Factors Associated with the use of Early Do-Not-Resuscitate Orders at NYPH/CUMC

A. Study Purpose and Rationale

Despite significant advances in medical science and technology over the past 40 years, rates of survival from in-hospital cardiac arrest using cardiopulmonary resuscitation (CPR) have only seen modest improvements in clinically significant outcomes[1,2] . Several observational studies and registries have noted generally poor survival rates [1-3], particularly among patients with pre-existing chronic diseases [4-7] as well as the very old [2]. Furthermore, even if a patient does survive to hospital discharge, this intervention can impose significant long-term morbidity to patients – including profound functional decline after prolonged hospitalization [1,3,7], as well as prolonged or permanent cognitive impairment [1,3,8].

Do-not-resuscitate (DNR) orders are intended to give patients the opportunity to avoid the morbidity associated with heroic resuscitation efforts. Prior observational studies showing rates of use of DNR orders can be highly variable depending on a variety of factors such as age, race, health status prior to admission, residence in a long-term care facility, or admission to an academic medical center [9-13]. A substantial proportion of DNR orders are written only after prolonged hospitalization [13], often only after a patient has had a devastating hospital course and or has lost the capacity to make medical decisions[13,14]. Early DNR orders written within 24-48 after admission are thought to better reflect patient preference. Early DNR orders have been shown to be independent predictors of survival during acute hospitalization compared with later DNR [15].

Taken together, this suggest that the modern American medical system has not performed well at identifying patients who are likely not going to benefit from CPR at an early stage of an acute care episode. Furthermore, this failure is likely to have a negative impact on patients' quality of life as these patients will only experience morbidity from CPR without much likelihood for In this study, we seek to identify the factors associated with early DNR at our institution, with particular focus on how early DNR is employed in patients with chronic medical conditions. We hypothesize that in our population, the proportion of patients with early DNR orders will be different depending on the presence of particular underlying chronic medical conditions, even when adjusting for patient-case mix and severity of illness.

B. Study Design and Statistical Analysis

This study will be an observational retrospective cohort study consisting of chart reviews of administrative-level data of inpatient admissions to the Milstein Hospital of NewYork-Presbyterian Hospital / Columbia University Medical Center (NYPH/CUMC) and to the Allen Hospital. Evidence from prior studies suggest that DNR orders are extremely uncommon for patients under 50 years old (under 1%) [9], therefore admissions for patients under the age of 50 years will be excluded. The primary outcome variable of interest will be placement of a DNR order into the medical record associated with the admission by a treating physician within the first 24 hours of hospital admission (early DNR) versus no placement of a DNR order within 24 hours of admission (no early DNR).

The primary independent risk factors of interest are the presence of an underlying medical condition as reported by the presence of ICD9 billing codes for each of the following diagnoses (henceforth referred to as "primary risk factors"): heart failure (428.xx, where "x" denotes wildcard placeholder); chronic obstructive pulmonary disease (491.xx, 492.xx, 496.xx); chronic kidney disease (585.xx); malignant neoplasm (140.xx – 209.xx, this excludes benign neoplasm and carcinoma in situ); chronic liver disease and cirrhosis (571.xx),and dementia (290.xx, 294.1x, 294.2x, 330.xx). Variables reflecting patient-case mix will include: age (in 5 year intervals), gender, ethnicity/race (non-Latino white, non-Latino black, Latino, Asian/Pacific Islander, and other), insurance status (Medicare, Medicaid, private, self-pay, or other), admission source (home, nursing home, or other facility), and degree of illness as measured by a modified Elixhauser comorbidity index [16]. The modified Elixhauser comorbidity index was chosen because it has been validated to predict both disease burden as well as in-hospital mortality using administrative-level data [16].

The unadjusted proportion of patients with early DNR for each primary risk factor will be compared using Pearson's χ^2 test in a 2x7 table format. We assume an overall prevalence of early DNR of approximately 10% for patients 50 years and older based on data from prior investigators [citation]. If we are to compare each primary risk factor against every other primary risk factor, we find there are 21 bivariate comparisons (6+5+4+3+2+1). Therefore by applying the Bonferroni correction for 21 comparisons we adjust the acceptable Type I error rate (α) to

$$\alpha = \frac{0.05}{21} \approx 0.002$$

Assuming equal distribution of patients among the primary risk factor categories, we would require approximately 393 patients in each group in order to have a power of 0.80 to detect a difference of 10% of early DNR (from 10% to 20%). This suggests that we will need to include at least 2751 admissions. However, given the true group sizes of each of the primary risk factor is unavailable at this time and unlikely to be equal, this study will likely require more than the number presented to be adequately powered.

If a statistically significant difference is found between the primary risk factor categories using Pearson's χ^2 test, then multivariate logistic regression analysis will be performed to predict the odds of early DNR for each primary risk factor after accounting for the patient-case mix variables.

C. Study Procedure.

The NYPH/CUMC Eclipsys EMR system will be queried for all inpatient admissions of patients over 50 years old. Administrative-level data will be abstracted including date and time of admission, patient's age, gender, ethnicity/race, insurance status, admission source, and associated ICD-9-CM billing codes associated with that admission. Furthermore the EMR system will be queried for the placement of a DNR order by a treating provider during the admission, as well as the date and time that the DNR order was placed.

D. Study Drugs

Not applicable

E. Medical Device

Not applicable

F. Study Questionnaires

Not applicable

G. Study Subjects

Inclusion criteria will be:

1) Inpatient admissions to the Milstein Hospital at NYPH/CUMC or to the Allen Hospital.
2) Age 50 years old or older.

H. Recruitment of Subjects

No subjects will be recruited as this is a retrospective study.

I. Confidentiality of Study Data

The patient's identities will be decontextualized by assigning a unique identification number to each hospital admission. All protected health information (medical record number,

Social Security numbers, subject initials, phone numbers, addresses, etc) except for date of admission will not be included in the data set. Only persons with training in HIPAA compliance will have access to protected health information. The data set will be kept on a secure server on the NYPH campus.

J. Potential Conflict of Interest

None of the researchers involved in this IRB proposal have any potential conflicts of interest to report.

K. Location of the Study

The study will take place at NYPH/CUMC as well as the Allen Hospital.

L. Potential Risks

There are no potential risks to study participants as this is a retrospective cohort study and no interventions are being undertaken.

M. Potential Benefits

Study participants are not expected to benefit from this study.

N. Alternative Therapies

Not applicable.

O. Compensation to Subjects

Not applicable.

P. Cost to Subjects

No costs to study participants are expected to occur

Q. Minors as Research Subjects

Patients under 18 years of age are to be excluded from this study.

R. Radiation or Radioactive Substances

Not applicable.

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