Comparison of Dispatch Call evaluation to Patient Acuity and the Resulting Resource Allocation in Emergency Medical Services

by

DREW HERBERT BURGWIN

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COMPARISON OF DISPATCH CALL EVALUATION TO PATIENT ACUITY AND THE RESULTING RESOURCE ALLOCATION IN EMERGENCY MEDICAL SERVICES

MAJOR PROJECT

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ABSTRACT

The British Columbia Ambulance Service (BCAS) is one of the largest emergency medical services (EMS) systems in Canada and one of only two provincial services. It uses a resource allocation plan (RAP) to standardize the dispatch of EMS resources and the level of service providers required (basic life support, advanced life support, and first responders) and the mode of response used (lights and siren or routine).

Matching the appropriate level of resources to the acuity of the patient(s) is crucial for optimum system design. To do this, EMS organizations must understand their customers, and develop methods to predict how physiologically stable or unstable is the patient.

This major project focuses on the call assessment component of the dispatch system and its sensitivity to patient acuity and the resulting resources sent to the scene (resource allocation). It then evaluates if stakeholders feel the appropriate resources are sent based on the call assessment, and its sensitivity to patient acuity.

A two-phased approach consisting of development and application of a patient acuity scoring system (PASS) and the Delphi survey served as the foundation of the study conduct.

The PASS provides "real world data" and forms a picture for EMS directors and stakeholders to view in order to put the resource need into perspective. Future trends toward increased use of ambulance services need to be considered and plans developed using this type of objective data.

PASS is a valuable tool to help agencies develop response strategies in terms of qualification level of paramedics, the mode of response (use of lights and siren) and the need for a first responder. This study showed that stakeholders make decisions about resource allocation despite the presence of data, which may indicate a different resource requirement.

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CHAPTER 1: STUDY BACKGROUND

Introduction to The Problem

The British Columbia Ambulance Service (BCAS) is one of the largest emergency medical services (EMS) systems in Canada and one of only two provincial services. The purpose of the service is to provide inter-hospital transfers and pre-hospital emergency care and inter-hospital care prior to and during transport to hospital.

The BC Ambulance Service uses a resource allocation plan (RAP) to standardize the dispatch of EMS resources and the level of service providers required (basic life support, advanced life support, and first responders) and the mode of response used (lights and siren or routine).

Matching the appropriate level of resources to the acuity of the patient(s) is crucial for optimum system design. To do this, EMS organizations must understand their customers, and develop methods to predict how physiologically stable or unstable is the patient. Then based on this assessment of acuity, the system must send the optimal level of resource (the acuity factor). EMS systems around the globe continue to look for the most cost effective and responsive design in EMS.

"Emergency Medical dispatching can be defined as the allocation of the human resources and the available equipment of an emergency medical service (EMS) system to anyone who asks for medical help" (Calle et al, 1996, p.187). Early in the history of emergency dispatching, (pre-1970) dispatchers were considered no more than telephone operators who received requests for ambulances and sent the ambulance to the correct location. Today emergency medical dispatchers (EMD) are considered the hub of an EMS organization and have been shown to be an effective component of emergency patient care (Clawson et al, 1996). It is these dispatchers who must determine the acuity level of the patient and dispatch appropriate resources

The British Columbia Ambulance Service uses the Medical Priority Dispatch System™ (MPDS) as a means of evaluating calls for assistance (the call assessment). Dispatchers also provide pre-arrival instructions to callers to coach them through life saving manoeuvres until paramedics arrive.

This major project will focus on the call assessment component of the MPDS system and its sensitivity to patient acuity and the resulting resources sent to the scene (resource allocation). It will then evaluate if stakeholders feel the appropriate resources are sent based on the call assessment, and its sensitivity to patient acuity.

Research Question:

- How accurate is the Medical Priority Dispatch System™ (MPDS) in predicting the patient's condition (acuity); and
- Can the call evaluation and resource allocation be improved to more specifically address the patient's needs and improve efficiency?

To ensure the best service to patients and the most effective use of resources, BCAS must establish an evidence-based rationale for resource allocation. To do this the BCAS needs to:

- Determine the ability to predict patient's needs;
- Identify the levels and modes of response for different levels of acuity;
- Determine the acceptable level of over triage (sending more resources than one necessary); and
- Collect what evidence supports a particular resource allocation plan.

Determine the ability to predict patient's needs

Special call evaluation processes, described as priority dispatch systems, have been developed and accepted as "best practice" for the interrogation of callers requesting an ambulance (Kuehl, 1994). This process attempts to elicit a chief complaint and associated signs and symptoms that indicate the severity of the patient's condition. Dispatchers ask pre-scripted questions in order to classify and assign a specific code that prioritizes the call. The classification and dispatch code will then dictate what resources to send according to a pre-defined plan called the resource allocation plan (RAP - see Appendix A).

The process used for call evaluation in the BCAS is called the Medical Priority Dispatch System (MPDS). This process was founded on the goal of "sending the right thing to the right person, at the right time, in the right way" (Kuel, 1994).

Identify the levels and modes of response for different levels of acuity

A RAP describes to dispatchers what level of service to send and how quickly they must respond.

1. The BCAS resources available to the dispatcher to send to the aid of a sick or injured person include one or more of the three levels of support:

- first responders (FR),
- basic life support ambulance (BLS),
- advanced life support ambulance (ALS).

2. How quickly they respond is known as the mode of response (lights and siren or routine).

In the British Columbia system and where available, advanced life support resources are at a premium so levels of service must be selected judiciously. Sending units using lights

and siren mode should be considered only when the benefit to the patient out weighs the risk to emergency personnel and the public.

The importance of choosing the right service level and mode of response is not only significant for optimum patient care but it also affects overall system response times. Depletion of resources through sending two BCAS units (ALS and BLS) on calls deemed to be serious reduces the availability of these units for other calls. This means the remaining units are covering a larger area resulting in longer response times.

Calle et al (1995) have shown priority dispatch systems commonly over estimate the need for advanced-level resources. Being able to more accurately predict what resources to send would improve the system efficiency by reducing multi unit response, and saving the highest level of resources for those incidents that require them.

Determine the acceptable level of over triage (sending more resources than one necessary)

Over-triage is when the dispatcher sends more or unnecessary higher level of resources to a call than the patient actually needs. A degree of over-triage is warranted in order to avoid missing truly life threatening cases. However, the optimum degree of over-triage has not been determined within the BCAS. There needs to be some definition around the desirable degree of over-triaging for each MPDS code.

Collect what evidence supports a particular resource allocation plan.

Currently the resource allocation plan for the BCAS represents the best estimates by practitioners, dispatchers, managers and physicians of what resources to send for a given call assessment. Except for anecdotal accounts, how sensitive the classification code is to the actual acuity of the patient is not well known. This is not an isolated problem in EMS. Michael Callaham once wrote:

> Contemporary North American urban EMS is based on a rather debatable notion – that there are large numbers of pre-hospital patients who will materially benefit from only 15 to 20 minutes of treatment, in an environment more difficult than any hospital or medical office, by individuals with less formal training and direct supervision than nurses or nurse practitioners or physicians, with essentially no verifiable medical history or records about the patient, treating an almost unlimited variety of ailments, and unsupported by the extensive diagnostic tools that so greatly improve accuracy and safety of treatment in the hospital environment (Callaham,1997, p. 786).

Callaham (1997) was describing the notion that there are a large numbers of patients that benefit significantly from receiving treatment 15 minutes faster. Few such conditions exist (e.g. ventricular fibrillation in cardiac arrest). This paper illustrates the lack of evidence available to EMS managers to make important system decisions such as treatment protocols and resource allocation to various types of calls (the dispatchers mode of treatment).

By retrospectively evaluating the patients' illness acuity and comparing it to the MPDS code, we can understand how to predict the seriousness of the patient's condition. The subsequent a resource allocation plan based on this qualitative and quantitative data could more accurately match patient need with optimal resources, and increase overall system efficiency and effectiveness.

Resource Allocation requires data

As a component of EMS, emergency medical dispatching is a complex process that must consider the unique nature of its resources, geography, and funding to provide a functional and cost-efficient system. However, the scarcity of quantifiable data has resulted in EMS system design being developed through trial and error and on the best guesses of experienced response personnel.

EMS system design, including dispatch call evaluation and resource allocation, is too complex to rely solely on individual preference and dogmas (Calle et al, 1996). A more evidence-based approach is important and it is critical to encourage participation of those affected by this problem.

EMS dispatch integrates the communication components, service providers, and administrators to provide quality emergency medical care. The Emergency Medical Dispatcher (EMD) receives calls, interrogates the caller, determine response combinations of service levels and response modes, and gives the caller appropriate pre-arrival instructions. The EMD can rapidly elicit reasonably accurate symptom pictures from frightened callers, allowing a more accurate medical categorization of victims. In addition the dispatcher can activate the configuration of responders optimally suited to deal with the specific emergency. Despite this, there is currently no proof that dispatch call evaluation results in the correct resource decision and has an impact on the patient's outcome.

The High Cost of "blanket responses"

Sending the highest level of provider and the most number of vehicles/units will always ensure the patient gets the best care. But, it is not enough to only send the highest level of paramedic on all cases; it is necessary to accurately determine the specific need for these highly trained individuals. If this is not done for all calls the number of available providers will be reduced because of their inappropriate use (Keuhl, 1994).

Over/Under Triage

Underestimation of the severity of the emergency may lead to insufficient responses (under triage) and inadequate patient care. That may in turn affect the patient's outcome. On the other hand overestimation (over triage) may be detrimental as it may render the advanced level team unavailable for the true emergency and will increase health care

costs (Calle et al, 1995). In order to capture as many of the true life-threatening emergencies as possible it is desirable to have a degree of over-triage, but how much has not been determined.

Priority dispatch systems offer a rational approach to identifying and ranking the level of emergency but it tends towards over triage. Slovis (1985) reported dispatchers using a priority dispatch system over triaged 47% of the time compared to paramedic's on scene evaluation of the patient. Calle et al (1995) reported a 30% over triage rate when dispatchers, using a priority dispatch system, were compared to a physician panel reviewing the call retrospectively using emergency department records. These sets of data do not indicate if this is desirable or not but it does present the dilemma of what is the appropriate over triage rate in order not to miss an important case?

Priority dispatch systems have a specific set of over-triage and under-triage rates. The challenge is to determine the optimum levels in order to minimize the costs of over-triage (resource costs) and under-triage (morbidity and mortality costs and liability).

Currently no one has established thresholds at which the potential benefits of ambulance dispatch or pre-hospital care outweigh the costs and risks of that service (Lamme, 1995). The authors studied the potential impact of a "no send" protocol for complaints of abdominal pain as means of decreasing the cost to the system and emphasized the need for more research into the use of pre-hospital resources.

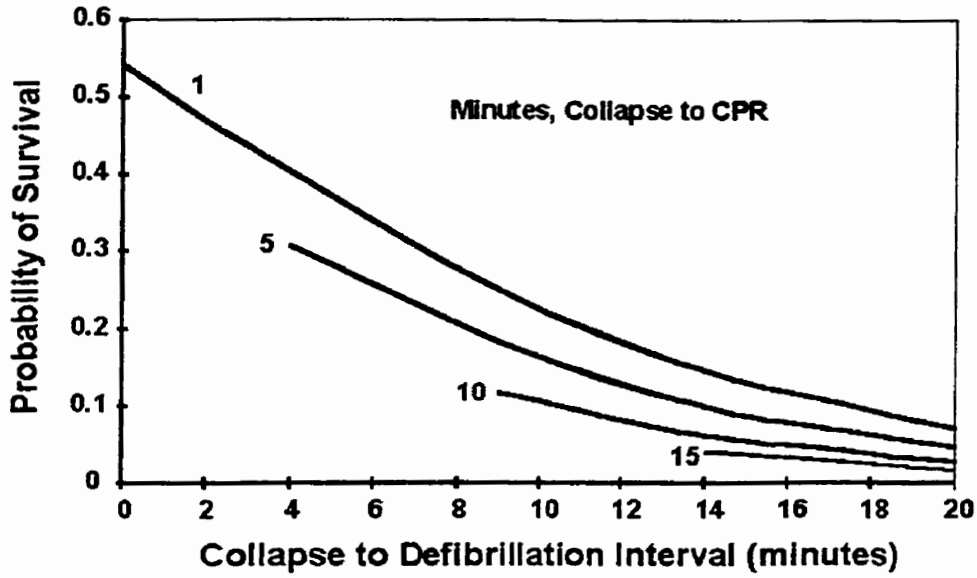
Survival from cardiac arrest is a useful measure of the performance of an ambulance service. It is a condition that has definite outcomes, and is easily monitored. Response times directly affect the survival from cardiac arrest and unit availability affects response times. Furthermore, call assessment and appropriate resource allocation are early determinants of cardiac arrest outcomes because of their affect on unit availability and response times.

There is an internationally recognized format recording data in databases of outcomes from cardiac arrests to allow valid comparisons between EMS services. The Utstein Template was developed as an international standard in reporting cardiac arrest in the pre-hospital setting. It defines time segments, cardiac rhythms, and circumstances that have an affect on patient survival. The Utstein Template has standardized the reporting of cardiac arrest so that different centres can compare their performance using the same measurements.

Response Time

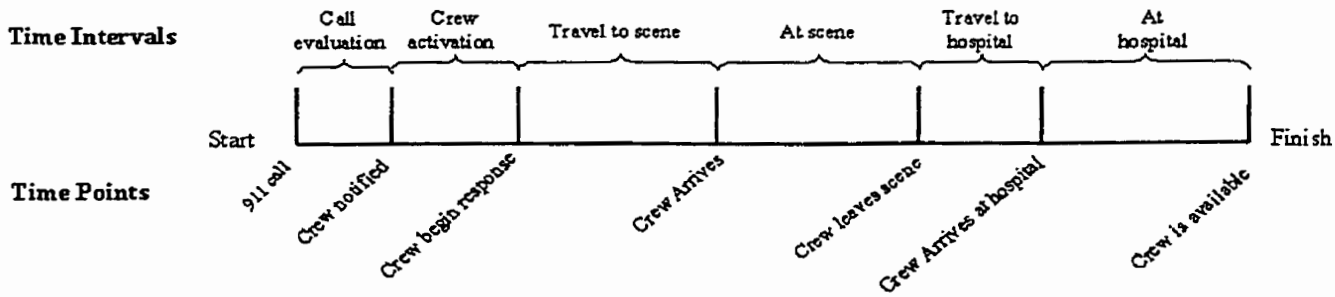
The response time is the time between the call assessor receiving the call and the arrival at the patient's side of the responders. Response times in the life-threatening situations can influence the outcome of patient survival. For example, cardiac arrest patients have a short time frame (4 to 6 minutes) in which to receive life-saving intervention before brain death occurs. Electrical shock (defibrillation) delivered in a timely fashion is the only proven chance these patients have to survive. Time is the critical factor in survival in out-of-hospital cardiac arrest (Figure 1.1). Each minute of delay in receiving defibrillation results in a 7% decrease in the chance of survival (Valenzuela 1997).

Figure 1.1 *Probability of Survival (Valenzuela, et al., 1997). Chances of survival reduces with time*



Response time performance in emergency medical services is dependent on multiple activities that come together in a sequenced effort to provide help in the shortest amount of time. Figure 1.2 shows the sequence of events that comprise an emergency call. Prolongation of any of the six time intervals will have an effect on the overall response time to the patient.

Figure 1.2 *Response Time Intervals*

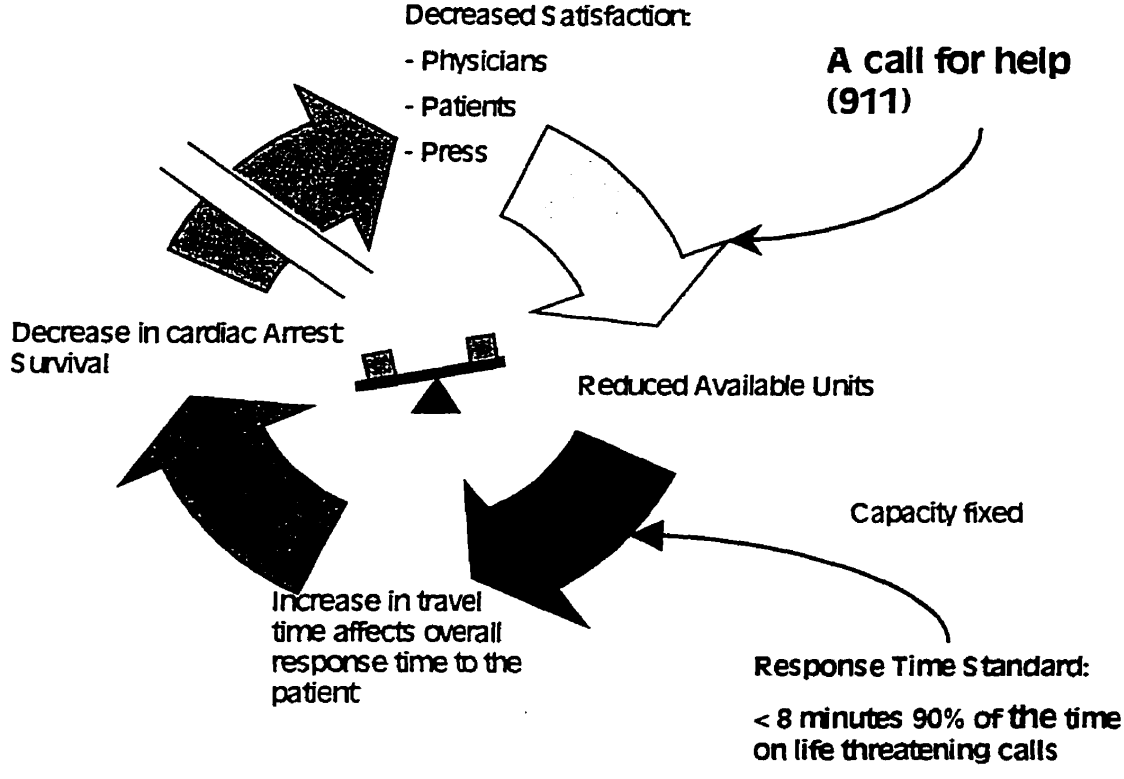


The current standard adopted by the BCAS to respond to the most life threatening calls is eight minutes with a goal of attaining the standard 90% of the time. Currently the service is reaching the standard an average of 53% of the time.

Although adding ambulances to improve response times may be ultimately necessary, there is a high financial cost. Measures to improve efficiency first need to be explored. Shortening any of the six time intervals will aid in the overall response time and may be significant.

Figure 1.3 is a systems diagram that shows the relationship between requests for help, unit availability, response time and the satisfaction of stakeholders. With finite resources, whenever an ambulance is sent on a call there will be a reduction in the number of resources left available for the next call. The problem of unit availability is compounded when dispatchers over estimate the need for multiple units or whether BLS or ALS level of care is needed.

Figure 1.3 Effects of Response Time



Response times in urban areas such as the Greater Vancouver Regional District and the Capital Regional District (Victoria area) are currently below the desired response time standard adopted by BCAS. Because of great financial scrutiny, any request for additional funds or resources to correct the response time problem will require convincing evidence. Before the funding agency can be approached, there needs to be proof that every effort of efficiency has been considered using existing resources to improve performance.

Response time performance is dependent on a number of variables. No single fix, by itself will ensure response times meet the accepted standard.

There is a perception by paramedics and dispatchers that the current Resource Allocation Plan is sending too many resources to certain call types. This research project will attempt to address this perception problem by comparing the patient's acuity with the dispatch classification code and the subsequent resources sent.

Response time performance is largely dependent on unit availability and location of resources. Addressing the appropriate resources for each call type using empirical data will ensure there is minimal wastage or overuse of finite resources. Reducing the demand for special resources on non-critical calls will free these resources and increase their availability for the next true emergency.

BCAS Call Evaluation

The call evaluation system used by the BCAS is the Medical Priority Dispatch System (MPDS), which is copyrighted by Medical Priority Consultants. This system is in use internationally in 20 countries and has been translated in six languages and three English dialects (Clawson, 1998). MPDS is a widely used call evaluation process that utilizes a protocol-based questioning format that requires the EMD to ask the questions according to an algorhythm. Each complaint is given a corresponding code called an MPDS code. There are over 240 MPDS codes in this system. Because the questions are standardized and compliance in asking the questions is required, the codes offer an excellent way to group patients for study purposes.

Research or objective data to validate the recommended resources for each MPDS code have only been done for cases involving cardiac arrest, cardiac complaints, intoxication, febrile seizures and cerebral vascular accidents. (Calle et al, 1995). By developing a process that will match the call type (MPDS code) to the patient's acuity of condition on arrival of the paramedics, managers could consider factual data in addition to opinion when deciding on the appropriate resource to send on all calls as a system.

Role conflict in the use of first responders

A challenge in regards to resource allocation is in identifying the most appropriate use of First Responders. First responders are generally provided by fire departments throughout the province of British Columbia and range from full time professionals in the major cities to on-call volunteer services in the rural setting. Generally, the larger metropolitan services feel that pre-hospital care is a service that they should be offering their respective constituents. Small rural first responder agencies have limited budgets and mainly wish to respond in the first responder capacity only if they can have a real impact on the patient's outcome or public safety. The dilemma faced by the BCAS is how to satisfy the first responder's desire to be involved while addressing safety and cost of over response of resources. So, if how we use first responders is variable, then application of this service affects consistency of RAP.

Consistent Resource Allocation

In communities with ALS coverage resources must be managed so that they are available for those patients who can benefit from their care. Responding to non-life threatening calls may result in the ALS paramedic not being available for the true-life emergency.

In both these situations efficient allocation of resources should be driven by the requirements of the patient.

This study set out to validate the MPDS' classification codes against the actual acuity of the patient and determine if the process for developing the subsequent RAP was evidenced based.

A method is required to identify the acuity of patients for each MPDS code that can be used to assign the appropriate resource. The MPDS call evaluation process is designed to triage patients according to medical criteria but the accuracy in predicting patient acuity needs to be determined for each of the 240+ codes. This process, when complete, can

form the basis of an established plan to be followed by each dispatcher thus creating a consistent approach to resource allocation.

The Organization

This research project takes place within the British Columbia Ambulance Service and involves the dispatch centres and the efficacy of the priority dispatch system used to prioritize calls and determine the appropriate resource allocation for each call handled in the province of British Columbia.

The British Columbia Ambulance Service

The British Columbia Service began as an organization as a result of legislation proclaimed in 1974. Through the Emergency Health Services Act, the Emergency Health Services Commission was created and given the authority to provide pre-hospital services in the province. The Commission accomplished this by creating the British Columbia Ambulance Service (Government of British Columbia, Health Emergency Act, 1996).

The BCAS currently employs approximately 3,300 people across the province. It operates 400 ambulances out of approximately 200 stations and dispatches from three centres, Victoria, Vancouver and Kamloops. Medical control is provided through prospective and on-line control. Prospective control is accomplished through policies and protocols. On-line control consists of hospital-based physicians providing permission to proceed with special protocols and to provide advice to paramedics while treating patients.

The Medical Advisory Committee, made up of physician representatives from various disciplines and regions, are responsible for the medical authority contained in the protocols and on-line control.

BCAS Culture

Dispatchers are trained to a minimum of emergency medical assistant I (EMA I). Prior to the implementation of the priority dispatch system in February, 1997, dispatchers used their own individual form of caller questioning based on a model provided during their initial dispatch training. No quality control was done except for complaint investigation.

The culture of the BCAS is heavily influenced by strong union affiliation and the union-management climate has been described as positional and confrontational. Introduction of the MPDS was perceived by some dispatchers and the union as a negative process and an affront to their medical training as EMAs.

Further to this the dispatchers were not all in favour of the continuous quality improvement (CQI) process that accompanies MPDS. Management was sensitive to these issues and implemented a CQI process that is confidential and non-punitive with the exception of proven negligence. Also the dispatchers' involvement has been sought through the implementation and continuing review of the MPDS system by inclusion on the medical dispatch review committees set up in each dispatch centre. So, asking for an objective review of the RAP in this culture posed some challenges.

Organization Stakeholders

It is important for an organization to know who its stakeholders are and who are impacted by its activities. In regards to resource allocation and response time, the following list identifies those stakeholders. This list is not complete but shows the complexity of the problem in context of those affected:

- Patients and families
- BCAS paramedics and dispatchers
- First responders
- Law enforcement

- Physicians
- Registered nurses
- Clinic and nursing home staff
- BCAS management
- BCAS administration staff
- Labour
- Politicians
- Information management group
- Quality Improvement staff
- Ambulance billing
- Communications

Priority Dispatch System Protocol

Emergency medical dispatching can be defined as the allocation of the human resources and the available equipment of an emergency medical service (EMS) system to anyone who asks for medical help (Calle et al, 1996). Early in the history of emergency dispatching, (pre-1970) dispatchers were considered no more than telephone operators who received requests for ambulances and sent the ambulance to the correct location. Today emergency medical dispatchers (EMD) are considered the hub of an EMS organization and has been shown to be an effective component of emergency patient care (Clawson et al, 1996).

The use of written protocols by professionals is an accepted method of delivering consistent quality patient care. Physicians, nurses and paramedics learn by the use of an accepted methodology when treating various patient conditions. When faced with a complex set of patient presentations, many clinicians will frequently refer to protocols to guide their treatment decisions rather than rely on their memory so nothing is missed or forgotten.

The EMD's role is also based on medical protocols similar to those used by other health care professionals. However there are two significant differences inherent in the dispatcher's environment:

- lack of direct patient contact; and
- tight time frame to perform an evaluation of the incident and make critical resource decisions.

Conducting patient evaluations in a non-visual environment and quite often through a second party (not the patient) requires insightful interrogation skills. As other medical professionals rely on protocols, the EMD also relies on strict protocol-driven questioning.

Dr. Clawson (1998) compares the EMD and EMS routines to emergency physician and paramedic routines in the table 1.1:

Table 1.1 Comparison between EMS routines and physician/paramedics

Patient Care Routines for EMDs and EMS	
EMD	Emergency Physician/Paramedic
Call receipt	Patient introduction
Case entry	Primary survey
Four commandments (case entry questioning)	Vital signs
Immediate dispatch	Call for MD specialist
Pre-arrival instruction	Support airway, breathing and circulation
Key question interrogation	Secondary survey
Dispatch code selection	Working diagnosis / action plan
Routine dispatch	Further evaluation of patient
(send mobile evaluators)	(order lab tests. ECG, X-ray, etc.
Post-dispatch instructions	Routine treatments
Case review	Morbidity / mortality conferences
QA / QI processes	QA / QI processes
Total quality management	Professional review organization

Authority for dispatch protocols and resource allocation rests with the MPDS Steering committee. This committee receives input from the regional Medical Dispatch Review Committees (MDRC) that serves as part of the CQI process.

Continuous Quality Improvement component of a priority dispatch system

The priority dispatch system used in British Columbia is Clawson's model and was implemented on February 17, 1997. A continuous quality improvement (CQI) process that reviews a significant sample of calls and provides confidential feedback to the dispatchers is an important component of the dispatch process. This approach allows the reviewers to serve as coaches and mentors rather than enforcing compliance through positional authority. The results of the process are reported as trends of groups over time and communicated province-wide and to all stakeholders including staff, politicians, ministry executives and other interested parties.

The CQI process is an important component to this study as it confirms that the MPDS codes chosen by the dispatcher are correct. In order for a particular code to be chosen, the answer to specific questions need to be answered the same way each time that code is chosen. CQI measures the compliance of dispatchers in asking the protocol questions. The compliance in the three dispatch centres in asking all the required questions is 90% or greater (BCAS Dispatch CQI monthly reports, unpublished). This high compliance rating provides confidence in the accuracy of the MPDS coding of each patient.

The Priority Dispatch System Process

The protocol that directs the dispatchers through the call assessment, code categorization, and ultimately to the decision on what resources to send is as follows:

1. Based on the answers to the Case Entry questions, the EMD selects the most appropriate priority dispatch protocol.
2. The dispatcher then asks all the questions on the priority dispatch protocol.
3. The EMD chooses the determinant code most closely linked what the caller has reported
4. The EMD matches the determinant code with the pre-hospital resource allocation plan that has been assigned by the Medical Dispatch Review Committee (MDRC)

5. Designated resources are then sent.
6. In some cases where breathing is absent, the resources will have already been sent.
7. The EMD provides the caller with pre-arrival instructions.

The Medical Priority Dispatch System (MPDS) consists of 32 Chief Complaint cards that each contains Key Questions. The thirty-two cards are listed in table 1.2.

Table 1.2 Definitions of MPDS cards

Card Number	Chief Complaint
1	Abdominal Pain
2	Allergies/Hives/Medical Reactions/Stings
3	Animal Bite/Attacks
4	Assault/Rape
5	Back Pain (Non-Traumatic)
6	Breathing Problems
7	Burns/Explosion
8	Carbon Monoxide/Inhalation/Hazardous Materials
9	Cardiac/Respiratory Arrest
10	Chest Pain
11	Choking
12	Convulsions/Seizures
13	Diabetic Problems
14	Drowning (Near).Diving Accidents
15	Electrocution
16	Eye Problems/Injuries
17	Falls/Back Injuries (Traumatic)
18	Headache
19	Heart Problems
20	Heat/Cold Exposure
21	Hemorrhage/Lacerations
22	Industrial/Machinery Accidents
23	Overdose/Ingestion/Poisoning
24	Pregnancy/Childbirth/Miscarriage
25	Psychiatric/Suicide Attempt
26	Sick Person (Specific Diagnosis)
27	Stab/Gunshot Wound
28	Stroke (CVA)
29	Traffic Accidents
30	Traumatic injuries, Specific
31	Unconscious/Fainting (Non-Traumatic)
32	Unknown Problem (Man Down)

The answers to the Key Questions lead the dispatcher to one of four response determinants. The four response determinants are:

A = Alpha-level

B = Bravo-level

C = Charlie-level

D = Delta-level

Table 1.3 contain the definitions for each determinant.

Table 1.3 Definitions of MPDS Determinants

Determinant	**Definition**
Alpha	Not life threatening. Time will not affect outcome.
Bravo	Not Life Threatening. Time may affect outcome
Charlie	Potentially life threatening. Time will affect outcome.
Delta	Life threatening. Time is of the essence.

Each of the determinants can be sub-divided into sub-determinants. This allows for a more specific coding of patient condition by using several categories for each determinant on a single chief complaint card. The sub determinant is a more specific symptom or condition relating to the chief complaint and determinant.

An MPDS code is an alphanumeric code representing:

- a numbered chief complaint card,
- a determinant, and
- a sub-determinant (see Table 1.4).

Table 1.4 Determinant coding (Clawson, 1998)

Chief Complaint Number	Determinant Level	Sub-determinant Number	Sub-determinant Descriptor	MPDS Code
12	D	1	Continuous or Multiple Seizures	12D1

This refers to a chief complaint of continuous convulsions, requiring a delta response and is classified as an MPDS code 12D1.

Asking all the listed questions on each complaint card is critical in selecting the correct MPDS code and therefore results in selecting the most appropriate resource to send to the call. The ability to gather meaningful statistical data with this standard coding system allows performance comparisons between cities, regions and even countries (Clawson, 1998).

CHAPTER 2: LITERATURE REVIEW

Review of Organization Documents

The organizational documents pertinent to this study in clued the mission statement, the Health Emergency Act of British Columbia, dispatch policies, the Resource Allocation Plan and records management documents. A review of organizational documents shows that there is a prospective structure in place to manage the BCAS resources and those resources available to the BCAS.

Mission Statement

The British Columbia Ambulance Service's mission statement is:

> We exist to provide timely transportation and care to the sick and injured. Our goal is to provide the best ambulance service possible with our allocated resources. Our Guiding principle is caring.

Health Emergency Act

The Health Emergency Act (HEA) of British Columbia establishes the Emergency Health Services Commission (EHSC) as having power to establish emergency health services for the British Columbia (Government of British Columbia, 1996). Under this legislation the Commission has the power and authority to provide ambulance service through the British Columbia Ambulance Service (see Appendix A).

Dispatch Policy and Procedure

Volume two, Chapter five of the BCAS Policy and Procedure manual deal with the process of dispatch and call evaluation (see Appendix A). These documents outline the

authority, responsibilities and process dispatcher need to follow when assessing the callers' need and determining the appropriate resource to send. These policies require revision to reflect changes to the resource allocation plan and call evaluation process.

Resource Allocation Plan

The Resource Allocation Plan (RAP) is a document developed by the BCAS to establish a consistent allocation of resources to match each medical priority dispatch code. Each of the 240 MPDS codes is assigned a designated level of response. This could include EMA I or EMA II, and/or EMA III (ALS in ALS communities), and first responders. The Resource Allocation Plan also includes the mode of response: lights and siren or routine (see Appendix A)

But even though regional differences in resources may necessitate variations of the RAP the designation of codes to the call assessment remains sovereign. Stakeholder group decisions regionally may assign different resources to a particular code because of variations in their available resources.

Record Management

The BCAS uses several means to record the data generated for each call. The dispatch phase data includes information regarding the incident such as time points, location, complaint (MPDS code), unit sent, etc. In two of the dispatch centres this information is entered directly into a computer by the dispatcher. In the other centre the information is manually captured on a dispatch form and later entered in a computer by data entry clerks. The actual patient information is captured through the paramedic's crew form and is later entered by data entry clerks.

The dispatch and paramedic information are then combined and reside in the management Information System (MIS) where it can be manipulated for data reporting and analysis. This capability is unique in the EMS industry and provides BCAS with the

opportunity to explore relationships between the dispatch phase and the patient's condition.

Review of Supporting Literature

The evolution of dispatch systems from random individualized decisions to consistent, predictable, professional practice has been a major improvement in the efficacy of EMS. The literature supports the importance of the dispatch function and the need for consistency. It also supports the need and development of scoring systems to more objectively categorize the actual acuity and severity of its patients' condition.

Dispatch Call assessment

Emergency medical services dispatch has evolved over the last 25 years as pre-hospital care grew from the 1960's when the first field defibrillation (electrical shock to start the heart) was performed in Belfast, North Ireland (Zachariah, 1995). As emergency medical services evolved through the 1970's and 80's the need for a more systematic method of call assessment, pre-arrival instruction and dispatching resources became evident.

In 1975 a Phoenix, Arizona paramedic gave the first recorded unscripted pre-arrival instruction to a mother of a non-breathing baby. The child survived and the age of dispatch life support began. The process of pre-arrival instructions in childbirth, choking and CPR are the benchmarks of a medical dispatch centre. Clawson began to develop a scripted call evaluation process to help the dispatcher determine the calls that required lights and siren response and advanced life support. This process grew to become the Medical Priority Dispatch System, which is the market leader in dispatch programs and related hardware and software (Zachariah, 1995).

Priority Dispatch Systems

In Houston, Texas, Curka et al (1993) tested the ability of a computerized priority dispatch system to safely exclude the need for advanced life support. He found through a retrospective review of calls that using a computerized priority dispatch system, advanced life support units were spared on 40.2% of EMS incidents thus increasing their availability for use on more serious calls. Of these calls only 0.5% later received advanced treatment. Overall Curka et al determined that 0.4% of the patients receiving basic life support may have benefited from an advanced level of care. They concluded that a computerized priority dispatch system could be used effectively to safely identify cases that require only a basic level of care. The Curka et al study is limited in that it did not address the number of ALS responses where the patients did not require this level of provider. Although the priority dispatch system used in Houston was not the MPDS model developed by Clawson, it used the basic principle of scripted questions to identify priority symptoms.

Curka at al's findings were reviewed by Zachariah (1995) who stated that when the priority dispatch system was developed in the 1980s, the goal was to decrease the number of times that ALS paramedics were sent when they were not required (exclusion principle). In contrast the MPDS onus is to send the right thing at the right time to the right place using an inclusion principle (Zachariah, 1995).

Upon further investigation of Curka et al's data, Zachariah found that the number of patients who actually could have benefited from ALS were even fewer than reported by Curka et al. However he did not address the over-triage of ALS units. Nor was it sensitive to instances where the BLS crew was sent first but did not recognize the need for advanced level care or there was inappropriate advance care provided. Zachariah reported that the Houston system now evaluates their responses by matching the interrogation question that resulted in choosing the level of response with the outcome of patients through retrospective review. Such reviews allow the questions to be omitted or changed to adjust the level of response. The study did not discuss what retrospective data

was reviewed nor did it describe a method for determining patient outcome for each call type.

Calle, et al (1995) investigated the performance of the dispatch centre in general. He noted that previous studies reviewed specific medical problems such as cardiac arrests, cardiac complaints, febrile seizures, or cerebral vascular accidents. Calle et al retrospectively reviewed the paramedic's run sheet, emergency department records and dispatch tapes. An evaluation on how the call was handled was performed by an emergency physician and two emergency nurses. The evaluation used the same three evaluators for all the calls. The results would have been more convincing if there was a process to garner input from other experts on the criteria for an advanced life support and a basic life support call prior to the review or to validate the reviewer's findings.

Nevertheless, Calle et al's main finding was that ALS teams were inefficiently used and that the dispatchers' triaging was only one of the factors involved. He found that only 59% of cases that required ALS actually received that level of care and that of the patients that received ALS, only 46% actually needed it. In a recent unpublished report from the BCAS, in the Greater Vancouver Regional District only 33% of patients identified by the BCAS Resource Allocation Plan (a pre-determined allocation of resources for each of the 240 MPDS codes) as requiring ALS actually received this level of care. Although a follow up was not done to see if these patients would have ultimately benefited from ALS, it is clear the system is not satisfying its own goals (Burgwin, BCAS ALS Report, 1999, unpublished).

Palumbo, et al (1996) compared the dispatchers' triage results using a priority dispatch system with the retrospective review of the paramedic run sheets and emergency department patient record. They found that hospitalisation of patients increased with the higher acuity dispatch codes. Fifty-one percent of those calls identified by dispatchers as urgent required hospitalisation compared to the physicians' review that had 100% of the same category hospitalised. The dispatchers and physicians agreed 57% of the time in assigning the dispatch response codes to patients (Palumbo, 1996). Slovis (1985) found

that in a similar dispatch system dispatchers assigned a high priority 47% of the time compared to field paramedics who assigned a high priority 7% of the time. These studies indicate a significant over-triage rate among dispatchers using a priority dispatch system but that the problem does not entirely rest with the dispatcher or the system used. (Calle et al, 1995).

To try and establish the effectiveness of priority dispatch, Keene (1990) conducted a survey of dispatchers and paramedics to evaluate the impact that the implementation of emergency medical dispatch had on the Orlando Fire Department to:

1. Enhance patient care by achieving a "zero-minute response time",
2. Reduce dispatcher and field-personnel stress,
3. Increase professionalism and co-operation between dispatch and field units, and
4. Increase department efficiency by using BLS units for BLS calls.

Two surveys were developed, one directed at paramedics, the other at dispatchers. The dispatcher survey consisted of ten statements, which the respondent was asked to agree or disagree. The author used a proportional stratified random sample of 140 paramedics and 25 dispatchers who were recent EMD course grads. Sixty-eight percent of the dispatcher surveys were returned and 41% of the paramedic surveys were returned. Although the dispatcher rate of return was satisfactory, the paramedic's sample could be questionable due to volunteer bias of those who returned the surveys.

The author concluded that dispatch centres that were dedicated to ambulance dispatch only (some dispatch centres served fire and police as well) had a greater congruence with the statements than did the non-dedicated centres that served several types of agencies. Paramedics generally agreed with the statements if their dispatch centre was dedicated to EMS. Also only 14% agreed that a call sent as BLS actually would turn out to be a BLS in a service with a non-dedicated dispatch centre as opposed to 61% in a dedicated service area.

Predictive statistical analysis was not done in Keene's survey; therefore the differences in responses could be a matter of chance. The design of the survey responses gave only two options: agree or disagree. There was no ability for the survey to capture those who were not absolutely agreeable or disagreeable. Finally the author concluded that implementing an emergency medical dispatch process when it cannot be appropriately applied, as in the case of non-dedicated dispatch centres, only serves to increase the ineffectiveness of the organisations and ultimately decreases the quality of care. The article fails to support the author's conclusion as the research was asking opinion and had no qualitative outcome data to support these opinions. However, the study's value is in its input from the dispatchers and paramedics to improve training and agency interaction between the two groups.

Medical Priority Dispatch System

> "Dispatch prioritization is an essential element in any EMS system for it establishes the appropriate level of care initially required including vehicle response configuration and mode of urgency. All medical dispatch centres must institute and monitor adherence to dispatch prioritization protocols that clearly delineate appropriate lights and siren use from those that do not." (Kuehl 1994, pp. 128)

After two major lawsuits in the United States involving dispatch call screening and refusal to send an ambulance that resulted in the death of two patients, there was a movement toward better training and standardization of protocols to better prepare dispatchers (Zachariah, 1995). One of the outcomes of this is the Medical Priority Dispatch Syatem™ that is standardized and used by over 2,000 dispatch centres worldwide with over 28,000 certified emergency medical dispatchers (Clawson, 1997). Also, the dispatch process is now accompanied by strict quality improvement monitoring to ensure the standards are maintained.

In 1990, under the direction of the United States Department of Transportation, a practice standard was developed which was issued through the American Society for Testing and Materials (ASTM) for emergency medical dispatch. These standards were closely fashioned after the Clawson model and together with the National Association of Emergency Medical Services Physicians position paper established the importance of emergency medical dispatch as a vital component in pre-hospital care.

The BCAS adopted Medical Priority Dispatch System in 1997 for call prioritization. This system was approved by its Medical Advisory Committee, and conforms to best practices as identified by the National Association of Emergency Medical Services Physicians in the United States according to their position paper.

Kallsen (1990) concluded that Clawson's model of priority dispatch successfully differentiates patients who suffer pre-hospital cardiac arrest or critical condition from less critical patients. Kallsen's research in Fresno, California indicated that calls were ranked into three priorities: life threatening (priority one), emergency (priority two) and other (priority three). Although Klassen's study is limited in its discussion on methodology, the results showed that priority one calls detected cardiac arrests with a sensitivity of 0.90 and a specificity of 0.50. This result means that when a dispatcher identifies a cardiac arrest through the priority dispatch call evaluation it will turn out to be a cardiac arrest 90% of the time. However it also means that 50% of cardiac arrests are not detected by the dispatcher (specificity 0.5).

This finding is similar to the BCAS finding that about 50% of cardiac arrests are not identified in the call evaluation although the call is normally considered critical (Burgwin, unpublished BCAS Cardiac Arrest Report, 1998). Failure to identify all cardiac arrests is understandable in the pre-hospital setting as many arrests occur after the call to 911, or during the paramedic's' presence or the caller is not aware of the status of breathing and consciousness when asked by the dispatcher.

Service Level availability in the BCAS

It is important to understand the various levels of responders available to dispatchers so that an efficient system of resource allocation can occur. In reviewing the literature it became apparent that the definition of ALS versus BLS was not satisfactorily addressed. In the United States the term BLS generally refers to a pre-hospital provider with little more than first aid skills and an ALS provider is one with intravenous, drug therapy and skills in interpreting electrocardiograms.

In the BCAS the basic level of provider in most communities with full time staff is Emergency Medical Assistant II (EMA II). This level is capable of some of the skills that in other jurisdictions would be considered ALS. The EMA II is capable of intravenous therapy, a limited array of pharmaceutical treatments and more advanced assessment ability than the traditional basic life support level. The EMA II is one of the resources dispatcher's can choose in certain communities. They can respond on their own or accompany an Advanced Life Support (ALS) team. The BCAS resource allocation plan identifies the MPDS codes that EMA II personnel can respond to on their own and those calls that require ALS support.

Because this distinction is blurred and will continue to be vague as future research adds or deletes treatment protocols, the term "Highest Level Available" is more appropriate when referring to the ALS resources sent to serious cases. This term enables a standardized resource allocation plan even when ALS is not in the community.

Physiologic scoring systems

Physiologic scoring systems describe the patient's condition based on physiologic indicators such as blood pressure, level of consciousness and respiratory rate. A score is applied to the values of each of these indicators to represent various levels of acuity.

Spaite et al (1997) believes that reliable scoring methods, severity scales, and outcome measures for EMS are lacking. They discussed the importance for EMS services to take the time and endure the expense of developing methods to evaluate their system and how it impacts patient outcome.

Trauma scoring systems have been developed to aid in predicting the seriousness of the patient and to aid in triage decisions made by the paramedic at the scene of an event. Scoring systems also aid to minimize the difficulties in evaluating care provided to the trauma patient. The utility of these scales in assisting triage, evaluating care during transport, and predicting mortality of trauma patients has been well established (Savitsky and Rodenberg, 1995). Examples of these scales include:

- Glasgow Coma Score (GCS);
- Trauma Score (TS) and;
- Therapeutic Intervention Severity Score (TISS)
- Revised Trauma Score (RTS)

There is little written on medical-scoring systems in the literature although there is an abundance of material describing trauma-scoring systems (Carley, 1996; Eichelberger, et al, 1989; Gilpin, 1991; Luk et al, 1999; Savistsky, 1995). This is because trauma patient outcome is related to their physiologic status that can be measured through blood pressure, pulse rate, breathing status, and level of consciousness. While these measurements may be predictive of medical patient outcome, it has not been proven in the literature.

Savitsky (1995) concludes that a combination of the RTS and the GCS may be used as a guide to the degree of pre-hospital care that may be provided to victims of medical illness. Although his analysis included only patients transported by helicopter from scene situations, his findings can be extrapolated to ground ambulance services.

Bonatti et al (1995) also dealt with physiologic scoring systems in the setting of helicopter transport. They attempted to identify easily obtainable predictors of short-term outcome for emergency victims treated by a physician-staffed helicopter emergency medical system (HEMS). This was a retrospective study conducted at the HEMS unit in Innsbruck, Austria. Eleven parameters were selected from the flight logs and were tested for their prediction on survival following helicopter rescue. Among eleven parameters reviewed, three had a statistical significance ($p < .05$) on outcome:

- State of consciousness,
- Respiratory status and
- Patient circulatory status

If physiologic measurements of consciousness, respiratory status and circulatory status are significant of medical outcome and if these same parameters are among the parameters used for tools to predict outcome of trauma, then these parameters could be used in developing a scoring system to measure the acuity of patients in the pre-hospital setting.

One component of this project was to develop an acuity scoring system using the parameters of the patient's condition as predictors of the need for advanced care. The other component is to compare MPDS codes to the percentage of patients that fit into each category of acuity. This can be a valuable method of confirming the appropriate resource to send for each MPDS code.

The Patient Acuity Scoring System (PASS)

Savitsky (1995) showed a correlation between the GCS, RTS and the Therapeutic Intervention Severity Score (TISS) for non-traumatic and traumatic patients. He concluded that a significant correlation would indicate that the RTS and GCS might be used to predict the level of care required by the patient (Savitsky, 1995).

Patients with non-traumatic etiology also need to be evaluated using objective indices. This researcher designed a scoring system called the Patient Acuity Score (PASS) to quantify the seriousness of trauma and non-trauma patients' condition according to:

- Blood pressure
- Respiratory rate;
- Level of consciousness;
- Cardiac arrest and;
- The need for ventilatory assistance.

The RTS closely resembles the Patient Acuity Scoring System (PASS) as it too uses GCS, respiratory rate and systolic blood pressure (see Research Methodology). However, the Savitsky approach does not account for patients who may have a normal set of vital signs but are suffering from a potentially lethal condition such as cardiac chest pain. This indicator is considered along with the PASS.

The remainder of the parameters used in Bonatti's study were from the National Advisory Committee of Aeronautics (NACA) scoring system. This is a description of the type of intervention the patient required ranging from no injury or disease to lethal injuries or illness. This scoring system required a physician to make the determination of score and therefore would not fit into the PASS model used in this project.

Resource Allocation – effects of response time

Response time is an important indicator in the survivability of some patients and is a main indicator of EMS performance. Utilization of resources has a profound effect on response times especially if too many resources are sent needlessly. This leaves fewer resources left to respond to a large area thus extending response times.

Valenzuela et al (1997) reports that there is a strong correlation between time to intervention of the out-of-hospital cardiac arrest and survival. The objective of his

research was to develop a simple, generalizable predictive model for survival after out-of-hospital cardiac arrest due to ventricular fibrillation. They performed a logistic regression analysis of two retrospective series (n = 205 and n = 1667 respectively) of out-of-hospital cardiac arrests. The two data sets represented two different communities that utilized similar two-tiered ambulance services.

Valenzuela et al demonstrates the importance for ambulance services to provide timely responses to potentially serious conditions that could lead to cardiac arrest. This paper establishes the truth that the longer the patient waits for defibrillation the worse the outcome (see Figure 1.1). Consequently cardiac arrest is used as an indicator of service performance because it is the only outcome that is measurable in the pre-hospital setting.

Mary Larsen, et al (1992) supports the effects time has on cardiac arrest survivability. Using a multiple linear regression model fitting the data, Larsen found that the decline in survival rate in sudden ventricular fibrillation cardiac arrest was 5.5% per minute. That translates into five or six lives per one hundred saved for every minute response times are reduced. In British Columbia, the ambulance service responds to approximately 2,500 cardiac arrests per year (Moffat, BCAS cardiac arrest data, 1999, unpublished)

A key component in attaining good response times to provide rapid defibrillation or other life saving interventions is availability of resources. The fewer the resources available for the next call, the more territory the remaining available resources need to cover, resulting in longer travel times. Availability is dependent on call volume, hospital-waiting time for patient drop off and positioning of units. In a multi-tiered system, such as the BCAS, it is important to be able to use discretion in selecting resources for a call so that there is minimal over-triaging thus ensuring the likelihood that there will be a unit close to the next call. The MPDS in conjunction with the acuity data from the PASS will yield data to help the BCAS distinguish between high-risk calls needing a higher level of resources and those that are low risk requiring only the basic type of resources.

Reducing unwarranted lights and siren responses also decreases the risk of motor vehicle crashes involving emergency vehicles. Some believe that lights and sirens are over used and probably cause more deaths and injuries than it saves or prevents (Wolfberg, 1996). Hunt et al (1996) concluded that using lights and siren during transport to hospital is faster than without by 43.5 seconds. Although Hunt's study focused on transport, there is a high likelihood that response time saving of such a small amount are similar. If lights and siren do not have a significant impact on patient outcome, ways need to be explored to reduce their use.

Other centres using the MPDS process are looking for ways to more accurately determine the need for advanced levels of responders and the justification for lights and siren use. In a letter to all Salt Lake City Fire Department (SLCFD) personnel, Fire Chief Tom Tallon stated that 52.3% of all lawsuits against EMS agencies are a result of emergency lights and siren responses that result in accidents. Based on their quality improvement reviews, Chief Tallon implemented a reduced response to the Bravo category of calls that were traditionally lights and siren responses. They reviewed 19,737 runs of which 9,608 (48.7%) were identified as Bravo level calls. Of the Bravo calls, 72 (0.74% of Bravo calls) required lights and siren transports to hospital (an indication the patient's condition was serious). Fourteen (0.14%) patients required advanced level care as defined by the SLCFD protocols. The call types that required a higher level of treatment were confined to three categories, motor vehicle accidents, stab/gunshot wounds (9 cases) and man down (3 cases), unknown problem (2 cases) (Dale, Salt Lake City Fire Department, Evaluation of EMS Bravo level calls, unpublished raw data 1997).

This data supports the contention that the priority dispatch systems tend to over-triage many call types. The limitations of this data is that it only addressed one of the four determinant levels of response (Bravo) and did not discriminate between the 240 response sub-determinant categories in the MPDS system. The objective of PASS is to identify the requirements of all 240 sub-determinants.

Priority dispatch systems can be useful in reducing the cost of over responding emergency services. In1985 Slovis identified a saving in response time of advanced level paramedics to critical calls when a priority dispatch system was implemented and also reduced the number of ambulances requiring backup. Together with the time and resource savings, there was an under triage rate of only 0.3% which was mainly due to dispatch error. This under-triage rate, where resources were dispatched for a less severe case but which turned out to be an urgent case, is acceptable given the time saving in response time. Although this study occurred in 1985, the premise of selecting resources to meet the demand as identified by a priority dispatch system remains true today and even more so given the increasing pressure on limited resources.

Efficacy of First Responders and Paramedics

The efficacy of first responders has yet to be established in the literature. Berringer et al (1999) showed that First Responders in Vancouver, British Columbia arrived before the ambulance on 49% of calls. Of these calls, the median time before arrival of the ambulance was five minutes. The protocols a first responder can do in five minutes needs to be examined and considered when determining the appropriate resources to send to a call.

Other than Berringer et al's study, there are no peer-reviewed publications dealing with the efficacy of First Responders in the pre-hospital environment. In fact Berringer et al concluded that many lights and siren dispatches are unnecessary and that First Responders perform critical interventions during a minority of code 3 calls. (1999). He also states:

> Real world data on first responder interventions will help emergency medical services (EMS) directors and planners determine manpower requirements, assess training needs, and optimize dispatch protocols to reduce the rate of inappropriate "code 3" (lights and siren) responses (Berringer et al, 1999, p. 93).

He goes on to say that research should attempt to identify dispatch criteria to predict the need for first responder intervention. This project is an attempt to do this plus determine the appropriate use of ALS and BLS resources as well by defining, in patient terms, the medical priority dispatch codes.

How Paramedic intervention affects patient outcome, other than defibrillation, remains unclear. In his review of the medial literature, Callaham (1997) described the notion that there are a large numbers of patients that benefit significantly from receiving treatment 15 minutes faster. Few such conditions exist (e.g. ventricular fibrillation in cardiac arrest). His paper revealed through a meta analysis that out of 5,842 original EMS studies, only 170 were clinical trials of any kind and only 93 were Randomized Clinical Trials – the only type of evidence a serious clinician should accept before implementing new therapies.

This point illustrates the lack of evidence available to EMS managers to make important system decisions such as treatment protocols and resource allocation to various types of calls (the dispatchers mode of treatment).

Focus Groups

Action research is a hermeneutic approach to evaluation that is participatory in nature. It is a more democratic, empowering, and humanizing approach to inquiry than traditional scientific research (Stringer, 1996). Stringer also talks about action research as being equitable, liberating and life enhancing. Those whose lives are impacted by the problem under study should be involved in the process of inquiry and investigation.

The BCAS culture is like a community and the staff is directly affected by the problems raised in this study. The solutions to resource allocation will not work if the staff have not had sufficient input into the investigation and problem-solving process. It is for this

reason that the major project will conduct focus groups to evaluate the quantitative data and allow for the organisational stakeholders to participate.

Focus group interviews are similar to one-on-one interviews in they attempt to illicit opinion and to put the problem or issue into context of those who experience the problem impact. Used extensively in market research, focus groups are gaining a place in social research. These groups are normally a target sample of larger groups brought together to discuss the problem or phenomenon (Palys, 1997).

Focus groups compliment other methods and provide another level of data gathering to other research methods. Focus groups are useful to the researcher who is looking for unanticipated consequences to issues that may be responsible for deep-rooted problems plaguing an organisation. Focus groups expose opinions so that the participants can discuss them and explore other perspectives. This results in a rich dialogue, different perspectives and a greater chance of moving to meaningful solutions.

There are drawbacks to conducting focus groups. Palys (1997) cautions that some people will be shyer than others, or people may be more aggressive in having their opinion heard, or to maintain their image in a public setting. To combat these drawbacks researchers should keep one person from dominating the group and should encourage the shy individuals to participate. The researcher must ensure all individuals have had a chance to contribute to the group discussion. The objective of the focus groups should be to have the results influenced by the group rather than the researcher.

Delphi Method

The Delphi technique was developed in the 1950s by Rand Corporation as a tool for modeling future scenarios. The first project it was used for was the application of "expert opinion to the selection, from the point of view of a Soviet strategic planner, of an optimal U.S. industrial targeting system and to the estimation of the number of A-bombs required to reduce the munitions output by a prescribed amount. The alternative method

to handle this problem would have involved been prohibitive due to the large amount of computer power that outstripped the technical abilities of that time. In addition to the calculations, subjective estimates on Soviet intelligence still would have dominated the analysis (Linstone and Turoff, 1975).

Originally used for military purposes, it was quickly adapted to other fields of research and is now used extensively. The Delphi process has been employed with great success for new product development, sales and marketing research, evaluation of management methods, in demographic predictions, and in financial arenas. By focusing on evolving trends rather than existing conditions, it is particularly effective in reviewing the complex subjects businesses are currently grappling with as they interact with the future.

The three qualifications for a traditional Delphi are:

- Anonymity,
- Iteration with controlled feedback, and
- Statistical response (both qualitative and quantitative).

Through a set of carefully designed sequential questionnaires this method solicits input and opinion from the participants. Each round poses a series of Likert questions to the group; the answers are then tabulated, and those results are used to form the basis for the next round. Through several iterations, this process synthesizes the responses, resulting finally in a consensus that reflects the participants' combined intuition and savvy, as well as expert knowledge (http://www.mgtaylor.com/delphi/delphiorigin.html). The Delphi technique does not require participants to sit face to face but rather takes advantage of experts who may be dispersed over a large geographic area (http://www.seanet.com/~daveg/chapter3.htm).

Continuous Quality Improvement

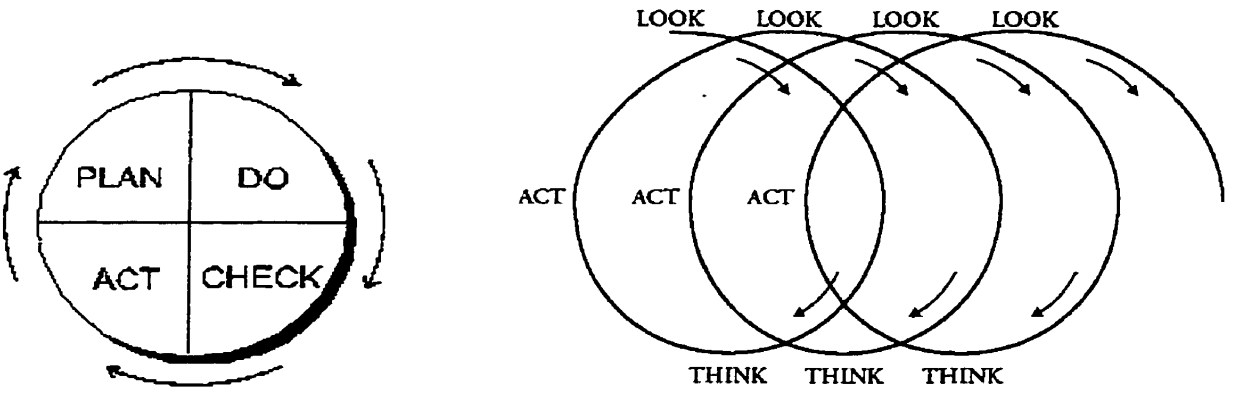
The genesis of this project began within the Quality Improvement Program of the BCAS as an attempt to develop measurable key performance indicators for dispatch call evaluation. Quality assurance has traditionally been defined as the sum of all activities undertaken to provide confidence that the products or services available maintain the standard of excellence established for those products and services. Continuous Quality Improvement (CQI) uses quality assurance as one way to continuously look for ways to improve the product or service. Similar to action research, CQI uses processes of inquiry, surveys and observation in addition to quantitative methods of measurement. A strong similarity between CQI and action research is both types of inquiry results in action that in turn results in a continuing cycle of looking, thinking and acting (Stringer, 1996).

W.Edwards Deming is considered the father of quality and is responsible for the underlying philosophies that have shaped the CQI movement. Under Deming's approach, quality is maintained and improved when leaders, managers and the workforce understand and commit to constant customer satisfaction through continuous quality improvement.

Deming and his colleague, Shewhart, promoted the PDCA cycle -- Plan, Do, Check and Act. PDCA is a continuous cycle; any improvement realized by carrying out one PDCA cycle will become the baseline for an improvement target on the next PDCA cycle (http://www.nhtsa.dot.gov/people/injury/ems/leaderguide/index.html).

The similarities between Deming's approach to quality and Stringer's Action research Interacting Spiral (1996) demonstrate how CQI is, in essence, a practice in Action Research (see Figure 2.1).

Figure 2.1 *Comparison of Deming's Plan, Do, Act, and Check Continuum and Stringer's Action Research Interacting Spiral* (Ernest t. Stringer, Action Research – A Handbook for Practitioners, pp. 17, copyright © 1996 by Sage Publications, Inc. Reprinted by Permission of Sage Publications, Inc.)



To extend this similarity further the core challenge in any organization is to develop tools and processes for describing or conceptualizing the big picture (Senge, 1990). Senge states that people in organizations must master the cycle of thinking, doing, evaluating, and reflecting. Without this, there is no valid learning.

A critical enabler in creating and maintaining high-performance EMS systems is the ability to measure performance; therefore, the development of a pre-hospital performance measurement system is essential. Performance measures should be Specific, Measurable, Action-oriented, Relevant and Timely (SMART). To date there have been few attempts to establish operational indicators of quality, validate those indicators, or develop tools to measure performance of EMS systems using such indicators (Moore 1999).

Valid learning is precisely the goal of this project. The people in the BCAS organization must continue to learn more about the patients that are served and the dynamics of providing that service. Cause and affect links need to be established. Continuous quality improvement process will serve as the engine that drives this learning.

Potential Solutions to the Problem

The literature describes instances where the intuitive resources sent by dispatchers based on intuition will be mismatched in a significant number of cases (Calle et al, 1995, Curka et al, 1993 and Slovis 1985). Calle et al concluded that the most important element in avoiding mismatches is the dispatcher/caller interaction. They recommended medical training for dispatchers so that valuable indicators of the patients' condition will not be omitted.

Calle et al (1995) also recommends a closer cooperation between the paramedic, EMD and medical community to ensure physicians are educated as to the modes of treatment available and the requirements of the EMD when requesting an ambulance in the emergency situation.

The process for this to occur already exists in the BCAS structure. The research methodology for this project includes representation of these groups in the focus group and evaluation component. Further inclusion of general practitioners should be a goal of the BCAS.

Public education on how and when to call for an ambulance and to recognize life-threatening conditions would allow the EMD to collect relevant information. Callers unable or unwilling to provide relevant information was the cause in about 50% of cases when the dispatcher overestimated the level of care needed (Calle et al, 1995).

The research presented in the literature review identified that:

- If the priority dispatch system overestimates the level of response, and
- If the rate of underestimation is low, and
- If the survival of patients in cardiac arrest (the only outcome based indicator in EMS) is enhanced with shorter response times, and
- If response times are affected by unit availability, and

- If the medical community is looking for ways to measure patient condition through scoring systems,

then improvement to the efficiency of allocating resources to each call can be accomplished through evaluation of the combined MPDS and patient acuity data. This will be the focus of this study.

CHAPTER 3: CONDUCT OF RESEARCH STUDY

Research Methods

The literature review identifies the importance of accurate dispatch call assessment, the problems of over and under triage, and the impact these have on the efficiency and efficacy of EMS systems. This study will help improve these conditions by answering two critical questions:

- How accurate is the Medical Priority Dispatch System (MPDS) in predicting the patient's condition (acuity), and
- Can the call evaluation and resource allocation be improved to more specifically address the patient's needs and improve efficiency?

Phase one is the comparison of PASS with MPDS codes (including data verification). Phase two uses this data to aid stakeholders evaluate and revise the resource allocation plan for the BCAS.

This is a qualitative study using a triangulation method consisting of a two-phased approach. The literature review revealed a need to develop scoring systems that accurately quantify the patient's condition. Phase one is the development of the Patient Acuity Scoring System (PASS) that describes the patients' severity of condition in an objective fashion using vitals signs, treatment protocols and indicators of the paramedics' sense of urgency.

The literature review also identified issues around over estimating the resources required for most out-of-hospital emergency calls. Phase two is a qualitative research inquiry that will present the data from the PASS to BCAS stakeholders. They will be asked to refer

to this data and revise the resource Allocation Plan for the BCAS based on this objective data.

Data Gathering Tools

A statistical sampling formula, a computer query, and the Delphi method of inquiry were the tools used in this research project. A two-phased approach consisting of development and application of a patient acuity scoring system and the Delphi survey served as the foundation of the study conduct.

Study Conduct

Phase One – Accuracy of Data and Pass Scoring

Before proceeding with the classification and comparison against PASS, the accuracy and completeness of the data had to be verified. The parameters that were verified in the data that impacts the PASS score included:

- Blood Pressure
- Respiratory Rate
- Glasgow Coma Score (scores the level of consciousness)
- Respiratory assistance rendered
- Patient Care Code (paramedics working diagnosis)

A data base query was designed that identified 63,516 calls with valid MPDS codes and complete vital signs for a six-month period (November 1, 1998 to April 30, 1999). The report generated from the query categorized the calls according to the MPDS codes and grouped them according to acuity scores (0 to 4). The report stated the percentage of each acuity score for each MPDS code as well as the percentage of each code that had indicators of chest pain. Additional data on the mode of transport to hospital was also included to provide another indicator of acuity, albeit a subjective one, that relies on each

crews' perspective of when to transport the patient to the hospital using lights and siren (Appendix C).

The accuracy of the computer query rested with the degree of agreement between what was written on the crew form and what was data entered. The reliability of information therefore depends on the care which data entry is performed (Fleege, 1991). The degree of accuracy needed to be determined to verify the PASS reports as dependable. A co-op student from the University of Victoria's Health Information Science program was assigned the task of evaluating the PASS tool with validation of the MIS data accuracy being the main priority (Marla Hanson, Evaluation of the PASS Tool, 1999, unpublished).

Comparing a sample of paper records to their corresponding electronic records validated the data. The MIS contained 231,514 records from the chosen study period from December 1, 1997 to June 30, 1998. The number of records required for a statistically significant sample size was calculated using the formula:

$$S = \frac{X^2NP(1-P)}{d^2(N-1) = X^2P(1-P)}$$ where:

- N = given population size (231,514)
- P = assumed number of yields max sample size (0.50)
- D = amount of error tolerated (0.05)
- X^2 = value of chi square for 1 degree of freedom relative to desired confidence level (95% C.I.) (3.841)

(Issac, 1981)

A statistically significant sample of 231,514 records is 384 records. The electronic sample was produced after eliminating records with invalid or blank MPDS codes or no vital signs recorded and extracting every 256th record. The required data elements were entered on an Excel spread sheet and compared to the original electronic data thus producing dual entry verification. When discrepancies were noted between the student's entries and the extraction from the MIS, the crew reports were re-checked to ensure that

the differences were not a result of data entry errors of the student. Therefore any discrepancies could be attributed to errors in the MIS, however this method could not detect instances in which the student and the data entry clerk made the same error. The methodology described above is consistent with published methodologies for data verification (Blumenstein, 1993 and Horbar, 1995).

A patient acuity score system (PASS) was designed to quantify the severity of patients' condition according to:

- Vital signs,
- Cardiac arrest,
- Chest pain and
- The need for ventilatory assistance

The PASS uses a five level scoring system ranging from Level 0 to Level 4. The values are defined as:

- Level 0 = normal vital signs,
- Level 1 = 1 abnormal vital sign,
- Level 2 = 2 abnormal vital signs,
- Level 3 = 3 abnormal vital signs or ventilatory assistance required,
- Level 4 = cardiac arrest or a combination of above > 4.

The vital signs and the threshold for being considered abnormal include:

- BP < 90 sys,
- Respiratory rate < 10 or > 30,
- Glasgow Coma Scale < 14.

An upper level of normal for blood pressure was not used because in the pre-hospital environment low blood pressure represents a common presentation that requires

immediate attention, whereas high blood pressure predominately is not a time sensitive emergency (except in rare cases of hypertensive crisis).

The MPDS comparison data would then be used in Phase Two in conjunction with the expert opinion of dispatchers, field staff, managers, physicians and first responder agencies to revise the Resource Allocation Plan and to provide a model to continually review the system performance.

Phase Two – Qualitative Inquiry

The second phase of the study consisted of focus groups to evaluate the PASS data, identify issues, and revise the resource allocation plan in relation to each MPDS code. The Delphi method of inquiry was chosen to collect the input of the focus groups. The main objective for phase II of this project was to seek out information, which may generate a consensus on the part of the respondent group. The Delphi technique was used in the qualitative phase to determine what items there was consensus and what items there was divergence and if there were emerging patterns on the practice of allocating resources in the pre-hospital care arena in British Columbia. Delphi is considered helpful in enhancing the opportunity of each participant to engage in an inductive process without allowing contentious issues to cloud the objectives of the study (Lindstrone, and Turoff, 1975).

Selection of Participants

The groups were comprised of members of the Medical Dispatch Review Committees (MDRC) from each of the three dispatch centres in the province. Each MDRC has a physician, manager, dispatchers, paramedics and union representative. As part of the implementation three years earlier, the initial RAP was developed by a similar representative group using their best judgment and experience to determine the best resources to send for each MPDS code, but without the benefit of objective patient outcome data. For this project the focus groups had the opportunity to repeat that process

to revise the RAP but this time with the aid of quantified data to put their opinions into perspective. In addition to the MDRC members, physicians and fire department first responder agencies were asked to participate. A total of thirty-eight participants enrolled in the project.

Data Selection Process

To make the Delphi process more effective, a presentation on the project was given to the participants prior to the beginning of the Delphi process. Delphi is essentially a series of questionnaires. The first questionnaire asks the individual to respond to a broad question. (Delphi questions might focus upon problems, objectives, solutions, or forecasts.) Each subsequent questionnaire is built upon responses to the preceding questionnaire (Delbecq, 1975). The Delphi process for this project consisted of three rounds. The first round was an open evaluation of all 240 MPDS codes by each participant. They were asked to submit by fax, their suggestions for change.

To encourage the participants to respond to the questionnaires, an assistant contacted each person by phone or email as a reminder to submit the questionnaire.

Three rounds were necessary before the participants exhausted their ability to reach consensus. Reviewing of the data from the first round of responses it became evident that a frequency distribution cut-off would have to be used to determine a level of agreement that represented consensus.

Survey Instruments

The survey instruments contained data on cumulative PASS scores for each MPDS code, presence of chest pain, and if the crews transported the patient to hospital with lights and siren. The stakeholders were asked to provide their opinion on proposed changes in each of three rounds.

Delphi Round One

In keeping with Delbecq, this project started with a broad question of the participants' opinion on the changes required to the resource allocation plan for each of the 240 codes (see Appendix C). This was a free flow process that included these options:

- Sending or not sending First Responders (FR)
- Upgrading or downgrading the paramedic qualification (Qual.)
- Upgrading or downgrading the mode of response (code 2 or code 3)

The researcher reviewed the submissions and identified common areas of consensus for change using frequency of responses.

Delphi Round Two

Round two summarized the common suggestions for change and the participants were asked to comment on those codes/resources marked for change in round one (see Appendix D).

Delphi Round Three

The third and final Delphi Round asked the participants to review the changes that did not reach consensus in the second round, to confirm or give them a "second chance". Also, the researcher wanted to look for opinion on three areas of controversy that had emerged throughout the first two rounds from the comments of the participants:

- On Bravo level calls, First responders should only be sent when the ambulance is expected to be greater than 10 minutes. (The exception would be sending the fire department on Bravo calls requiring scene safety, i.e. card 7, 8, and 29)
- All Bravo level calls with low acuity, i.e. codes with 90% of the patients having normal vital signs (Level 0), should be a code 2 response

- First Responders should not be sent on calls that are routine responses (no lights or siren) except on scene safety calls

In the Delphi round three survey the participants were asked to assign a score of between one and four to each of the 14 "second chance" codes and the three statements:

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

The questionnaire for the second and third round was designed according to the results and comments received in the previous round. Emerging themes were identified and were included in the third round (see Appendix E).

Final Analysis of Data

Responses from the three Delphi rounds were reviewed by the researcher to determine if there was group consensus by looking at the frequency of common opinion for each round. A final review of the list of changes was not sent to the participants because it was clear after three rounds that the diverse points of reference of the participants meant that true consensus could not be achieved. A final summary outlining this will be sent to the participants.

Reliability and Validity

According to Stringer (1996), reliability in the true scientific model is not applicable in action research that deals with mental constructions and mental interpretations. Reliability is the consistency of results either over time or among different observers (Palys, 1997). Reliability may relate to inter-rater reliability (a tool that measures the same thing when used by different people) or test-retest reliability (the tool yields the same measurements when used repeatedly among the same respondents). In this project reliability was not tested but reliability and validity are important and should be the focus of future studies.

Face Validity of the survey instruments was established by having them reviewed by physicians and the project advisor. The physicians were asked: "Do the questionnaires appear to measure what the instrument purports to measure (Gould, 2000)?"

The methodology outlined in this project reflects Stringer's (1996) concept of action research using the Look, Think and Act model.

Look

- Establish dispatcher compliance with the MPDS process
- Identify indicators of patient acuity
- Determine preliminary test of data
- Develop access to data
- Design reports
- Build a picture and describe the situation to others

Think

- Extend research to add qualitative context using focus groups
- Develop focus group questions
- Conduct focus groups
- Evaluate the data
- Assess level of agreement
- Identify variables associated with each MPDS code.
- Make recommendations for change

Act

- Produce report
- Reflection and review of report by focus groups
- Educate management and staff
- Review with medical community
- Implement the RAP recommendations

Look

- Use the study process to perform periodic evaluation of the plan.

The role of the researcher was as a facilitator to help stimulate people to address issues and to focus on the process rather than the result or outcome. The facilitator's primary goal was to enable the stakeholders to contribute their opinion armed with information surrounding the resources sent to emergency calls. This inductive approach was appropriate in this situation since the culture of the focus groups is such that collaboration rather than enforcement may bring about a richer and "thicker" analysis.

Solutions to the issues surrounding the resource allocation plan need to involve those who deliver service and who are impacted every day by the decisions related to the provision of resources to ambulance calls. Results generated from a review of only quantitative data will miss the rich experiential nuances that any human system or ecology must consider. This was an important concept for the researcher to keep in mind, as the resource allocation is a critical part of an intricate province-wide system, and the results have significant impact on staff and their service to the public.

Ethical Considerations

The researcher adhered to the principles of ethical research as outlined by the American Psychological Association (Palys, 1997). Confidentiality of the patients included in the study was assured, as identifiers were stripped from the data reports. Participants in focus groups were informed of the objectives of the study and understood that they have the right to opt out of the study if they so desired. Confidentiality of participants was maintained by eliminating names or other identifiers from transcripts and reports. The researcher removed or corrected any undesirable consequences to the participants as they were detected. Results of the study will be supplied to the participants and their input will be sought to confirm the accuracy of the information involving the participants.

Project Deliverables.

1. A comparison of MPDS codes with patient acuity data.
2. A scoring system for future analysis of subjective data.
3. A synopsis of stakeholders views on the data and RAP.
4. A revised RAP.

1. A comparison of MPDS codes with patient acuity data.

A quantitative evaluation of the BC Ambulance Service patient acuity data (based on the Patient Acuity Scoring System) provides a framework with which to compare patient condition with each of the 240 MPDS codes.

2. A scoring system for future analysis of subjective data.

A secondary benefit is to have a quantitative model against which to measure subjective changes in future analysis.

3. A synopsis of stakeholders views on the data and RAP.

Also, the research project provides the sponsor with a qualitative action research deliverable addressing the stakeholders' opinion gathered through focus group sessions. This puts the quantitative component of the research into perspective and provides the sponsor with feedback on how stakeholders regard and apply the data.

4. A revised RAP.

Finally, the researcher will present a revised resource allocation plan based on the findings of this research. This plan may be implemented by the sponsor and reviewed through the quality improvement process previously developed by the researcher.

Project Participants.

The research included participants to help with compiling and validating the quantitative data, focus groups to put the quantitative data into context and through evaluation of the data made recommendations for improvement.

Phase One participants

- The researcher
- Health Information Science Co-op student, University of Victoria
- Information Management Group, Ministry of Health, Province of British Columbia

Focus Groups

Members of the three focus groups were selected from the members of the Medical Dispatch Review Committees set up for each dispatch centre. These committees are part of the Quality Improvement process. Each committee has representatives of the following disciplines:

- Advanced level paramedic (EMA III)
- Basic Level paramedic (EMA II)
- Emergency Medical Dispatcher
- Charge Dispatcher (supervisor)
- Dispatch Superintendent
- Union representative

To provide continuity there are four members common to all three committees:

- Manager, Quality Improvement Program (researcher)
- Physician
- Assistant Director of Dispatch Programs
- Representative of the Paramedic Academy (educator)

In addition fire chiefs from eleven area fire departments were included to gain the input of the first responders. Confirmation of the process and recommendations involved review by members of the:

- Medical Priority Dispatch Steering Committee
  - Manager, Quality Improvement (researcher)
  - Provincial Medical Director (physician)
  - Assistant Executive Director
  - Union President
  - Assistant Director of Dispatch Programs
- Medical Advisory Committee.
  - Regional physician representatives
  - Special Services physician representatives (e.g. intensive care, research, neonatal care)
- Greater Vancouver Fire Chiefs Association

For the purposes of analysis the participants were further grouped according to their affiliation as described in Table 3.1:

Table 3.1 Delphi Group Participants

Group	# Enrolled
Physicians	7
Dispatchers	8
Superintendents	6
Fire Chiefs	11
ALS Providers	4
BLS Provider	1
Educator	1
Total	38

Project Resource Requirements.

Resources for the study were readily available in the researcher's current workplace. Travel for the researcher and participants were required for the Victoria and Kamloops focus groups. This travel was incorporated into part of the normal routine of conducting business and therefore not considered an added expense.

Data management was conducted through the Ministry of Health Information Management Group and was prearranged. Co-op students from the University of Victoria Health Science program were involved in data entry validation.

CHAPTER 4: RESEARCH STUDY RESULTS

Study Findings

The major project consisted of two phases. The first phase involved development of a scoring system using physiologic parameters that describe the patient's condition. The data used for populating the scoring system resides on the management information system of the BCAS. This phase also required a process to determine the accuracy of the electronic data used in the computer query and subsequent calculation of the PASS.

The second phase of the study used focus groups to evaluate the PASS data, identify issues, and revise the resource allocation plan in relation to each MPDS code.

Phase One - Accuracy of Data and PASS Scoring

The accuracy of the data entry process was within acceptable limits for this project. A random sample of 474 records showed that 84 records (17.93%) had at least one data entry error. Of the 84 records with data errors, 70 errors were due mainly to cases in which the number entered in the database was incorrect, yet still in a range that was considered normal for the purpose of the PASS calculation (example: an entry of 138 rather than 130 for initial blood pressure). Fourteen (12%) had incorrect PASS calculations as a result. Therefore, 2.53% (12/474) of the forms reviewed contained a data entry error that affected the PASS calculation

The error rate in relation to each data field can also be viewed in relation to the percentage of fields with errors. There were five fields that were reviewed per form that was used in the PASS calculation. This resulted in 2,370 data fields entered and only 12 that had an error that affected the PASS score. This is an error rate of 0.50%.

Fleege et al (1991) stated that an error rate for data entry of forms into a database of 1% is tolerable. The error rate for the sample of crew form is less than the one percent. For the purposes of this project the error rate from data entry is tolerable.

The data entry validation process also discovered that there were errors in calculation due to incomplete documentation of data by the paramedics on the crew forms. The way the forms were filled out had an impact on the PASS score and thus resulted in artificially high or low score. For example, if only one vital sign was documented on the crew form and it was normal (e.g. a blood pressure > 90 systolic), a PASS score of level 0 (normal) would be assigned by the computer. If the patient was also unconscious and the Glasgow Coma Score was not documented on the form it would not have been included in the calculation.

As a result of the PASS data entry validation process several changes were made to the computer query in order to yield a more accurate calculation of acuity. For this project, only those calls that had a valid MPDS code and complete sets of vital signs documented on the crew report were included in the study. During the study period (November 1, 1998 to April 30, 1999) there were 103,830 calls with a valid MPDS code. Of these a total of 63,516 calls had complete sets of vital signs.

The 63,516 calls were divided into the five levels of acuity. The majority (97.42%) of calls fell into Level zero and Level one. Level two and three yielded a low percentage of calls (2.58%). This may be because of the characteristics of the scoring system in that if a patient had three abnormal vital signs it would affect the fourth parameter - they would most likely require ventilatory assistance. That then resulted in a higher score (Level 4). Although Level four also had a low percentage of patients, it is expected to be a low percentage of patients that are truly in a life-threatening situation that the Level four represents (see Table 4.1).

Table 4.1 *Breakdown of calls per acuity level, n = 63,516*

Level	Definition	Number of Calls (%)
Level 0	normal vital signs	53,822 (84.74%)
Level 1	1 abnormal vital sign	8,051 (12.68%)
Level 2	2 abnormal vital signs	837 (1.32%)
Level 3	3 abnormal vital signs or ventilatory assistance required	131 (0.20%)
Level 4	cardiac arrest or a combination ≥ 4	675 (1.06%)

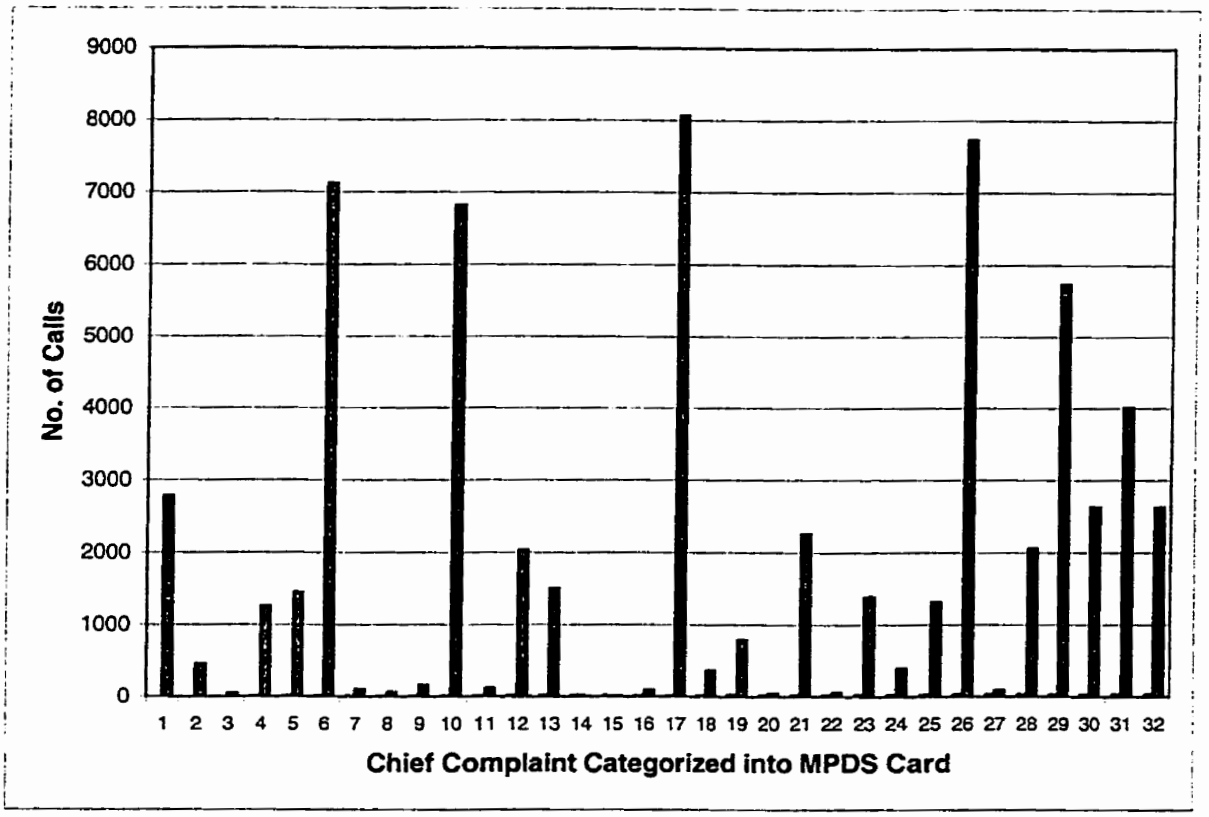
The were 4,910 (7.73%) calls that were cardiac related (i.e. requiring treatment for chest pain) and 4,014 (6.32%) that required rapid transport to hospital using lights and siren due to the paramedics perception of the seriousness of the patient's condition. Of the 63,516 calls, 34,419(54.19%) were sent to the scene using lights and siren.

The data was grouped in three ways:

1. Into thirty-two MPDS cards (chief complaints);
2. Then into four levels of response determinants (Alpha, Bravo, Charlie and Delta);
3. Then into 240 more specific sub-determinants.

The volume of calls for each chief complaint classified by MPDS card is displayed in Figure 4.1 on the following page.

Figure 4.1 Volume per Chief Complaint Card



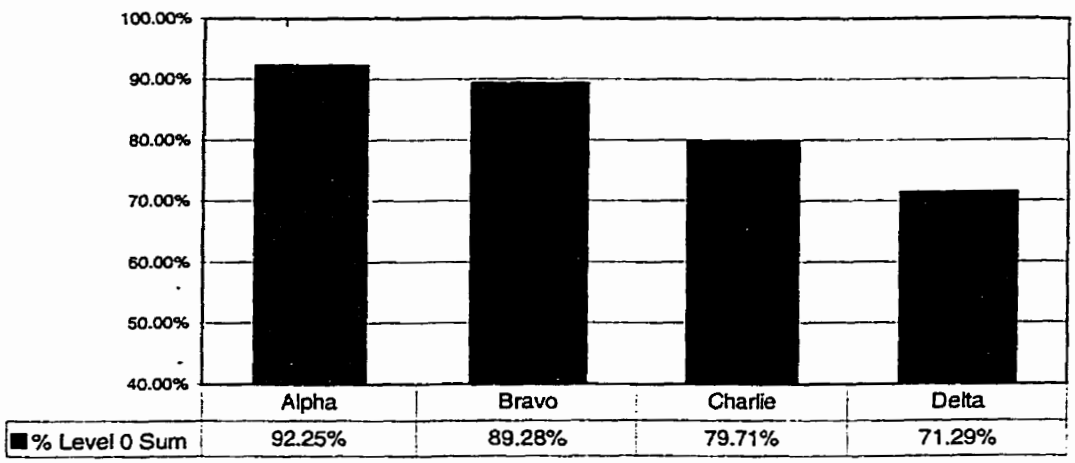
Card 17 (Fall) had the highest number of calls at 8,058 (12.69%). Sixty-two percent of the calls are captured into the following six chief complaint cards:

- Card 17 (Falls) 8,058 (12.69%)
- Card 26 (Sick Person) 7,739 (12.18%)
- Card 6 (Breathing Problems) 7,118 (11.21%)
- Card 10 (Chest Pain) 6,826 (10.75%)
- Card 29 (Traffic Accidents) 5,736 (9.03%)
- Card 31 (Unconscious/Fainting) 4,017 (6.32%)

When ranking the response determinants (A,B,C and D) according to the percentage of patients with a PASS of Level 0 (normal vital signs), an Alpha response (Not life

threatening, time is not a factor) should have the highest percentage. This should be followed by Bravo, then Charlie and finally Delta (life threatening, time is of the essence) responses. The data supports this intuition when analysed according to the percentage of calls that had a PASS score of Level 0 (normal vital signs). Calls in the Alpha determinant category had the highest percentage of Acuity Level 0 patients at 92.25%. Delta had the lowest percentage of calls with Level 0 at 71.29% (see Figure 4.2).

Figure 4.2 *Percentage of calls with PASS score of Level 0 (normal vital signs) by Determinant*



It is remarkable that 71.29% of the Delta calls had normal vital signs (Level 0). The significance of this is an over-triage of resources going to theses call. What is not known is the warranted level of over-triage in order to avoid missing the truly life threatening patient.

The data was displayed and then reviewed by stakeholders for each of the four determinants ranking them according to their percentage of calls that fall into the Level 0 PASS. When displayed graphically, it became apparent which MPDS codes yield the unstable patients (see Appendix F). The summary data, displayed visually, was provided to the participants in the Delphi survey groups with objective data to help them revise the resource allocation plan.

Another indicator of the patient's severity, albeit a subjective one, is the decision of the ambulance crew to transport the patient to the hospital using emergency lights and siren. All lights and siren transports do not necessarily indicate a life-threatening situation. For example, getting the patient to hospital in a time-efficient manner may be the desired approach such as a woman about to deliver a baby. However, these cases are in the minority and can be viewed independently.

In Table 4.2, Cardiac Arrest is shown as resulting in only 21% of the calls using lights and siren transport to hospital. Because of the level of emergency in a cardiac arrest, it would seem appropriate to have 100% of the calls transported lights and siren. However, according to the data, the percentage of cardiac arrest transports using lights and siren are not 100% for two reasons:

- Not all cardiac arrests end in transport. Many are either discontinued at the scene if there is no response to resuscitation efforts, or many turn out to be dead-on-arrival (DOA) of the paramedics and no resuscitation is attempted. In either case transport is not performed or it is performed without the use of lights and siren.
- Review of the documentation on cardiac arrest and DOA patients showed lower (or incomplete) compliance than for non-cardiac arrest patients. The probable explanation is there is more attention by the EMA staff given to completion of the special cardiac arrest form than the Crew Form.

Table 4.2 Top ten MPDS Codes with Lights and Siren to hospital

MPDS Code	Description (chief complaint)	Transported with Lights and Siren
24D3	Pregnancy – Imminent Delivery	21.67%
09D1	Cardiac Arrest	21.5%
10D1	Chest Pain – Severe Resp. Distress	20.94%
06D1	Breathing Problem – severe Resp. Distress	18.1%
06D2	Breathing Problem – Not Alert	16.06%
23C3	Overdose – Antidepressants	14.52%
06D3	Breathing Problems – Sweaty or Changing Colour	14.48%
24A1	Pregnancy – 1st Trimester Bleed	14.29%
10D3	Chest Pain – Sweaty or Changing Colour	14.09%

Results of Phase Two – Qualitative Inquiry

The original resource allocation plan developed in the BCAS was done without the aid of objective patient acuity data. The resources selected for each MPDS code resulted from the best guess and intuition of the stakeholders. The literature review identified a common agreement that priority dispatch systems over triage responses. Phase two of this project uses the data developed in phase one to help the stakeholders revise the resource allocation plan to try and improve the accuracy of the resources thus creating a more efficient response process.

Seven groups were identified to participate in the Delphi Survey. The groups represented stakeholders in the provision of emergency health care in the province of British Columbia. Representatives of each group were selected based on their participation in the BC Ambulance Service system review and design.

Patient representation was not included because the process design required the stakeholder to interpret response data in addition to their experience in responding to emergency situations. The emotional and descriptive content of the MPDS codes would, in the researcher's opinion, distract the patient representative from being objective in analyzing the data.

A total of 38 persons agreed to participate in the Delphi Survey. In the first round 29 (76%) persons returned the survey, 17 (45%) returned the second survey and 16 (42%) returned the third survey.

Table 4.3, on the following page, describes the number of participants for each group and the extent to which each group members participated in each of the three rounds of the Delphi survey. Reasons for not returning the surveys were not always provided but those who did contact the researcher stated work load as the major reason. One person reported satisfaction with the resource allocation process and was content to let the others in the groups determine the changes. Only nine of the thirty-eight persons enrolled in the survey responded to all three surveys. Two responses in the second round did not have a name or affiliate and therefore could not be identified. These two responses were discarded.

Table 4.3 *Breakdown of Respondents Participation*

Group	# Signed up	# Round One	# Round Two	# Round Three
Physicians	7	3	5	4
Dispatchers	8	8	6	4
Superintendents	6	4	2	2
Fire Chiefs	11	9	3	4
ALS Providers	4	4	2	2
BLS Provider	1	0	0	0
Educator	1	1	0	0
Total	38	29	18	16

Delphi Round One

Of the 38 surveys sent to all participants in round one, 29 (76%) were returned. Changes to be selected for inclusion in the second round was determined using the degree of consensus for any one change. The options offered to the stakeholders for each of the MPDS codes were:

- Sending or not sending First Responders.
- Upgrading or downgrading the paramedic qualification (Basic Life Support or Advanced Life Support)
- Upgrading or downgrading the mode of response (lights and siren).

The volume and complexity of reviewing 240 MPDS codes and assigning one of three conditions forced the researcher to identify criteria to select the codes to move to the next round. A proposed resource allocation change was moved to round two if:

- Two or more persons in agreement on any one change
- There were no contradicting recommendations from other stakeholders.
- There were no opposing views (e.g. one person proposes an upgrade in First Responder while another proposes a downgraded in First Responder or a downgrade in mode from code three to code two – these would not be included in the second round).

- A change was consistent with the acuity of the call type (gross inconsistency was not considered).
- Others supported a suggestion for change.

The average agreement to a proposed change to any one code was two people agreeing with any one change (6%). The highest agreement, which happened twice, was 7 people (22%), and occurred in the Fire Chief's group. Ultimately thirty-three codes were selected for possible change (see Appendix C)

Themes

A qualitative research project is an inductive process that looks for themes to emerge. In this case themes developed that could serve as operational guidelines as well as indicators for change to the Resource Allocation Plan. Themes that emerged from comments during the Delphi round one were:

- First Responders should be cancelled on calls involving the ambulance waiting for police to secure the scene.
- First Responders should be sent on all calls where there is a potential for BCAS to be delayed greater than ten minutes.
- If the BCAS unit would be more than 10 minutes First Responders should be sent on the following calls: 25B1, 25C3, 26B1, 28B1, 30B1.
- Basic life support crews (EMA II) can adequately handle childbirth. ALS paramedics do not have added training in childbirth and therefore are of no advantage.
- Although ALS providers are not better trained in childbirth than EMA II providers, they are better qualified in Paediatric Advanced Life Support and should be considered for pregnancy calls to provide advanced care to the infant.
- First Responders are not trained in emergency childbirth and therefore should not be sent on these calls.

Delphi Round Two

The thirty-three codes that met the criteria for entry into round two were listed in the second round survey form and the participants were asked to agree or disagree with each proposed change (see Appendix D). All of the original 38 participants were sent the survey of which 20 were returned. Two of the 20 returned surveys did not contain identification and therefore were not included. This left 18 responses (47%) that could be used for analysis.

Two respondents in one of the groups did not fully respond to all 33 changes. The reason for this was not identified. Therefore, the degree of consensus was measured as a percentage of responses that agreed for each one of the 33 proposed changes.

The diverse nature, background and orientation of the stakeholder groups was evident. The researcher considered this and elected to select a 75% consensus level for inclusion as an accepted change. This represented a consensus as low as 12 out 18 in some cases due to the low number of respondents and the incomplete data on some of the proposed changes.

The stakeholder group reached complete consensus on resource changes on two MPDS codes:

- 28B1 - Stroke with unknown symptoms (add first responder)
- 17D2 - Long Falls >2 meters (upgrade EMA qualification to IV endorsement).

Of the 33 proposed changes, 19 received 75% or greater agreement for the proposed change by the respondents. The survey group reached consensus that 19 of 33 codes should have their response resource increased or decreased. The remaining fourteen were entered into round three (Appendix D).

Delphi Round Three

Round three served as a "second chance" for those proposed changes that were not accepted in round two. There were 14 proposed changes considered for the "second chance". The third round survey asked whether the respondent agreed or disagreed with the 14 proposed changes. Also, there were three statements on the survey that emerged from the comments in round one and two. The participants were asked to agree or disagree (see appendix E). Of the 38 surveys sent out, 16 (42%) were returned.

In this round 12 (75%) respondents agreed to change six responses and adopted one of the statements. All groups agreed on five of the changes in resources allocation and five agreed on the statement:

> "First Responders should not be sent on calls that are routine responses (no lights or siren) except on scene safety calls."

The dispatcher group did not agree to the change for code 17B1. The Fire Chief's group did not agree with the statement.

Final Delphi List of Changes

A total of 25 changes were identified through the Delphi process (see Table 4.4). In addition 12 (75%) people agreed with the statement:

> "First Responders should not be sent on calls that are routine responses (no lights or siren) except on calls that require scene safety."

Table 4.4 *Summary of 25 changes and one statement evolving from the three Delphi rounds*

MPDS Code	Definition	Revised Resource	Change in Resource
01C1	Abdominal Pain - Male ≥ 35 Years	EMA Code 2	Downgrade response mode
01C2	Abdominal Pain – Female ≥ 45 years	EMA Code 2	Downgrade response mode
03D1	Animal Bites - Severe Central Bites	FR EMA Code 3	Downgrade Qualification
03D2	Animal Bites – Large Carnivore	FR EMA Code 3	Downgrade Qualification
05C1	Back Pain (non-traumatic) – Fainting ≥ 50 years	FR EMA Code 3	Downgrade Qualification

MPDS Code	Definition	Revised Resource	Change in Resource
06C2	Breathing Problems – Asthma	FR HLA Code 3	Upgrade Qualification
07A1	Burns/Explosions – Small (<18%)	FR EMA Code 3	Add FR and Upgrade mode of response
08B1	Carbon Monoxide/Inhalation/Hazmat – Alert, not Short of Breath	FR EMA Code 3	Add FR
08D4	Carbon Monoxide/Inhalation/Hazmat – Unknown	FR EMA Code 3	Downgrade Qualification
13D1	Diabetic – Unconscious	FR HLA Code 3	Upgrade Qualification
17B1	Falls/Back Injuries (traumatic) – Possibly Dangerous Injuries	FR EMA Code 3	Add FR
17D2	Falls/Back Injuries (traumatic) – Long Fall (> 2m)	FR EMA* Code 3	Upgrade IV Endorsement
18C2	Headache – Numbness or paralysis	EMA Code 3	Upgrade Mode of Response
18C3	Headache – Speech or movement problems	EMA Code 3	Upgrade Mode of Response
19B1	Heart Problems – Unknown Symptoms (3rd party call)	FR HLA Code 3	Upgrade Qualification
19C3	Heart Problems – Rate ≥130, no symptoms	FR HLA Code 3	Add FR
19C4	Heart Problems – Cocaine	FR HLA Code 3	Add FR
24D2	Pregnancy/Childbirth – Crowning	EMA Code 3	Downgrade Qualification
24D3	Pregnancy/Childbirth – Imminent Delivery (3rd Trimester)	EMA Code 3	Downgrade Qualification
25C3	Psychiatric/Suicide – Suicidal	EMA Code 2	Downgrade Mode of Response
27B2	Stab/Gunshot – Not Recent (>6 hours)	EMA Code 2	Remove FR Downgrade Mode of Response
28B1	Stroke/CVA – Unknown Symptoms (3rd Party)	FR EMA Code 3	Add FR
29D1	Traffic Accidents – Multiple Victims	FR EMA Code 3	Downgrade Qualifications
29D2	Traffic Accidents – Auto-ped/motorcycle/bicycle	FR EMA Code 3	Downgrade Qualification
29D3	Traffic Accidents – Hazmat	FR EMA Code 3	Downgrade qualification
Statement 3	First Responders should not be sent on calls that are routine responses (no lights or siren) except on scene safety calls.		

Of the twenty-five recommendations for change, 12 involved upgrades and 13 involved a downgrade in resource allocation. This represents 6037 calls or 9.5% of the call volume captured in this study period (63,616). Of these, 2,519 calls were downgraded in terms of level of service (qualifications, first responder or mode of response). There were 3,518 calls that were upgraded in terms of level of service (see Table 4.5).

Table 4.5 The number of calls affected by the proposed changes.

Type of Change	**# of Calls Upgraded**	**# of Calls Downgraded**
Lights and Siren	62	1453
First Responder	1999	0
EMA Qualification	1457	1066
TOTAL	**3518**	**2519**

Discussion

Identifying the true life emergency and matching the right resource to meet patient's needs is a difficult task. Interventions performed by advanced life support (ALS) paramedics occur in approximately 5% to 20% of emergency calls that use lights and siren responses (Berringer, 1999). Further, there is little research in the literature that supports the benefit of ALS paramedic intervention on overall patient outcome except in cardiac arrest. The same is true for the role of First Responders.

The purpose of this study was to provide stakeholders with objective patient care data and to use this data in a survey process to identify changes to the ambulance service resource allocation plan.

The Patient Acuity Scoring System (PASS) uses objective vital sign data to quantify the patient's condition against each MPDS code. PASS provides actual physiological parameters by which to compare the actual seriousness of the patient condition against an MPDS code assigned by a dispatcher based on the telephone call evaluation.

Over Triaging

The literature review showed that dispatch systems overuse available resources. This study supports this. Fifty-four percent of the responses in the study group were lights and siren but only 6.32% required a "code 3" (lights and siren) transport to hospital. The PASS showed that 84% of patients in this study had normal vital signs on arrival of the paramedics and throughout transportation to hospital. Seven percent had indicators of cardiac problems and 1.06% were in cardiac arrest or extremis. Seventy-one percent of patients in the Delta determinant category (most life threatening) turned out to have normal vital signs.

Although it is prudent to over respond in order to catch as many real emergencies as possible, the size of this over-triaging safety net is still undetermined. The Medical Priority Dispatch System has provided a means to prospectively categorizing the requests for pre-hospital emergencies while the PASS provides retrospective data on the actual patient's condition. The data from the PASS reviewed in this project indicates there is a large disparity between the system's classification of an emergency response and the actual presence of a life-threatening condition.

Stakeholder Response

The goal of this project was to provide information to stakeholders in the ambulance service to better match the need of the patient to the appropriate resource.

Despite the presentation of objective acuity data to the Delphi stakeholders suggesting that the patient's physiological parameters were often mismatched against

the urgency reflected in the resources allocated, the stakeholders still recommended a net gain in the resources sent rather than the expected reduction in resources that the data indicated should occur.

The stakeholder responses appeared to group by factors other than the acuity comparison. In one group, it appeared as though the quantitative data was not considered. Suggestions for change from other groups appeared to take into account the acuity data. With the exception of several individual opinions, as a group, they did not seem to favour a particular position.

In summary the key findings of this study are:

1. Seventy-one percent of patients in the Delta determinant category (most life threatening) turned out to have normal vital signs.
2. There is a large disparity between the system's classification of an emergency response and the actual presence of a life-threatening condition.
3. Despite the presentation of objective acuity data to the Delphi stakeholders suggesting that the patient's physiological parameters were often mismatched against the urgency reflected in the resources allocated, the stakeholders still recommended a net gain in the resources sent rather than the expected reduction in resources that the data indicated should occur.

Study Conclusions

As a qualitative project, an important aspect of this study is the inductive process that should allow theories and principles to emerge. Palys recognized the benefit in conducting observations and then developing an analysis that adequately accounts for the observational data collected (1997). This was the methodology applied in this study.

The qualitative theories, principles and conclusions from this study have, through the Delphi surveys, identified the need to strive for more objective analysis when deciding on resource allocation.

Further discussion is needed among stakeholders about the relevance and importance of the PASS in the context of clinical and pre-hospital terms. For example, when making decisions on resource allocation, should an MPDS code with 90% of the patient population having normal vital signs be considered a safe parameter to downgrade responses?

Further study and validation of the PASS as a tool for resource allocation determination is required.

Organizations are formed because of a community need, and that need can be better served through the formation of that organization. However, the need that initiated the formation of the organization quickly becomes secondary to the survival of the organization. Emergency services are no exception. It appears that some stakeholders made resource allocation decisions based on variables other than patient acuity data.

To bring the organization back to its primary, original purpose, stakeholders need to focus on objective data in order to rationalize their involvement in pre-hospital care. This is not meant to diminish the dedication these organizations have toward public safety. It simply implies that there is a belief that public safety is dependent on the organizations' full involvement in pre-hospital care.

Emotional decision-making leads to over-response of the system. Seven of the twelve call types that were upgraded had over 90% of the patients with normal vital signs. The decision to upgrade these calls may have been based on other factor factors than the patient's condition such as the description of the call type and what that meant to the study participant.

There is a misconception that every call for an ambulance has a high probability of being a life or death situation. An example of this mind-set is demonstrated by one respondent's comment in the third Delphi round:

> My basic principle on this is that whenever a tax payer calls for help, we owe them an immediate response no matter what the problem is. The definition of the problem, which is what MPDS is all about, is less important to me than getting there quickly to help. The definition of the problem as to whether or not it is worthy of a code 3 response has already been made by the person who called, i.e. they would not have called if it wasn't an emergency. I have a big problem with another agency, ambulance or police, controlling whether or not we can respond to a call for help from the people who pay us.

This comment suggests the view of emergency responders and public perhaps, but at what expense? Administrators in Salt Lake City found that although there was an increase in call volume of emergency calls, the increase was not in the Delta or Charlie level calls but in the Alpha and Bravo level calls (Brian Dale, Captain Salt Lake City Fire Department, unpublished data, Navigator Conference presentation, 1998). This suggests a trend toward the public using the ambulance service as a gateway into an already overcrowded health care system.

Appropriate level of resource is what is required, not always faster, higher trained personnel. Administrators of EMS services have a duty to:

- Triage efficiently
- Respond appropriately
- Meet public perception / expectation

The PASS provides "real world data" and forms a picture for EMS directors and stakeholders to view in order to put the resource need into perspective. Future trends

toward increased use of ambulance services need to be considered and plans developed using this type of objective data. Responding with the emergency services cavalry to every 9-1-1 call may prove unsustainable as demand increases.

Study Recommendations

The researcher anticipated that, given the patient data presented to the participants, the results should have included a significant reduction in the level of resources sent on calls with low acuity (> 90% of patients with normal vital signs). However, the opposite occurred with a 1.06% overall increase in resources. It is worth noting that the key findings reject a hypothesis that given objective acuity data stakeholders would reduce the resources sent to certain MPDS codes. With this in mind the following recommendations seem appropriate:

1. Publish this report in selected trade magazines, journals and agency newsletters.

This project will also be submitted to the executive director of the BCAS for information.

2. Educate stakeholders on the benefits of data collection and analysis as a management tool.

The literature review identified several sources that reported over triage in priority dispatch systems (Calle et al, 1995, Palumbo, and 1996, Slovis, 1985). The PASS data also demonstrated an over triage of patients and the associated resource allocation was over resourced. The project goal of making resources allocation decisions based on data was not realized. Instead, participants reverted back to their method of entertaining "what if" scenarios and basing resource decisions on emotional rather than objective information.

Therefore, there needs to be an educational process to keep stakeholders emphasizing the objective data in their decisions rather than non-objective (emotional, jurisdictional, instinctive, cultural, historical).

3. Conduct further resource allocation reviews.

Continued reviews of the resource allocation will be required using the data collection tools described in phase one of this study. This is not a single event but rather a continual cycle of "look, think and act". Because the skills and protocols evolve in the BCAS, so too should the resources required for each type of patient.

4. Continue research of the Patient Acuity Scoring System to improve the validation of the system by comparing the acuity scores to patient outcome.

The PASS has not yet been compared to patient outcome in the hospital. Further study into the correlation between the PASS scores and outcome is needed to further validate the PASS system. Concurrently, discussion between stakeholders lead by physicians is needed to identify acceptable limits of PASS scores and the need for higher levels of response.

5. Review the Medical Priority Dispatch System™ question structure to try and more accurately match the response determinants with the patient's condition.

Results of this project will be shared with the producers of the Medical Priority Dispatch System to help with future revisions of their product. The PASS is a useful tool in comparing the actual acuity level of patients to the perceived acuity level. Questions may be altered to further refine the accuracy of the assignment of response determinants to match the patient's condition.

CHAPTER 5: RESEARCH IMPLICATIONS

Organizational Implementation

As an organization, the BCAS may wish to now consider changing the way it views resource allocation. A committee should review the data contained in this project and describe strategies accomplish the study's recommendations.

Issues to be considered by this committee include the cut-off point to send ambulances using lights and siren. For example, if the PASS acuity level zero is 90% or greater and less than 5% of the patients are transported to hospital with lights and siren, the resource should be basic life support responding without lights and siren. In essence the decisions on resource allocation will be based on evidence rather than emotion, intuition, or jurisdictional protectionism.

Future Research

This research project has identified the level of acuity for each of the MPDS codes using pre-hospital information. It has also been demonstrated that stakeholders revert back to other considerations to make resource allocation decisions. Future research is required to further validate the PASS by linking the scoring system with patient outcome data. Other jurisdictions should be encouraged to do their own acuity research so comparisons can be made.

CHAPTER 6: LESSONS LEARNED

Major Project Lessons Learned

The question stated at the beginning of the project remains, in part, unanswered. The Medical Priority Dispatch System is fairly accurate in predicting the patient's condition but the resources applied could be revised to improve its accuracy by reducing the over triage of calls. Although the patient's condition can be quantified, the question still remains about the context of this information.

Some stakeholders do not rely on the data as the primary drive for their decisions. To correct this they require further education and conditioning. That is, even though stakeholders will ultimately learn to apply the data, they must also come to terms with the paradox between what is best for the patient and what is best for their organization's survival.

As with most research projects, more questions arise from a study then questions answered. There must be continued research into developing the context in which the Patient Acuity Scoring System (PASS) can be understood. For example, is having 90% of patients in a particular MPDS code with normal vital signs a safe cut-off point when deciding when to use lights and siren responses? Is 95% a safe cut-off? The answer to this question may come with more patient outcome studies. Further study looking at hospital diagnosis and disposition is needed in order to confirm the validity and reliability of the PASS.

PASS is a valuable tool to help agencies develop response strategies in terms of qualification level of paramedics, the mode of response (use of lights and siren) and the need for a first responder. Its value includes:

- A concise summary of the patient population related to patient acuity.
- A method to analyze response data according to a set of parameters.
- A method to establish criteria for setting community service levels.
- A way to check the effectiveness of the call evaluation system in dispatch.
- Providing a reference when discussing patient need and resource allocation.

This study showed that stakeholders make decisions about resource allocation despite the presence of data, which may indicate a different resource requirement. Although administrators of EMS systems need to be objective in their resource allocation decisions, it is not totally appropriate to ignore the cultural, jurisdictional and historical influences in a community. However, to attain system efficiency and the optimal care of patients, the acuity data parameters must be the primary criteria.

Although this project did not attain one of its objectives, revising the RAP, it will serve as a model for future revision attempts once the above recommendations are implemented.

Program Lessons Learned

The following competencies were demonstrated in the major project:

1b. and 1c. Demonstrate leadership characteristics and provide leadership

Characteristics of leadership and providing leadership are linked in that the characteristics of leadership are demonstrated when leadership is provided. The high level of input from various stakeholders to produce the reports, research various elements and enrol people in participating in the Delphi Surveys required motivating people and portraying a keen interest in the project and its potential benefit to the organization.

People were treated with respect and their ideas were listened to and incorporated into the study when appropriate.

The organization was presented with a new innovative method of looking at its data. This major project was a vehicle to lead decision-makers in the direction of evidence-based thought. The acuity data is now a valuable method in reviewing resource allocation within the BCAS. Other ambulance organizations in North America are now requesting the BCAS data in order to reconcile their resources.

2b. Apply systems theories to the solution of leadership and learning problems

Relationships between groups and processes are important to understand when attempting to improve and change organizations. This project provided an opportunity to look beyond the surface of events and look for system causes of root problems.

3b. Provide consulting services to help organizations succeed

This project was an action research project that required the approval of the organization's leaders. The problem was identified, potential solutions were discussed and methodologies were introduced to fit into a specific timeline.

My roll during the major project can be described as an internal consultant to the BCAS. The organization needed a process to quantify patient condition in a way to help adjust resources.

My project is considered value added to the organization in its methodology and information. As a change agent, consultants help organizations succeed through change. My project is a small move toward improving services.

3c. Create and lead teams

The major project required a collection of people who were tasked with jobs at different stages of development. People in the BCAS were asked to perform tasks such as call evaluation, data cleanup, phone calls, and focus groups. Involving those close to the issue and motivating them to complete their task involved the ability to create and motivate teams.

4e. Help others learn

The organization as a whole now has a new way of looking at their service. This is a direct learning opportunity for the organization.

In hiring a Co-op student, learning was offered in data entry, databases and interaction with the culture of the ambulance service and the Ministry of Health. Involving the focus groups is the first step in educating them to look at objective data about patient care and to learn to discard old mindsets that result in too many emergency responses. This learning will be a slower process than other learning opportunities offered by this project. However it will be the most life-impacting as we change our way of doing business in an environment of increased demand for services that outstrip our old fashion ways of looking at delivering those services.

4f. Manage own learning to achieve maximum added value

My own learning has profited in the same way as the others who were involved in the project. I learned about aspects of leading a team, helping an organization change and about methodologies required for the completion of this project. I learned to recognize my own mindset so I can change with the organization.

5b. Utilize research methods to solve problems

This project demonstrates the use of quantitative and qualitative methods of research. The Acuity scoring system uses objective patient data in an attempt to quantify and describe the patient's seriousness in condition.

The qualitative methodology used a form of inquiry called the Delphi process. Survey groups representing the stakeholders in the delivery of emergency services were recruited as experts and to provide their opinions on the appropriate resource allocation.

The epistemology incorporated the objective data, which was not previously available, and the qualitative survey method to try and develop an educated resource allocation plan.

5a. Identify, locate, and evaluate research findings

The literature review in the major project demonstrated the degree upon which research finding were cited and synthesized with the premise of the project. Evaluation of each reference was included as was the importance of the findings to the project subject matter. The World Wide Web, on line library search engines and library resources were used to identify relevant research material.

In closing, the information presented in this project will serve as a foundation for future initiatives into developing an efficient and efficacious ambulance delivery system. The learning I have experienced has opened doors to new ways of looking at research and methodologies. It has also stimulated some thought in other ambulance jurisdictions. It is my belief that the British Columbia Ambulance Service must continue to look at itself critically and in a meaningful way so that it always remains true to its mission and values.

"One who holds a true belief without intelligence is like a blind man who happens to take the right road."

Plato, The Replublic

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APPENDIX A

HEALTH EMERGENCY ACT
[RSBC 1996] CHAPTER 182

Contents

Section

Definitions

1 In this Act:

"ambulance" means a conveyance that is used, or intended to be used, for the purpose of transporting persons requiring medical attention or under medical care, and that is designed and constructed, or equipped, for that purpose;

"board" means the Emergency Medical Assistants Licensing Board continued under section 6;

"commission" means the Emergency Health Services Commission;

"emergency health service" means the provision of first aid or medical services in emergency situations;

"emergency medical assistant" means a person licensed by the board under this Act as an emergency medical assistant;

"minister" includes a person designated in writing by the minister;

"municipality" includes a village municipality;

"profession" means practice as an emergency medical assistant.

Commission

2 (1) The Emergency Health Services Commission is continued.

(2) The commission is to be composed of one or more members appointed by the Lieutenant Governor in Council.

(3) The Lieutenant Governor in Council may

(a) establish the terms and conditions of the members' appointments under subsection (2), and

(b) designate a member of the commission as chair.

(4) A member of the commission is entitled to necessary and reasonable travelling and living expenses incurred while exercising powers or performing duties on behalf of the commission.

(5) The minister may appoint a person who, if a member or the chair of the commission is unable for any reason to act, is to act temporarily in the place of and exercise the powers and perform the duties of the member or chair.

Agent of the government

3 (1) The commission is, for all purposes, an agent of the government.

(2) The commission may, as agent,

(a) carry out its powers and duties under this Act in its own name,

(b) purchase or otherwise acquire and hold in its own name personal, and, with the prior approval of the Lieutenant Governor in Council, real property required for the purpose of the commission, and

(c) sell, transfer, lease or otherwise dispose of, the property.

(3) The commission, as agent, is a legal entity.

Staff

4 (1) An executive officer of the commission must be appointed by the Lieutenant Governor in Council and must be paid remuneration for his or her services on behalf of the commission as determined by the Lieutenant Governor in Council.

(2) Subject to the prior approval of the minister, the commission or, if authorized by the commission, the executive officer may, despite the *Public Service Act*, appoint officers and employees and engage and retain specialists and consultants considered necessary to carry out the duties and functions of the commission and

may determine their remuneration.

(3) The *Public Service Act* and the *Public Service Labour Relations Act* do not apply to the commission or its officers and employees appointed under subsection (2).

(4) Despite subsection (3), the Lieutenant Governor in Council may, by order, direct that some or all of the provisions of the *Pension (Public Service) Act* apply to the executive officer and some or all of the officers and employees of the commission, and the provisions of that Act apply accordingly.

Power and authority of commission

5 (1) The commission has the power and authority to do one or more of the following:

(a) provide emergency health services in British Columbia;

(b) establish, equip and operate emergency health centres and stations in areas of British Columbia that the commission considers advisable;

(c) assist hospitals, other health institutions and agencies, municipalities and other organizations and persons, to provide emergency health services and to train personnel to provide services, and to enter into agreements or arrangements for that purpose;

(d) establish or improve communication systems for emergency health services in British Columbia;

(e) make available the services of medically trained persons on a continuous, continual or temporary basis to those residents of British Columbia who are not, in the opinion of the commission, adequately served with existing health services;

(f) recruit and train emergency medical assistants;

(g) provide ambulance services in British Columbia to be known as the British Columbia Ambulance Service;

(h) perform any other function related to emergency health services as the Lieutenant Governor in Council may order.

(2) Except with the written consent of the commission and on terms it may specify, a person must not do anything that the commission is given the power to do under subsection (1).

(3) Subsection (2) does not apply if a person is acting in connection with the provision of industrial first aid in accordance with the requirements of the *Workers Compensation Act* or regulations made under that Act.

Emergency Medical Assistants Licensing Board

6 (1) The Emergency Medical Assistants Licensing Board is continued.

(2) The board is composed of 3 members, one of whom must be an emergency medical assistant selected in the prescribed manner and another of whom must be a medical practitioner, appointed by the Lieutenant Governor in Council.

(3) The Lieutenant Governor in Council may

(a) establish the remuneration and other terms and conditions of appointments under subsection (2), and

(b) designate a member of the board as its chair.

(4) A member of the board is entitled to necessary and reasonable travelling and living expenses incurred while exercising powers or performing duties on behalf of the board.

(5) Subject to this Act and the regulations, the board has the power and authority to do the following:

(a) examine, register and license emergency medical assistants;

(b) set terms and conditions for a licence under this section;

(c) investigate complaints;

(d) delegate to one or more persons the power and authority to act under one or more of the provisions of paragraphs (a), (b) and (c).

Disciplinary action

7 (1) On receipt of a complaint or on its own motion and after a hearing, the board may determine that an emergency medical assistant or former emergency medical assistant

(a) has incompetently carried out the duties of an emergency medical assistant,

(b) has breached a term or condition of his or her licence, or

(c) suffers from a physical ailment, emotional disturbance or an addiction to alcohol or drugs that materially impairs his or her ability to act as an emergency medical assistant.

(2) For the purposes of a hearing under this section, the board has the protection, privileges and powers of a commissioner under sections 12, 15 and 16 of the *Inquiry Act*.

(3) If the board has made one or more determinations under subsection (1), it may do one or more of the following:

(a) impose conditions on the person's licence;

(b) suspend the licence for a term the board considers appropriate;

(c) revoke the licence;

(d) bar the person from being licensed under this Act for a period the board considers appropriate.

Extraordinary action to protect public

8 (1) If the board considers the action necessary to protect the public during the investigation of an emergency medical assistant or until a hearing of the board, it may

(a) set limits or conditions on the practice of the profession by the emergency medical assistant, or

(b) suspend the licence of the emergency medical assistant.

(2) If the board acts under subsection (1), it must notify the emergency medical assistant in writing of

(a) its decision,

(b) the reasons for the decision, and

(c) the emergency medical assistant's right to appeal the decision to the Supreme Court.

(3) A decision under subsection (1) is not effective until the earlier of

(a) the time the emergency medical assistant receives the notice under subsection (2), and

(b) 3 days after the notice is mailed to the emergency medical assistant at the last address for the emergency medical assistant recorded in the register.

(4) If the board determines that action taken under subsection (1) is no longer necessary to protect the public, it must cancel the limits, conditions or suspension and must notify the emergency medical assistant in writing of this as soon as possible.

(5) An emergency medical assistant against whom action has been taken under subsection (1) may appeal the decision to the Supreme Court and, for these purposes, the provisions of section 9 respecting an appeal from a decision of the board apply to an appeal under this section.

Appeal

9 (1) A person who considers himself or herself aggrieved or adversely affected by a determination or disciplinary action of the board under section 7 may appeal to the Supreme Court at any time within 30 days after the date of the determination or disciplinary action.

(2) The appellant must file a notice of appeal with the Registrar of the Supreme Court and must serve a copy of the notice of appeal on a member of the board within the time limited under subsection (1).

(3) The board, on the request of the appellant, must provide to the appellant certified copies of all records on which the board acted, on payment for copies at the same rate as would be charged for the same service by an official stenographer of the Supreme Court.

(4) The appeal is to be

(a) a new hearing if there is no transcript, or

(b) a review of the transcript and proceedings if there is a transcript, but the court may, if it considers it necessary in the interests of justice, conduct a new hearing or allow the introduction of new evidence.

(5) The board is entitled to be a party on the hearing of the appeal and may take part in the proceedings.

(6) On the hearing of an appeal under this section, the Supreme Court may

(a) make an order confirming, reversing or varying the decision of the board,

(b) refer the matter back to the board with or without directions, or

(c) make any other order that it considers proper in the circumstances.

Immunity for acts or omissions in good faith

10 (1) No action for damages lies or may be brought against the commission, against a member of the commission or of the board or against a person appointed under section 4 because of anything done or omitted in good faith

(a) in the performance or intended performance of any duty or function under this Act, or

(b) in the exercise or intended exercise of any power under this Act.

(2) Subsection (1) does not absolve the government from vicarious liability for an act or omission for which it would be vicariously liable if this section were not in force.

Practise of medicine by emergency medical assistant

11 Nothing in this Act authorizes a person to practise medicine without being registered under the *Medical Practitioners Act*; but if the unavailability of a medical practitioner is likely to result in a person's death or deterioration of health, an available emergency medical assistant may perform emergency procedures that he or she has been trained for and considers necessary to preserve the person's life or health until the services of a medical practitioner are available.

Licence required

12 A person must not assume or use the title "emergency medical assistant" or otherwise represent himself or herself to be an emergency medical assistant unless the person is the holder of a valid and subsisting licence under this Act.

Annual reports

13 (1) The commission must submit an annual report to the minister about the operation of the commission.

(2) The board must submit an annual report about the operations of the board, including information that the Lieutenant Governor in Council may prescribe, to the minister not later than 120 days after the end of the fiscal year for the board.

Power to make regulations

14 (1) The Lieutenant Governor in Council may make regulations referred to in section 41 of the

Interpretation Act.

(2) Without limiting subsection (1), the Lieutenant Governor in Council may make regulations as follows:

(a) respecting the qualifications, examination, training, registration and licensing of emergency medical assistants;

(b) prescribing the manner of selection of an emergency medical assistant for the purposes of section 6 (2);

(c) prescribing fees payable for any service rendered, or a licence issued, under this Act, and providing for different fees for a service rendered to

(i) a person who is not a "beneficiary" or "qualified person" as defined in the *Hospital Insurance Act*, or

(ii) an employee who requires an emergency health service if the employer is, under an enactment, obliged to supply emergency health services;

(c) authorizing the waiving of fees for involuntary committals under the *Mental Health Act*;

(d) prescribing fees for the service of documents, on behalf of the commission, arising out of legal proceedings relating to the work of the commission;

(e) respecting the equipping of emergency health centres and stations;

(f) establishing standards of construction and maintenance required for an ambulance, and providing for different standards for different classes of ambulances;

(g) establishing the standard of equipment and supplies to be carried in an ambulance while it is being used or held out as being available for use as an ambulance.

(3) Regulations under subsection (1) and (2) may make different provisions for different classes of emergency medical assistants.

(4) The commission may, with the prior approval of the minister, make rules governing its own procedure as it considers advisable.

(5) The board under section 6 may, with the prior approval of the minister, make rules governing its own procedure.

[STATUTES HOME PAGE]

[Full Listing | A | B | C | D | E | F | G | H | I | J | L | M | N | O | P | Q | R | S | T | U | V | W | Y]

BRITISH COLUMBIA

QUEEN'S PRINTER
Ministry of Finance and Corporate Relations

1996 REVISED STATUTES OF BRITISH COLUMBIA

Amendment No. 2

(consolidated to October 1, 1998)

IMPORTANT INFORMATION

In order to preserve the original formatting of the Statutes as closely as possible, extensive use of Cascading Style Sheets have been used in their production.

The 1996 *Revised Statutes of British Columbia*, which came into force on April 21, 1997, is a consolidation of the public general Acts of British Columbia and other selected Acts. This consolidation **represents the law** contained in those consolidated Acts **as of December 31, 1996.** The consolidated Acts may have been amended or repealed after that date, and users are directed to the "Provisions in Force" link for assistance in finding recent changes in the law. Acts and amendments that existed but were not in force as of that date are contained in the printed Supplements of this consolidation.

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[STATUTES HOME PAGE]

BRITISH COLUMBIA

Ministry of Health and Ministry Responsible for Seniors

British Columbia Columbia Ambulance Service

MPDS RESOURCE ALLOCATION

HLA = Highest level available EMA
EMA other than ALS
MA* = Assumes IV endorsed – If EMAII not available use ALS in communities with ALS

#	PROBLEM	DETERMINANT			FR	QUAL	CODE
1	ABDOMINAL PAIN / PROBLEMS	A	1	Abdominal Pain		EMA	2
		C	1	Male > = 35 years		EMA	3
			2	Female > = 45 yrs		EMA	3
			3	Not Alert	Yes	HLA	3
			4	Female, Fainting (12-50 years)	Yes	EMA*	3
2	ALLERGIES / HIVES / STINGS	A	1	No SOB / Swallowing problem		EMA	2
		B	1	Unknown (3rd Party)		EMA	3
		C	1	Difficulty Breathing / Swallowing	Yes	HLA	3
		D	1	Severe Respiratory Distress	Yes	HLA	3
			2	Not Alert	Yes	HLA	3
			3	Condition worsening	Yes	HLA	3
3	ANIMAL BITES	A	1	Superficial or Minor Bites		EMA	2
			2	Spider or Insect Bites		EMA	2
		B	1	Peripheral with Serious Haemorrhage		EMA	3
			2	Unknown (3rd party)		EMA	3
		D	1	Severe Central Bite	Yes	HLA	3
			2	Large Carnivore	Yes	HLA	3
			3	Zoo Animal	Yes	EMA	3
			4	Exotic Animal	Yes	EMA	3
			5	Any Snake (Poisonous Animal)	Yes	EMA	3
			6	Attacks / Multiple Animals	Yes	EMA	3
4	ASSAULT / RAPE	A	1	Not dangerous injuries		EMA	2
			2	Not recent injuries (> 6 hrs)		EMA	2
		B	1	Possibly dangerous		EMA	3
			2	Serious Haemorrhage		EMA	3
			3	Unknown injuries (police not present)		EMA	3
		D	1	Multiple victims	Yes	EMA	3
			2	Dangerous injuries	Yes	HLA	3
			3	Not Alert	Yes	HLA	3
			4	Abnormal breathing	Yes	HLA	3
5	BACK PAIN (NON TRAUMA)	A	1	Non Traumatic Back Pain		EMA	2
			2	Non Recent " " (> 6 hours)		EMA	2
		C	1	Fainting (> = 50 years)	Yes	HLA	3
		D	1	Not Alert	Yes	HLA	3
6	BREATHING PROBLEM	C	1	Difficulty Breathing	Yes	HLA	3
			2	Asthma	Yes	EMA*	3
			3	Cardiac History	Yes	HLA	3
		D	1	Severe Respiratory Distress	Yes	HLA	3
			2	Not Alert	Yes	HLA	3
			3	Sweaty or Colour Change	Yes	HLA	3
7	BURNS / EXPLOSION	A	1	Small (< 18%)		EMA	2
			2	Sunburn or Minor (< = Hand Size)		EMA	2
		B	1	Unknown (3rd party)	Yes	EMA	3
		C	1	Difficulty Breathing	Yes	HLA	3
			2	Large Burns (> 18%)	Yes	HLA	3
		D	1	Multiple Victims / HLA & EMA	Yes	HLA	3
			2	Severe Respiratory Distress	Yes	HLA	3
			3	Not Alert	Yes	HLA	3
			4	Explosion	Yes	HLA	3
8	CARBON MONOXIDE	B	1	Alert, Not SOB		EMA	3
	Inhalation / HAZMAT	C	1	Alert, Abnormal Breathing	Yes	HLA	3
		D	1	Multiple Victims / HLA & EMA	Yes	HLA	3

	PROBLEM			DETERMINANT	FR	QUAL	CODE
8	CARBON MONOXIDE CONTD.		2	Not Alert	Yes	HLA	3
	Inhalation / HAZMAT		3	HAZMAT	Yes	HLA	3
			4	Unknown	Yes	HLA	3
9	CARDIAC / RESPIRATORY	B	1	Obvious Death		EMA	3
		D	1	Suspect Cardiac Arrest	Yes	HLA	3
			2	Suspected Respiratory Arrest	Yes	HLA	3
10	CHEST PAIN	A	1	Normal Breathing (age < 35)		EMA	2
		C	1	Normal Breathing (age >= 35)	Yes	HLA	3
			2	Abnormal Breathing	Yes	HLA	3
			3	Cocaine	Yes	HLA	3
			4	Cardiac History	Yes	HLA	3
		D	1	Severe Respiratory Distress	Yes	HLA	3
			2	Not Alert	Yes	HLA	3
			3	Sweaty or Changing Colour	Yes	HLA	3
11	CHOKING	A	1	Not Choking Now (can talk/cry alert &		EMA	2
		D	1	Choking	Yes	HLA	3
			2	Abnormal Breathing	Yes	HLA	3
			3	Not Alert	Yes	HLA	3
12	CONVULSION / SEIZURE	A	1	Breathing Now		EMA	2
		B	1	Age < 35 (breathing not verified)	Yes	EMA	3
		C	1	Pregnant	Yes	HLA	3
			2	Trauma	Yes	HLA	3
			3	Diabetic	Yes	EMA*	3
			4	Cardiac History	Yes	HLA	3
		D	1	Continuous or Multiple	Yes	HLA	3
			2	Age >= 35 (breathing not verified)	Yes	HLA	3
			3	Not Breathing	Yes	HLA	3
13	DIABETIC	A	1	Conscious and Alert		EMA	2
		C	1	Conscious, but not Alert	Yes	EMA	3
			2	Conscious, Abnormal Breathing	Yes	HLA	3
		D	1	Unconscious	Yes	EMA*	3
14	DROWNING / DIVING ACCIDENT	A	1	Alert / Breathing Normally (out water)		EMA	2
		B	1	Alert/Breathing Normally (Injuries and/or in	Yes	EMA	3
			2	Unknown	Yes	EMA	3
		C	1	Alert / Abnormal Breathing	Yes	HLA	3
		D	1	Unconscious	Yes	HLA	3
			2	Not Breathing or Underwater	Yes	HLA	3
			3	Not Alert or Abnormal Breathing	Yes	HLA	3
			4	Suspected Neck Injury	Yes	EMA	3
			5	Diving or SCUBA Accident	Yes	HLA	3
15	ELECTROCUTION	C	1	Alert, Breathing Normally	Yes	HLA	3
		D	1	Unconscious	Yes	HLA	3
			2	Not Disconnected from Power	Yes	HLA	3
			3	Power Not Off, Hazard Present	Yes	HLA	3
			4	Not Alert	Yes	HLA	3
			5	Abnormal Breathing	Yes	HLA	3
			6	Long Fall (>2 m)	Yes	HLA	3
			7	Unknown	Yes	HLA	3
16	EYE PROBLEM / INJURIES	A	1	Moderate Injuries		EMA	2
			2	Minor Injuries/problems		EMA	2
		B	1	Severe Injuries		EMA	3
		D	1	Not Alert	Yes	HLA	3
17	FALLS/BACK INJURIES	A	1	Not Dangerous Injuries		EMA	2
	(Traumatic)		2	Non-Recent (> 6 hours)		EMA	2
		B	1	Possibly Dangerous		EMA	3
			2	Serious Haemorrhage	Yes	EMA*	3
			3	Unknown	Yes	EMA	3

#	PROBLEM			DETERMINANT	ER	QUAL	CODE
17	FALLS/BACK INJURIES CONTD.	D	1	Dangerous Injuries	Yes	EMA*	3
			2	Long Fall (> 2 m)	Yes	EMA	3
			3	Not Alert	Yes	HLA	3
			4	Abnormal Breathing	Yes	HLA	3
18	HEADACHE	A	1	Normal Breathing		EMA	2
		B	1	Unknown Symptoms (3rd party situation)		EMA	3
		C	1	Not Alert	Yes	HLA	3
			2	Numbness or Paralysis		EMA	2
			3	Speech or movement problems		EMA	2
			4	Sudden onset of Severe Pain		EMA	3
			5	Abnormal Breathing	Yes	HLA	3
19	HEART PROBLEMS	A	1	Heart Rate, <130, No Symptoms		EMA	2
		B	1	Unknown Symptoms (3rd party)	Yes	EMA	3
		C	1	Not Alert	Yes	HLA	3
			2	Cardiac History	Yes	HLA	3
			3	Rate >= 130 No Symptoms		HLA	3
			4	Cocaine		HLA	3
		D	1	Firing of Implanted Defibrillator	Yes	HLA	3
20	HEAT / 2 EXPOSURE	A	1	Alert (No Priority Symptoms)		EMA	2
		B	1	Change in Skin Colour		EMA	2
			2	Unknown		EMA	3
		C	1	Cardiac History	Yes	HLA	3
		D	1	Not Alert	Yes	HLA	3
21	HAEMORRHAGE	A	1	Not Dangerous Haemorrhage		EMA	2
		B	1	Possibly Dangerous Haemorrhage		EMA	3
		D	1	Dangerous Haemorrhage	Yes	EMA*	3
			2	Not Alert	Yes	HLA	3
			3	Severe Respiratory Distress	Yes	HLA	3
22	INDUSTRIAL/MACHINERY	B	1	Unknown, Not Caught in Machine		EMA	3
		D	1	Multiple Victims / HLA & EMA	Yes	HLA	3
			2	Trapped or Caught in Machinery	Yes	HLA	3
			3	Life Status Questionable	Yes	HLA	3
23	OVERDOSE / INGESTION	B	1	Conscious and Alert	DPIC	EMA	2
	Poisoning	C	1	Not Alert	Yes	HLA	3
			2	Abnormal Breathing	Yes	HLA	3
			3	Antidepressants or Cardiac Meds	Yes	HLA	3
			4	Cocaine		HLA	3
			5	Acid or Alkali		HLA	3
			6	Violent		EMA	3
		D	1	Unconscious	Yes	HLA	3
			2	Severe Respiratory Distress	Yes	HLA	3
24	PREGNANCY / CHILDBIRTH /	A	1	1st Trimester Bleed/Miscarriage		EMA	2
	Miscarriage		2	Illness during Pregnancy (No Priority Symptoms)		EMA	2
		B	1	Labour 2nd or 3rd Trimester (Delivery not Imminent)		EMA	2
			2	Unknown Pregnancy Problem		EMA	3
		C	1	2nd Trimester Bleed/Miscarriage		EMA*	3
		D	1	Baby Born (HLA if problem w/baby)		EMA	3
			2	Crowning		HLA	3
			3	Imminent Delivery (3rd Trimester)		HLA	3
			4	3rd Trimester Bleeding	Yes	HLA	3
			5	Breech Presentation	Yes	HLA	3
25	PSYCHIATRIC / SUICIDE	A	1	Non Violent, Not Suicidal, Alert		EMA	2
		B	1	Unknown		EMA	3
		C	1	Not Alert	Yes	HLA	3
			2	Violent		EMA	2
			3	Suicidal (Threatening)		EMA	3
		D	1	Hanging, Strangulation, Suffocation	Yes	HLA	3

#	PROBLEM			DETERMINANT	FR	QUAL	CODE
26	SICK PERSON	A	1	No Priority Symptoms		EMA	2
			2-28	Non Priority Symptoms		EMA	2
		B	1	Unknown Symptoms		EMA	3
		C	1	Not Alert	Yes	HLA	3
			2	Cardiac History (not 2-28)	Yes	HLA	3
27	STAB / GUNS3 WOUNDS	A	1	Not Recent, Single, Peripheral (>6 h)		EMA	2
		B	1	Single, Peripheral	Yes	EMA	3
			2	Not Recent (> 6 hrs) Central	Yes	EMA	3
			3	Unknown	Yes	EMA	3
		D	1	Central Wound	Yes	HLA	3
			2	Multiple Victims / HLA & EMA	Yes	HLA	3
			3	Not Alert	Yes	HLA	3
			4	Multiple Wounds	Yes	HLA	3
28	STROKE / CVA	A	1	Normal Breathing (age < 35)		EMA	2
		B	1	Unknown symptoms (3rd party situations)		EMA	3
		C	1	Not Alert	Yes	HLA	3
			2	Abnormal Breathing	Yes	HLA	3
			3	Speech or movement problems		EMA	2
			4	Numbness or tingling		EMA	2
			5	Stroke History		EMA	2
			6	Normal Breathing (age > 35		EMA	2
29	TRAFFIC ACCIDENT	A	1	1st Party, Not Dangerous Injuries		EMA	2
		B	1	Injuries	Yes	EMA	3
			2	Unknown	Yes	EMA	3
		D	1	Multiple Victims /HLA & EMA	Yes	HLA	3
			2	Auto-Ped / Motorcycle / Bicycle	Yes	HLA	3
			3	HAZMAT	Yes	HLA	3
			4	Trapped	Yes	HLA	3
			5	Ejected	Yes	HLA	3
			6	Not Alert	Yes	HLA	3
			7	Severe Respiratory Distress	Yes	HLA	3
30	TRAUMATIC INJURIES SPECIFIC	A	1	Not Dangerous		EMA	2
			2	Not Recent (> 6 hrs)		EMA	2
		B	1	Possibly Dangerous		EMA	3
			2	Serious Haemorrhage	Yes	EMA*	3
		D	1	Dangerous Injuries	Yes	HLA	3
			2	Severe Respiratory Distress	Yes	HLA	3
			3	Not Alert	Yes	HLA	3
31	UNCONSCIOUS / FAINTING	A	1	Single Faint, Alert (< 35 yrs)		EMA	2
	(Non-Traumatic)		2	Near Faint, Alert (< 35 yrs)		EMA	2
		C	1	Single or Near Faint (> 35 yrs)	Yes	EMA	3
			2	Multiple Fainting Episodes	Yes	EMA*	3
			3	Female 12 - 50 yrs, Abdominal Pain	Yes	EMA*	3
			4	Conscious, Abnormal Breathing	Yes	HLA	3
			5	Cardiac History	Yes	HLA	3
		D	1	Unconscious	Yes	HLA	3
			2	Severe Respiratory Distress	Yes	HLA	3
			3	Not Alert	Yes	HLA	3
32	UNKNOWN PROBLEM	B	1	Standing, Sitting Up Moving, Talking		EMA	2
			2	Medical Alert Notification (Pending)	Yes	EMA	3
			3	Unknown	Yes	EMA	3
		D	1	Life Status Questionable	Yes	HLA	3

KEY TERMS; ALS = Advanced Life Support
EMA = Emergency Medical Assistant
FR = First Responders

Qual = Qualification (ALS, EMA)
Code = Mode of Response
2 = Routine (no lights and siren)
3 = Lights and siren

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DATE EFFECTIVE	REVISION NO.
July 15, 1996	

Ministry of Health and
Ministry Responsible for Seniors

British Columbia Ambulance Service

FIELD OPERATIONS POLICY & PROCEDURE MANUAL

SUBJECT

EMERGENCY MEDICAL DISPATCH (EMD) AUTHORITY

POLICY:

Regional EMDs have the responsibility to:

- direct the use of ambulances and crews within their own regions;
- coordinate responses which may involve outside agencies, including:
  - police;
  - fire departments;
  - first aid personnel;
  - Search and Rescue;
  - Provincial Emergency Program, and;
  - other emergency agencies, and;
- coordinate with provincial EMDs.

Provincial EMDs have the responsibility to:

- approve the use of airevacs;
- designate types of aircraft to be used;
- assign either dedicated airevac crews or appropriately qualified crews;
- coordinate responses which may involve outside agencies, including:
  - police;
  - fire departments;
  - first aid personnel;
  - Canadian Coast Guard;
  - Canadian Military;
  - Search and Rescue;
  - Provincial Emergency Program, and;
  - other emergency agencies, and;
- coordinate with regional EMDs.

PURPOSE/RATIONALE:

Dispatchers have the responsibility to direct the use of ambulance crews. However, once the crew has arrived at the scene of the incident, the crew has the responsibility for treatment and transport to the appropriate facility.

PROCEDURE:

N/A

Ministry of Health and
Ministry Responsible for Seniors

British Columbia Ambulance Service

FIELD OPERATIONS POLICY & PROCEDURE MANUAL

SUBJECT

CALL ASSESSMENT AND ASSIGNING PRIORITY RESPONSE CODES

POLICY:

EMDs will carry out a thorough call assessment on every call, following the dispatch call assessment model.

After doing a call assessment, EMDs will assign a unique regional or provincial response number, as appropriate, and assign a response or a priority code.

PURPOSE/RATIONALE:

Accurate information is required in order to dispatch the appropriate resources to the scene within the quickest reasonable time frame.

Priority response codes indicate the urgency of the response.

DEFINITIONS:

Regional Priority Response Codes:

Code 3:
Emergency response, no avoidable delays acceptable.

Code 7:
(Dispatch use only.) Immediate response required; anticipated arrival time is less than 10 minutes; crews attend as a routine response. If response exceeds 10 minutes, call will be reassessed and upgraded to Code 3. However, the ten minute criteria may not apply in rural areas.

Code 2:
Routine response. In urban areas, if the ambulance is not 10-7 scene in 10 minutes, the EMD will, as soon as operationally possible, phone the call originator back and reassess the call. In rural areas, the EMD will tell the call originator the time the ambulance will arrive (ETA). If the ETA is delayed for longer than 10 minutes, the originating caller will be advised of the new ETA.

Continued:

Provincial Airevacuation Priority Response Codes:

Priority I (Red):
The patient's condition is life and/or limb threatening and requires immediate transport to a facility which can provide appropriate patient care. Requires immediate take-off when crew and aircraft are ready; no avoidable delays are acceptable.

Priority I (Green):
The patient's condition is serious but stable. A response can be delayed by 2-3 hours if, after the sending physician consults with the receiving physician and/or the transport advisor, the sending physician advises the PAACC of such a delay.

Priority II:
The patient's condition is such that the patient should be in the receiving hospital within 12 hours (with concurrence of the sending physician).

Priority III:
The patient's condition is not critical and does not require a higher level of care. May wait up to five (5) days.

PROCEDURE:

<u>All Calls</u>

1. Obtain as much pertinent information as possible from the caller by asking easy-to-understand questions. Basic facts required are:
   a) complete scene address and/or location and/or landmarks;
   b) telephone number and/or call-back number;
   c) patient(s)'s chief complaint;
   d) patient's condition, including:
      - breathing;
      - level of consciousness;
      - chief complaint;
      - bleeding, and;
      - age of the patient.
   e) nature of incident, and;
   f) additional information related to the call.
2. Assign priority response code.
3. Provide emergency medical telephone instructions, as necessary.

Ministry of Health and
Ministry Responsible for Seniors

British Columbia Ambulance Service

FIELD OPERATIONS POLICY & PROCEDURE MANUAL

SUBJECT

LAYERED RESPONSES

POLICY:

BCAS units dispatched to a call will be layered with another BCAS unit only when additional pre-hospital care resources are required and/or when one of the units involved in the call is an ALS car.

All calls where a first responder has been dispatched by a BCAS dispatcher will be layered with a BCAS crew.

PURPOSE/RATIONALE:

The Emergency Medical Dispatcher (EMD) has a responsibility to ensure that the most effective and efficient utilization of all pre-hospital care resources when responding to a request for pre-hospital care and transportation (i.e., maximize patient care while maintaining efficient deployment of resources).

DEFINITIONS:

Layering:

Layering is the dispatching of more than one pre-hospital care resource to the same patient/scene. Layering to the scene in this definition is distinct from situations where more than one BCAS unit respond to a multi-casualty incident.

Pre-Hospital Care Resource:

Emergency resources which respond to calls. These resources include BCAS crews, first responders, police and fire personnel.

Available Unit:

- first responder unit which is not already responding to another call;
- BCAS full-time unit that is not assigned to an out-of-hospital call;
- BCAS kilo car that has completed a call and is still in-service, and is not assigned to an out-of-hospital call.
- NOTE: for the purpose of layering, only kilo cars already on duty are to be considered available.

Closest Unit:

A unit which is expected to arrive at the scene most quickly. Does not necessarily mean units which are geographically closest to the scene. When considering using a kilo crew, the time it takes the crew to get on the road or in the air must be taken into account.

Continued:

PROCEDURE:

1. Response to a Code 3 Call

   a) All code 3 calls will be responded to with the closest pre-hospital care unit. If the closest unit is not a BCAS unit, then it must be layered with one.

   b) BCAS units will not be layered unless the call is in an ALS response area and one of the units involved is an ALS unit.

   c) If an ALS unit is the first unit responding to one of the following calls, they will be layered with additional resources (closest available BCAS unit or, if no BCAS unit is available, a first responder unit):
   - cardiac/respiratory arrest;
   - sudden collapse (unconscious or unresponsive);
   - compromised airway (choking or foreign body obstruction);
   - cardiac arrest (CHF, altered LOC, pain with SOB), or;
   - respiratory distress (history of COPD, asthma, trauma).

   d) In the calls listed in (c), above, if the first unit is not ALS then an ALS unit will be layered to the call, if available.

2. Response to a Code 2 Call

   a) Responses of a routine nature will normally be handled by the closest BCAS unit (i.e., layering is typically not required).

3. If a non-ALS crew has been dispatched to a call and they or the EMD determines that ALS treatment is required, then an ALS unit will be dispatched to the call, provided that the transport of the patient is not unreasonably delayed, and definitive patient care is not compromised.

4. If two BCAS units are present at a scene, the unit that will not be directly involved with the treatment and transport of the patient will clear the call as soon as possible and follow the direction of the EMD.

5. If the closest unit is an ALS crew, then that crew will normally be considered dedicated to the call and will treat and transport the patient.

   a) However, if ALS skills are not required for the call, the closest non-ALS unit may be considered to complete the call, provided that the delay in response is not unreasonable and patient care is not compromised.

   b) Each dispatch centre will develop specific procedural guidelines to deal with these situations.

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FIELD OPERATIONS POLICY & PROCEDURE MANUAL

SUBJECT

PROPER USE OF AMBULANCES

(See also Volume I, Chapter 8, re: appropriate use of BCAS vehicles.)

POLICY:

Ambulances will only be used as directed through or by the dispatch centre. Usage of ambulances for all reasons other than responding to calls is secondary to fulfilling our obligation to respond to calls.

Ambulances and other BCAS vehicles may not be used for:

- conducting private business, or;
- roving or cruising the area.

PURPOSE/RATIONALE:

Dispatchers have been delegated authority by the BCAS to deploy and control the movement of ambulances in order to maintain an efficient and effective service. Crews are subject to that authority and have a responsibility to comply with the intent of the policy.

PROCEDURE:

1. Dispatchers will only dispatch ambulances for the following reasons:
   a) to respond to calls;
   b) at the direction of a manager of the BCAS;
   c) at the request of a unit chief/charge dispatcher, or;
   d) for other BCAS business, including, for example:
      - transport of airevacuation crew members and pilots, equipment, tissue/organs, medication and/or antidotes;
      - community cross coverage;
      - BCAS administrative duties, such as delivery/pickup of BCAS mail and/or laundry;
      - vehicle maintenance;
      - movement of vehicles from one location to another.

2. Crews may, when going back to their stations, stop briefly (e.g. meal break) and must:
   a) have obtained prior approval from dispatch;
   b) make available a secure telephone number;
   c) remain in contact by radio, pager, or cellular telephone;
   d) not be taken off the most direct or fastest route back to their assigned station, and;
   e) not cause an increase in cost to BCAS.

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FIELD OPERATIONS POLICY & PROCEDURE MANUAL

SUBJECT

TURN OUT TIMES

POLICY:

Crews will not refuse or delay service on any ambulance call except in extraordinary circumstances, or they may be subject to immediate dismissal. (See Volume II, Chapters 3 and 5 re: safety and health reasons, and Volume II, Chapter 2, re: beyond licensed protocols.)

On-duty crew members will respond (i.e., be 10-8) within 90 seconds to calls received from dispatch.

Call-out crews will contact the dispatch centre within two minutes of being paged and follow the direction of dispatch.

PURPOSE/RATIONALE:

Dispatchers have been delegated authority by the BCAS to deploy and control the movement of ambulances in order to maintain an efficient and effective service. Crews are subject to that authority, and are required to respond immediately to all calls.

PROCEDURE:

1. While on duty, full-time crew members will ensure that they are available for calls by remaining at their station at all times, except when coordinated through or directed by dispatch to leave on BCAS business, in which case they must:
   a) make available a secure telephone number, and/or;
   b) remain in contact by radio or pager.
2. Crews will immediately acknowledge receipt of all calls.
3. Upon verification of the location of a call, the crew will proceed to the scene via the quickest and most direct route.

POLICY:

Under all circumstances, optimum patient care will remain the goal of all personnel, and a spirit of cooperation will be emphasized at the scene (e.g. during rescue and extrication situations).

PURPOSE/RATIONALE:

When all emergency responders attempt to maximize the efficiency of resources and work cooperatively, the health and safety of all persons involved at a scene benefits.

PROCEDURE:

1. A BCAS dispatcher will request first responders to respond to:
   a) emergency calls where a first responder unit can reasonably be expected to arrive at the scene sooner than an ambulance;
   b) any other calls where the first responder unit can be of special assistance (e.g. rescue and extrication of patient), and;
   c) calls as per any existing first responder agreements (e.g. GVRD).

   Note: See Volume II, Chapter 5, re: dispatch procedures for requesting assistance from other emergency agencies.

2. At the scene
   a) Primary responsibilities will be as follows:
      - police are responsible for safety and investigation;
      - fire fighters are responsible for fire suppression, rescue and safety, and;
      - BCAS personnel are responsible for patient care, treatment, and transportation.
   b) First responders will administer appropriate care to the patient until the BCAS paramedics assume responsibility for the patient. The change over will be at the discretion of the paramedics (e.g. during the period of one-minute Cardio Pulmonary Resuscitation (CPR)). Any further treatment required will be done by the paramedics or under their direction.

Continued:

3. Where the first responders initiate treatment prior to the arrival of an ambulance, they must report all information pertinent to the patient's condition and treatment to the paramedics. This information must be reported through the completion of a First Responder Report, HLTH-2424 (see Appendix A) and may also be relayed verbally to the paramedics by the first responders.

   a) Copies of the First Responder Report should accompany the patient to the hospital if it is completed by the time the BCAS crew is ready to leave the scene.

      - The first responders are responsible for their report being united with the patient's record if it is not given to the BCAS crew at the scene.

   b) The First Responder Report is distributed as follows:

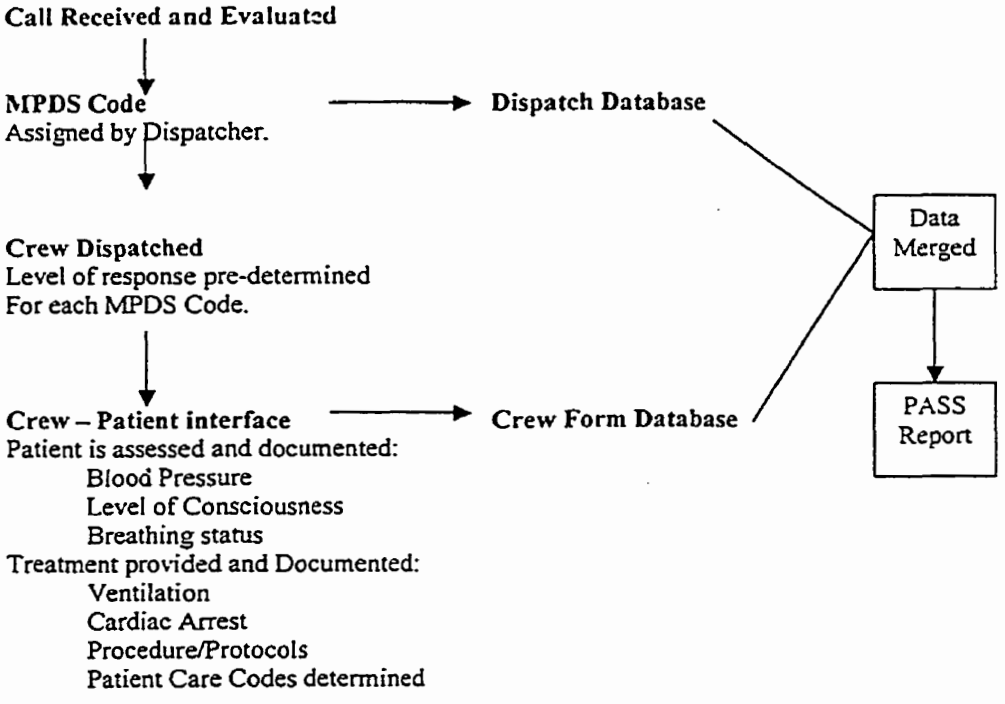
      - White and Yellow:
        - the first responder crew must give both copies to the BCAS crew.
        - the BCAS crew will attach one to the original of the Crew Report, HLTH-2402, as part of the patient care record, and attach the other to the hospital copy of the Crew Report.
      - Pink:
        - to be retained by the first responder agency.

   c) First responder agencies will be responsible for the initial purchase of materials and equipment. BCAS will only replenish approved medical supplies (see Appendix E). First responders should contact the local BCAS unit chief to obtain replacement supplies. These items may come either from existing station stock or by ordering new stock (see Volume I, Chapter 6, re: ordering procedures).

(See also:
Volume II, Chapter 2, re: general responsibilities and duties of first responders;
Volume II, Chapter 5, re: layered responses and dispatching first responder agencies;
Volume I, Chapter 6, re: forest fire first aid coverage, and;
Volume I, Chapter 6, re: first responder supplies.)

APPENDIX B

Information Event Path



APPENDIX C

Patient Focused Resource Allocation in EMS
Revision of the RAP in the BC Ambulance Service

In February, 1997 the Medical Priority Dispatch System (MPDS) was adopted by the British Columbia Ambulance Service as its dispatch call evaluation process. On October 19, 1999 the BCAS implemented the Resource Allocation Plan (RAP). It identified the resource(s) to be sent on each of the 240 MPDS codes. The process for deciding the resource allocation involved consultation with dispatchers, EMA's, superintendents, managers, physicians, and first responder agencies. The decisions were based on experience and best opinion according to the description of each MPDS code. Final approval of the RAP was that of the Emergency Health Services Commission (EHSC). Missing from this exercise was quantitative data that objectively described the acuity of patients for each of the MPDS codes.

With almost one year of experience there is now data that can be analyzed to help revise the original Resource Allocation Plan. This project will introduce a process called the Delphi Method to include many experts who will go through a large amount of data to arrive at revisions that are significant and based on evidence as well as opinion. Patient care data can now be presented according to each MPDS code to offer the researcher the ability to review what was actually happening as opposed to what the stakeholders thought would happen.

Patient Acuity Score

A patient acuity score was designed to quantify the seriousness of patients' condition according to vital signs, indicators of cardiac arrest, chest pain and the need for ventilatory assistance. The scoring system from 0 to 4 was defined as:

- ✓ 0 = normal vital signs,
- ✓ 1 = 1 abnormal vital sign,
- ✓ 2 = 2 abnormal vital signs,
- ✓ 3 = 3 abnormal vital signs or ventilatory assistance required,
- ✓ 4 = cardiac arrest or a combination > 4.

The vital signs used and the threshold for being considered abnormal include:

- ✓ BP < 90 sys,
- ✓ Respiratory rate < 10 or > 30,
- ✓ Glasgow Coma Scale < 14.

A data base query was designed to identify calls with valid MPDS codes and complete vital signs for a six month period. The report generated from the query categorized the calls according to the MPDS codes and grouped them according to acuity scores (0 to 4). The report stated the percentage of each acuity score for each MPDS code as well as the percentage of each code that had indicators of chest pain. Additional data on the mode of transport to hospital is also included to provide another indicator of acuity, albeit a subjective one that relies on each crews' perspective of when to go lights and siren.

The acuity score will be used in conjunction with the expert opinion of dispatchers, field staff, managers, physicians and first responder agencies to revise the current Resource Allocation Plan and to provide a model to continually review the system performance.

Assumptions

Before considering changes to the RAP, it is important to be aware of some basic assumptions that will affect how resource decisions should be applied. The assumptions are:

- ✓ The HLA designation refers to calls that would benefit from a BCAS advanced life support (ALS) crew if one was available. In practice the highest level available will be sent in communities that do not have ALS.
- ✓ First Responders are available and can be used as first arrival or added resource to aid paramedics with the patient or patients.
- ✓ According to local research, when arriving before BCAS, first responders are on scene 3 to 5 minutes prior to the arrival of BCAS paramedics (Berringer and Christiansen, 1998). This is important when determining the scope of practice of first responders and the impact their intervention will have on patients if used.
- ✓ Decisions to send First Responders based on paramedic delay would be made at the discretion of the dispatcher and should not be a part of this process.
- ✓ Individual first responder agreements are not considered. For the purposes of this exercise it will be assumed that first responders will respond on all calls up to the level of the RAP.
- ✓ Determining which calls will be layered with additional BCAS units is not part of this exercise.

Delphi Method

The Delphi is a method for structuring a group communication process so that the process is effective in allowing a group of individuals, as a whole deal with a complex problem (Linstone and Turoff, 1975). It was first used in the early 1950's as a spinoff of defense research. The Delphi method is applicable when accurate information is not available and/or too expensive to obtain or when the subjectivity of the research is the dominant parameter. There are a number of health care applications of Delphi in use today Des Marchais, 1999).

This method will be used in conjunction with the patient acuity data to arrive at a final list of revisions to the current Resource Allocation Plan. The Delphi process allows for assessment of group judgement, opportunity for individuals to revise their views and provides some degree of anonymity for individual responses.

Delphi is a useful process in situations where the problem does not lend itself to precise analytical techniques but can benefit from subjective judgements on a collective basis (Linstine and Turoff, 1975). Other advantages include avoiding dominance by one group or individual, including more individuals than can effectively interact face to face and is a time and cost efficient means to collect opinions and consensus.

The Delhi process uses a series of rounds to allow the selected experts to submit their opinions and choices. The researcher aligns the submissions into an organized list of changes which are feedback to the experts. Subsequent rounds will further define and

Drew Burgwin – Email: drew.burgwin@moh.hnet.bc.ca
Phone: (250) 952-0884, Fax: (250) 952-0905.

consolidate the data until there is consensus or the researcher feels there is no further advantage to starting another round.

Introduction to the Project

Face to face meetings with the various stakeholder groups will occur before the Delphi process begins. These meetings will consist of a presentation of the Acuity data and the steps in the Delhi method.

Names, email addresses and fax numbers will be collected from those that agree to be included in the project. The experts will be grouped according to their affiliations as follows:

Region 1 Medical Dispatch Review Committee
Region 2 Medical Dispatch Review Committee
Regions 3-8 Medical Dispatch Review Committee
Physicians
Fire Chiefs

Each round requires documents to be passed between the groups and the researcher in a timely fashion. Email or fax transmission will be used, as the turn around time for each round will be limited. Data can be sent to the researcher as follows:

Email - drew.burgwin@moh.hnet.bc.ca
Fax - (250) 952-0905.

Round one
The experts will be asked to review the current RAP and the acuity data. They are also asked to reflect on their own experiences. They will submit to the researcher, a list of the MPDS codes that require a change and to describe the change.

The researcher will receive the first round results and organize the data into the above groups for each change. The list of changes will be organized according to frequency and returned to the experts for further revision.

Round Two
The experts will each be asked to rank the list of changes from Round 1 organized by the researcher. The results will be sent back to the researcher who will organize the data again.

Round Three
The data should now be scaled down to a number of significant changes. These changes will be sent back to the experts for another review and ranking. This is an opportunity to make changes and to comment on any issues.

Round 4
Once the researcher receives and organizes the round three changes, the groups will then review the final changes and return any last minute revisions to the researcher.

Final Revisions
The researchér will then finalize the data to present to the medical advisory committee for their approval.

Submit to the Emergency Health Services Committee
The researcher will then incorporate the MAC changes and submit the revisions to the EHSC for final approval. Once final approval has been granted the revised RAP document will be feedback to the groups and implementation will be planned.

Ethical Issues
- ✓ Participation in this process is voluntary.
- ✓ Names will not be used in the analysis or in the report.
- ✓ The data will represents groups and not individuals.
- ✓ All persons participating will be treated with respect and dignity.
- ✓ Confidentiality will be strictly maintained.
- ✓ Documents submitted by individuals will eventually be shredded.

References

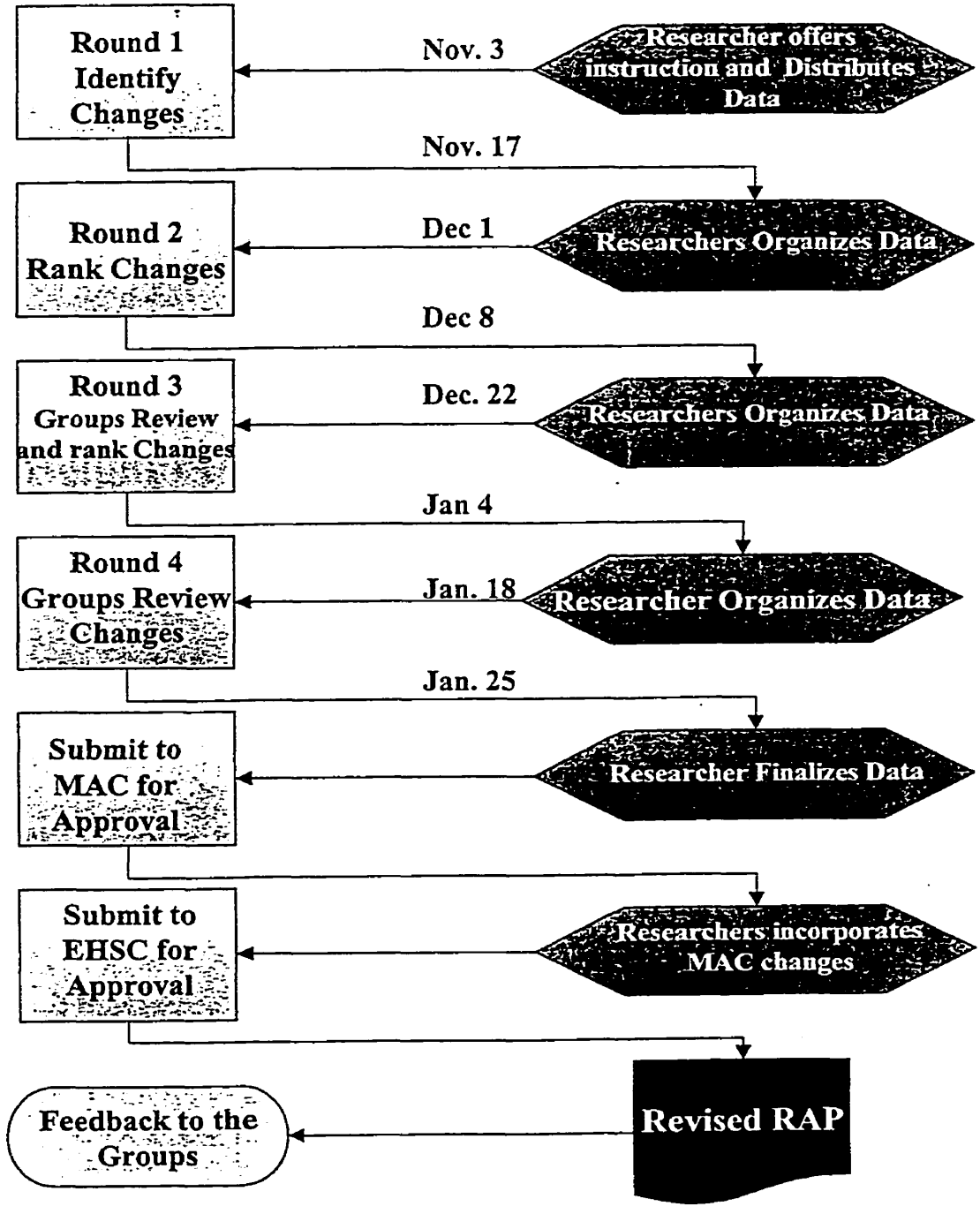
Berringer, R., Christenson, J., Blitz, M., Spinelli, J., Freeman, J., Maddess, G., Rae, S. (1999). Medical role of first responders in an urban setting. Canadian Journal of Emergency Medicine, 1999, 1(2), 93 – 98.

Des Marchais, J.E., (1999). A Delphi technique to identify and evaluate criteria for construction of PBL problems. Medical Education (33), 504 – 508.

Linstone, H. A., Turoff, M. (1975). The Delphi Method - Techniques and Application. Addison-Wesley Publishing Company, Inc. Reading, Massachusetts.

Drew Burgwin – Email: drew.burgwin@moh.hnet.bc.ca
Phone: (250) 952-0884, Fax: (250) 952-0905.

Delphi Process for RAP Revision in the BCAS



Indicators of Acuity

- Blood Pressure
  - <90 sys in adults (>12 yrs) add 1
- Respirations
  - <10 or > 30 add 1
- Glasgow Coma Scale
  - <14 add 1
- Ventilatory support add 3
- Cardiac Arrest add 4

(If total >4 then score 4)

Level of Patient Acuity

0 = All v/s normal

1 = 1 abnormal v/s

2 = 2 abnormal v/s

3 = 3 abnormal v/s, or airway control required

4 = 1 abnormal v/s plus airway control, or cardiac arrest, or combination > 4.

BRITISH COLUMBIA

Ministry of Health and Ministry Responsible for Seniors
British Columbia Ambulance Service

Round One

MPDS RESOURCE ALLOCATION

KEY TERMS: Qual = Qualification; FR = First Responder; EMA = Emergency Medical Assistant (other than ALS); ALS = Advanced Life Support; MA* = Assumes IV endorsed, if EMA II not available, use ALS in communities with ALS; HLA = Highest level available EMA

Code: 2 = Routine transport (no lights and siren); 3 = Lights and siren

Action: ↑ = Upgrade response; — = No change; ↓ = Downgrade response

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL	CODE	ACTION	COMMENTS
						0	1	2	3	4								
1	ABDOMINAL PAIN / PROBLEMS	A	1	Abdominal pain	1,594	94.04	5.46	0.31		0.19	0.75	3.76	1.38		EMA	2		
		C	1	Male > = 35 years	539	91.28	7.42	0.93	0.37		0.93	73.28	3.90		EMA	3		
			2	Female > = 45 years	604	92.05	6.95	0.50	0.33	0.17	2.16	73.18	4.14		EMA	3		
			3	Not alert	21	71.43	28.57					100.00		Y	HLA	3		
			4	Female, fainting (12-50 years)	32	87.50	9.38	3.13				75.00		Y	EMA*	3		
2	ALLERGIES / HIVES / STINGS	A	1	No SOB / swallowing problem	135	93.33	6.67				1.48	13.33	3.70		EMA	2		
		B	1	Unknown (3rd party)	45	93.33	6.67				4.44	84.44	2.22		EMA	3		
		C	1	Difficulty breathing / swallowing	168	88.10	10.71	1.19			1.19	89.88	7.14	Y	HLA	3		
		D	1	Severe respiratory distress	22	77.27	22.73					90.91	18.18	Y	HLA	3		
			2	Not alert	24	70.83	16.67	12.50				91.67	12.50	Y	HLA	3		
			3	Condition worsening	56	92.86	7.14					83.93	3.57	Y	HLA	3		
3	ANIMAL BITES	A	1	Superficial or minor bites	21	100.00									EMA	2		
			2	Spider or insect bites	1	100.00									EMA	2		
		B	1	Peripheral with serious haemorrhage	11	81.82	18.18					81.82			EMA	3		
			2	Unknown (3rd party)	4	75.00	25.00					75.00	25.00		EMA	3		
		D	1	Severe central bite	6	83.33	16.67					100.00	33.33	Y	HLA	3		
			2	Large carnivore	1	100.00						100.00		Y	HLA	3		
			3	Zoo animal	1		100.00					100.00		Y	EMA	3		
			4	Exotic animal										Y	EMA	3		
			5	Any snake (poisonous animal)										Y	EMA	3		
			6	Attacks / Multiple animals										Y	EMA	3		
4	ASSAULT / RAPE	A	1	Not dangerous injuries	649	95.22	4.62	0.15			0.46	4.62	1.08		EMA	2		
			2	Not recent injuries (> 6 hrs)	27	96.30	3.70					3.70			EMA	2		
		B	1	Possibly dangerous	241	94.19	5.81					67.63	7.05		EMA	3		
			2	Serious haemorrhage	33	87.88	9.09	3.03				69.70	12.12		EMA	3		
			3	Unknown injuries (police not present)	235	92.34	6.81	0.43		0.43	0.43	66.81	5.96		EMA	3		
		D	1	Multiple victims	7	85.71				14.29	14.29	57.14	14.29	Y	EMA	3		
			2	Dangerous injuries	14	78.57	21.43					78.57	42.86	Y	HLA	3		
			3	Not alert	47	87.23	12.77					87.23	4.26	Y	HLA	3		
			4	Abnormal breathing	7	71.43	28.57					85.71	14.29	Y	HLA	3		
5	BACK PAIN (NON TRAUMA)	A	1	Non traumatic back pain	1,049	96.66	3.24		0.10		1.14	2.10	0.95		EMA	2		
			2	Non recent * * (> 6 hrs)	371	98.65	1.35					1.35	0.27		EMA	2		
		C	1	Fainting (> = 50 years)	11	81.82	18.18					81.82		Y	HLA	3		
		D	1	Not alert	9	77.78	11.11		11.11			77.78		Y	HLA	3		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL.	CODE	ACTION	COMMENTS
						0	1	2	3	4								
6	BREATHING PROBLEM	C	1	Difficulty breathing	2,921	70.93	25.40	2.50	0.34	0.82	10.71	86.72	9.52	Y	HLA	3		
			2	Asthma	789	69.71	28.01	1.01		1.27	3.92	89.35	11.66	Y	EMA*	3		
			3	Cardiac history	1,356	67.40	28.47	2.51	0.44	1.18	26.25	89.90	11.21	Y	HLA	3		
		D	1	Severe respiratory distress	755	56.69	36.95	3.31	0.66	2.38	15.75	90.60	18.81	Y	HLA	3		
			2	Not alert	137	55.47	30.66	8.76		5.11	10.95	91.97	16.06	Y	HLA	3		
			3	Sweaty or colour change	1,160	65.34	28.88	3.36	0.17	2.24	17.41	88.10	14.48	Y	HLA	3		
7	BURNS / EXPLOSION	A	1	Small (< 18%)	38	94.74	5.26					15.79	2.63		EMA	2		
			2	Sunburn or minor (< = hand size)	3	100.00									EMA	2		
		B	1	Unknown (3rd party)	37	94.60	2.70	2.70				70.27	13.51	Y	EMA	3		
		C	1	Difficulty breathing	3	100.00						66.67	33.33	Y	HLA	3		
			2	Large burns (> 18%)	9	88.89	11.11					100.00	44.44	Y	HLA	3		
		D	1	Multiple victims / HLA & EMA										Y	HLA	3		
			2	Severe respiratory distress										Y	HLA	3		
			3	Not alert										Y	HLA	3		
			4	Explosion	6	100.00						100.00	16.67	Y	HLA	3		
8	CARBON MONOXIDE INHALATION / HAZMAT	B	1	Alert, not SOB	19	89.47	10.53					68.42	5.26		EMA	3		
		C	1	Alert, abnormal breathing	13	92.31	7.69					79.62	23.08	Y	HLA	3		
		D	1	Multiple victims / HLA & EMA	8	100.00						100.00	37.50	Y	HLA	3		
			2	Not alert	3	66.67		33.33				100.00	33.33	Y	HLA	3		
			3	HAZMAT	1		100.00					100.00	100.00	Y	HLA	3		
			4	Unknown	13	84.62	15.38					84.62		Y	HLA	3		
9	CARDIAC / RESPIRATORY	B	1	Obvious death	27	7.41	3.70		7.41	81.48		77.78	3.70		EMA	3		
		D	1	Suspect cardiac arrest	107	26.17	15.89	8.41	9.35	40.19		88.79	21.50	Y	HLA	3		
			2	Suspected respiratory arrest	20	45.00	5.00	25.00	5.00	20.00		90.00	20.00	Y	HLA	3		
10	CHEST PAIN	A	1	Normal breathing (age < 35)	184	94.02	5.98				8.15	15.76	4.89		EMA	2		
		C	1	Normal breathing (age >= 35)	1,463	92.00	6.70	0.21	0.14	0.96	36.91	87.08	8.00	Y	HLA	3		
			2	Abnormal breathing	777	86.62	12.48	0.26		0.64	35.78	90.09	10.17	Y	HLA	3		
			3	Cocaine	38	89.47	10.53				31.58	81.58	5.26	Y	HLA	3		
			4	Cardiac history	2,834	88.18	10.16	0.71	0.14	0.81	52.89	90.68	11.47	Y	HLA	3		
		D	1	Severe respiratory distress	191	85.34	14.14			0.52	47.12	87.96	20.94	Y	HLA	3		
			2	Not alert	47	78.72	19.15			2.13	25.54	95.74	12.77	Y	HLA	3		
			3	Sweaty or changing colour	1,292	87.38	10.84	0.70	0.15	0.93	45.28	90.17	14.09	Y	HLA	3		
11	CHOKING	A	1	Not choking now (can talk/cry, alert)	31	83.87	12.90	3.23				19.35			EMA	2		
		D	1	Choking	60	73.33	18.33	1.67			3.34	90.00	10.00	Y	HLA	3		
			2	Abnormal breathing	21	90.48	4.76	4.76				90.48	4.76	Y	HLA	3		
			3	Not alert	1	100.00						100.00		Y	HLA	3		
12	CONVULSION / SEIZURE	A	1	Breathing now	686	82.22	15.16	1.60	0.15	0.87	0.73	24.93	3.50		EMA	2		
		B	1	Age < 35 (breathing not verified)	337	71.22	21.96	2.97	0.89	2.97	0.30	85.16	5.64	Y	EMA	3		
		C	1	Pregnant	6	50.00	33.33	16.67				83.33		Y	HLA	3		
			2	Trauma	20	80.00	10.00	5.00		5.00		80.00	10.00	Y	HLA	3		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL.	CODE	ACTION	COMMENTS
						0	1	2	3	4								
12	CONVULSION / SEIZURE	C	3	Diabetic	57	57.89	38.60	3.51			3.50	89.47	12.28	Y	EMA*	3		
	Contd.		4	Cardiac history	67	62.69	32.84	2.99		1.49	4.48	91.04	11.94	Y	HLA	3		
		D	1	Continuous or multiple	666	63.66	30.33	3.00	0.45	2.55	0.60	89.94	10.51	Y	HLA	3		
			2	Age >= 35 (breathing not verified)	154	70.13	24.03	3.90	0.65	1.30	1.30	86.36	8.44	Y	HLA	3		
			3	Not breathing	41	48.78	41.46	7.32		2.44		80.49	9.76	Y	HLA	3		
13	DIABETIC	A	1	Conscious and alert	431	90.02	9.28	0.23	0.23	0.23	1.39	9.98	2.78		EMA	2		
		C	1	Conscious but not alert	680	59.56	37.21	2.06	0.29	0.88	2.22	87.35	7.35	Y	EMA	3		
			2	Conscious, abnormal breathing	105	57.14	37.14	1.90	1.90	1.90	5.71	82.86	5.71	Y	HLA	3		
		D	1	Unconscious	285	31.58	60.70	3.16	1.05	3.51	1.40	90.18	10.18	Y	EMA*	3		
14	DROWNING /	A	1	Alert / breathing normally (out of water)	2	50.00		50.00							EMA	2		
	DIVING ACCIDENT	B	1	Alert / breathing normally (injuries &/or in water)	1	100.00						100.00		Y	EMA	3		
			2	Unknown	1	100.00						100.00		Y	EMA	3		
		C	1	Alert / abnormal breathing										Y	HLA	3		
		D	1	Unconscious										Y	HLA	3		
			2	Not breathing or underwater										Y	HLA	3		
			3	Not alert or abnormal breathing										Y	HLA	3		
			4	Suspected neck injury	2	100.00						50.00		Y	EMA	3		
			5	Diving or scuba accident	2	50.00	50.00					50.00		Y	HLA	3		
15	ELECTROCUTION	C	1	Alert / breathing normally	9	88.89		11.11			11.11	88.89		Y	HLA	3		
		D	1	Unconscious	3	100.00						66.67		Y	HLA	3		
			2	Not disconnected from power										Y	HLA	3		
			3	Power not off, hazard present										Y	HLA	3		
			4	Not alert										Y	HLA	3		
			5	Abnormal breathing	5	100.00						100.00		Y	HLA	3		
			6	Long fall (> 2m)										Y	HLA	3		
			7	Unknown										Y	HLA	3		
16	EYE PROBLEM / INJURIES	A	1	Moderate injuries	48	95.83	2.08	2.08				10.42	6.25		EMA	2		
			2	Minor injuries / problems	15	100.00									EMA	2		
		B	1	Severe injuries	25	96.00	4.00					84.00	12.00		EMA	3		
		D	1	Not alert	1	100.00						100.00		Y	HLA	3		
17	FALLS / BACK INJURIES	A	1	Not dangerous injuries	4,395	93.58	6.01	0.23	0.07	0.11	0.48	2.64	0.77		EMA	2		
	(TRAUMATIC)		2	Non-recent (> 6 hours)	801	92.76	6.74	0.50			0.75	1.00	0.37		EMA	2		
		B	1	Possibly dangerous	1,673	92.53	6.46	0.66		0.36	0.90	82.01	2.93		EMA	3		
			2	Serious haemorrhage	97	91.75	8.25				1.30	80.41	3.09	Y	EMA*	3		
			3	Unknown	384	90.63	8.33	0.78		0.26	1.30	89.84	2.86	Y	EMA	3		
		D	1	Dangerous injuries	159	90.57	8.81	0.63			0.63	79.87	8.81	Y	EMA*	3		
			2	Long fall (> 2m)	241	91.70	7.05	0.41		0.83		87.97	7.88	Y	EMA	3		
			3	Not alert	224	75.00	21.88	0.89	0.45	1.79	0.45	85.71	8.93	Y	HLA	3		
			4	Abnormal breathing	84	77.38	17.86	3.57	1.19		3.57	84.52	7.14	Y	HLA	3		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL.	CODE	ACTION	COMMENTS
						0	1	2	3	4								
18	HEADACHE	A	1	Normal breathing	245	95.10	4.90					2.04	1.22		EMA	2		
		B	1	Unknown symptoms (3rd party situation)	1	100.00						100.00			EMA	3		
		C	1	Not alert	17	64.71	29.41			5.88	5.88	76.47	11.76	Y	HLA	3		
			2	Numbness or paralysis	20	95.00	5.00					70.00	5.00		EMA	2		
			3	Speech or movement problems	4	100.00						100.00	25.00		EMA	2		
			4	Sudden onset of severe pain	66	93.94	4.55	1.52			1.52	92.42	10.61		EMA	3		
			5	Abnormal breathing	11	100.00						90.91		Y	HLA	3		
19	HEART PROBLEMS	A	1	Heart rate <130, no symptoms	129	89.92	10.08				16.28	17.05	0.78		EMA	2		
		B	1	Unknown symptoms (3rd party)	104	85.58	12.50	0.96	0.96		20.19	85.58	12.50	Y	EMA	3		
		C	1	Not alert	23	82.61	17.39				21.74	86.96	13.04	Y	HLA	3		
			2	Cardiac history	376	89.36	10.37	0.27			27.66	88.83	7.71	Y	HLA	3		
			3	Rate >= 130, no symptoms	131	93.89	6.11				36.64	90.08	8.40		HLA	3		
			4	Cocaine	10	90.00				10.00	50.00	70.00			HLA	3		
		D	1	Firing of implanted defibrillator	10	100.00					10.00	60.00	10.00	Y	HLA	3		
20	HEAT / 2 EXPOSURE	A	1	Alert (no priority symptoms)	14	85.71	14.29					7.14			EMA	2		
		B	1	Change in skin colour	2	100.00						50.00			EMA	2		
			2	Unknown	22	68.18	22.73	9.09				86.36	9.09		EMA	3		
		C	1	Cardiac history	3	100.00						100.00		Y	HLA	3		
		D	1	Not alert	5	60.00	20.00		20.00			100.00		Y	HLA	3		
21	HAEMORRHAGE	A	1	Not dangerous haemorrhage	807	92.94	6.82		0.12	0.12	0.25	7.43	2.73		EMA	2		
		B	1	Possibly dangerous haemorrhage	752	91.22	8.38	0.27		0.13	1.46	84.04	7.85		EMA	3		
		D	1	Dangerous haemorrhage	639	85.60	13.30	0.94		0.16	0.63	87.64	12.05	Y	EMA*	3		
			2	Not alert	30	80.00	20.00					90.00	6.67	Y	HLA	3		
			3	Severe respiratory distress	25	60.00	28.00	12.00				96.00	28.00	Y	HLA	3		
22	INDUSTRIAL / MACHINERY	B	1	Unknown, not caught in machine	36	97.22	2.78					83.33	16.67		EMA	3		
		D	1	Multiple victims / HLA & EMA	2	100.00						50.00		Y	HLA	3		
			2	Trapped or caught in machinery	10	100.00						70.00	30.00	Y	HLA	3		
			3	Life status questionable	1	100.00						100.00	100.00	Y	HLA	3		
23	OVERDOSE / INGESTION POISONING	B	1	Conscious and alert	528	82.58	13.63	2.46		1.14	0.19	9.85	4.36	**	EMA	2		
		C	1	Not alert	333	62.46	26.73	5.71	0.90	4.20	0.30	84.38	13.21	Y	HLA	3		
			2	Abnormal breathing	45	73.33	17.78	6.67		2.22		97.78	4.44	Y	HLA	3		
			3	Antidepressants or cardiac meds	62	77.42	19.35			3.23		88.71	14.52	Y	HLA	3		
			4	Cocaine	45	73.33	17.78	6.67		2.22		60.00	2.22		HLA	3		
			5	Acid or alkali	9	88.89	11.11					55.56	11.11		HLA	3		
			6	Violent	23	91.30	8.70				0.30	65.22	8.70		EMA	3		
		D	1	Unconscious	335	30.12	31.34	14.63	0.30	17.61		91.04	11.64	Y	HLA	3		
			2	Severe respiratory distress	5	40.00	20.00			40.00		100.00		Y	HLA	3		
24	PREGNANCY / CHILDBIRTH MISCARRIAGE	A	1	1st trimester bleed/miscarriage	70	90.00	10.00					20.00	14.29		EMA	2		
			2	Illness during pregnancy (no priority symptoms)	32	90.63	9.38					6.25	6.25		EMA	2		
		B	1	Labour 2nd D 3rd trimester (del very not imminent)	80	93.75	6.25					30.00	10.00		EMA	2		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 1 RESPONSE	% CODE 1 DESTINATION	FR	QUAL.	CODE	ACTION	COMMENTS
						0	1	2	3	4								
24	PREGNANCY / CHILDBIRTH MISCARRIAGE *contd.*	B	2	Unknown pregnancy problem	50	84.00	14.00		2.00			72.00	12.00		EMA	3		
		C	1	2nd trimester bleed/miscarriage	49	89.80	8.16		2.04			89.80	26.53		EMA*	3		
		D	1	Baby born (HLS if problem w/ baby)	10	90.00	10.00					60.00	20.00		EMA	3		
			2	Crowning	7	85.71	14.29					100.00	14.29		HLA	3		
			3	Imminent delivery (3rd trimester)	60	95.00	3.33	1.67			1.67	80.00	21.67		HLA	3		
			4	3rd trimester bleeding	27	96.30	3.70					77.78	33.33	Y	HLA	3		
			5	Breech presentation										Y	HLA	3		
25	PSYCHIATRIC / SUICIDE	A	1	Non violent, not suicidal, alert	742	91.64	8.09	0.27			0.27	1.48	0.81		EMA	2		
		B	1	Unknown	89	87.64	8.99	3.37			1.12	47.19	5.62		EMA	3		
		C	1	Not alert	24	75.00	16.67	4.17		4.17		62.50	12.50	Y	HLA	3		
			2	Violent	129	88.37	9.30	1.55		0.78		16.28			EMA	2		
			3	Suicidal (threatening)	310	90.97	6.13	1.94		0.97	0.32	41.29	6.13		EMA	3		
		D	1	Hanging, strangulation, suffocation	14	57.14	21.43			21.43		100.00	7.14	Y	HLA	3		
26	SICK PERSON	A	1	No priority symptoms	6,286	89.44	9.47	0.84	0.10	0.16	1.44	2.20	1.34		EMA	2		
			1N	Non priority symptoms	767	68.30	10.70	0.81	0.14	0.05	0.28	0.52	0.32		EMA	2		
		B	1	Unknown symptoms	148	81.76	14.19	2.70		1.35	6.08	70.27	8.11		EMA	3		
		C	1	Not alert	176	76.70	16.75	4.55			5.69	80.68	5.11	Y	HLA	3		
			2	Cardiac history (not 2-28)	362	85.64	12.71	1.10	0.28	0.28	7.19	79.83	3.31	Y	HLA	3		
27	STAB / GUNSHOT WOUNDS	A	1	Not recent, single, peripheral (>6h)	9	100.00						11.11			EMA	2		
		B	1	Single, peripheral	12	100.00						58.33		Y	EMA	3		
			2	Not recent (> 6 hrs) central										Y	EMA	3		
			3	Unknown	44	86.36	13.64					84.09	25.00	Y	EMA	3		
		D	1	Central wound	20	75.00	20.00		5.00			85.00	30.00	Y	HLA	3		
			2	Multiple victims / HLA & EMA										Y	HLA	3		
			3	Not alert	1	100.00						100.00		Y	HLA	3		
			4	Multiple wounds										Y	HLA	3		
28	STROKE / CVA	A	1	Normal breathing (age < 35)	1,270	86.77	12.05	0.87		0.31	1.49	6.14	2.91		EMA	2		
		B	1	Unknown symptoms (3rd party situations)	128	79.69	16.41	0.78	0.78	2.34	1.56	86.72	12.50		EMA	3		
		C	1	Not alert	485	63.71	29.07	4.12	0.41	2.68	2.48	87.63	10.10	Y	HLA	3		
			2	Abnormal breathing	172	75.00	21.51	2.33		1.16	6.97	93.60	8.72	Y	HLA	3		
			3	Speech or movement problems	1	100.00						100.00			EMA	2		
			4	Numbness or tingling											EMA	2		
			5	Stroke history											EMA	2		
			6	Normal breathing (age > 35)											EMA	2		
29	TRAFFIC ACCIDENT	A	1	1st party, not dangerous injuries	325	96.92	3.08		0.06		0.31	12.00	0.62		EMA	2		
		B	1	Injuries	1,638	95.48	3.97	0.18	0.06	0.31	0.55	85.23	6.65	Y	EMA	3		
			2	Unknown	2,532	95.38	3.55	0.43		0.55	0.24	86.89	8.33	Y	EMA	3		
		D	1	Multiple victims / HLA & EMA	190	93.16	6.32			0.53	0.53	88.95	11.05	Y	HLA	3		
			2	Auto-ped / motorcycle / bicycle	768	93.75	4.56	0.78		0.91	0.54	88.02	10.81	Y	HLA	3		
			3	HAZMAT	11	100.00						81.82	9.09	Y	HLA	3		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL.	CODE	ACTION	COMMENTS
						0	1	2	3	4								
29	TRAFFIC ACCIDENT *contd.*	D	4	Trapped	226	89.38	6.19	1.77		2.65	0.44	91.59	20.80	Y	HLA	3		
			5	Ejected	22	90.91	9.09					86.36	4.55	Y	HLA	3		
			6	Not alert	21	80.95	9.52			9.52		85.71	19.05	Y	HLA	3		
			7	Severe respiratory distress	3	66.67				33.33		100.00	33.33	Y	HLA	3		
30	TRAUMATIC INJURIES SPECIFIC	A	1	Not dangerous	1,748	95.88	3.78	0.23		0.11	0.28	4.00	1.09		EMA	2		
			2	Not recent (>6 hrs)	102	96.08	3.92					0.98			EMA	2		
		B	1	Possibly dangerous	570	94.74	4.91	0.18		0.18		82.81	6.32		EMA	3		
			2	Serious haemorrhage	29	93.10	6.90					89.66	6.90	Y	EMA*	3		
		D	1	Dangerous injuries	143	91.61	6.99		0.70	0.70	0.70	83.92	9.79	Y	HLA	3		
			2	Severe respiratory distress	12	91.67	8.33					91.67	8.33	Y	HLA	3		
			3	Not alert	30	83.33	16.67					90.00	10.00	Y	HLA	3		
31	UNCONSCIOUS / FAINTING (NON-TRAUMATIC)	A	1	Single faint, alert (< 35 yrs)	276	89.13	10.51	0.36				17.03	2.54		EMA	2		
			2	Near faint, alert (< 35 yrs)	71	95.77	1.41		1.41	1.41	4.23	16.90	4.23		EMA	2		
		C	1	Single or near faint (> 35 yrs)	1,217	84.14	13.56	1.23	0.08	0.99	2.71	84.14	4.77	Y	EMA	3		
			2	Multiple fainting episodes	130	84.62	13.85		0.77	0.77	2.31	87.69	4.62	Y	EMA*	3		
			3	Female 12 – 50 yrs, abdominal pain	25	88.00	12.00					76.00	4.00	Y	EMA*	3		
			4	Conscious, abnormal breathing	150	74.67	29.67	4.00		0.67	6.01	92.67	10.67	Y	HLA	3		
			5	Cardiac history	415	82.41	13.49	2.17	0.48	1.45	10.12	91.33	7.71	Y	HLA	3		
		D	1	Unconscious	1,144	55.42	29.72	6.12	0.87	7.87	3.24	88.29	14.07	Y	HLA	3		
			2	Severe respiratory distress	42	64.29	14.29	9.52	2.38	9.52	9.52	80.95	11.90	Y	HLA	3		
			3	Not alert	547	63.80	26.69	6.22	0.91	2.38	4.38	88.30	9.96	Y	HLA	3		
32	UNKNOWN PROBLEM	B	1	Standing, sitting up, moving, talking	720	83.61	13.75	1.25	0.42	0.97	1.25	10.14	1.67		EMA	2		
			2	Medical alert notification (pending)	121	86.78	11.57	1.65			10.75	75.21	4.96	Y	EMA	3		
			3	Unknown	1,718	77.88	16.76	2.27	0.41	2.68	2.50	83.41	7.22	Y	EMA	3		
		D	1	Life status questionable	64	51.56	25.00	4.69	6.25	12.50	3.12	87.50	7.81	Y	HLA	3		
				TOTAL	63,516	84.74	12.68	1.32	0.21	1.06	7.73	54.19	6.32					

COMMENTS/NOTES:

Delphi Round One
Proposed Changes

MPDS Code	Definition	Revised Resource	Change in resource
1C1	Abdominal Pain - Male ≥ 35 Years	EMA Code 2	Downgrade response mode
1C2	Abdominal Pain – Female ≥ 45 years	EMA Code 2	Downgrade response mode
3D1	Animal Bites - Severe Central Bites	FR EMA Code 3	Downgrade Qualification
3D2	Animal Bites – Large Carnivore	FR EMA Code 3	Downgrade Qualification
4B1	Assault/Rape – Possibly Dangerous Injuries	FR EMA* Code 3	Add FR and IV Qualification
4D3	Assault/Rape – Not Alert	FR EMA Code 3	Downgrade Qualification
5C1	Back Pain (non-traumatic) – Fainting ≥ 50 years	FR EMA Code 3	Downgrade Qualification
6C2	Breathing Problems - Asthma	FR HLA Code 3	Upgrade Qualification
7A1	Burns/Explosions – Small (<18%)	FR EMA Code 3	Add FR and Upgrade mode of response
8B1	Carbon Monoxide/Inhalation/Hazmat – Alert, not Short of Breath	FR EMA Code 3	Add FR
8C1	Carbon Monoxide/Inhalation/Hazmat – Alert with abnormal breathing	FR EMA Code 3	Downgrade Qualification
8D4	Carbon Monoxide/Inhalation/Hazmat – Unknown	FR EMA Code 3	Downgrade Qualification
12A1	Convulsion/Seizure – Breathing Now	FR EMA Code 3	Add FR /Upgrade Mode of Response
13C1	Diabetic – Conscious but not alert	FR HALS Code 3	Upgrade qualification
13D1	Diabetic – Unconscious	FR HLA Code 3	Upgrade Qualification
17B1	Falls/Back Injuries (traumatic) – Possibly Dangerous Injuries	FR EMA Code 3	Add FR
17D2	Falls/Back Injuries (traumatic) – Long Fall (> 2m)	FR EMA* Code 3	Upgrade IV Endorsement
18C2	Headache – Numbness or	EMA Code 3	Upgrade Mode of

	paralysis		Response
18C3	Headache – Speech or movement problems	EMA Code 3	Upgrade Mode of Response
19B1	Heart Problems – Unknown Symptoms (3rd party call)	FR HLA Code 3	Upgrade Qualification
19C3	Heart Problems – Rate ≥130, no symptoms	FR HLA Code 3	Add FR
19C4	Heart Problems – Cocaine	FR HLA Code 3	Add FR
23B1	Overdose/Ingestion/Poisoning – Conscious and Alert	FR EMA Code 2	Add FR
24D2	Pregnancy/Childbirth – Crowning	EMA Code 3	Downgrade Qualification
24D3	Pregnancy/Childbirth – Imminent Delivery (3rd Trimester)	EMA Code 3	Downgrade Qualification
24D4	Pregnancy/Childbirth – 3rd Trimester Bleed	EMA* Code 3	Remove FR Downgrade Qualification
25C3	Psychiatric/Suicide – Suicidal	EMA Code 2	Downgrade Mode of Response
27B2	Stab/Gunshot – Not Recent (>6 hours)	EMA Code 2	Remove FR Downgrade Mode of Response
28B1	Stroke/CVA – Unknown Symptoms (3rd Party)	FR EMA Code 3	Add FR
29A1	Traffic Accident – 1st Party, not dangerous injuries	FR EMA Code 2	Add FR
29D1	Traffic Accidents – Multiple Victims	FR EMA Code 3	Downgrade Qualifications
29D2	Traffic Accidents – Auto-ped/motorcycle/bicycle	FR EMA Code 3	Downgrade Qualification
29D3	Traffic Accidents – Hazmat	FR EMA Code 3	Downgrade qualification

APPENDIX D

BRITISH COLUMBIA

Ministry of Health
Ministry Responsible for Seniors

British Columbia Ambulance Service
Provincial Headquarters

MEMORANDUM

Date: December 2, 1999

To: Resource Allocation Revision Project Participants

Re: Resource Allocation Plan Revision - Round 2

The attached document is a summation of the proposed changes to the Resource Allocation Plan (RAP) from round one. Of the 38 individuals enrolled in the project, 32 (89%) responded. The options available for change include:

- Sending or not sending First Responders (FR)
- Upgrading or downgrading the paramedic qualification (Qual.)
- Upgrading or downgrading the mode of response (code 2 or code 3)

The average agreement to a proposed change to any one of the above categories was 6% (2 people agreeing with any one change). The highest agreement, which occurred twice, was 22% (7) and included people in the same group. There were 34 codes that resulted in possible change.

Although there were codes that had changes recommended, they were not included due to several factors:

- There were opposing views. E.g. one person proposed an upgrade in First Responder while another proposed a downgraded in mode from code 3 to code 2.
- The number of calls was too small to make an accurate judgement.
- The change was grossly inconsistent with the acuity of the call type.
- A single suggestion for change not supported by others.

Themes

Several themes emerged from comments that include:

- First Responders should be canceled on calls involving the ambulance waiting for police to secure the scene.
- If the BCAS unit would be more than 10 minutes First Responders should be sent on the following calls: 25B1, 25C3, 26B1, 28B1, 30B1.
- Childbirth can be adequately handled by EMA. ALS paramedics do not have added training in childbirth.
- First Responders are not trained in emergency childbirth and therefore should not be sent on these calls.

Instruction for Round 2

Please review the attached information sheet that contains the same information as Round one plus the proposed 34 changes. Once you are familiar with the data follow these instructions:

1. Review the revised codes and indicate whether you agree or disagree.

2. Using references to the objective acuity, cardiac and code three data on the RAP sheet, state the rationale for your opinion.

3. Comment on the themes stated above. Do you agree? Why? Why not?

4. You may use an addition document for you comments or you may use the Comment section on the RAP sheet. Please reference the MPDS code.

5. Send your response to:

Drew Burgwin
Fax: (250) 952-0905
Email: drew.burgwin@moh.hnet.bc.ca
2nd Floor, 1810 Blanshard Street
Victoria, BC
V8V 1X4

6. The fax seems to be the most efficient means to send in your replies.

7. Submit your reply no later than December 10, 1999

8. You will be contacted by phone or email to remind you to send in your response and to answer any questions you may have.

The intent of this methodology to revise the resource allocation is to gather as many opinions from the BCAS stakeholders as possible. Thank you for your time effort in participating in the project.

Drew Burgwin
Manager, Quality Improvement Program
BC Ambulance Service

BRITISH COLUMBIA

Ministry of Health and Ministry Responsible for Seniors
British Columbia Ambulance Service

ROUND 2

December 2, 1999
MPDS RESOURCE ALLOCATION

KEY TERMS:
Qual. = Qualification
FR = First Responder
EMA = Emergency Medical Assistant (other than ALS)
ALS = Advanced Life Support
EMA* = Assumes IV endorsed. If EMA II not available, use ALS in communities with ALS
HLA = Highest level available EMA
Code = Mode of response
2 = Routine transport (no lights and siren)
3 = Lights and siren

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL	CODE	REVISED RESOURCE ALLOCATION	COMMENTS
						0	1	2	3	4								
1	ABDOMINAL PAIN / PROBLEMS	A	1	Abdominal pain	1,594	94.04	5.46	0.31		0.19	0.75	3.76	1.38		EMA	2		
		C	1	Male > = 35 years	539	91.28	7.42	0.93	0.37		0.93	73.28	3.90		EMA	3	EMA Code 2	
			2	Female > = 45 years	604	92.05	6.95	0.50	0.33	0.17	2.16	73.16	4.14		EMA	3	EMA Code 2	
			3	Not alert	21	71.43	28.57					100.00		Y	HLA	3		
			4	Female, fainting (12-50 years)	32	87.50	9.38	3.13				75.00		Y	EMA*	3		
2	ALLERGIES / HIVES / STINGS	A	1	No SOB / swallowing problem	135	93.33	6.67				1.48	13.33	3.70		EMA	2		
		B	1	Unknown (3rd party)	45	93.33	6.67				4.44	84.44	2.22		EMA	3		
		C	1	Difficulty breathing / swallowing	168	88.10	10.71	1.19			1.19	89.88	7.14	Y	HLA	3		
		D	1	Severe respiratory distress	22	77.27	22.73					90.91	18.18	Y	HLA	3		
			2	Not alert	24	70.83	16.67	12.50				91.67	12.50	Y	HLA	3		
			3	Condition worsening	56	92.86	7.14					83.93	3.57	Y	HLA	3		
3	ANIMAL BITES	A	1	Superficial or minor bites	21	100.00									EMA	2		
			2	Spider or insect bites	1	100.00									EMA	2		
		B	1	Peripheral with serious haemorrhage	11	81.82	18.18					81.82			EMA	3		
			2	Unknown (3rd party)	4	75.00	25.00					75.00	25.00		EMA	3		
		D	1	Severe central bite	6	83.33	16.67					100.00	33.33	Y	HLA	3	FR EMA code 3	
			2	Large carnivore	1	100.00						100.00		Y	HLA	3	FR EMA Code 3	
			3	Zoo animal	1		100.00					100.00		Y	EMA	3		
			4	Exotic animal										Y	EMA	3		
			5	Any snake (poisonous animal)										Y	EMA	3		
			6	Attacks / Multiple animals										Y	EMA	3		
4	ASSAULT / RAPE	A	1	Not dangerous injuries	649	95.22	4.62	0.15			0.46	4.62	1.08		EMA	2		
			2	Not recent injuries (> 6 hrs)	27	96.30	3.70					3.70			EMA	2		
		B	1	Possibly dangerous	241	94.19	5.81					67.63	7.05		EMA	3	FR EMA* Code 3	
			2	Serious haemorrhage	33	87.88	9.09	3.03				69.70	12.12		EMA	3		
			3	Unknown injuries (police not present)	235	92.34	6.81	0.43		0.43	0.43	66.81	5.96		EMA	3		
		D	1	Multiple victims	7	85.71				14.29	14.29	57.14	14.29	Y	EMA	3		
			2	Dangerous injuries	14	78.57	21.43					78.57	42.86	Y	HLA	3		
			3	Not alert	47	87.23	12.77					87.23	4.26	Y	HLA	3	FR EMA Code 3	
			4	Abnormal breathing	7	71.43	28.57					85.71	14.29	Y	HLA	3		
5	BACK PAIN (NON TRAUMA)	A	1	Non traumatic back pain	1,049	96.66	3.24	*	0.10		1.14	2.10	0.95		EMA	2		
			2	Non recent* * (> 6 hrs)	371	98.65	1.35					1.35	0.27		EMA	2		
		C	1	Fainting (> = 50 years)	11	81.82	18.18					81.82		Y	HLA	3	Fr EMA Code 3	
		D	1	Not alert	9	77.78	11.11		11.11			77.78		Y	HLA	3		

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						0	1	2	3	4								
6	BREATHING PROBLEM	C	1	Difficulty breathing	2,921	70.93	25.40	2.50	0.34	0.82	10.71	88.72	9.52	Y	HLA	3		
			2	Asthma	789	69.71	28.01	1.01		1.27	3.92	89.35	11.66	Y	EMA*	3	FR HLA Code 3	
			3	Cardiac history	1,356	67.40	28.47	2.51	0.44	1.18	26.25	89.90	11.21	Y	HLA	3		
		D	1	Severe respiratory distress	755	58.69	36.95	3.31	0.66	2.38	15.75	90.60	18.81	Y	HLA	3		
			2	Not alert	137	55.47	30.66	8.76		5.11	10.95	91.97	18.06	Y	HLA	3		
			3	Sweaty or colour change	1,160	65.34	28.88	3.36	0.17	2.24	17.41	88.10	14.48	Y	HLA	3		
7	BURNS / EXPLOSION	A	1	Small (< 18%)	38	94.74	5.26					15.79	2.63		EMA	2	FR EMA Code 3	
			2	Sunburn or minor (< = hand size)	3	100.00									EMA	2		
		B	1	Unknown (3rd party)	37	94.60	2.70	2.70				70.27	13.51	Y	EMA	3		
		C	1	Difficulty breathing	3	100.00						66.67	33.33	Y	HLA	3		
			2	Large burns (> 18%)	9	88.89	11.11					100.00	44.44	Y	HLA	3		
		D	1	Multiple victims / HLA & EMA										Y	HLA	3		
			2	Severe respiratory distress										Y	HLA	3		
			3	Not alert										Y	HLA	3		
			4	Explosion	6	100.00						100.00	16.67	Y	HLA	3		
8	CARBON MONOXIDE INHALATION / HAZMAT	B	1	Alert, not SOB	19	89.47	10.53					68.42	5.26		EMA	3	FR EMA Code 3	
		C	1	Alert, abnormal breathing	13	92.31	7.69					79.62	23.08	Y	HLA	3	FR EMA Code 3	
		D	1	Multiple victims / HLA & EMA	8	100.00						100.00	37.50	Y	HLA	3		
			2	Not alert	3	66.67		33.33				100.00	33.33	Y	HLA	3		
			3	HAZMAT	1		100.00					100.00	100.00	Y	HLA	3		
			4	Unknown	13	84.62	15.38					84.62		Y	HLA	3	FR EMA Code 3	
9	CARDIAC / RESPIRATORY	B	1	Obvious death	27	7.41	3.70		7.41	81.48		77.78	3.70		EMA	3		
		D	1	Suspect cardiac arrest	107	26.17	15.89	8.41	9.35	40.19		88.79	21.50	Y	HLA	3		
			2	Suspected respiratory arrest	20	45.00	5.00	25.00	5.00	20.00		90.00	20.00	Y	HLA	3		
10	CHEST PAIN	A	1	Normal breathing (age < 35)	184	94.02	5.98				8.15	15.76	4.89		EMA	2		
		C	1	Normal breathing (age >= 35)	1,463	92.00	6.70	0.21	0.14	0.96	36.91	87.08	8.00	Y	HLA	3		
			2	Abnormal breathing	777	86.62	12.48	0.26		0.64	35.78	90.09	10.17	Y	HLA	3		
			3	Cocaine	38	89.47	10.53				31.58	81.58	5.26	Y	HLA	3		
			4	Cardiac history	2,834	88.18	10.16	0.71	0.14	0.81	52.89	90.68	11.47	Y	HLA	3		
		D	1	Severe respiratory distress	191	85.34	14.14			0.52	47.12	87.96	20.94	Y	HLA	3		
			2	Not alert	47	78.72	19.15			2.13	25.54	95.74	12.77	Y	HLA	3		
			3	Sweaty or changing colour	1,292	87.38	10.84	0.70	0.15	0.93	45.28	90.17	14.09	Y	HLA	3		
11	CHOKING	A	1	Not choking now (can talk/cry, alert)	31	83.87	12.90	3.23				19.35			EMA	2		
		D	1	Choking	60	73.33	18.33	1.67			3.34	90.00	10.00	Y	HLA	3		
			2	Abnormal breathing	21	90.48	4.76	4.76				90.48	4.76	Y	HLA	3		
			3	Not alert	1	100.00						100.00		Y	HLA	3		
12	CONVULSION / SEIZURE	A	1	Breathing now	686	82.22	15.16	1.60	0.15	0.87	0.73	24.93	3.50		EMA	2	FR EMA Code 3	
		D	1	Age < 35 (breathing not verified)	337	71.22	21.90	2.97	0.89	2.97	0.30	85.16	5.64	Y	EMA	3		
		C	1	Pregnant	6	50.00	33.33	16.67				83.33		Y	HLA	3		
			2	Trauma	20	80.00	10.00	5.00		5.00		80.00	10.00	Y	HLA	3		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL	CODE	REVISED RESOURCE ALLOCATION	COMMENTS
						0	1	2	3	4								
12	CONVULSION / SEIZURE *Contd.*	C	3	Diabetic	57	57.89	38.60	3.51			3.50	89.47	12.28	Y	EMA*	3		
			4	Cardiac history	67	62.69	32.84	2.99		1.49	4.48	91.04	11.94	Y	HLA	3		
		D	1	Continuous or multiple	666	63.66	30.33	3.00	0.45	2.55	0.60	89.94	10.51	Y	HLA	3		
			2	Age >= 35 (breathing not verified)	154	70.13	24.03	3.90	0.65	1.30	1.30	86.36	8.44	Y	HLA	3		
			3	Not breathing	41	46.78	41.46	7.32		2.44		80.49	9.76	Y	HLA	3		
13	DIABETIC	A	1	Conscious and alert	431	90.02	9.28	0.23	0.23	0.23	1.39	9.98	2.78		EMA	2		
		C	1	Conscious but not alert	680	59.56	37.21	2.06	0.29	0.88	2.22	87.35	7.35	Y	EMA	3	FR HLA Code 3	
			2	Conscious, abnormal breathing	105	57.14	37.14	1.90	1.90	1.90	5.71	82.86	5.71	Y	HLA	3		
		D	1	Unconscious	265	31.58	60.70	3.16	1.05	3.51	1.40	90.18	10.18	Y	EMA*	3	FR HLA Code 3	
14	DROWNING / DIVING ACCIDENT	A	1	Alert / breathing normally (out of water)	2	50.00		50.00							EMA	2		
		B	1	Alert / breathing normally (injuries &/or in water)	1	100.00						100.00		Y	EMA	3		
			2	Unknown	1	100.00						100.00		Y	EMA	3		
		C	1	Alert / abnormal breathing										Y	HLA	3		
		D	1	Unconscious										Y	HLA	3		
			2	Not breathing or underwater										Y	HLA	3		
			3	Not alert or abnormal breathing										Y	HLA	3		
			4	Suspected neck injury	2	100.00						50.00		Y	EMA	3		
			5	Diving or scuba accident	2	50.00	50.00					50.00		Y	HLA	3		
15	ELECTROCUTION	C	1	Alert / breathing normally	9	88.89		11.11			11.11	88.89		Y	HLA	3		
		D	1	Unconscious	3	100.00						66.67		Y	HLA	3		
			2	Not disconnected from power										Y	HLA	3		
			3	Power not off, hazard present										Y	HLA	3		
			4	Not alert										Y	HLA	3		
			5	Abnormal breathing	5	100.00						100.00		Y	HLA	3		
			6	Long fall (> 2m)										Y	HLA	3		
			7	Unknown										Y	HLA	3		
16	EYE PROBLEM / INJURIES	A	1	Moderate injuries	48	95.83	2.08	2.08				10.42	6.25		EMA	2		
			2	Minor injuries / problems	15	100.00									EMA	2		
		B	1	Severe injuries	25	96.00	4.00					84.00	12.00		EMA	3		
		D	1	Not alert	1	100.00						100.00		Y	HLA	3		
17	FALLS / BACK INJURIES (TRAUMATIC)	A	1	Not dangerous injuries	4,395	93.56	6.01	0.23	0.07	0.11	0.48	2.64	0.77		EMA	2		
			2	Non-recent (> 6 hours)	801	92.76	6.74	0.50			0.75	1.00	0.37		EMA	2		
		B	1	Possibly dangerous	1,673	92.53	6.46	0.66		0.36	0.90	82.01	2.93		EMA	3	FR EMA Code 3	
			2	Serious haemorrhage	97	91.75	8.25				1.30	80.41	3.09	Y	EMA*	3		
			3	Unknown	384	90.63	8.33	0.78		0.26	1.30	89.84	2.86	Y	EMA	3		
		D	1	Dangerous injuries	159	90.57	8.81	0.63			0.63	79.87	8.81	Y	EMA*	3		
			2	Long fall (> 2m)	241	91.70	7.05	0.41		0.83		87.97	7.88	Y	EMA	3	FR EMA* Code 3	
			3	Not alert	224	75.00	21.88	0.89	0.45	1.79	0.45	85.71	8.93	Y	HLA	3		
			4	Abnormal breathing	84	77.38	17.86	3.57	1.19		3.57	84.52	7.14	Y	HLA	3		

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL	CODE	REVISED RESOURCE ALLOCATION	COMMENTS
						0	1	2	3	4								
18	HEADACHE	A	1	Normal breathing	245	95.10	4.90					2.04	1.22		EMA	2		
		B	1	Unknown symptoms (3rd party situation)	1	100.00						100.00			EMA	3		
		C	1	Not alert	17	64.71	29.41			5.88	5.88	76.47	11.76	Y	HLA	3		
			2	Numbness or paralysis	20	95.00	5.00					70.00	5.00		EMA	2	EMA Code 3	
			3	Speech or movement problems	4	100.00						100.00	25.00		EMA	2	EMA Code 3	
			4	Sudden onset of severe pain	66	93.94	4.55	1.52			1.52	92.42	10.61		EMA	3		
			5	Abnormal breathing	11	100.00						90.91		Y	HLA	3		
19	HEART PROBLEMS	A	1	Heart rate <130, no symptoms	129	89.92	10.08				18.28	17.05	0.78		EMA	2		
		B	1	Unknown symptoms (3rd party)	104	85.58	12.50	0.96	0.96		20.19	85.58	12.50	Y	EMA	3	FR HLA Code 3	
		C	1	Not alert	23	82.61	17.39				21.74	86.96	13.04	Y	HLA	3		
			2	Cardiac history	376	89.36	10.37	0.27			27.66	88.83	7.71	Y	HLA	3		
			3	Rate >= 130, no symptoms	131	93.89	6.11				36.64	90.08	8.40		HLA	3	FR HLA Code 3	
			4	Cocaine	10	90.00				10.00	50.00	70.00			HLA	3	FR HLA Code 3	
		D	1	Firing of implanted defibrillator	10	100.00					10.00	60.00	10.00	Y	HLA	3		
20	HEAT / 2 EXPOSURE	A	1	Alert (no priority symptoms)	14	85.71	14.29					7.14			EMA	2		
		B	1	Change in skin colour	2	100.00						50.00			EMA	2		
			2	Unknown	22	68.18	22.73	9.09				86.36	9.09		EMA	3		
		C	1	Cardiac history	3	100.00						100.00		Y	HLA	3		
		D	1	Not alert	5	60.00	20.00		20.00			100.00		Y	HLA	3		
21	HAEMORRHAGE	A	1	Not dangerous haemorrhage	807	92.94	6.82		0.12	0.12	0.25	7.43	2.73		EMA	2		
		B	1	Possibly dangerous haemorrhage	752	91.22	8.38	0.27		0.13	1.46	84.04	7.85		EMA	3		
		D	1	Dangerous haemorrhage	639	85.60	13.30	0.94		0.16	0.63	87.64	12.05	Y	EMA*	3		
			2	Not alert	30	80.00	20.00					90.00	6.67	Y	HLA	3		
			3	Severe respiratory distress	25	60.00	28.00	12.00				96.00	28.00	Y	HLA	3		
22	INDUSTRIAL / MACHINERY	B	1	Unknown, not caught in machine	36	97.22	2.78					83.33	16.67		EMA	3		
		D	1	Multiple victims / HLA & EMA	2	100.00						50.00		Y	HLA	3		
			2	Trapped or caught in machinery	10	100.00						70.00	30.00	Y	HLA	3		
			3	Life status questionable	1	100.00						100.00	100.00	Y	HLA	3		
23	OVERDOSE / INGESTION POISONING	B	1	Conscious and alert	528	82.58	13.83	2.46		1.14	0.19	9.85	4.36	[illegible]	EMA	2	Fr EMA Code 2	
		C	1	Not alert	333	62.46	26.73	5.71	0.90	4.20	0.30	84.38	13.21	Y	HLA	3		
			2	Abnormal breathing	45	73.33	17.78	6.67		2.22		97.78	4.44	Y	HLA	3		
			3	Antidepressants or cardiac meds	62	77.42	19.35			3.23		88.71	14.52	Y	HLA	3		
			4	Cocaine	45	73.33	17.78	6.67		2.22		80.00	2.22		HLA	3		
			5	Acid or alkali	9	88.89	11.11					55.56	11.11		HLA	3		
			6	Violent	23	91.30	8.70				0.30	65.22	8.70		EMA	3		
		D	1	Unconscious	335	36.12	31.34	14.63	0.30	17.61		91.04	11.64	Y	HLA	3		
			2	Severe respiratory distress	5	40.00	20.00			40.00		100.00		Y	HLA	3		
24	PREGNANCY / CHILDBIRTH MISCARRIAGE	A	1	1st trimester bleed/miscarriage	70	90.00	10.00					20.00	14.29		EMA	2		
			2	Illness during pregnancy (no priority symptoms)	32	90.63	9.38					6.25	6.25		EMA	2		
		B	1	Labour 2nd & 3rd trimester (delivery not imminent)	80	93.75	6.25					30.00	10.00		EMA	2		

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						0	1	2	3	4								
24	PREGNANCY / CHILDBIRTH / MISCARRIAGE *contd.*	B	2	Unknown pregnancy problem	50	84.00	14.00		2.00			72.00	12.00		EMA	3		
		C	1	2nd trimester bleed/miscarriage	49	89.80	8.16		2.04			89.80	26.53		EMA*	3		
		D	1	Baby born (HLS if problem w/ baby)	10	90.00	10.00					60.00	20.00		EMA	3		
			2	Crowning	7	85.71	14.29					100.00	14.29		HLA	3	EMA Code 3	
			3	Imminent delivery (3rd trimester)	60	95.00	3.33	1.67			1.67	80.00	21.67		HLA	3	EMA Code 3	
			4	3rd trimester bleeding	27	96.30	3.70					77.78	33.33	Y	HLA	3	EMA* Code 3	
			5	Breech presentation										Y	HLA	3		
25	PSYCHIATRIC / SUICIDE	A	1	Non violent, not suicidal, alert	742	91.64	6.09	0.27			0.27	1.48	0.81		EMA	2		
		B	1	Unknown	89	87.64	6.99	3.37			1.12	47.19	5.62		EMA	3		
		C	1	Not alert	24	75.00	16.67	4.17		4.17		62.50	12.50	Y	HLA	3		
			2	Violent	129	88.37	9.30	1.55		0.78		16.28			EMA	2		
			3	Suicidal (threatening)	310	90.97	6.13	1.94		0.97	0.32	41.29	6.13		EMA	3	EMA Code 2	
		D	1	Hanging, strangulation, suffocation	14	57.14	21.43			21.43		100.00	7.14	Y	HLA	3		
26	SICK PERSON	A	1	No priority symptoms	6,286	89.44	9.47	0.84	0.10	0.16	1.44	2.20	1.34		EMA	2		
			2/3	Non priority symptoms	767	88.30	10.70	0.81	0.14	0.05	0.28	0.52	0.32		EMA	2		
		B	1	Unknown symptoms	148	81.76	14.19	2.70		1.35	6.08	70.27	8.11		EMA	3		
		C	1	Not alert	176	76.70	18.75	4.55			5.69	60.68	5.11	Y	HLA	3		
			2	Cardiac history (not 2-28)	362	85.64	12.71	1.10	0.28	0.28	7.19	79.83	3.31	Y	HLA	3		
27	STAB / GUNSHOT WOUNDS	A	1	Not recent, single, peripheral (>6h)	9	100.00						11.11			EMA	2		
		B	1	Single, peripheral	12	100.00						58.33		Y	EMA	3		
			2	Not recent (> 6 hrs) central										Y	EMA	3	EMA Code 2	
			3	Unknown	44	86.36	13.64					84.09	25.00	Y	EMA	3		
		D	1	Central wound	20	75.00	20.00		5.00			85.00	30.00	Y	HLA	3		
			2	Multiple victims / HLA & EMA										Y	HLA	3		
			3	Not alert	1	100.00						100.00		Y	HLA	3		
			4	Multiple wounds										Y	HLA	3		
28	STROKE / CVA	A	1	Normal breathing (age < 35)	1,270	86.77	12.05	0.87		0.31	1.49	6.14	2.91		EMA	2		
		B	1	Unknown symptoms (3rd party activation)	128	79.69	16.41	0.78	0.78	2.34	1.56	86.72	12.50		EMA	3	FR EMA Code 3	
		C	1	Not alert	485	63.71	29.07	4.12	0.41	2.68	2.48	87.63	10.10	Y	HLA	3		
			2	Abnormal breathing	172	75.00	21.51	2.33		1.16	6.97	93.60	8.72	Y	HLA	3		
			3	Speech or movement problems	1	100.00						100.00			EMA	2		
			4	Numbness or tingling											EMA	2		
			5	Stroke history											EMA	2		
			6	Normal breathing (age > 35)											EMA	2		
29	TRAFFIC ACCIDENT	A	1	1st party, not dangerous injuries	325	90.92	3.08		0.06		0.31	12.00	0.62		EMA	2	FR EMA Code 2	
		B	1	Injuries	1,638	95.48	3.97	0.18	0.06	0.31	0.55	85.23	8.05	Y	EMA	3		
			2	Unknown	2,532	95.38	3.55	0.43		0.55	0.24	86.89	8.33	Y	EMA	3		
		D	1	Multiple victims / HLA & EMA	190	93.16	6.32			0.53	0.53	88.95	11.05	Y	HLA	3	FR EMA Code 3	
			2	Auto-ped / motorcycle / bicycle	768	93.75	4.56	0.78		0.91	0.54	88.02	10.81	Y	HLA	3	FR EMA Code 3	
			3	HAZMAT	11	100.00						81.82	9.09	Y	HLA	3	FR EMA Code 3	

#	PROBLEM	DETERMINANT			TOTAL # CALLS	ACUITY LEVEL (% TOTAL CALLS)					% CARDIAC INDICATOR	% CODE 3 RESPONSE	% CODE 3 DESTINATION	FR	QUAL	CODE	REVISED RESOURCE ALLOCATION	COMMENTS
						0	1	2	3	4								
29	TRAFFIC ACCIDENT cont'd.	D	4	Trapped	226	89.38	6.19	1.77		2.65	0.44	91.59	20.80	Y	HLA	3		
			5	Ejected	22	90.91	9.09					86.36	4.55	Y	HLA	3		
			6	Not alert	21	80.95	9.52			9.52		85.71	19.05	Y	HLA	3		
			7	Severe respiratory distress	3	66.67				33.33		100.00	33.33	Y	HLA	3		
30	TRAUMATIC INJURIES SPECIFIC	A	1	Not dangerous	1,748	95.88	3.78	0.23		0.11	0.28	4.00	1.09		EMA	2		
			2	Not recent (>6 hrs)	102	96.08	3.92					0.98			EMA	2		
		B	1	Possibly dangerous	570	94.74	4.91	0.18		0.18		82.81	6.32		EMA	3		
			2	Serious haemorrhage	29	93.10	6.90					89.66	6.90	Y	EMA*	3		
		D	1	Dangerous injuries	143	91.61	6.99		0.70	0.70	0.70	83.92	9.79	Y	HLA	3		
			2	Severe respiratory distress	12	91.67	8.33					91.67	8.33	Y	HLA	3		
			3	Not alert	30	83.33	16.67					90.00	10.00	Y	HLA	3		
31	UNCONSCIOUS / FAINTING (NON-TRAUMATIC)	A	1	Single faint, alert (< 35 yrs)	276	89.13	10.51	0.36				17.03	2.54		EMA	2		
			2	Near faint, alert (< 35 yrs)	71	95.77	1.41		1.41	1.41	4.23	16.90	4.23		EMA	2		
		C	1	Single or near faint (> 35 yrs)	1,217	84.14	13.56	1.23	0.08	0.99	2.71	84.14	4.77	Y	EMA*	3		
			2	Multiple fainting episodes	130	84.62	13.85		0.77	0.77	2.31	87.69	4.62	Y	EMA*	3		
			3	Female 12 – 50 yrs, abdominal pain	25	88.00	12.00					76.00	4.00	Y	EMA*	3		
			4	Conscious, abnormal breathing	150	74.67	29.67	4.00		0.67	6.01	92.67	10.67	Y	HLA	3		
			5	Cardiac history	415	82.41	13.49	2.17	0.48	1.45	10.12	91.33	7.71	Y	HLA	3		
		D	1	Unconscious	1,144	55.42	29.72	6.12	0.87	7.87	3.24	68.29	14.07	Y	HLA	3		
			2	Severe respiratory distress	42	64.29	14.29	9.52	2.38	9.52	9.52	80.95	11.90	Y	HLA	3		
			3	Not alert	547	63.80	26.69	6.22	0.91	2.38	4.38	88.30	9.96	Y	HLA	3		
32	UNKNOWN PROBLEM	B	1	Standing, sitting up, moving, talking	720	83.61	13.75	1.25	0.42	0.97	1.25	10.14	1.67		EMA	2		
			2	Medical alert notification (pending)	121	86.78	11.57	1.65			10.75	75.21	4.96	Y	EMA	3		
			3	Unknown	1,718	77.88	16.76	2.27	0.41	2.68	2.50	83.41	7.22	Y	EMA	3		
		D	1	Life status questionable	64	51.56	25.00	4.69	6.25	12.50	3.12	87.50	7.81	Y	HLA	3		
				TOTAL	63516	84.74	12.68	1.32	0.21	1.06	7.73	54.19	6.32					

COMMENTS/NOTES:

Delphi Round Two
Accepted Changes

MPDS Code	Definition	Revised Resource	Change in resource
1C1	Abdominal Pain - Male ≥ 35 Years	EMA Code 2	Downgrade response mode
1C2	Abdominal Pain – Female ≥ 45 years	EMA Code 2	Downgrade response mode
3D1	Animal Bites - Severe Central Bites	FR EMA Code 3	Downgrade Qualification
6C2	Breathing Problems - Asthma	FR HLA Code 3	Upgrade Qualification
8B1	Carbon Monoxide/Inhalation/Hazmat – Alert, not Short of Breath	FR EMA Code 3	Add FR
8D4	Carbon Monoxide/Inhalation/Hazmat – Unknown	FR EMA Code 3	Downgrade Qualification
13D1	Diabetic – Unconscious	FR HLA Code 3	Upgrade Qualification
17D2	Falls/Back Injuries (traumatic) – Long Fall (> 2m)	FR EMA* Code 3	Upgrade IV Endorsement
19B1	Heart Problems – Unknown Symptoms (3rd party call)	FR HLA Code 3	Upgrade Qualification
19C3	Heart Problems – Rate ≥130, no symptoms	FR HLA Code 3	Add FR
19C4	Heart Problems – Cocaine	FR HLA Code 3	Add FR
24D2	Pregnancy/Childbirth – Crowning	EMA Code 3	Downgrade Qualification
24D3	Pregnancy/Childbirth – Imminent Delivery (3rd Trimester)	EMA Code 3	Downgrade Qualification
25C3	Psychiatric/Suicide – Suicidal	EMA Code 2	Downgrade Mode of Response
27B2	Stab/Gunshot – Not Recent (>6 hours)	EMA Code 2	Remove FR Downgrade Mode of Response
28B1	Stroke/CVA – Unknown Symptoms (3rd Party)	FR EMA Code 3	Add FR
29D1	Traffic Accidents – Multiple Victims	FR EMA Code 3	Downgrade Qualifications
29D2	Traffic Accidents – Auto-ped/motorcycle/bicycle	FR EMA Code 3	Downgrade Qualification
29D3	Traffic Accidents – Hazmat	FR EMA Code 3	Downgrade qualification

APPENDIX E

Round 3
Resource Allocation plan Revision Project

Dear Participants,

This is the third round of the Resource Allocation Revision Project to determine changes in how we respond to emergencies with the BC Ambulance Service. Here is a brief recap of the history of this project. Due to the vast amount of data and the large number of participants, it was necessary to use a process that was conducive to identifying the changes that were important and agreed to by the majority of participants. The data provided to you included information about the acuity or seriousness of patients in each of the 240 call types (MPDS Codes). The Delphi method was used because it allows for input and feedback that spans over several rounds and does not require the participants to meet face-to-face.

Round 1
Round 1 of this process began with a presentation to describe the project, to explain the Delphi Process and to distribute the first round of surveys. Common themes were identified and compiled. The result of the first round was a list of 33 proposed changes.

Round 2
Round 2 asked whether you agreed or disagreed with the 33 proposed revisions identified in Round 1. Consensus was determined if $\geq$ 75% of you were in agreement. Of the 33 proposed revisions, you reached consensus on 19.

Round 3
The attached table shows the remaining 14 codes that were suggested for change in Round 1 but received less than 75% agreement in Round 2. Before dismissing these codes I would like you to take another look to see if you think the proposed changes are appropriate or not appropriate.

For Round three please pay attention to the quantitative data, i.e.

- percentage of calls with normal vital signs,
- percentage of calls requiring code three transport, and
- the percentage of calls that had indicators of a cardiac event (chest pain).

Based on this information indicate to what extent you agree or disagree with the revised resource for these calls by circling a number on the scale next to each code that best describes you opinion (1 = Strongly Disagree; 5 = Strongly Agree).

Please return the completed questionnaire by fax no later than January 21, 2000 to:

Drew Burgwin
c/o BCAS Headquarters
(250) 952-0905

REMEMBER: Please include your NAME and AFFILIATION

The research methodology does not allow us to use your data unless we can categorize you by name and affiliation.

NAME:_____ AFFILIATION_____

KEY TERMS:
Qual = Qualification of BCAS provider (EMA, EMA*, Highest Level Available)
HLA = Highest Level Available (ALS in communities with ALS coverage)
FR = First Responder
EMA = Emergency Medical Assistant (Other than ALS)
EMA* = EMA with IV Skills
ALS = Advanced Life Support
Code = Mode of response (lights and siren)
Code 2= Routine
Code 3= Lights and Siren

NOTE:
There has been concern voiced by several First Responder Agencies that they cannot agree to the RAP because they do not have sufficient resources to respond to all the calls indicated as First Responder calls. The RAP represents the highest level of First responder involvement. First Responder agencies have the option to respond to a limited number of call types or they can participate to the full extent of the RAP.

CODE	DEFINITION	# of Calls with complete documentation	% with Normal Vital Signs	% of calls code 3 to hosp.	% Cardiac Indicator	PROPOSED RAP REVISION (Upgrade or Downgrade)	Strongly Disagree	Disagree	Agree	Strongly Agree
03D2	Animal Bites - Large carnivore	1	100%	0%	0%	FR EMA Code 3 (Downgrade Qual)	1	2	3	4
04B1	Assault/Rape - Possibly dangerous injuries	241	94.19%	7.05%	0%	FR EMA* Code 3 (Upgrade FR)	1	2	3	4
04D3	Not alert	47	87.23%	4.26%	0%	FR EMA Code 3 (Downgrade Qual)	1	2	3	4

CODE	DEFINITION	# of Calls with complete documentation	% with Normal Vital Signs	% of calls code 3 to hosp.	% Cardiac Indicator	PROPOSED RAP REVISION (Upgrade or Downgrade)	Strongly Disagree	Disagree	Agree	Strongly Agree
5C1	Back Pain (Non Traumatic) – Fainting ≥ 50 years	11	81.82%	0%	0%	FR EMA Code 3 (Downgrade Qual)	1	2	3	4
07A1	Small Burns (< 18%)	38	94.74%	2.62%	0%	FR EMA Code 3 (Upgrade FR & Qual)	1	2	3	4
08C1	Carbon Monoxide/Inhalation/HazMat - Alert, abnormal breathing	8	92.31%	23.08	0%	FR EMA Code 3 (Downgrade Qual)	1	2	3	4
12A1	Breathing now (Physically Verified by the caller	686	82.22%*	3.5%	0.73%	FR EMA Code 3 Upgrade FR & Code)	1	2	3	4
13C1	Diabetic – Conscious but not alert	680	59.56%	7.35%	2.22%	FR HLA Code 3 (Upgrade Qual)	1	2	3	4
17B1	Falls – Possibly Dangerous Injuries	1,673	92.53%	2.93%	0.90%	FR EMA Code 3 (Upgrade FR)	1	2	3	4
18C2	Headache – Numbness or paralysis	20	95%	5%	0%	EMA Code 3 (Upgrade Code)	1	2	3	4
18C3	Headache – Sudden onset of severe pain	4	100%	25%	0%	EMA Code 3 (Upgrade Code)	1	2	3	4
23B1	Overdose/Ingestion/Poison – Conscious & Alert	528	82.58%	4.36%	0.19%	FR EMA Code 2 (Upgrade FR)	1	2	3	4
24D4	Pregnancy/Childbirth – 3rd Trimester Bleed	27	96.30%	33.33%	0%	EMA Code 3 (Downgrade Qual)	1	2	3	4
29A1	Traffic Accidents – 1st party Caller with Not Dangerous Injuries	325	96.92	.62%	0.31%	FR EMA Code 2 (Upgrade FR)	1	2	3	4

**12A1 represents patients that have stopped seizing and are confirmed to be breathing. An altered level of conscious is the main vital sign that is abnormal but in this setting it is not considered life threatening as long as breathing,is confirmed.*

The following statements were offered in addition to the 33 changes identified in the first Delphi round. Please indicate your level of agreement by circling the number that closely resembles your agreement or disagreement..

1. On Bravo level calls, First responders should only be sent when the ambulance is expected to be greater than 10 minutes. (The exception would be sending the fire department on Bravo calls requiring scene safety, i.e. card 7, 8, and 29)

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

2. All Bravo level calls with low acuity, i.e. codes with 90% of the patients having normal vital signs (Level 0), should be a code 2 response

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

3. First Responders should not be sent on calls that are routine responses (no lights or siren) except on scene safety calls.

Strongly Disagree	Disagree	Agree	Strongly Agree
1	2	3	4

Delphi Round Three
Accepted Changes

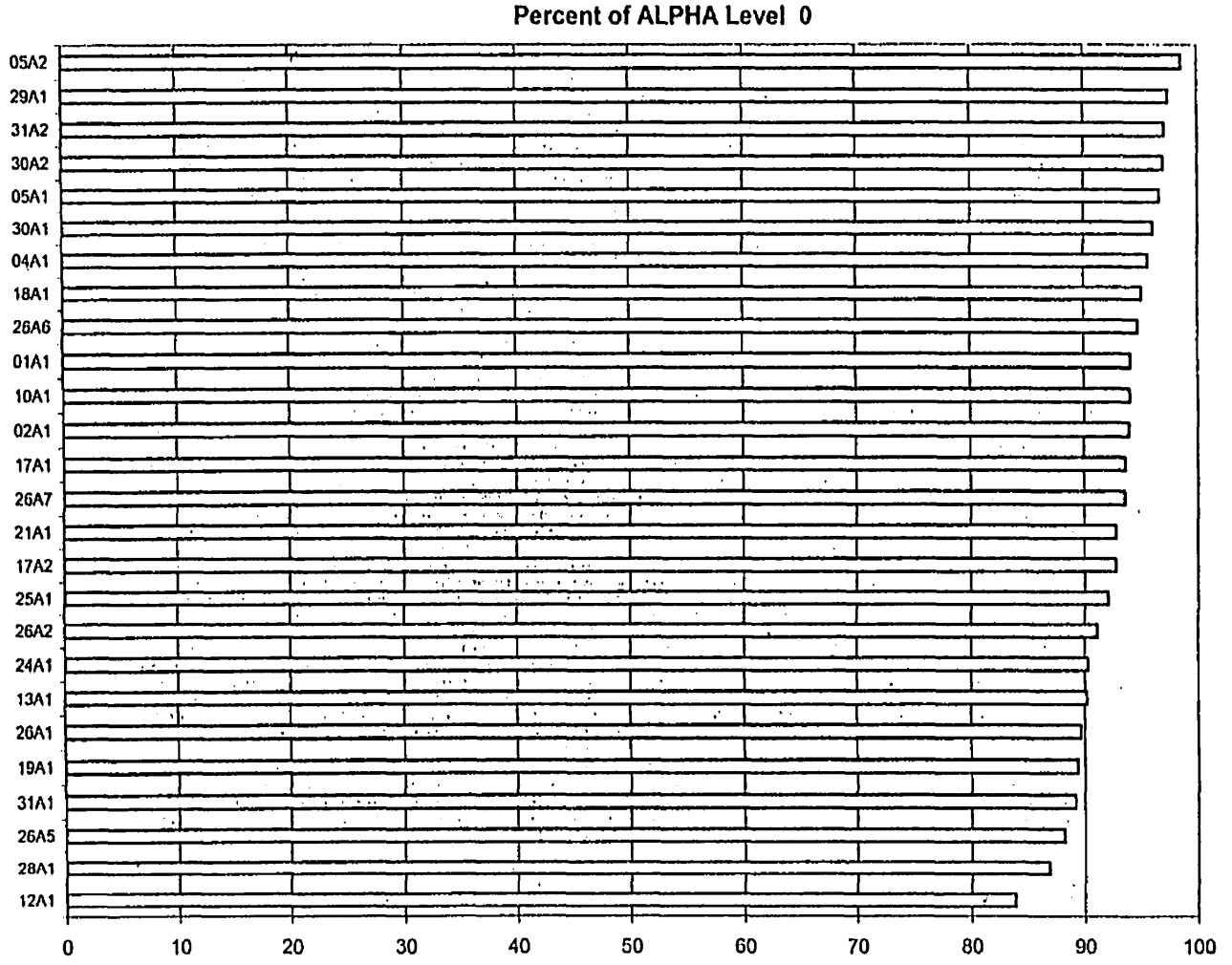
MPDS Code	Definition	Revised Resource	Change in resource
3D2	Animal Bites – Large Carnivore	FR EMA Code 3	Downgrade Qualification
5C1	Back Pain (non-traumatic) – Fainting ≥ 50 years	FR EMA Code 3	Downgrade Qualification
7A1	Burns/Explosions – Small (<18%)	FR EMA Code 3	Add FR and Upgrade mode of response
17B1	Falls/Back Injuries (traumatic) – Possibly Dangerous Injuries	FR EMA Code 3	Add FR
18C2	Headache – Numbness or paralysis	EMA Code 3	Upgrade Mode of Response
18C3	Headache – Speech or movement problems	EMA Code 3	Upgrade Mode of Response
Statement 3	First Responders should not be sent on calls that are routine responses (no lights or siren) except on scene safety calls.		

Final Delphi List of Changes

MPDS Code	Definition	Revised Resource	Change in Resource
01C1	Abdominal Pain - Male ≥ 35 Years	EMA Code 2	Downgrade response mode
01C2	Abdominal Pain – Female ≥ 45 years	EMA Code 2	Downgrade response mode
03D1	Animal Bites - Severe Central Bites	FR EMA Code 3	Downgrade Qualification
03D2	Animal Bites – Large Carnivore	FR EMA Code 3	Downgrade Qualification
05C1	Back Pain (non-traumatic) – Fainting ≥ 50 years	FR EMA Code 3	Downgrade Qualification
06C2	Breathing Problems - Asthma	FR HLA Code 3	Upgrade Qualification
07A1	Burns/Explosions – Small (<18%)	FR EMA Code 3	Add FR and Upgrade mode of response
08B1	Carbon Monoxide/Inhalation/Hazmat – Alert, not Short of Breath	FR EMA Code 3	Add FR
08D4	Carbon Monoxide/Inhalation/Hazmat – Unknown	FR EMA Code 3	Downgrade Qualification
13D1	Diabetic – Unconscious	FR HLA Code 3	Upgrade Qualification
17B1	Falls/Back Injuries (traumatic) – Possibly Dangerous Injuries	FR EMA Code 3	Add FR
17D2	Falls/Back Injuries (traumatic) – Long Fall (> 2m)	FR EMA* Code 3	Upgrade IV Endorsement
18C2	Headache – Numbness or paralysis	EMA Code 3	Upgrade Mode of Response
18C3	Headache – Speech or movement problems	EMA Code 3	Upgrade Mode of Response
19B1	Heart Problems – Unknown Symptoms (3rd party call)	FR HLA Code 3	Upgrade Qualification
19C3	Heart Problems – Rate ≥130, no symptoms	FR HLA Code 3	Add FR
19C4	Heart Problems – Cocaine	FR HLA Code 3	Add FR
24D2	Pregnancy/Childbirth – Crowning	EMA Code 3	Downgrade Qualification
24D3	Pregnancy/Childbirth – Imminent Delivery (3rd Trimester)	EMA Code 3	Downgrade Qualification
25C3	Psychiatric/Suicide – Suicidal	EMA Code 2	Downgrade Mode of Response
27B2	Stab/Gunshot – Not Recent (>6 hours)	EMA Code 2	Remove FR Downgrade Mode of Response
28B1	Stroke/CVA – Unknown Symptoms (3rd Party)	FR EMA Code 3	Add FR
29D1	Traffic Accidents – Multiple Victims	FR EMA Code 3	Downgrade Qualifications

29D2	Traffic Accidents – Auto-ped/motorcycle/bicycle	FR EMA Code 3	Downgrade Qualification
29D3	Traffic Accidents – Hazmat	FR EMA Code 3	Downgrade qualification
Statement 3	First Responders should not be sent on calls that are routine responses (no lights or siren) except on scene safety calls.		

APPENDIX F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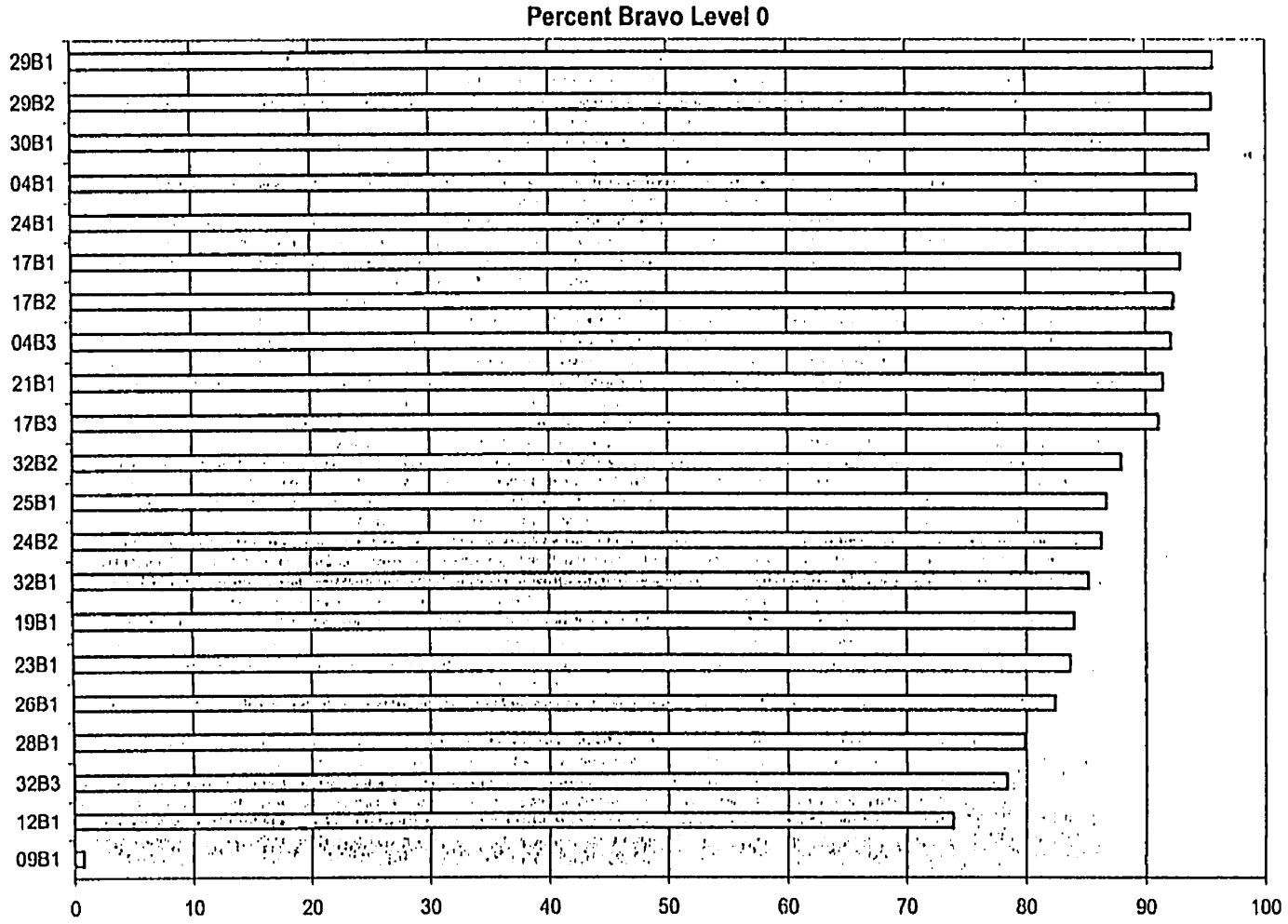
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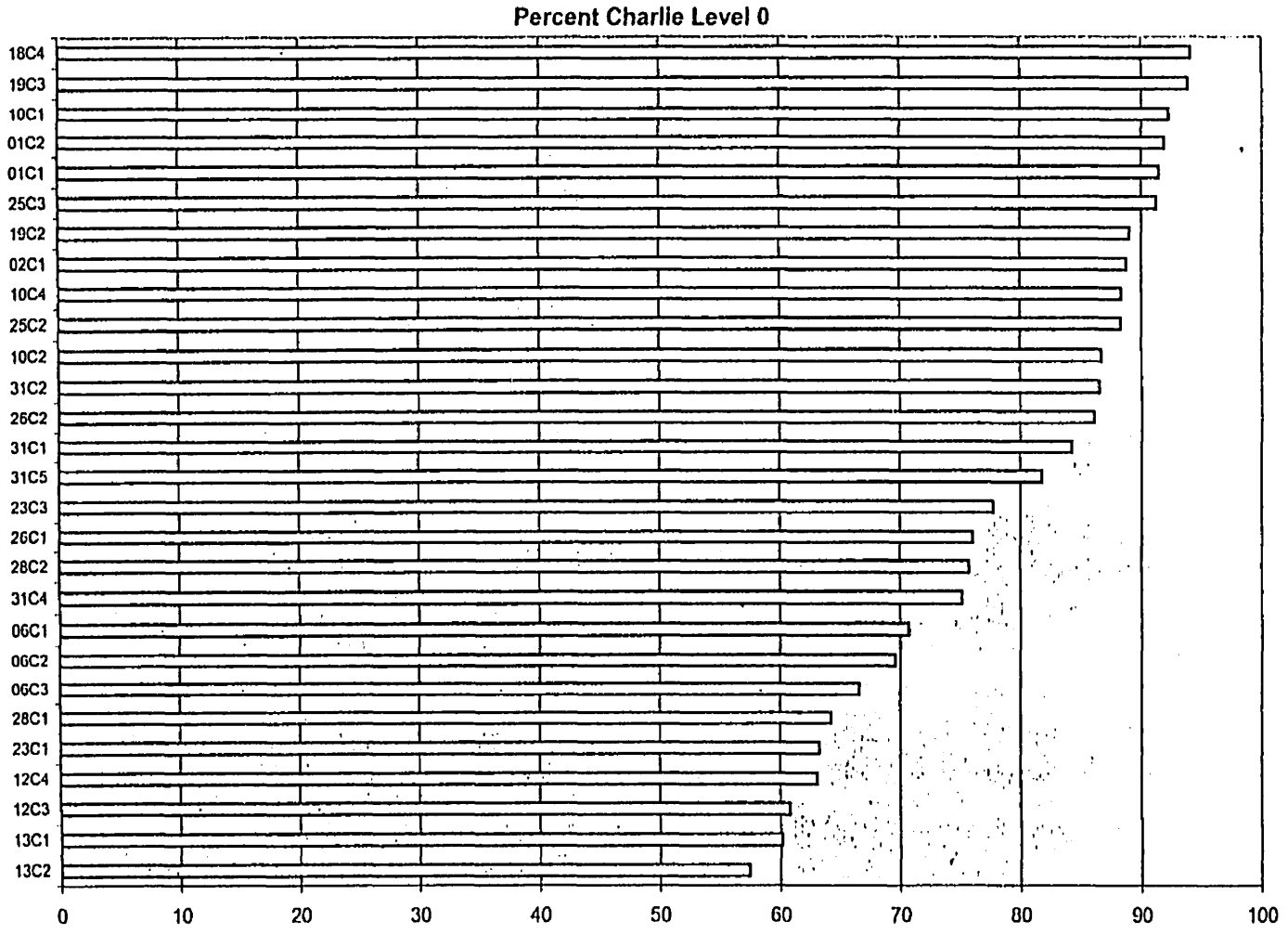
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26C1
28C2
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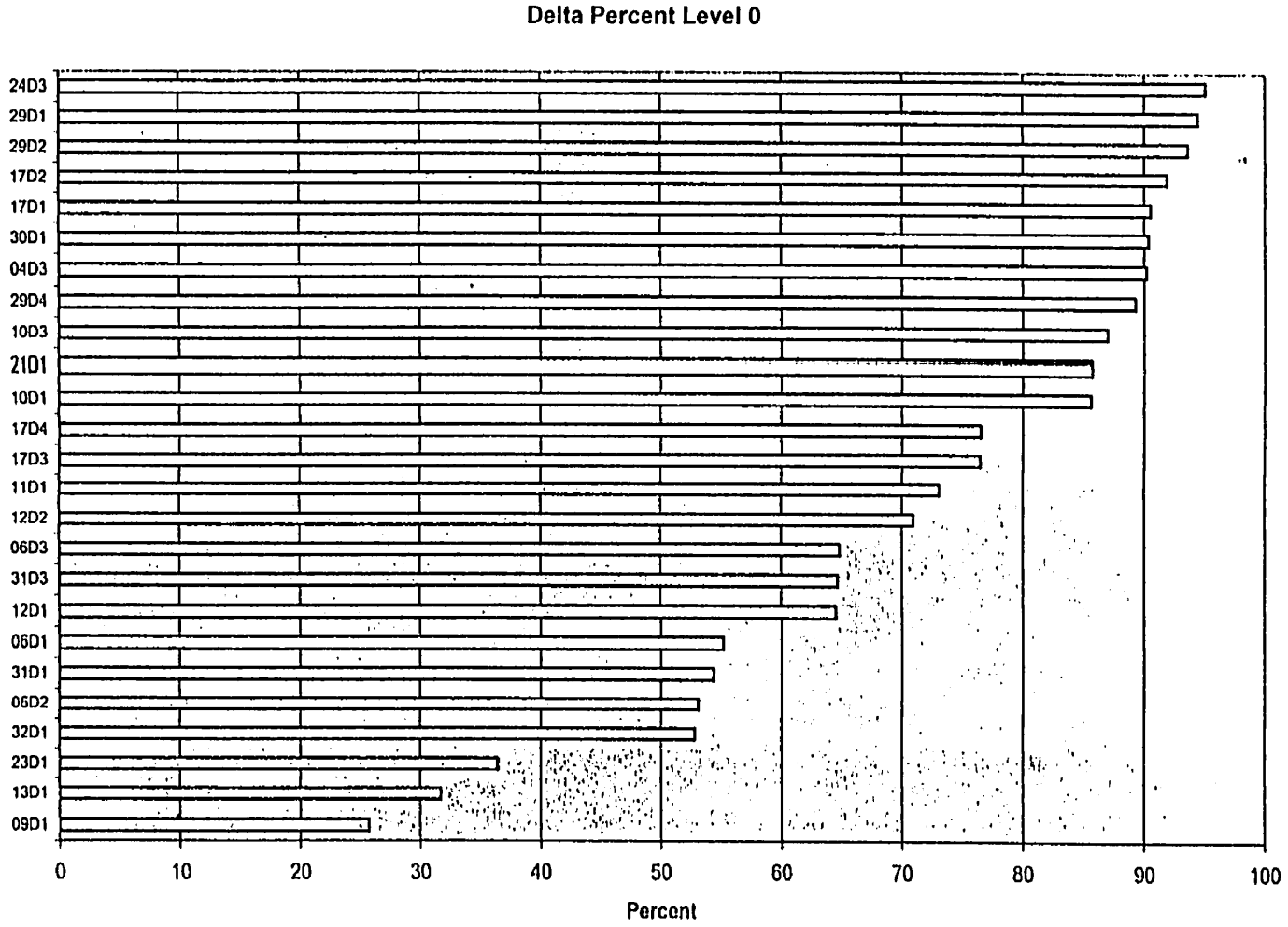
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20
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40
50
60
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80
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100
Percent

APPENDIX G