



# Clinical characteristics and prognosis of patients with Shiga toxin-producing *Escherichia coli* hemolytic uremic syndrome and encephalopathy: a nationwide observational study in Japan

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## Background

Shiga toxin-producing *Escherichia coli* (STEC) causes hemorrhagic colitis and hemolytic uremic syndrome (STEC-HUS). Understanding its prognostic factors is essential for immediate interventions.

## Methods

- A retrospective cohort study to analyze practice patterns and identify prognostic factors among patients with STEC-HUS.
- We used the Diagnosis Procedure Combination Database, which includes approximately half of the acute-care hospitalized patients in Japan.
- We enrolled patients who were hospitalized for STEC-HUS from July 2010 to March 2020.
- The composite unfavorable outcome included in-hospital death, mechanical ventilation, dialysis, and rehabilitation at discharge.
- Unfavorable prognostic factors were assessed using a multivariable logistic regression model.

## Conclusion

- Patients requiring early steroid pulse therapy and antiepileptic drugs were considered to be in poor general condition.
- Such patients should receive aggressive intervention to avoid worse outcomes.

## Results

Table 1. Patient characteristics and therapeutic interventions within two days of admission

|   | All patients<br>n=655               | Unfavorable<br>outcome<br>n=126 | P value    |
|---|-------------------------------------|---------------------------------|------------|
| Age category, years                             | 0-4                                 | 226 (34.5)                      | 22 (9.7)   |
|   | 5-10                                | 159 (24.3)                      | 12 (7.5)   |
|   | 11-17                               | 58 (8.9)                        | 7 (12.1)   |
|   | 18-64                               | 124 (18.9)                      | 33 (26.6)  |
|   | > 65                                | 88 (13.4)                       | 52 (59.1)  |
| Sex   | Male                                | 233 (35.6)                      | 42 (18.0)  |
|   | Female                              | 422 (64.4)                      | 84 (19.9)  |
| Body weight category, kg                        | <15.0                               | 191 (29.2)                      | 25 (13.1)  |
|   | 15.0-29.9                           | 202 (30.8)                      | 22 (10.9)  |
|   | ≥30.0                               | 262 (40.0)                      | 79 (30.2)  |
|   | Japan Coma Scale score at admission | 0                               | 618 (94.4) |
| Admission to intensive care unit, within 2 days | 1-3                                 | 26 (4.0)                        | 13 (50.0)  |
|   | ≥10                                 | 11 (1.7)                        | 8 (72.7)   |
|   | Yes                                 | 62 (9.5)                        | 17 (27.4)  |
| Antibiotics, within 2 days                      | No                                  | 593 (90.5)                      | 109 (18.4) |
|   | Yes                                 | 321 (49.0)                      | 67 (20.9)  |
| Antihypertensives, within 2 days                | No                                  | 334 (51.0)                      | 59 (17.7)  |
|   | Yes                                 | 143 (21.8)                      | 40 (28.0)  |
| Vasoactive agents, within 2 days                | No                                  | 512 (78.2)                      | 86 (16.8)  |
|   | Yes                                 | 25 (3.8)                        | 14 (56.0)  |
| Antiepileptic drugs, within 2 days              | No                                  | 630 (96.2)                      | 112 (17.8) |
|   | Yes                                 | 76 (11.6)                       | 28 (36.8)  |
| Methylprednisolone pulse therapy, within 2 days | No                                  | 579 (88.4)                      | 98 (16.9)  |
|   | Yes                                 | 7 (1.1)                         | 6 (85.7)   |
| Anticoagulants, within 2 days                   | No                                  | 648 (98.9)                      | 120 (18.5) |
|   | Yes                                 | 154 (23.5)                      | 45 (29.2)  |
| Blood transfusion, within 2 days                | No                                  | 501 (76.5)                      | 81 (16.2)  |
|   | Yes                                 | 120 (18.3)                      | 41 (34.2)  |
| Dialysis or plasma exchange, within 2 days      | No                                  | 535 (81.7)                      | 85 (15.9)  |
|   | Yes                                 | 64 (9.8)                        | 28 (43.8)  |
| Respiratory support, within 2 days              | No                                  | 591 (90.2)                      | 98 (16.6)  |
|   | Yes                                 | 88 (13.4)                       | 41 (46.6)  |
|   | No                                  | 567 (86.6)                      | 85 (15.0)  |

Table 2. Potential prognostic factors for unfavorable outcomes

|   | Unadjusted OR<br>(95% CI) | P value | Adjusted OR<br>(95% CI) | P value          |
|---|---------------------------|---------|-------------------------|------------------|
| Age category, years                             |                           |         |                         |                  |
| 0-4   | Reference                 |         | Reference               |                  |
| 5-10  | 0.76 (0.36-1.58)          | 0.458   | 0.91 (0.39-2.15)        | 0.837            |
| 11-17   | 1.27 (0.52-3.14)          | 0.601   | 4.07 (1.29-12.79)       | <b>0.016</b>     |
| 18-64   | 3.36 (1.86-6.09)          | <0.001  | 8.08 (3.12-20.91)       | <b>&lt;0.001</b> |
| >65   | 13.4 (7.27-24.69)         | <0.001  | 39.35 (14.65-105.73)    | <b>&lt;0.001</b> |
| Male sex  |                           |         |                         |                  |
|   | 0.88 (0.59-1.33)          | 0.559   | 1.14 (0.68-1.91)        | 0.609            |
| Body weight category, kg                        |                           |         |                         |                  |
| <14   | Reference                 |         | Reference               |                  |
| 15-29   | 0.81 (0.44-1.49)          | 0.503   | 1.63 (0.79-3.37)        | 0.187            |
| >30   | 2.87 (1.74-4.71)          | <0.001  | 0.66 (0.28-1.54)        | 0.333            |
| Japan Coma Scale score at admission             |                           |         |                         |                  |
| 0   | Reference                 |         | Reference               |                  |
| 1-3   | 4.89 (2.20-10.84)         | <0.001  | 1.57 (0.52-4.74)        | 0.425            |
| ≥10   | 13.03 (3.40-49.93)        | <0.001  | 3.51 (0.42-29.28)       | 0.247            |
| Admission to intensive care unit, within 2 days |                           |         |                         |                  |
|   | 1.68 (0.92-3.04)          | 0.089   | 0.65 (0.22-1.95)        | 0.444            |
| Antibiotics, within 2 days                      |                           |         |                         |                  |
|   | 1.23 (0.83-1.81)          | 0.298   | 0.67 (0.39-1.16)        | 0.154            |
| Antihypertensives, within 2 days                |                           |         |                         |                  |
|   | 1.92 (1.25-2.96)          | 0.003   | 1.43 (0.75-2.71)        | 0.278            |
| Vasoactive agents, within 2 days                |                           |         |                         |                  |
|   | 5.89 (2.60-13.31)         | <0.001  | 1.40 (0.37-5.34)        | 0.622            |
| Antiepileptic drugs, within 2 days              |                           |         |                         |                  |
|   | 2.86 (1.71-4.79)          | <0.001  | 2.59 (1.23-5.47)        | <b>0.013</b>     |
| Methylprednisolone pulse therapy, within 2 days |                           |         |                         |                  |
|   | 26.40 (3.15-221.32)       | 0.003   | 31.60 (5.35-186.59)     | <b>&lt;0.001</b> |
| Anticoagulants, within 2 days                   |                           |         |                         |                  |
|   | 2.14 (1.41-3.26)          | <0.001  | 0.63 (0.31-1.26)        | 0.193            |
| Blood transfusion, within 2 days                |                           |         |                         |                  |
|   | 2.75 (1.76-4.28)          | <0.001  | 1.51 (0.70-3.26)        | 0.295            |
| Dialysis or plasma exchange, within 2 days      |                           |         |                         |                  |
|   | 3.91 (2.28-6.71)          | <0.001  | 2.02 (0.72-5.62)        | 0.180            |
| Respiratory support, within 2 days              |                           |         |                         |                  |
|   | 4.95 (3.07-7.98)          | <0.001  | 2.01 (0.92-4.36)        | 0.079            |

## Contact Information

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