

VII. EMERGENCY MEDICAL SERVICES

Emergency Medical Services (EMS) in Portland is provided via a public advanced life support (ALS) first response Bureau and a private ambulance transport agency. ALS first response is provided by Portland Fire and Rescue (PF&R) while the ambulance transport is provided by American Medical Response (AMR). AMR is contracted through Multnomah County to provide ambulance transportation in the City of Portland. In many cities, this type of relationship is often wrought with distrust, disagreement, territorial battles, and even questionable service to the citizens. In this situation, one quickly realizes that the stereotypical public/private feuds are not present – much to everyone’s credit.

This section describes how EMS in the City of Portland is organized, the role of medical oversight, and a review of clinical practices, quality management, EMS education, and training and health and wellness. Many of these recommendations are directed toward future planning and continuing to improve this already excellent service.

ADMINISTRATIVE OVERSIGHT OF EMS

Delivery and oversight of EMS in Oregon is regulated much like many other states. Distinct roles are provided to political entities, with many powers delegated to counties.

State EMS – The Oregon State EMS and Trauma System is charged with statewide regulation of EMS, including EMS providers, ambulance services, and trauma system coordination. Testing and certification of Oregon providers is regulated at the state level with three skill levels recognized: EMT-Paramedic, EMT-Intermediate, and EMT-Basic.

On July 1, 1994, the Oregon Legislature passed Senate Bill 95, which amended the Oregon Revised Statutes (ORS) and provided the authority for the Oregon Health Services to begin licensing ambulance services operating in Oregon and established an annual ambulance service licensing fee.⁴³ ORS 682 provides for the state EMS agency to delegate several oversight powers to individual counties, especially in the area of licensing EMS provider agencies.

Oregon State EMS also regulates medical oversight of both emergency and non-emergency EMS care by approving qualified physicians to function as *supervising physicians*. *They are* the medical directors for EMS agencies throughout the state.

Multnomah County EMS – Significant authority is granted by the state to each county. Portland Fire and Rescue (PF&R) EMS falls under the jurisdiction of Multnomah County. The county has an EMS Director who reports to the County Health Officer. Multnomah County EMS is the regulatory agency for all ambulance service, public or private, within the county. They coordinate all EMS activities within the county except provider licensure and

⁴³ Oregon Emergency Medical Services and Trauma System. (2005). Oregon Ambulance Service Licensing. Available: [On-line]. <http://egov.oregon.gov/DHS/ph/ems/amb-lic/about.shtml>.

certification, which is a state function. The Multnomah County EMS director feels that the county has a good relationship with PF&R. There appears to be synergy between PF&R and the transport provider, AMR.

Multnomah County EMS is responsible for the coordination of EMS data from all providers and hospitals. They assure that patient care report data is sent by each agency. They also assure that all EMS providers carry the same equipment so exchange and replacement can be easily accomplished – a wise decision. This cooperative effort has yielded several benefits to PF&R including:

- \$200,000 worth of disposable goods via the exchange program,
- \$100,000 worth of additional joint training (multiple cities and AMR),
- \$280,000 worth of LifePak 12 upgrades, and,
- Providing a pool of immobilization equipment (backboards, traction splints, KED's)

The county EMS Medical Director, Dr. Jon Jui, is considered the supervising physician of record. Dr. Jui has full authority for all EMS medical practices within the county. There is also a continuous quality improvement (CQI) group that assists the medical director with specific incident and general quality management purposes. The CQI group has representatives from each provider agency. The county EMS medical director reports to Dr. Gary Oxman, Multnomah County Health Officer.

At this time, the county has no official plans to develop a countywide EMS service. Dr. Jui and others have considered the idea, but AMR's recently signed contract may place this idea further back.

EMS MEDICAL DIRECTION

The Portland Fire and EMS medical direction, Dr. Jui, doubles as the Multnomah County medical director. Dr. Jui has been the County Medical Director since 1995. He is Board Certified in Emergency Medicine, Internal Medicine and Infection Control. He is a modified full-time employee (0.7 FTE) and divides his time between Multnomah County, Portland, AMR, Gresham, and the Communications Center. Dr. Jui is also a half-time (0.5) employee of the Oregon Health Science University (OHSU) as an emergency physician and Associate Professor for the emergency medicine residency program. This also includes some oversight of the EMS/Toxicology post-graduate fellowship.

Dr. Jui is assisted by three co-medical directors including:

- Liz Hatfield-Keller, MD, FACEP
- Mike Muarry, MD, FACEP
- Gregory Lorts, MD, FACEP

Dr. Hatfield-Keller serves as the primary backup when Dr. Jui is unavailable. She is a board-certified emergency physician who works in the Portland area. Dr. Jim Bryant is also a board-certified emergency physician who serves as the Chair for the Multnomah County EMS CQI Committee. Other community physicians in medical and surgical specialties assist as needed.

PORTLAND FIRE BUREAU EMS SECTION

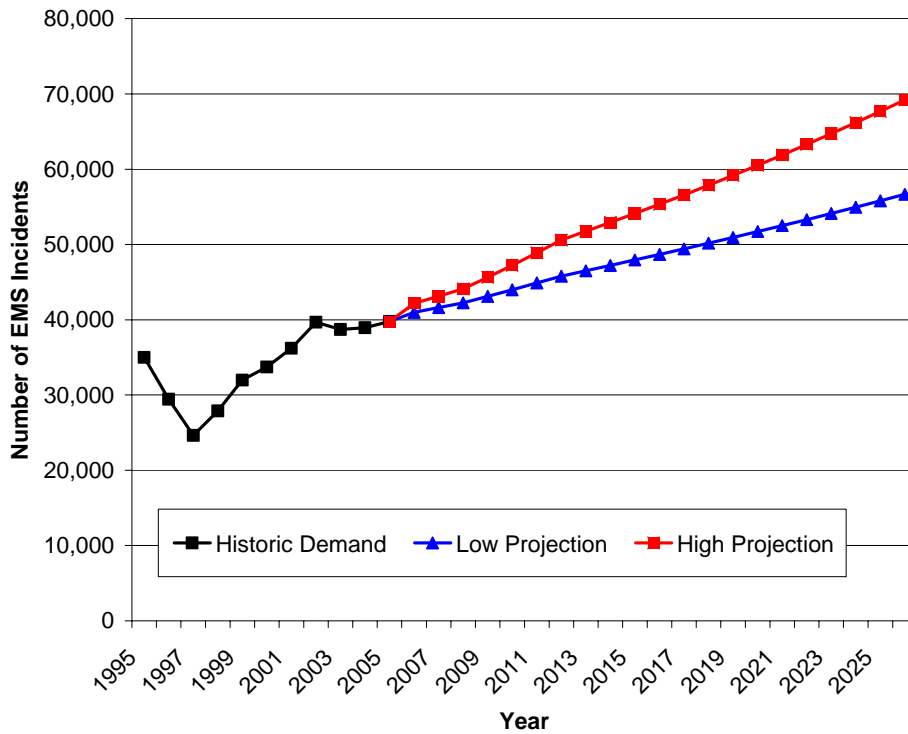
The PF&R EMS Section is responsible for all EMS administration, training, quality management, infection control, and health and wellness. PF&R is an ALS First Response agency with medical transportation provided by American Medical Response (AMR), a nationwide private service. All AMR units responding in Portland are staffed with two paramedic-level providers.

All PF&R engine, truck and squad companies are equipped as ALS units and have at least one paramedic on duty. PF&R has nine truck companies of which six are ALS units with at least one paramedic on duty. The three BLS trucks are scheduled to become ALS in the next one to two years. In FY05, PF&R responded to 39,775 EMS calls, accounting for over 66 percent of all responses. As in most communities, the trend for EMS responses continues to rise. Between FY94–95 and FY04–05, the number of EMS responses has increased by over 12 percent.⁴⁴

The availability of a paramedic on each fire unit means that paramedic-level care can start sooner for citizens in distress and represent a major improvement in quality of care compared to many other cities. It is a major credibility factor for the city.

⁴⁴ Portland Fire Bureau. (2005). Bureau of Fire, Rescue and Emergency Services: 10-Year Performance Statistics. Unpublished Work Product, p. 21.

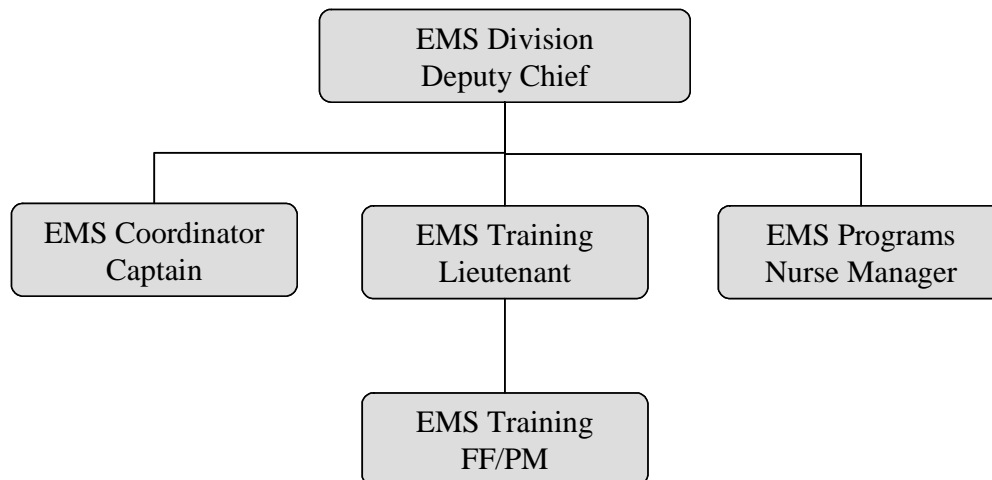
Figure 27: EMS Projected Demand



The long-term forecast model shows the trend in response numbers to continue rising through 2025 (See Figure 1).

The EMS Section is commanded by a deputy chief, who is assisted by an EMS Coordinator (Captain), EMS Trainer (Lieutenant), EMS Trainer (Fire Fighter) and EMS Program Manager/RN (Non-Uniformed, CQI, Health and Wellness, and Infection Control). The deputy chief oversees the entire bureau, with the EMS Coordinator concentrating on training and supply issues (See Figure 2).

Figure 28. Portland Fire-Rescue EMS Section



EMS TRANSPORTATION

EMS transportation is exclusively provided by AMR, a large, private provider agency. On September 1, 2005, AMR was granted a five-year renewal of their exclusive contract with Multnomah County, including provisions for post-contract annual extensions for up to five years.

AMR responds to 60,000–65,000 calls in the Multnomah County area, transporting about 50,000 patients. PF&R units are encouraged to cancel AMR when not needed. The high percentage of patient transports may be attributed to citizens calling for true emergencies and the fire department canceling ambulances appropriately (i.e., when they are not needed). AMR is dispatched from the Bureau of Emergency Communications (BOEC) and can access FD 800 Mhz talk groups.

AMR units provide 2,716 unit hours on the road each week. There are a minimum of 12 transport units available, with peak-load staffing of 23 during busy times. All units that respond to Portland calls are staffed with two Oregon-certified Paramedics. The EMT-Intermediate certification level is available, but only as a training level. EMT-Is and EMT-Bs are restricted from working on ALS units. There are one or two EMS field supervisors on-duty at all times, who are responsible for AMR units throughout Multnomah County. AMR responds to incidents involving extrication, but all extrication services are provided by the PF&R.

All parties interviewed agreed that the relationship between the PF&R and AMR is good. There is an open line of communications between each organization, allowing incident specific problems to be quickly mediated. Many PF&R paramedics started their careers working with AMR. Some still work part-time for AMR.

Recommendation 43: Maintain the current relationship with AMR and reevaluate at the five-year mark. The current relationship and service provided by AMR is more than sufficient.

DELIVERY PROFILE

The EMS delivery profile involves a combination of EMS priority dispatch, fire department ALS first response for potentially serious calls and an AMR ALS unit providing transportation. The primary system access point (PSAP) for Portland is the regional 911 center. The call is assigned a priority based on the medical priority dispatch program. Depending on the type of call and system status, the request is forwarded to fire dispatch, AMR or both. Calls are dispatched on the appropriate 800 Mhz talk group.

First Response – All engine, squad, and six truck companies respond with at least four personnel, at least one of whom is a paramedic. The remaining three trucks response with four personnel who are State certified as EMT-Basics. Between January 1, 2005 and August 30, 2005, the PF&R responded to 25,235 EMS first responder calls. They were the first arriving unit on

17,283 (68.5 percent) of their responses while AMR was first arriving on all others. This statistic shows that the PF&R is a vital link in the EMS delivery process.

There are a few issues concerning delivery of EMS first responder service that warrant mentioning.

The possibility of missing a fire call while committed to an EMS response is possible but evidence does not support possibility as being a critical issue. When considering the possibility associated with “missing a fire call,” one must consider time of arrival of a back-up company, actual fire, actual fire with trapped persons, and if response would have made a difference. After considering these variables, this is likely a non-issue. As data collection becomes more sophisticated, scientifically based answers will become more apparent.

Recommendation 44: PF&R should attempt to analyze data concerning suppression equipment being unavailable due to EMS responses. Consideration must be given to multiple variables that affect this situation.

Another assumption is that the increase in EMS responses causes an increase wear and tear on expensive response apparatus. This concern is also logical, but little data exists to determine either correlation or cause and effect. Two years of repair cost data in relation to number of calls were analyzed. A correlation analysis of the PF&R maintenance data revealed that there is no correlation between number of calls and repair costs for engine or truck companies (Pearson = .05, p = ns).

Recommendation 45: PF&R should not modify responses to medical calls based on suppression vehicle wear and tear.

Is sending a four-person first response crew on medical incidents overkill? Again, there is little evidence to clearly establish whether a two- or four-person first response crew is the most efficient and effective method of first response. Dr. Jui prefers a four-person first response crew as it allows critical patients to be handled swiftly and efficiently. Evidence is beginning to support Dr. Jui’s standards.

Recently, the American Heart Association (AHA) revised its CPR guidelines to emphasize the need for proper chest compressions. This included as a recommendation to switch rescuers every two minutes.⁴⁵ Evidence exists that infers decreased on-scene time for chest pain patients when a four-person first response company assists.⁴⁶

⁴⁵ AHA. (2005). Highlights of the 2005 American Heart Association Guidelines for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Currents in Emergency Cardiovascular Care*, 16(4), 1-28.

⁴⁶ Cohen, H.C. (2001). Does 12-Lead ECG acquisition increase on-scene time in the pre-hospital setting? Poster Presentation at the 2001 National Association of EMS Physicians Annual Conference, Phoenix, AZ.

There may be times when sending only two rescuers could be appropriate. This would require strict medical oversight of medical priority dispatch and only be acceptable for Level B and Level C calls (as per medical priority dispatch guidelines).

Rescues – Prior to budget cuts, the PF&R strategically placed nine, two paramedic rescue units at certain locations to be the primary first responders in the busiest districts. During this time, engine and truck companies did run fewer calls. Fire department leadership is interested in possibly reviving this practice on a more limited basis. In theory, these units would reduce the load off the busiest of suppression units.

One deployment method to consider is placing these units at Stations 41, 1, 11 and 28. The rescue would respond first on all calls dispatched by the BOEC as Level B or Level C (serious) medical calls and the Engine and Rescue would respond together on Level D incidents. For this to be effective, meticulous EMS Dispatch quality management would be needed at BOEC.

It may be reasonable to implementing the first rescue unit at Station 41 as its response levels and status as the Hazardous Materials Team are especially challenging. The rescue unit could provide at least two primary services:

- Reduce the number of first responder calls for Truck 41, keeping them available for Hazmat team duties.
- Staffing Rescue 41 with two paramedics who are specially trained in Hazmat medical emergencies. They would respond with the Hazmat team on suspected hazardous materials incident where illness or injury has occurred. These paramedics could be trained to use antidotes that are rarely used, but life-saving when needed.

The second Rescue unit should be considered for Station 1. If Truck 1 is moved to Station 5, as is recommended in Chapter V, a Rescue Unit at Station 1 would provide the following benefits:

- Rescue 1 will mitigate the increased first responder load for Engine 1.
- Rescue 1 paramedics who could be specially trained in Technical Rescue-EMS. This would provide two additional technical rescue-qualified personnel on the technical rescue team. These paramedics could be trained in advanced EMS techniques needed for long-term extrication, below-grade rescue and high angle rescue.
- The move of Truck 1 would only result in the loss of 2 instead of 4 technical rescue specialists per shift.

The decision to place a rescue unit in-service should be based on (a) value added service, (b) number of EMS calls and (c) lack of a truck company or alternate vehicle at the station.

Recommendation 46: Add four, two-paramedic rescue units. Two rescue units should be located at Stations 1 and 41. The other two rescue units should be located at stations in District 3, such as 11 and 28. The reason to place rescue units at Stations 11 and 28 is because they are near major roads and intersections, and have good street access. Also, the demand and

workload is increasing and there is a need for additional support. The ultimate decision for the latter two units is up to PF&R.

QUALITY MANAGEMENT

Quality management is the sum of all activities undertaken to assess and improve the products and services provided throughout the entire EMS system. The quality management process couples carefully identified, measurable performance indicators with information systems to monitor, analyze, and trend data. The goal is to deliver a service that is timely, consistent, appropriate, compassionate, cost-effective and, most importantly, beneficial to the patient's outcome or comfort.⁴⁷

The PF&R EMS Program Manager is a full-time employee, who is an RN, and has experience in emergency and critical care nursing, public health, and quality management. A significant percentage of her time is spent on EMS clinical care quality management. PF&R uses several key indicators to assess both the quality of patient care and levels of proficiency for each Paramedic. Data are collected and analyzed by the EMS Program Manager and reviewed by appropriate personnel. These findings are also shared with the PF&R's personnel by way of a quarterly department newsletter.⁴⁸

Recommendation 47: Expand the FireMedic newsletter and consider a quarterly CATV broadcast on EMS quality management issues.

TriData examined several EMS quality management indicators to provide a more in-depth analysis of the data.

Patient Care Report (PCR) Review – An important component of EMS Quality Management is PCR review by the responsible agency. There are several advantages to PCR review including:

1. Assuring that proper data collection and entry occur.
2. Compliance with state and local administrative directives.
3. The provision of medical oversight.
4. Assuring compliance with state and local protocols.
5. Assisting with the creation of a comprehensive patient care database.
6. Assuring that receiving facilities have the appropriate patient care data needed for clinical and financial continuity.
7. Enhancement of service financial reimbursement.

There are several methods used to accomplish meaningful patient care reports. These include peer review, supervisory review, central review, regulatory agency review, or

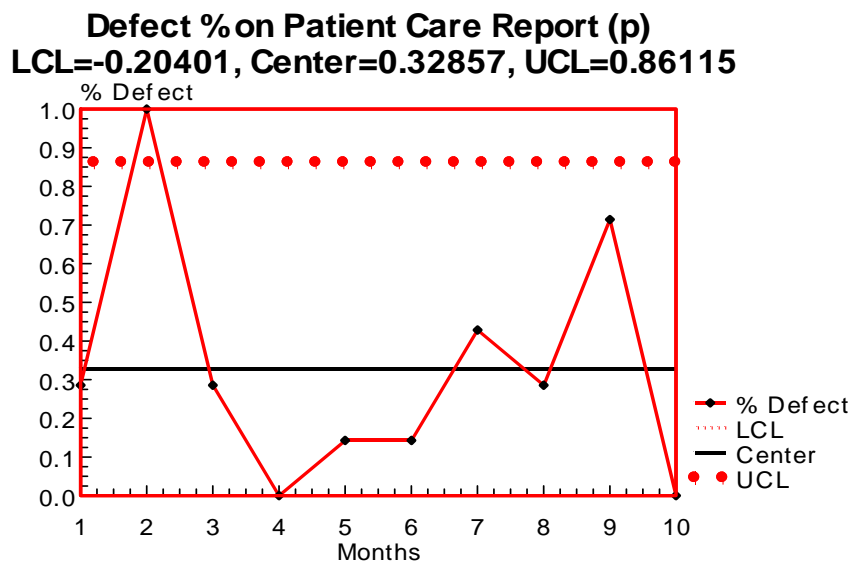
⁴⁷ Sayah, A.J. (2005) EMS QA, E Medicine: Instant Access to the minds of medicine. Available: [On-line.]. <http://www.emedicine.com/emerg/topic719.htm>, Sections 1-9.

⁴⁸ PF&R (September, 2000). *PF&R FireMedic News*. Unpublished Manuscript. Portland Fire & Rescue.

outside/private agency review. The PF&R uses a central agency review method where the EMS Program Manager randomly selects PCR for review. Also, the medical director selects certain types of incidents where 100 percent review is done. Multnomah County also provides outside oversight, usually involving specific procedures (STEMI identification). This type of review is appropriate for quality management.⁴⁹

The PF&R PCR review includes the appropriate breadth and depth of review. There is an overall review of charts for defects and identification of individual charts that do not meet standards. Charts are scored based on a department standard and classified as excellent, good, fair and needs improvement. Between January to October of 2005, PF&R paramedics achieved an average PCR score of 95.3 percent with 70 percent being considered excellent. The range of reports that needed improvement were between 0–7 percent monthly. Looking at this using a percent defects chart, you can appreciate that the percentage of defects were generally consistent, with February 2005 being the only month with defects above the upper confidence limit (UCL).

Figure 29: Patient Care Report Defects



Quality management of PCRs included follow-up and request for correction. Charts that needed improvement were identified by name, with the paramedic being expected to correct future reports. Follow-up indicated that only a few paramedics were placed on chart review.

EMS Clinical Quality – A continuing frustration among EMS managers is the inability to truly tell our communities what we do and how well we do it. It has been difficult to determine

⁴⁹ NHTSA. (1997). A leadership guide to quality improvement for EMS systems. Washington, DC: United States Department of Transportation.

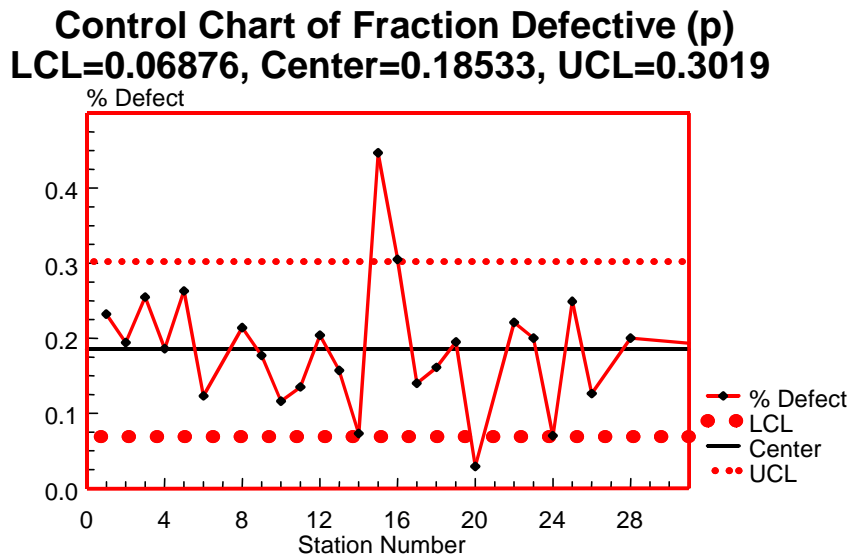
if out-of-hospital care makes a difference in access, mortality, morbidity or cost. The PF&R is ahead of most EMS systems as they have identified key indicators in clinical quality.

A major aspect of clinical quality management is oversight of patient care. Both the medical director and EMS Deputy Chief are actively involved in this function. Patient care and protocol exception issues are usually handled by a conference with the medical director and either the EMS Deputy Chief or EMS Coordinator. Serious incidents, while rare, can be handled within the department disciplinary process or referred to Multnomah County EMS for further action.

Quality management techniques can help pinpoint causes of defects in compliance. An important benchmark that is recorded is the time that the paramedic reaches the patient (Time With Patient [TWP]). This provides a more accurate response time, thereby allowing the department to determine whether resuscitation predictions are accurate.

Portland Fire and Rescue is ahead of most by collecting TWP. One quality management indicator is the percent of defects by not recording or reporting TWP. Between January through August 2005, there was an 18 percent defect in reporting TWP. Using the quality management chart, the EMS staff can clearly see that Station 15's percentage defect was considerably above the upper control limit of 30 percent.

Figure 30: Recording of Time with Patient



Recommendation 48: *Strive to achieve zero-defects in “with patient” reporting and recording times.*

Endotracheal Intubation (ETI) – In 2004, PF&R paramedics attempted ETI in 204 patients and were successful 192 times (95 percent). In 2005, ETI was attempted in 199 patients

with 184 successes (92 percent). Although the success rate was slightly lower, it was not statistically significant.

The PF&R ETI success rate was compared to several other EMS systems. Data was extrapolated from several published and on-line references. The data represented a cross-section of EMS systems, including those of different sizes and provider models. Comparing intubation success rates between PF&R and published literature, the 2004 success rate of 95 percent was superior to the sample. Using the 2005 data, there was a decrease in the overall success rate. Fewer patients were also intubated as compared to 2004.

Table 51: ET Intubation Comparisons

Source	Attempts	Success	% Success
Nova Scotia ⁵⁰	112	103	94.3%
Cady, C & Pirrallo, R. ⁵¹	2144	1969	91.6%
Colwell, C.B., Et.al. ⁵²	124	120	96.7%
Garza, Et. al. ⁵³	1066	909	85.3%
Wang, Et al. ⁵⁴	783	680	86.8%
Deakin, Et. al. ⁵⁵	52	35	71.2%
Gerich, Et. al. ⁵⁶	383	373	97.4%
McGuire, Et. al. ⁵⁷	263	223	84.8%
El Dorado County EMS ⁵⁸	63	57	90.0%
Overall	4990	4469	88.68%
PF&R 2004	204	192	95% (p = .04)
PF&R 2005	166	144	87% (p = ns)

⁵⁰ Nova Scotia Emergency Health Services. (2005). Medical Quality Performance Measure Report. Unavailable: [On-line].

⁵¹ Cady, C.E. & Pirrallo, R.G. (2005). The effect of Combitube use on paramedic experience in orotracheal intubation. *American Journal of Emergency Medicine*, 23(7), 868-71.

⁵² Colwell, C.B., McVaney, K.E., Haukoos, J.S., Wiebe, D.P., Gravitz, C.S., Dunn, W.W. & Bryan, T (2005). An evaluation of out-of-hospital advanced airway management in an urban setting. *Academic Emergency Medicine* 12(5), 417-22.

⁵³ Garza, A.G., Gratton, M.C., Coontz, D., Noble, E. & Ma, O.J. (2003). Effect of paramedic experience on orotracheal intubation success rates. *Journal of Emergency Medicine* 25(2), 251-6.

⁵⁴ Wang, H.E., Kupas, D.F., Paris, P.M., Bates, R.R., & Yealy, D.M. (2003). *Resuscitation* 58(1), 49-58.

⁵⁵ Deakin, C.D., Peters, R., Tomlinson, P., & Cassidy, M. (2005). Securing the prehospital airway: A comparison of laryngeal mask insertion and endotracheal intubation by UK paramedics. *Emergency Medicine Journal* 22, 64-67.

⁵⁶ Gerich, T.G., Schmidt, U., Hubrich, V., Lobenhoffer, H.P., & Tscherne, H. (1998). Prehospital airway management in the acutely injured patient: The role of surgical cricothyrotomy revisited. *Journal of Trauma* 45(2), 312-314.

⁵⁷ McGuire, T. (2001, February). *EMS News: Alameda County Emergency Medical Services Agency Newsletter* 16(1). Available: [On-line.], p. 1.

⁵⁸ El Dorado County EMS (2004). *EMS quality management data*. Unpublished Data.

Whether using the 2004 or 2005 data, it is safe to conclude that the PF&R’s intubation success rate is very good and comparable with data from other EMS systems.

Intraosseous (IO) Infusion – This is a procedure that provides an alternative access to the body circulation when intravenous (IV) access is unsuccessful. IO is not a new technique, but in the mid-20th century fell into disfavor as IV access became more popular. In the 1980s, this technique was revived as an alternative to IV access. Until recently, IO infusion’s resurgence was limited to pediatric resuscitation. Recent technological advancements have allowed EMS to add IO infusion into adult resuscitation protocols.

IO infusion involves placing a large, sturdy, needle into places within the bone that allow for access into the circulation. The most popular sites are in the leg, below the tibial tuberosity, and in the ankle at the medial malleolous. Resurgence of IO into adult resuscitation has seen a renewal in sternal IO placement. IO is usually reserved for patients who are in extremis where IV attempts are unsuccessful. This procedure is performed on extremely critical patients and therefore they are usually unconscious.. Pediatric emergency centers will place IO’s after anesthetizing the skin, but this is uncommon in the out-of-hospital setting. When IO is successful, fluids, medications and blood products may be infused via this route.

In 2005, PF&R paramedics’ attempted IO infusion on four occasions in pediatric patients, with one (25 percent) being successful. Adult IO infusion will not be an available procedure until 2006. Table 52 provides a sample of IO success rates found within other EMS systems. PF&R’s IO success rate is below the sample data analyzed. This is because it did not provide IO infusion to adult patients, as it was not part of PF&R’s protocol.

Table 52: Intraosseous (IO) Success Rates

Study	Attempts	Success	% Success
Banargee, et al. ⁵⁹	30	30	100%
Glaeser, et. al. ⁶⁰	152	116	76%
Macnab, et. al. ⁶¹	50	41	84%
Nijssen-Jordan ⁶²	42	36	86%
Totals	274	223	81%
Portland Fire-EMS	4	1	25%

⁵⁹ Banerjee, S., Singhi, S.C., Singh, S., & Singh, M. (1994). The intraosseous route is a suitable alternative to intravenous route for fluid resuscitation in severely dehydrated children. *Indian Pediatrics* 31(12), 1511-20.

⁶⁰ Glaesner, P.W., Hellmich, T.R., Szewczuga, D., Losek, J.D., & Smith, D.S. (1993). Five-year experience in prehospital intraosseous infusion in children and adults. *Annals of Emergency Medicine* 22(7), 1119-24.

⁶¹ Macnab, A., Christenson, J., Findlay, J., Horwood, B., Johnson, D., Jones, L., Phillips, K., Pollack, C., Jr., Robinson, D.J., Rumball, C., Stair, T., Tiffany, B., & Whelan, M. (2000). A new system for sternal infusion in adults. *Prehospital Emergency Care* 4(2), 173-7.

⁶² Nijssen-Jordan, C. (2000). Emergency department utilization and success rates for intraosseous infusion in pediatric resuscitation. *Canadian Journal of Emergency Medicine* 2(1) 1-7.

PF&R should investigate the reasons why their IO success rates are lower than expected. Additional continuing education and laboratory practice should be considered. Technological enhancements may also be of assistance, including a small drill type device that powers the IO needle into the intraosseous space. This type of device has shown early success in the EMS environment.⁶³

Recommendation 49: Attempt to increase the IO success rate to at least 80 percent. Since adult infusion is now part of protocol, PF&R should strive to increase its IO success rate. The addition of adults to the IO protocol will likely increase skill use. PF&R may also consider additional education, skill practice, and new technologies. It should also continue participation in the Multnomah County EMS EZ-IO project.

Intravenous Therapy – IV Therapy is a standard skill for paramedics in Portland and throughout the United States. Since the late 1960’s, prehospital IV therapy has been a mainstay of critical care and resuscitation. In 2005, PF&R paramedics attempted IV access 2,269 times, with 1,622 first-attempt successes (75 percent). Both published and anecdotal evidence reveals that the PF&Rs first attempt success rate is on par with other EMS organizations.⁶⁴

Cardiac Arrest – Portland Fire and Rescue and Multnomah County EMS have taken a leading role in data gathering and analysis of out-of-hospital cardiac arrest data and outcome. In 2002, the PF&R and AMR began to collect extensive data on cardiac arrest calls. Between January and June, 2003, bystander CPR was performed in 36 of 157 (23 percent) cases and return of spontaneous circulation (ROSC) in 58 of 157 cases (37 percent).

Of cardiac arrest cases, there were 97 witnessed cardiac arrests and 46 unwitnessed cardiac arrests. There were also 15 cases where the witness/no witness variable was not recorded. ROSC in witnessed arrests was 45 of 97 (46 percent) compared to non-witnessed ROSC, 12 of 46 (26 percent). An odds ratio (OR) was calculated to determine whether patients suffering a witnessed cardiac arrest had a greater likelihood of regaining a pulse than a patient suffering a non-witnessed cardiac arrest.⁶⁵

Table 53: Odds Ratio for ROSC “Witnessed” Cardiac Arrest vs. “Un-Witnessed” Cardiac Arrest

Odds Ratio	2.45
95% Confidence Interval	1.12–5.11
P-value	.02

*P-value < .05 is considered significant

⁶³ Davidoff, J., Fowler, R., Gordon, D., Klein, G., Kovar, J., Lozano, M., Potkya, J., Racht, E., Saussay, J., Swanson, E., Yamada, R. & Miller, L. (2005). Clinical evaluation of a novel intraosseous device for adults: EZ-IQ 250 patient Prospective Multi-center Trial. Unpublished Manuscript. Available: [On-line].

www.Vidacare.com/research/seminar-data/pdf/250_patient_prospective/MCT.pdf, 1-9.

⁶⁴ California EMSA. (2000). Report on trial studies. Available: [On-line]. <http://www.emsa.ca.gov>

⁶⁵ An odds-ratio is a statistical test used to measure the degree of association between variables (e.g., witnessed cardiac arrest vs. non-witnessed cardiac arrest). A value of “1.0” indicates no relationship between variables.

The results of the OR test indicate that “witnessing” a cardiac arrest was a positive indicator of temporary outcome.

Another OR test was performed to determine if there was a positive association in outcome when a bystander performed CPR. Table 54 shows the results of the odds ratio test.

Table 54: Odds Ratio When Bystander CPR Was Performed

Odds Ratio	0.93
95% Confidence Interval	0.42–2.03
P-value	ns

Witnessed or non-witnessed cardiac arrest cases had bystander CPR performed 24 of 97 (25 percent) vs. 12 of 46 (26 percent). The results of the test indicate that bystander CPR did not make a difference in ROSC.

The combination of witnessed or non-witnessed CPR was 14 of 97 (14 percent) and 4 of 46 (9 percent) (Chi-squared = 0.74, p = ns) respectively. Results are shown in Table 55.

Table 55: Odds Ratio When the Cardiac Event was Witnessed or Unwitnessed and Bystander CPR Was Performed

Odds Ratio	1.77
95% Confidence Interval	0.53–5.03
P-value	ns

Table 56 summarizes the effect of these external variables on whether ROSC was achieved. It assumes that the PF&R or AMR performed standard resuscitation measures.

Table 56: External Variables and Outcome

Variable	Effect on Outcome
Witnessed/Non Witnessed Arrest	+ for Witnessed Arrest
Bystander CPR	Insignificant
Witness/Non-Witness and Bystander CPR	Insignificant

Data for January to October, 2005 reveals an ROSC rate of 53 of 196 (29.2 percent). This compares with January through June 2003 rate of 58 of 157 (37 percent) (Chi-Square 2.05, p = ns).

PF&R also began a pilot program to determine if the new advance cardiac life support (ACLS) drug Vasopressin affected ROSC. Between January and September 2005, Vasopressin was administered as the first drug in 25 cases, with 7 (28 percent) cases of ROSC. Comparing vasopressin and standard resuscitation (epinephrine) cases, there was ROSC in 7 of 25 (28 percent) and 44 of 171 (26 percent) respectively (OR = 1.12, 95% CI = 0.47 – 2.90, p = ns). This

revealed that there was no significant difference between vasopressin or standard resuscitation in achieving ROSC. Due to low vasopressin use, more data is necessary to validate this conclusion.

Recommendation 50: Continue to investigate the use of vasopressin in out-of-hospital cardiac arrest for at least one year. Quality management personnel should assure that field providers are following the investigational program methods.

The PF&R is superior to most other EMS systems regarding the collection and analysis of EMS data. One area that needs improvement is the ability to integrate this data with hospital data to determine the affects of EMS on patient outcomes. Although most EMS systems struggle with this, Portland has reached a level of sophistication that positions itself to lead this challenge.

Recommendation 51: The PF&R should lead and advocate for the improvement of EMS data collection and analysis systems, especially involving the integration of EMS and hospital data.

EMS TRAINING

All initial EMT and Paramedic training is conducted by one of several Portland area colleges. Most attend the Oregon Health Sciences University training programs. Employees who are hired as firefighters must have EMT-B certification to be hired. Those hired under the apprentice program are sent for EMT-B training during the probationary year.

Firefighters wishing to become paramedics may attend an approved program at their own time and expense. At this time, the PF&R does not have problems recruiting or retaining certified EMT-Ps, a much better situation than many places in the country.

Recommendation 52: The PF&R should closely monitor the number of applicants who are certified paramedics and the number of firefighters attending paramedic training. If the current trend continues, no further action is needed.

EMS Continuing Education –The EMS Section coordinates EMS Continuing Education. Most of the paramedic continuing education (CE) is instructed by Drs. Jui and Hatfield-Keller. There is a prescribed program that all paramedics must attend. Those who miss required programs may review a videotape and be tested on its content. Cardio pulmonary resuscitation (CPR), ACLS, prehospital trauma life support (PHTLS) and pediatric advanced life support (PALS) are provided by contracted instructors. Instruction cost is reduced by having an EMS Section trainer assist with the courses. Interactive video, on-line CE or CD-ROM methods are being considered. Phone-line computer access limits this avenue of continuing education.

Recommendation 53: Pursue on-line, interactive methods of providing recertification in ACLS, PALS, and other standardized courses. Paramedics can obtain recertification based on their own level of mastery.

There is an interest at all levels in having more joint training between the PF&R and AMR. As AMR's status is secure for five to 10 years, political boundaries between the city and AMR continue to lessen. This should mitigate some of the inter-agency hesitation that may still

exist. The PF&R provides services that allow AMR to meet their response time and on-scene care goals. For this, the PF&R neither seeks nor receives direct remuneration. Although the city could seek this remuneration, a better method may be to seek more in-kind services.

Recommendation 54: The PF&R should request AMR to assign a full-time EMS instructor to the EMS Section. The instructor assigned should be approved by AMR, the PF&R EMS Deputy Chief and Dr. Jui. The amount of joint training will increase to both organizations benefit.

THE FUTURE OF EMS: There are several possibilities for the PF&R regarding EMS and the future. Two major areas include emergency preparedness and public health. The fire department is likely the best organization to lead EMS in the areas emergency management, mass casualty incident, and weapons of mass destruction.

Another aspect of the future is the PF&R's involvement in public health. Lack of health care access due to the increasing numbers of uninsured or underinsured, mainstreaming of the mentally ill and substance abuse diseases are forcing citizens to use EMS for primary care. The fire department can take a lead role in the revision of triage, prevention, treat and release and public health access. Fire stations may become an access point for some community health care, especially follow-up care or wellness preservation.

The main goal for PF&R should be to continue fostering relationships with city and community health leaders. This includes public health agencies, the physician community, hospitals and healthcare systems and other health advocacy groups.

Recommendation 55: Continue to foster open relationships with city and community health care entities.

FIREFIGHTER HEALTH AND WELLNESS

A major responsibility of the EMS Section is to administer the department health and wellness program. The EMS Program Manager is responsible for the day-to-day operations of the health and wellness program. This program includes immunizations, coordination of mandated annual hearing testing, and firefighter physical fitness.

Immunizations – The EMS Program Manager is responsible for the immunization program which includes, influenza, Hepatitis A and B, Tetanus, TB, and Hepatitis B titers. The program is administered and the immunizations provided by one person. Other EMS jurisdictions have allowed paramedic-level EMS providers to assist with the administration of vaccinations and blood draws. There is some controversy as to scope of practice issues, but these are usually more imagined than real. After determining an appropriate quality management and tracking exercise, the EMS Program Manager's time may be better spent administering the program rather than administering injections.

Recommendation 56: Continue to develop the immunization program by having paramedics assist with administering vaccinations and drawing blood samples.

Coordination of Annual Physicals – The PF&R does not normally provide annual physicals for most of its personnel. The department was fortunate that in 2002, grant monies were available to hire OHSU to provide comprehensive physicals to department members.

At first, some members were hesitant to participate and labor officials were concerned about these physicals being a catalyst for forced separation. These fears were put to rest, partly due to the efforts of the EMS Program Manager, a non-uniformed medical provider, who employees felt more at ease with.

These preventive health physicals were successful in diagnosing various major and minor issues involving the firefighters. There were several cases of significant heart disease, liver disease and diabetes discovered. Medical evidence is overwhelming that early diagnosis of these conditions, especially prior to obvious symptoms, can save lives, reduce disabilities, and save health care dollars.

Recommendation 57: The PF&R should make it a top priority to continue funding annual preventive physicals for their uniformed personnel. Efforts should be made to find government, public health or academic grant monies available for this purpose.

The department has access to aggregate data as to general findings within the department. These data should be analyzed to assist in determining the overall health of the department, planning for educational programs and working with insurers to provide more effective disease management.

Recommendation 58: Continue to collect and analyze aggregate health data. This can be done so not to violate individual privacy issues.

Firefighter Physical Fitness – The EMS Program Manager spends considerable hours administering the physical fitness program. All suppression personnel are allowed one hour workout time per shift. All 40-hour personnel get two, one hour work periods per week. Most work locations have elliptical cardiovascular trainers and universal strength training equipment. Elliptical trainers should soon be available at all work locations.

The department also subscribed to the guidelines recommended in the IAFC/IAFF Joint Wellness and Fitness Program. This included the training of peer fitness trainers that would assist firefighters in need of instruction or assistance with the program.

There is positive outcome data concerning the physical fitness program, specifically a 50 percent reduction in line of duty injuries. More data should be collected and analyzed to determine if there is truly cause and effect between fire fighter fitness programs and injury reduction.

Recommendation 59: Continue to collect and analyze data concerning the benefits of the physical fitness program.