

Consultant Report

Nova Scotia Emergency Health Services: Analysis of LifeFlight Air Ambulance Services

20 October 2006

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Executive Summary

The Nova Scotia Department of Health, Emergency Health Services (“EHS”) issued a Request for Proposal to have a comprehensive review and analysis of its LifeFlight air ambulance program. The project was awarded to Fitch & Associates, an internationally recognized consulting firm with specific expertise in air ambulance services. The LifeFlight review and audit process initiated in February 2006 and involved a series of on-site interviews with key stakeholders and data collection activities that spanned over a period of several months. The data from the LifeFlight air ambulance program was then analyzed and benchmarked against North American industry standards applicable to the operation of medical helicopter and medical airplane services. This report is the compilation of the findings and recommendations of the consultant.

The major areas analyzed included clinical systems, safety, organizational structure and relationships, financial performance, service delivery, and general program operational parameters. The analysis took into account the unique geographic operating environment in which LifeFlight delivers its services, whilst fully understanding the needed balance of clinical, financial, and operational performance associated with competent and safe air ambulance service delivery.

Most critical to air ambulance operations is the consistency, and reliability, upon which it safely delivers its services. There is a very strong safety culture at LifeFlight, and it is reflected by the industry leading safety practices that are central to its operations. LifeFlight has been appropriately conservative in consistently supporting its aviation contractor’s full authority to establish and implement stringent criteria for acceptance of missions. Further, LifeFlight has complemented its medical helicopter resource with a fixed wing aircraft which provides an expanded operational capability for certain patient missions that would be marginal to respond to by helicopter due to distance and/or weather conditions. Furthering the commitment for the fixed wing aircraft into a

dedicated service is one additional step in providing a high margin of safety and improving air transport availability.

A significant attribute of LifeFlight is its patient centered clinical program that is physician driven.. The clinical systems and performance at LifeFlight are exemplary. Patient care protocols are outcome based, and focus on providing the right care, at the right time, while using the best transport mode available to link clinical talent to the patient, and/or move the patient to tertiary/specialized resources. Clinicians are held accountable to assure that their skill and knowledge competencies are current and demonstrate proficiency, thus yielding a highly qualified and experienced medical flight team.

The budgetary dollars committed to LifeFlight are consistent with other air ambulance programs of similar size and operation. The 2006 capital improvements to the helicopter reflected equipment upgrades that are supportive of enhancing safe operations.

Within the above achievements and performance, there are also opportunities for improvement at LifeFlight. The organizational structure and multiple entities involved in LifeFlight create a complexity that complicates, and at time obstructs, the work processes. One result of this complex arrangement has been manifest in the tension between program management and staff.

The attached report details 29 recommendations, of which the following are of the highest priority. EHS should direct LifeFlight to:

1. Continue to focus on evidence based patient outcomes, and accept that the time to talent is a physician specified response period.
2. Return to the program's original organizational structure such that a management company provides overall program management and is the adult medical crew's employer.
3. Improve fixed wing aircraft services by contracting for a 24/7 dedicated aircraft.

Nova Scotia has provided its citizens with an exceptionally well integrated system of prehospital care and transportation—and LifeFlight has proven to be an important contributor in the system. LifeFlight provides patients access to health care services throughout the province—overcoming time and distance and concurrently providing exceptional clinical services. The mission and goals established for LifeFlight upon its

inception in 1996 have been consistently achieved each year despite being revised several times in response to medical advancements and changes in operational demands.

The LifeFlight air ambulance program has provided a decade of clinically sophisticated and safe air ambulance services to Nova Scotians. It is preparing for the next 10 years by having undergone this review and audit process to determine the opportunities it has for improvement and to recognize how to build from its achievements and contributions.

I. Introduction

Through a bid process, Fitch & Associates was awarded a contract by the province of Nova Scotia Department of Health, Emergency Health Services (“EHS”) to complete an analysis of its LifeFlight air ambulance program.

The on-site review was completed during the period February through April 2006 using data EHS and LifeFlight provided in response to the consultant’s Information and Data Request and onsite meetings and/or telephone interviews with key individuals who are involved in, and/or receive services through the LifeFlight program. An audit based methodology was applied, to examine the key components of the organization and its operating environment. The data gathering process was both quantitative in examining records, reports and documented information as well as qualitative through interviews and focus group discussions conducted in Halifax, and telephone interviews with sending and receiving physicians throughout the province. The consultant’s internal database was used to apply relevant industry standards and practices.

The key objectives for the consultation were to:

- complete a comprehensive assessment of the LifeFlight program;
- determine if the current model for LifeFlight is efficient, effective, and economical; and
- where applicable, compare LifeFlight’s performance against industry benchmarks/standards.

This report is a summary of the consultant’s findings and recommendations.

II. Overview

The Nova Scotia Department of Health, through its Emergency Health Services division, launched the LifeFlight program in 1996 to provide a province-wide access to centralized tertiary and specialty services, and regional health care resources. Under EHS, the air program is integrated with all other provincial pre-hospital services including the EHS Communications Center, EHS ground ambulance system, the EHS Medical First Response program, the Nova Scotia Trauma Program, and the Atlantic Health Training and Simulation Center. This organizational interrelatedness optimizes the delivery of efficient out of hospital health care services.

LifeFlight demonstrated from its start there was a need for accessibility and transport of critical care patients to tertiary care/regional resources. In its first full year of service, LifeFlight completed 367 patient flights as compared to the 524 transports completed in 2005. As helicopter flight requests have steadily grown, the fill rate (e.g. number of transports completed) has decreased. In an attempt to close this gap, there is greater dependency on having medical airplane services readily available. The LifeFlight helicopter is fully staffed with pilots for immediate response between the hours of 0700 – 2300, and then with an on-call pilot and a contractual 60 minute response time between the hours of 2300 – 0700. While the medical airplane can be prospectively reserved for upcoming periods of scheduled maintenance, it is not guaranteed to be available if requested. It is even more difficult to secure an airplane for unanticipated events such as weather or unscheduled maintenance.

LifeFlight operates within a unique geographic and weather environment. Having a dedicated large cabin class fully instrumented twin engine helicopter, and access to an on demand twin engine pressurized airplane, facilitates a prudent approach to a mission response. The over water capabilities of the helicopter and contracted airplane safely extends LifeFlight's reach through out Nova Scotia, and into Prince Edward Island, New Brunswick, and occasionally Newfoundland on an as needed basis.

Different from most air ambulance programs in North America, LifeFlight is the sole provider of air ambulance services in its service area. Consequently, competitive pressures are eliminated, allowing the LifeFlight program to focus on the efficacious distribution of its resources for the appropriate reasons, versus response to economic or market demands. Decisions to activate LifeFlight are not based on marketing or the

program's "need" for flight volume – rather, the use of the air program resources is based upon sound clinical parameters including the distance to be traveled, the patient's medical condition, resources available within the area, and the expertise of the flight team members under the direction of the on-line Medical Control Physicians.

LifeFlight's clinical services are provided through two different flight teams: an adult team for response to adult and all scene requests, and a neonatal/pediatric team—which will, on predetermined flights, include staff from high risk obstetrical services. The adult team is comprised of a nurse and paramedic, and the neonatal/pediatric team a nurse and respiratory technologist. Both team configurations are representative of the typical medical crew configuration of air medical services in North America.

It is not uncommon for flight programs to segregate patients by age or clinical condition to a specific team. Generally, these are separated into two teams: a core team and a children's team. The "core" team is similar to the LifeFlight adult team, while the children's team manages all neonatal and pediatric interfacility transports. The high risk obstetrical patients are typically managed by the children's team, with additional training in contrast to LifeFlight which includes a member of the OBS service on the mission. Less than 10% of North American air programs use one team for all patient transports.

LifeFlight has enjoyed high levels of success over the years culminating in 2004 with a full three (3) year accreditation from the Commission for Accreditation of Medical Transport Services ("CAMTS"). The CAMTS process is a comprehensive review of every aspect of the air ambulance program, and in the case of LifeFlight, the review resulted in a full accreditation being awarded. The CAMTS board recognized EHS LifeFlight as being substantially in compliance with the accreditation standards and noted several areas of excellence within EHS LifeFlight service. These include:

- the active involvement of Medical Control Physicians – particularly in annual training and updates;
- clinical skills competencies being done in house, at clinical sites and also at one of the medical centers;
- the advanced simulation labs with METI and SIM MAN high fidelity simulators – noting that simulator and clinical time involves active participation of medical directors;
- a full service backup communications center;

- the number of outcome studies currently in progress;
- pilots being ATP rated;
- outreach programs that are well developed and used for training hospital heliport personnel and Landing Zone responders;
- the system has evidence based utilization criteria and education that is appropriate for utilization and integration of air medical;
- there is a province-wide integrated post accident and incident drills; and,
- an innovative Flow Chart used for all procedures by the communications specialists.

LifeFlight is no stranger to major changes as the program has undergone many since its beginning in 1996: relocating from the Shearwater air base to Halifax International in 1999; transitioning from the STARS management company in 2000; transitioning through three (3) program managers in six (6) years; and the construction of rooftop helipads at the QEII and IWK in June 2000 and February 2002, respectively. Changes that have occurred within the program recently have lead to a less than optimal working environment for staff and management. The changes have included unionization of the adult medical crew, review of staff downtime and patient contact hours, movement of the neonatal and pediatric teams to the IWK, and disruptions associated with months of temporary housing pending completion of permanent hangar facilities and offices. During the changes, the strain between management and staff has become evident. In an effort to resolve this, a consultant/facilitator was engaged to conduct an assessment of these dynamics and provide recommendations.

III. The EHS LifeFlight Program

A. Clinical Systems at LifeFlight are Exemplary.

Findings:

The level of sophistication and advancement of LifeFlight's clinical systems is quite impressive. Protocols are evidence based and policies and procedures are well integrated with the prescribed clinical practices. Physician involvement is an integral, active component of clinical care, training, and the quality review processes. The Medical Directors and Medical Control Physicians demonstrate a keen interest, and an active role in the clinical leadership of LifeFlight.

LifeFlight is a clinically driven system. It focuses on achieving clinical outcomes through delivering the clinical talent and interventions specific to the patient's medical condition in an appropriate time frame. The "time to talent" has incorporated appropriate safety practices and the involvement and judgment of the Medical Control Physician ("MCP"). Generally, interfacility transports are achieved within a one hour wheels up time – a response that is within the acceptable standards of the MCPs and appropriate to safe aviation operating parameters.

Clinical competencies and the correlating expectations for proficiency and current practices are defined and a system to improve tracking and monitoring is under development. Staff has access to human patient simulators in a state of the art training lab, and clinical time in the emergency departments and intensive care units of the major tertiary centers in the province.

The air ambulance program is an active participant in the total prehospital care delivery system, which includes a single communications center controlling all ambulance movement within the province. The exclusive single provider ground ambulance model, coupled with the sole air ambulance provider, works rather seamlessly together. Evidence based protocols provide a common language among the air and ground providers, as well as the sending and receiving physicians.

In 2004, EHS LifeFlight achieved full accreditation from the Commission for Accreditation for Medical Transportation Services ("CAMTS"). This recognized LifeFlight as having demonstrated achievement of the air medical industry standards and

benchmarks. It is a widely recognized accomplishment among North American air ambulance services. Most air programs have a tendency, once completing their accreditation process, to place the work completed to the side until the three year re-accreditation period resurfaces. LifeFlight has taken a refreshing alternative path in implementing the work, and keeping it up to date and useful. EHS LifeFlight is to be commended for its forethought in the ongoing commitment, as this is gradually becoming standard practice for air medical programs, and an expectation of CAMTS in its subsequent program re-accreditations. The CAMTS process provided an excellent foundation for the needed infrastructure of policies and procedures to be in place.

There is active involvement of the medical directors with LifeFlight, and strong emphasis on clinical competency and skill maintenance. LifeFlight has the unique benefit of access to the Training and Simulation Center. The Medical Control Physicians complete appropriate coursework prior to being on line with LifeFlight and serving as the receiving physician.

The quality program, although new, is on strong footing. Full chart audits are completed, and the focus is on developing the balanced scorecard to reflect more quality indicators. The data and information systems do not easily support trend analysis and reporting, but these are the next phases for communicating the quality program findings and action plans.

The amount of patient flights per caregiver has raised clinical concerns. The pull back of the teams to the IWK was heavily influenced by the low number of patient encounters experienced per staff member. The annual number of patient transports completed by the specialty team, by helicopter, is illustrated in figure 1 below. Missions with incomplete data, repatriations, and out of province are not included in the figure below.

Figure 1. Total Helicopter Transports by Team

	<u>2003</u>	<u>2004</u>	<u>2005</u>
Adult	295	270	257
Neo	61	54	66
Peds	64	64	48
OBS	67	50	60

Information from the IWK reflects that over a recent 18 month period, the patient contact ratio per FTE is 0.13. The data illustrates that during this period, the ratio of transport shifts scheduled versus clinical shifts was 89 to 11—far higher than the partnership contract of a 60% transport to 40% clinical.

Sending and receiving physicians have indicated that relocating the team to the IWK for reasons of clinical competencies maintenance and to keep abreast of the changes in intensive care patient management was a higher priority than was the impact of a Launch Time delay.

Although the adult team had a higher number of transports, retrieving the pertinent information to analyze similar ratios is extraordinarily difficult due to the multiple data systems involved, and the required person hours to extract and reenter the information.

Recommendations:

1. Continue to develop the clinically based response matrix that integrates time to talent with transport response time and vehicle (mode). The focus needs to be on clinical outcomes, rather than response times.
2. Continue to base the specialty teams at the IWK.
3. Identify an efficient system for electronically recording all employees' transport time, clinical time, patient missions, and skills within a singular interactive data base. This may be through the employee logging into special software, and data tracking software that is linked to the electronic patient chart. Parameters should be established to easily identify persons who have gone for periods without transports, and without using their advanced practice skills.
4. The adult transport team should remain scene ready for response within the parameters established by aviation safety conditions, and with clear expectation and acceptance of their non-flight responsibilities. These would include:
 - Assigned clinical time with re-assignment to the hospital critical care unit or emergency department when the aircraft is out of service;
 - Preparation and re-stocking of aircraft used by the off airport transport teams; and

- Active involvement in LifeFlight projects (at least one project per staff member should be active at any one time).
5. LifeFlight needs to obtain direct control over the clinical experience time, and objectives for the adult team. LifeFlight should assign all clinical time as part of the flight position, and then develop the content for the clinical time so as to focus it primarily on experiences with the physicians and the flight team member's advanced skills. The flight job description would define the role, responsibilities, skills, and frequency of scheduled clinical time. LifeFlight should no longer accept time worked independent of its assigned time and clinical sites as credit toward the ongoing clinical experience required to remain active on transport unless such time is worked in a critical care area prospectively approved by the medical director.
 6. The quality program, with solid data support, needs to establish a plan for internally communicating findings and recommendations to staff and management. There are feedback loops for the external survey data to be gathered and reviewed, but a similar system for internal feedback needs to be developed. A tool such as employee report cards could provide internal feedback by comparing performance across the group. Staff members also have a professional responsibility to participate and/or, at a minimum, review the quality activities and outcomes of the organization so as to improve their own performance.

B. LifeFlight Has a Strong Aviation Safety Culture.

LifeFlight has developed an excellent safety culture supported by well defined internal and external safety practices. The medical helicopter is an IFR, twin engine aircraft that is equipped appropriately to address the geographic and weather demands of the service area. Coupled with floats for safe over water operations, the aircraft is flown with a two pilot crew. Landing at scene flights is restricted to daylight hours, while after dark, the aircraft can use any of the numerous pre-approved landing zones to rendezvous with EMS to accept the patient.

LifeFlight outreach has assured that thousands of EMS, public safety, and hospital personnel have received landing zone training. The well placed helipads and pre-approved landing zones throughout the province are evidence of the work and attention LifeFlight has given to communicating safety as its top priority.

As part of the program assessment, a maintenance audit was conducted with Canadian Helicopters Limited (“CHL”) and Provincial Airlines Limited (“PAL”). The following areas were inspected in Halifax, Nova Scotia during 14 thru 16 March 2006 in accordance with the consultant’s audit documents, the Canadian Aviation Regulations (CAR) Audit Document Rev.0 and similar audit standards and guidelines used in the aviation industry for CAR Part VII. The areas reviewed included:

- Management: 2.01
- Certificate and Operations Specifications: 2.02
- Manuals and Procedures: 2.03
- Training Programs: 2.04 (9 Passengers or less)
- Records System: 2.05
- Maintenance Facilities: 2.06
- Contractual Arrangements: 2.07
- MEL / Deferred Maintenance: 2.08
- Weight and Balance Programs: 2.09
- Airworthiness Directive Compliance: 2.10
- Maintenance Program: 2.11 (9 Passengers or less)
- Reliability Program: 2.11
- Maintenance Inspection System and/or RII Items: 2.13
- Continuing Analysis and Surveillance Program: 2.14
- Mechanical Reporting Procedures: 2.15
- Major Repair and Alteration Conformity: 2.16
- Fueling and Servicing: 2.17
- Aircraft Ramp Inspection: 2.18
- Aircraft Spot Inspection: 2.19

Findings

There were no major or minor safety discrepancies noted of either air operator during this visit.

The aviation maintenance section of Provincial Airlines and Canada Helicopters are appropriately managed. The maintenance staff is knowledgeable about their duties and overall operation, Canadian Aviation Regulations and appropriate company policies and procedures.

Communication is acceptable at every level of the program and the maintenance aspect of the program is well managed locally with support and oversight from the main offices as required. The overall aviation safety programs at both vendors are at a high standard for both charter and aero medical operations.

With EHS LifeFlight responding to approximately 600 missions per year and 1,000 hours of flight time annually, their ability to achieve the goal of universal availability for services is being challenged due to this high utilization rate on the primary aircraft (Sikorsky S76A).

Recommendations

1. LifeFlight's primary aircraft, the Sikorsky S76A model, is being operating at maximum distances of the aircrafts mission capabilities. A review of a newer model Sikorsky, or another helicopter model, could benefit the program's ability to meet mission requirements during hot summer operations and to address the weather challenges that require secondary landing requirements.
2. The addition of a dedicated fixed wing aircraft will support operations improvements during certain weather conditions, but helicopter operations in the summer will continue to be curtailed using the current rotor wing aircraft.

C. EHS LifeFlight Focuses on Patient Outcomes, Rather than Solely on Rapid Transport.

Industry Benchmark/Standard

In the past, the typical benchmark for helicopter launch time has been a non-evidenced based benchmark of 10 minutes from the time of call. However, air programs are appropriately moving away from launch times toward a matrix response that prospectively allocates time for risk assessment, weather planning, and mobilization of

specialty teams and/or equipment. The focus is on risk management and safety, evidence based patient outcomes, and less on response times

Findings

The launch of the LifeFlight program opened a vital bridge for Nova Scotians to have timely access to the healthcare services in Halifax. Throughout the province, LifeFlight's services are an important dimension in the movement of critical care patients. This is supported through the clinical expertise of the flight team and the ability to more rapidly bring patients to specialized services than could be accomplished by ground.

Access was further improved with the opening of the roof top helipads at the QEII and IWK in 2000 and 2002. This significantly reduced the time from landing to delivery of the patient to the receiving physician, and improved the return to service time frame for the aircraft and medical crews—thus, making LifeFlight resources available to respond to the next request.

In addition to providing access, an air ambulance program also provides an element of speed. Rapid transport is only one of the building blocks for air ambulance programs, including EHS LifeFlight. Further, each of the time segments incorporated into rapid response—whether it is the launch time, enroute time, bedside time, or delivery of the patient to definitive care—should not be isolated. The focus of rapid response is defined not by any one of these time segments, but rather by evidence based clinical outcomes. LifeFlight personnel, EHS, the Medical Control Physicians, and the sending physicians/personnel emphasize a balance of time and clinical outcomes as to the expectations for a “rapid” response of LifeFlight.

An overview of the key components of the air ambulance response is provided in order to assure common reference points for comparisons. The components, in chronological order, are listed in figure 2 below.

Figure 2. Components of an Air Ambulance Response

<i>Component</i>	<i>Overview</i>
<i>Initial Notification</i>	From call receipt until the pilot and MCP accept the mission.
<i>Launch</i>	From acceptance until the aircraft and team lifts off (this will include the time needed to pick up a team that may be located at the hospital).
<i>Enroute to pick up</i>	From Lift off until landing at the patient location.
<i>Bedside</i>	From landing at the patient's location until lift off from the patient location. May include ground transport to and from the patient location)
<i>Patient transport</i>	From departure at the patient location until arrival of the patient at the receiving hospital.
<i>Patient drop off</i>	From arrival at the receiving hospital, includes the transfer of care, until lift off to return to base. (May include ground transport to the aircraft)
<i>In service</i>	From time of departure from the receiving hospital until the aircraft and team are prepared to service the next request.

The first time interval for LifeFlight is the Initial Notification. This interval begins when the call is received in dispatch, and ends when the pilot and MCP accept the flight. Typically, the benchmark for this time interval is to achieve a flight acceptance in less than 10 minutes, 90% of the time. According to the dispatch data, the Initial Notification for helicopter transports during the core staffed hours of 0700 – 2300 during 2005 has been documented for each team as illustrated below in figure 3. Fixed wing flights, and flights with incomplete data, repatriations, and out of province are not included in the information below.

Figure 3. Initial Notification Time Consumed in 2005 (Helicopter Only)

	<i>0 – 5 minutes</i>	<i>0 - 10 minutes</i>
<i>Adult transports</i>	25%	65%
<i>Neonatal transports</i>	19%	61%
<i>Pediatric transports</i>	25%	69%
<i>OBS</i>	18%	71%

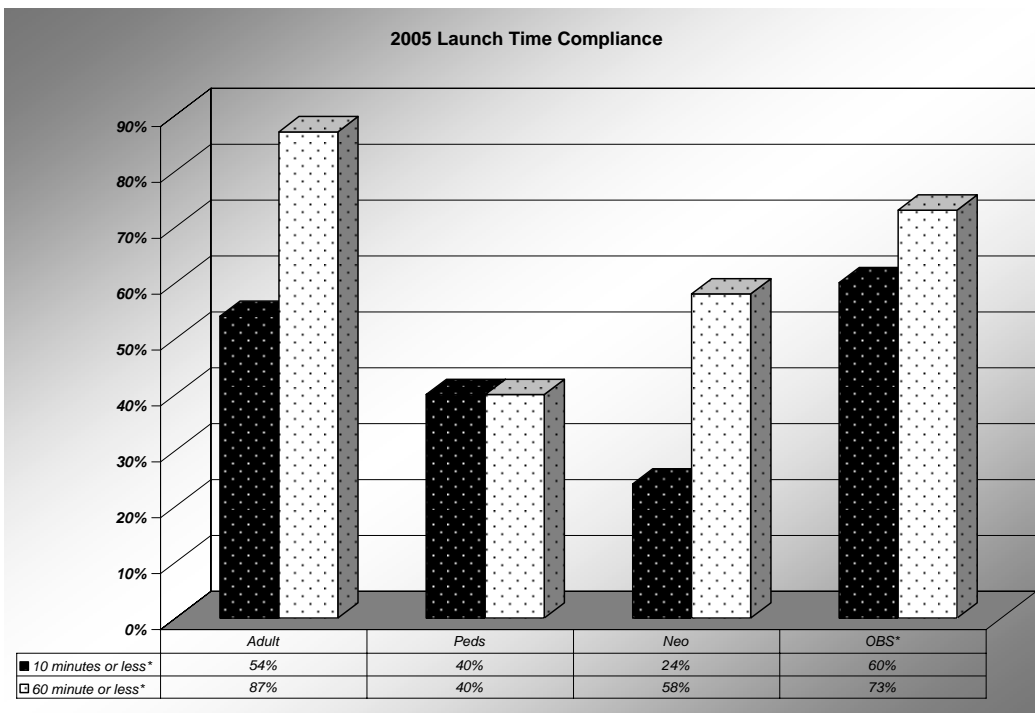
As illustrated, the time involved in call processing is longer than projected by the benchmark.

Launch time is the second time interval in the overall time consumed by a LifeFlight mission. Launch Time is the time from when the call is accepted by the pilot and MCP,

until the aircraft and team is off the ground. This time has been isolated for heavy scrutiny due to the discussions to move the teams into the hospitals at night (when a one hour launch time has been in effect).

An examination of the 2005 launch times for all teams is illustrated in figure 4. Please note that the OBS response time benchmarks differ from the other teams—they use a one hour benchmark for all responses to the airport regardless of time of day. For helicopter pick ups at the Lower Battery helipad or the IWK during 0700 – 2300, a 25 minute benchmark is used. The OBS team data for the 25 minute response benchmark is illustrated on the chart on the same line as the 10 minute response for the other teams.

Figure 4. Launch Times for All Teams



The benchmarks for the OBS team are different, as described in the preceding paragraph.

The benchmark for helicopter launch time at LifeFlight is 10 minutes or less, 90% of the time during the hours of 0700 – 2300 when pilots are on duty (versus on call). During the fully staffed hours, helicopter Launch Time during 2005 fell below the benchmark with 54% of the adult team missions being launched in 10 minutes or less, and even lower compliance percentages for the pediatric and neonatal teams. It is noted that during 2005,

there were staffing shortages for the pediatric/neonatal team, but teams were still available with no impact on response time.

In Figures 5, 6 and 7 the helicopter launch time performance for each team is illustrated for 2003 through 2005.

Figure 5. Neonatal Launch Time Trend (Helicopter)

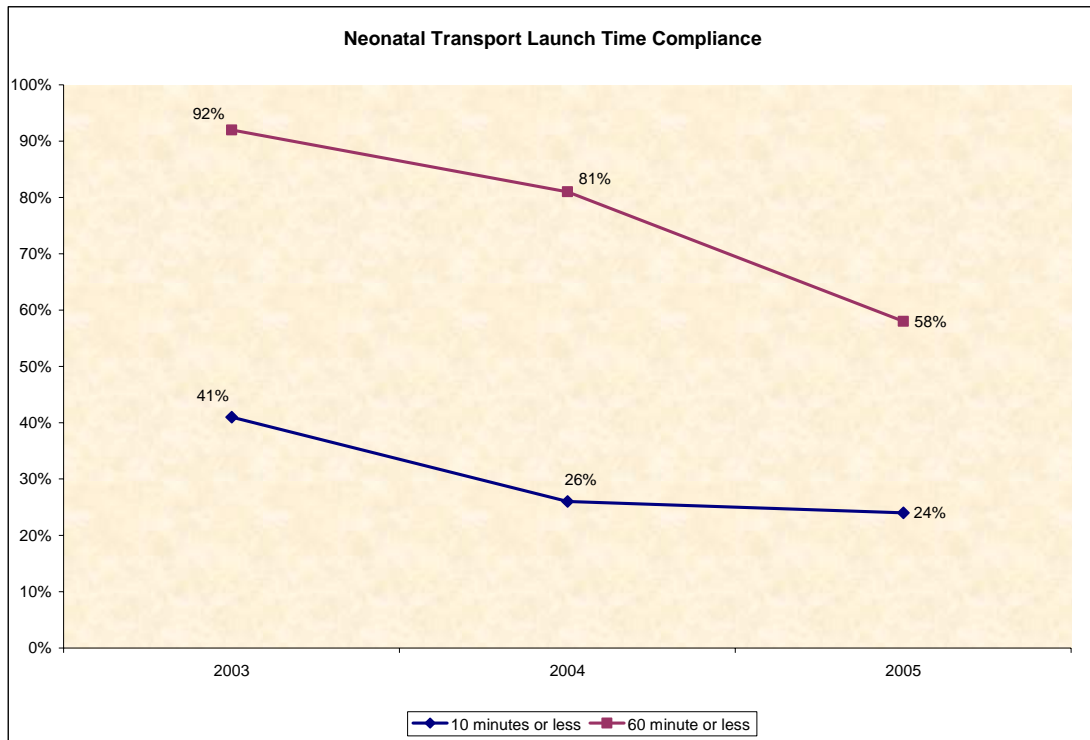


Figure 6. Pediatric Launch Time Trend (Helicopter)

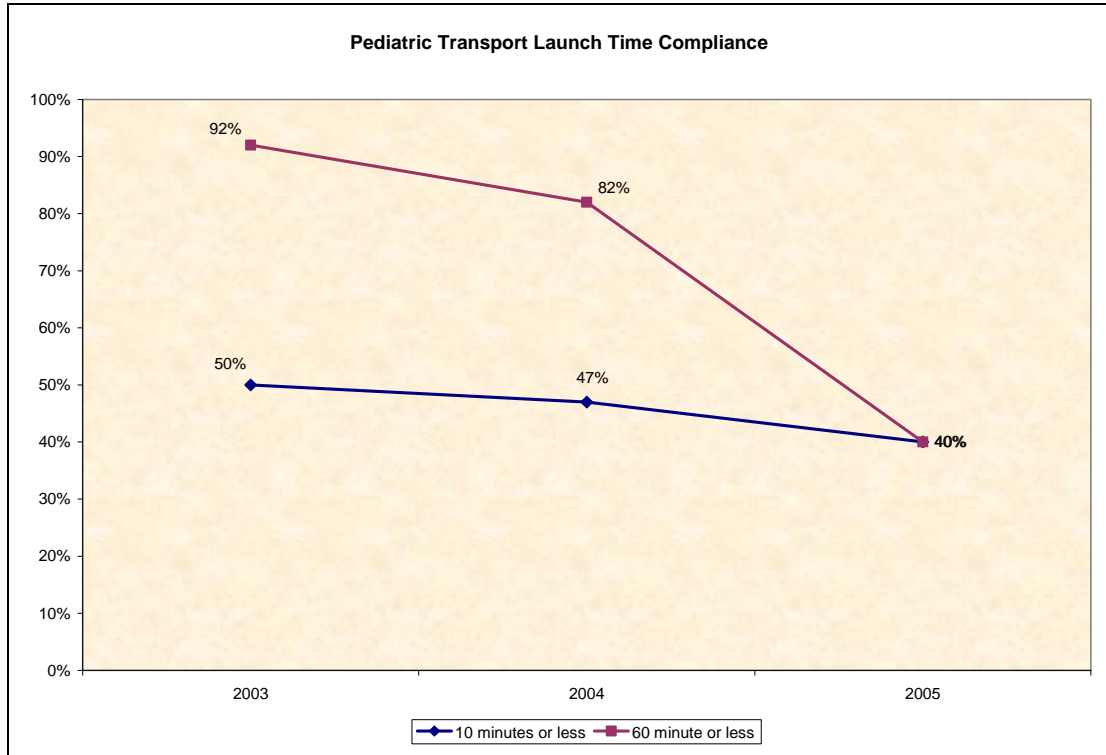
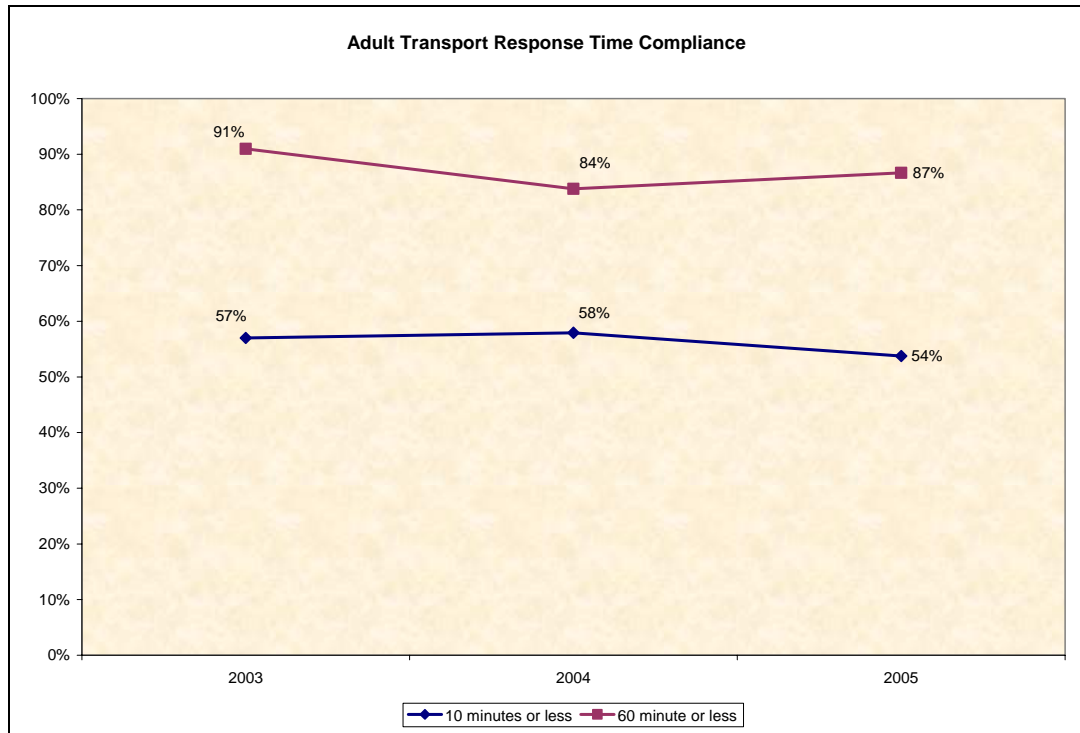


Figure 7. Adult Transport Launch Time Trend (Helicopter)



Access and rapid response couple together in getting the right talent to the patient in a timely manner. Neonatal and pediatric specialty transport personnel in North America have taken the position that it is better to wait for the right talent to arrive. Thus, many such specialty transport programs “stack calls”—keeping the patient at the sending facility until the appropriate team of clinicians is available for dispatch. In these cases, “rapid response” takes a secondary position to delivering the “right” clinical expertise to the patient’s bedside—even if the response is delayed. This scenario is experienced in Nova Scotia when pediatric or neonatal patients from New Brunswick are being transferred to the IWK. LifeFlight and the receiving physicians strongly feel that the IWK team should retrieve these patients directly (e.g. the patient should wait), as it is felt LifeFlight has the more advanced and experienced neonatal/pediatric transport team.

The time intervals for dispatch of an air ambulance unit, helicopter or airplane, is not one size fits all. Rather, it is a matrix of decision making that takes into account where the patient is geographically located, the immediate resources available at the patient site, the patient’s condition, and the safety of flight. The universal application of a launch time benchmark for all patient conditions is unrealistic, and unachievable.

The OBS team is a good example as it has set realistic launch time targets that recognizes their response parameters (e.g. they respond from in-hospital units). While it may be reasonable to strive for the 10 minute launch for scene flights and certain time sensitive critical interfacility transfers, the application of this same benchmark for neonatal/pediatric and high risk obstetrical patients warrants re-evaluation. It was also noted that the 10 minute launch time lacks local MCP endorsement.

Recommendations

1. Helicopter launch time is but one component of the overall response to providing access and critical care services. It should be viewed to more appropriately reflect LifeFlight’s operational constraints such as pilot duty time, the location of the aircraft and the responding team, and weather. These benchmarks should be revised following deeper examination as to why, historically, the target has been missed and whether these factors impact patient care outcomes.
2. The medical directors should continue with the development of a clinically driven helicopter launch time matrix for *all* teams. The OBS targets are a good example

- of matching the response of the team from in-hospital with the benefit of waiting a few more minutes in order to get the right team to the patient as safely as possible. OBS has a one hour target for responses to the airport, and a 25 minute response for helicopter pick up at the Lower Battery pad/IWK.
3. The activation and launch process from the IWK needs to be supported by anticipating prospectively the response needs and requirements. A consistent means of reliable ground transport to the airport should be established. The equipment, medications (controlled substances), and other items needed for transport with the team must continue to be readily available and fully prepared for use.
 4. If there is a team at the hanger, they must consistently prepare the aircraft and the responding team's equipment and other reconfiguration needs to assist in safely expediting the response as well as assist in returning the aircraft into service after the specialty team flight is completed.
 5. The Medical Control Physician should have more input into the selection of the appropriate transport vehicle when ground or air may be equally suitable to complete the transport.

D. EHS LifeFlight is a Complex Organization.

Industry Benchmark/Practice

The traditional air medical program is hospital based, with all employees and management reporting to a single point of authority with contracts for specific expertise such as aviation services. This has evolved somewhat as air medical programs have consolidated, and outsourcing of other aspects of the program (in addition to aviation services) such as management and patient billing have increased. Further, the industry is seeing a significant increase in the for-profit, independently owned and operated air medical services—a model whereby all aspects of the program (aviation, management, medical staff) are provided under the air operator.

Alternative models also exist, including arrangements whereby:

- the core (adult) medical team is contracted on a per flight basis to an independently owned air medical service; and/or
- specialty teams contract with an air program to “use” their helicopter or the inverse, whereby the helicopter program “contracts” with the specialty team.

Both alternative models have proved to be successful.

Findings

EHS LifeFlight has been in operation for nearly ten years, and during that time, has undergone several key organizational changes. The LifeFlight program was initially launched under a management services agreement with STARS, a helicopter provider for the province of Alberta, Canada. STARS employed the management team and the adult medical crew members and operated the program under contract with the Nova Scotia Department of Health. The pediatric medical team has always been employed by the IWK. EHS maintained a regulatory oversight of the program. After a five year term, the relationship with STARS was not renewed, and the first restructuring of the LifeFlight program was experienced—the management and adult medical personnel were absorbed under Canadian Helicopters Limited (“CHL”), the aviation company which provides the medical helicopter, pilots, engineers, and aviation operations. At that time, the interim program manager was appointed from the EHS staff to lead LifeFlight during this transition. It was during this time that numerous advancements and improvements occurred at LifeFlight. Program leadership facilitated:

- development of comprehensive policies and procedures;
- successful CAMTS accreditation (one of only three Canadian programs achieving this standard);
- enhancing relationships with sending facilities and physicians;
- capital investment with the acquisition of new isolettes and monitors;
- implementation of quality and risk management initiatives;
- securing a long term lease for the hanger and the completion of leasehold improvements at the facility;
- securing a dedicated communications specialist for LifeFlight operations 24/7;
- a Request for Proposals which improves medical airplane availability; and
- improvements to the helicopter such as the new loading system, and avionics such as GPS.

For the 18 month transition period, which started with the non-renewal of the STARS contract while the permanent Program Manager was hired, government (EHS) became both manager and regulator of the LifeFlight program.

With the exception of the EHS assigned Program Manager, the remainder of the LifeFlight management team and adult medical crew were employed by Canadian Helicopters Ltd (CHL). This arrangement continued until such time as an agreement was reached with the adult tertiary hospital which saw the adult medical team become employees of the QEII. These employees were then contracted to the EHS LifeFlight service. The IWK, on the other hand, has had a contract with LifeFlight for the medical crew since 1996 whereas the QEII signed their agreement in March 2006, although it has essentially been in effect since 2004.

A full time Program Manager was hired by CHL eighteen (18) months after the departure of STARS. This management structure brought complexity to LifeFlight's service delivery model - these three (3) groups of contracted employees (CHL, IWK and QEII) have a dual responsibility: to their employer and to LifeFlight. Further complicating relationships is the organization of the medical crews under two separate labor unions. The duality continues as employees assigned to LifeFlight from the hospitals have differing position descriptions (e.g. the IWK nurses have a job description specific to transport), slightly differing wages between the IWK and QEII nurses assigned to LifeFlight, differing wage structures for paramedics and the respiratory technologists, and a scope of practice for each flight job category that expands the scope of practice permitted within their home hospitals.

As a result, major challenges evolved due to the various employers and stakeholders involved. In addition, clear lines of authority were not in place. Each entity involved in providing people and/or services to LifeFlight brought their own leadership and management structure. Staff level personnel had at least two reporting structures. The hiring of the full time manager under CHL formalized the leadership that would shift from EHS to the contracted provider - and the difficulties of transitioning the multiple government and labor relationships to an "external" contracted manager were not fully anticipated.

Recommendations

1. EHS should return Lifeflight to its initial management model and develop a Request for Proposals to contract for a management company to provide the core medical (adult) team and management personnel to deliver the services of LifeFlight. This will support EHS returning fully to its responsibilities as the regulator and to oversee the contractor's performance, and will be a key step in bringing the management and staff personnel together.
2. The need for a single point of management for a program and the employees is the major priority to be resolved.
3. The relationship between LifeFlight and the specialty teams—pediatric, neonatal, and obstetrics—needs to be clearly delineated. There are two models for consideration: LifeFlight contracting with the IWK for the medical teams (the current model); or alternatively, the IWK contracting with EHS LifeFlight for access and use of the air ambulance resources to complete their transports.

E. LifeFlight Management and Staff Relations are Strained.

Findings

Beginning in the fall of 2005, tension between management and staff at LifeFlight has been increasing. It has become a source of low morale for management and staff, and a distraction to the work needing to be done at LifeFlight. Several warning signs are present in the organization that warrants intervention: increasing absenteeism, incomplete daily equipment checks, and the “us versus them” focus that has been taken on by both groups.

The discontent at LifeFlight has unfortunately been placed in the public forum and will require some repair with the media and the community in general. The recent attempt to change program direction that was under review by LifeFlight management, EHS, IWK, QEII, and LifeFlight Medical Directors—specifically to base the medical crew at the hospitals at night—was raised publicly by one of the unions. The action resulted in increased defensiveness and likely tarnished LifeFlight's image in the community. While air ambulance services throughout North America reach for opportunities to solidify relationships within their communities to offset public concerns about safety and cost,

LifeFlight has an added burden as to assuring its internal conflicts are properly resolved without public exposure.

The management-labor issues have dominated the current environment at LifeFlight, and overshadowed the exceptional work that LifeFlight has completed over the last ten years. There is need for immediate, aggressive action to correct the current course.

Setting a strong course forward must be initiated from LifeFlight management, and it must be accompanied by an open willingness and commitment from staff to rebuilding internal relationships and to again energize the organization toward fulfilling its mission, vision, and goals. Further, there will be need for self reflection from LifeFlight program management and medical staff as to whether they each can support and actively participate in a positive direction for the organization and rebuilding relationships. LifeFlight management and staff must work together toward the mission of LifeFlight to provide an optimal service for Nova Scotians.

Recommendations

1. Program management and the adult medical team should be provided by the same employer under a performance based contract to EHS. This returns EHS to its key role as regulator of the LifeFlight program. The credentialing phase of the RFP should assure that the pool of candidate companies brings a depth of experience in providing contract management services, and a portfolio of management personnel with senior management experience in air medical/aviation services.
2. The specialty teams, as previously noted, should remain under the IWK. The IWK staff assigned to LifeFlight shall be governed under the IWK and its designated Medical Directors for all aspects of their performance. IWK shall cause its staff to be fully compliant under LifeFlight's operational and safety training programs and all related policies and procedures when on the aircraft.

F. LifeFlight's Management Structure Reflects the Needs of the Organization.

Industry Benchmark/Standard

Common amongst air medical programs is a structure that distributes the core management team functions across the following positions: Director/Manager, Operations Manager, Clinical Manager/Chief Flight Nurse, Quality Assurance/CAMTS Coordinator, Business Manager, Marketing/Outreach Coordinator, Education Coordinator and Information Technology Coordinator. The size of the program (often defined by volume, and/or the number of employees), its level of independence in maintaining its business and facilities, and its regulatory requirements will further define whether positions are full time to the management function, or in addition to shifts worked in staff. Most programs are trending toward a larger role for CAMTS as accreditation is becoming a distinguishing factor among air programs and on Risk Management as a result of the increased incidents and accidents.

Findings

The management structure is comprised of a full time Program Manager, Operations Supervisor, Quality and Risk Management Coordinator, and the recent addition of an IT/IM coordinator. These positions are supported by a full time administrator and a part time administrative assistant.

The criticism of the management structure and rejection of the people serving in some of the positions was often related as “they are not from flight”. The inference is that without such background, there is a relative decrease in the value of that person’s contribution to the vision, mission and goals of LifeFlight. Although such a background brings certain experience, it may also bring limitations of a more narrow view—and thus constraining to the ability of LifeFlight to meet its objectives in an ever changing health care environment. The consultant’s find that the structure at LifeFlight reflects the needs of the organization at this time and the expertise and experience from non-flight personnel have benefited the organization.

The Operations Supervisor is an amalgamation of the previous adult and pediatric coordinator positions. It is an important bridge to the hospitals, the MCPs, and orchestration of the people, equipment, supplies, and aviation resources toward a safe response to mission requests. The rift between management and staff, the lack of having an education coordinator, and the absence of accurate delineation of daily responsibilities

has caused this position to become more self-dependent, resulting in a work load that is unreasonable for one person to carry.

The Quality and Risk Management position is poorly understood by staff and other external parties. Although this position was initiated by the need to prepare and complete the application for the CAMTS accreditation process, it is an integral piece to the ongoing maintenance of such standards, the internal quality review of LifeFlight compliance with its clinical and operational performance requirements, and the lead in coordinating the research and education agendas for the organization. Although EHS has been forward thinking in its commitment to risk management and safety practices, staff has not yet acknowledged the value and long term benefit of this commitment.

The quantitative aspects of LifeFlight cannot survive without a coordination of information and data systems. The person hours consumed to generate reports that guide decisions for improvements are staggering. The recapture of these hours will far outweigh the cost for the IT/IM coordinator. Further, the quality of the data and the ease at which it is captured is critical to supporting the research projects underway at LifeFlight.

Many of the tools needed to manage LifeFlight, such as computerized data and information systems, are poorly integrated. For example, the database in the communications center downloads to the LifeFlight database, but if corrections are made at LifeFlight—they are not being reentered into the communications center database. The result is conflicting information. Other data and information management concerns are the lack of an integrated, interactive information system, which results in a significant amount of time of manually combining or cross tabulating data from multiple source points. Several of the requests by the consultants for information that should be generally accessible to management were tedious to process.

As with most stand alone air medical programs, the administrative assistant position is broadened to include functions such as payroll, human resources, accounts payable, accounts receivable, and overall facility security and maintenance. The addition of a part time receptionist to support the clerical activities is appropriate, given the responsibilities assigned to the full time administrative assistant.

Staff has indicated that they feel dissociated from LifeFlight, yet when asked to assist on projects, will complain that they are clerical in nature. Management has noted continuous efforts to engage the staff, with limited response. Approximately 25% of the staff is actively and consistently involved. This level of participation is lower than most other programs, and lower than had been the previous level of involvement at LifeFlight. Part of the rebuilding of management and staff relationships is to engage people in working together on meaningful projects toward common goals. Part of the rebuilding of relationships is to engage people in working together toward common goals—and sharing the work load in a meaningful manner. This will fundamentally require trust—in the delegation of responsibilities and the commitment for completing the assigned duties.

Management needs to re-engage the staff into the operation and functions of LifeFlight. It cannot, on its own, manage and operate the LifeFlight program. Conversely, staff's level of contribution to LifeFlight cannot be limited to clinical care as they are equally responsible for LifeFlight's success, and must be consistently engaged in the organization's projects. Management and staff unable to embrace the broader commitment needed from them at LifeFlight may need to consider alternative employment.

Recommendations

1. Management should prepare a list of projects that need staff involvement, clearly outlining the expectations, timelines for completion, and management resource person. The list should include delegating some of the Operations Supervisor's responsibilities such as equipment management, inventory of supplies, and scheduling staff. Staff should be required to be actively engaged in at least one project at all times.
2. Incorporate the responsibilities of the education and training position into two staff coordinator positions (in-staff, working positions), similar to the way in which the outreach coordinator functions have been assigned. The education and the training responsibilities can be assigned through an application process to two staff members as their duties at LifeFlight that are in addition to flight assignment. This will assist in an appropriate distribution of the Operations Supervisor's work load. The additional responsibilities will require use of the staff person's time while on duty, and may also require non-flight duty time to be assigned on an as needed basis. The position description, once redrafted to incorporate flight duties,

- will best define the percentage of on-duty and off-flight assignment time required to fulfill the scope.
3. Immediately correct the one way database download from the communication center. The current system for corrections is unacceptable as it leads to inaccuracies in either data base. The options are either to enter any corrected data back into the communications center data base so it is always primary; or, allow LifeFlight access to the data base via a VPN /remote server so that they are working with the same information and can make changes as is appropriate.
 4. Quality and Risk Management should continue as a permanent, full time position on the management team.

G. LifeFlight's High Production Ratio Indicates Need for Additional Aircraft Capacity.

Industry Benchmark/Standard

In North America, a production ratio of 0.30 – 0.35 for air medical services (helicopter and airplane) generally demonstrates that a transporting unit is working at a level of profitability when supported by effective billing and collection activities. The production ratio reflects a typical resource deployment cycle—more demand occurs during peak hours (typically 10:00 am to 10:00 PM). Generally, when production ratios begin to exceed 0.35, the transport system begins to experience an increasing number of missed flights (or stacked flights) due to simultaneous demand during peak hours.

Findings:

The production ratio for an aircraft is expressed by the number of hours that the aircraft is actively involved on a mission, divided by the number of hours the aircraft was available to respond. The aircraft is considered "involved on mission" from the time it accepts a patient mission until that mission has been completed and the aircraft is again available for the next request. Aircraft availability is measured by the number of hours the aircraft is staffed and prepared to respond, less those hours in which the aircraft is out of service due to weather, maintenance, or commitment to a previous flight request.

Monitoring production is more effective than counting flights as production calculations take into account the length of the mission. Knowing production performance becomes

important when determining when to add, or remove, staffed aircraft or staffed team hours.

Using the time a staffed aircraft is involved in production is a more accurate measure of a transport unit's work load than is demonstrated by reporting the number of flights it completes. It is also a more reasonable means for comparing aircraft activity within the LifeFlight system than the traditional flight volume comparisons because of the distances traveled. For example, an average flight for most air programs in North America consumes 2.2 – 2.4 production hours. In comparison, we determined by compiling total time on transport from the dispatch records that EHS LifeFlight averages 4.5 production hours per transport. This production was also verified as a reasonable average during staff interviews.

Illustrated below is the number of production hours, on average, that LifeFlight consumes to complete a transport. The production hours vary by type of aircraft and by time of day due to the scheduled longer launch time during the night hours. The production time includes a 60-minute period to complete the flight paperwork, and restock and clean the aircraft.

The formula used to determine production ratios is:

$$\frac{(Average\ production\ hours\ per\ flight) \times (number\ of\ flights)}{(Total\ hours\ available\ for\ response - total\ hours\ out\ of\ service\ for\ weather\ \&\ maintenance)}$$

LifeFlight's transport volume is heavily impacted by weather and aircraft maintenance. These variables reduce LifeFlight helicopter availability by 30% and 6% respectively.

Weather in the service area presents the most likely factor to reduce transport volume, particularly in those months when visibility is often reduced and low ceilings prevail. Fog, freezing rain and icing will be the primary climatic conditions inhibiting the use of the helicopter. Hence, there is then increased dependency on the availability and access to the medical airplane.

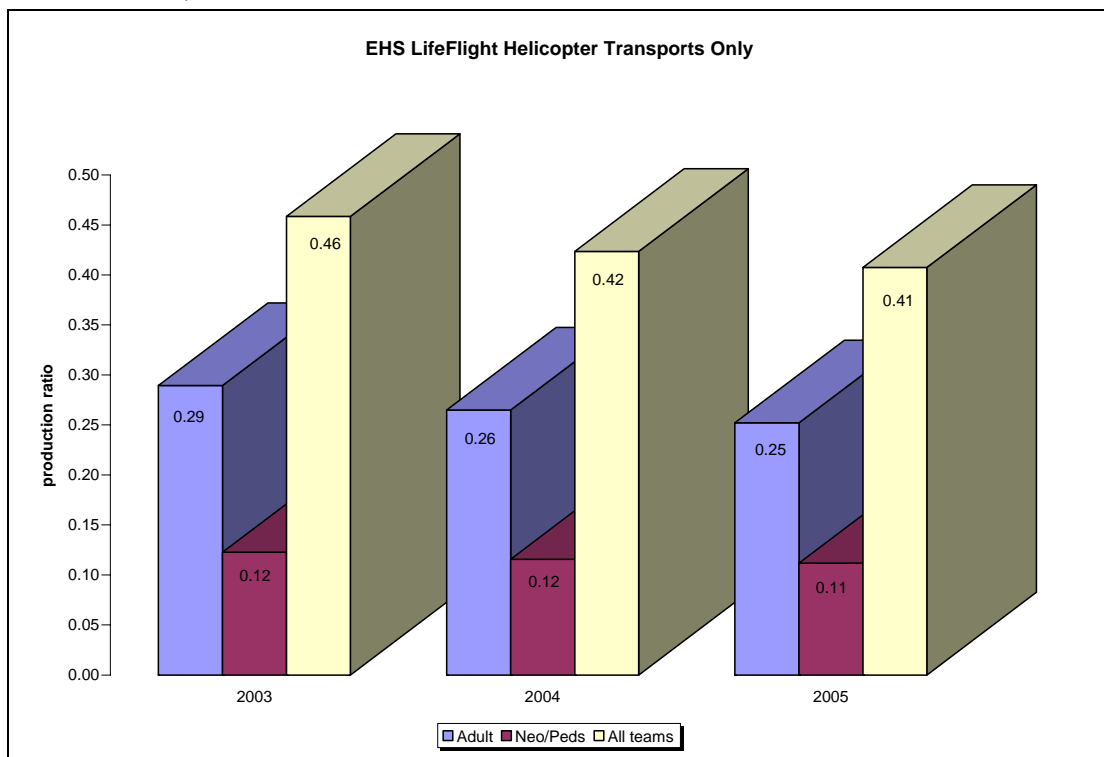
North American air operators of medical transportation programs have demonstrated aircraft availability to range from 95% to 98% for the SK 76 aircraft. This availability is achieved with those air operators experienced in EMS operations, the aircraft, complete

maintenance during the low demand period (e.g. at night), and supplying a back up helicopter for extended maintenance events that extend past 24 – 48 hours consecutively. In comparison, CHL completes its maintenance during peak hours, and on a Monday – Friday schedule.

Simultaneous demand for the helicopter will increase as activity (volume) increases. Simultaneous demand has been demonstrated to impact air medical response when production ratios range near the 0.15 mark. Data demonstrates a 3% simultaneous demand (request for service) at these production ratios. With the high production ratios for the LifeFlight helicopter overall (e.g. it is 0.45), it is not surprising to see a recorded 10% simultaneous demand.

The helicopter production ratios for the LifeFlight teams are illustrated in Figure 8.

Figure 8. All Teams, Production Ratios



It is important to note that the production ratios are different when looked at as it applies to the aircraft, versus applied to a specific team. The overall production ratio for the aircraft is elevated because it is being shared by three teams—two of which are at full staffing 24/7. In this regard, the ratio for each team is a more relevant of a benchmark. The OBS flights and staffing are included in the “all teams” category.

LifeFlight’s high production ratios indicate the need for additional aircraft resources, which can be met through an on-demand relationship as outlined in the EHS RFP for fixed wing services. With appropriate tracking of the variables affecting aircraft availability, the need for a dedicated airplane will be easily identifiable.

Recommendations:

1. LifeFlight should examine the cost of having a back up aircraft provided during times when maintenance is expected to extend past 48 consecutive hours.
2. CHL should schedule maintenance, to the extent possible, in a manner that will optimize aircraft availability during peak hours and the period of on-duty pilot staffing. Maintenance activities should be shifted to the night hours when the aircraft is already on a delayed response. It is understood that some maintenance cannot be performed at night as it requires operational and/or maintenance test flights. However, conducting general scheduled maintenance during the day hours when the aircraft is at its peak availability for service needs to be evaluated.
3. Every time the aircraft is out of service, the event needs to be recorded, and monitored to identify the factors and/or trends that are affecting availability. The description of the event, time out of service and time returned to service are the minimal criteria to be tracked. Weather related events should also include the duty pilot determination as to whether the flight could have been completed by airplane.

H. A Dedicated Fixed Wing Aircraft is Needed.

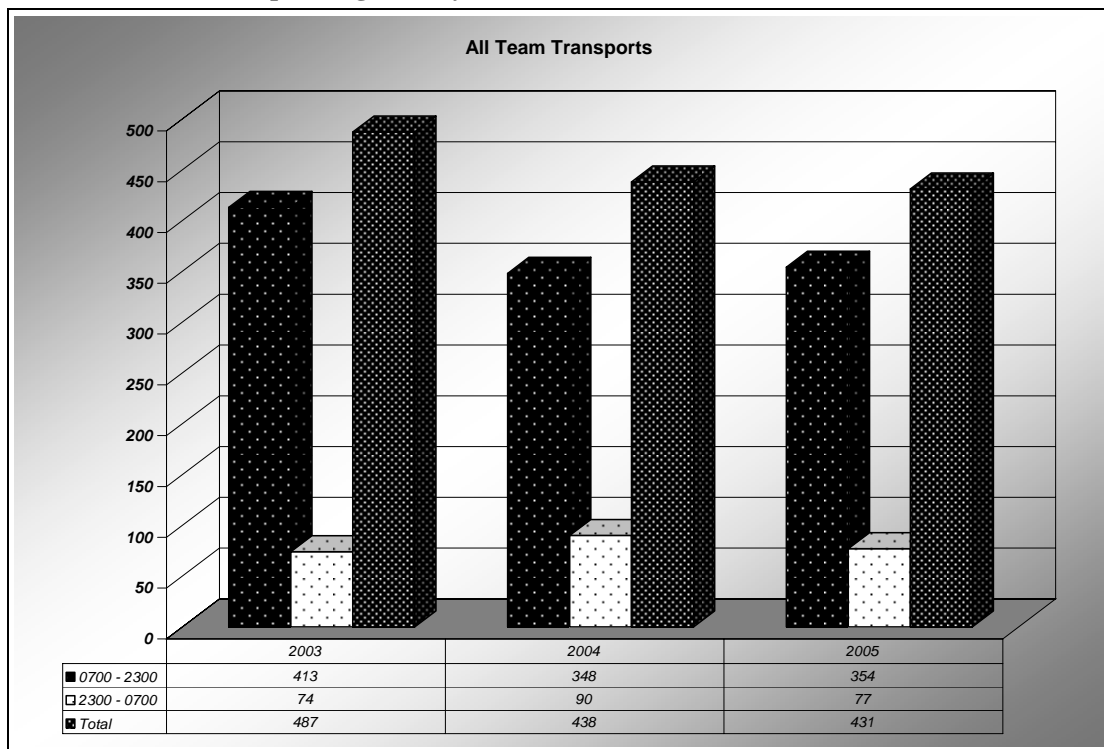
Findings

LifeFlight is fully staffed with pilots for immediate response between the core staffing hours of 0700 – 2300, and then with an on-call pilot and a 60 minute response time between the hours of 2300- 0700. Approximately 86% of the transports occur during

these core hours. This is typical of the transport demand cycle experienced in other air programs in North America. However, LifeFlight is unique in that it does not respond to scene flights during night time conditions. Given the volume of interfacility transports recorded during the time that pilots are on call, and response times documented during the staffed hours, it is difficult to justify the cost of pilot staffing a helicopter 24/7. However, there is increased need for fixed wing transport to support air medical mission requests when conditions prohibit safe helicopter operations, and/or there is no helicopter available due to simultaneous demand or maintenance.

Flight volume for all helicopter transports is illustrated in Figure 9. The data for Figure 9 and 10 was taken from the response time reports and it excludes out of province, repatriation flights, and transports with incomplete data. Total helicopter volume has been declining over the past three years due to issues with aircraft availability including weather, maintenance, and increased demand (e.g. the higher production ratios previously noted).

Figure 9. All Teams, Helicopter Flights Only



While helicopter flights may be down, primarily due to weather, the LifeFlight system overall is experiencing declining volume, as illustrated in Figure 10. Under the current

arrangement for airplane services, LifeFlight has limited access to the medical airplane as they are used primarily for on-demand and scheduled charters. The limited medical airplane support due to lack of availability even when pre-scheduled for helicopter out of service periods for weather or unscheduled maintenance has further contributed to the decreasing transport volumes.

Figure 10. All Teams Transports, All Modes

<i>Year</i>	<i>Ground</i>	<i>Airplane</i>	<i>Helicopter</i>	<i>Total</i>
<i>2003</i>	24	72	487	583
<i>2004</i>	28	70	438	536
<i>2005</i>	30	55	431	516

LifeFlight has the necessary protocols and procedures in place to define the use of air ambulance services. The distribution of transports has been averaging 80% helicopter, 14% airplane, and 7% ground over the past five years. Within the constraints of its operating budget and available resources, LifeFlight is able to garner an appropriate responding unit, helicopter or airplane, to fulfill on average 60% of its transport requests. Weather is by far the most dominant mitigating factor for a LifeFlight response—contributing to 30% of the total missed helicopter flights.

Despite what appears to be a decline in volume, the need for reliable back up transport resources (e.g. the airplane) is a priority. EHS has been engaged in a process to procure improved availability from an airplane. An RFP had been issued to select a provider for airplane services under the current standby arrangements. Two service provision options were outlined in the RFP: an “on demand/non-dedicated” airplane for the LifeFlight system; and a dedicated airplane.

To increase helicopter coverage to on site, fully staffed pilot capability 24/7 would be an annual increase of \$565,000 in budget cost. In contrast, the fixed cost of a dedicated airplane responding within 45 minutes is approximately \$300,000 more than the \$700,000 already budgeted. With the airplane available 24/7, there is greater improvement in the number of patients that will be reached than will be gained through the addition of eight hours of helicopter pilot coverage. The medical airplane will be available to service simultaneous demand, out of service maintenance events (scheduled

and unscheduled), and certain weather conditions that are unsuitable for helicopter operations.

Recommendations:

1. The best value for money, and flexibility for LifeFlight's overall service needs, is to improve availability by adding airplane capacity on a 24/7 basis. This will provide an immediate resource for weather, maintenance, and simultaneous requests to be served by a second team if available (e.g. the pediatric/neonatal team if the adult team is already out with the helicopter).
2. It was noted in a previous recommendation that evaluation of CHL's times for completing maintenance and a cost analysis for provision of a back up helicopter could lead to improved helicopter availability.
3. Key components of aircraft availability have been under review for the past 18 months. The steps to accomplish this begins with the above recommendation, and continues in the following order of priority:
 - Evaluate need and demand for a dedicated airplane;
 - Increase on duty helicopter pilot staff to 24/7 coverage; and
 - Establish the parameters to quantify the point of demand for a second helicopter and its hours of coverage, and initiate the data tracking of the criteria.

I. Communications Services are Provided Consistent with CAMTS Standards

Industry Benchmark/Standard

The LifeFlight communication center is staffed 24/7 with persons trained in air medical program operations. Each segment of the mission is recorded on voice (radio or telephone) and time stamped and documented in a data base.

Findings:

LifeFlight's service requests and transports are coordinated and dispatched through the EHS communications center. This center is organized and equipped consistent with centers found in high performance EMS systems. A robust computer aided dispatch

system supports ease in managing high demand and assuring the experience and judgment of the communications personnel is not overlooked.

A Communication Specialist is assigned 24/7 to LifeFlight responsibilities for call intake and coordination for all transport requests by all modes and teams. In 2003, this became a dedicated position in the staffing complement. The training program is comprehensive and well prepares an individual for the LifeFlight dispatch role.

The Communications Center meets or exceeds the standards and requirements for air ambulance flight processing.

It is unusual to find a ground ambulance communications center that embraces the unique needs and demands of an air ambulance program. This is likely the result of the closely integrated relationship and interdependency among the pre-hospital provincial programs.

Recommendations:

1. LifeFlight should collaborate with the communications center to further develop the communications specialist role and responsibilities during non-LifeFlight mission periods. The Communications Specialist is a resource that should be assigned additional LifeFlight duties/tasks for periods when LifeFlight is not on a mission. These duties could include areas such as data quality reviews, compiling data for special reports, and other related assignments as needed by LifeFlight management.

IV. Conclusion

EHS LifeFlight is an exceptional air medical service that meets or exceeds industry standards in every facet of its operation. The initial mission for LifeFlight to provide the citizens and visitors of Nova Scotia with access to tertiary services has been exceeded. The first ten years have set a solid course for delivering clinical care and transporting patients within the safest operational parameters possible. This has been done with the utmost respect for balance in the resources expended, and the desired patient outcomes, without compromising known standards.

It is imperative for LifeFlight to move from under the paralysis of the current environment. The organization needs to return to internal, self governance with direct accountability to EHS, re-establish a working relationship between management and labor, and improve communications throughout the organization.

LifeFlight must continue to evaluate its resource needs that assure it will deliver critical care services throughout the province in the most efficacious manner possible. The addition of a dedicated fixed wing aircraft will provide needed aircraft capacity and response. And, as many air medical programs have expanded into critical care ground ambulance services, EHS LifeFlight should also examine strategies whereby its role in critical care transport includes ground ambulance in the future.