

# Rescue from the Air

Air rescue operation profiles in Europe and the U.S. increasingly require the use of a compact ventilator with clinical capabilities. Air Evac, an air medical service company based in Missouri, will also soon be utilizing the Dräger Oxylog 3000 for **EMERGENCY TRANSPORT VENTILATION**



This Air Evac Lifeteam helicopter has landed safely; the patient can now be transferred to an ambulance

## ALTHOUGH THE QUICK FLIGHT

to the scene of an accident is still an important element of an air medical rescue operator's repertoire, changes in the hospital landscape have led to a shift of emphasis. Helicopters are increasingly being used to transfer patients from one clinic to another. Prior to these changes, simple ventilators were sufficient to ensure controlled breathing during transport. Now, however, the increasing demands are requiring the use of ventilators that meet critical-care performance criteria.

The general technical demands of the task haven't changed, however—small

installation spaces, strict adherence to the tight restrictions on helicopter payloads, and resistance to vibrations are still essentials.

## Helicopters save lives

Air rescue has a long tradition. Back in 1966, the U.S. National Academy of Sciences published a White Book on Death and Invalidity that criticized the lack of coordinated action with regard to the rescue of injured individuals, thereby laying the foundation for the creation of an organized civil rescue service in the U.S. Then, in 1972, the first civil rescue med- >

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**ABSTRACT** Structural changes in healthcare systems are creating new challenges for air rescue services in Europe and the U.S. Cutbacks in treatment capacity in rural areas are leading to an increased need for patient transfer services, and the strategy for providing air rescue coverage has been adapted to meet the new demands. Rescue helicopters are no longer utilized solely for primary-care operations but are also increasingly being used for the provision of inter-hospital transfers.

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# Ventilation is the key to air rescue operations

> ical helicopter began operating out of St. Anthony's Hospital in Denver, Colorado. Germany was actually ahead of the rest of the world in the civilian use of helicopters for air rescue operations at this time, as its first rescue helicopter—Christoph 1—had gone into operation at Munich-Harlaching Hospital on November 1, 1970. Germany had become a mass-motorized society by the end of the 1960s. As a result, the number of traffic fatalities rose to nearly 20,000 per year—but ground rescue services were not available throughout the country, nor were they equipped to provide qualified onsite medical care.

In 1972, the German federal government therefore procured several helicopters which were made available to the German states for medical rescue purposes. As a result, Germany was able to establish 22 air rescue locations, providing nearly nationwide coverage for helicopter rescue services. Today, Germany has more than 75 such helicopter bases. In 1974, the U.S. decided to introduce a nationwide air rescue system, which today encompasses an impressive fleet of more than 800 helicopters and 150 ambulance aircraft.

## Ventilation on demand

A compact, high-performance ventilator is a must for both the emergency rescue and inter-hospital transfer systems today. This is especially true when critical-care ventilation quality is required in small spaces. In fact, ventilation is a crucial aspect of air rescue operations, because trauma patients flown by helicopter are ventilated much more frequently than patients transported in ambulances. What's

more, an ambulance can pull over to intubate a patient whose condition has deteriorated—but this is not an option in a helicopter.

Germany's ADAC Air Rescue division has therefore chosen to utilize the Dräger Oxylog 3000—with good reason. For example, the share of critical-care transports between clinical centers has increased significantly. At some medical helicopter rescue bases, these transfers now account for more than 30 percent of all flights. In such a situation, it's extremely helpful for therapeutic continuity if the different ventilation modes used by the clinics can be provided as needed in transit.

This is in fact the greatest strength of the Oxylog 3000—one which has ensured it a high market share in the air rescue sector in Germany. The compact unit utilizes the most common emergency ventilation modes, IPPV and SIMV. It also offers assisted ventilation and can measure the patient's spontaneous breathing, providing ventilation support only as it is needed (CPAP, ASB). Its performance also extends to the pressure-controlled BIPAP ventilation mode. Non-invasive ventilation (NIV; see also p. 10) can be activated as a supplementary function in the pressure-controlled ventilation modes BIPAP and CPAP.

“Because German medical helicopter rescue missions fly almost exclusively with anesthetists, there is a tendency to sedate the patient only as much as is necessary during the intubation in order to maintain their spontaneous breathing,” says Peter Dietl, who is responsible for air rescue applications at Dräger.



Perfect preparation ensures that

The German Air Rescue Service (DRF) also ventilates its patients in helicopters with the Dräger Oxylog 3000. “There were two important reasons for us to switch over to this unit,” says DRF medical director Dr. Jörg Braun. “Firstly, the previous distinction between primary-care and clinic-transfer helicopters is no longer present. Nearly all of our helicopters are now in dual use: they are employed for both acute emergency rescues and inter-hospital transfers. The Oxylog 3000 is a compact emergency ventilator that is equally suitable for both applications, and it can be used to ventilate 99 percent of all patients.” The device thus offers advantages in direct rescue situations just as it does in critical-care transfer operations.

Rescue helicopters generally first serve to transport emergency physicians onsite. The patients receive medical treatment there, and, if necessary, the helicopter subsequently acts as an ambulance aircraft, moving patients to the hospital most



PHOTOGRAPHY: PICTURE-ALLIANCE, ADAC

things get off to a fast start—when transferring patients and certainly in an emergency

suiting to their needs. “Non-invasive mask ventilation is an interesting option,” says Braun. “Whether the situation involves COPD or asthma, skilled personnel can often use it to avoid intubation.”

### Air Evac rescues in rural areas

The development of Germany’s hospital landscape is similar to what has happened in the U.S., where, according to a 2006 study conducted by the Foundation for Air-Medical Research and Education (FARE), “...the closure of rural hospitals because of reimbursement and other financial pressures, or their conversion to Critical Access Hospitals (CAHs) with reduced services and fewer specialist physicians, has created large geographical gaps in the availability of specialized surgical resources.

Unfortunately, these rural areas are also the location of the most serious car crashes and are where 60% of fatal crashes in the U.S. occur, a rate nearly >

## Air rescue with the Oxylog 3000

Along with traditional volume-controlled ventilation modes such as IPPV (purely volume-controlled) and SIMV (synchronized ventilation), the Oxylog 3000 also offers the BIPAP (ASB) and CPAP/ASB ventilation modes, which are used in state-of-the-art critical-care applications. CPAP/ASB supports spontaneous breathing, which eliminates the need to sedate the patient. BIPAP/ASB offers an additional pressure-controlled ventilation mode with simultaneous pressurized support of the patient’s spontaneous breathing. These advanced ventilation modes fully support the continual ventilation of patients in critical condition who are being transferred from one hospital to another. The Oxylog 3000 can even be used to continue a ventilation separation procedure that has already been started.

The unit also offers the option of non-invasive mask ventilation (NIV) with automatic leakage compensation, thereby making it possible to avoid the intubation of critical-care patients in the pre-hospitalization phase.

## Regular civil air rescue operations began in the 1970s

> double that of similar accidents in suburban or urban areas.” Medical rescue helicopters can help here by filling these gaps in coverage and improving access to special clinics.

Air Evac Lifeteam specializes in helping to close such rural bottlenecks—and with 78 air rescue bases, it’s the number two air rescue service in the U.S. The company operates in 12 U.S. states and is the market leader in nine.

Air Evac Lifeteam’s commitment to rural America has generated a lot of public support for the organization, which now has more than 600,000 paying members. It operates 100 Bell 206 Long Ranger helicopters and has selected the Dräger Oxylog 3000 as its future ventilator. Air Evac Lifeteam’s entire active helicopter fleet will soon be outfitted with the Dräger Oxylog 3000.

“We’re the largest independent air rescue service in the United States,” says Julie Heavrin, director of Public Relations at Air Evac Lifeteam in West Plains, Missouri.

“Independent” in this case means that Air Evac is solely responsible for the helicopters themselves, as well as for their equipment, the pilots who fly them, and the paramedics who man them. Unlike their German counterparts, U.S. air medical rescue helicopters generally fly with specially trained paramedics rather than physicians.

### Advanced treatment methods

“A total of 70 percent of our trips are between hospitals,” says Air Evac’s safety expert, Tom Baldwin. “It’s exactly in such



1946: Emergency landing at 3,500 meters

## Swiss pioneers

In November 1946, a Douglas C-53 Dakota U.S. Air Force plane crashed into a glacier above the town of Meiringen in Switzerland. The plane, which was flying from Munich to Pisa, Italy, carried a four-man crew and eight passengers, among them high-ranking military officers and family members. After changing course twice and encountering poor visibility, the plane descended to 3,350 meters, which was 300 meters below the top of the glacier. All of the passengers survived the crash, but with severe injuries. Because the U.S. military was unfamiliar with the region, the Swiss Army had to carry out the rescue operation. After climbing for 13 hours, the first rescue team finally reached the crash site.

The team knew they didn’t have enough time to bring the injured people safely down to the valley. The Swiss did have experienced pilots, however, who were well trained in making landings on snow in mountainous regions. Two pilots, Pista Hitz and Victor Hug, each flew out in a Fieseler Storch, a plane that can remain in the air even when cruising at only 50 km/h, and which, with a little bit of headwind only requires a runway of about 50 meters. It took eight flights back and forth, but in the end the two brave pilots succeeded in rescuing all the injured people.

During the Korean War (1950–1953), the U.S. recognized the importance of being able to rapidly transport wounded soldiers out of the field and into military hospitals. By the time the war had ended, more than 20,000 wounded soldiers had been transferred to such clinics via helicopter. Specially designed rescue helicopters were then used in the Vietnam War to transport 800,000 soldiers. Regular civil air rescue operations began in Germany in 1970 out of Munich-Harlaching Hospital; they started in the U.S. in 1972 with a helicopter based in Denver, Colorado.

situations that the Oxylog 3000 offers us options that our current units can't provide." Even intubation can be carried out by extremely well-trained personnel, even if they're not doctors.

"Intubation is actually very common in both ground medical rescue operations and in the air," Baldwin reports, correcting an erroneous European preconception regarding the standard of care in this area in the U.S. "Air rescue services typically employ advanced treatment strategies such as the fast-acting short anesthesia Rapid Sequence Induction."

One strategy doesn't automatically exclude the other, however. After all, short anesthesia and intubation harbor risks that can be avoided through non-invasive mask ventilation in certain cases.

"The medical aspect of air rescue missions focuses strongly on airway management—in other words, strategies for ensuring that air passages remain open," says Baldwin. "The fact that our crews will now have a non-invasive option for keeping patients breathing without having to resort to intubation will provide our patients with a big safety benefit."

Baldwin's conclusion is that Dräger was ultimately selected to provide the required ventilation unit because of the "combination of differentiated ventilation options, robustness, and the positive customer feedback we've heard regarding the Oxylog 3000." **Mario Gongolsky**

Further information online, including:

- ▢ Product information
- ▢ Trainer software

[www.draeger.com/96/Emergency](http://www.draeger.com/96/Emergency)



Air rescue requires teamwork. Professionalism in the cockpit...



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PHOTOGRAPHY: DRF

...continues in the rear