

# The challenges faced after a major trauma at an expedition ship at a remote area. Report of one Case

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*The challenges of practicing medicine in small ships on remote sites involve limited resources, lack of specialized support, and longer interactions with a patient in an isolated environment. This report describes the successful management of a patient who suffered a major injury after fell from the stairs in an expedition ship in the Southern Ocean in the Antarctic route. The patient was managed by the onboard physician for four days until the medical evacuation was possible.*

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**Key words:** Accidents; Antarctic Regions; Wounds and Injuries.

## Desafíos enfrentados después de un trauma mayor en un barco de expedición en un área remota. Informe de un caso

*Los desafíos de practicar la medicina en barcos pequeños en sitios remotos implican recursos limitados, falta de apoyo especializado e interacciones más prolongadas con el paciente en un entorno aislado. Este manuscrito describe el manejo exitoso de un paciente quien sufrió un trauma mayor producto de una caída en un barco de expedición en el Océano Austral en la ruta Antártica. El paciente fue manejado por el médico de a bordo durante cuatro días hasta que fue posible realizar la evacuación médica.*

**Palabras clave:** Regiones Antárticas; Accidentes; Heridas y Lesiones.

The challenges of practicing medicine in small ships on remote sites involve limited resources and equipment, lack of specialized support, and longer interactions with a cross-cultural patient in an isolated environment<sup>1</sup>. This report describes the successful management of major trauma on board a 110-passenger/crew expedition ship in the Southern Ocean during the navigation from South Georgia (54°57S 36°04W) to the Antarctic Peninsula on a Gale 8 on Beaufort scale with 20-25 degrees rolling. Due to data reports of these injuries on ships being limited<sup>2,3</sup>, this case could be used for epidemiology, clinical, and prevention of these events.

### Case report

#### Context

During a hard rolling, a woman fell from the stairs. She was found laid face down on the floor, conscious, bleeding, with left leg on flexion, swollen ankle, and obvious displaced closed fracture of the left humerus. Trauma assessment was done following the International Trauma Life Support (ITLS) standard. Glasgow scale 15. No evidence of skull crepitus or cervical vertebrae deformity. Bleeding injury on the forehead. Her neck, both arms, and legs were immobilized, bleeding was stopped, and she was moved with a spine stretcher

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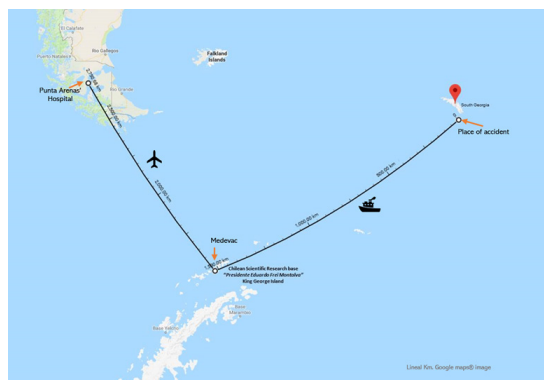
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to a room. Brachial, radial, popliteal and pedal pulses on both sides were present with a capillary refill in less than 3 seconds. Thorax and pelvis stable, abdomen not painful to superficial or deep palpation. She had no thoracic pain or shortness of breath; cardiac and pulmonary auscultation was normal. Later she complains also about a tooth. Vitals were: blood pressure 100/70 mmHg, respiratory frequency 22 per minute, and heart rate 88 per minute. Fluid therapy, analgesia, antiemetics, and antibiotics were placed by IV. The infirmary has no X-ray nor labs equipment, however, after a full assessment, clinical diagnoses on board were: closed left humerus displaced fracture, left patellar crush fracture, left tibia and fibula distal fracture with possible astragalus fracture, right shoulder joint dislocation, an open wound on the forehead and lower right premolar fracture. During the next four days, she received the medical care that could be provided by the only doctor onboard: control of vitals signs, splints for fractures, stitches for the open forehead wound, urinary catheter, analgesia, antibiotics, and IV fluids with in/out fluid balance, respiratory and anticoagulant therapy.

### Medevac

The Ship was evading a 10 Beaufort storm on the Southern Ocean that kept it away of any possible port for a medevac (Port Stanley at Falkland Island or Ushuaia in Argentina). The safest option was to sail until the South Shetland Islands at the Antarctic Peninsula and medevac from there. On the fourth day after the accident, the medevac was done on a Twin Otter airplane from Chilean Scientific Research base "Presidente Eduardo Frei Montalva" at King George Island (62°12'0"S 58°57'51"W) until Punta Arenas, Chile (Figure 1). She was secured on a spine stretcher and transported inside of the pneumatic boat (Zodiac®) from the ship to shore and then by a snowmobile to the aerodrome. The flight took five hours and since was not a pressurized cabin and the airplane flew over ten thousand feet, she received oxygen. A full handoff report was sent prior to the beginning of the medevac, which included up-to-date information regarding patient care, treatment, and condition. The patient was escorted by the onboard doctor who participated in all discussions with the onshore medical team.



**Figura 1.** Medevac route. Navigation leg from the island of South Georgia to the Chilean scientific research base "Presidente Eduardo Frei Montalva" (62°12'S - 58°57'W) in King George - South Shetland Islands - Antarctic Peninsula and flight by Twin plane Otter to Punta Arenas, Chile.

### Progress

Once at the hospital, the ortho and emergency team completed the evaluation, a CT scan, MRI, and labs were done and the same day she went to surgery. All initial diagnostics were confirmed but right shoulder joint dislocation turns out to be a right humeral head with no displaced fracture. She did not develop renal failure or infection, no rhabdomyolysis, no pneumonia, and no scars. She was kept under observation with no complications. After nine weeks in Punta Arenas, she flew back home, continues physical therapy, and is getting better.

### Discussion

#### Challenges faced

On the contrary to the average cruise ship medical center, with full ICU, x-ray, and laboratory facilities and a minimum staff of 2 doctors, 3 nurses, and paramedics<sup>2</sup>, small ships on the Antarctic route have an infirmary with basic trauma, cardio and respiratory support equipment with medications and supplies and just one doctor, no nurse, paramedic, X-rays, laboratory, or a hospitalization area. Generally, in a rolling ship, the physician will be pushed far beyond the normal trauma practice in a general hospital, therefore must have emergency and prehospital care experience and it would be recommendable to have knowledge about safety, microbiology,

public health, and expedition medicine<sup>1,4</sup>. Must be able to make independent decisions, be willing to improvise and implement creative solutions during the rolling of the ship and manage advice by telecommunications<sup>5,6</sup>. Should operate effectively with a multicultural team in remote environments where trivial accidents can turn into nightmares with limited resources and no outside help for days<sup>6,7</sup>.

Although most of the illnesses are dizziness, vomiting, dehydration, and respiratory infections, occasionally, cardiac arrest, internal bleeding, injuries, traumas, anxiety, or panic attack will happen and medical care could be done for several days<sup>3,8,9</sup>. All medical supplies and kits must be prepared in advance and the crew should know where to find it at the infirmary since they will have to help<sup>7,10</sup>. Medevac possibilities in Antarctica are few and all are expensive. In the Antarctic Peninsula, the Chilean Research base: "Eduardo Frei Montalva" at King George Island (South Shetland Islands), has an aerodrome (IATA: TNM) that allows landings of Hercules, Boeing 737, or Twin Otter. The doctor must do a thorough discussion and recommendations to the Captain, expedition leader, and insurance team. Few commercial airlines or army airplanes can make the aerial evacuation, but it will depend on the weather conditions and airplane availability and could take days<sup>9,11,12</sup>.

### Lessons learned

In this case, the resulting of several fractures from the fall down the stairs had two important variables, she has osteoporosis and the increasing kinetic energy for the rolling ship<sup>13</sup>. Even when international procedures for trauma cases and guidelines for cruise maritime medicine were followed this event has three key points: 1.- The continuous rolling and pitching of the ship made the patient's movement to the room, immobilization of fractures, stitching, placement the IV and urinary catheter, complicated; 2.- The Medevac's delay due to the weather conditions forces a single physician to do all medical attention, reports, and teleconsultations 24 hours for four consecutive days; 3.- There were still 109 passengers and crew members in the open ocean in a strong gale storm, so the precautions had to be extreme. What would it be like to handle another serious injury like this

with only one medical staff and limited resources on board?

### *An overview: the proposal*

Every expedition, journey, or work in a remote site must be prepared considering several aspects and in small passenger ships, (far from the multidisciplinary medical teams of the large cruise ships that are mostly a few hours from the coast), these aspects are important. Iserson in 2017 explained the 10 key elements of a workable remote health care system and some things that can be added in a small vessel:

1. Optimize workers' fitness: being a remote site physician on a ship mean being fit for the job, working on small places, knowing basic marine & safety rules, and managing self-seasickness.

2. Anticipate treatable problems: know the characteristic of sickness and injuries in vessels and be prepared to recognize them.

3. Stock appropriate medications: based on medical knowledge and stats reports of each place.

4. Provide appropriate equipment: adequate quantity and in the right place onboard.

5. Provide adequate logistical support: it is important to organize with the crew the "medical team" with clear tasks and responsibilities. The onshore crew must be able to support the best way for adequate treatment and/or evacuation.

6. Provide adequate medical communications: with a topside support medical team, with the crew members and family of the injured.

7. Know the environmental limitations on patient access and evacuation: as part of the preparation for a vessel journey, medical personnel must be in communication with the officials regarding weather and meteorological conditions.

8. Use qualified providers: well trained, fit, and with adequate experience who follows international rules for care and reports.

9. Arrange for knowledgeable and timely consultations: as per item 5.

10. Establish and distribute rational administrative rules: with the personnel, crew, and organizers.

The white continent has unbelievable places with a history, environment, and scenery like no other in the world. It is as magical and fragile as it is powerful and challenging. So, if you want to live this experience and be the only medical personnel onboard at a remote site, be sure you can face it.

**Ethical authorization**

The authors declare that, although this article does not publish personal data that allow the identification of the patient, it has been notified and informed consent has been obtained.

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**References**

1. Dahl E. Cruise ship doctor: demands and challenges versus qualifications and training. *International Maritime Health* 2009; 60:33–35. PMID: 20205125 Available: <https://core.ac.uk/download/pdf/268457457.pdf> (accessed on December 2018).
2. Ottomann C, Hartmann B, Antonic V. Burn Care on Cruise Ships—Epidemiology, international regulations, risk situation, disaster management and qualification of the ship's doctor. *Burn*. 2016; 42:1304-1310. doi.org/10.1016/j.burns.2016.01.032
3. Schultz L, Zak D, Holmes JF. Pattern of Passenger Injury and Illness on Expedition Cruise Ships to Antarctica. *Journal of Travel Medicine* 2014; 21(4): 228–234. DOI: 10.1111/jtm.12126
4. Curry C, Johnston M. Emergency doctors by sea to Antarctica: small ship medicine in Polar Regions. *Emergency Medicine (Fremantle, W.A.)* 2001;13:233-6. DOI: <https://doi.org/10.1580/06-WEME-OR-029R.1>
5. Stannard S. Managing medical emergencies: risks and responses. *International Maritime Health*. 2018; 69(2): 151-152. DOI:10.5603/IMH.2018.0023
6. Imray CH, Grocott M, Wilson M, Hughes A, Auerbach P. Extreme, expedition, and wilderness medicine. *Lancet*. 2015;386:2520–25. Available: [https://www.academia.edu/29834373/Extreme\\_medicine\\_1\\_Extreme\\_expedition\\_and\\_wilderness\\_medicine](https://www.academia.edu/29834373/Extreme_medicine_1_Extreme_expedition_and_wilderness_medicine). (Accessed: December 2018).
7. Iserson K. Medical Planning for Extended Remote Expeditions. *Wilderness & Environmental Medicine*. 2013; 24, 366–377. DOI: 10.1016/j.wem.2013.05.005
8. Bledsoe G, Brill J, Zak D, Li G, Injury and Illness Aboard an Antarctic Cruise Ship *Wilderness and Environmental Medicine*. 2001; 18: 36-40. DOI:<https://doi.org/10.1580/06-WEME-OR-029R.1>
9. Carron M, Globokar P, Sicard B. Acute gastrointestinal haemorrhage on board a cruise ship in the Antarctic Peninsula. *International Maritime Health*. 2016; 67, 4: 223–226. DOI: 10.5603/IMH.2016.0040
10. Dahl E. Debriefing of the medical team after emergencies on cruise ships. *International Maritime Health* 2017;68(4): 83-186. DOI: 10.5603/IMH.2017.0034
11. Gould FJ. Non-operative management of a patella fracture: environmental considerations in the Subantarctic. *International Maritime Health*. 2017; 68(3): 159-162. DOI: 10.5603/IMH.2017.0028
12. Mills GH, Mills CN. Challenges of Air Medical Evacuation from Antarctica. *Air Medical Journal Associates*. 2008; 6:281-285. Doi:10.1016/j.amj.2008.07.009
13. Horne S. Been There, Done That. *Journal of the Royal Army Medical Corps* 2002; 148: 188-192. <http://dx.doi.org/10.1136/jramc-148-02-16>