) was quantified from "admission authorization" data provided by the patients' health insurers. Compared to controls, GC patients were twice as likely to rate their health care in the highest quality category (aOR = 2.6, 95% CI = 1.3 - 4.8). The two groups' use of hospital days was similar, but the GC group used 66.3% fewer SNF days. If the final results remain positive, GC may become a national model for providing cost-effective health care to patients with chronic conditions.

**DORRY SEGEV, M.D.**

ASSISTANT PROFESSOR OF SURGERY

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## **Disparities in Access to Kidney Transplantation for Older Women**

**Background:** Multiple studies have associated female gender with decreased access to kidney transplantation, but little is known about the underlying causes of this disparity. The criteria for evaluating a patient for transplantation are based on risk assessment models designed for younger patients. A lack of metrics specific to older patients has resulted in clinical decision-making based on perceptions of rather than measurements of physiologic reserve. We hypothesized that older women are more commonly perceived as frail when compared with older men, despite comparable physiologic reserve and outcomes. Our goal was to quantify the relationship between female gender, access to transplantation, and post-transplant survival benefit.

**Methods:** We analyzed 563,197 adult patients with ESRD as captured in USRDS between 2000 and 2005. Access to transplantation (ATT) was defined as either registering for the deceased donor waiting list or receiving a live donor transplant. Survival benefit was defined as relative survival after transplantation versus dialysis. Multivariate generalized linear models and Cox proportional hazards models were adjusted for age, gender, ethnicity, BMI, comorbidities, type of insurance, and primary cause of ESRD, and smoking. All models were stratified by age category with or without comorbidity.

**Results:** Women aged 18-55 had equivalent ATT compared to their male counterparts. With increasing age, ATT for women declined dramatically (RR 0.85 for ages 56-65, RR 0.71 for ages 65-75, and RR 0.41 for those over 75,  $p < 0.001$  for all estimates). These disparities were seen despite equivalent SBT for men and women in all age subgroups. Furthermore, women with comorbidities had even further decreased ATT compared to men with the same comorbidities, again despite similar SBT.

**Conclusions:** Older age and the presence of comorbidities both play significant roles in gender disparities for ATT. We theorize that at some level (patient, family, dialysis center, nephrologist, or transplant provider), elderly women and women with comorbidities are perceived as more frail and less able to tolerate a surgical procedure than their male counterparts, and thus suffer from decreased access. These perceptions may not be accurate, as post-transplant survival benefit is similar for men and women regardless of age or comorbidities that we studied. A better understanding of the underlying causes of this disparity is needed so that interventions can be developed to increase access to kidney transplantation for those older women who stand to benefit from it.

CARLOS WEISS, MD, MHS

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**Clinically complex health status patterns and repeated hospitalization among adults with heart disease.**

**Purpose:** To estimate the prevalence of common clinical patterns of health status complexity among older adults with coronary heart disease including angina and infarction (CHD) then determine which are associated with repeated hospitalization.

**Methods:** Data were from the National Health and Nutrition Examination Survey 1999-2004, n=1,259 with CHD aged 45+. Mutually exclusive patterns of health status complexity for people with CHD were examined across 3 dimensions: 1) additional self-reported chronic diseases (arthritis, diabetes, heart failure, lung disease, and/or stroke); 2) self-reported and laboratory-based clinical measures (anemia, high ALT, dizziness or falls, low glomerular filtration rate (GFR), 4+ medications, urinary incontinence, and/or on warfarin); 3) self-reported and observed function (frequent mental distress, mobility difficulty, cognitive, hearing and/or visual impairment). We modeled the odds ratios (OR) of CHD with each complexity pattern, versus CHD alone for having incurred more than one hospitalization in the last year.

**Results:** A subset of complexity factors across dimensions were associated with repeated hospitalizations. While 22.2% of participants with CHD had arthritis they were not at significantly greater risk for rehospitalization (OR: 1.36, 95%CI: 0.77-2.38) in comparison to the 7.7% of participants of CHD who had both arthritis and diabetes (2.33, 1.18-4.62). In the clinical dimension, the 13.1% with CHD taking 4+ meds (3.15, 1.75-5.66) and 7.0% taking 4 or more meds and had dizziness and urinary incontinence (4.65, 1.37-15.79) were at greater risk for rehospitalization, but those with urinary incontinence were not. In the health status dimension, 11.4% with CHD with mobility difficulty (2.05, 1.15-3.67) and 3.3% with mobility difficulty and hearing impairment (2.11, 0.87-5.16) were at elevated risk.

**Conclusions:** In adults with CHD, there was considerable heterogeneity to whether clinical patterns of complexity conferred risk for repeated hospitalization. We found non-disease-specific health status indicators to carry as strong associations with repeated hospitalization as diseases.

This poster session accompanies the **Elizabeth L. Rogers, M.D. Visiting Lecture in Geriatric Medicine** *The Next Generation of Older Americans: Meeting the Challenges and Needs of an Aging Population* presented by **Congressman Chris Van Hollen**, of Maryland's 8th Congressional District on Friday, May 9th, 10am at the Johns Hopkins Asthma & Allergy Center, Bayview Medical Campus, Atrium Auditorium.

Traditionally, the Rogers lectureship has focused on the academic and research side of geriatric medicine, including many noted speakers, such as Richard Hodes, Director of the National Institute on Aging. Recognizing that addressing the issues facing older adults will require more than effective partnerships within science and medicine, the goal of this year's lectureship is to stimulate an even broader discussion of society's responsibilities to one's of its greatest resources its older adult population.