

a higher number of unique medications and inappropriate medications or drugs with abuse potential, increasing risk of adverse drug events, financial toxicity, poor adherence, and drug-drug interactions. Adolescent and young adult survivors appear at increased risk of polypharmacy.

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### Post-discharge opioid prescriptions and their association with healthcare utilization in the Vanderbilt Inpatient Cohort Study

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**OBJECTIVES/SPECIFIC AIMS:** Opioid prescribing is common and increasing in certain areas of the country with known risk of misuse and dependence. Our study examined the association of opioid prescription at discharge after hospitalization for acute coronary syndrome (ACS) or acute decompensated heart failure (ADHF) with emergency department (ED) care or all-cause readmission, intended healthcare utilization (follow-up with physician within 30 d of discharge and cardiac rehab participation), and all-cause mortality. **METHODS/STUDY POPULATION:** The Vanderbilt Inpatient Cohort Study is a prospective cohort of hospitalized patients age >18 enrolled with either ACS or ADHF between 2011 and 2015 (index hospitalization). We then excluded those who died during the index hospitalization, patients with hospitalization <24 hours, patients discharged to hospice care, or those who underwent coronary artery bypass surgery because of the high probability of receiving opioids. In addition, we limited the analyses to patients whom we had complete covariate data. The primary predictor variable was an opioid prescription at the time of hospital discharge. We collected healthcare utilization behavior for 90 days after discharge, and mortality data until March 8, 2017. Time-to-event analysis using Cox proportional hazard models was performed for both unintended healthcare utilization behavior and mortality outcomes. Logistic regression was performed for intended healthcare utilization (adherence to follow-up appointments and cardiac rehabilitation). All models were adjusted for demographic data, opioid use prior to index hospitalization, severity of illness, and healthcare utilization prior to the index hospitalization. **RESULTS/ANTICIPATED RESULTS:** There were 501 patients discharged with an opioid prescription and 1994 with no opioid prescription at discharge. Among patients with opioids at discharge 235 (47%) experienced unplanned healthcare events (71 ED visits and 164 readmissions) and among nonopioid patients 775 (39%) experienced unplanned healthcare events (254 ED visits and 521 readmissions) (aHR: 1.06, 95% CI: 0.87, 1.28). Patient mortality in the opioid group was 131 versus 432 in the nonopioid group (aHR: 1.08, 95% CI 0.84, 1.39). Patients in the opioid at discharge group were less likely to attend follow up visits or participate in cardiac rehab (OR: 0.69, 95% CI 0.52, 0.91,  $p=0.009$ ) compared with those not discharged on opioid medications. Sensitivity analysis of patients who were prescribed prehospital opioids (including prehospital opioids in the exposure group with postdischarge opioids) did not reveal a statistically significant increase in mortality (aHR: 1.09, 95% CI 0.91, 1.31) or unintended healthcare utilization (aHR: 1.12, 95% CI 0.89, 1.41) among opioid users. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Morbidity and mortality related to opioid use is a public health concern. Our study demonstrates a statistically significant reduction in physician follow-up and participation in cardiac rehab among opioid users, both of which are known to decrease patient mortality. We did not find a statistically significant increase in unplanned healthcare utilization or mortality. Sensitivity analysis combining prehospital and posthospital opioid prescriptions did not reveal a statistically significant association between opioid use, hospital readmissions, or mortality. The hospital provides unique patient interactions where providers can make significant medical changes based on their patient's clinical status. Continuing to understand the association between opioid use, healthcare utilization, morbidity, and mortality in recently hospitalized cardiac patients will provide data to support reduction in total opioid dose to improve clinical outcomes.

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### Post-traumatic stress symptoms in caregivers of pediatric hydrocephalus population

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**OBJECTIVES/SPECIFIC AIMS:** The goal of this study is to characterize traumatic events and post-traumatic stress symptom severity experienced by caregivers of children with hydrocephalus. Results will eventually be evaluated and compared with demographic and medical characteristics. This study is part of a

larger research project that aims to (1) determine the prevalence and risk factors for post-traumatic stress symptoms in pediatric hydrocephalus patients and their caregivers; (2) develop a targeted intervention to mitigate its effects and pilot test the intervention. **METHODS/STUDY POPULATION:** Caregivers of children with hydrocephalus that have received surgical treatment (CSF shunt or ETV/CPC) were enrolled during routine follow up visit in a pediatric neurosurgery clinic. Caregivers completed the PTSD Checklist for DSM-5 (PCL-5), a 20-item self-report measure that assesses the presence and severity of post-traumatic stress disorder (PTSD) symptoms. **RESULTS/ANTICIPATED RESULTS:** Participant responses ( $n=56$ ) revealed that 57.14% of caregivers indicated that their most traumatic event was directly related to their child's medical condition. In total, 23.21% of caregivers did not specify their most traumatic event and 1.79% of caregivers indicated that they had never experienced a traumatic event. Median Total Symptom Severity Score was 11 (mean: 15.32  $\pm$  14.92), and scores ranged from 0 to 67; 32.14% of caregivers scored 19 or greater, and 16.07% of caregivers scored 33 or greater, a value suggestive of a provisional diagnosis of PTSD. Severity scores by DSM-V clusters were as follows: cluster B—intrusion symptoms (mean: 4.91  $\pm$  4.77, median: 4, range: 0–20), cluster C—avoidance symptoms (mean: 1.27  $\pm$  1.87, median: 0.5, range: 0–8), cluster D—negative alterations in cognition and mood (mean: 4.86  $\pm$  6.07, median: 2, range: 0–22), and cluster E—alterations in arousal and reactivity (mean: 4.29  $\pm$  4.07, median: 3, range: 0–17). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Preliminary results from this study indicate that post-traumatic stress symptoms are prevalent among caregivers of children with hydrocephalus. These results suggest that psychosocial issues such as PTSS may be a significant problem in need of treatment, that is not traditionally addressed as part of routine care for families of children with hydrocephalus. Characterizing post-traumatic stress symptoms in this population sets the foundation for the development of screening and treatment protocols for post-traumatic stress symptoms in caregivers of children with hydrocephalus. This study is the first step towards fundamentally improving routine clinical care and quality of life for patients with hydrocephalus and their caregivers by understanding and addressing the effects of traumatic stress.

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### Prenatal near roadway air pollution exposure and early neurodevelopment in young Mexican-American children: Findings from the CHAMACOS prospective birth cohort study

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**OBJECTIVES/SPECIFIC AIMS:** Previous studies suggest that prenatal exposure to environmental pollutants can have an adverse effect on brain development. We examine the association between prenatal near roadway air pollution (NRAP) exposure and early neurodevelopment. **METHODS/STUDY POPULATION:** The Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) Study is a prospective birth cohort that began in 1999 with 605 mother-child pairs of primarily Mexican-American descent. Maternal residence during pregnancy was geocoded using ArcGIS and prenatal NRAP exposure was assigned using the CALINE4 line source dispersion model. We used composite Bayley Scale scores for cognitive and motor development, and created separate linear regression models at 6, 12, and 24 months of age. **RESULTS/ANTICIPATED RESULTS:** After adjusting for relevant maternal and child characteristics, preliminary estimates suggest that prenatal NRAP exposure is associated with a nonsignificant increase in Bayley Scale scores at 6 and 24 months (cognitive:  $\beta=0.13$ ,  $p$ -value = 0.20 and motor:  $\beta=0.08$ ,  $p$ -value = 0.58 at 6 months; cognitive:  $\beta=0.16$ ,  $p$ -value = 0.42 and motor:  $\beta=0.20$ ,  $p$ -value = 0.25 at 24 months) and a nonsignificant decrease at 12 months (cognitive:  $\beta=-0.07$ ,  $p$ -value = 0.64 and motor:  $\beta=-0.12$ ,  $p$ -value = 0.56). **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our preliminary findings do not suggest that prenatal NRAP exposure is associated with early cognitive development. Additional exploration of co-exposures known to effect neurodevelopment should be examined in this rural population.

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### Profile of pediatric potentially avoidable transfers

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**OBJECTIVES/SPECIFIC AIMS:** While hospital-hospital transfers of pediatric patients is often necessary, some pediatric transfers are potentially avoidable.

Pediatric potentially avoidable transfers (PAT) represent a process with high costs and safety risks but few, if any, benefits. To better understand this issue, we described pediatric inter-facility transfers with early discharges. **METHODS/STUDY POPULATION:** We conducted a descriptive study using electronic medical record data at a single-center over a 12-month period to examine characteristics of pediatric patients with a transfer admission source and early discharge. Among patients with early discharges, we performed descriptive statistics for PAT defined as patient transfers with a discharge home within 24 hours without receiving any specialized tests, interventions, consultations, or diagnoses. **RESULTS/ANTICIPATED RESULTS:** Of the 2414 pediatric transfers 31.2% were discharged home within 24 hours. Among transferred patients with early discharges, 348 patients (14.4% of total patient transfers) received no specialized tests, interventions, consultations, or diagnoses. Direct admissions were categorized as PAT 2.2-fold more frequently than transfers arriving to the emergency department. Among transferred direct admissions, PAT proportions to the neonatal intensive care unit (ICU), pediatric ICU, and non-ICU were 5.8%, 17.4%, and 27.3%, respectively. Respiratory infections, asthma, and fractures were the most common PAT diagnoses. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Early discharges and PAT are relatively common among transferred pediatric patients. Further studies are needed to identify the etiologies and clinical impacts of PAT, with a focus on direct admissions given the high frequency of PAT among direct admissions to both the pediatric ICU and non-ICU.

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### Risk factors for prescription opioid misuse after traumatic injury in adolescents

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**OBJECTIVES/SPECIFIC AIMS:** The objective of this study is to determine predictors and motives for sustained opioid use, prescription misuse, and nonmedical opioid use in the adolescent trauma population. **METHODS/STUDY POPULATION:** This is a prospective cohort study that will follow patients for 1 year and administer surveys to patients on prescription opioid usage; substance use; utilization of pain management and mental health services; mental and physical health conditions; and behavioral and social risk factors. Patient eligibility criteria include: (1) patient is 12–18 years of age; (2) admitted for trauma; (3) English speaking; (4) resides within Indianapolis, IN metropolitan area; and (5) consent can be obtained from a parent or guardian. Patients with severe brain injuries or other injuries that prevent survey participation will be excluded. The patient sample will comprise of 50 traumatically injured adolescents admitted for trauma who will be followed for 12 months after discharge. **RESULTS/ANTICIPATED RESULTS:** We expect that the results of this study will identify multiple risk factors for sustained opioid use that can be used to create targeted interventions to reduce opioid misuse in the adolescent trauma population. Clinical predictors such as opioid type, dosage, and duration that can be modified to reduce the risk of long-term opioid use will be identified. We expect to elucidate clinical, behavioral, and social risk factors that increase the likelihood adolescents will misuse their medication and initiate nonmedical opioid use. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Trauma is a surgical specialty that often has limited collaboration with behavioral health providers. Collaborative care models for trauma patients to adequately address the psychological impact of a traumatic injury have become more common in recent years. These models have primarily been concerned with the prevention of post-traumatic stress disorder. We would like to apply the findings of our research to better understand what motivates adolescents to misuse pain medications as well as how clinical, individual, behavioral, and social factors affect medication usage. This may help identify patients at greater risk of developing a SUD by asking questions not commonly addressed in the hospital setting. For example, similar to how trauma centers have mandated brief interventions on alcohol use be performed for center verification, screening patients' on their social environment may identify patients at greater risk for SUD than assumed. The long-term goal would be to prevent opioid use disorders in injured adolescents by providing better post-acute care support, possibly by developing and implementing a collaborative care model that addresses opioid use. Additionally, we believe our findings could be applied in the acute care setting as well to help inform opioid prescribing and pain management methods in the acute phase of an injury. Genetic testing to determine which opioid to prescribe pediatric surgical patients is starting to be done at some pediatric hospitals. Certain genes determine which specific opioid is most effective in controlling a patient's pain and, further, using the optimal opioid medication can also reduce overdose. Our findings may help refine prescribing patterns that could increase or decrease the likelihood of developing SUD in patients with certain genetic, clinical, behavioral, and social characteristics.

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### Risk of readmission after discharge from skilled nursing facilities following heart failure hospitalization

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**OBJECTIVES/SPECIFIC AIMS:** Determine timing of risk of readmissions within 30 days among patients first discharged to a skilled nursing facilities (SNF) after heart failure hospitalization and subsequently discharged home. **METHODS/STUDY POPULATION:** This was a retrospective cohort study of patients with SNF stays of 30 days or less following discharge from a heart failure hospitalization. Patients were followed for 30 days following discharge from SNF. We categorized patients based on SNF length of stay (LOS): 1–6 days, 7–13 days, 14–30 days. We then fit a piecewise exponential Bayesian model with the outcome as time to readmission after discharge from SNF for each group. Our event of interest was unplanned readmission; death and planned readmissions were considered as competing risks. Our model examined 2 different time intervals following discharge from SNF: 0–3 days post SNF discharge and 4–30 days post SNF discharge. We reported the hazard rate (credible interval) of readmission for each time interval. We examined all Medicare fee-for-service (FFS) patients 65 and older admitted from July 2012 to June 2015 with a principal discharge diagnosis of HF, based on methods adopted by the Centers for Medicare and Medicaid Services (CMS) for hospital quality measurement. **RESULTS/ANTICIPATED RESULTS:** Our study included 67,585 HF hospitalizations discharged to SNF and subsequently discharged home [median age, 84 years (IQR; 78–89); female, 61.0%]; 13,257 (19.2%) were discharged with home care, 54,328 (80.4%) without. Median length of SNF admission was 17 days (IQR; 11–22). In total, 16,333 (24.2%) SNF discharges to home were readmitted within 30 days of SNF discharge; median time to readmission was 9 days (IQR; 3–18). The hazard rate of readmission for each group was significantly increased on days 0–3 after discharge from SNF compared with days 4–30 after discharge from SNF. In addition, the hazard rate of readmission during the first 0–3 days after discharge from SNF decreased as the LOS in SNF increased. **DISCUSSION/SIGNIFICANCE OF IMPACT:** The hazard rate of readmission after SNF discharge following heart failure hospitalization is highest during the first 6 days home. Length of stay at SNF also has an effect on risk of readmission immediately after discharge from SNF; patients with a longer length of stay in SNF were less likely to be readmitted in the first 3 days after discharge from SNF.

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### Shared decision making in child health: A qualitative study of parents of children with medical complexity

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**OBJECTIVES/SPECIFIC AIMS:** Children with medical complexity (CMC) comprise less than 5% of the pediatric population and over 40% of pediatric spending, yet receive poorer quality health care compared with other children. The American Academy of Pediatrics recently identified shared decision making (SDM) as a key quality indicator for CMC, but there is no consensus model for SDM in CMC. **Objective:** To create a model of SDM from perspectives of parents of CMC. **METHODS/STUDY POPULATION:** Interviews with parents of CMC explored SDM preferences and experiences. Eligible parents were ≥18 years old, English-speaking or Spanish-speaking, with a CMC <12 years old. Interviews were recorded, transcribed, and analyzed by 3 independent coders for shared themes using grounded theory. **RESULTS/ANTICIPATED RESULTS:** Interviews were with 31 parents [26 English speakers, median parent age 33 years (SD 11), median child age 3 years (SD 3.6)] in inpatient and outpatient settings. We identified specific, unique components of SDM that affect decision quality, the alignment of a decision with the parent's preferences and values. Themes included: concerns about uncertainty of the child's life trajectory, conflict during parent-provider communication, health system factors such as provider schedule; parent agency, and the influence of the source of information. **DISCUSSION/SIGNIFICANCE OF IMPACT:** Our findings provide specific components of SDM unique to CMC that can inform future research and interventions to support SDM for parents and providers of CMC.