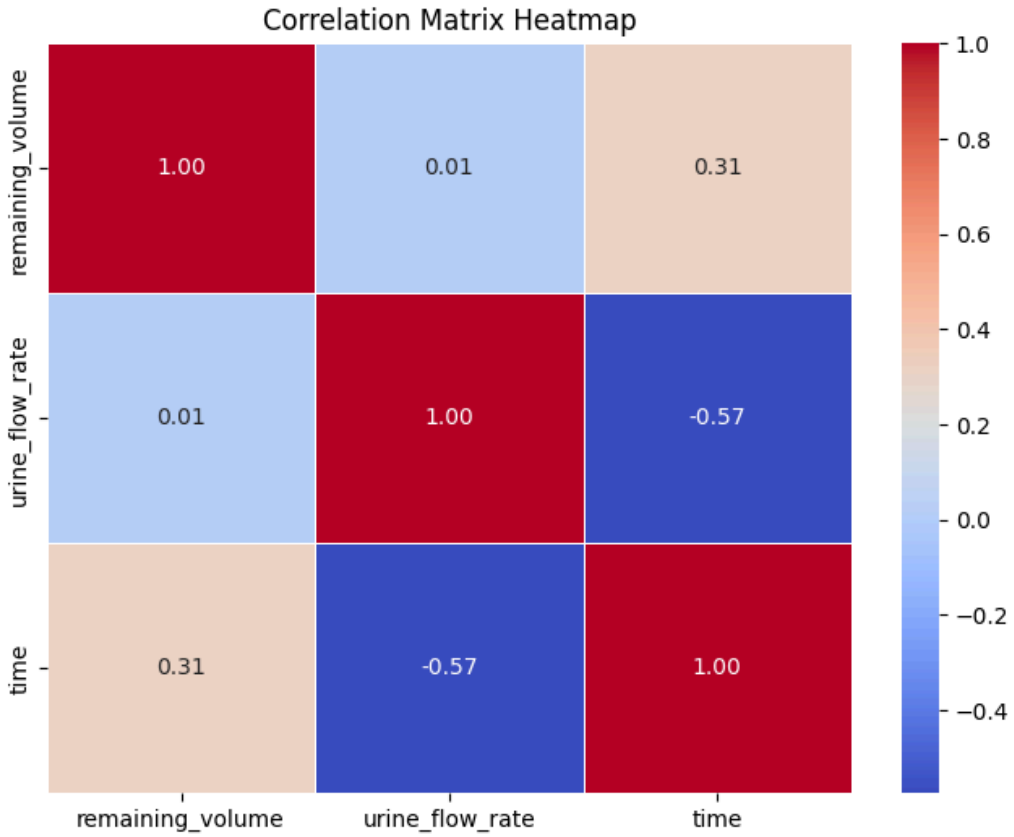
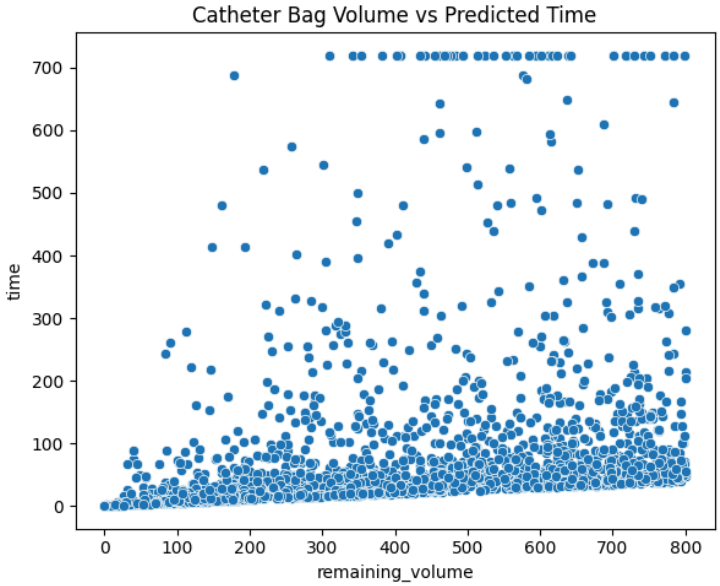
In [24]:
```
import pandas as pd
import numpy as np

num_samples = 5000
urine_flow_rate_min = 0.1
urine_flow_rate_max = 21
catheter_bag_volume_min = 0
catheter_bag_volume_max = 800

data = []

for _ in range(num_samples):
    urine_flow_rate = np.random.uniform(urine_flow_rate_min, urine_flow_rate_max)
    catheter_bag_volume = np.random.randint(catheter_bag_volume_min, catheter_bag_volume_max + 1)
    if catheter_bag_volume == 0:
        time = 0
    else:
        time = catheter_bag_volume / urine_flow_rate
    time = min(time, 720)
    data.append([catheter_bag_volume, urine_flow_rate, time])

df = pd.DataFrame(data, columns=['remaining_volume', 'urine_flow_rate', 'time'])
print(df.head())

df.to_csv('catheter_bag_dataset_random7.csv', index=False)
```

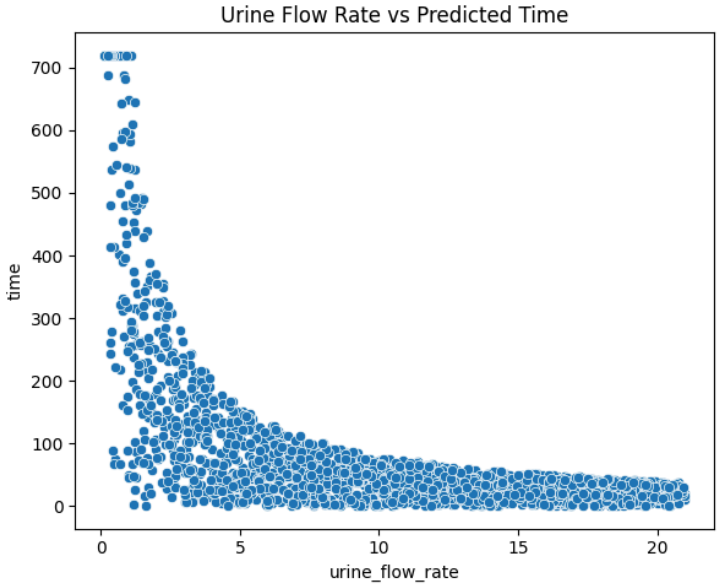
```
   remaining_volume  urine_flow_rate        time
0               630        12.922115   48.753629
1               696         8.689238   80.099084
2               487         2.998209  162.430328
3               128         2.371134   53.982601
4                93         2.417713   38.466102
```

In [25]:
```
import seaborn as sns
import matplotlib.pyplot as plt

correlation_matrix = df.corr()

print("Correlation Matrix:")
print(correlation_matrix)

plt.figure(figsize=(8, 6))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm', fmt='.2f', linewidths=0.5)
plt.title("Correlation Matrix Heatmap")
plt.show()

plt.figure(figsize=(12, 5))

plt.subplot(1, 2, 1)
sns.scatterplot(data=df, x='remaining_volume', y='time')
plt.title('Catheter Bag Volume vs Predicted Time')

plt.subplot(1, 2, 2)
sns.scatterplot(data=df, x='urine_flow_rate', y='time')
plt.title('Urine Flow Rate vs Predicted Time')

plt.tight_layout()
plt.show()
```

```
Correlation Matrix:
                  remaining_volume  urine_flow_rate      time
remaining_volume          1.000000         0.011565  0.310273
urine_flow_rate           0.011565         1.000000 -0.574113
time                      0.310273        -0.574113  1.000000
```


Correlation Matrix Heatmap
remaining_volume
urine_flow_rate
time
1.00
0.01
0.31
0.01
1.00
-0.57
0.31
-0.57
1.00
1.0
0.8
0.6
0.4
0.2
0.0
−0.2
−0.4


Catheter Bag Volume vs Predicted Time
time
remaining_volume
0
100
200
300
400
500
600
700
800


Urine Flow Rate vs Predicted Time
time
urine_flow_rate
0
5
10
15
20

In [ ]: