**利尿剂抵抗心衰患者行肾脏替代治疗的风险预测研究**

**1. 研究目标及预期结果**

**2. 研究人群**

**3. 结局变量及暴露变量**

**4. 项目管理**

**5. 统计分析**

**6. 项目成员及人员分工**

**7. 时间安排**

**Prediction of Renal Replacement Therapy application in Heart Failure Patients with a poor response to diuretics**

**1. Objectives:**

1.1 To explore the rate of patients who finally came up with Renal Replacement Therapy （RRT） in all the heart failure patients with diuretic resistance in CCU.

1.2 To clarify risk factors of RRT application in heart failure patients with diuretic resistance and build a prediction model of RRT application.

1.3 To clarify the effects of different clinical strategies on mortality to help physicians in making clinical decisions.

**2. Cohorts:**（张渊）

**2.1 Inclusion criteria:**

① CCU Patients

② Patients with ICD-9 include “Heart Failure”, excluding”without heart failure”

③ Echo Files: Left Ventricular Systolic Function: “2 Moderate” and “3 Severe”

Or ICD-9：NYHA 3 or NYHA 4

④ Age>=18 years old

⑤ Diuretic Resistance （Furosemide >80mg iv /day or>160mg po /day or equal）

**2.2 Exclusion Criteria**

① Not lymphoma, solid tumor, metastatic cancer

② Not ESRD（End Stage Renal Disease）

③ Not Bladder Dysfunction

**3. Outcomes：**（刘一鸣）

**3.1 Primary outcome:**

Patients come up with dialysis (HD):  ICD-9:  “Hemodialysis”

**3.2 Secondary outcome:**

    Hospital Stay Duration

ICU Stay Duration

In hospital mortality

30 day, 90 day, 1 year, post-charge mortality

30 day, 90 day, 1 year, post-charge cardiac rehospitalization

30 day, 90 day, 1 year, post-charge emergency room visiting

**4. Measures：**（曹阳）

1. Duration of diuretics application before HD

2. Aggregated dose of diuretics before HD

3. How long time is it from incidence of DR to application of HD

4. Total Fluid overload before HD （Fluid overload = input – output）

Fluid overload before HD per Day

5. Total Gain of Weight Before Dialysis

Gain of Weight Before Dialysis per Day

6. Total Urine Output Before Dialysis

Urine Output Before Dialysis per Day

**5. Exposure Variables:**

|  |  |  |
| --- | --- | --- |
|  | **Variables** | **Table** |
| **Demographic Characteristics**  （曹阳）  #Time Points:  1.First time since Admission  2.First time since DR  3.Last time before HD  4.Last time before Discharge | Age | icustay-details |
| Gender | icustay-details |
| Height | chartevents |
| Weight **#** | chartevents |
| BMI=Weight1/Height^2 |  |
| **Comorbidities**（戈程、朱梅） | Ischemic Heart Disease | Diagnoses\_icd |
| Cardiomyopathies | Diagnoses\_icd |
| Valvular Disease | Diagnoses\_icd |
| Atrial Fibrilation or Atrial Flutter | Diagnoses\_icd |
| Hyperlipidemia | Diagnoses\_icd |
| Hypertension | Diagnoses\_icd |
| Diabetes | Diagnoses\_icd |
| Sleep Disordered Breathing | Diagnoses\_icd |
| Renal failure | Diagnoses\_icd |
| Anemia | Diagnoses\_icd |
| Hypoproteinemia | Diagnoses\_icd |
| Infections | Diagnoses\_icd |
| Alcohol abuse\* | Diagnoses\_icd |
| **Nosocomial Comorbidities**（张爽、张渊） | SodiumLowest Between Admit and HD | labevents |
| AlbuminLowest Between Admit and HD | labevents |
| Hemoglobin(mod/Sev) Lowest Between Admit and HD | labevents |
| Nosocomial Infections | （文本提取）or  Final Diagnosis |
| **Medication**（刘一鸣） | ACEIs/ARBs |  |
| βRBs |  |
| MRAs |  |
| Inotropes |  |
| Vasodilators |  |
| **Vital signs**（张渊、张爽）  #Time Points:  First time since Admission  First time since DR  Last time before HD  Last time before Discharge  \*Difference Value: DR-Ad  \*Ratio: DR/Ad | Heart rate # | chartevents |
| SysBP # | chartevents |
| DiasBP # | chartevents |
| SPO2 # |  |
| Temperature # | chartevents |
| Central Venous Pressure (CVP) # |  |
| Fluid Input #\* |  |
| Fluid Output #\* |  |
| Urine Output #\* |  |
| **Symptoms & Signs**（张渊、戈程）  (文本提取)  #Time Points:  First time since Admission  First time since DR  Last time before HD  Last time before Discharge | Dyspnea # | (文本提取) |
| Orthopnea # | (文本提取) |
| Moist Rales # | (文本提取) |
| Edema # | (文本提取) |
| Jugular Vein Distention # | (文本提取) |
| Gallop Rhythm # | (文本提取) |
| Sign of Ascites # | (文本提取) |
| **Echocardiography**（张渊）  (文本提取)  #Time Points | Left Ventricular Ejection Fraction (LVEF) # | (文本提取) |
| Left  ventricular end diastolic diameter（LVED）# | (文本提取) |
| **Labs**（张爽、张渊）  #Time Points:  First time since Admission  First time since DR  Last time before HD  Last time before Discharge  \*Difference Value: DR-Ad  \*Ratio: DR/Ad | B-type natriuretic peptide or  brain natriuretic peptide(BNP) #\* | labevents |
| NT-pro BNP #\* | labevents |
| Creatinine (Cr) #\* | labevents |
| BUN #\* | labevents |
| glomerular filtration rate(GFR) #\* |  |
| Sodium #\* | labevents |
| Potassium #\* | labevents |
| serum albumin #\* | labevents |
| Hemoglobin #\* | labevents |
| uric acid #\* |  |
| pH #\* | Blood Gas |
| HCO3- #\* | Blood Gas |
| Base Excess (BE) #\* | Blood Gas |

**4. 统计分析**

4.1 基本信息的统计分析

4.2 回归分析

4.3 生存分析

**5. 项目管理**

有道云协作，上传数据及提取代码，记录过程文档

**6. 项目成员及人员分工**

董蔚 戈程 朱梅 张爽 张渊 刘一鸣 曹阳

**研究问题制定及变量筛选**：董蔚 朱梅 戈程

**数据提取**：张渊 张爽 戈程

**模型**：刘一鸣 曹阳 张渊

**7. 时间安排**

MIMIC数据库使用申请：现在申请，预计11/25前可以通过

研究问题制定及变量确定：11/24前

数据提取：11/30前

数据分析（初步）：12/3