**Supplemental Materials File**

**Title:** Evaluation of an institutional diabetic ketoacidosis protocol using a titrated insulin infusion with an electronic medication administration record calculator

Supplemental Figure 1: Consolidated summary of electronic medication administration record calculator for institutional intravenous titratable insulin protocol

| | |
|---|---|
| Equations Used: | **Initial ISF = (Initial BG - 60) / (initial insulin rate of 0.1 units/kg/hr in units/hr)** |
| | **New ISF is calculated via below logic, considering relative % change in BG and other factors** |
| | **New Insulin rate (units/hr) = new ISF * (current BG - 60)** |

**Steps to calculate new ISF**

1. Pull forward the last ISF
2. Calculate new unadjusted ISF from Table 1
3. Take calculated ISF and adjust it if indicated in Table 2
4. Round to nearest 0.01 and do not go below 0.01
5. Multiply final new ISF * (current BG-60) = new drip rate

Table 1

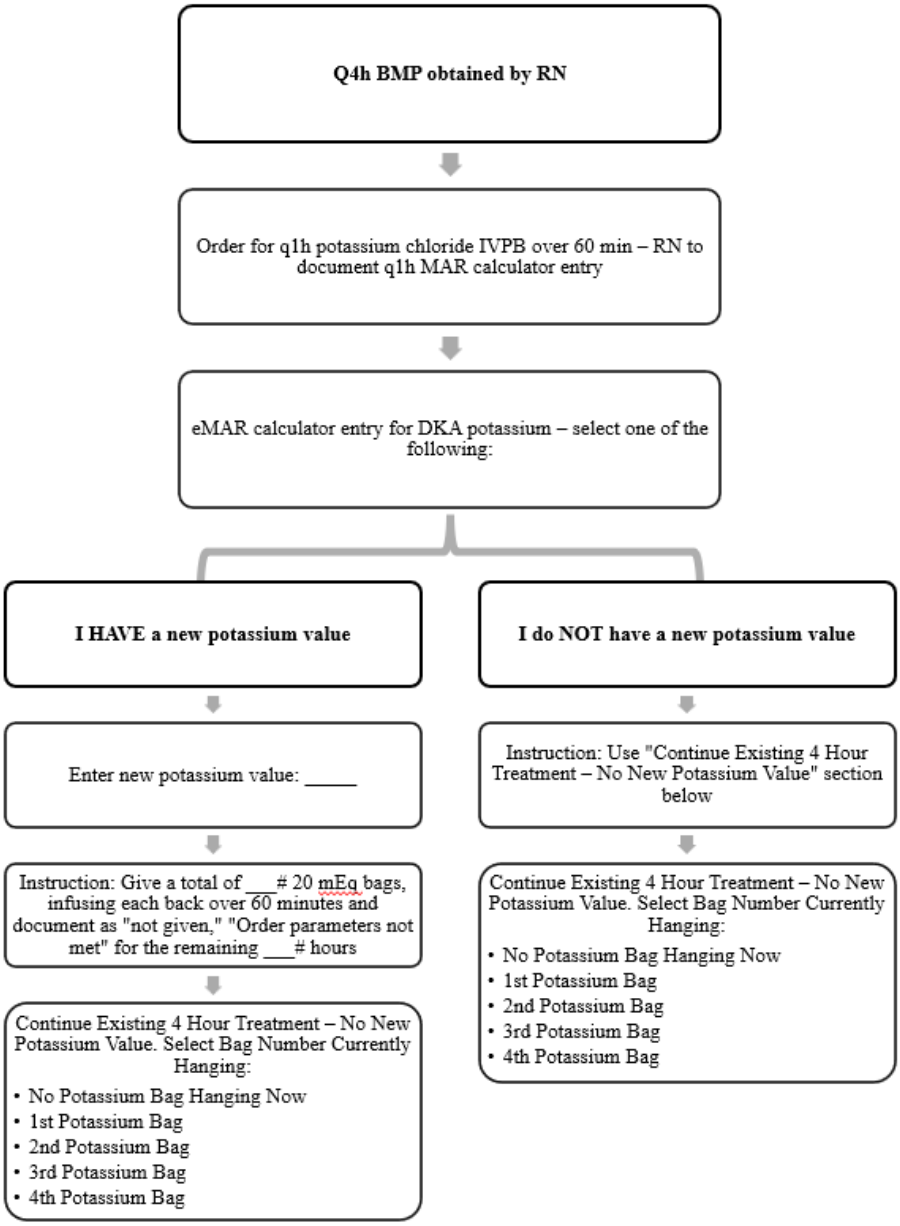
| | Current BG<100 | Current BG 100-180 | Current BG>180 |
|---|---|---|---|
| Current BG </=50% of prior | decrease ISF by 33% | decrease ISF by 33% | |
| Current BG >50% of prior | decrease ISF by 33% | keep same ISF | |
| Current BG </=85% of prior | | | keep same ISF |
| Current BG >85% of prior | | | increase ISF by 0.01 |

Table 2

| Current BG>70 but prior was<70 | Calculated ISF</=prior ISF | If [(previous BG-60)*previous ISF]>30 | None of these |
|---|---|---|---|
| reduce calculated ISF by 33% | keep calculated ISF | reset ISF to step 1 | keep calculated ISF |

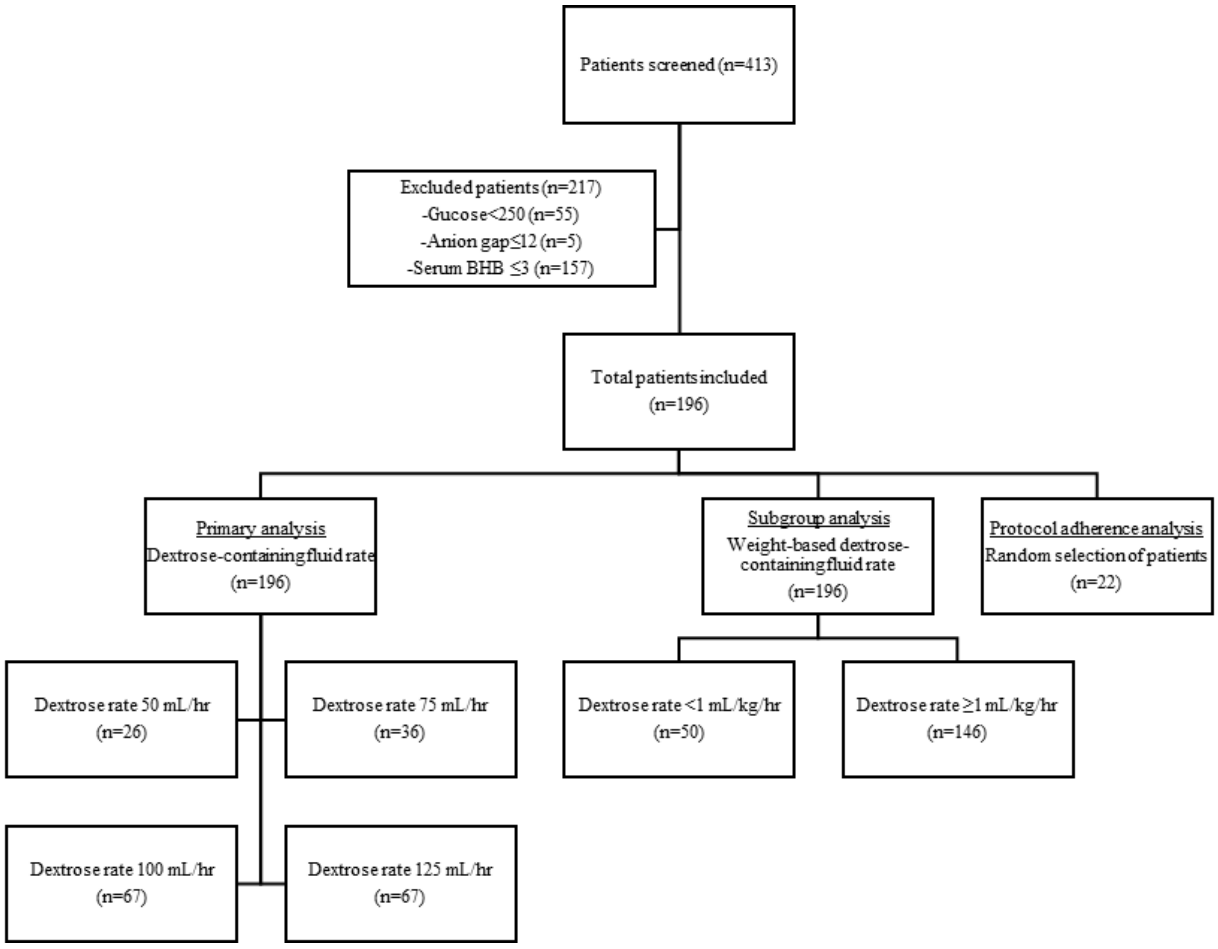
Legend: BG=blood glucose, ISF=insulin sensitivity factor

Supplemental Figure 2: Summary of eMAR calculator for potassium replacement while on DKA protocol




Legend: BMP=basic metabolic panel, DKA=diabetic ketoacidosis, eMAR=electronic medication administration record, RN=registered nurse, IVPB=intravenous piggyback

Supplemental Figure 3: Population determination




Legend: BHB= β-hydroxybutyrate

Supplemental Table 1: Demographic variables by dextrose-containing maintenance fluid rate

| | **50ml/hr** (n=21) | **75mL/hr** (n=31) | **100mL/hr** (n=59) | **125mL/hr** (n=64) | **P-value** |
|---|---|---|---|---|---|
| Sex<br>Female (%)<br>Male (%) | <br>13 (61.90)<br>8 (38.10) | <br>17 (54.84)<br>14 (45.16) | <br>37 (62.71)<br>22 (37.29) | <br>26 (40.63)<br>38 (59.38) | 0.076 |
| Race<br>Caucasian (%)<br>African American or Black (%)<br>Declined to specify (%) | <br>9 (42.86)<br>11 (52.38)<br>1 (4.76) | <br>21 (67.74)<br>9 (29.03)<br>1 (3.23) | <br>37 (62.71)<br>22 (37.29)<br>0 (0.00) | <br>33 (51.56)<br>28 (43.75)<br>2 (3.13) | 0.528 |
| Ethnicity<br>Hispanic or Latino (%)<br>Not Hispanic or Latino (%) | <br>1 (4.76)<br>20 (95.24) | <br>0 (0)<br>31 (100.00) | <br>1 (1.69)<br>58 (98.31) | <br>2 (3.13)<br>62 (96.88) | 0.660 |
| Age, median years, IQR | 38 (30.50, 46.00) | 37 (30.00, 52.00) | 46 (32.00, 59.00) | 41 (32, 50.50) | 0.189 |
| Weight, median kg, IQR | 69.12 (55.45, 78.95) | 66.80 (54.1, 78.50) | 72.50 (57.2, 86.20) | 71.65 (63.7, 90.05) | 0.074 |
| End-stage renal disease (%) | 4 (19.05) | 3 (9.68) | 4 (6.78) | 2 (3.13) | 0.182 |

Legend: IQR=interquartile range

Supplemental Table 2: Demographic variables by weight-based dextrose-containing maintenance fluid rate

| | **< 1 mL/kg/hr** (n=40) | **≥ 1 mL/kg/hr** (n=135) | **P-value** |
|---|---|---|---|
| Sex<br>Female (%)<br>Male (%) | <br>24 (60.00)<br>16 (40.00) | <br>69 (51.11)<br>66 (48.98) | 0.322 |
| Race<br>Caucasian (%)<br>African American or Black (%)<br>Declined to specify (%) | <br>21 (52.50)<br>18 (45.00)<br>1 (2.50) | <br>79 (58.52)<br>52 (38.52)<br>3 (2.22) | 0.843 |
| Ethnicity<br>Hispanic or Latino (%)<br>Not Hispanic or Latino (%) | <br>1 (2.50)<br>39 (97.50) | <br>3 (2.22)<br>132 (97.78) | 0.918 |
| Age, median years, IQR | 37 (30.50,49.50) | 41 (32.00,52.00) | 0.480 |
| Weight, median kg, IQR | 80.54 (71.25,106.50) | 67.50 (57.9,79.4) | < 0.00001 |
| End-stage renal disease (%) | 4 (10.00) | 9 (6.67) | 0.653 |

Legend: IQR=interquartile range

Supplemental Table 3: Primary and secondary outcomes by dextrose-containing maintenance fluid rate

| | **50ml/hr** (n=21) | **75mL/hr** (n=31) | **100mL/hr** (n=59) | **125mL/hr** (n=64) | **P-value** |
|---|---|---|---|---|---|
| Time to DKA resolution, median hours, (IQR) | 7.38 (3, 15.70) | 9.00 (3.52, 20.02) | 8.17 (2.95, 15.83) | 5.65 (2.46, 11.41) | 0.469 |
| Incidence of insulin drip dropping below 0.05 u/kg/hr post dextrose initiation (%) | 26 (100.00) | 36 (100.00) | 66 (98.51) | 66 (98.51) | 0.817 |
| Incidence of transition off insulin or dextrose infusion prior to meeting the primary outcomes (%) | 5 (19.23) | 5 (13.89) | 8 (11.94) | 3 (4.48) | 0.159 |
| Incidence of increase in dextrose rate from initial rate (%) | 5 (19.23) | 11 (30.56) | 10 (14.93) | 1 (1.5) | 0.0005 |
| Incidence of decrease in dextrose rate from initial rate (%) | 1 (3.85) | 0 (0) | 3 (4.48) | 1 (1.50) | 0.490 |
| Phosphorus ≤2 mg/dL while on insulin drip (%) | 6 (23.08) | 12 (33.33) | 26 (38.80) | 20 (29.85) | 0.478 |
| Phosphorus ≤1 mg/dL while on insulin drip (%) | 1 (3.85) | 3.00 (8.33) | 5 (7.46) | 10 (14.93) | 0.312 |
| Blood glucose <70 mg/dL while on insulin drip (%) | 13 (50) | 13 (36.11) | 18 (26.87) | 19 (28.36) | 0.148 |
| Serum potassium <3.3 mEq/L while on insulin drip (%) | 5 (19.23) | 5 (13.89) | 13 (19.40) | 18 (26.87) | 0.450 |

Legend: DKA=diabetic ketoacidosis, IQR=interquartile range

Note: 21 patients were excluded from the primary outcome analysis due to being transitioned off the DKA protocol prior to meeting the criteria for resolution of DKA