Alcor A-3714

Case Report

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1. Summary

Information was derived from multiple sources and was all converted to Mountain Standard Time (MST). For de-identification, dates are not shown. T-0 represents the date of cardiac arrest, T-X represents occurrences before T-0, and T+X represents occurrences following T-0.

A-3714 was a 62-year-old member with whole-body cryopreservation arrangements. The time of cardiac arrest was estimated to be 13:40 hrs and the member was pronounced legally deceased in Florida at 13:42 hrs on T-0 days in October of 2024.

After stabilization and field blood substitution, the patient was flown to Alcor. Because perfusion was not possible, this was a cryopreservation without cryoprotection (a straight-freeze procedure). The cryogenic cooldown was initiated on T+1 days at 00:29 hrs and terminated on T+12 days at 15:50 hrs. The patient was transferred to long-term care at liquid nitrogen temperature on T+25 at 14:07 hrs.

2. Member Assessment

T-165 days

This member was placed on the Alcor watchlist for a diagnosis of Glioblastoma with multiple tumors all localized to the brain. The member had stopped chemotherapy and radiation treatments about a month prior. The member was currently on immunotherapy.

T-162 days

The member's family submitted a request for an evaluation to place the member on in-home hospice care due to declining appetite, mobility, and further decline. The caregiver confirmed the family's support for cryopreservation.

T-160 days

The hospice nurse completed the evaluation for in-home hospice admission, and the member was accepted. The hospice nurse stated that the prognosis was poor, with approximately no more than two to three months to live. The member would remain on all medical treatments, including immunotherapy.

T-159 days

The member's caregiver called to explain that the member was confused about how Alcor works, and also that the member wants to move to Arizona to be closer to Alcor headquarters. However, the member was unable to focus on the conversation when the MRD explained how a relocation would work, and if the member chose to stay at home, Alcor could deploy the DART team to their location.

T-145 days

The MRD spoke with the caregiver. The member had no significant changes. The member was eating and drinking three times per day, and the hospice nurse continued to see them weekly.

T-137 days

The member was doing well, remaining mobile, and eating and drinking normally. The hospice nurse assessed the member weekly, and their confusion and aggravation had improved according to the caregiver. The MRD contacted the caregiver for an update on the relocation to AZ and the plan moving forward. The caregiver reported that the member and family had decided not to relocate to Arizona.

T-131 days

The member had no significant changes. The member was eating and drinking three times per day, and the hospice nurse continued to visit weekly. The member had an MRI scheduled in two days.

T-117 days

The MRI results had showed a decrease in tumor size, and the member and family had made the decision to stop all immunotherapy treatments. The RN continued to assess the member weekly. There had been no significant changes in mental status or mobility, and the member continued to eat and drink well.

T-116 days /T-66 days
The MRD continued with weekly check-ins to the caregiver with no significant changes in health status. The hospice nurse continued to see the member weekly.

T-63 days

The caregiver reached out to the MRD to inform Alcor that the member had now become incontinent. The member had declined in mobility requiring assistance out of bed, and the use of a walker to walk. The hospice nurse had assessed the member the day prior and reported that vital signs were stable. The hospice nurse increased the visits to twice weekly.

T-58 days

The MRD spoke with the caregiver and learned that there had been a new caregiver assigned by the family. The member was still mobile with a walker, eating and drinking normally, and performing activities of daily living (ADLs) on their own. The caregiver noted that the member had difficulty with speech, which was reported to have started two weeks prior. The hospice nurse had assessed the member, and determined the speech impairment was due to the tumors and not an event (i.e. stroke). The caregiver noted that the member's blood pressure was 112/77.

T-54 days

The caregiver called and reported that the member remained stable. Blood pressure (BP) was 116/84, temperature (T) 97°F, respiratory rate (RR) 16, and the member had a normal bowel movement during the night. They had eaten both breakfast and lunch. Over the weekend, the caregiver noticed uncontrolled coughing, which was concerning, but there had been no coughing this day. An MRI with and without contrast was scheduled in three days, but the member was refusing to go. The caregiver informed the MRD that the member was a Do Not Resuscitate (DNR) and Do Not Intubate (DNI).

The caregiver inquired about significant events such as seizures or strokes, which the doctors had indicated were a high possibility. The MRD instructed the caregiver and the hospice nurse to notify Alcor immediately of any changes, as well as the hospice registered nurse (RN). The MRD also advised discussing with the hospice RN what actions to take during any significant event, as Alcor did not make medical decisions, but did need to be informed of such events to initiate standby if necessary. The caregiver verbalized understanding and confirmed would call or text after each visit by the hospice nurse (scheduled twice a week) with an update, even if it was just to confirm no changes.

T-50 days

The caregiver called the MRD and reported that the member's family had made the decision to revoke the member's wishes for cryopreservation. The MRD immediately alerted Alcor's executive team and general counsel. The MRD was instructed to continue with attempts to check on member health status unless Alcor received an official and legal revocation.

T-42 days

The MRD contacted the caregiver to check in. There were no changes.

T-39 days

The MRD contacted the caregiver to check in. Again, there were no changes.

T-37 days

The MRD attempted to contact the caregiver again. The member's family reached out to the MRD stating they wished the phone calls for status updates on the member to cease. The MRD honored the family's wishes to cease status update calls.

T-22 days

The MRD was contacted by the member's family to inform Alcor that they were not going to revoke the member's wishes for cryopreservation. No medical update was given at that time.

T-21 days

The MRD spoke with the member's family. They reported that the member required assistance for getting out of bed, bathing, toileting, and ambulation. The member experienced

incontinence and used a walker but was unable to move beyond short distances, such as from the bed to the couch or the couch to the toilet, and back, with assistance. The family mentioned that it recently took an hour for the member to get out of bed.

The member was still eating 80-100% of meals two to three times per day and was maintaining adequate fluid intake. A recent MRI, although undated, showed no tumor growth, but doctors expressed concerns about potential seizures and organ failure as likely causes of legal death in the near future.

The member was being moved to an assisted living facility, for a higher level of care that could not be provided at home. The family estimated the move would occur the following week.

T-15 days

The member was moved to the assisted living facility. The MRD spoke to the director of nursing at the facility. Contact information was exchanged, and the MRD explained when to provide updates, report changes, and notification in case of emergencies. As the member had just arrived, the facility did not have an update yet, but the director of nursing mentioned that the MRD could call anytime to obtain their assessment of the member.

T-11 days

The MRD spoke with the director of nursing services regarding the member. Although she did not have specific vital signs, she noted that the member's vitals were stable and within normal limits (WNL).

Neurological status: The member was responding to commands and was alert and oriented to person, place, time, and event (A+O x4), but responses were limited to one-word sentences.

Cardiovascular/Pulmonary status: The member’s vitals were within normal limits, and no oxygen supplementation was required; the member was on room air.

Gastrointestinal/Genitourinary status: The member was eating and drinking normally, consuming three meals per day. The member was described as "somewhat incontinent," meaning that it took a long time to reach the toilet, and if delayed, the member would sometimes release bowels or urine before reaching the toilet or in the brief.

Ambulation: The member currently required two-person assistance for safe ambulation.

The member remained on outpatient hospice care and was listed as Do Not Resuscitate (DNR). The facility did not believe the member was imminent at that time.

The MRD addressed logistical concerns and provided information on when to notify Alcor with updates or changes in status. The MRD also explained Alcor's standby processes. It was noted that hospice would be responsible for pronouncing the time of legal death, and coordination regarding that aspect would need to be done through them.

T-2 days

Alcor received a message from the member's skilled nursing facility about the member becoming nonresponsive and their O2 saturation being in the mid 80's.

At 18:12 hrs, Suspended Animation (SA), a strategic partner of Alcor that provides standby, stabilization, transport, and blood substitution services, was contacted by Alcor's MRD to discuss a potential deployment. Flights had been halted due to a hurricane that was in the member's area, and the risk of endangering a team by deploying during hurricane winds was advised against. SA notified their local contractor, Resurgence Biomedical Services (RBS) team member, as well as their surgeon and perfusionist in the area. The member's facility was able to apply 2L/min oxygen by nasal cannula for the night to help with the O2 saturation. The SA team and one DART member were ready to deploy as soon as the hurricane danger passed.

T-1 days

The member was more alert in the morning. When offered food, the member would decline. The nurse noticed rattling sounds in the lungs upon auscultation, possibly due to pneumonia. Because the member was a hospice patient in a skilled nursing facility (SNF), the staff at the SNF was waiting for the family to authorize diagnostic testing and treatment with antibiotics.

The member's vital signs at 09:17 hrs were: blood pressure (BP) 120/77, heart rate (HR) 100, respiration rate (RR) 18, temperature (T) 97.8°F, and capillary oxygen saturation (SpO2) 91% on 2 liters (L) of oxygen (O2) by nasal cannula. Road closures in the area were still in effect and the airport was still closed. The SA team was on alert and 3 regional DART members were notified. Alcor would monitor the member throughout the day prior to deciding on a deployment.

T-0 days

The member's caregiver called the Alcor MRD at 06:18 hrs to report that the member's breathing was labored with gurgling sounds. The skilled nursing facility had increased the nasal O2, and the member still had not eaten.

3. Deployment

T-0 days

At 06:25 hrs, the MRD contacted SA regarding deployment. The SA team leader called the local RBS team member to load and deploy using the southern Florida Mobile Operating Vehicle (MOV) and also notified their regional perfusionist and surgeon.

Once the team was in motion, the team leader began contacting local funeral homes to assist with filing the paperwork and booking commercial air travel. An accommodating funeral home was secured at 08:08 hrs, and the member's paperwork was shared to prefill out the death certificate worksheet. A combo air shipper was ordered and would be waiting for the team to pick up.

The SA team leader and one additional team member met at the SA California facility at 08:45 hrs. Additional equipment was loaded, and the team departed for the airport at 09:15 hrs. The team leader contacted the team member in Florida and instructed him to position the MOV at the member's Skilled Nursing Facility. The RBS team member told the Team Leader that once the MOV was loaded, the drive would take approximately 3 hours.

At 09:04 hrs the decision was made by Alcor to send the neuro field cryoperfusion kit and perfusate with a DART team member to Florida as well, arriving at the same time as the SA team members.

At 09:44 hrs, the member was declining with an unreadable BP, HR 54, RR 48, and SpO2 60% with 4L/min by nasal cannula. The two SA team members boarded their flight at 11:00 hrs with an estimated time of arrival in Florida at 16:18 hrs. At 11:49 hrs both BP and SpO2 were no longer registering for the member. By 12:10 hrs the member's breathing was rapid with a BP of 82/52. Comfort medications had not yet been made available to the member.

At 12:39 hrs, the Alcor neuro kits were declined at airport cargo because the Florida airport was closed until 14:00 hrs the next day due to the hurricane. The SA team leader confirmed with the funeral director that this hold on all cargo coming to Florida would not affect transport of the patient from Florida to Alcor. The quickest flight was confirmed to be at 04:00 hrs out of Florida and arriving in Arizona at 09:12 hrs the next morning.

4. Patient Recovery, Stabilization, and Transport to Alcor

T-0 days

The Alcor MRD reported to the team that the member had gone into cardiac arrest at approximately 13:40 hrs and had been pronounced legally deceased at 13:42 hrs. After pronouncement, the patient's family was on site and placed 200 lbs. of water ice covering the patient's body and head in the patient's bed. The member weighed 104.5 kg (230 lbs.).

The SA Team leader notified the funeral home and the skilled nursing facility to expedite processing of the paperwork. At 14:02 hrs the funeral home was in the process of booking the morning flight out of Florida. Approximately 180 lbs. of water ice was placed around the patient's head and torso. At 14:30 hrs a transit permit and working death certificate was issued.

There was only one team member available for the initial stabilization. At 14:36 hrs, the decision was made to administer the abbreviated medications protocol, because it would be more than an hour past cardiac arrest before that could be done. At 15:05 hrs the RBS team member and the SA surgeon were on site at the skilled nursing facility with the MOV. The nursing staff assisted the RBS team member in transferring the member into the portable ice bath (PIB).

The member was transported to the MOV at 15:42 hrs. An EZ-IO intraosseous device was placed in the distal femur of the patient's right leg. The abbreviated medications protocol began being drawn and administered (see the below Table of Medications Administered for

the names of the medications, dosages, and the times of administration). Antacid was not administered due to the patient's rigor hindering the insertion of an airway adjunct.

After the medications were administered an additional 64 lbs. of water ice was added to the PIB as well as 4 gallons of water. The surface conduction cooling device pump was initiated at 16:27 hrs after the chest compressions were terminated. At 16:33 hrs the cooling mask was replaced as there was noticeable leakage that prevented flow. Thermocouples were placed in the right and left nasopharynx to monitor the patient's nasopharyngeal temperature. The probes were secured with nasal putty to prevent water from entering the nose and interfering with temperature measurements.

The SA team leader relayed the location of a local funeral home that would permit the usage of their parking lot to perform the blood substitution procedure. The SA team leader would meet the MOV at the funeral home location while the SA and DART team members secured a vehicle at the airport, acquired their checked equipment, and picked up the combo air shipper enroute to the funeral home. An additional 14 lbs. of water ice was added to the PIB and the MOV left the skilled nursing facility for the funeral home.

The MOV, the surgeon, and the SA team leader met in the funeral home parking lot at 17:22 hrs. The team decided to proceed with the whole-body blood substitution as soon as possible. Both of the 15 liter MHP2 bladders were hung for priming. No added room oxygen was connected to the patient circuit.

The main perfusionist had an unavoidable emergency leaving a backup perfusionist to be enroute and estimated to arrive at 21:00 hrs. The SA team leader took over the perfusionist duties while on phone video with one of the on-call perfusionists for assistance. The circuit was set up with venous and arterial temperature monitoring and primed for connection to the patient. A pressure transducer was connected to the circuit but was unable to be calibrated to zero. After 5 minutes of troubleshooting, the decision was made to forgo further trouble shooting and proceed with the blood substitution perfusion.

The patient was draped and prepped for surgery. The first cut was made at 17:55 hrs and the Stryker sternal saw was used at 17:57 hrs to gain access to the heart. The pericardium was dissected, and purse-string sutures were placed on the ascending aorta and right atrial appendage with 3-0 Proline. The ascending aorta was cannulated at 18:15 hrs with a 24 French (Fr) curve tipped Sarns arterial cannula. At 18:19 hrs, the inferior vena cava is cannulated with a 32 Fr single-stage venous cannula.

At 18:25 hrs both cannulae were primed and connected to the circuit. Open circuit blood substitution started at 18:27 hrs with a flow of 2L/min delivered at 1.94°C and returning at 17.72°C. Due to the administration of the abbreviated medications protocol, there was no additional streptokinase to add to the open circuit perfusion. Open circuit perfusion delivered approximately 24 liters of MHP2 perfusate to the patient before switching to closed circuit perfusion.

Closed-circuit perfusion began at 18:40 hrs with approximately 6 liters of MHP2 to provide additional cooling. Flow was reduced to 1.2 L/min to provide longer cooling. Very little loss of perfusate due to leakage was noted, allowing an optimal amount of time for recirculation.

At 19:19 hrs the decision was made by Alcor and the SA team leader to terminate the blood substitution procedure and to transport the patient to Alcor the following morning. In the event there were transport complications because of the hurricane, the contingency to convert to a field neuro-on-whole-body procedure was available.

At 19:21 hrs the surgeon secured the cannula with additional sutures. At 19:26 hrs the closed-circuit blood substitution procedure was terminated. The venous and arterial cannulae were disconnected and looped together with spare tubing. The surgeon closed the patient's chest with the cannulae exposed. The patient was then transported to the SA Florida facility, arriving at 23:00 hrs. Approximately 200 lbs. of water ice was double bagged in preparation to be used for commercial air transport. The left nasopharyngeal probe was transferred to the right nasopharyngeal probe HOBO logger for transport (see the Discussion section).

T+1 days

Once the DART and SA team members arrived at the SA facility, the team built the combo air shipper with R19 rock wool as insulation. The team then transferred the patient into two body bags for transport at 00:21 hrs. Due to one of the body bags breaking the patient was removed and transferred back into the combo shipper with new body bags at 00:31 hrs. The nasopharyngeal temperature probes were dislodged but were replaced once the patient was secured in the new body bags and combo shipper.

The patient was sealed in the combo shipper and loaded into the transport van at 00:39 hrs. The patient was then transported to the airport and checked into the cargo department at 02:20 hrs. The patient was booked on a direct flight to Phoenix departing at 04:08 hrs. The patient landed in Phoenix at 08:46 hrs. Alcor's MRD received the patient at cargo at 10:49 hrs and transported the patient to Alcor.

5. Cryoprotectant Surgery and Perfusion

T+1 days

10 liters of M22 perfusate had been put into the mixing reservoir prior to the arrival of the patient. The cryoprotectant perfusion would start with a 14.2 Brix concentration because blood substitution was done in the field, and this would help reduce edema.

The patient arrived at the back door to Alcor at 11:21 hrs. The patient was in a whole-body shipper with water ice and was rolled into the Alcor OR at 11:24 hrs. Removal of the shipping container, insulation, etc., was begun at 11:25 hrs. The initial patient temperatures at 11:29 hrs were: Port-1 Right NPT = 0.54°C, Port-3 Left NPT = 0.35°C.

Using a hoist, the patient was transferred to the OR table at 11:30 hrs. Due to the patient's size, the arms could not fit inside the patient tray but were resting over the edge of table. Ice bags were placed around the patient's cephalon and body at 11:33 hrs. The patient's arms were secured close to body using Coban straps at the wrists at 11:34 hrs. The feet were secured together using Coban at 11:36 hrs.

The patient had been cannulated in the field prior to the blood substitution. At 11:37 hrs the OR perfusion tubing was prepared for use. Connecting the tubing to the cannulae in the patient was started at 11:40 hrs with the venous tubing first. The arterial pressure was set to 19 mmHg. No return flow could be seen. The arterial tubing was connected at 11:41 hrs. There was still no return flow. The arterial pressure was set to 40 mmHg, starting the open-circuit perfusion, with the main pump speed in the normal range. A single burr hole was made on the patient's left forehead at 11:44 hrs.

At 11:46 hrs, the arterial pump was barely moving. 4 liters of M22 perfusate had gone into the patient, but no effluent had come out of patient. As the patient's abdomen was visibly distended, this was likely due to an internal leak within the patient. A large amount of effluent was coming from the burr hole. The arterial pump was stopped at 11:47 hrs with a target pressure of 30 mmHg, however, the pump pressure was continually cycling due to back pressure from the patient.

A thermocouple was placed in the burr hole and sutured to the scalp at 11:49 hrs. The left nasopharyngeal thermocouple was connected to the computer at 11:52 hrs. The burr hole temperature (BT) was 2.3°C and the nasopharyngeal temperature (NPT) was 1.5°C.

At 11:53 hrs there was still no, or extremely slow, effluent flow from the patient into the perfusion tubing, but effluent was still flowing from the burr hole. 6 liters of perfusate had gone into the patient.

Perfusion was stopped at 12:02 hrs. Because so much effluent was flowing from burr hole and almost no effluent was being removed from the patient via the OR tubing, a neuro cryoprotectant perfusion could not be done (see the Discussion section). The only option for this patient was a cryopreservation without cryoprotection (a straight-freeze procedure).

Disconnection of the tubing circuit and all lines and equipment was begun at 12:04 hrs in order to move to the patient care bay for cryogenic cooldown. The patient, on the OR table, was moved to patient care bay at 12:19 hrs. Using a hoist, the patient was moved from the OR table into cooldown box at 12:21 hrs. The last recorded patient temperature (LNPT = 1.5°C) was taken at 11:52 hrs.

6. Cooling to Liquid Nitrogen Temperature

Computer-controlled cryogenic cooldown was initiated at 12:29 hrs on T+1 days, plunging to -20°C (verified) and descending thereafter at -1°C/hour to liquid nitrogen temperature. Cooldown was paused at -150°C for an LN_2 delivery. On T+12 days at 15.:50 hrs, an uneventful cooldown was terminated.

On T+25 at 14:07 hrs, the patient was transferred to long-term care at liquid nitrogen temperature. There was some delay because the container in which the patient was to be stored needed a liquid level gauge which had to be ordered.

7. Timeline and Time Summaries

Timeline

T-0	13:40	Time of cardiac arrest
T-0	13:42	Time of pronouncement
T-0	15:20	Start of ice bath cooling
T-0	15:25	Start of mechanical chest compressions
T-0	15:50	First medication administered (sodium citrate)
T-0	16:13	Last medication administered (Tempol)
T-0	17:22	Arrive at funeral home
T-0	17:55	Start of field surgery
T-0	18:26	Completion of surgery
T-0	18:27	Start of open-circuit washout
T-0	18:40	Start of closed-circuit perfusion
T-0	19:26	Completion of closed-circuit perfusion
T+1	00:42	Departure of patient for airport
T+1	02:20	Checked patient into cargo at airport
T+1	11:24	Arrival of patient at Alcor
T+1	12:29	Start of cryogenic cooldown
T+12	15:50	Termination of cooldown
T+25	14:07	Transfer to long-term care in liquid nitrogen

Time Summaries

Event Duration hr:min		days	time	
00:02	From: Till:	T-0 T-0	13:40 13:42	Time of cardiac arrest Time of pronouncement
01:40	From: Till:	T-0 T-0	13:40 15:20	Time of cardiac arrest Start of ice bath cooling
02:10	From: Till:	T-0 T-0	13:40 15:50	Time of cardiac arrest First medication administered (sodium citrate)
02:33	From: Till:	T-0 T-0	13:40 16:13	Time of cardiac arrest Last medication administered (Tempol)
00:23	From: Till:	T-0 T-0	15:50 16:13	First medication administered (sodium citrate) Last medication administered (Tempol)
04:15	From: Till:	T-0 T-0	13:40 17:55	Time of cardiac arrest Start of field surgery
00:31	From: Till:	T-0 T-0	17:55 18:26	Start of field surgery Completion of surgery
04:47	From: Till:	T-0 T-0	13:40 18:27	Time of cardiac arrest Start of open-circuit washout
00:59	From: Till:	T-0 T-0	18:27 19:26	Start of open-circuit washout Completion of closed-circuit perfusion
05:46	From: Till:	T-0 T-0	13:40 19:26	Time of cardiac arrest Completion of closed-circuit perfusion
17:03	From: Till:	T-0 T+1	19:26 12:29	Completion of closed-circuit perfusion Start of cryogenic cooldown
22:49	From: Till:	T-0 T+1	13:40 12:29	Time of cardiac arrest Start of cryogenic cooldown
01:05	From: Till:	T+1 T+1	11:24 12:29	Arrival of patient at Alcor Start of cryogenic cooldown

8. Table of Medications Administered

T-0 days

TIME	MEDICATION	DOSE	PURPOSE
15:50 hrs	Sodium citrate	20 g Note 2	Anticoagulant; prevents blood clot formation.
15:55 hrs	Streptokinase	250,000 IU Note 3	A thrombolytic used to break up existing blood clots.
15:57 hrs	Heparin	50,000 IU	Anticoagulant; prevents blood clot formation.
16:00 hrs	Minocycline	200 mg	Antibiotic; reduces microbial overgrowth during long transport times.
16:02 hrs	Decaglycerol/THAM	200 ml Note 4	Decaglycerol inhibits cerebral edema.
16:13 hrs	Tempol	5 g	Low molecular weight superoxide scavenger used to mitigate ischemia-induced free radical damage.

Notes:

1. Antacid was not administered due to the patients rigor hindering the insertion of an airway adjunct.

2. The standard formulation for sodium citrate is 20% w/v, in sterile packaging provided by the manufacturer. 10 grams of sodium citrate are given to patients who weigh less than 40 kg, and 20 grams are given to patients who weigh over 40 kg. This patient weighed 104.5 kg and therefore received 40 grams of sodium citrate.

3. The standard administration of streptokinase is 250,000 IU fixed dose, dissolved in 5 mL of 9% sodium chloride, to be added to the blood washout solution prior to remote blood washout, or to the first cryoprotection flush in the OR. The dosage is reduced to 25,000 IU in field neuro (FCP) cases and added to the first bladder). This medication previously needed to be infused through a 0.2 µ filter. The medication now in use is already sterile-filtered and can be reconstituted in the vial.

4. Decaglycerol/THAM is administered as a custom formulation of 20% w/v decaglycerol and 4.5% w/v THAM (tromethamine) in water (pH = 10.4 and pKa = 8.3). It is a fixed dose of 400 ml to be given in two separate doses.

9. Discussion

Standby and Stabilization

Because of delays in air travel due to a hurricane, the member went into cardiac arrest after deployment was called, but before either the Alcor Deployment and Recovery Team (DART) team or the Suspended Animation (SA) team could arrive at the member's location. Teams were deployed as soon as it was possible and safe. Post-hurricane traffic problems caused further delays. Fortunately, stabilization procedures were initiated close to time of death.

At the end of the stabilization procedures, the left nasopharyngeal thermocouple was transferred to the right port on the HOBO datalogger. This is done on all cases. SA logs the nasopharyngeal temperatures during stabilization with two data loggers. Once the patient is prepped for shipping, one thermocouple is removed and attached to the other data logger. This way, if the transportation logger fails or is broken, there is still stabilization and transport data recorded.

Field Surgery and Washout

The hurricane prevented the SA perfusionist from reaching the patient's location in time. The blood substitution was done by the SA team lead, aided by a video phone call with the perfusionist. Because of the hurricane damage in the area, transport was difficult to arrange, and the patient arrived at the Alcor OR 21.63 hours after cardiac arrest.

Patient Transport to Alcor

DART neuro and perfusion kits were separated during travel due to airline confusion about the perfusate, with no notification provided to the accompanying DART member until boarding. This caused delays and required equipment recovery from two different locations.

Cryoprotectant Surgery and Perfusion at Alcor

Whole body cryoprotection procedures were initiated upon arrival to Alcor. The procedure was not successful; large quantities of clear perfusate were immediately observed flowing from the burr hole and abdominal distension was significant. Typically, in the case of abdominal distension and poor flow in whole body patients, neuro perfusion is attempted as a fallback procedure. However, the rapid perfusate flow from the burr hole is consistent with breakdown of the vasculature supplying the brain. Fluid exits the heart into the aorta and immediately travels to the brain directly via the carotid arteries. Therefore, flow out of the burr hole indicates that the carotids were intact and perfused. The team concluded that carotid cannulation would not address the problem and elected to transfer the patient directly to cooldown to minimize further ischemic exposure.

Alcor's surgeon stated that there was no major issue with the placement of the cannulae during blood substitution. There was noticeable backflow of nonclotted blood in the arterial tubing, which would only happen if the cannulae were still in place. Likely the vessels became noncompliant (extremely stiff) over time, but still allowed some fluids to leak out of the vessels into the surroundings tissues similar to the term called diapedesis.

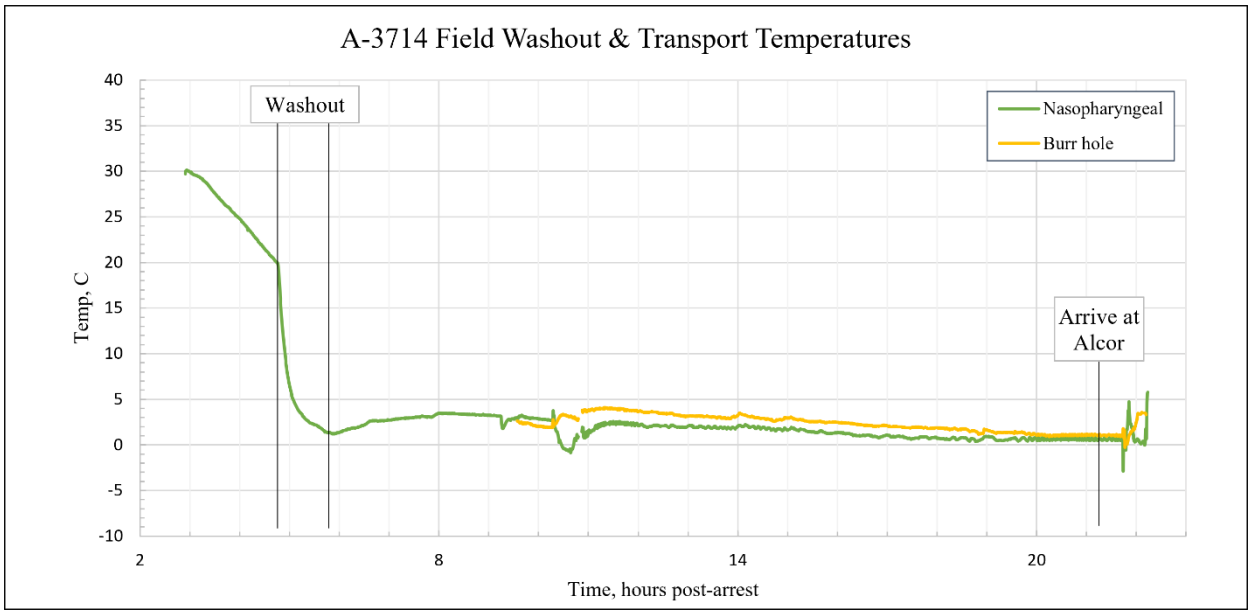
Cryogenic Cooldown

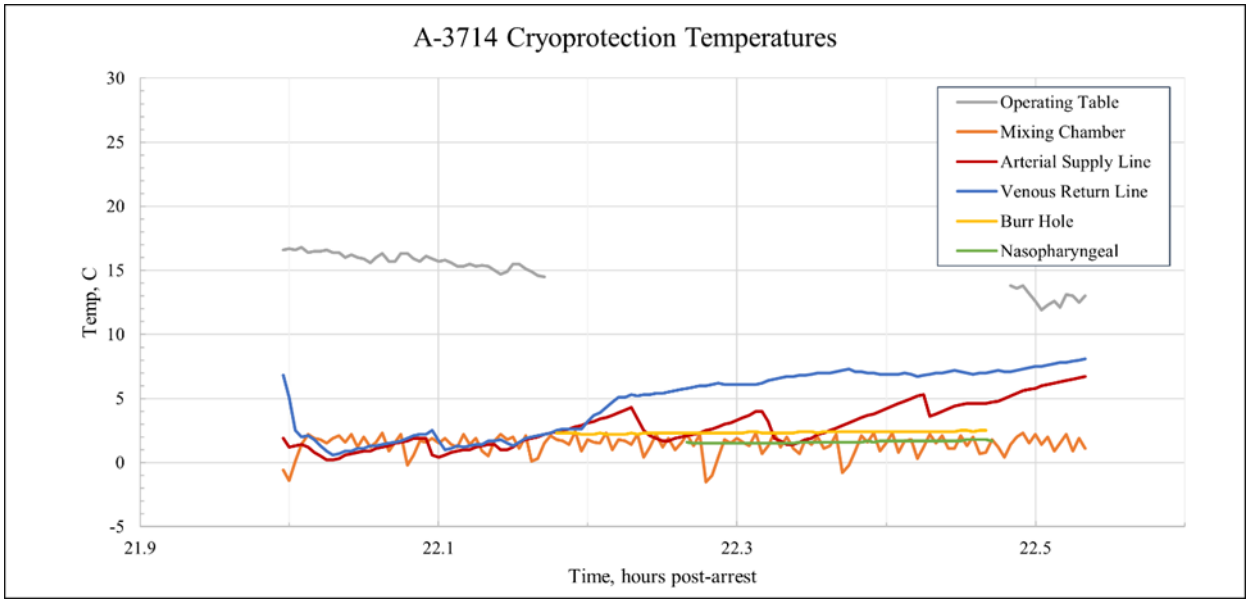
The cooldown proceeded without any issues. After transfer to the vertical cooldown dewar, the cooldown was paused at -150C and held for an extended period. The bulk tank did not have enough nitrogen to complete the cooldown on schedule due to a delay in the weekly LN2 delivery. After LN2 delivery, the cooldown was resumed and continued to completion.

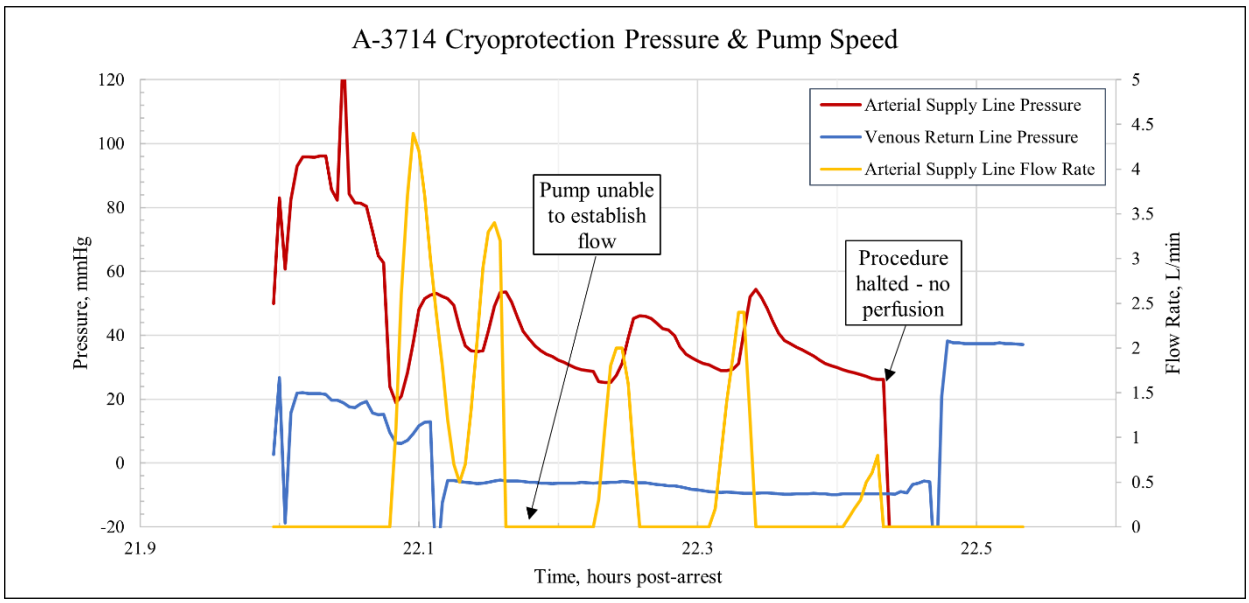
10. Cryoprotection and Temperature Graphs

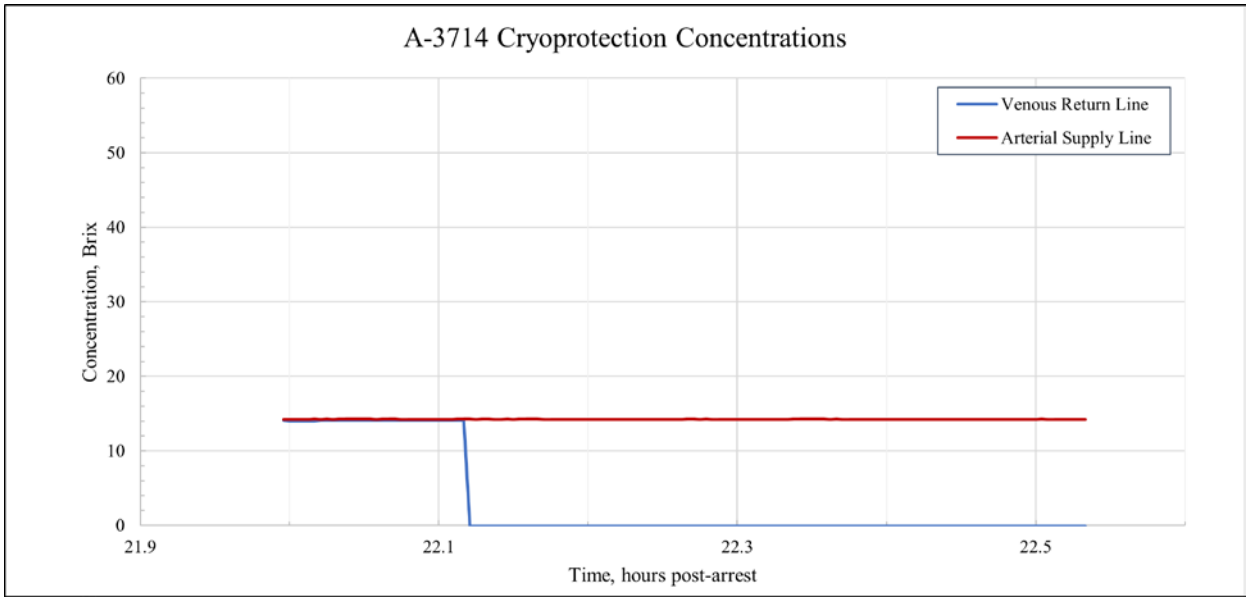
Graphs provided by SA:

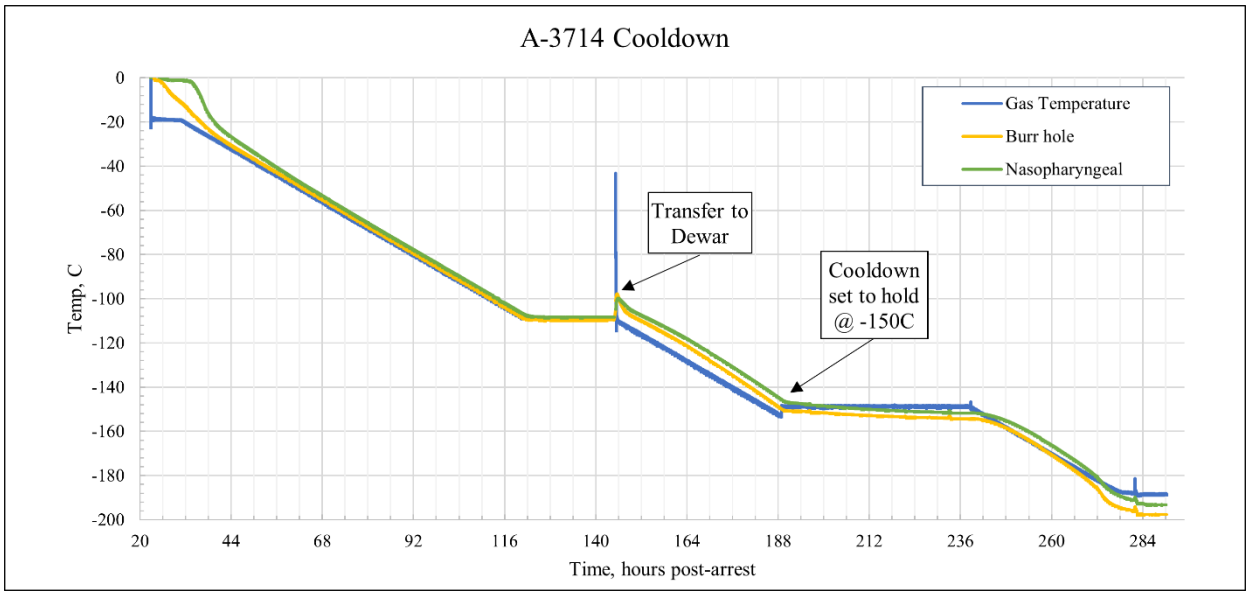
Graphs provided by Alcor:

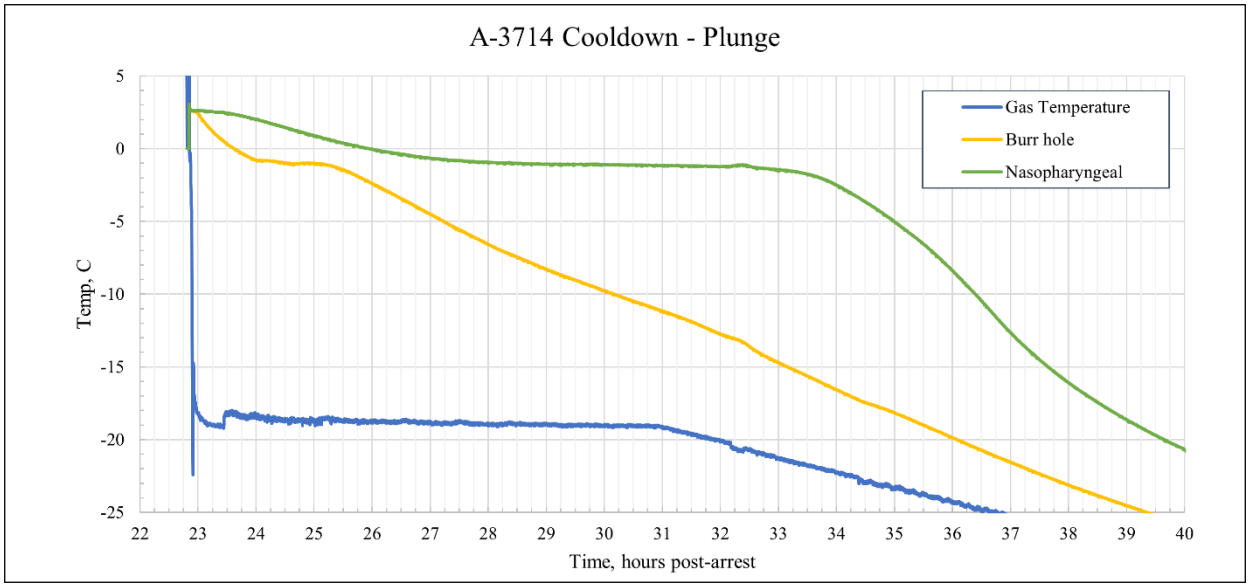



A-3714 Cryoprotection Temperatures
Temp, C
Time, hours post-arrest
Operating Table
Mixing Chamber
Arterial Supply Line
Venous Return Line
Burr Hole
Nasopharyngeal


A-3714 Cryoprotection Pressure & Pump Speed
Pressure, mmHg
Flow Rate, L/min
Time, hours post-arrest
Arterial Supply Line Pressure
Venous Return Line Pressure
Arterial Supply Line Flow Rate
Pump unable to establish flow
Procedure halted - no perfusion


A-3714 Cryoprotection Concentrations
Concentration, Brix
60
50
40
30
20
10
0
21.9
22.1
22.3
22.5
Time, hours post-arrest
Venous Return Line
Arrterial Supply Line


A-3714 Cooldown
Temp, C
0
-20
-40
-60
-80
-100
-120
-140
-160
-180
-200
20
44
68
92
116
140
164
188
212
236
260
284
Time, hours post-arrest
Gas Temperature
Burr hole
Nasopharyngeal
Transfer to Dewar
Cooldown set to hold @ -150C



11. S-MIX

The Standardized Measure of Ischemic Exposure (S-MIX) is not analyzed for cases, such as this one, in which cryoprotectant perfusion is not performed.

12. CT Scans

Cryoprotectant Distribution (Post-cryopreservation CT scan)

When the in-house scanner is functional and whole-body patients are being scanned, additional information will be added to this report.