HISTORICAL NOTE

Aeromedical Evacuation in the "Luftwaffe" from its Origins until 1945

Victor Harsch

Harsch V. ***Aeromedical evacuation in the "Luftwaffe" from its origins until 1945.*** **Aviat Space Environ Med 2006; 00:000–00.**

Prior to WWII, Germany had little experience in aeromedical evacuation (AE) of the sick and wounded. The need for a specialized AE organization was recognized, organized and used extensively on all fronts during WWII. Nearly 2.5 million casualties were transported by regular troop carriers and 11 specialized AE Units, which concentrated on the intensive care air transport of the seriously wounded, especially those with injuries of the brain, eyes, or jaw, thoracic or abdominal wounds, or gun-shot fractures. The AE Units were commanded by medical officers, most of whom were pilot-physicians, who had command jurisdiction over flying and line personnel as well as medical service personnel. The AE Units were equipped with both Junkers Ju-52s, which could carry up to 12 litter patients plus 3 to 5 ambulatory patients each, and with Fieseler Fi -156s (STOL "Stork" for 1 or 2 litter patients), ambulances, as well as the personnel needed for operating and maintaining the vehicles and materiel. The AE Units of the Luftwaffe—the Sanitaetsflugbereitschaften—made an outstanding contribution to military medical care in achieving this significant number of casualties evacuated under the humanitarian symbol of the Red Cross.

Keywords: air ambulance, aeromedical evacuation, airmedevac, Sanitaetsflugbereitschaft, Luftwaffe, ambulance planes, Luftwaffe, history, air evacuation, World War II, Red Cross.

DURING THE 1920–30s, France established one of the first military aeromedical evacuation (AE) organizations and transported over 8,000 sick and wounded soldiers (27,29). Germany, however, had little practical experience in AE prior to WWII (3,4,10,11), mainly because of the restrictions on the German military imposed by the Treaty of Versailles. While there were some civilian efforts, such as those instituted as early as 1926 by the Lufthansa Airline, these did not significantly contribute to the military medical efforts (10,28,29). After the founding of the Luftwaffe in 1935, the Surgeon General Erich Hippke began elaborating concept of AE for the Luftwaffe and Wehrmacht, and earmarked the three-engine Junkers Ju-52 as the up-and-coming workhorse of the AE system (3–6). This commercial transport plane was available by the early 1930s and was used for AE first in the Grand Chaco War in South America (between Paraguay and Bolivia, 1932-1935) (33). The German Company, BEYER had a Ju-52 (D-AOHU) which could carry four stretcher patients in case of multiple trauma. This plane was eventually acquired by Luftwaffe before WWII and became the prototype for the later medical versions of the Ju-52 (10).

Initial experiences in AE were gained during the German support of the Franco Regime in Spain during the Spanish Civil War (1936-1938) when wounded soldiers of the "Condor Legion" were transported not only by hospital ships, but also by AE missions to Germany. An AE and long-range modification of a Junkers Ju-52 made it possible to fly up to five stretcher patients non-stop over the Alps to Berlin within 10 h. In 8 reported missions the flight levels were up to 6,000 m in an unheated and unpressurized cabin. The patients, some with cardiac and pulmonary impairments (tuberculosis, pneumonia, valvular disease) and anemia, as well one case of severe burns, were treated with additional oxygen, intravenous fluids, etc. Surprisingly, no serious incidents were reported. A total of 37 patients were transported by medical evacuation aircraft, while 5 were transported by regular troop-carriers (9, 24).

During WWII a growing need for specialized AE Units was identified, and 11 specialized Companies of the Luftwaffe were established (7,12,13,15,16). The first two AE Units became operational during the Polish-Campaign in September and October 1939 (1). Within 4 wk (18 September to 16 October, 1939) 2,568 patients were reported as having been air-evacuated, half of them by the specialized AE Units. The Neurosurgeon Wilhem Toennis escorted 557 of them and documented 375 gunshots to the extremities, 39 to the thorax, 30 to the abdomen, 45 to the scalp, and 19 to the eyes. There were 3 patients who died in flight (peritonitis and severe hemorrhage) and 13 in hospitals after transport due to the severity of their injuries (1,30). The loading process for eight severely injured and two less injured patients was reported to require between 8 and 15 min by well trained AE teams (26).

The AE Units were headed by flight surgeons with personal flight experience, who had command jurisdiction over flying and medical service personnel. They commanded between 30-140 personnel, which included flight-crews for the Ju-52s and Fi-156 STOL airplanes operated as a feeder service, medical service personnel and nurses of the German Red Cross for the AE mis-

From the: Aeromedical Center Trollenhagen, Nuebrandenburg, Meck-Pomm, Germany.

This manuscript was received for review in August 2005. It was accepted for publication in October 2005.

Address reprint requests to: Viktor Harsch, M.D., who is a Senior AME at the Aeromedical Center Trollenhagen, Suedstrasse/Fliegerhorst, Neubrandenburg, Meck-Pomm 17033, Germany; FUNeubrandenburg@t-online.de.

Reprint & Copyright © by Aerospace Medical Association, Alexandria, VA.



Fig. 1. Junkers Ju-52 AE Plane.

sions, personnel needed to operate an airfield medical Remain Over Night area, as well the personnel necessary for operating and maintaining the unit's planes, vehicles and materiel (6,8,17–20). In 1941, AE Units had 29 personnel with 3 Junkers Ju-52s and 2 Fieseler Fi-156s, and by 1942 this increased to 140 personnel with 5 AE Ju-52s, and 1 Transport Ju-52, and 2 Fieseler Fi-156s (1,18). Additional planes could be used by the AE Units on demand when available.

Initially, Ju-52s were adapted to AE needs by installing eight army-type 1937 stretchers (**Fig. 1**). Along each side of the fuselage were two tiers of two litters each. The wounded were loaded through easily accessible, wide cargo doors (about 6 x 6 ft) on the right side of the fuselage or through the smaller personnel doors on the left. Some modifications were made to the extensively used Junkers Ju-52 which, as originally manufactured, had no cabin heating installation, no separate oxygen supply to the stretchers, and no soundproofed fuselage, making it less than desirable for intensive care AE use. From 1941 on, EA Ju-52s for use in Scandinavia or Russia were partially adapted to the AE needs by thermal insulation, cabin heating and a new installation providing support for either 10 (3 tiers left side and 2 tiers right side with 2 litters each) or 12 stretcher patients (2 tiers each side with 3 litters each) with the ability to carry an additional 3 to 5 ambulatory patients requiring medical observation. These units were supplemented with additional Junkers Ju-52s, Fieseler Fi-156s (**Fig. 2**), and ground ambulances (10, 28).

To ensure efficient operations, the commanding officer of an AE Unit had to be kept well informed about



Fig. 2. Evacuation of brain-injured patient by STOL plane Fieseler Fi-156 "Storch."



Fig. 3. Focke-Wulff Fw-200 "Condor" troop-transporter used for AE missions.

the medical situation within the joint warfare environment. While smooth cooperation was widely reported between Navy and Air Force Units, there was occasional friction with the Army over such issues as indications for transport and patient prioritization procedures, mainly due to a lack of understanding of the unique requirements the Air Force had in adhering to the necessary procedures for AE (1,17–22,26). The commanding officer had to know the status of personnel and equipment in the clearing stations, hospitals, and medical depots in the combat zone in order to direct appropriate AE from forward areas, and to manage the air transport of medical personnel and materiel in the opposite direction (28). When active missions were underway, the hospitals had to be informed about the estimated time of arrival in order to start patient selection, complete patient reports, and coordinate ground transport to the airfields. To optimize the feeder service for the troop carriers and ambulance planes, patients were collected and prepared for AE in tents or buildings with Remain Over Night capability. In this way, the turn-around times for patient evacuation could be minimized to a fuel stop (6,10).

With 3–4 Junkers Ju-52s, AE Unit #7, headed by pilot-physician Erwin A. Lauschner (who later became an AsMA Fellow), transported more than 10,000 patients between August 1942 and January 1943 from Africa to Greece, with a refuelling stop on the island of Crete. Although most patients were seriously injured, only five patients were lost in flight ($< 0.05\%$). Lauschner was himself critically injured in a plane crash in 1943 (1,10,20,32). AE Unit #3 had a similar workload and transported a significant amount of predominantly medical materiel (18): 2,660 T/O; 1,172 AE missions; 998 missions in AOR; 52 incidents of hostile fire; 679,000 km total flight distance; 11,761 wounded transported; and 338,229 kg of transported materiel.

While about 80% of the German sick and wounded were transported by regular troop carriers (i.e., with no Red Cross insignia, even when carrying patients, e.g., the Focke Wulff Fw-200 "Condor"; **Fig. 3**), the specialized AE Units of the Luftwaffe concentrated on the transport of seriously injured patients, especially those with injuries to the brain, eye or jaw, thoracic or abdominal wounds, or gun-shot fractures. By the end of WWII about 2.5 million patients were reported to have been transported by German airplanes (28). F3

The German AE organization demonstrated its operational capability during the Polish Campaign in September 1939, during which the ability to transport patients over long distances in a fast and smooth flight proved to be beneficial to the outcome of the transported wounded. It was shown that trauma patients with significant blood loss, with circulatory, cerebral, eye, pulmonary, and abdominal injuries tolerated air evacuation better than expected, and for those with eye and jaw injuries requiring extensive care in homeland hospitals, medically escorted AE was widely used (2,5,25,30,31,34). Patients were rejected for AE only if they were in shock or in danger of collapse, had improperly applied bandages, or were obviously going to die regardless of evacuation or care.

Wounded and vehicular trauma patients were stabilized by the use of cardiovascularly active medications (e.g., intravenous fluids with sodium chloride, tutofusin, or camphor), blood transfusions, rewarming procedures, and surgical interventions with the primary goal of making them stable for AE. The intravenous fluids were also administered in flight in combination with oxygen insufflations, if needed (8).

The Geneva Convention, "Convention for the Amelioration of the Condition of the Wounded and Sick in Armies in the Field" of July 27th 1929, in Articles 18 and 19, states that airplanes used solely for air evacuation

must be painted white, with the medical insignia painted on the upper and lower side of the wing beside the national insignia. Initially the German AE planes were painted all white, making it impossible to camouflage the advancing airfields. Therefore, beginning as early as 1940, camouflage for the AE planes was changed to traditional military camouflage, but with red crosses in circular white fields painted in the prescribed places. Because of the loss of numerous well-marked Junkers Ju-52s in flight by hostile fire, especially in the Mediterranean Sea and on the eastern front in 1943, it became advisable to omit all special identifying insignia, and to have the evacuation planes fly in troop carrier units or with fighter escort. These planes were equipped with a machine-gun for self-protection (7,14,23,28).

The AE Units of the Luftwaffe made an outstanding contribution to military medicine by carrying out this significant number of lifesaving transports under the insignia of the Red Cross of humanity. The experiences were useful for the further development of aeromedical-evacuation organizations worldwide (28).

ACKNOWLEDGMENTS

This research was supported in part by the German Academy for Aviation and Travel Medicine, Frankfurt am Main, Germany. An earlier version of this paper was presented at the 76th Annual Scientific Meeting of the Aerospace Medical Association in Kansas City, MO, May 10th, 2005. I thank Ms. Petra Illig and Dr. David M. Lam for assistance with the English translation.

REFERENCES

1. Fischer H. The German Medical Service 1921-1945: organisation, documents and personal experiences (Der deutsche Sanitaetsdienst 1921-1945. Organisation, Dokumente und persoenliche Erfahrungen). Osnabrueck, Germany: Biblio Verlag; 1982.
2. Hartmann K. Penetrating eye injuries in war. Questions about transport and treatment (Perforierende Augenverletzungen im Kriege. Fragen des Transportes und der Behandlung). Der Deutsche Militaerarzt 1941; 6:76–80.
3. Hippke E. Air service and transport of the sick (Flugdienst und Krankentransport). Der Deutsche Militaerarzt 1936; 1:74–5.
4. Hippke E. On the question of transport of the wounded by aerial means. (Zur Frage des Verwundetentransportes auf dem Luftwege). Der Deutsche Militaerarzt 1936; 1:300–2.
5. Hippke E. On the aerial transport of the sick and wounded (Ueber den Lufttransport Kranker und Verwundeter). Der Deutsche Militaerarzt 1940; 5:1–4.
6. Hippke E. On the organization of the medical service of the former German Air Force (Ueber den Aufbau des Sanitaetswesens der ehemaligen Deutschen Luftwaffe). Wehrdienst und Gesundheit 1960; 1:54–63.
7. Imperial War Museum, UK. HQ U.S. strategic air forces in Europe: air staff post hostilities requirements on German Air Force, Part 7. A.A.F. Sta. 379, U.S. Army; 16th August 1945:71–2.
8. Knoche H. The development and organization of the medical service of the German Luftwaffe 1935-1945 (Die Entwicklung und Organisation des Sanitätswesens der deutschen Luftwaffe 1935-1945) [Medical Theses]. Duesseldorf; 1974.
9. Kowalzig H. Transport of wounded by the aerial route over long distances and at high altitudes (Verwundetentransport auf dem Luftwege über weite Strecken und in groβen Hoehen). Der Deutsche Militaerarzt 1940; 5:10–4.
10. Lauschner E. A. Aerial transport in the medical service (Lufttransport im Sanitaetsdienst). Wehrdienst und Gesundheit 1959; 1:87–118.
11. Link MM, Colemann HA. Medical support of the Army air forces in World War II. Washington, DC: Department of the Air Force, Office of the Surgeon General, USAF; 1955.
12. National Archives. Military archive, Freiburg i. Brsg. (NA-MA): NA-MA 1/42 - List of Luftwaffe units in the war (Liste der Einheiten der Luftwaffe im Kriege v. 19. Juni 1940).
13. NA-MA, RL 2/v 922. - Units and establishments of the Luftwaffe Medical Service 1945 (Einheiten und Einrichtungen der Sanitaetstruppe der Luftwaffe. Stand 20.04.1945, verbessert auf Stand 01.05.1945). OKL Genst. Gen. Qu. 2 Abt. (II F). Nr. 1868/45 g. Kdos.
14. NA-MA, RL 2/1023h. Identifying insignia of medical evacuation planes (Betr. Kennzeichnung von Sanitaetsflugzeugen). OKL Generalstab - Gen. Qu. Az. 11 b 16. 28 Nr. 15162/44 g. Kdos. 2. Abt. (II B), H. Qu., den 19.12.1944.
15. NA-MA RL 4 II/283. Overview of the medical units and establishments of the Medical Service of the Luftwaffe 1944 (Uebersichtsaufstellung der Einheiten und Einrichtungen der San-Truppe der Luftwaffe vom 5. Oktober 1944).
16. NA-MA RL 19/58. Establishment of medical air evacuation companies (Betr.: Aufstellung von Sanitaesflugbereitschaften). Abschrift: Anlage zum 8.3.41. Der Reichsminister der Luftfahrt und Oberbefehlshaber der Luftwaffe, Generalstab Gen.Qu.2.Abt., Az. 11 b 38 Nr. 5538/41 geh. (II A), H.Qu., den 8. März 1941.
17. NA-MA RL 26/45. War diary of AirMedEvac Unit # 2 (Luftarchiv Ktb. 22. Nov. 1941 - 22. Jan. 1944 - SanFlugber. 2).
18. NA-MA RL 26/46. AirMedEvac Unit # 3 personnel and material, change of (SanFlugber. 3. Aenderung der K.St.N (Luftw.) Nr. 5393 (L) vom 1.5.41Luftarchiv Anl. z. Ktb. 1 12.Nov.1941-29.Juni1942, Schr. Az 20 Tgb. Nr. 398/41 v. 19.11.41).
19. NA-MA RL 26/47. War diary of AirMedEvac Unit # 6 (SanFlugber. 6 Ktb. # 1 24.03.1941 - 31.12.1943).
20. NA-MA RL 26/48. War diary of AirMedEvac Unit # 7 (SanFlugber. 7 Ktb. # 8 14.04.1943 - 31.07.1944).
21. NA-MA RL 26/48. War diary of AirMedEvac Unit # 17 (SanFlugber. 17 Ktb. # 2 01.01.1942 - 24.07.1942).
22. NA-MA RL 26/78. War diary of Neurosurgical MedEvac Unit # 2/VIII (Lw.Sanitaets-Bereitschaft (mot.) 2/VIII 1943 (hirnchir.)).
23. NA-MA RL 29. German Air Force sea rescue units (Dienststellen und Einheiten des Seenotdienstes der Luftwaffe).
24. NA-MA RL 35/28. Personnel of the Condor Legion (Personalliste, Stand vom 25.12.1938, Legion Condor San.-Abt./88 an S/88 Abt. 2B).
25. Schaltenbrand G. Concerning the results of aerial transport of the brain-injured (Ueber die Wirkung des Flugtransportes auf Hirnverletzte). Der Deutsche Militaerarzt 1939; 4:208–11.
26. Schmidt F. Transport of the wounded by planes (Verwundetentransport im Flugzeug). Der Deutsche Militaerarzt 1940; 5:7–10.
27. Scholl MD, Geshekter CL. The Zed Expedition: the world's first air ambulance? J Roy Soc Med 1989; 82:679–80, and corrective letter to the editor: Lam DM. J Roy Soc Med 1990, 83: 811.
28. Schroeder O. Air evacuation of the wounded. In: Department of the Air Force: German aviation medicine World War II, Ch. XII-A. Washington, DC: Dept. of the Air Force; 1950:1133–7.
29. Siebenhuener W. The airplane in the medical service (Das Flugzeug im Sanitaetsdienst). Reclams Universum 1926; 42:1243–4.
30. Toennis W. The aerial transport of the wounded and sick as a medical problem. (Der Lufttransport von Verwundeten und Kranken als aerztliches Problem). Der Deutsche Militaerarzt 1940; 5:5–7.
31. Toennis W. The treatment of gun-shot-injuries of the brain and a critical examination of their follow-up (Richtlinien fuer die Behandlung der Schussverletzungen des Gehirns und die Beurteilung ihrer Folgzustaende). Muenchen-Berlin: J. F. Lehmanns Verlag; 1942.
32. Valentin R. Doctors in the Desert War - the German Medical Service in the Africa theatre 1941-1943. (Der deutsche Sanitaetsdienst im Afrikafeldzug 1941-1943). Koblenz: Bernard & Graefe Verlag; 1984.
33. Von Rausch G. The green hell air war. Air Enthusiast Quarterly 1977; 2:207–13.
34. Walther G. Results of the meeting of the medical consultants to the Armed Forces in the Military Medical Academy of Berlin, January, 3rd–4th 1940 (Die Ergebnisse der Tagung der Beratenden Aerzte am 3. und 4. Januar 1940 in der Militaeeaerztlichen Akademie zu Berlin). Der Deutsche Militaerarzt 1940; 5:127–30.

AQ: 2