

HISTORY AND PHYSICAL

Gregory A Ross, M.D.  
Admitted: 02/08/2009  
Location: 6PI-B620

Date of Birth:

DATE OF ADMISSION: 02/08/2009.

TIME: 0740.

REFERRING FACILITY: Morehead Hospital.

CHIEF COMPLAINT: Cardiac arrest and influenza A.

HISTORY OF PRESENT ILLNESS:

is a 6-year-old otherwise

healthy Caucasian diagnosed with influenza A at outside hospital where was admitted on February 7, 2009 to the Pediatric Service's report, the patient had a worsening condition today complaining of headache, fever, abdominal pain, and sustained respiratory and cardiac arrest requiring intubation and a dopamine drip and was also noted to have elevated potassium

and the patient was transferred to Wake Forest University Baptist Medical Center Pediatric ICU.

On arrival to the Pediatric ICU, the patient was hypotensive, dopamine drip was increased from 5 to 10, the patient had cool extremities, no peripheral pulses, was tachycardic in the 140s, IV fluids were pushed, central line arterial access was obtained, steroids and epinephrine drip were initiated. Infectious Disease was consulted. Broad-spectrum antibiotics were initiated. Calcium, insulin, and bicarbonate were all given for hyperkalemia which was confirmed on ABG. Labs and chest x-ray were obtained at that time. At approximately 8:20 a.m.,

the patient rested with loss of pulses and PA asystole arrest. The patient was noted to have oozing from mouth, nares, IV access sites. For a

septic and coagulopathic picture, FFP precipitated and platelets were initiated. CPR was initiated and the patient was coded for approximately one hour during which time, Pediatric Surgery was consulted for ECMO. The patient did have a brief return of spontaneous pulses and ECMO access was being obtained. The patient again went into the PA asystole arrest and was continued to be coded until approximately 10:02 a.m. when ECMO was initiated.

Please see code sheet for complete details. Total IV fluids were approximately 200 cc per kilogram, total rounds of epinephrine were 9, total

FFP was 7, total platelets 3, and total packed red blood cells 3, peak

potassium during code was noted to be 7. A Vas-Cath was placed in addition to arterial and central line.

PAST MEDICAL HISTORY:

BIRTH HISTORY: Unknown. Unable to obtain.

MEDICATIONS: No home medications, was initiated Tamiflu at outside hospital  
3.5 mg p.o. b.i.d.

ALLERGIES: No known drug allergies.

IMMUNIZATIONS: Up-to-date by report.

ILLNESSES: Hydronephrosis by review of records.

HOSPITALIZATIONS: None.

SURGERIES: None.

DEVELOPMENTAL: Normal.

FAMILY HISTORY: Unable to obtain.

SOCIAL HISTORY: Per report of the parents attends public schools.

REVIEW OF SYSTEMS: Unable to obtain from the patient, per records in general is otherwise healthy until admitted recently. For GI was complaining of abdominal pain at outside hospital. For neurologic was complaining of headache at outside hospital and that has also been complaining of subjective fever.

LABORATORY DATA: From February 7, 2009, Morehead Hospital, potassium 3.8, white blood cell count 11.2, hemoglobin 8.1, creatinine 1, and calcium 7.9.

PHYSICAL EXAMINATION:

VITAL SIGNS: Temperature 98.3, blood pressures systolic in the 80s, respiratory rate ventilated 20s, oxygen saturation is 99%, heart rate 140s, and weight 19 kilograms.

GENERAL: Intubated, coagulopathic cardiac arrest.

HEENT: Endotracheal tube in place, oozing from mouth and bilateral nares without obvious source. ECMO in place right carotid IJ, mild facial petechiae.

NECK: Trachea is midline. No masses.

CHEST: Bilateral equal chest rises and air movement with mechanical ventilation.

HEART: Tachycardic, no murmurs. Normal S1, S2.

LUNGS: No crackles, no wheezes. Ventilation does have coarse breath sounds

bilaterally.  
ABDOMEN: Firm and distended.  
GU: There is a Foley in place. Normal female.  
RECTAL: No gross blood.  
EXTREMITIES: Cool, no peripheral pulses.  
NEUROLOGIC: Pupils are fixed and dilated. There are no spontaneous movements. Some decorticated movements noted on arrival.

LABORATORY VALUES: Cortisol 9.9. CMP: Sodium 158, potassium 6.8, chloride 111, CO<sub>2</sub> is 27, urea 25, glucose 60, creatinine 1.6, calcium 4.5, protein 1.3, albumin less than 1, total bilirubin 0.5, alkaline phosphatase 195, AST 1650, ALT 550, anion gap of 20. PT/PTT: Prothrombin time 76 and a PTT greater than 200. CK total 89,094. Ionized calcium 0.77. Blood gas venous pH 7.228, pCO<sub>2</sub> of 37, pO<sub>2</sub> of 43, bicarbonate of 15.4, and base deficit of 11.

RADIOGRAPHIC STUDIES: Pending chest x-ray.

I have discussed this patient with Dr. Jarrah, who was present to in the admission and medical decision making this patient.

IMPRESSION: Influenza A, cardiac arrest, rhabdomyolysis, acute renal failure, and multiorgan failure.

PLAN:

1. Admit to PICU, attending Dr. Jarrah.
2. Cardiovascular. We will monitor ECMO support per Pediatric Surgery, dopamine and epinephrine infusions, blood pressure support as well as IV fluids. We will order echocardiogram. Continue calcium for cardio protection and for hyperkalemia.
3. Respiratory. We will continue vent management and optimize, following ABGs and chest x-rays.
4. Neurologic. Poor prognosis given extended CPR. Neurology consulted and pending EEG. Also consider antiseizure medications. We will follow exam closely.
5. Infectious Disease. Infectious Disease was consulted, initiated broad-spectrum antibiotics, vancomycin, and Rocephin. Also, continue Tamiflu and initiated rimantadine, also added clindamycin and doxy to cover for possible but unlikely RMSF. We will follow exam for fevers closely, culture, and obtain records from outside hospital. We will consider plasmapheresis, FEN. Nephrology consulted for dialysis for hyperkalemia due to rhabdomyolysis. Continue IV fluids and following labs closely. We will

attempt nutritional support with ECMO.

6. Heme. The patient DIC resuscitated with platelets and currently precipitated FFP. ENT consulted for oozing bilateral nares. The patient was given Afrin and nares were patent. ENT will follow. The patient is heparinated on the ECMO.

7. GI. Protonix prophylaxis, n.p.o. For distended abdomen, Peds Surgery consult And consider abdominal decompression with vacuum assisted closure for possible compartment syndrome. The patient also has evidence of compartment syndrome in extremities.

8. Endocrine. We will have all and treat for any abnormalities.  
9. Psych. Family is with the patient and they are updated, notified on status and prognosis. We will keep family informed of plan and condition and we will sustain close contact with the family to help guide therapy.

Dictated by:  
Brian A Opitz, MD

Gregory A Ross, M.D.  
Attending Physician  
Anesthesiology

EXPIRATION SUMMARY

Gregory A Ross, M.D.  
Admitted: 02/08/2009  
Expired: 02/09/2009

Date of Birth:

DATE OF ADMISSION: February 8, 2009.

DATE OF DEATH: February 9, 2009.

ADMITTING ATTENDING: Gregory Ross, MD, Pediatric ICU.

ATTENDING AT TIME OF DEATH: Thomas Pranikoff, MD, ECMO Service of  
Pediatric  
Surgery.

ADMITTING DIAGNOSES:

1. Septic shock.
2. Influenza A.
3. Rhabdomyolysis.
4. Status post cardiopulmonary arrest.

DISCHARGE DIAGNOSES:

1. Septic shock.
2. Influenza A.
3. Rhabdomyolysis.
4. Acute renal failure.
5. Gram negative bacteremia.
6. Status post cardiopulmonary arrest.

PROCEDURES PERFORMED:

1. On 02/08/09 cannulation for veno-arterial extracorporeal cardiopulmonary resuscitation.
2. The patient also had hemodialysis with plasmapheresis on 02/08/09 and hemodialysis on 02/09/09.
3. Had an echocardiogram on 02/08/09.
4. EEG performed on 02/09/09.

CONSULTATIONS OBTAINED:

1. Infectious Disease, Timothy Peters, MD.
2. Nephrology, Shashi Nagaraj, MD.

ADMISSION HISTORY AND PHYSICAL: The patient was a 6-year-old who presented to an outside hospital (Moorehead Memorial) on Saturday, 02/07/09,

in the morning after essentially a one-day history of vomiting and abdominal pain and fever to 103 at home associated with an illness that had.

begun as what appeared to be to mom a cold on Monday but also began to

2/2

include muscle aches and pains on Thursday, and stayed home from school on Friday to be watched by grandmother, and although initially fever was controlled with Tylenol it returned on Saturday, along with vomiting, and was brought to the ER for evaluation. On first visit there, she was evaluated, provided with fluids and a p.o. challenge, tested for influenza, which was positive for influenza A, and strep, which was negative.

Had urine and blood drawn and was sent home with prescriptions for Tamiflu and an antihistamine decongestant. At home, mother reported that the patient was unable to tolerate medications as was still vomiting and not urinating and was brought back to the emergency room for reevaluation that evening, where repeat labs again showed dehydration and was hydrated, admitted to the hospital and provided with fluids over the course of approximately six hours, although did have one urine output on the floor

that mom described as large and clear-colored or appropriate. The child was noted to have what appeared to be a seizure and arrested approximately 2:30 in the morning, was resuscitated with ALS protocol at that hospital, intubated and evaluated for transfer to Baptist.

On arrival to Baptist PICU, initial labs again showed dehydration, acidosis and hyperkalemia that they had begun correcting at the outside hospital. had elements of rhabdomyolysis and acute renal failure. was initially supported with pressors with steroids and unfortunately experienced another arrest with resuscitation here and after initial resuscitation from that code arrested again. It was during the second code

and performance of CPR that the ECMO Team was consulted for placement on VA bypass, which was performed as ECPR. Soon after ECMO cannulation, the patient was also noted to have evidence of compartment syndrome in bilateral

lower extremities requiring bilateral four compartment fasciotomies. also had evidence of abdominal compartment syndrome. Pressures in all these

compartments were measured and were approximately 70 in the legs and 35 in the abdomen at bedside then the bilateral lower extremity fasciotomies were performed and a laparotomy for release of abdominal pressure with

placement of an abdominal VAC dressing was performed. Shortly after, had return of electrical activity of her heart but an echocardiogram that day showed no effective muscular function. was also provided with a run of

hemodialysis combined with plasmapheresis and an EEG that was performed that evening was essentially flat. Although [redacted] was able to be weaned off

most of pressors, [redacted] ended up back on dopamine initially at 5 mg and by Monday morning then dropped to 3. [redacted] was kept cool under protocol at approximately 92 or 93 degrees and [redacted] sedation was then lifted to allow for

neurologic evaluation, but there was never any clear indication of neurologic recovery or intact mental status. By the following morning, [redacted]

had evidence of upper extremity posturing, some reflexive movements of the eyes and mouth and limbs according to Neurology and [redacted] pupillary exam

showed pupils that were sluggishly reactive, intermittently reactive and at some point mildly asymmetric. Over the course of this next day, this was

also found to change in that they became asymmetric in the opposite direction briefly and then stopped reacting altogether, and both pupils were

noted to be essentially equal, fixed and dilated. [redacted] lost all reflexive actions, both spontaneous and reactive, and no longer had evidence of posturing or any real physical activity at all. [redacted] did have another

round of hemodialysis, after which it was discovered that [redacted] had Gram negative rods that had grown in [redacted] blood cultures from the outside hospital, so antibiotic coverage was broadened, although [redacted] was already on [redacted] vancomycin, clindamycin, doxycycline and cefotaxime, as well as antivirals, both [redacted] and rimantadine. [redacted] was taken off the cefotaxime, provided with doses of meropenem and gentamicin immediately following the dialysis session.

With the physical changes and neurologic changes, however, by late in the afternoon it was decided not to wait until morning to obtain a nuclear cerebral flow study, which showed no evidence of cortical blood flow whatsoever, and although it was mildly equivocal at the cerebellar or brain

stem level, particularly as the echocannulas could not be removed entirely

from the field of view, long discussions were had with the family and the parents regarding the fact that [redacted] illness was in fact at this point unrecoverable.

The family understood these implications and agreed to withdraw remaining care. After Baptismal service was held at the bedside, and at 9:58 p.m. the

patient was extubated and the ECMO circuit terminated. [redacted] was pronounced

dead at 10:08 p.m. on February 9. The family consented to a full autopsy, although the case is not referred to the medical examiner and further communication with Moorehead Hospital indicates that it is possible Gram

negative organism, which is not yet fully identified at the time of this dictation, was most likely *Citrobacter freundii*. Further details of this patient's admission may be found in chart.

FINAL DIAGNOSIS: Septic shock due to viral or bacterial sepsis complicated by influenza A, Gram negative bacteremia, cardiopulmonary arrest, acute renal failure, rhabdomyolysis and compartment syndromes.

Dictated by:  
Adrien J Kant, MD

Thomas Pranikoff, M.D.  
Attending Physician  
Surgical Services

DOB:

Sex:

Race:

Address:

Night Phone:

Day Phone:

Cultures:

Blood Cultures (2) 2/8/09 – negative to date  
Blood Cultures (2 paired) 2/9/09 – negative to date  
Viral Culture (trach asp) 2/9/09 – negative to date