

# Chartist



# Toxic Metabolic Encephalopathy

## Definition

Acute toxic-metabolic encephalopathy (TME), which encompasses delirium and the acute confusional state, is an acute condition of global cerebral dysfunction in the absence of primary structural brain disease

Reference: UpToDate

**DATE: 12/22**

# EMERGENCY DEPARTMENT NOTE

**Chief Complaint:** General weakness, **confusion**

**History of Present Illness:** The patient is an 84-year-old female presenting to the ED c/o general malaise and **confusion**. The patient is c/o general malaise and **confusion** with mild back pain and dyspnea but denies any other acute medical complaints. Per son the patient does not smoke and does have a history of CHF. He notes that her generalized weakness started two weeks ago which worsened over this past weekend and he notes that patient lost use of her legs 2 days ago needing help to get in and out of her wheelchair, **her confusion began yesterday, mental status is not a baseline.**

**Exam:**

Constitutional	No apparent distress
Eyes	No conjunctival injection. Normal sclera. Extra ocular movements intact.
	Supple. Trachea midline. Thyroid not visibly enlarged.
	Breath sounds – Rales. Bilateral. Normal respiratory effort.
Neurological	<b>Alert &amp; Oriented x 2</b>

Patients presenting with confusion may have toxic metabolic encephalopathy (TME)

Look for when the symptoms began; recent or acute changes in mental status support the diagnosis of TME

Check to see if there is an acute change from the patient's baseline mental status

In the patient's exam, look for the level of awareness

Alert & Oriented

X 1 = Person (who are you?)

X 2 = Place (where are you?)

X 3 = Time (what is the date and time?)

X 4 = Situation (what just happened to you?)

**DATE: 12/22**

## EMERGENCY DEPARTMENT NOTE

Interventions:

**Levaquin**  
**Potassium IV**  
**Magnesium IV**

Radiology Reading:

**CT HEAD WO CONTRAST**

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 CLINICAL HISTORY: AMS

Exam: CT head without intravenous contrast was performed.

**FINDINGS:** No acute hemorrhage, focal edema, or mass-effect is seen. The ventricles and cisterns are normal in size for the patient's age. There is a moderate amount of low attenuation change in the periventricular and subcortical white matter. This is nonspecific but likely related to chronic microvascular change.

**IMPRESSION:**

1. No acute intracranial process.
2. Lytic calvarial lesions particularly involving the right parietal bone as described.
3. Findings suggesting chronic microvascular disease.

Look for treatment of infections and/or electrolyte abnormalities; both can cause TME

TME is a diagnosis of exclusion (when other conditions are ruled out, TME can be ruled in)

The CT brain ruled out an acute intracranial process (e.g. stroke)

**DATE: 12/22**

## **EMERGENCY DEPARTMENT NOTE**

### Medical Decision Making:

The patient is an 84-year-old female presenting to the ED c/o AMS and confusion. The patient's CT head showed lytic calvarial lesions particularly involving the right parietal bone and findings suggesting chronic microvascular disease but there was **no other intracranial process**. Her diagnostics were noted which was consistent with **hypomagnesemia, hypokalemia and acute UTI**. The patient was treated with **Levaquin and supplemented with potassium and mag** and her care has been endorsed to Dr. Johnson for further care.

Differential diagnosis: Emergent conditions considered after evaluating the presenting, history and physical exam of the patient. Infection vs. stroke.

### Clinical Impression / Problem List:

**AMS**

**UTI**

**Hypomagnesemia**

**Hypokalemia**

### Disposition

Condition: Stable

Status: Admitted as inpatient

Location: Med/surg bed.

Disposition decision time: 05/23/16 18:42

No intracranial process was found, so TME could still potentially be the cause for the AMS

Infections and electrolyte imbalances are common causes of TME

**DATE: 12/23**

## **HISTORY AND PHYSICAL**

Chief Complaint: **Weakness, diarrhea, lethargy, altered mental status.**

History of Present Illness: This is an 84-year-old pleasant female, brought in by her son from home due to progressively worsening **weakness and fever of 102 today**. Four days to five days ago over the weekend, she had a "stomach bug with significant vomiting and watery diarrhea." It resolved about 3 days ago; however, since then she has gotten weaker. She is typically at baseline; is able to ambulate with a walker. However, the son has noticed that she could not help herself up. Although, she was afebrile initially, the son noticed that she had spiked a fever of **102 max earlier today**. He also noticed that she was breathing a little bit more shallow and wheezing more. He also reports that she has decreased oral intake. History is being obtained primarily from the son since the patient is fairly lethargic to answer questions appropriately. There was no history of any dysuria or urinary frequency. She is incontinent at baseline. Denies any cough or shortness of breath. She did not get her flu shot this year. No recent travel. No sick contacts with similar symptoms of diarrhea.

Review of Systems: A 10-point review of systems was completed and were noted to be negative except for the ones mentioned above.

Weakness, lethargy, and altered mental status may be supportive of TME

The clinical presentation is consistent with an infection/sepsis which is one of the main causes of encephalopathy

**DATE: 12/23**

## **HISTORY AND PHYSICAL**

**ED COURSE :** She received a **dose of Levaquin 500 mg IV, magnesium sulfate, KCl 40 mEq tablets.**

**PAST MEDICAL HISTORY :** Thyroid disease, osteoporosis, hemorrhoid, urinary incontinence.

**PAST SURGICAL HISTORY :** Hip surgeries 2 years ago, left leg vein ligation, distant D and C.

**SOCIAL HISTORY :** She lives with her health aide and a grandson who lives upstairs. She used to be a nurse at St. Claire's and currently retired. **There is no history of smoking or alcohol usage or drug usage.**

**FAMILY HISTORY :** Her siblings had cancer in the family. Otherwise, the son did not know of any other significant medical history.

**HOME MEDICATIONS :** None.

The potential underlying cause of TME (infection and electrolyte imbalance) was treated in the ED

The clinical presentation is consistent with an infection/sepsis which is one of the main causes of encephalopathy

No history of alcohol or drug use which could cause the AMS

**DATE: 12/23**

## **HISTORY AND PHYSICAL**

PHYSICAL EXAMINATION : Temp is 99.5, pulse is 110, blood pressure 140/63, O2 sats were 95, weight was 65 kilos. She is an elderly-appearing female, lying in bed, and appears to be in mild distress. She does not acutely appear to be in any pain. She opens eyes intermittently and answers questions intermittently. **She is able to verbalize pain and symbol yes or no, but does appear overall altered mental status, which is not her baseline.** Her pupils were equal and reactive. Her head was normocephalic, atraumatic. Her lungs were clear to auscultation, but had diminished and shallow breath, particularly towards the bases. I did not hear any crackles or wheezing. Cardiac: Showed S1, S2. Mild tachycardia noted. Regular rhythm. She did not have any JVD. Her neck was supple. Her abdomen was soft, nontender, nondistended, and she had good bowel sounds. Posteriorly, she had some back pain diffusely, unclear whether it was true CVA tenderness or chronic back pain. The patient was not able to verbalize the difference. She did not have any joint effusions or joint tenderness. She was not able to lift her legs out from the bed. She was able to wiggle her toes. She was able to squeeze my hand as well. She did not have any rashes. **Neurologically, she appeared very lethargic, but was oriented to place, time, and person.**

AMS which is not her baseline supports an acute TME as opposed to chronic causes of AMS such as dementia

Lethargy was also noted in the physical exam



**DATE: 12/23**

## **HISTORY AND PHYSICAL**

LABORATORY DATA : White count was 11.1, hemoglobin was 13.4, hematocrit was 41. Sodium was 136, potassium was 3.4, chloride was 99, bicarb 27, BUN was 10, creatinine was 0.68. Alk phos was 147, AST was 15, ALT was 13, lactate 1.8, magnesium was 1.4. INR was 1.1.

**Her urinalysis showed significant pyuria with 623 white blood cells and 61 rbc's. She also had moderate leukocytes, but negative nitrites. She had trace ketones as well.**

Troponin was negative. Her BNP was 2512.

DIAGNOSTIC IMAGING : Portable **chest x-ray was done, which showed no evidence of acute intrathoracic disease.**

**A CT of the head showed no acute intracranial process,** lytic calvarial lesions particularly involving the right parietal bone was noted. **There was a question whether she has history of any myeloma.**

Urinalysis shows evidence of UTI

Chest x-ray was clear which narrows the etiology of the infection to the UTI

CT of the head was also negative (which rules out a stroke as the cause for the AMS)

However, the myeloma could potentially be causing the AMS is ruled in

Clinical Key: TME is a diagnosis of exclusion

**DATE: 12/23**

## **HISTORY AND PHYSICAL**

**ASSESSMENT AND PLAN :** This is an 84-year-old female with past medical history of osteoporosis, presenting with **weakness, lethargy, fevers, likely secondary to a urinary tract infection.**

1. **Sepsis secondary to UTI. Given that the patient is significantly lethargic, weak, altered mental status, recurrent source is likely her urinary system.** She has significant pyuria with 623 wbc's. Her lung exam was clear. Other sources such as skin or soft tissue was evaluated and was not found. She does have back tenderness, but that could be due to chronic issues or positional. We will continue resuscitation with IV fluids. We will also give her antibiotics with ceftriaxone instead of Levaquin to minimize any \_\_\_\_\_ in the elderly. We will also check urine and blood cultures.
2. Deconditioning, this is likely in the setting of her sepsis. She will need PT evaluation and may be even need rehab once this sepsis has resolved.
3. History of thyroid disease, her TSH was checked in October 2015 and it was 4.06. Given that she currently has an altered mental status, we can recheck her TSH; however, I doubt this is the culprit.

All presenting symptoms were attributed to the source of the infection, UTI

Sepsis secondary to UTI was also diagnosed

**DATE: 12/23**

## **HISTORY AND PHYSICAL**

4. **Hypokalemia, this was repleted with 40 mEq and we will continue to check it daily and replete as needed.**
5. **Hypomagnesemia, 2 g of magnesium was given and we will continue to check it daily.**
6. **Lytic lesions on the right parietal lobe seen on CT of the head. There were some concerns for myeloma. A protein electrophoresis could be considered for further evaluation.**
7. Elevated BNP, she does not appear to be in any cardiac failure at this point given that she has no JVD, no crackles, or lower extremity edema. However, there is no baseline echo to compare. She has no end-stage renal disease that would cause an elevated BNP. I will go ahead and check a transthoracic echo tomorrow morning and to evaluate for right heart strain.

Hypokalemia and hypomagnesemia were diagnosed and treated and could also have contributed to the AMS

Myeloma should be followed as a potential etiology of the AMS

**DATE: 12/24**

**PROGRESS NOTE**

**HOSPITALIST**

Patient seen and examined

S – Feeling slightly better, no chest pain, some abdominal pain, **AMS improving**

O – T96.8 P74 BP 98/50 Pulse Ox 97 RA

General – Nontoxic

CV – Regular, systolic murmur

Chest – CTA

Abdomen – Soft, ND, mild tenderness

Extremities – Trace LE edema

Neuro – **lethargic but improving**

A/P

1. Sepsis probably related to UTI, blood culture growing Group B Strep. Follow urine culture. Continue IV ceftriaxone
2. UTI – follow blood culture

AMS noted to be improving

Lethargy also improving

**DATE: 12/25**

## **PROGRESS NOTE**

### **HOSPITALIST**

Patient seen and examined

S – Feeling better. No chest pain

O – T 97.9 P 85 BP 134/63 Pulse Ox 93 RA

General – NAD

CV – Regular, systolic murmur

Chest – CTA B/L

Abdomen – Soft, ND, mild tenderness

Extremities – Trace LE edema

**Neuro – alert, oriented**

A/P

1. Sepsis improving, afebrile, WBC decreasing, continue IV ceftriaxone
2. UTI – 2 different bacteria growing from urine culture
3. Bacteremia – Group B strep same as in urine. Probably UTI causing bacteremia

Patient now alert and oriented

**DATE: 12/31**

## **DISCHARGE SUMMARY**

Admission Date: 12/23

Discharge Date: 12/31

DISPOSITION: Home with visiting nurses.

### PRIMARY DIAGNOSES:

1. Complicated strep bacteremia, source is unclear.
2. Weakness, which is progressive.
3. Multiple lesions on thoracic and lumbar spine, question of metastatic lesion worse as a primary malignancy like multiple myeloma.
4. A soft tissue mass in left breast, concern for tumor.

SECONDARY DIAGNOSIS: Chronic back pain.

FOLLOWUP : Follow up will be with Dr. C and I discussed with Dr. C today. He may be able to do home visits. Also, the patient will need follow up with Dr. P, which may be difficult being the patient is mostly bedridden at this point, but she will need weekly CBC, complete metabolic profile, and CRP and the results will go to Dr. P while on antibiotics.

**DATE: 12/31**

## **DISCHARGE SUMMARY**

**MEDICATIONS AT THE TIME OF DISCHARGE :** She will take ceftriaxone 2 g IV daily, today's dose will be given and she needs about 3 more weeks for the complicated strep bacteremia.

**CONSULTS :** The patient was seen by Dr. P from Infectious Disease.

**IMAGING :** The patient had multiple imaging done including chest x-ray when she came in, which was negative for any infiltrate. She had a CT abdomen and pelvis done, which showed no evidence of bowel obstruction, perforation or abscess, sigmoid diverticulosis. There were calcified stones in the left renal pelvis with mild hydro and gallbladder stones. Then, the patient had a CT chest done to rule out PE because she was having trouble breathing and she was also tachycardic at that time. It does not show any PE, but it did show focal parenchymal increased soft tissue density involving the right breast and a mammogram was recommended for further evaluation. The patient also had MRI of the lumbar and thoracic spine because of lower back pain and that showed numerous bone lesions highly suspicious for metastasis versus primary hematological malignancy. Posterior epidural abnormality demonstrating heterogeneous contrast enhancement and narrowing of thecal sac, which is epicentered at T7. Possible epidural neoplasm, but infection cannot be ruled out. She had lower extremity Doppler, which did not show any DVT.

**DATE: 12/31**

## **DISCHARGE SUMMARY**

**HISTORY OF PRESENT ILLNESS :** This patient is an 84-year-old female who lives at home and has sufficient help at home, came in with weakness, some diarrhea, lethargy and confusion. She was having stomach bug issues. When she came in, she was febrile. Her urine appeared infected. She was admitted and ceftriaxone was started. Blood cultures were sent as well. **She had significant leukocytosis of 16,000. The patient had urine growing group B beta strep; in addition, there were 2 gram-negative rods. In addition, it showed E. coli and morganelle.**

The patient became afebrile, though her white count trended up and source of group B beta strep bacteremia was unclear. I asked Infectious Disease doctor to see the patient. Dr. P saw the patient. Based on her complaints of lower back pain, she recommended MRI, which was done, though MRI showed severe abnormal findings with numerous bone lesions which appear more malignant than infectious.

Overall, the patient improved regarding infection. Her leukocytosis resolved. She remained afebrile. Her repeat blood culture on the 25th was negative. I had a detailed discussion with the patient as well as son who is involved in her care regarding further investigation including IR biopsy of the spine or further investigation of the cancer, though the patient and son both are refusing any workup at this point. After discussion with Dr. P, the plan is to put a PICC line and send the patient home with IV antibiotics. She will be going home with ceftriaxone for 3 more weeks and treated as a complicated infection for 4 weeks.

Patient confirmed to have bacteremia and urinary tract infection growing multiple organisms



**DATE: 12/31**

## **DISCHARGE SUMMARY**

If they want any future workup, they can definitely discuss with Dr. C. I have discussed this with Dr. C as well. Today, I saw the patient. Overall, she is feeling down after all this new information, but in no distress, temperature is 97.9, pulse 84, BP 137/62, pulse ox 96% on room air. Generally, she appears comfortable. Her heart is regular. She does have a systolic murmur. Neurologically, she is alert. Her blood work shows WBC 10.2, hemoglobin 11.4, hematocrit 35.0, platelets are 325. Sodium 137, potassium 4.2, chloride 101, bicarb 27, glucose 83, BUN 13, creatinine 0.8, her calcium is 9.7.

The patient is stable to go home. She is a Hoyer lift, but the son is assuring us that there is enough help at home. She has health aide coming in during the daytime. The grandson is there as well as the son can go whenever needed, so she will be sent home today.

Sodium and potassium returned to normal levels by the time of discharge

**DATE: 12/31**

**LABS**

-----GENERAL HEMATOLOGY-----

DATE:	12/31/15	12/30/15	12/29/15	12/28/15	12/27/15	12/26/15	12/25/15	12/24/15	12/23/16	REF RANGE	UNITS
TIME:	0518	0650	0600	0520	0620	0600	0520	0540	0640		
FOOTNOTE:	#1	#2	#3	#4	#5	#6	#7	#8	#9		
WBC	10.2	11.2*	15.3*	28.1*	17.2*	16.8*	13.0*	15.5*		3.5 - 11.0	thous/mcl
Potassium			4.2	4.8		3.8	3.6	4.5	3.3*	3.5 - 5.0	mEq/L
Magnesium								2.0	1.4*	1.6 - 2.6	mg/dL
Creatinine			0.85	0.93		0.67	0.41	0.56	0.68	0.6 - 1.3	mg/dL
GFR			>60	57*		>60	>60	>60	>60		

Leukocytosis persisted throughout the stay

Potassium and magnesium were low on admission which could have contributed to the patient altered mental status in the setting of sepsis, bacteremia, and urinary tract infection

# Toxic Metabolic Encephalopathy

## Clinical Keys

- Acute toxic-metabolic encephalopathy (TME), which encompasses delirium and the acute confusional state, is an acute condition of global cerebral dysfunction in the absence of primary structural brain disease
- **TME is a diagnosis of exclusion** (once other conditions such as stroke, alcohol withdrawal, etc. are ruled out, TME can then be considered)
- TME is most commonly **caused by** sepsis, uremia (renal failure) hypernatremia, hyponatremia, hypocalcemia, hypomagnesemia, and hypophosphatemia
- TME is managed by **treating the underlying cause**
  - Look for antibiotics to treat an underlying infection and/or treatment of electrolyte abnormalities
- Check to see if there is an **acute change** from the patient's **mental status baseline** since TME is an acute condition

Reference: UpToDate

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