Alcor A-2887
Case Report

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Alcor A-2887 Case Report Contents:

1. Overview

Information is derived from multiple sources and is all converted to Mountain Standard Time (MST).

On August 13, 2018, at 09:02 hrs a TeleMed alert was received stating that non-confidential, 75-year-old Alcor member Herbert Drazen of Pomona, New York had been pronounced legally deceased.

Since the New York mortician estimated that the patient had died approximately 24 hours prior to being found by a family member, it was decided by the Alcor Deployment Committee it would not be possible to perfuse this patient with cryoprotectant. Therefore, the decision was made to pack the patient in dry ice as quickly as possible and then have him air shipped back to Alcor to be placed into liquid nitrogen.

The patient departed JFK Airport in New York on Wednesday, August 15, 2018, at 18:15 hrs and arrived at Phoenix, Sky Harbor Airport at 20:55 hrs. Alcor personnel picked up the patient and brought him to Alcor in the rescue vehicle. The patient was placed into cooldown at Alcor on August 20, 2018.

2. Personnel

Transport and Cooldown:

Hugh Hixon, Jr., Alcor Research Fellow
Steve Graber, Alcor Technical & Readiness Coordinator
Sandra Russell, Interim Medical Response Director
R. Michael Perry, Ph.D., Patient Care Manager

Deployment Committee:

Steve Harris (SH), M.D., Alcor Chief Medical Advisor
Max More (MM), Ph.D., Alcor CEO

3. Patient Assessment and Preparation

The member lived alone in a small upstate New York community about an hour north of Manhattan. The patient had been found in his home on August 13, 2018, by a relative who had received a call from a dialysis center that the member had been late for an appointment. The date and time of death were not known. During a later conversation with Alcor staff, the New York mortician stated that in his experience the member had probably died approximately 24 hours prior to being found. The police and paramedics were present and they immediately released the patient as he was not considered to be a coroner's case.

In subsequent phone conversations, the patient's nephew had stated that his uncle had not suffered any recent illnesses that indicated that death was imminent. He had not spoken with his uncle for several days. He also stated that his uncle lived alone, had few friends and routinely spent the entire day in his pajamas. Therefore, the nephew could not determine if his uncle had slept in his bed that night as his uncle never made the bed after he woke in the morning.

Alcor staff called their local mortician to ask for assistance in finding a mortuary near the patient in New York. At approximately 09:30 hrs, Alcor's local mortician contacted a mortician in New York who was willing to immediately retrieve the patient.

There was extensive communication on Slack about whether to do a field neurocryoprotection (ruled out because of the long delays) or a "straight freeze" (freezing without prior cryoprotectant perfusion) and how to be sure the mortician would build and use a dry ice shipping box correctly according to instructions from Alcor.

Airlines were contacted about flight schedules and their dry ice allowances for domestic flights. The patient's nephew was sent a text that the funeral home would be contacting him for the address where they would pick up the patient.

The New York mortician purchased 160 lbs. of dry ice which he planned to place on the patient when he arrived back at the mortuary. At approximately 10:48 hrs Alcor sent directions for building and using a dry ice shipper to the New York mortician and asked him to send back photos after the shipper was built as well as photos of the patient and dry ice in the shipper before Alcor would authorize him to be shipped.

After discussions about using water ice or dry ice, Alcor staff located a dry ice delivery company that was willing to deliver dry ice to the home where the patient was still located.

The mortuary pickup service arrived before the dry ice delivery company, however, and the mortician made the decision to return immediately to his mortuary with the patient. Alcor contacted the dry ice delivery company and they agreed to send their driver to the mortuary with 500 lbs. of dry ice.

At 14:08 hrs Alcor's local mortician received eight pictures from the New York mortician showing how the patient had been packed in dry ice (in his morgue, not for shipment on the plane). Alcor forwarded the photos to Alcor's Chief Medical Advisor (CMA).

4. Transport

On August 14, 2018, the New York mortician was sent a text asking him not to ship the patient yet. Since the patient was being cooled with dry ice there was no urgency and Alcor wanted to make sure that all preparations were properly managed. Alcor staff spoke with the New York mortician to assist him with properly packing the Ziegler case and the dry ice shipper.

In the early morning on August 15, 2018, the New York mortician called Alcor and stated that he was ready to ship the patient and that American Airlines would be open until 21:00 hrs. Alcor's local mortician was alerted to the details of the conversation with the New York mortician.

At 12:12 hrs Alcor received a call from the local mortician that the member had been shipped on an American Airlines flight to Phoenix. Both Alcor staff and the local mortician were surprised that the patient had been shipped despite the fact that the New York mortician had been told several times not to ship until authorized, and that there was no hurry as long as the patient was being cooled with dry ice.

The patient had departed JFK Airport in New York on August 15, 2018, at 18:15 hrs and arrived at Phoenix Sky Harbor Airport at approximately 20:55 hrs (this short shipping time reflects the loss of hours as the patient as shipped across several time zones). The patient was picked up at Sky Harbor Airport by Alcor staff and the local mortician and then transported to Alcor in the Alcor rescue vehicle.

At 21:30 hrs the patient arrived at Alcor and was moved to the Patient Care Bay. The Ziegler case was opened and there was almost no dry ice inside except for one small brick-sized package at the patient's feet weighing approximately 5 lbs. Alcor staff immediately placed approximately 100 lbs. of dry ice on and around the patient.

The dry ice shipper constructed by the New York mortician did not conform to the instructions sent by Alcor. A blue plastic tarp was used as the vapor barrier, the dimensions were 12' x 16', which was larger than the 9' x 12' drop cloth recommended. This was more durable than the recommended drop cloth.

The insulation used was R19 fiberglass, as per the instructions. It appeared to not be from a roll, but 8' lengths. Coverage of the bottom and sides was approximately 95% as the head end of the case was a bit exposed. The top was approximately 80% covered, which was expected and which normally has no effect

The NY mortician had said the spacers to keep the case from crushing the insulation were only 1" x 2", instead to the 2" x 2" specified by the Alcor instructions. Considering the thickness of the insulation it was probably crushed, resulting in poor performance. However, the outside bottom of the tray was dry and warm upon receipt.

The shipper was tested with the patient in it and the following was determined:

1. The shipper's stable performance was nearly 60 lbs./day, which was twice the approximately 30 lbs. /day expected with this design. This was probably in large part due to the use of 1" bottom spacers instead of the 2" spacers specified, causing the bottom insulation to be crushed to half the specified design thickness.

2. The shipper was built just before shipment. Since the Ziegler, patient and dry ice had been kept in a refrigerator, without insulation, the patient could not have been at dry ice temperature

and there was a large thermal debt to get the patient to dry ice temperature once he was in the shipper; this would have taken at least 50 lbs. of dry ice.

3. The shipped dry ice weight (air bill minus no dry ice in the shipper with the patient) was 24 lbs. (366 – 342) about nine hours' worth at 60 lbs./day.

4. The shipper could be loaded to approximately 230 lbs. of dry ice, for a gross weight of approximately 570 lbs. Even with the loss that would occur between closing up and actual shipment, American Airlines would probably not accept that much over their 500 lb. gross weight limit, but it is well within the 200 kg IATA dry ice limit.

5. Cooling to Liquid Nitrogen

The patient was kept on dry ice for several days, as Alcor was just recovering from a previous whole body cooldown. The dewar used for whole body cooldown still had residual LN_2 and water and was being dried. The additional time was used to check the performance of the shipper and look into what had gone wrong and how it could be prevented in the future (see the Issues and Actions section. Dry ice was added on August 16, 17 and 18, 2018. On August 20, 2018, the patient was placed in a sleeping bag and a metal protection pod and transferred to the cooldown dewar. The cooldown was complete on August 25, 2018. The cooldown was uneventful. On November 22, 2018, the patient was transferred to long-term maintenance in LN_2.

6. Timeline

August 13, 2018

09:02 Notification of legal death and estimate that patient had arrested 24 hours before found

09:30(est) New York mortician contacted

10:41 NY mortician told not to ship patient until authorized by Alcor

10:48 Directions sent for building and using a dry ice shipper
14:08(est) Start of dry ice cooling after shipper approved by Alcor

12:12 NY mortician alerts Alcor that patient was shipped prior to authorization

August 15, 2018

18:15 Patient shipped from NY airport

21:30 Patient arrives at Alcor
21:40 The Ziegler case was opened; almost no dry ice was on the patient

August 20, 2018

Start of patient cryogenic cooldown

November 22, 2018

Transfer of patient to long-term maintenance at LN2temperature

7. Issues & Actions

Issue 1: The patient was put on an airplane prematurely. Alcor staff had emphasized to the mortician that there was no need to rush since the patient could be kept on dry ice for about two weeks without major issues. The mortician, however, proceeded to put the patient on an airplane against Alcor instructions. Alcor's local mortician also confirmed that it is normal for the shipping mortuary to confirm with the receiving mortuary that they are ready to receive before a shipment is made, which was not done in this case.

Corrective Action: The mortician did admit his errors and apologized for them. He said he was used to shipping as soon as possible in this type of case. In the future, however, when speaking with a new mortician about our needs, we need to make sure they understand our instructions by asking them to repeat our instructions back to us so we can be sure they do indeed understand and will follow our instructions.

Issue 2: The mortician did not use the proper materials to build the shipping container.

Corrective Actions:

2.a The current manual for building and using a dry ice shipping container is at least eight years out of date and very poorly written. An improved manual has been created that has caveats, cautions, photographs and "Ikea" style instructions on how to build the box to make it as error free as possible.

2.b A pre-package of materials will be sent with the instructions to make sure the proper materials are used and to minimize the time required to assemble the shipper.

2.c Make sure the remote mortician understands they need to send photos of the shipping box once it is constructed so that we can make sure it has been constructed properly.

Issue 3: The mortician should have built the dry ice shipper as soon as possible and put the patient into it. Unfortunately, the mortician instead thought he was buying time for that by putting the patient into a Ziegler case and then into his refrigerator.
Corrective Action: The mortician needs to understand the difference between the patient being held on dry ice as opposed to being held on water ice or in a refrigerator. Also, make sure morticians in the future understand that refrigeration is not acceptable. This is being incorporated into the new shipper instructions.

Issue 4: Insufficient dry ice was put in the shipping container and around the patient.

Corrective Action: This again is a communication problem. Make the mortician repeat instructions about how much dry ice needs to be placed around the patient for shipping and have them send photos before authorization to ship is given. This is being incorporated into the new shipper instructions.

Issue 5: The active New York city Alcor group was not contacted or involved in this case.

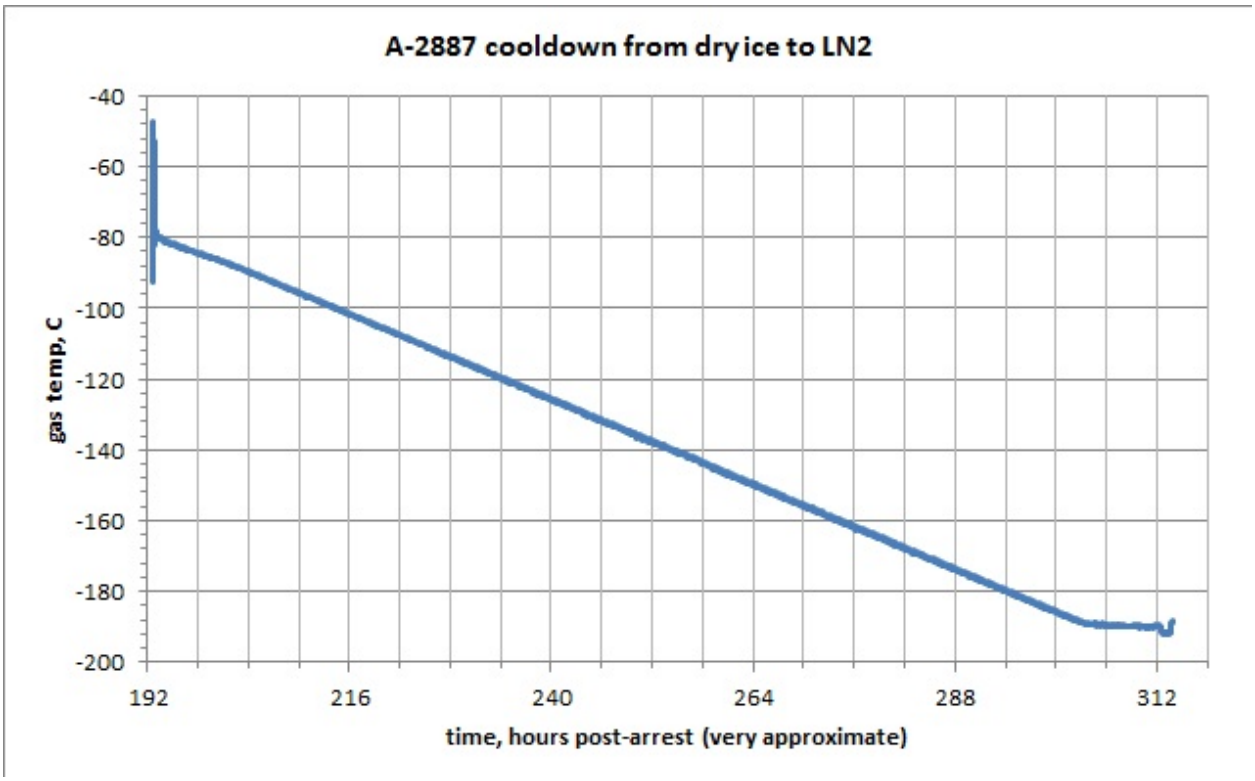
Corrective Action: Whenever possible, an active, local Alcor member living near the patient, or an Alcor staff member, should be dispatched with the new dry ice shipper instructions and deployed to the mortuary to help with compliance. There are at least two kinds of cases where a local Alcor member and/or staff member should be sent to the location of the patient to ensure protocol compliance:

1) A dry-ice shipment of a straight-frozen patient.
2) Cases where an autopsy cannot be avoided or an alternative kind of autopsy is being conducted.

Issue 6: It wasn't possible to obtain a patient temperature measurement upon arrival at Alcor because blocked nasal passages prevented insertion of a nasopharyngeal temperature probe.

Corrective Action: After discussion with scientist and physician consultants, it was decided that in future cases in which nostrils or ear canals are blocked in patients that arrive frozen, 1/8" holes up to 1" deep may be drilled into nostrils to permit an approximate temperature measurement by inserting a thermocouple probe.

9. Graphs



Note: This was a whole body patient so no CT scans were done.