Supplemental Table 1: Complete list of the admission biochemical characteristics of validation cohort patients with AP

| Characteristic | SAP (n=22) | Mild AP (n=51) | p-value |
|---------------|------------|----------------|---------|
| Lipase x ULN  | 23.8 (5.6-45.9) n=21 | 12.3 (6.9-42.9) n=48 | 0.66    |
| Amylase x ULN | 4.1 (2.4-10.5) n=19  | 2.2 (1.4-7.1) n=40  | 0.15    |
| Albumin, g/dL | 3.3 (3.1-4.2) n=21   | 4.0 (3.6-4.6) n=47  | 0.005   |
| Anion Gap, mmol/L | 12.0 (8.0-16.0) n=21 | 12.0 (10.0-15.0) n=51 | 0.74    |
| WBC, 10^3/microL | 13.1 (5.8-17.3) n=19 | 9.8 (6.5-13.8) n=39 | 0.38    |
| Creatinine, mg/dL | 0.5 (0.4-0.7) n=22 | 0.5 (0.4-0.7) n=51 | 0.94    |
| Calcium, mg/dL | 9.2 (8.8-9.5) n=22 | 9.3 (8.9-9.7) n=51 | 0.29    |
| AST, Unit/L | 32.0 (24.0-63.0) n=21 | 38.0 (22.0-80.0) n=47 | 0.69    |
| ALT, Unit/L | 29.0 (21.0-57.0) n=21 | 31.0 (24.0-135.0) n=47 | 0.39    |
| Hematocrit, % | 39.4 (33.2-41.9) n=19 | 37.3 (34.4-39.8) n=39 | 0.53    |
| Hemoglobin, g/dL | 13.7 (11.0-14.5) n=19 | 12.9 (11.7-14.1) n=39 | 0.89    |
| BUN, mg/dL | 14.5 (11.0-19.0) n=22 | 11.0 (8.0-13.0) n=51 | 0.002   |
| Alk Phosphorus, Unit/L | 163.0 (137.0-207.0) n=21 | 138.5 (91.0-225.0) n=46 | 0.54    |
| Glucose, mg/dL | 97.5 (80.0-138.0) n=22 | 99.0 (89.0-118.0) n=51 | 0.75    |
| Triglyceride, mg/dL | 49.5 (35.0-69.0) n=10 | 68.0 (50.0-115.0) n=21 | 0.06    |
| Sodium, mmol/L | 138.5 (136.0-140.0) n=22 | 140.0 (138.0-142.0) n=51 | 0.11    |
| Chloride, mmol/L | 103.5 (101.0-106.0) n=22 | 104.0 (101.0-106.0) n=51 | 0.91    |
| Total Bilirubin, mg/dL | 0.5 (0.4-0.9) n=21 | 0.6 (0.4-1.1) n=47 | 0.50    |
| CRP, mg/dL | 1.3 (0.5-6.6) n=11  | 1.1 (0.6-3.0) n=29  | 0.83    |
| Potassium, mmol/L | 4.1 (3.9-4.6) n=21  | 4.1 (3.7-4.4) n=51  | 0.64    |
| Total protein, g/dL | 6.6 (5.9-7.6) n=21  | 7.1 (6.5-7.5) n=47  | 0.20    |
| Platelet count, 10^3/microL | 288.0 (154.0-393.0) n=19 | 261.0 (219.0-326.0) n=39 | 0.67    |
| CO2, mmol/L | 24.5 (18.0-27.0) n=22 | 24.0 (22.0-25.0) n=51 | 0.93    |

Data presented as median (25th-75th percentile) or n (%)
Supplemental Table 2: BUN Change admission to 24-48 hours, patient characteristics

|                      | All  | Mild AP | SAP*  | P-value† |
|----------------------|------|---------|-------|----------|
|                      | N=176| N=137   | N=39  |          |
| Age at admission (years) | 13.5 (8.7, 15.6) | 13.5 (9.3, 15.6) | 12.3 (7.7, 15.5) | 0.29 |
| Sex (female)          | 96 (55%) | 77 (56%) | 19 (49%) | 0.41 |
| Fluid type            |      |         |       |          |
| Isotonic              | 58/157 (37%) | 47/121 (39%) | 11/36 (31%) | 0.37 |
| Hypotonic             | 88/157 (56%) | 67/121 (55%) | 21/36 (58%) |
| TPN/Other             | 11/157 (7%)  | 7/121 (6%)  | 4/36 (11%) |
| Fluid rate            |      |         |       |          |
| < 1.5x maintenance    | 76/160 (47%) | 58/122 (48%) | 18/38 (47%) | 0.73 |
| 1.5 - <2x maintenance | 70/160 (44%) | 52/122 (43%) | 18/38 (47%) |
| ≥ 2x maintenance      | 14/160 (9%)  | 12/122 (10%) | 2/38 (5%) |
| Feeds on admission    |      |         |       |          |
| NPO                   | 134/165 (81%) | 101/128 (79%) | 33/37 (89%) |
| Clear liquid diet     | 17/165 (10%)  | 16/128 (13%)  | 1/37 (3%)  |
| PO general diet       | 10/165 (6%)   | 7/128 (5%)    | 3/37 (8%)  |
| PO low fat diet       | 3/165 (2%)    | 3/128 (2%)    | 0/37 (0%)  |
| Feeds through existing enteral tube | 1/165 (1%) | 1/128 (1%) | 0/37 (0%) | - |
| IV bolus within 6 hours | 103/162 (64%) | 75/125 (60%) | 28/37 (76%) | 0.08 |
| BUN admission (mg/dL) | 11.0 (8.0, 15.0) | 10.0 (8.0-13.0) | 15.5 (11.0-22.5) | <0.0001 |
| BUN 24-48hrs (mg/dL)  | 8.0 (6.0, 12.0) | 7.0 (5.0-10.0) | 12.5 (8.0-19.0) | <0.0001 |
| BUN change (mg/dL)    | -3.0 (-6.0, -1.0) | -3.0 (-5.0, -1.0) | -3.5 (-7.0, -1.0) | 0.32 |
| BUN no change admission-24hrs | 15/143 (10%) | 13/109 (12%) | 2/34 (6%) | 0.52 |
| BUN percent change from admission (includes all) | -23.5 (-44.4, -9.1) (n=143) | -27.3 (-50.0, -9.1) (n=109) | -19.1 (-32.4, -9.4) (n=34) | 0.22 |
| BUN percent rise from admission (for those increased) | 25.0 (10.0, 40.0) (n=15) | 25.0 (16.7, 40.0) (n=13) | 19.8 (6.3, 33.3) (n=2) | 0.60 |
| BUN percent decrease from admission (for those decreased) | -33.3 (-50.0, -20.0) (n=113) | -35.7 (-52.9, -22.2) (n=83) | -21.5 (-38.5, -12.5) (n=30) | 0.002 |
| BUN elevated admission (>20 mg/dL) | 15/162 (9%) | 3/126 (2%) | 12/36 (33%) | <0.0001 |
| BUN elevated 24hrs (>20 mg/dL) | 10/145 (7%) | 2/111 (2%) | 8/34 (24%) | 0.0001 |
| BUN elevated both at admission & at 24 hours (>20 mg/dL) | 10/143 (7%) | 2/109 (2%) | 8/34 (24%) | 0.0002 |

Data presented as median (25th-75th percentile) or n (%).

*SAP (moderately severe and severe AP)

†P-value is from testing differences between the Mild AP and SAP groups
Supplemental Table 3: BUN Values and Resultant Statistics

A. Derived from the CHKD and CNH Data (n= 73)

| BUN Value (mg/dL) | Sensitivity | Specificity | PPV  | NPV  |
|-------------------|-------------|-------------|------|------|
| 10                | 77%         | 33%         | 33%  | 77%  |
| 11                | 77%         | 49%         | 40%  | 83%  |
| 12                | 73%         | 59%         | 43%  | 83%  |
| 13                | 68%         | 73%         | 52%  | 84%  |
| 14                | 59%         | 76%         | 52%  | 81%  |
| 15                | 50%         | 82%         | 55%  | 79%  |
| 16                | 45%         | 90%         | 67%  | 79%  |
| 17                | 41%         | 90%         | 64%  | 78%  |
| 18                | 36%         | 92%         | 67%  | 77%  |
| 19                | 27%         | 94%         | 67%  | 75%  |
| 21                | 23%         | 98%         | 83%  | 75%  |
| 23                | 18%         | 98%         | 80%  | 74%  |
| 24                | 14%         | 98%         | 75%  | 72%  |
| 37                | 14%         | 100%        | 100% | 73%  |
B. Derived from the BUN Change Cohort (CHKD & CCHMC) data (n=176)

| BUN Value (mg/dL) | Sensitivity | Specificity | PPV  | NPV  | Sensitivity | Specificity | PPV  | NPV  |
|-------------------|-------------|-------------|------|------|-------------|-------------|------|------|
| 10                | 83%         | 38%         | 28%  | 89%  | 59%         | 71%         | 38%  | 85%  |
| 11                | 78%         | 52%         | 31%  | 89%  | 59%         | 81%         | 49%  | 87%  |
| 12                | 72%         | 60%         | 34%  | 88%  | 56%         | 84%         | 51%  | 86%  |
| 13                | 69%         | 72%         | 42%  | 89%  | 50%         | 88%         | 57%  | 85%  |
| 14                | 61%         | 79%         | 45%  | 88%  | 44%         | 94%         | 68%  | 85%  |
| 15                | 56%         | 83%         | 48%  | 87%  | 41%         | 95%         | 70%  | 85%  |
| 16                | 50%         | 88%         | 55%  | 86%  | 41%         | 95%         | 74%  | 84%  |
| 17                | 47%         | 88%         | 53%  | 85%  | 35%         | 95%         | 71%  | 83%  |
| 18                | 44%         | 91%         | 59%  | 85%  | 32%         | 95%         | 69%  | 82%  |
| 19                | 42%         | 91%         | 59%  | 85%  | 26%         | 96%         | 69%  | 81%  |
| 20                | 39%         | 94%         | 67%  | 84%  | 24%         | 97%         | 73%  | 81%  |
| 21                | 33%         | 98%         | 80%  | 84%  | 24%         | 98%         | 80%  | 81%  |
| 22                | 28%         | 98%         | 77%  | 83%  | 21%         | 98%         | 78%  | 80%  |
| 25                | 19%         | 98%         | 70%  | 81%  | 18%         | 98%         | 75%  | 80%  |
| 32                | 17%         | 99%         | 86%  | 81%  | NA          | NA          | NA   | NA   |
Supplemental Figure 1.

\[ P < 0.0001 \]

AUROC (95% CI): 0.76 (0.66-0.85)