NATIONAL TRANSPORTATION SAFETY BOARD

Office of Research and Engineering
Washington, DC

Injury Group Chairman Factual Report

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Chief Medical Officer

A. ACCIDENT: WPR16FA055; Hanalei, HI

On January 17, 2016, about 1430 Hawaii standard time, an Airbus EC130 T2, N11VQ, landed hard on a beach 2 miles west of Hanalei on the Hawaiian island of Kauai after a reported loss of engine power. The commercial pilot and 2 passengers sustained minor injuries, and 4 passengers were seriously injured. The helicopter sustained substantial damage to the tailboom and airframe. The helicopter was registered to Nevada Helicopter Leasing LLC, operated by Blue Hawaiian Helicopters under the provisions of 14 Code of Federal Regulations, Part 135, and was conducting an air tour flight at the time of the accident. Visual meteorological conditions prevailed for the flight, and a company visual flight plan had been filed. The local flight originated in Lihue at 1406.

B. GROUP IDENTIFICATION:

No group was formed for this investigation.

C. DETAILS OF INVESTIGATION

1. Purpose

   This report was developed to describe the injuries sustained by the occupants in the Blue Hawaiian helicopter.

2. Background and Methods

   Accident photographs, seat information, and medical records from the occupants' post accident treatment were reviewed.

   Medical Records

   For each identified occupant, the NTSB subpoenaed the following items from the hospitals where treatment occurred:

(1) Complete emergency department records (physician and nursing notes, medication administration record, procedural notes, radiology readings, laboratory results);

(2) If admitted, the admission note, any physician transfer notes, final radiology reports, any operation notes, and the discharge summary; and

(3) For all patients, the discharge or transfer instructions and billing records (to include coded information such as ICD-9, E&M, or CPT codes, but may exclude financial information).

Hospitals provided a variety of typewritten and computerized documents in response to the NTSB subpoenas.

Demographic Data and Notes

The demographic data (age, sex, and height) came from information in the medical records. In some cases, height and weight were not recorded by hospitals. Weights came from those recorded prior to the flight.

Injury Descriptions

For each of the injured occupants, each injury diagnosed by treating health care providers, as recorded in the medical records, is provided in narrative format. In some cases, occupants complained of pain in areas where no injury was formally diagnosed. Where there were discrepancies, such as multiple providers describing the same injury differently, the final radiology reading (if available) was used to determine presence or absence of injuries. In cases where the radiology reading used words like "possible" or "clinical correlation required," notes from the physician staff and their diagnoses were used to define whether or not the specific injury was present. Radiological images were obtained only for the most severely injured passenger and no direct discussion with health care providers regarding specific injuries was carried out.

Injury descriptions are provided in Table 1. This information includes any available specifics, such as left or right, upper or lower arm, and the loss of height quoted on the radiology reports of spinal fractures. It also includes the narrative description of signs or symptoms.

NTSB Injury Severity

The NTSB also codes people with injuries into four severity codes: fatal, serious, minor, and none. According to Title 49, Code of Federal Regulations, Section 830.2, serious injuries are defined as an injury which is sustained by a person in an accident and which:

Requires hospitalization for more than 48 hours, commencing within seven days from the date the injury was received;
Results in a fracture of any bone (except fractures of fingers, toes, or nose);
Involves lacerations which cause severe hemorrhage, nerve, muscle, or tendon damage;
Involves injury to any internal organ;
Involves second or third-degree burns, or any burns affecting more than five percent of the body surface;

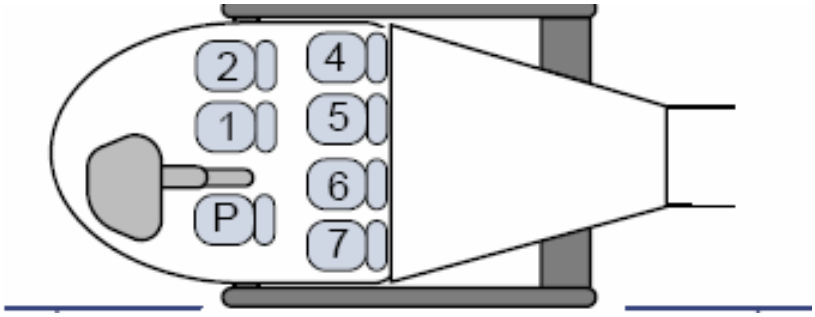
If a person dies within 30 days as a result of injuries sustained in an NTSB investigated accident, they are coded as "fatal." Survivors with injuries that do not meet the "serious" definition are coded as "minor." If no injury diagnosis is made, the person is coded as having no injury.

Non-injury diagnoses such as pre-existing co-morbid diseases (like high blood pressure or diabetes), complications of hospitalization (such as pneumonia, blood clots, or urinary tract infections), and psychological trauma were not included.

3. Results

All of the helicopter seats were occupied during this accident. See Figure 1 for a numbering scheme.

Figure 1. Helicopter Seating Diagram



Injury descriptions and NTSB severity levels for each occupant are provided in Table 1. Of note, while plain X-rays were negative for the passenger in seat 5, he was the only occupant whose spine was not imaged with a CT scan at the initial hospital. Plain radiology imaging of the lumbar spine is 58-86% sensitive for identifying acute fractures in the setting of blunt trauma where more recent multidetector CT scanners are 97-100% sensitive.[1,2,3] Follow up records were obtained for this occupant who was later diagnosed with a lumbar fracture.

[1] Hauser CJ, Visvikis G, Hinrichs C, Eber CD, Cho K, Lavery RF, Livingston DH. Prospective validation of computed tomographic screening of the thoracolumbar spine in trauma. J Trauma. 2003; 55: 228–235.
[2] Sheridan R, Peralta R, Rhea J, Ptak T, Novelline R. Reformatted visceral protocol helical computed topographic scanning allows conventional radiographs of the thoracic and lumbar spine to be eliminated in the evaluation of blunt trauma patients. J Trauma. 2003; 55: 665–669.
[3] Herzog C, Ahle H, Mack MG, Maier B, Scwarz W, Zangos S, Jacobi V, Thalhammer A, Peters J, Ackermann H, et al.. Traumatic injuries of the pelvis and thoracic and lumbar spine: does thin-slice multidetector-row CT increase diagnostic accuracy? Eur Radiol. 2004; 14: 1751–1760.

Table 1. Occupant Injuries by Seating Location

Seat	Age	Sex	Height (in)	Weight (lb)	Injury Descriptions	NTSB Injury Category
Pilot	56	M			● L2 compression fracture, 10% loss of height, no impingement on the spinal canal ● Multiple abrasions	Serious
1	33	F		143	● L1 burst fracture with marked retropulsion of osseous structures x 6 mm resulting in severe spinal canal narrowing. Fractures extend into posterior elements on the right. Associated with a 6-7 mm subluxation of the L2 vertebral body and 20 degrees of kyphosis. Cauda equina and nerve roots severely compressed. ● Spinal epidural hematoma, 2 mm, anterior, from lower thoracic region to S1 ● Focal discontinuity in the supraspinous ligament at T12-L1 ● Sprain, high grade, anterior longitudinal ligament L1-L2 ● Sprain, high grade, posterior longitudinal ligament, L1-L2 ● Sprain, interspinous ligament, T12-L1 ● Paraplegia ● Buckle fracture, sternum	Serious
2	58	M	70	180	● Fracture, sternum, at manubrium with significant displacement (6 mm) ● T8 compression fracture, 5-10% loss of height ● T11 compression fracture, 10-15% loss of height ● T12 compression fracture, 50% loss of height ● T12 laminar fracture, left, non-displaced	Serious
4	62	F		154	● Fracture L1 spinous process, non-displaced ● L1 burst fracture (mild) with slight retropulsion of osseous structures x 2 mm. 15% loss of vertebral body height posteriorly ● Abrasion, right elbow ● Abrasion, left shin	Serious
5	28	M		223	● T12 endplate fracture with 20% loss of height	Serious
6	63	M		263	● L1 compression fracture, 10-15% loss of height ● Contusion, right knee	Serious
7	42	M	74	180	● L1 compression fracture, 40% loss of height with 9 mm area of retropulsion with severe canal stenosis ● L3 compression fracture with 10% loss of height	Serious

D. SUMMARY OF INJURY FINDINGS

Six of the seven helicopter occupants in this accident were diagnosed on the day of the accident with thoracolumbar compression fractures. The seventh was diagnosed several weeks later. With the exception of the occupant of seat one (who became paraplegic) the occupants remained neurologically intact. The occupants in seats 2 and 7 had fractures at multiple vertebral levels. The occupants in seats 1 and 2 both had sternal fractures, although in seat one it was limited to a buckle fracture and in seat 2 it was significantly displaced.