Safety and Feasibility of Long-Distance Aeromedical Transport of Neonates and Children in Fixed-Wing Air Ambulance

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Abstract

In cases of critical injury or illness abroad, fixed-wing air ambulance aircraft is employed to repatriate children to their home country. Air ambulance aircraft also transport children to foreign countries for treatment not locally available and newborns back home that have been born prematurely abroad. In this retrospective observational study, we investigated demographics, feasibility, and safety and outcomes of long-distance and international aeromedical transport of neonates and children. The study included 167 pediatric patients, 56 of those preterm neonates. A total of 41 patients were ventilated, 45 requiring oxygen prior to the transport, 57 transferred from an intensive care unit (ICU), and 48 to an ICU. Patients were transported by using Learjet 31A, Learjet 45, Learjet 55, and Bombardier Challenger 604, with a median transport distance of 1,008 nautical miles (NM), median transport time of 04:45 hours (median flight time = 03:00 hours), flight time ≥8 hours in 15 flights, and transport time ≥8 hours in 29 missions. All transports were accompanied by a pediatric physician/nurse team. An increase in FiO_2 during the transport was documented in 47/167 patients (28%). Therapy escalation (other than increased oxygen) was reported in 18 patients, and technical adverse events in 3 patients. No patient required CPR or died during the transport. Clinical transport outcome was rated by the accompanying physician as unchanged in 163 transports, improved in 4, and deteriorated in none. In summary, international, long-distance transport of neonatal and pediatric patients performed by experienced and well-equipped transport teams is feasible. Neither major adverse events nor physician-rated clinical deteriorations were observed in this group of patients.

Keywords
- pediatric
- neonatal
- transportation
- air ambulance

Introduction

A New York University study reported in 2017 that 88% of families are either “very likely” or “likely” to travel with their child or children in the coming 12 months.[1] In cases of critical injury or illness, fixed-wing air ambulance aircraft is employed to repatriate children (and adults) from hospitals abroad back to their home country. Furthermore, air

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ambulance aircraft also transports children to foreign countries for advanced treatment, which is not available at local medical facilities, and also transporting newborns back home who have been born prematurely while the pregnant mother was traveling. Children and neonates make up a small but unique segment in the air ambulance population that contributes less than 10% to the overall number of patients moved internationally.[2,3] Long-distance transports of pediatric and neonatal patients entail specific challenges in respect to equipment, personnel, and transport logistics. However, the majority of published data on pediatric and neonatal transfers focuses either on regional neonatal or pediatric emergency transport services (NETS and PETS transport systems) or on hospital-based transport programs for highly specific indications such as extracorporeal membrane oxygenation. There is limited, if any, data on international, long-distance, pediatric aeromedical transports.[3–11] In this paper we report demographics and transport characteristics of a large group of children and neonates that have been transported by international fixed-wing air ambulance by a European air ambulance company over a 5-year period. This retrospective, observational study aimed to investigate the feasibility and outcomes of international, long-distance aeromedical transport of neonates and children by analyzing transport-associated therapy escalations, autoevaluated transport outcomes, and occurrences of adverse events (AE) en-route.

Materials and Methods

Data Capture and Analysis

A retrospective review of all transports of patients aged <18 years at the time of transport (transported by Jetcall air ambulance, Idstein, Germany between January 1, 2015 and December 31, 2019 [5-year period]) was conducted by using the organization's standardized transport protocols, AE reporting forms, and filed medical reports.

Transport specific data were extracted from the transport protocol: point of origin, destination (city, country, continent); hand-over and take-over points (hospital ward, intensive care unit [ICU]); airport); flight time (take-off to touchdown, including fuel stops if any); transport time (patient take-over to hand-over); number of fuel stops; cabin pressure; and single or multipatient transport. Transport distance was calculated in nautical miles (NM) from airport of origin to the destination airport by using a great circle mapper (www.gcmap.com). Transports were grouped into either repatriations (transport home from vacation or home from a higher level of care) versus medical transfers from a place of residence to a higher level of care.

Demographics (age on the day of transport, prematurity at birth, and sex) and medical data on the diagnostic indication for transportation (full text and grouped in prematurity, accident/drowning, congenital heart disease [CHD], infection, hematological/cancer, and others) were extracted from the transport protocol. In addition, medical data on ventilation (yes/no, type), oxygen requirement (yes/no, flow rate), inotropic therapy (yes/no, type), type of venous access, and drains and sedation requirements were captured. Disease severity was documented by using the National Advisory Committee for Aeronautics (NACA) and Stratification of Air Medical Transport by Expression of Symptoms in Patients (STEP) scores.[12,13] A need for therapy escalation was defined as any increase of already existing therapy (i.e., increase in dosage or frequency of a medication or IV fluid, positive end-expiratory pressure, or other ventilation settings). New therapeutic interventions (i.e., new medication, new vascular access, new gastric tube, or initiation of invasive, or noninvasive ventilation [NIV]) were extracted from the transport protocol and grouped into interventions prior to commencing transport (e.g., at handover) or during the transport (e.g., during road ambulance transport to and from the airport or in flight). At the end of each transport, the accompanying physician rated the clinical outcome as either unchanged, improved, or deteriorated, and these data were also extracted from the transport protocol. Medical and technical/operational AEs, such as ground ambulance not arriving or aircraft or equipment breakdown, were collected by analyzing the organization's AE reporting system. The AE reporting forms are stored on every airplane. Medical and flight crews are instructed to report (anonymous if preferred) unforeseen events that either did, or could have had, a potentially negative or adverse effect on the mission outcome, conduct, timing, or safety. They are instructed to report these events regardless of whether the patient, crew, aircraft, or operational integrity of the mission are affected (►**Supplementary Fig. S1** [available in the online version]). All AE reports are reviewed by the organization's safety team on a bi-monthly basis.

Transport System

All patients were transported by using a either a Learjet 31A (not used for incubator transports due to the small fuselage and blocking of the emergency exit by the incubator), a Learjet 45, a Learjet 55 (used only for a small number of patients in 2015, this aircraft was later replaced by the Learjet 45), or a Bombardier Challenger 604 long-distance air ambulance aircraft (joined the fleet in September 2018). In these aircraft, like for commercial airliners, cabin pressure equilibrates to an elevation of 4,000 to 6,000 feet (ft) on standard flight levels between 35,000 and 45,000 ft (resulting in a volume increase of trapped gases and a decrease in pO_2). The aircraft cabin pressure could be kept at sea level when medically indicated; however, this would require restricting the maximum flight level to 25,000 ft and accepting the potential need for additional fuel stops due to greater fuel consumption, less economical flight performance, and weather induced turbulence at lower flight levels.

Neonatal patients were transported in an Air-Shields T1500 incubator (Air-Shields; Hatboro, Pennsylvania, United States) or a Babypod (used in infants with a body weight >2,500 g, Advanced Healthcare Technology Ltd., Potters Bar, Hertfordshire, United Kingdom). Ventilated patients (invasive ventilation, NIV, nasal continuous positive airway pressure, or high flow) were ventilated with either a Stephan EVE TS, a Stephan F120 Mobile Ventilator (Fritz Stephan GmbH, Gackenbach, Germany) or a Draeger Oxylog 3000 (Dräger Safety AG & Co. KGaA, Lübeck, Germany). From 2019 onward, all ventilated patients were ventilated with the Stephan EVE TS, with humidified and warmed air by using a Fisher & Paykel MR850 ARU humidifier (Fisher & Paykel Healthcare, Auckland, New Zealand).

The incubator/stretcher was fixed on a Spectrum Aeromed 20/2200 Stretcher Base Module (Spectrum Aeromed, Fargo, North Dakota, United States) or a Lifeport ALS Base Module with AeroSled Stretcher (Lifeport Air Medical Solutions, Woodland, Washington, United States) during the transport. The stretcher base module contains an air compressor, a vacuum pump, and a converter to supply four 220V power outlets and 3,400 L of oxygen. Since all aircraft other than the Learjet 31A are used in double stretcher configuration, there are 6,800 L of oxygen in fixed tanks in the stretchers available, as well as an additional portable 8 L cylinder filled with 300 bar and two portable 2 L cylinders filled with 300 bar, providing an additional 3,600 L of oxygen that can also be used during ground transports if needed. Standard air ambulance equipment, including monitoring (oxygen saturation, heart rate, invasive and non-invasive blood pressure, and temperature), ventilator, suction pump, infusion pumps and syringe drivers, portable blood gas analyzer and portable ultrasound, a wide array of intravenous, and oral medications etc. was available on board. The organization is fully accredited by the European Aeromedical Institute (EURAMI) for adult, pediatric, and neonatal critical care transports since 2010 and is audited by EURAMI on a regular basis.

Transport Teams

Transport teams consisted of two medical team members, one physician (either a general pediatrician, neonatologist, pediatric cardiologist, or pediatric intensivist), one pediatric nurse, and two or three pilots dependent upon transport distance and duration. Transport team physicians and nurses were qualified, and had experience, in critical care, and underwent theoretical and practical team training pertaining to all equipment according to the instructions by the manufacturers and received aeromedical and aviation safety training with Jetcall. The training curriculum can be found as ►**Supplementary Table S1** [available in the online version]).

Statistics

Data are expressed as median with range for continuous variables and number and/or frequency (%) for binary or categorical data. Statistical testing for binary or categorical variables was performed by using Fisher's exact test. All p-values are two-tailed and considered significant if $p < 0.05$.

Institutional Review Board

The project plan was presented to the ethics review board of the German (Hessen) Chamber of Physicians in Frankfurt/Germany, who granted an exemption of formal ethics board review and a waiver of patient informed consent due to the retrospective nature of the analysis without any interventions imposed on the patient by the analysis. The principles of the Declaration of Helsinki and data confidentiality were followed throughout the conduct of this retrospective analysis.

Results

Out of a total of 2,388 international long-distance air ambulance transports conducted by the organization during the observation period, there were 167 patients between the ages of 0 and 18 years (7%). Transports were performed with four different types of aircraft: Learjet 31A (42 transports), Learjet 45 (105 transports), Learjet 55 (5 transports), and Bombardier Challenger 604 (15 transports). All aircraft and configuration are depicted in ►**Fig. 1**. The longest transport distance was 8,660 NM from Bangkok, Thailand to Raleigh-Durham, North Carolina, United States, with a transport time of 25:00 hours (flight time 24:10 hours). The shortest transport distance was Paris, France to Frankfurt, Germany, 254 NM with a transport time of 03:00 hours (flight time 00:45 hours). Median transport distance was 1,008 NM, median transport time 04:45 hours (median flight time = 03:00 hours), flight time was ≥8 hours in 15 flights, transport time was ≥8 hours in 29 missions. Most transports originated and terminated in Europe ($n = 129$ and $n = 162$, respectively), with 12 transports from Africa, 16 from Asia, 9 from North America, and 1 from South America. Other than Europe, two transports ended in Asia and three in North America. Thirteen patients were transferred as combined transports (i.e., two patients on board ($n = 5$) or three patients on board [$n = 1$]). These flights included three sets of twins and several families after accidents with more than one family member affected. The cabin was pressurized to sea level in 10 transports to avoid ambient pressure changes, these flights included patients with pneumothoraxes without a drain or recent craniotomy.

The majority of transports were repatriations (transport home from vacation or home from a higher level of care, $n = 145$) versus medical transfers (from a place of residence to a higher level of care, $n = 22$). The majority of take-overs occurred in the referral hospitals setting ($n = 126$, 57 of those from ICU), fewer take-overs occurred at the airport ($n = 33$), and the fewest number were picked-up at home or in a hotel ($n = 8$). Accordingly, most patients were handed-over in the receiving hospitals ($n = 136$, 48 of those in ICU), some at the destination airport ($n = 23$) and eight brought home.

Of the 167 patients, 74 were females and 93 males. The age at transport for premature neonates is shown in ►**Fig. 2**, the youngest premature neonate ($34^{3/7}$ weeks of gestational age [GA]) was 7 days old at transport, the oldest 150 days ($24^{0/7}$ weeks of GA), with a median of 35.5 days. The age distribution for all other children transported is shown in ►**Fig. 3**, with the youngest child being 3 days at transport (CHD) and the oldest 17 years 9 months (accident). One or both parents accompanied 80% of all transports.

Preterm birth was the most common, main diagnostic group ($n = 56$, including two neonates with CHD), followed by accident/drowning ($n = 41$), infection ($n = 16$), hematological/cancer ($n = 15$), CHD including two preterm neonates ($n = 12$) and other ($n = 29$). Detailed diagnoses for this group can be found listed in ►**Supplementary Table S2** (available in the online version). Diagnostic groups and further medical details for repatriations versus medical transfers are shown in ►**Table 1**. Medical details for neonates

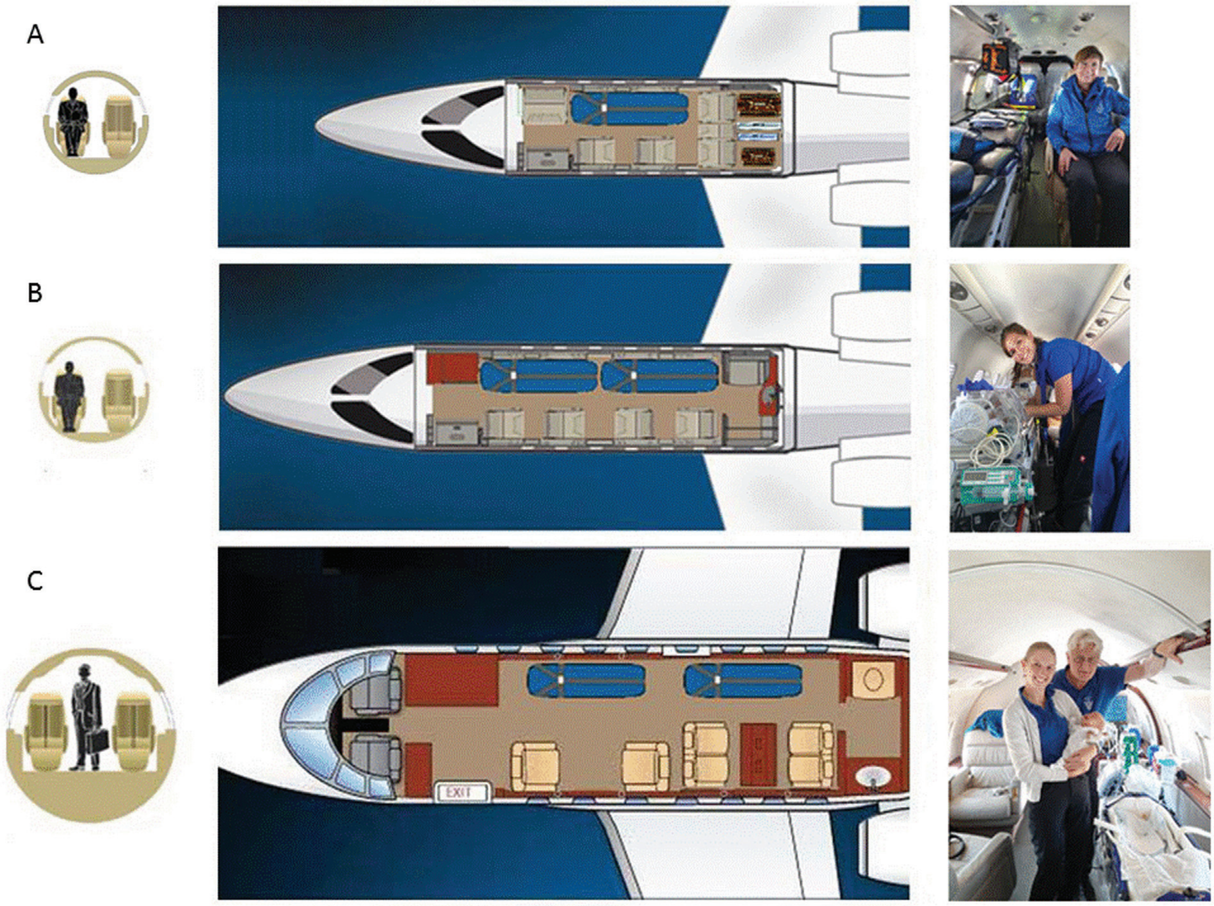

Fig. 1 Main aircraft types used in this study with cabin configuration, cross-sections, and interior layout. (**A**) Learjet 31A, (**B**) Learjet 45, (**C**) Bombardier Challenger 604.

born preterm compared with all other patients are shown in ►**Table 2**. Median NACA score was 3 (range = 1–5) median STEP score was 3 (range = 1–4).

A total of 41 patients were ventilated, 20 of those with NIV, 17 were intubated with an endotracheal tube, and 4 ventilated over a tracheostomy. Of the 20 patients on NIV, 14

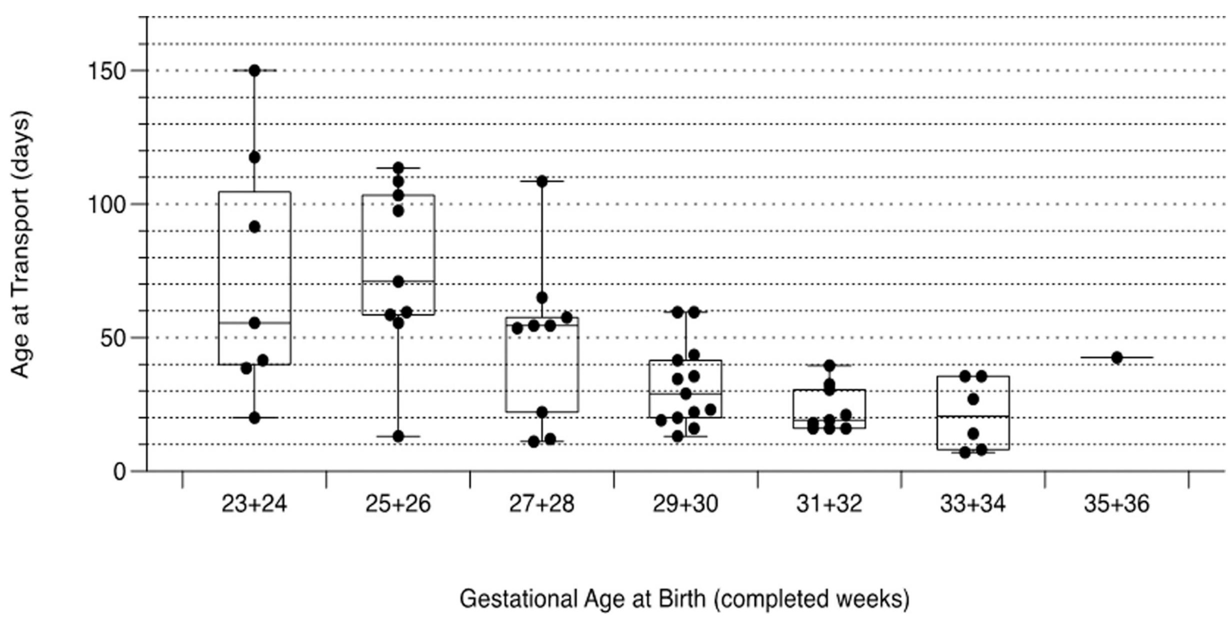

Fig. 2 Neonates born prematurely abroad ($n = 56$): age at transport in days (y-axis) grouped by gestational age at birth in completed weeks (x-axis). Individual cases are shown as dots, boxes show median, Q1 and Q3 and whiskers show minimum and maximum.

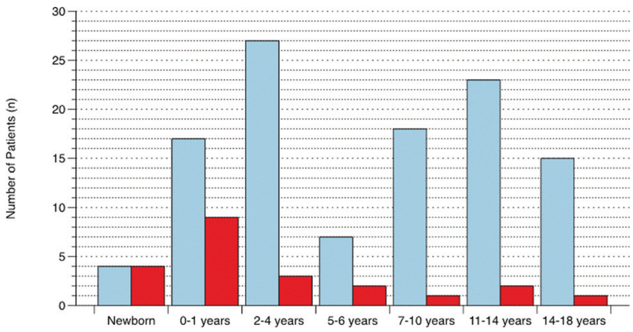

Fig. 3 Age distribution of all patients other than prematurely born neonates (blue, $n = 111$) and age distribution of children transported as medical transfers (red, $n = 22$)

had a fraction of inspired oxygen (FiO_2) greater than 0.21 prior to transport and 9 of those had the FiO_2 increased in flight (plus 2 who were on room air prior to take-off but needed oxygen in-flight). Likewise, of the 17 intubated patients, 14 had a FiO_2 greater than 0.21 prior to transport and 3 of those had the FiO_2 increased in flight (plus 1 who was on room air prior to take-off but needed oxygen in-flight). All four ventilated patients with tracheostomy needed oxygen prior to take-off, but none had an increased oxygen demand during the transport. Out of the 126 nonventilated children, 13 were on oxygen prior to transport, of which 6 needed an increased FiO_2 during the flight, and 27 were on room air prior to take-off but needed in-flight oxygen. In total, 18 patients had a blood gas analysis performed during transport. Overall, an increase in FiO_2 during transport was documented in 47/167 patients (28%). When comparing the effect of cabin pressurization, we observed that fewer patients had an increased FiO2 requirement when transported at sea-level cabin pressure, only 1/10 patients, than when transported at standard cabin pressure, 46/157 patients, although this difference did not reach statistical significance. Therapy escalations separate from increased oxygen requirements were reported in 18 patients which included: increase of sedation ($n = 8$), analgesia ($n = 4$), ventilation parameters ($n = 3$), and volume therapy ($n = 3$). In addition, a total of 10 therapeutic interventions were documented, five those prior to the transport (3× IV access, 1× start of analgesia, 1× start of sedation), and five during the transport (1× IV access, 1× gastric tube, 1× commencement of NIV, 1× commencement of IV fluids, and 1× commencement of enteral feeding). A total of three AEs were reported including a road ambulance burst tire, a transient ventilator failure during road transfer, and a transient technical malfunction of the aircraft that delayed take-off; however, none of these AEs resulted in a negative outcome for the patient or crew. No patient required cardiopulmonary resuscitation or died during the transport. Clinical transport outcome was rated by the accompanying physician as unchanged in 163 transports, improved in four and deteriorated in none.

Discussion

The data reported in this study show that intercontinental, fixed-wing, and air ambulance transport of pediatric patients is feasible and safe, even over very long distances, when performed by experienced and specialized transport teams. Our analysis is supported by a study published by Mortamet that showed comparable results on a group of 96 patients; however, in that dataset, only 53 children were transported by air ambulance aircraft and 43 by scheduled airlines with overall shorter transport time and distances than reported here.[3]

Transport of children and neonates is a rare occurrence in the daily business of an air ambulance company. It is well known that a lack of adequate equipment and low skill levels of the personnel involved in the transport increases the risk

Table 1 Patient characteristics of preterm neonates versus all other patients

	All patients excluding preterm neonates ($n = 111$)	Preterm neonates[a] ($n = 56$)	*p*-Value
Ventilated	23 (21%)	18 (32%)	NS
Of those NIV	6 (5%)	14 (25%)	$p < 0.01$
Of those invasive ventilation	17 (15%)	4 (7%)	NS
Inotropes	6 (5%)	0	NS
CVCs	33 (30%)	6 (11%)	$p < 0.01$
Arterial line	5 (5%)	0	NS
Chest drains	4 (4%)	0	NS
CSF drain	4 (4%)	2 (4%)	NS
Gastric tube	29 (26%)	38 (68%)	$p < 0.01$
Therapy escalation	12 (11%)	6 (11%)	NS
Intervention before/during the transport	3 (3%)/1 (1%)	1 (2%)/4 (7%)	NS

Abbreviations: CVC, central venous catheter; CSF, cerebral-spinal fluid; NIV, noninvasive ventilation; NS, not significant.
[a]For additional diagnoses, see ►**Supplementary Table S3** (available in the online version).
Note: Medical details grouped into all patients excluding preterm neonates ($n = 111$) and preterm neonates ($n = 56$). Statistical testing for significance was performed by using Fisher's exact test.

Table 2 Patient characteristics of repatriations versus medical transfers

	Repatriations ($n = 145$)	Medical transfers ($n = 22$)	p-Value
Diagnosis			
Preterm birth	55 (38%)	1[a] (5%)	$p < 0.01$
CHD	5 (3%)	7[a] (32%)	$p < 0.01$
Hematological/cancer	9 (6%)	6 (27%)	$p < 0.01$
Accident/drowning	39 (27%)	2 (9%)	NS
Infection	15 (10%)	1 (5%)	NS
Others	23 (16%)	6 (27%)	NS
Parents not on board	20 (14%)	6 (27%)	$p < 0.05$
Ventilated (invasive and NIV)	34 (23%)	7 (32%)	NS
Inotropes	2 (1%)	4 (18%)	$p < 0.01$
CVCs	31 (21%)	8 (36%)	NS
Arterial line	3 (2%)	2 (9%)	NS
Chest drains	4 (3%)	0	NS
CSF drain	6 (4%)	0	NS
Gastric tube	60 (41%)	7 (32%)	NS
Therapy escalation	15 (10%)	3 (14%)	NS
Intervention before/during the transport	5 (3%)/5 (3%)	0	NS

Abbreviations: CHD, congenital heart disease; CSF, cerebral-spinal fluid; CVC, central venous catheter; NIV, noninvasive ventilation; NS, not significant.
[a]One infant with CHD was also born prematurely.
Note: Medical details comparing of repatriations ($n = 145$) to medical transfers ($n = 22$). Statistical testing for significance was performed by using Fisher's exact test.

of serious adverse events, at least in the transport of severely ill newborns,[6] while specialized teams are reported to have fewer en-route complications.[14,15] Therefore, it seems natural to use pediatric transport teams for this specific group of patients. However, even in organizations with a high pediatric case load such as ours, pediatric transports have a frequency of less than one per week, requiring a strategically planned training schedule to ensure up-to-date aeromedical training, aviation safety, and familiarity with the equipment on-board for pediatric teams with a comparable low overall mission exposure.

The majority of repatriated patients in this study were preterm neonates, born while mothers were traveling abroad or living/working as expatriates. This high number of preterm neonates in our patient collective is not particularly surprising, given that an increasing number of women are traveling during pregnancy. Some studies report that greater than 50% of pregnant women travel abroad during pregnancy and over a third of those embark on long-distance, intercontinental trips. The risk of preterm delivery, prior to 37 weeks of GA, is currently estimated at approximately 8% in a first observed pregnancy with an increased risk up to 30% in women with a history of preterm delivery.[16,17] The optimal time to transport preterm babies remains an area of debate. Individual risk-benefit assessments must be taken into account balancing inherent transport risks with the patient's clinical condition and locally available resources.[11,18–20] The preterm infants in this series were transported at a median age of 35.5 days (range = 7–150 days), with a trend toward earlier transport in less premature babies. The first 5 days of life, shown to carry the highest risk of death in premature infants, have been avoided in all infants.[21]

Expectedly, children transferred for specialized medical treatment differed in respect to diagnosis from the group of those repatriated home after illness or injury abroad, with CHD and hematologic/cancer being the most common diagnostic groups in medical transfers, whereas preterm birth and accident/injury being most prevalent in repatriated children. However, severity of illness indicators such as the number of ventilated patients, drains, lines, and interventions were comparable between groups. One difference we observed was that inotropes were more commonly used in medical transfers, and this was most likely a result of the higher number of patients with cardiac conditions.

The transport of a critically ill child is a stressful event for both, the parent and the awake patient. Parental accompaniment during transport is highly desired by parents and children alike.[22] One specific feature about an air ambulance transport is the limited cabin space available inside the aircraft, with the inability to separate the parents from the child in case of necessary and emergency medical interventions, such as intubation and CPR. However, there has been a notable culture shift in the clinical practice of allowing parental support during invasive procedures, and even promoting parental involvement during resuscitation in the ED or ICU setting.[23] It is our daily practice to clearly communicate the limited cabin space available, potential need for therapeutic interventions and the potential parental impact this may have in advance of the flight. Accordingly, in the dataset reported here, most children were accompanied by one or both parents.

Transportation of critically ill patients, intra- or inter-hospital, always involves risks when resources are limited. One study reported that 43% of all medical errors impacting ICU patients occurred outside of the ICU.[24] With aeromedical transports, additional risk factors are introduced. The physiological effects of altitude, when both pressure and density decline, can lead to hypobaric hypoxia and gases trapped in body cavities will expand and cause stress on tissue. Road or air retrieval confers exposure to additional environmental stressors, such as sound, vibration, and bright light because of transit through different environments and vehicles.[25] In a study on air transportation of pediatric patients, Carreras-Gonzalez et al reported a high rate of en-route complications in a group of intrahospital transfers, with 20 major and 68 minor AEs, including one death, in 388 transfers by air.[26] Löllgen et al reported that acute oxygen desaturations occurred during aeromedical transport in up to 32% of infants that had needed no additional oxygen prior to transport.[8] In contrast, however, Hun et al report a high rate of necessary ventilator setting adjustments during transport, but showed no difference in the frequency of interventions when comparing ground and air transportation.[27] It is difficult to compare these studies that focus on interhospital transfer of acutely ill children (and adults) who are often transferred to a higher level of care in a state of deterioration and instability to the collective of this study.

In the 167 children reported here, the rate of AEs, therapy escalation, interventions, and unfavorable outcomes was low, despite approximately 25% of patients being ventilated (invasively or noninvasively), approximately 30% being either picked up at or delivered to an ICU, and approximately 25% requiring oxygen already prior to the transport. This might be a reflection of the high portion of repatriations from European holiday destinations with a high standard of care in the country of origin. The children transported as medical transfer from their country of residence to specialized centers abroad had comparable low rates of AEs, therapy escalation, interventions, and unfavorable outcomes, most likely highlighting the nonemergency character of most of these international fixed wing air ambulance transfers.

While fitness-to-fly assessments for children by commercial airlines follow more or less standardized criteria,[28] such assessments to transfer a child in an air ambulance almost always come down to individual risk-benefit analyses that take into account the levels of care available at the referring location, individual transport risks, and the willingness to invest in sufficiently large and capable transport options.[29,30] The positive outcomes and low complication rates reported here support the hypothesis that assistance companies, health insurance providers, and government organizations have been making decisions that follow reasonably conservative assumptions on pre-transport safety and stability, and that have been careful to error on the side of not transporting overly critical, unstable patients.

This study has some obvious limitations. First, the data presented and case-mix reported is from a single organization, with company-specific mission and customer profiles. However, Jetcall has a diverse portfolio of clients, including travel insurance/assistance companies, NGOs and governments, to the best of our knowledge, is representative of most international air ambulance organizations. Furthermore, since German Law mandates a physician on board of an air ambulance, all missions reported here were accompanied by a pediatric physician/nurse team. Therefore, it remains unclear whether comparable results could be achieved by transports without physician presence or lacking a specialized pediatric team. While data from other geographic regions show that nurse/nurse, nurse/paramedic, and nurse/respiratory therapist teams achieve results that are comparable with physician staffed systems,[31] we would be careful to challenge a non-pediatric transport team with such a specialized group of patients, even if we clearly are not able to compare the outcome of pediatric and non-pediatric transport teams.

Future collaborative studies could address outcomes up to hospital discharge after international long-distance aeromedical transport of children and neonates to better understand the effects of transport on overall prognosis. A prospective study design would be able to include acuity scores, such as the Pediatric Risk of Mortality (PRSIM III) scoring system and/or other scoring systems, to more accurately differentiate between expected and observed mortality and morbidity during and after pediatric, long-distance aeromedical transport. This would also enhance the ability of the dataset to describe safety characteristics using objective, biological parameters rather than having to rely on AE reporting and autoevaluation of mission outcomes.[32,33]

Conclusion

This study shows that international, long-distance transport of neonatal and pediatric patients, when performed by transport teams composed of experienced, well-equipped, and specialized pediatric team members, is feasible. With the exception of increased FiO2 requirements during transport, adverse events, unexpected deterioration and therapy escalation were rarely observed.

Conflict of Interest

A.V., S.K., D.S., M.D., D.F., C.R., and R.P. are employed by, or shareholders of, Jetcall GmbH & KoKG and receive as such an honorarium.

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