APR 2019 | VOL 2.04

Clinical in•sight™

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EMERGENCY | HOSPITALIST | HYBRID

CLINICAL INSIGHTS AND INNOVATION FOR PROVIDERS

EVIDENCE BASED TREATMENT OF DIABETIC KETOACIDOSIS DKA IN THE ED

Patients coming in with altered mental status and/or elevated blood glucose levels should be evaluated for DKA. These patients may also have hyperosmolar hyperglycemic state (HHS), which is treated similarly to DKA. DKA is defined by metabolic acidosis and hyperglycemia. Glucose levels are often between 350 and 500 mg/dL; however, glucose levels can exceed 900 or can be near normal. With HHS the glucose level is often higher (often times upwards of 1000) but there is no ketoacid accumulation. The treatment of both these conditions is accomplished with several corrections.

Correct fluid deficits

- Infuse isotonic saline to expand extracellular volume, stabilize cardiovascular status and improve insulin responsiveness.
- Patients in hypovolemic shock should receive isotonic saline as rapidly as possible.
- In hypovolemic patients without shock or heart failure, isotonic saline should be administered at a rate of 1000ml/hr for the first couple of hours.
- After the first few hours, the IV fluid composition should be based on the CORRECTED sodium level.
  - You can easily calculate the corrected sodium in the MDCalc app.

From the Editor

Welcome to this installment of Clinical in•sight™! This publication is aimed to help YOU, our community of clinicians, keep up with and learn information relevant to your position at HospitalMD. I would love to hear your feedback, comments, suggestions and accolades. Please email me with any thoughts at: BNewberry@HospitalMD.com.

BRITTANY NEWBERRY, PhD, MSN, MPH, APRN, FNP-BC, ENP-BC
Board Certified Family and Emergency Nurse Practitioner,
Vice President Education and Provider Development, HospitalMD

- For sodium less than 135 mEq/L – isotonic saline should continue at 250 to 500 ml/hr.
- For sodium that is normal or elevated – switch to ½ isotonic saline at a rate of 250 to 500 ml/hr.
  - Concurrent potassium replacement may also be an indication for the use of ½ isotonic saline
- Dextrose is added to the saline solution once the serum glucose reaches 200 mg/dL in DKA or 250 to 300 mg/dL in HHS.
  - Patients with DKA will oftentimes require treatment with both insulin and glucose in order to treat the ketoacidosis and prevent hypoglycemia, especially if the DKA is euglycemic.

Correct electrolyte imbalances

- Patients with an initial Potassium < 5.3 mEq/L should have potassium replacement initiated immediately.
  - If the initial potassium is < 3.3 mEq/L, 20-40 mEq of potassium should be given per hour until potassium normalizes to the 4 to 5 mEq/L range.
  - If the initial potassium is between 3.3 and 5.3 mEq/L, 20-30 mEq of potassium should be given per hour until potassium normalizes to the 4 to 5 mEq/L range.
  - If the initial potassium level is > 5.3 mEq/L, potassium administration should be deferred unless the potassium falls below this level.
  - Replace potassium levels cautiously in patients with renal failure.
  - Don't forget to check the magnesium level when replacing potassium as well. Administer magnesium if necessary to correct to normal levels.

Administer insulin

- Administer low dose regular IV insulin in patients with moderate to severe DKA who have a potassium level ≥ 3.3 mEq/L (initial dose is often 0.1 units/kg which is then followed by insulin infusion of 0.1 units/kg/hr)
- If the potassium is < 3.3, insulin therapy should be delayed until potassium replacement has begun and potassium levels have increased.
- Keep in mind that insulin will worsen hypokalemia potentially leading to cardiac arrhythmias.

Administer bicarbonate if indicated

- The use of bicarbonate is controversial, and evidence of benefit is not well demonstrated in the literature and has potential complications.
- For patients with a pH ≤ 6.9, give 100 mEq sodium bicarb in 400 mL sterile water over 2 hours.
- Patients with life threatening hyperkalemia (potassium >6.4 mEq/L) should receive 100 mEq sodium bicarb in 400 mL sterile water over 2 hours.
- The venous pH and bicarbonate concentration should be monitored every 2 hours and bicarb doses should be repeated until the pH rises above 7.0.

Phosphate depletion

- The routine use of phosphate repletion is NOT recommended unles the serum concentration is below 1 mg/dL, especially if cardiac or respiratory compromise is present.
- When needed, potassium or sodium phosphate 20 to 30 mEq can be added to 1L of IV fluid.

Monitor

- Glucose should be monitored every hour until stable.
- Electrolytes, BUN, creatinine and venous pH (DKA only) should be measured every 2 to 4 hours depending on severity and clinical response.

- Venous pH is adequate to assess metabolic acidosis and arterial blood gasses are not required.

Resolution

- The hyperglycemic crisis is considered to be resolved when:
  - Ketoacidosis is resolved as evidenced by a normalized anion gap (< 12 mEq/L) and normalized blood beta-hydroxybutyrate levels (ketones).
  - Patients with HHS are mentally alert and plasma osmolality is below 315 mOsmol/kg.
  - The patient is able to eat.

Complications

- Hypoglycemia and hypokalemia are the most common complications and are best prevented with frequent laboratory monitoring.
- Cerebral edema
  - Not usually seen in patients > 20 years of age.
  - Monitor for headache, lethargy, decreased arousal.
  - Neurologic deterioration may be rapid and include seizures, incontinence, pupillary changes, bradycardia and respiratory arrest.
  - Cerebral edema has a mortality rate of 20 to 40%. Monitor patients carefully for any changes in mental or neurologic status.
  - Sodium should be replaced gradually in patients who are hyperosmolar (not more than 1000 ml/hr).
  - Add dextrose to the saline once glucose falls below 200 mg/dL in DKA and 250-300 mg/dL in HHS.
- Noncardiogenic pulmonary edema
  - Monitor for fluid overload and respiratory symptoms.

For more detailed information about treating DKA and HHS visit this link on UpToDate.

6 DOCUMENTATION *Reminders*

HPI
Strive to always include **FOUR HPI** elements in your charts.

ROS
Document the necessary elements in the ROS and then write or check "**ALL OTHER SYSTEMS REVIEWED AND ARE NEGATIVE**". This statement must be present, and the wording MUST BE PRECISE in order to be considered acceptable by the billing company.

Exam
You must have **EIGHT** exam elements present for a higher level chart.

ECG/Radiology interpretation
If you have ordered either of these, the statement "interpreted by me" must be present in the chart. **An ECG must have 3 elements and an interpretation documented and a radiology result must have an interpretation documented**.

Critical Care Time
If your patient qualifies for critical care, BE SURE to document this on the chart.

Procedures
Be sure to include all pertinent details regarding procedures so that any more complex procedures (ie intermediate vs simple suture repair) can be billed at the rate that matches the true complexity of the procedure.

If you have ANY questions about the documentation of any of these things, or any other types of documentation, please don't hesitate to contact your medical director or email bnewberry@hospitalmd.com.

Improve your RVUs!

BE SURE TO DOCUMENT THE ACCURATELY MEASURED LENGTH OF YOUR LACERATION REPAIR.

- Laceration ≤ 2.5cm = approximately 4.5 RVUs
- Laceration > 2.5cm = approximately 5.5 RVUs

DOCUMENT LACERATION LOCATION

- Facial laceration repairs have a higher reimbursement than scalp lacerations so be specific in your location documentation.

DOCUMENT EVERYTHING ASSOCIATED WITH THE LACERATION

- An intermediate laceration repair (extensive irrigation, multiple layer closure and/or particulate removal) has a higher RVU assignment than a simple so document these pertinent details.
- For example: A 6.0 cm single layer repair is assigned approximately 2 RVUs while the same 6.0 cm laceration using a multi-layered closure yields approximately 5.5 RVUs.

ESTABLISH MEDICAL NECESSITY

- Document the laceration as a diagnosis in addition to other diagnoses. Be sure to document at least two diagnoses. If you don't, the laceration repair may get unfairly bundled in the E/M service visit.
- For example, document: Finger injury and finger pain in addition to finger laceration.

ANNUAL HEALTHSTREAM EDUCATION DEADLINE! APPROACHING! (4/30)!

HMD has a package of new education from HealthStream that was assigned to you on December 3! This education will meet several requirements for topics that providers are required to have education on each year. The medical directors will be receiving a monthly report showing compliance for this education on a monthly basis. There is a lot of information so PLEASE go ahead and start working on this annual education requirement. We must show compliance with these education topics for our providers.

All education needs to be completed no later than April 30, 2019.

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Join our Providers Facebook Group!

Are you a part of our Facebook group for all **HospitalMD** providers? This is a fun way for all providers to be able to interact, get to know each other, share clinical information and learn from each other. We want this to be a fun, relaxed place where we can share whatever is on our minds. You are free to upload case information and images, please just be cognizant of HIPAA and remove patient names from images or lab work and change any case information to prevent any identifying information.

Here's how to join:

- Sign into Facebook
- Go to: https://www.facebook.com/groups/971504039692503/
- Click on "Join"

Once you do that, a request will come to HospitalMD for approval. Contact Brittany Newberry (bnewberry@hospitalmd.com) if you have any questions or problems. We look forward to seeing you there!

Events and Clinical Resources

ERLANGER TRAUMA SYMPOSIUM

Each year Erlanger puts on an excellent Trauma Symposium with one day of lecture and one day of hands-on cadaver lab. These experiences are not easy to find! The conference is always reasonably priced and Chattanooga is a great town to visit! See **THIS** announcement about this year's trauma conference in June. The conference offers CME as well.

NEED AN ECG OR IMAGING REFRESHER?

The Center for Medical Education has an excellent online course for ECG and imaging interpretation! These two courses are completely online, earn you CMEs and are reasonably priced at $115 each. You can find links for each course below. I HIGHLY recommend these courses! They are very informative and well done.

Advanced Emergency Medicine Bootcamp: ECG Interpretation **(3.75 CMEs)**

Advanced Emergency Medicine Bootcamp: Imaging Interpretation **(4 CMEs)**

UPCOMING CONFERENCES

ACEP Calendar of Emergency Medicine Conferences

Calendar of Hospital Medicine Conferences

AAENP Conference Events

ONLINE EDUCATION

Emergency Medicine Boot Camp

Hospital Medicine Boot Camp

PROCEDURE TRAINING

Global Training Institute

Emergency Procedures Course

CERTIFICATION REVIEWS

Fitzgerald ENP Certification Review

Rosh ENP Certification Review

JOURNALS AND PROFESSIONAL ORGANIZATIONS

FREE! Emergency Medicine News

FREE! ACEP Now

Emergency Medicine Practice

Advanced Emergency Nursing Journal

Annals of Emergency Medicine

Journal of Hospital Medicine

Society of Hospital Medicine

American College of Emergency Physicians

American Academy of Nurse Practitioners

American Academy of Emergency Nurse Practitioners

American Academy of Physician Assistants

PODCASTS

EM: Rap

EMCRIT

FOAMCast

REBELEM

EMplify

Hospital and Internal Medicine Podcast

The Hospitalist Podcast

If you have a great resource you would like added to this list, let us know!

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