Validation of Stroke Network of Wisconsin (SNOW) Scale at Aurora Health Care

Kessarin Panichpisal
Adil Chohan
Paul Vilar
Maharaj Singh
Reji Babygirija
Mary L. Hook
Sharon Matyas
Rehan Sajjad
Thomas Wolfe
Richard A. Rovin

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Conclusion: With 20% or more of all inpatients 65 and older discharged from the hospital to skilled home care, the impact of this adapted and bundled model of care is significant. Given average length of hospital stay is 3 days, there is less time to deliver HELP protocols in the hospital setting. The findings of this study provide support for extending this model of care beyond acute care and replicating the study.

Effect of a Novel Long-Acting Neutralizing Monoclonal ACTH Antibody (ALD1611) in the Neonatal Rat: Basal and Corticosterone Responses to ACTH and Hypoxic Stress

Ashley Gehrand, Jonathan M. Phillips, Kevin Malott, Hershel Raff

Endocrine Research Laboratory, Aurora St. Luke’s Medical Center; Aurora Research Institute

Background: The control of steroidogenesis in the neonatal adrenal gland is of great clinical interest. We have demonstrated that the newborn rat [postnatal day (PD) 2] exhibits a corticosterone response to hypoxia in the absence of an increase in plasma ACTH measured by radioimmunoassay, whereas the corticosterone response to exogenous ACTH is intact. By PD8, the corticosterone response to hypoxia is ACTH-dependent. This apparently ACTH-independent response to hypoxia in the newborn rat may be due to an increase in a bioactive, non-immunoassayable form of ACTH.

Purpose: To evaluate the ACTH-independent response to hypoxia in newborn rats using a novel, specific neutralizing antibody (ALD1611) to ACTH.

Methods: Rat pups (N=6–14 per group) were given ALD1611 (20 mg/kg, intraperitoneal) or vehicle on the morning of PD1, PD7, or PD14; 24 hours later (on PD2, PD8, or PD15), baseline blood samples and adrenal glands were obtained. Then, porcine ACTH [1-39] was injected (20 mcg/kg, subcutaneous) or hypoxia (8% O2) was administered, and blood was sampled for ACTH and corticosterone and adrenal glands collected for quantitative polymerase chain reaction (qPCR) 60 minutes later.

Results: Treatment with ALD1611 decreased baseline corticosterone and eliminated the corticosterone response to ACTH or hypoxia in all age groups. This occurred despite the fact that hypoxia did not induce a statistically significant increase in plasma ACTH in the PD2 pups. In additional experiments, we found that the magnitude and duration of the attenuation of the adrenal response to ACTH injection or hypoxia was related to the dose of ALD1611 (0.1 mg/kg to 20 mg/kg, intraperitoneal). ALD1611 also blocked stress-induced changes in the expression of mRNAs (by qPCR) of critical adrenal steroidogenic pathway genes.

Conclusion: ALD1611 is highly effective in decreasing basal plasma corticosterone and in blocking the adenocortical response to exogenous ACTH and hypoxic stress in the neonatal rat. We conclude that, despite the minimal increase in plasma ACTH, the adrenal response to hypoxia is ACTH-dependent at all age groups, suggesting stress-induced increases in alternate biologically active forms of ACTH and/or hypoxia-induced increase in adrenal sensitivity in the PD2 neonatal rat. ALD1611 may prove useful in attenuating ACTH-dependent adrenal steroidogenesis in vivo and eventually in treated patients with ACTH-dependent Cushing’s syndrome.

New-Onset Cardiomyopathy With and Without Atrial Fibrillation

Vinay Mehta, Alexander J. Albers, Alex Baek, Maharaj Singh

Aurora BayCare Medical Center; Aurora Research Institute

Background: Atrial fibrillation (AF) is the most common arrhythmia and is often associated with cardiomyopathy (CM) and heart failure. There has been little research performed to assess whether there are any differences in patient profile, comorbidities, presenting complaints, and electrocardiographic (ECG) or laboratory characteristics and outcomes between patients who have AF at presentation or preceding the diagnosis of new-onset CM (defined as left ventricular ejection fraction ≤ 40%) and patients who are diagnosed with new-onset CM without any preceding atrial dysrhythmias.

Purpose: To assess differences among patients with new-onset CM (LVEF ≤ 40%) with AF and without AF.

Methods: We used a balance research design to compare patients diagnosed with new-onset CM with AF (N=196) and without AF (N=197). Demographic characteristics, comorbidities, diagnosis, ECG characteristics, laboratory marker variables, and outcome data were described using appropriate descriptive statistics. The two groups of patients with and without AF were compared using chi-squared and independent t-test. An alpha of 0.05 was used for all statistical tests, and all statistical analysis was done using SAS version 9.4 (SAS Institute Inc., Cary, NC).

Results: Patients in the AF-CM group were older (73.51 vs 64.18 years; P<0.001) and more likely to be male (63.3% vs 49.2%; P=0.005), of Caucasian ethnicity (96.9% vs 76.7%; P<0.001), and have a history of hypertension (70.4% vs 53.3%; P=0.0005) or coronary artery disease (33.7% vs 20.8%; P=0.0042). They were more likely to be diagnosed as an outpatient (35.7% vs 10.2%; P=0.0001), if presenting to the hospital, they were much more likely to have congestive heart failure as their presenting complaint (61.1% vs 38.4%; P=0.0001). They also were more likely to have low voltage on their presenting ECG compared to the control group (39% vs 27.6%; P=0.0003). Troponin (0.91 vs 14.27; P=0.0067) and brain natriuretic peptide (771.3 vs 1015.6; P=0.021) values were significantly lower in the AF group. Patients in the AF-CM group showed an increased risk of death: 30.1% vs 20.8% (P=0.0345).

Conclusion: Patients with atrial fibrillation and new-onset cardiomyopathy differ from patients without atrial fibrillation in demographic characteristics, comorbidities, venue of diagnosis, presenting complaints, ECG characteristics, laboratory markers, and prognosis. This may have implications for diagnosis, work-up, and treatment of these patients.

Validation of Stroke Network of Wisconsin (SNOW) Scale at Aurora Health Care


Aurora Neuroscience Innovation Institute; Marian University College of Osteopathic Medicine; Aurora St. Luke’s Medical Center; Aurora Research Institute; Aurora Sinai Medical Center
Background: The Stroke Network of Wisconsin (SNOW) scale, previously called the Pomona scale, was developed to predict large-vessel occlusions (LVO) in patients with acute ischemic stroke. The original study showed a high accuracy of this scale.

Purpose: We sought to externally validate the SNOW scale in an independent cohort.

Methods: The SNOW scale includes 3 items: gaze deviation, expressive aphasia, and neglect. The SNOW scale is positive if any one of these items is present. We retrospectively reviewed a large cohort of all acute stroke patients who presented within 24 hours after onset at Aurora Health Care (14 hospitals) from January 2015 to December 2016. We calculated SNOW scale, the Vision Aphasia and Neglect (VAN) scale, the Cincinnati Prehospital Stroke Severity Scale (CPSSS), the Los Angeles Motor Scale (LAMS), and the Prehospital Acute Stroke Severity (PASS) scale for all patients. The predictive performance of all scales and several National Institute of Health Stroke Scale (NIHSS) cutoffs ≥ 6 were determined and compared. LVO was defined by total occlusions involving the intracranial internal carotid artery, middle cerebral artery (M1), or basilar arteries.

Results: Among 2183 acute ischemic stroke patients, 1381 had vascular imaging and were included in the analysis. LVO was detected in 169 (12%). A positive SNOW scale had comparable accuracy to predict LVO as the CPSS and an NIHSS ≥ 6. With area under the receiver operating characteristics curve of 0.78, a positive SNOW scale had higher accuracy than VAN (0.67, P=0.001), LAMS ≥ 4 (0.62, P<0.001), and PASS ≥ 2 (0.69, P<0.001). A positive SNOW scale had sensitivity of 0.80, specificity of 0.76 to predict LVO, positive predictive value of 0.31, and negative predictive value of 0.96 for the detection of LVO versus CPSS ≥ 2 of 0.64, 0.87, 0.41, and 0.95, respectively.

Conclusion: In our large stroke network cohort, the SNOW scale has promising sensitivity, specificity, and accuracy to predict LVO. Future prospective studies in both prehospital and emergency room settings are warranted.

Hot Spotting Medically Complex At-Risk Patients in an Urban Primary Care Residency Clinic

Glenda Sundberg, Chris Peters, Catherine de Grandville, Natalie Sorenson, Rinal Patel, Melissa Grube

Aurora St. Luke’s Family Practice Center; Department of Family Medicine, Aurora Health Care; Aurora Family Services

Background: In the United States, 5% of patients incur 50% of health care costs. Hot spotting, a collaborative care approach, may improve patient outcomes and decrease health care costs among those considered to be super-users. Aurora Health Care may benefit from this new and innovative approach to care.

Purpose: The purpose of this pilot project was to create a more formalized plan for managing the most complex patients at Aurora St. Luke’s Family Practice Center (Milwaukee, WI).

Methods: During 2017, 20 medically at-risk patients ≥ 18 years of age were identified and tracked. Each patient was asked to voluntarily participate and verbally consented. Brief patient/family and caregiver surveys were conducted pre- and post-home visit. Following identification of our cohort, an interdisciplinary team meeting was conducted quarterly to discuss patients and to initiate and update care plans. The diverse medical team included a faculty physician, resident(s), clinic social worker, nurse practitioner, clinical pharmacist, registered nurse, and any other available learners. Through these meetings, we attempted to analyze and address each patient’s social situation and barriers. There was at least one home visit conducted for each patient and, overall, more frequent contact with the patients and caregivers. Additionally, pre- and postproject hospital admissions, clinic access, and emergency department (ED) utilization was tracked.

Results: Overall, the patient population had a mean age of 62.4 years and was predominately female (70%). The average Charlson score for patients was 6.2 (median: 6). (A score of 6 equates to a 10-year mortality risk of 98%). Analysis of characteristics of the 20 patients revealed 80% prevalence of mental illness and communication problems; 70% were overmedicated. Comparing the 6-month periods before and after initiating the pilot, total ED visits decreased 20.0% (95 vs 76) and total admissions decreased 35.5% (31 vs 20). Surveys determined that patients, clinic staff, and physicians were very satisfied with the intervention. Overall, 94% of provider respondents felt more patients would benefit from being involved.

Conclusion: This well-received collaborative pilot substantially reduced hospital utilization in high-risk clinic patients. We believe this concept has large potential to provide further future benefit and may be replicated elsewhere in the system. In 2018, our pilot efforts will be extended to two residency sites for further evaluation.

Differences in Metabolic Profile Between Right and Left Atria of Patients With Atrial Fibrillation

Larisa Emelyanova, Steven M. Komas, Susan Olet, Sean Ryan, Catherine Warner, Farhan Rizvi, Gracioux R. Ross G, David C. Kress, Daniel P. O’Haire, Francis X. Downey

Center for Integrative Research on Cardiovascular Aging, Aurora Research Institute; Department of Biophysics, Medical College of Wisconsin; Cardiovascular and Thoracic Surgery, Aurora Medical Group

Background: Several studies have demonstrated genomic, morphological, and electrophysiological differences between the right atrium and left atrium, suggesting that dissimilar mechanisms may contribute to the development and progression of atrial fibrillation (AF). Therefore, differences in metabolic response to AF between atria are foreseeable. Given the complexity of AF development and progression, understanding AF-associated changes in metabolites in both atria will help in better clinical management of AF.

Purpose: To compare potential changes in metabolites in the right atrial (RAA) and left atrial (LAA) appendage tissue from patients with (AF+) and without (non-AF) history of AF.

Methods: RAA and LAA tissue from AF+ (n=20) and non-AF (n=20) patients undergoing elective open heart surgery at Aurora St. Luke’s Medical Center (Milwaukee, WI) was collected. The tissue was snap-frozen in liquid nitrogen and stored at -80°C. Metabolites were profiled in frozen tissue using high-performance liquid chromatography coupled to tandem mass spectrometry (LC-MS). Comparison between groups was done using the 2 sample t-test and Wilcoxon rank-sum test, with 5% level of significance. The study was approved by the local institutional review board.

Results: A total of 24 metabolites related to glycolysis and tricarboxylic acid cycle (TCA) were identified. The most significant AF-associated changes in metabolites were observed in RAA compared to LAA tissue. In AF+ patients, glycolysis metabolites’ level of glucose-6-phosphate (P=0.03) and...