Clinical Characteristics of Aortic Aneurysm in MIMIC-III

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ABSTRACT

Background: Aortic aneurysm (AA) is an aortic disorder prone to sudden, life-threatening aortic dissection or rupture, with poor clinical outcomes. In this study, we aimed to analyze the clinical characteristics of AA in MIMIC-III to explore implications for management.

Methods: All patients with AA, including abdominal aortic aneurysm (AAA) and thoracic aortic aneurysm (TAA), in the MIMIC-III database were included. Clinical and laboratory variables were analyzed and compared in AAA and TAA.

Results: A total of 345 patients, including 183 patients with AAA and 162 patients with TAA, were enrolled in this study. The in-hospital mortality in AAA and TAA groups was 6.01% and 3.7%, respectively. In the nonsurvivor groups in both AAA and TAA, patients were older, and the incidence of surgery was lower. In the nonsurvivor group of AAA, the levels of alanine aminotransferase, aspartate aminotransferase, urea nitrogen, creatinine, lactate dehydrogenase (LDH), creatine kinase, anion gap, and lactate were significantly higher in the nonsurvivor group, whereas the level of albumin was lower. In the nonsurvivor group of TAA, the level of LDH significantly increased and the level of albumin decreased. In the nonsurgery group, in-hospital mortality was higher, and patients were older, with higher levels of glucose, total bilirubin, urea nitrogen, and creatinine and longer length of stay in ICU and hospital.

Conclusion: Age, surgery, albumin, and LDH showed significant differences between survivor and nonsurvivor groups in both AAA and TAA. In the nonsurgery group, the mean age was older and disease severity was worse, with poorer clinical outcomes. Older AA patients without surgery and with lower levels of albumin and higher levels of LDH had higher risk of in-hospital mortality.

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INTRODUCTION

Aortic aneurysm (AA) is an aortic disorder prone to sudden, life-threatening aortic dissection or rupture, with poor clinical outcomes [Isselbacher 2005]. Abdominal aortic aneurysm (AAA) and thoracic aortic aneurysm (TAA) are subgroups based on anatomic characteristics. Etiology [Li 2018; Mori 2020], pathogenesis of aneurysm formation [Yamada 2020; Pasta 2020], clinical manifestation, management, and prognosis [Yigit 2020; Wang 2020] differ between AAA and TAA.

In an increasing number of retrospective and observational studies, different scoring systems [Pires Coelho 2019], plasma biomarkers [Molecek 2019; Acosta 2018], and machine learning methods [Jordanski 2018] have been applied to evaluate the clinical outcomes of AA in different samples. Previous studies mainly focused on AA patients after different surgeries and discussed the association of surgeries with clinical outcomes [Grootes 2018; Leighton 2019]. In this study, AA in the MIMIC-III public database was retrospectively analyzed to explore differences in clinical characteristics in AAA and TAA. We aimed to identify those patients with higher risk of poor outcomes. Risk factors for in-hospital mortality were further evaluated to provide useful clinical guidance for physicians so that early prevention and management may be implemented in AA patients with higher risk for fatal outcomes in hospital.

METHODS

Ethics Approval and Consent to Participate

MIMIC-III is an anonymized public database. To apply for access to the database, we passed the Protecting Human Research Participants examination (no. 32900964). The project was approved by the institutional review boards of MIT and Beth Israel Deaconess Medical Center and was given a waiver of informed consent.

Dataset

All patients with AA including TAA and AAA (International Classification of Diseases, Revision 9 codes 4411, 4412, 4413, 4414) in the MIMIC-III database were included in this study. MIMIC-III is a large US-based critical care public database containing data associated with 53,423 adult patients (≥16 years old) from 2001 to 2012 and 7870 neonates from 2001 to 2008 in intensive care units (ICUs) [Johnson 2016]. Data include vital signs, medications, laboratory measurements, observations, and provider notes charted by care providers, and fluid balance, procedure codes, diagnostic codes, imaging
most patients were American. In admission type, elective was the most common, accounting for 72.13% and 69.75% of AAA and TAA, respectively. However, ~30% of AA patients were admitted to the hospital emergently or urgently. In the AAA group, LOS in ICU was significantly longer than that in the TAA group (P < .001). Scores of APACHEII (P = .035) and SOFA (P = .045) were higher for AAA.

### Comparison of Variables between Survivor and Nonsurvivor Groups in AAA

A comparison of variables in AAA is shown in Table 2. In the nonsurvivor group, patients were older (P = .045). There was no significant difference in proportion of males, SBP, DBP, or HR between the groups. In the survivor group, the numbers of patients with diabetes, hypertension, renal disease, and CHD were 4 (2.32%), 99 (57.55%), 4 (2.32%), and 42 (24.21%), respectively. In the nonsurvivor group, the numbers of patients with hypertension and renal disease were 2 (18.18%) and 1 (9.09%), respectively. No patients had diabetes or coronary heart disease in the nonsurvivor group. The incidence of surgery in the survivor group was 5.81%, and none of the patients in the nonsurvivor group had surgery (P < .001).

There was no significant difference in WBC (P = .313), PLT (P = .942), MCV (P = .913), RDW (P = .799), HCT (P = .165), glucose (P = .429), PT (P = .633), TT (P = .574), total bilirubin (P = .139), total calcium (P = .273), sodium (P = .359), or triglycerides (P = .787) between the groups. The levels of ALT (P = .006), AST (P = .033), urea nitrogen (P = .016), creatinine (P = .018), LDH (P = .001), CK (P = .024), anion gap (P = .017), and lactate (P = .045) were significantly higher in the nonsurvivor group, whereas the level of albumin was lower (P = .016). LOS in ICU was longer in the nonsurvivor group (P = .022). The scores of APACHEII (P = .167) and SOFA (P = .304) showed no difference between the groups.

### Comparison of Variables between Survivor and Nonsurvivor Groups in TAA

A comparison of variables in TAA is shown in Table 3. Patients in the nonsurvivor group were older (P = .04). The proportion of males, SBP, DBP, and HR showed no significant difference. There was also no difference in diabetes, hypertension, or CHD. Surgery was implemented in 89.1% of patients in the survivor group and only 4 in the nonsurvivor group (P = .014).
In the nonsurvivor group, the level of LDH was significantly increased ($P < .001$), and the level of albumin was decreased ($P = .005$). Other laboratory variables including WBC ($P = .248$), PLT ($P = .301$), MCV ($P = .328$), RDW ($P = .596$), HCT ($P = .361$), glucose ($P = .949$), PT ($P = .893$), TT ($P = .356$), ALT ($P = .356$), AST ($P = .867$), total bilirubin ($P = .085$), urea nitrogen ($P = .355$), CK ($P = .153$), total calcium ($P = .576$), sodium ($P = .266$), anion gap ($P = .279$), lactate ($P = .351$), and triglycerides ($P = .109$) showed no significant difference between the groups.

**Comparison of Variables between Surgery and Nonsurgery Groups Overall**

Between surgery and nonsurgery groups, variables are compared in Table 4. In the surgery group, patients were younger, and the proportion of males was lower compared with the nonsurgery group (both $P < .001$). More than 90% of patients with TAA had surgery, versus <10% with AAA ($P < .001$). Insignificant differences were found in vital signs including SBP ($P = .099$), DBP ($P = .761$), and HR ($P = .212$). Significant differences were shown in glucose ($P < .001$), albumin ($P < .001$), total bilirubin ($P = .015$), urea nitrogen ($P < .001$), and creatinine ($P < .001$). In the surgery group, LOS in ICU was shorter ($P = .015$) and in-hospital mortality was significantly lower. Both APACHEII ($P < .001$) and SOFA ($P = .024$) scores were significantly lower in the surgery group.

**DISCUSSION**

In our study, age, surgery, albumin, and LDH showed significant differences between survivors and nonsurvivors in both AAA and TAA. In the nonsurvivor group, the mean age was older, the proportion of patients with surgery was lower, the level of albumin was decreased, and the level of LDH was elevated. In the nonsurgery group, the mean age was older, and disease severity was worse, with poorer clinical outcomes.

Age has been identified as a risk factor in many disorders as in AA [Fattahi 2020]. Those older than 59 years with stroke or a transient ischemic attack were found to have a doubted

### Table 1. General Characteristics of Patients with AA*

| Characteristic          | AAA (n = 183)       | TAA (n = 162)       | $P$ Value |
|-------------------------|--------------------|--------------------|-----------|
| Age (y)                 | 73 (67 to 80)      | 67 (56 to 78)      | .106      |
| Sex                     |                    |                    | .008      |
| Male                    | 126 (68.85)        | 89 (54.93)         |           |
| Female                  | 57 (31.15)         | 73 (45.07)         |           |
| Marital status          |                    |                    | .005      |
| Single                  | 18 (9.83)          | 38 (23.45)         |           |
| Married                 | 106 (57.92)        | 90 (55.55)         |           |
| Divorced                | 14 (7.65)          | 11 (6.8)           |           |
| Widowed                 | 37 (20.21)         | 19 (11.72)         |           |
| Other                   | 8 (4.39)           | 4 (2.48)           |           |
| Ethnicity               |                    |                    | .027      |
| White                   | 160 (87.43)        | 123 (75.92)        |           |
| Black/African American  | 5 (2.73)           | 4 (2.48)           |           |
| Hispanic/Latino         | 3 (1.63)           | 6 (3.7)            |           |
| Other                   | 15 (8.21)          | 29 (17.9)          |           |
| Admission type          |                    |                    | <.001     |
| Elective                | 132 (72.13)        | 113 (69.75)        |           |
| Emergent                | 48 (26.24)         | 48 (29.62)         |           |
| Urgent                  | 3 (1.63)           | 1 (0.63)           |           |
| In-hospital mortality   | 11 (6.01)          | 6 (3.7)            | .231      |
| LOS in ICU (h)          | 90.3 (41.9 to 221) | 53.1 (30.2 to 121.8)| <.001     |
| APACHEII score          | 9 (6 to 11)        | 7 (5 to 9)         | .035      |
| SOFA score              | 1 (0 to 2)         | 0.5 (0 to 1)       | .045      |

*Data are mean (SD), median (IQR), or n (%).
### Table 2. Comparison of Variables between Survivor and Nonsurvivor Groups in AAA*

| Variable                        | Survivors (n = 172) | Nonsurvivors (n = 11) | P Value |
|---------------------------------|---------------------|-----------------------|---------|
| **Age (yr)**                    | 73 (67 to 80)       | 78 (71 to 84)         | .045    |
| Male sex                        | 120 (69.76)         | 6 (54.55)             | .293    |
| SBP (mmHg)                      | 117.5 (95 to 135.5) | 115.5 (92 to 129.5)   | .471    |
| DBP (mmHg)                      | 56.5 (48 to 67.75)  | 58.5 (55 to 66.5)     | .669    |
| HR (beats/min)                  | 80 (67.5 to 90)     | 92 (79 to 101)        | .055    |
| Diabetes                        | 4 (2.32)            | 0 (0)                 | .045    |
| Hypertension                    | 99 (57.55)          | 2 (18.18)             | .011    |
| Renal disease                   | 4 (2.32)            | 1 (9.09)              | .184    |
| CHD                             | 42 (24.41)          | 0 (0)                 | <.001   |
| Surgery                         | 10 (5.81)           | 0 (0)                 | .001    |
| **Laboratory findings**         |                     |                       |         |
| WBC (×10^9/L)                   | 9.5 (7.3 to 12.9)   | 11.3 (6.8 to 16.1)    | .313    |
| PLT (×10^9/L)                   | 173 (135 to 233)    | 175 (105 to 272)      | .942    |
| MCV (fl)                        | 91 (87 to 94)       | 91 (87 to 95)         | .913    |
| RDW (%)                         | 14.4 (13.6 to 15.2) | 14.6 (13.8 to 15.7)   | .799    |
| HCT                             | 0.344 (0.312 to 0.384) | 0.348 (0.271 to 0.392) | .165    |
| Glucose (mg/dL)                 | 120 (103 to 142)    | 112 (105 to 134)      | .429    |
| PT (s)                          | 13.8 (13.1 to 14.8) | 13.9 (12.7 to 15)     | .633    |
| TT (s)                          | 31.95 (27.525 to 37.4) | 30 (26.1 to 35.1)    | .574    |
| Albumin (g/dL)                  | 2.6 (2.275 to 3)    | 1.95 (1.575 to 2.825) | .016    |
| ALT (U/L)                       | 20 (12.5 to 39)     | 22 (12 to 380)        | .006    |
| AST (U/L)                       | 37 (22 to 59)       | 70 (22 to 516)        | .033    |
| Total bilirubin (mg/dL)         | 0.7 (0.4 to 1.1)    | 1.25 (0.575 to 3.975) | .139    |
| Urea nitrogen (mg/dL)           | 18 (13 to 24)       | 26 (19 to 31)         | .016    |
| Creatinine (mg/dL)              | 1 (0.8 to 1.2)      | 1.5 (1 to 1.8)        | .018    |
| LDH (U/L)                       | 301 (221.5 to 371)  | 623.5 (203.7 to 1238) | .001    |
| CK (U/L)                        | 107 (61 to 302)     | 63 (48 to 200)        | .024    |
| Total calcium (mg/dL)           | 8.2 (7.6 to 9)      | 7.8 (7.3 to 8.7)      | .273    |
| Sodium (mmol/L)                 | 140 (138 to 141)    | 139 (136 to 144)      | .359    |
| Anion gap (mmol/L)              | 12 (11 to 14)       | 14 (12 to 18)         | .017    |
| Lactate (mmol/L)                | 1.6 (1.2 to 2.075)  | 1.9 (1.3 to 3.4)      | .045    |
| Triglycerides (mg/dL)           | 128 (100 to 151.5)  | 97 (86 to 203)        | .787    |
| **Clinical outcome**            |                     |                       |         |
| LOS in ICU (h)                  | 77 (29 to 211)      | 62 (35 to 449)        | .022    |
| **Scoring system**              |                     |                       |         |
| APACHEII                        | 8 (5 to 10)         | 9 (8 to 12)           | .167    |
| SOFA                            | 1 (0 to 1)          | 2 (1 to 2)            | .304    |

*Data are mean (SD), median (IQR), or n (%).
prevalence of AAA [Gratama 2010]. A systemic review on the quality of life in 1272 patients >75 years old with AAA reported that perioperative mortality reached 7.8% [Shan 2019], similar to the results in our study. Moreover, morbidity and mortality increasing significantly with age in AAA was proven in a nationwide German study [Trenner 2020]. In TAA, a decade-long retrospective study in Canada also showed that age was associated with poor clinical outcomes [McClure 2020].

Previous studies have investigated different methods of surgery in AAA and TAA, as well as clinical outcomes [Li 2019]. Machine learning research with a total of 781 patients with nondissecting ascending TAA showed that patients who did not follow surgical recommendations experienced substantially worse outcomes [Sayyidyin 2019]. A Medicare-derived risk prediction model also showed a 10-fold decrease in operative mortality for AAA with surgery compared with nonsurgery [Hicks 2015].

In our study, the level of albumin was significantly lower in the nonsurvivor group, whereas the level of LDH was significantly higher. Hypoalbuminemia has been found to be linked with progression and prognosis in AA [Cersit 2020]. In AAA patients with surgery, preoperative hypoalbuminemia was associated with increased postoperative morbidity and mortality [He 2020]. Moreover, with increasing severity of hypoalbuminemia, early and late mortality in TAA and AAA also increased, as did complications [Inagaki 2017]. Elevated levels of LDH were associated not only with hypoxia, but also with a marker of inflammation and oxidative stress [Wohlauer 2017]. A clinical prospective study of biochemical markers in patients after thoracic and thoracoabdominal aortic aneurysm surgery showed that elevated LDH was associated with adverse neurological complications and poor prognosis [Lases 2005].

In MIMIC-III, older AA patients without surgery, with lower levels of albumin, and with higher levels of LDH had higher risk of in-hospital mortality. So far, this is the first study to analyze the clinical characteristics of AA in MIMIC-III, providing clinical references for physicians to take early precautions for AA patients with a higher risk of worse clinical outcomes.

**Limitations**

Several limitations should be explained. First, MIMIC-III is a public database in the United States. Although the results of this study apply to other countries or ethnicities, caution must be used in doing so. Second, because of relatively small samples, a predictive model could not be constructed. Further research with larger samples in multiple centers should be explored for an accurate model to predict short- and long-term prognosis in AA. Third, some data and variables are missing and incomplete in MIMIC-III, so not all the variables associated with clinical outcomes could be analyzed. Clinical characteristics including etiologies, medical history, operation type, and anatomic location of TAA and AAA were not all included. Previous studies indicated that etiologies including Marfan syndrome, aortic dissection, connective tissue disorders, atherosclerosis, and infection are linked to outcomes [Li 2021; Boczar 2021]. Other factors such as natural history of different types of aneurysms and laboratory indicators of patients before admission (which were not in the database) also could affect our results. In AAA, the diameter and the location associated with the renal artery definitely affects outcomes. Moreover, TAA in the ascending aorta has a different prognosis from that in the descending aorta [Nargesi 2021; Rueckel 2021]. In the future, prospective research with clinical variables and management needs to be comprehensively analyzed for more clinical guidance.

**CONCLUSION**

In this study, age, surgery, albumin, and LDH showed significant differences between survivor and nonsurvivor groups in both AAA and TAA. In the nonsurgery group, the mean age was older and disease severity was worse, with poorer clinical outcomes. Older AA patients without surgery and with lower levels of albumin and higher levels of LDH had higher risk of in-hospital mortality.

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Table 3. Comparison of Variables between Survivor and Nonsurvivor Groups in TAA*

| Variable           | Survivors (n = 156) | Nonsurvivors (n = 6) | P Value |
|--------------------|---------------------|----------------------|---------|
| Age (y)            | 67 (56 to 77)       | 76.5 (66.5 to 83)    | .04     |
| Male sex           | 87 (55.77)          | 2 (33.33)            | .069    |
| SBP (mmHg)         | 117 (97 to 126)     | 110.5 (95.5 to 122.25) | .551 |
| DBP (mmHg)         | 61 (55 to 67.75)    | 58.5 (52.25 to 71.5) | .183    |
| HR (beats/min)     | 80 (72.5 to 88.5)   | 86 (64.5 to 91.75)   | .667    |
| Diabetes           | 1 (0.64)            | 0 (0)                | .694    |
| Hypertension       | 103 (66.02)         | 3 (50)               | .411    |
| CHD                | 30 (19.23)          | 2 (33.33)            | .536    |
| Surgery            | 139 (89.1)          | 4 (66.66)            | .014    |

Laboratory findings

| Variable           | Survivors (n = 156) | Nonsurvivors (n = 6) | P Value |
|--------------------|---------------------|----------------------|---------|
| WBC (×10^9/L)      | 8.6 (6.5 to 12)     | 12.45 (6.9 to 17.25) | .248    |
| PLT (×10^9/L)      | 179 (157 to 235)    | 173.5 (146 to 231.5) | .301    |
| MCV (fL)           | 88 (86 to 92)       | 90 (86.5 to 91.75)   | .328    |
| RDW (%)            | 13.7 (13.2 to 14.6) | 14.15 (13.62 to 15.45) | .596    |
| HCT                | 0.295 (0.259 to 0.36) | 0.342 (0.26 to 0.393) | .361    |
| Glucose (mg/dL)    | 103 (96 to 113)     | 98 (92 to 140)       | .949    |
| PT (s)             | 14.4 (13.1 to 16.4) | 15.05 (12.55 to 16.85) | .893    |
| TT (s)             | 31.5 (26.7 to 41.3) | 34 (27.57 to 70.22)  | .356    |
| Albumin (g/dL)     | 3.7 (3.1 to 4.1)    | 2.3 (2.15 to 2.825)  | .005    |
| ALT (U/L)          | 21 (15 to 27.75)    | 87 (19.5 to 307.5)   | .356    |
| AST (U/L)          | 25 (19.25 to 38)    | 131 (33.5 to 172.5)  | .867    |
| Total bilirubin (mg/dL) | 0.5 (0.3 to 0.7)  | 1.1 (0.7 to 1.5)     | .085    |
| Urea nitrogen (mg/dL) | 16 (13 to 20)     | 19.5 (12.5 to 32.75) | .355    |
| Creatinine (mg/dL) | 0.9 (0.7 to 1.1)    | 1 (0.8 to 1.425)     | .306    |
| LDH (U/L)          | 254 (190.5 to 305)  | 460 (300.75 to 8763.5) | <.001   |
| CK (U/L)           | 72 (56.5 to 162.5)  | 46 (32 to 223)       | .153    |
| Total calcium (mg/dL) | 8.4 (8.1 to 8.9)   | 8.5 (8.225 to 9.225) | .576    |
| Sodium (mmol/L)    | 140 (138 to 141)    | 140.5 (138.5 to 146.5) | .266    |
| Anion gap (mmol/L) | 12 (11 to 14)       | 13.5 (11 to 20.5)    | .279    |
| Lactate (mmol/L)   | 1.4 (1.1 to 1.9)    | 1.7 (1.35 to 7.05)   | .351    |
| Triglyceride (mg/dL) | 112.5 (80.75 to 141.25) | 88.5 (76.25 to 155.25) | .109    |

Clinical outcome

| Variable           | Survivors (n = 156) | Nonsurvivors (n = 6) | P Value |
|--------------------|---------------------|----------------------|---------|
| LOS in ICU (h)     | 52 (30 to 101)      | 209.5 (109.75 to 440) | .023    |

Scoring system

| Variable           | Survivors (n = 156) | Nonsurvivors (n = 6) | P Value |
|--------------------|---------------------|----------------------|---------|
| APACHEII           | 8 (6 to 10)         | 8.5 (6.75 to 10.25)  | .561    |
| SOFA               | 1 (0 to 1)          | 0.5 (0 to 1.25)      | .125    |

*Data are mean (SD), median (IQR), or n (%).
# Table 4. Comparison of Variables between Surgery and Nonsurgery Groups*

| Variable          | Surgery (n = 153) | Nonsurgery (n = 192) | P Value |
|-------------------|-------------------|----------------------|---------|
| Age (y)           | 65 (35 to 76)     | 73 (68 to 79)        | <.001   |
| Male sex          | 87 (56.86)        | 128 (66.66)          | <.001   |
| SBP (mmHg)        | 111 (96 to 124)   | 120 (105 to 136)     | .099    |
| DBP (mmHg)        | 60 (53 to 66)     | 62 (53 to 72)        | .761    |
| HR (beats/min)    | 81 (74 to 88)     | 79 (67 to 90)        | .212    |
| TAA               | 143 (93.46)       | 19 (9.89)            | <.001   |
| AAA               | 10 (6.54)         | 173 (90.11)          | <.001   |
| Laboratory findings |                  |                      |         |
| WBC (×10^3/L)     | 9 (6 to 12)       | 10 (7 to 12)         | .053    |
| PLT (×10^9/L)     | 184 (136 to 228)  | 192 (131 to 235)     | .392    |
| MCV (fL)          | 88 (86 to 92)     | 90 (87 to 94)        | .105    |
| RDW (%)           | 14 (13 to 14)     | 14 (13 to 15)        | .135    |
| HCT               | 32 (25 to 35)     | 34 (31 to 38)        | .126    |
| Glucose (mg/dL)   | 107 (95 to 112)   | 128 (101 to 141)     | <.001   |
| PT (s)            | 15 (13 to 16)     | 14 (13 to 14)        | .174    |
| TT (s)            | 39 (26 to 42)     | 42 (26 to 36)        | .256    |
| Albumin (g/dL)    | 3 (3 to 4)        | 2 (2 to 3)           | <.001   |
| ALT (U/L)         | 57 (15 to 30)     | 163 (11 to 42)       | .161    |
| AST (U/L)         | 77 (20 to 44)     | 226 (22 to 82)       | .139    |
| Total bilirubin (mg/dL) | 0 (0 to 0) | 1 (0 to 1) | .015 |
| Urea nitrogen (mg/dL) | 16 (13 to 18) | 20 (14 to 25) | <.001 |
| Creatinine (mg/dL) | 0 (0 to 1)       | 1 (0 to 1)           | <.001   |
| LDH (U/L)         | 488 (192 to 325)  | 511 (221 to 421)     | .955    |
| CK (U/L)          | 305 (57 to 210)   | 343 (61 to 281)      | .598    |
| Total calcium (mg/dL) | 8 (8 to 8)   | 8 (7 to 9)           | .072    |
| Sodium (mmol/L)   | 139 (130 to 141)  | 139 (130 to 141)     | .698    |
| Anion gap (mmol/L)| 12 (11 to 14)     | 12 (11 to 14)        | .182    |
| Lactate (mmol/L)  | 1 (1 to 1)        | 1 (1 to 2)           | .495    |
| Triglyceride (mg/dL) | 108 (95 to 121.5) | 107 (96 to 138.5)   | .387    |
| Clinical outcome  |                  |                      |         |
| LOS in ICU (h)    | 116 (31 to 122)   | 171 (39 to 228)      | .015    |
| In-hospital mortality | 4 (2.6)    | 13 (6.77)           | .043    |
| Scoring system    |                  |                      |         |
| APACHEII          | 6 (5 to 8)        | 8 (6 to 11)          | <.001   |
| SOFA              | 0 (0 to 1)        | 1 (0 to 2)           | .024    |

*Data are mean (SD), median (IQR), or n (%).
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