Air Ambulance Nurses as Expert Supplement to Local Emergency Services

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Abstract

Objective: Flight nurses in the Norwegian National Air Ambulance Service are specialist nurse anesthetists or intensive care nursing specialists. For air ambulance bases far from hospitals, these nurses present otherwise unavailable competencies. This study reports a 6-year experience with flight nurse participation in local emergencies beyond the transportation phase.

Methods: The fixed-wing air ambulance base in Alta, Northern Norway (20,000 inhabitants), with 2 aircraft and 2 on-call teams is 150 km by road from the nearest hospital. We did a prospective registration of all emergency nonflight missions near the air ambulance base from January 1, 2005, to December 31, 2010.

Results: The 217 completed missions corresponded to 3 missions per month, half during daytime. Twenty-three percent of patients were under age 18, injury rate was high (36%), 63% had potentially or manifest life-threatening conditions, and 11% died during treatment. One third of all missions (67/217) resulted in an air ambulance flight to the hospital.

Conclusion: Mission frequency did not significantly reduce flight availability, and precision in case selection for this special service was good. The use of flight nurses in the local community promotes equal access to advanced medical services for populations far from hospitals.

Introduction

The Norwegian government has a national goal of providing equal access to health services regardless of where its residents live.[1] One approach to achieving this goal is a well-developed national air ambulance service.[2] The Norwegian National Air Ambulance Service has ambulance helicopters and dedicated ambulance fixed-wing aircraft distributed over the country, with most fixed-wing aircraft in the northern part where the population density is low. The infrastructure in Northern Norway was developed through the 1970s by establishing a number of short runway air fields to enable communications, including patient transport, which previously was performed by boats and seaplanes.

In the northernmost part of Norway (Finnmark County), the community of Alta is the most inhabited area with approximately 20,000 residents (Fig. 1). This population is 150 km by road from the nearest hospital. The primary health care service in Alta has developed a unique model of a decentralized, advanced medical service in cooperation with the Finnmark Health Trust,[3,4] the government's organization for providing specialized health care, including hospitals, ambulance services, and emergency medical preparedness. The Alta Health Centre had already implemented regular, multiprofessional emergency medical team training in cooperation with Finnmark Health Trust.[5]

Fixed-wing air ambulance services have been employed in Alta since the 1950s, initially using seaplanes. In 1988, a national air ambulance service was established, and since then, 2 ambulance aircraft have been deployed in Alta (Fig. 1); the current craft are 2 dual-engine Beech King Air 200/B200s. The flight nurses in the Norwegian National Air Ambulance Service are either specialist nurse anesthetists or intensive care nursing specialists.[6] In Alta, all nurses work on a rotational basis at the air ambulance base and in the intensive care or anesthesia department at the hospital in Hammerfest, respectively. Thus, they have competency and experience in emergency situations beyond that available in the municipality's emergency medical preparedness network. At the air ambulance base in Alta, the flight nurses have traditionally engaged in preparedness and cooperation in the local community with the municipality health care services. The flight nurses have been summoned to emergency situations in the vicinity of the air ambulance base since its implementation in 1988.

In 2010, the Norwegian National Air Ambulance Service performed a total of 18,003 missions, of which 9,203 were fixed-wing aircraft missions.[7] The rotor wing air ambulance bases and the rescue helicopter bases (all staffed by anesthesiologists) have an established emergency car service to enable the flight anesthesiologist to assist in emergency situations

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Figure 1. The air ambulance base in Alta, Finnmark, with the municipality of Alta shaded. The local hospitals in Hammerfest and Kirkenes as well as the University Hospital of Northern Norway in Tromsø (UNN) are marked. The straight line air distance between Alta and Hammerfest is 84 km, Alta and Tromsø is 175 km, and Alta and Kirkenes is 251 km.

near the bases. This service was established to obtain maximal benefit from this expertise independent of weather conditions and distance from the base. These anesthesiologist-staffed cars were involved in 1,793 missions in 2010 on a national level.[7] A similar service has not been established nationally for flight nurse–staffed bases except for the base in Alta.

We systematically reviewed experiences gained through the use of flight nurses as a local emergency medical resource and performed a prospective registration over the course of 6 years of all missions involving the flight nurses in the vicinity of the base. We report demographic data on the missions, their indications, and our experiences.

Material and Methods

Flight nurses since January 1, 2005, have registered all requests for assistance from the vicinity of the base. Registrations were completed using especially developed forms, and all registrations in the time period from January 1, 2005, to December 31, 2010 (6 years), were analyzed.

Results

In the 6-year period, the flight nurses were requested to assist in the vicinity of the base in 249 situations. Requests came mainly from the regional emergency dispatch center (184, 74%), but some came from the local emergency medical center (58, 23%); the flight nurses offered their assistance after an "all-units alarm" at the emergency radio communication system in 5 instances (2%).

A total of 217 missions (87%) were completed in the time frame, and 32 missions were aborted before the flight nurse reached the patient. Thus, the average of completed missions was 36 annually or 3 per month. Of these, 67 missions resulted in a subsequent air ambulance flight to the hospital, whereas the rest did not involve transfer or were transported by ambulance helicopter or anesthesiologist-staffed fixed-wing aircraft from another air ambulance base.

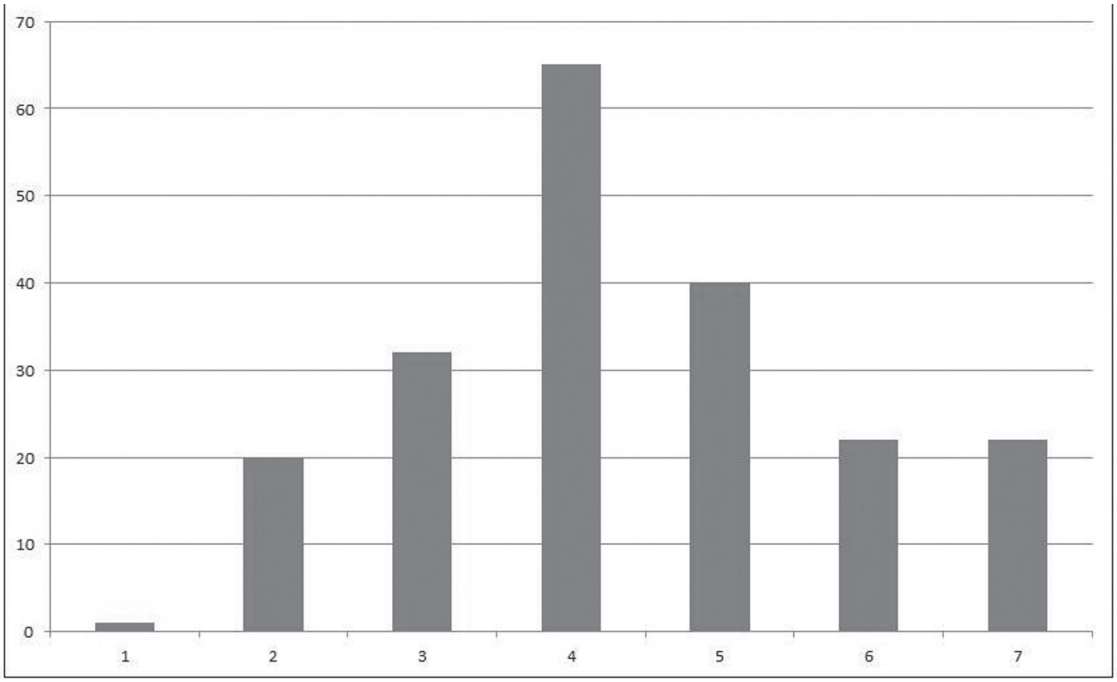
Missions

The missions were mainly in daytime, with 49% between 8:00 AM and 3:59 PM and 38% between 4:00 PM and 11:59 PM; 13% were between midnight and 7:59 AM. Most missions, a total of 116 (54%), were to scenes outside patient homes or institutions. The Alta municipal emergency health center was the scene for 60 missions (28%), whereas 30 missions (14%) were to a patient's home and 10 (5%) were to other institutions, such as nursing or retirement homes. The median duration was 1 hour (mean = 1 hour 11 minutes), with an interquartile range of 1 to 2 hours.

Patients

The age distribution was 8% infants, 15% children and adolescents (ages 1-18 years), and 77% adults. Emergency medical conditions were the main diagnosis in 58% of patients; this group included 32 cases of cardiac arrest, 20 cases of airway or respiratory problems, and 1 case of anaphylaxis. Trauma comprised 36% of diagnoses, with 14 victims having multiple trauma and 6 with traumatic brain injury. The local midwife-led maternity clinic requested assistance for newborns in 4 situations (2%).

Figure 2. The severity of injury/illness in patients treated by flight nurses in the vicinity of the Alta air ambulance base according to the NACA.[8] NACA scores 4 to 6 designate potentially or manifest life-threatening injury/illness, whereas NACA 7 indicates patients dying during treatment or transportation. The number of patients is in the ordinate axis.



The flight nurse classified the severity of each condition in each case using the service's severity assessment for flight missions from the National Advisory Committee on Aeronautics (NACA)[8] (Table 1). The classification distribution is shown in Figure 2. NACA groups 4 to 6 are considered potentially or manifest life-threatening injuries/conditions, which were present in 63% of patients, and 11% died during treatment (NACA group 7).

Treatment Given

Flight nurses participated in the usual stabilization before air transport with local general practitioners and ambulance personnel in two thirds of patients. Advanced cardiopulmonary resuscitation was performed in 14% of patients; 7 patients in addition to the cardiac arrest victims were endotracheally intubated, and in 15% of the patients flight nurse assistance involved achieving otherwise difficult intravenous access.

Cooperation

The flight nurses worked in close cooperation with local general practitioners, nurses in the local emergency medical center, and ambulance personnel except for some cases of obtaining intravenous access at nursing homes. The flight nurses were transported to the scene either by local ambulances or private cars/taxis. The air ambulance base does not have a dedicated emergency car, in contrast to the anesthesiologist-staffed air ambulance bases.

Discussion

This study shows that it is possible to use specialized flight nurses to strengthen the local emergency system in an area with a large population that is a long distance from the nearest

Table 1. Severity scoring to classify injury or illness severity in the Norwegian National Air Ambulance Service as originally described by NACA[8]

NACA score	Definition
0	No injury or disease
1	Injuries/deseases without any need for acute physician care
2	Injuries/diseases requiring examination and therapy by a physician, but hospital admission is not indicated
3	Injuries/diseases without acute threat to life but requiring hospital admission
4	Injuries/diseases that can possibly lead to deterioration of vital signs
5	Injuries/diseases with acute threat to life
6	Injuries/diseases transported after successful resuscitation of vital signs
7	Lethal injuries or diseases (with or without resuscitation attempts)

NACA = National Advisory Committee on Aeronautics.

hospital. This solution applies mainly to emergency situations but also when the unique capabilities of the flight nurses could be helpful in preventing the need to transport patients long distances, such as for intravenous cannulation in cancer patients. This practice is concurrent with the national use of flight anesthesiologists at the rotor wing air ambulance bases, all of which are equipped with emergency cars for use in difficult weather conditions and in the vicinity of the base.

The patients who the flight nurses assisted were surprisingly ill, with 63% in NACA categories 4 to 6 and 11% of cases proving fatal. The missions were to a large extent for trauma, and more than half of the patients were treated outside their home or institutions (ie, at the scene of injury/medical emergency). This pattern indicates that the selection of cases for this supplementary service has been efficient and that the nurses were sent for situations requiring their specialized skills. That implication is important because of national air ambulance dispatch center concerns about flight nurses working outside their primary duty area of the aircraft given that these kinds of supplementary missions count as duty time for the whole aircrew. The early and efficient use of the nurses' skills and time pretransport could instead mean a reduced need for handover for an air ambulance mission. Indeed, ground missions are already often performed by duty nurses without available aircraft or by flight nurses at the air ambulance base who are not on active duty. Another consideration in the context of concerns about crew time required is that half the missions occurred in the daytime with a median duration of 1 hour despite their seriousness.

Overlap of competencies or jurisdiction might also be a concern, but our data suggest that the involvement of the flight nurses instead builds community. Nurses in other countries have defined working fields in the prehospital setting but not in Norway. We have not found any other studies of flight nurses working in prehospital services in the vicinity of the air ambulance bases as a supplement to local resources. Our experience is that the local general practitioners welcomed the flight nurses as an extra resource with specialized capabilities for rare but difficult emergency situations. Because the cooperation includes ambulance personnel and the local emergency medical center nurses, it also served to build relations among these groups, and such cooperation would likely benefit patients as well. This study was performed prospectively, but we lack information about how often flight nurses were unavailable for these events. We did not plan to assess specific outcome measures such as increased survival or reduced morbidity after serious injuries or illness. In addition, we did not assess how flight nurses estimated the NACA score in line with Norwegian air ambulance service practices in general.

Conclusion

The special competencies of the flight nurses at the air ambulance base in Alta constitute a unique supplement to the local emergency medical services, and these nurses were called on in rare, correctly selected cases of high severity. The frequency of use was low and acceptable in relation to the primary responsibility of providing air ambulance availability. In this way, the service is operating according to original intentions and enhances equal access to specialized health care for a population residing far from the hospital.

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