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Evaluation of Emergency Medical Services

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16. Abstract

This contract extension was to continue to generate data from Maine's EMS management system for the purpose of evaluating EMS effectiveness. This study suggests support for the hypothesis that there is no significant difference in patient outcome between the reference group receiving BLS treatment and a comparison group receiving ALS treatments. Incomplete data complicated the process of implementing the proposed evaluation design using ridit analysis. The resulting modifications to the design will facilitate repetition of the study using 1981 data in hopes of generating more cells for analysis. Ambulance personnel should be encouraged to record accurate and complete prehospital data so that EMS effectiveness can be documented for funding purposes.

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INTRODUCTION

The Emergency Medical Services (EMS) Act of 1973 was enacted to reduce unnecessary mortality and morbidity from medical emergencies and was a reflection of the increased perception that timely, appropriate care could have a positive impact on victims previously considered unsalvageable. This act provided federal funds to encourage a partnership among federal, state, regional, and local authorities for adoption of a systems approach to the development of fifteen EMS component areas.

Maine has received over four million dollars of EMS funds to implement and expand basic (BLS) and advanced life support (ALS) systems regionally and statewide. BLS services (non-invasive treatments) are available throughout the state. Availability of ALS services (invasive treatments) varies by capability level and location. Within the five EMS regions, population covered by ALS care of any description ranged in 1981 from none in the Aroostook County region to 90% in the Kennebec Valley region. Paramedic services have only recently become available and only in the urban areas. ALS at the MAST/EOA Level is available to one half of the Maine population. In 1980, approximately 3.6% of the 60,000 run reports processed reflect administration of at least one ALS treatment such as MAST, EOA, IV, or defibrillation.

Coordinated recordkeeping and evaluation were two of the fifteen priority component areas to be developed under the EMS Act. In Maine, a statewide run report system was revised and computerized in November, 1978 for linkage with an existing computerized hospital discharge data system. These two systems serve as the base of the EMS management information system which also includes data from the State of Maine police traffic accident reports, Vital Statistics, and special EMS research projects. It is possible to trace most ambulance transported patients from the scene to discharge, but not always via the routinely collected and computerized data bases.

The EMS data base is managed by the EMS Data/Research Unit of the Maine Health Information Center (MHIC) under contract to the Maine Department of Human Services. Run report data is key punched, processed and stored at the State Computer Center. In-house, it is also stored and manipulated at the MHIC using a DEC 2020 computer and Apple microcomputers. The amount of data missing for persons suffering medical emergencies varies within each data base. For 1980, computerized data is available for all automobile accidents in which serious personal injuries occur, for all medical emergencies admitted to Maine hospitals, and for about 81% of all ambulance runs within Maine. Completion rates vary for specific data items within each data base. Disposition data is recorded for 33% of the ambulance run reports compared to 85% for

motor vehicle injury reports. All vital signs (pulse, blood pressure and respirations) are recorded on 56% of the run reports designated "emergency" compared to almost all ED records for emergencies. Completion rates are high for data items on hospital discharge and special research data abstracts since designated personnel are specifically hired and trained to collect this data. Evaluation of the effectiveness of EMS systems using routinely collected and automated data bases is hampered by difficulties in standardizing and refining data collected by over a thousand persons during moments of high stress. However, increasing monetary and political costs discourage the creation of new data bases.

PROJECT OBJECTIVES

This project was initiated to determine whether or not a significant relationship could be demonstrated between ALS treatments and patient outcome using data generated by the Maine EMS management information system. At the time the contract was awarded, urban and rural EMS decision makers in Maine were debating the relative merits of where and when to upgrade EMS capabilities. The run report system was assumed to be capable of generating sufficient accurate data for evaluation. Implementation of this study was also intended to identify erroneous data within the system as well as those changes to the data system which would be beneficial to EMS evaluation efforts.

EVALUATION PLAN

Evaluation Question: This project proposed to test the following hypothesis:

> There is no significant difference in mortality rates between comparison groups of ambulance transported patients treated with IV, MAST, EOA, or defibrillation and the reference group not so treated prior to arrival at the hospital.

The reference group includes ambulance transported patients who received BLS care only. The comparison group includes ambulance transported patients who received one or more of the following ALS treatments as identified on Maine's ambulance run report.

1. Military Anti-Shock Trousers (MAST)
2. Esophageal Obturator Airway (EOA)
3. IV (administration of parenterals)
4. Defibrillation

It was possible to implement the evaluation design in a natural setting because ALS capabilities were not available uniformly statewide. The trauma and cardiac patients chosen for this study were, for the most part, identified retrospectively from run reports generated during 1980. It was assumed that each patient received appropriate treatment at the level available at the incident location.

Ambulance transported patients were first classified by type illness/injury, hospital categorization level, ambulance response time, age group, and severity, and then further by BLS or ALS treatment. When two levels of severity were used, this classification produced a potential of 864 cells or 432 sets of BLS and ALS paired cells for analysis; 720 sets were produced when four levels of severity were used. At each level, an "unknown" category was included for records missing data classification criteria.

Classification Criteria: The classification criteria were defined as follows.

> Type Illness/Injury: The study was limited to trauma and cardiac patients, as identified on Maine's ambulance run reports, who were transported to an acute care hospital in Maine.

Hospital Categorization Level: The existing categorization scheme in Maine was used to define hospital capability level. It includes four cardiac capability levels and two trauma capability levels. (See Appendix A for greater detail.)

Ambulance Response Time: Response time was defined as the time from the receipt of call or dispatch of vehicle to arrival at the scene. Patients were divided into those for whom the ambulance arrived within 15 minutes, and those with arrival after 15 minutes from the call or dispatch. At the end, one analysis was repeated with another response time division. Patients were divided into those for whom the ambulance arrived within 8 minutes, and those with arrival after 8 minutes from the call or dispatch.

Age Group: Patients were divided into five age groups: 0-4, 5-17, 18-44, 45-64, and 65+ years.

Severity: The Bever-Veenker Illness/Injury Severity Index (IISI) was used to score patient severity (Appendix B). Two different score groupings were used to categorize severity. The first of these segregated moderate from severe conditions.

IISI Scores For Moderate and Severe Levels

	Trauma (Injury)	Cardiac (Illness)
Moderate	0-13	0-6
Severe	14+	7+

The second grouping established four levels of severity which represented subdivisions of the moderate and severe categories.

IISI Scores For Four Severity Levels

	Trauma (Injury)	Cardiac (Illness)
Level 1	1-5	0-3
Level 2	6-13	4-6
Level 3	14-24	7-11
Level 4	25+	12+

Outcome Variable: The patient outcome measure was limited to disposition (live or dead) upon discharge from care. For analysis, disposition from prehospital care and ambulance transport was defined as one of the following:

1. Live discharge from inpatient hospitalization or from the emergency department.
2. Unknown status at discharge.
3. Dead upon discharge from inpatient hospitalization.
4. Dead upon discharge from or dead upon arrival (DOA) to the emergency department.

Disposition was recorded only once for each patient (e.g. a patient who was transferred from hospital A to hospital B where he died would have been recorded as dead at discharge from inpatient hospitalization, disposition #3).

DATA COLLECTION:

Identification of Trauma and Cardiac Patients Receiving Prehospital Treatment and Transported by Ambulance

Trauma and cardiac patients included in this study were chosen from the 1980 ambulance run report data base and from 1979-80 patient data collected for another research project. Details about Maine's voluntary ambulance run report system are provided in Appendix C. Details about the special research project are provided in Appendix G. Four data sets were developed in an attempt to compensate for missing data. A cell set with fewer than 5 cases in each cell was considered inadequate for analysis.

In Data Set I, the study population was defined as those run reports with a check in box 1 (Trauma) or box 5 (Cardiac) on the type illness/injury section of the run report. A special computer program was written to identify the trauma and cardiac patients and to classify them according to the study criteria, excluding severity. This program classified cases into 75 of the 144 potential cell sets. (Appendix E). As expected, cardiac data was missing or insufficient for analysis in cells including age groups 0-4 and 5-17. A total of 18,357 (Table 1) cases were identified, of which 1,552 received ALS treatment.

Table 1: Trauma and Cardiac BLS and ALS Cases Transported by Ambulance Maine - 1980 in Data Set 1

	Trauma	Cardiac	Total
BLS	11,296	5,509	16,805
ALS	199	1,353	1,552
Total	11,495	6,862	18,357

Source: 1980 Maine Ambulance Run Report Data Base

The results of this classification raised concerns about the use of the type illness/injury box by ambulance personnel completing the run report. Cardiac cases were found to be undercounted when ambulance personnel recorded shortness of breath and other cardiac symptoms as "respiratory", rather than "cardiac." Trauma cases were overcounted when ambulance personnel recorded non-traumatic bleeding, such as a bleeding ulcer, as "trauma".

An estimate of the extent of such inaccurate use of the type illness/injury box was measured by identifying cases via the treatments rendered. Selected parenteral (IV) cases were identified and then compared to the original research copy of the

run report to review utilization of the type illness/injury box. Of the records reviewed, 13.2% (5/38) contained at least one mismarking. This error level was considered important since ALS personnel are considered to be more professional and better trained in completing patient records. In addition to errors made by the ambulance personnel, a small percentage of the errors were caused by slippage of pages in the multi-copy form. For example, the original copy in the patient record could indicate "cardiac"; but due to slippage, the research copy would indicate "burn", one field above "cardiac".

Data Sets II, III, and IV were subsequently created in an attempt to improve the results of the original classification by compensating for the data quality and thereby filling additional cell sets for analysis.

Data Set II was limited to 1980 run reports from a specific accident location to a single destination which had a high rate of completion for the disposition item. The definition of the trauma population was expanded to include all transports or transfers with a check in boxes 1 - 4 (Trauma, Head, Spinal. or Burns). The cardiac population remained the same, a check in box 5 (Cardiac). Patients DOA at the ED were identified from research abstracts (Appendix G) and added to Data Set II. The process classified 759 cases into 10 of the 36 potential cell sets for this data set. (See Appendix F)

Data Set III was limited to 533 inpatients, transported by ambulance and discharged during 1979-1980, who were identified from abstracts completed for a research project sponsored jointly by the Center for Health Systems Research and Analysis at the University of Wisconsin and EMS/MHIC. This data base was created to provide severity scores. Eventually this data base will include 6,000 trauma and cardiac patients. Data Set III classified cases into 35 of the 216 potential cell sets. (See Appendix G)

Data Set IV was established as an attempt to provide severity scores for the larger data base in Data Set I. The trauma population included all emergency transports or transfers with a check in box 1 - 4 (Trauma, Head, Spinal, Burn). The cardiac population was expanded to include all cases with a check in box 5 or 7 (Cardiac, Respiratory). A modified version of the Bever-Veenker IISI was utilized in order to generate a severity score, via inhouse computer, for 16,823 of the 23,274 trauma and cardiac patients in the 1980 run report data base. (Appendix B). Modification of the IISI was necessary since missing data prohibits calculation of a valid score. The modification provided a method for grouping the patients into one of four levels of severity. Data Set IV-A, which sorted cases using plus or minus 15 minute response time, generated 324 of the 720 potential cell sets. Data Set IV-B, which sorted cases using plus or minus 8 minute response time, generated 332 of the 720 potential cell sets. (See Appendix H)

Patient Disposition Data: The EMS management information system provides access to information from several data bases for the same patient transported in 1980. Thus it is possible to obtain disposition data from the run report system and/or the inpatient discharge abstract system or from abstracts for other research projects.

Linkage of the 100% hospital patient discharge data file to the run report system presented a challenge. At the outset of this project, outcome for any inpatient could be obtained only by making a special data request to the hospital recorded as receiving the patient. Tracking was done by sending each hospital an index card for each patient, listing as much pertinent information as was available except the patient name, which was unavailable. If available from the run report tearsheet, the medical record number was sent. If that was not available, identifiers such as age, sex, admission date and type illness/injury were sent. This effort met with little success and much resistance on the part of the medical record personnel. For Data Set I, it became apparent that inpatient outcome would potentially be available only for those 942 run reports which had a medical record number included on the tearsheet.

By April 1981, interactive computer resources were available to link run reports listing an inpatient record number with the 100% hospital discharge data set to obtain disposition. The ease of this linkage was complicated by individual hospital patient identification systems which assign different numbers to the same patient at different points in time. Thus, it was difficult to link the run report system to the hospital discharge data set when the tearsheet listed a patient number other than the discharge abstract medical record number.

Disposition data were obtained from the run report system for 41% (7,458) of the cases in Data Set I. Discharge outcomes from the ED revealed 4.2% deaths, 3.0% transfers, 51.8% other live discharges. The remaining 44.6% (3,326) were admitted to the hospital. Of the 490 admissions for which inpatient disposition was available, 453 were discharged alive and 37 expired.

Disposition data were obtained for 95.2% (732) of the 759 patients in Data Set II; 60.6% (460) were discharged alive from the ED (either to home or to a non-acute care facility), 5.6% died, 1.4% were transferred to another hospital, and the remaining 33.2% were admitted. Inpatient disposition data was obtained for 218 of the 255 admitted patients of which 90.8% lived, 8.3% died, and 0.9% were transferred.

Disposition data were available for 100% of the 533 inpatients in Data Set III from patient abstracts completed by nurse abstactors reviewing inpatient records for each patient. This data set includes 162 trauma and 371 severe cardiac emergencies transported to 27 Maine hospitals during 1979 and 1980. Of the total, 52.9% (282) lived and 47.1% (251) died.

Disposition data for Data Set IV was limited to outcome at the ED only and was available via computer for 42.5% (9,895) of the 23,274 cases of which 2.6% died. A special study of the remaining 57.5% (13.379) was conducted to see whether or not this group differed markedly from that with known outcomes. Appendix H contains details of this study.

Severity: The IISI was adopted in lieu of developing a new index to classify patients by severity. This index requires data from eight indicators which should be recorded routinely on the ambulance run report. The index, designed to determine severity for triage purposes, includes vital signs, level of consciousness, skin color, bleeding rate, location and type of injury. All eight indicators must be present in order to accurately calculate the severity score for triage purposes. Appendix B contains the protocol for IISI scoring. Ambulance personnel in Maine have been trained in routine collection of this data but are not trained in calculation of the IISI score. Reporting for each of the eight indicators varies. As an example, Table II indicates completion rates for pulse, blood pressure, and respirations on run reports in the 1980 data base. As indicated previously, only 56% of the run reports for emergency runs record all three vital signs.

TABLE 2: Completion Rates For Reporting Vital Signs for Emergency Runs - Maine 1980

1980 Quarter	Pulse	Blood Pressure Systolic	Blood Pressure Diastolic	Respirations
1st	77%	68%	61%	55%
2nd	74%	68%	60%	54%
3rd	79%	73%	66%	59%
4th	79%	71%	63%	59%
Total Year	77%	70%	63%	65%

Source: 1980 Maine Ambulance Run Report Data

Data Set I and II were not amenable to IISI severity score computation as developed by Bever and Veenker. Data Set III had an IISI severity score calculated for each case by the University of Wisconsin which used ED data in the absence of appropriate run report data. Data Set IV had a computerized severity score calculated from a modification of the IISI. See Appendix B for details of this modification.

STATISTICAL ANALYSIS

Ridit analysis technique was initially proposed to examine the relationships between ALS treatments and patient outcome. This technique was chosen based upon its relative ease and its specific applicability to data which is difficult to quantify in order to identify the relative positioning of units to one another. In EMS. for example, data includes severity rankings and categorization schemes. Quantification of this data assigns arbitrary numerical values to indicate relative positionings from low to high or least to most.

Length of stay (LOS) was excluded as a patient outcome measure because it could not be analyzed using the ridit technique. LOS is not in the so-called "borderland" or "fuzzy" data suitable to ridit. Furthermore, LOS can be affected by a host of factors neither included nor pertinent to the design of this project. A few of these confounding factors are: concommitant patient conditions, nosocomial infections and incidents, physician practice patterns, and to some extent, patient preferences.

The ridit technique assumes that there is a natural ordering in the categories to be compared; it is not concerned with the distribution of these categories. Mean ridits for comparisons can be generated for any cell where an arithmetic mean is appropriate. Thus, it is feasible to perform the calculations for comparison even though few cases are present within a given cell. Once calculated, t-test techniques apply to the mean ridit of any comparison group. Further discussion, examples and formulas are presented in Appendix D.

The first step of ridit analysis was selection of an "identified distribution" or a reference group. For each of the two illness/injury categories, the reference group consisted of all cases receiving BLS care only. The initial comparison group consisted of the cases who received one or more of the specified ALS treatments.

For the reference population, ridits were calculated at each node of the disposition schema. The ridit associated with each disposition was interpreted as the probability that a given patient would be found in that disposition or in one of those which preceeded it in the schema.

Ridit analysis was not performed with Data Sets I and IV due to the dichotomous nature of the disposition information. Data Set II, while lacking severity scores, did have sufficient outcome data to be analyzed using the ridit technique. Data Set III was analyzed as described above, and using an identified distribution of severity as well.

Chi-square analysis was used as an adjunct to ridit analysis for Data Sets II and III and as the principal technique, where ridit was inappropriate, in Data Sets I and IV.

RESULTS

Based upon the analyses performed, a significant relationship has not been demonstrated to exist between the administration of ALS treatments and patient outcome. It was not possible to demonstrate, using the proposed methodology, that patients who receive ALS care fared better than those who receive only BLS care.

In all analyses involving the chi-square technique, cells with five or fewer cases were removed from consideration. Fisher's exact test was not utilized.

For Data Set I (Appendix E), 18,357 cases were distributed across a potential 144 cell sets. ALS cases were unrecorded for 60 cell sets involving 1,844 trauma and 362 cardiac BLS cases. BLS cases were unrecorded for 1 cell set involving 1 cardiac ALS case. These 2,207 cases were eliminated from further consideration. There were 9,651 trauma cases in 29 cell sets and 6,499 cardiac cases in 46 cell sets. It was then necessary to eliminate cell sets with fewer than 5 cases in each cell, which reduced this group to 5,509 trauma cases in 9 cell sets and 5,850 cardiac cases in 25 cell sets. Finally, elimination of cell sets with fewer than 5 known outcomes in both ALS and BLS cells further reduced this group to 2,036 trauma cases in 2 cell sets and 3,502 cardiac cases in 8 cell sets. Application of chi-square yielded 1 trauma and 7 cardiac cell sets with outcomes at the $p < 0.05$ significance level or better. Computation of Cramer's phi, a correlation factor, revealed that 3 cardiac cell sets had a non-trivial correlation of outcome with treatment type. For Data Set I, 3 cardiac cell sets demonstrated significance both in correlation factor and in outcome, suggesting that BLS was more vital than ALS to patient survival. These cell sets are presented in Table 3.

TABLE 3: Significant Cardiac Cell Sets in Data Set I

HOSPITAL LEVEL	RESPONSE TIME	AGE GROUP	TOTAL	LIVE	DIE	UNKNOWN	
II	≤ 15 min	18-44	167	68	7	92	BLS
			38	8	10	20	ALS
			df = 2	X = 21.5	Φ = .32		
III	≤ 15 min	45-64	165	46	3	116	BLS
			77	33	14	30	ALS
			df = 2	X = 32.2	Φ = .36		
III	≤ 15 min	65+	297	65	10	222	BLS
			146	52	24	70	ALS
			df = 2	X = 39.4	Φ = .30		

Source: 1980 Maine Ambulance Run Report System

Although the above cell sets demonstrate statistical significance, the high proportion of patients with unknown outcomes casts considerable doubt upon the importance of these 3 cardiac cell sets.

For Data Set II (Appendix F), 759 cases were distributed across a potential 36 cell sets. ALS cases were unrecorded for 12 cell sets involving 42 trauma and 4 cardiac BLS cases. BLS cases were unrecorded for 2 cell sets involving 2 cardiac ALS cases. These 48 cases were eliminated from further consideration. There were 468 trauma cases in 5 cell sets and 243 cardiac cases in 5 cell sets. Elimination of cell sets with fewer than 5 cases in each cell then reduced this group to 309 trauma cases in 2 cell sets and 238 cardiac cases in 3 cell sets. Elimination of cell sets with fewer than 5 known outcomes in both ALS and BLS cells further reduced this analysis group to 224 trauma cases in 1 cell set and 238 cardiac cases in 3 cell sets. Application of chi-square yielded no cell sets with outcomes at the $p < 0.05$ significance level or better. Computation of Cramer's phi, revealed 1 cardiac cell set with a non-trivial correlation of outcome and treatment type. For Data Set II, no cell sets demonstrated significance both in correlation factor and outcome.

The ridit technique was applied to the analysis group of cell sets. Using total cardiac BLS cases as the ridit reference group for the ALS comparison group, 1 cardiac cell set demonstrated significance at the $p < 0.05$ level. Using only the BLS portion of the specifed cell set as the ridit reference group for the ALS comparison group, 1 cardiac cell set demonstrated significance at $p < 0.05$ level. The ridit analysis indicated that this BLS group was better off than the corresponding ALS group.

For Data Set III (Appendix G), 533 cases were distributed across a potential 216 cell sets. ALS cases were unrecorded for 49 cell sets involving 69 trauma and 73 cardiac BLS cases. BLS cases were unrecorded for 5 cell sets involving 1 trauma and 6 cardiac ALS cases. These 149 cases were eliminated from further consideration. There were 92 trauma cases in 10 cell sets and 292 cardiac cases in 25 cell sets. Elimination of cell sets with fewer than 5 cases in each cell then reduced this analysis group to 31 trauma cases in 1 cell set and 148 cardiac cases in 5 cell sets. Application of chi-square yielded no cell sets with outcomes at the $p < 0.05$ significance level or better. Computation of Cramer's phi, revealed trauma cell sets with non-trivial correlation of outcome and treatment type. For Data Set III, no cell set demonstrated significance both in correlation factor and outcome.

The ridit technique was applied to the analysis group of these cell sets. In order to obtain different views of this data, each of the 5 cell sets was evaluated with regard to two distinct reference groups. These reference groups were: first, total

cardiac BLS or total trauma BLS cases as appropriate; second, the total BLS cases within the hospital categorization level. Using a reference BLS group within a hospital categorization level subset, 2 cardiac cell sets demonstrated significance at $p < 0.05$ level. Using total BLS cardiac cases as the ridit reference group for the ALS cardiac comparison groups, all 4 cell sets demonstrated significance at $p < 0.05$ level. The ridit analysis indicated that the BLS group was better off than the ALS group. The trauma cell set did not demonstrate significance.

Adjunct ridit analysis of Data Set III for all cardiac patients generated several descriptive statements. (See Appendix G) ALS cardiac patients tend to have higher IISI scores than BLS cardiac patients in this data set. ALS cardiac patients tended to expire more frequently than BLS cardiac patients. For cardiac patients with Level 3 IISI scores, BLS patients did not fare as well as ALS patients. The mean IISI severity score for cardiac patients who expired, whether the recipient of ALS or BLS care was seen to be higher than that of the reference population. Furthermore, the mean severity score for ALS treatment expirations was greater than that for BLS treatment expirations.

Adjunct ridit analysis of all Data Set III trauma patients also generated several descriptive statements. (See Appendix G) ALS trauma patients tended to have higher IISI scores than BLS trauma patients. ALS trauma patients tended to expire more frequently than BLS trauma patients. For those trauma patients with a Level 4 IISI score, there was a significant difference in outcome when ALS was compared to BLS. The ALS cases fared worse than the BLS cases. This may have been influenced by the paucity of cases, and by the distribution of scores within this group. Both ALS and BLS cases in this group had outcomes significantly worse than the reference group.

For Data Set IV-A, 23,274 cases were distributed across 720 cell sets. When analyzed with response categories of 15 or fewer minutes and in excess of 15 minutes, there were 15,566 trauma cases in 141 cell sets and 7,708 cardiac cases in 183 cell sets. Elimination of cell sets with fewer than 5 cases in each cell reduced this group to 7,587 trauma cases in 12 cell sets and 5,228 cardiac cases in 22 cell sets. (See Appendix H) Elimination of cell sets with fewer than 5 known outcomes in both ALS and BLS cells further reduced this group to 3,764 trauma cases in 7 cell sets and 5,018 cardiac cases in 17 cell sets. Application of chi-square yielded 1 trauma and 6 cardiac cell sets with outcomes at the $p < 0.05$ level or better. Computation of Cramer's phi revealed 1 trauma and 1 cardiac cell set with a non-trivial correlation of outcome and treatment type. For Data Set IV-A, with response categories broken at 15 minutes, 2 cell sets (1 trauma and 1 cardiac) demonstrated significance both in correlation factor and outcome. These cell sets are presented in Table 4.

Table 4: Signficant Cell Sets in Data Set IV-A

HOSPITAL LEVEL	RESPONSE TIME	AGE GROUP	TYPE / SEVERITY	TOTAL	LIVE	DIE	UNKNOWN	
II	Unknown	18-44	TRAUMA	227	113	0	114	BLS
			Level I	10	5	1	4	ALS
				df = 2	X^2 = 22.9		ϕ = .31	
IV	≤ 15 min	65+	CARDIAC	64	29	4	31	BLS
			Level 3	31	9	4	8	ALS
				df = 2	X^2 = 20.7		ϕ = .47	

Source: 1980 Maine Ambulance Run Report System

A special study of a sample of Data Set IV records with missing disposition data indicated no difference in distribution of outcomes from that of records with known disposition at the ED (Appendix H). It may be assumed that the same is true for the 157 records with an unknown outcome listed in Table 4. The importance of the single trauma cell set may be questioned due to the inequity of total cell size for ALS (6 cases with known outcomes) as compared to BLS (113 cases with known outcomes). The cardiac cell set was additionally evaluated by checking for significance and correlation in combination with the Level 2 severity cell set. Since the significance of this cell set rest upon 13 ALS cases, it is important to consider the effect of incomplete data upon severity level. Due to the known erratic nature of some recording practices, and due to the makeup of the computerized file, the calculation of a severity score may understate the appropriate severity level for an unknown proportion of Data Set IV and, more specifically, for the cases identified in severity level B. This expanded cardiac cell set, without regard to severity level is described in Table 5.

TABLE 5: Expanded Cardiac Cell Set from Data Set IV-A

HOSPITAL LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY	TOTAL	LIVE	DIE	UNKNOWN	
IV	≤ 15 min	65+	Levels	2,024	987	54	983	BLS
			2 & 3	388	208	38	142	ALS
				df = 2	X^2 = 54.9		ϕ - .15	

Source: 1980 Maine Ambulance Run Report System

While the distribution of outcomes is significant, Cramer's phi indicates a trivial correlation of treatment with outcome.

When Data Set IV-B was analyzed with response categories of 8

or fewer minutes and in excess of 8 minutes, there were 15,566 trauma cases in 143 cell sets and 7,708 cardiac cases in 189 cell sets. Elimination of cell sets with fewer than 5 cases in each cell reduced this group to 6,392 trauma cases in 14 cell sets and 5,248 cardiac cases in 24 cell sets. Elimination of cell sets with fewer than 5 known outcomes for ALS and BLS cells further reduced this group to 3,050 trauma cases in 5 cell sets and 4,770 cardiac cases in 19 cell sets. Application of chi-square yielded 1 trauma and 6 cardiac cell sets with chi-square at the $p < 0.05$ level or better. Computation of Cramer's phi revealed 1 trauma and 1 cardiac cell set with a non-trivial correlation of outcome and treatment type. For Data Set IV-B with response categories broken at 8 minutes, 2 cell sets (1 trauma and 1 cardiac) demonstrated significance both in correlation factor and outcome. These cell sets are presented in Table 6.

TABLE 6: Significant Cell Sets in Data Set IV-B

HOSPITAL LEVEL	RESPONSE TIME	AGE GROUP	TYPE / SEVERITY	TOTAL	LIVE	DIE	UNKNOWN	
II	Unknown	18-44	TRAUMA	227	113	0	114	BLS
			Level 1	10	5	1	4	ALS
				df = 2	$X^2 = 22.9$		$\phi = .31$	
IV	$\leq$ 8 min	65+	CARDIAC	48	20	3	25	BLS
			Level 3	22	8	10	4	ALS
				df = 2	$X^2 = 16.8$		$\phi = .49$	

Source: 1980 Maine Ambulance Run Report System

The importance of the single trauma cell set may be questioned due to the inequity of the total cell size for ALS (6 cases with known outcomes) as compared with the BLS (113 cases with known outcomes). The cardiac cell set was additionally evaluated by checking for significance and correlation in combination with the severity level 2 cell set. Since the significance of this cell set rests upon 10 ALS cases, it is important to consider the effect of incomplete data upon severity level. Due to the erratic nature of some recording practices, and due to the makeup of the computerized file, the calculation of a severity score may understate the appropriate severity level for an unknown proportion of Data Set IV and, more specifically, for the cases identified in severity Level 2. This expanded cardiac cell set without regard to severity level is described as follows:

TABLE 7: Expanded Cardiac Cell Set from Data Set IV-B

HOSPITAL LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY	TOTAL	LIVE	DIE	UNKNOWN	
IV	≤ 8 min	65+	Levels 2 & 3	398	200	10	188	BLS
				101	55	13	33	ALS
				df = 2	X^2 = 22.9		ϕ = .21	

Source: 1980 Maine Ambulance Run Report System

While the distribution of outcomes is significant, Cramer's phi indicates a trivial correlation of treatment with outcome.

DISCUSSION

This study has highlighted the obvious need for complete, accurate data in order to document prehospital EMS effectiveness. Ambulance personnel frequently complain that time pressures, the location of the emergency, and the crisis atmosphere interfere with documentation of patient status and treatment. However, their training emphasizes the need for this documentation for medical-legal, planning, and management purposes. The quality of the data collected within the run report system varies across services, among individuals within each service, and for different types of patients. Failure to routinely complete a minimal patient data set reflects the lower level of professionalism on the part of prehospital personnel compared to hospital personnel. Failure to document prehospital patient status and treatment hinders evaluation of prehospital EMS effectiveness and makes it difficult to justify the expenditure of public funds for training and equipment.

Data analysis based on the ridit technique is useful for evaluation of EMS effectiveness at different points along the continuum of an emergency event. However, its use can only be recommended for a mature EMS data system which enjoys high compliance rates in order to generate complete and accurate data. Patient specific disposition data must be available throughout the continuum for the majority of the cases. It was possible to use the ridit technique only on Data Sets II and III which had sufficient patient specific outcome data available from the scene, ED, and acute hospitalization. Missing data also hampers construction of an appropriate reference group and of comparison groups. The reference group should contain a minimum of 100 cases distributed across all cells. The comparison groups are not restricted by minimum cell size requirements. The definition of the comparison group used to identify cases may, in fact, result in undercounting, leading to inflated outcome rates. For example, by defining the comparison group as those persons receiving ALS treatment(s) as documented on a run report, ALS cases not documented were excluded. The excluded cases may include patients receiving ALS care at non-acute care facilities (health care facility, nursing home, office of a physician or other practitioner) prior to arrival of ambulance personnel. Such undercounting of ALS cases may lead to inflated ALS mortality rates, thus, BLS appears to be more effective.

Evaluation of EMS effectiveness, as indicated by a significant difference in patient mortality, requires implementation of a feasible severity measurement. Modification of the IISI by scoring missing elements as normal produced lower severity scores overall. Genuinely severe patients appeared to be easily identified since the rate of missing information is expected to be lower for these patients. Scores were skewed

downward for less severe patients as the missing data rate increased. Further analysis of the "non-severe" population indicated a mortality rate sufficiently low so as not to skew the results. However, our modification would not be suitable for studies using morbidity rates to measure outcome since it understates need as defined by severity.

CONCLUSION

Evaluation of EMS effectiveness using routinely collected and automated data bases is hampered by difficulties in standardizing and refining data collected by many persons during moments of high stress. It appears that ambulance service managers, in comparison with hospital supervisors, place a lower priority on the "paperwork" which provides complete and accurate status and treatment data for each patient transported.

A major factor causing the loss of cases for analysis is insufficient data. The proposed evaluation design was modified to permit repetition of this study on a regular basis in the hope of increasing the number of cell sets with sufficient data for analysis. Implementation of the methodology successfully identified the strengths and weaknesses of the Maine EMS management information system. Inadequate provision of disposition data by emergency department personnel on the run report tearsheet limits the use of the system as a monitor of EMS effectiveness impact on patient outcome. A major benefit of the implementation of this project and of participation in the NHTSA funded RURALSIM project, sponsored by the University of Pittsburgh, has been the adoption of new state ambulance service regulations. Use of the statewide run reporting system is mandated for ALS licensed services, a reflection of the Maine commitment to monitor EMS effectiveness using routinely collected and computerized data. In addition to the new regulations, the newly revised (January 1, 1982) state traffic accident report will provide a direct link to computerized run report data. It will thus be possible to identify subpopulations, such as "alcohol-related", "no seat belt", and "no helmet", and to compare ALS outcome with BLS outcome.

The methodology of this study generated data which accepts the null hypothesis: that there is no significant difference in patient outcome between the reference group receiving BLS treatment and a comparison group receiving ALS treatment(s). Reclassification of patients with an 8 minute response time produced the same results as the original classification of patients with a 15 minute response time.

ALS capabilities continue to expand statewide. Currently, half of the ambulance services statewide are licensed as ALS services capable of providing MAST/EOA services or greater. Statewide, sixteen percent of the ambulance personnel are licensed at the MAST/EOA level or higher. Although this commitment to implementation of ALS may be questionable considering the outcome of this project, it would be of interest to repeat this analysis on a regular basis. This could determine whether or not the increased ALS licensure of services and personnel, as well as the compliance to the run reporting system, results in sufficient data for analysis which may support the hypothesis that ALS indeed has an impact on patient outcome.

RECOMMENDATIONS

It is recommended that the study be repeated on a regular basis to observe the impact of increased ALS capability through data accumulated under the compliance with the run report system. It would also be instructive to perform this analysis on data limited to the Northeast and Aroostook EMS regions in order to monitor the impact of RURALSIM applications.

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GLOSSARY

ACLS	Advanced Cardiac Life Support
ALS	Advanced Life Support (Includes bodily invasive therapies, specifically EOA, MAST, IV, Defibrillation)
BLS	Basic Life Support Non-bodily invasive therapies
CARDIAC	Third level of ALS licensure
DOA	Dead On Arrival
ED	Emergency Department
EMS	Emergency Medical Services
EMT	Emergency Medical Technician
EOA	Esophageal Obturator Airway
IISI	Illness-Injury Severity Index from Bever-Veenker
IV	Intravenous administration of parenterals (Second level of ALS licensure)
MAST	Military Anti-Shock Trousers
MAST/EOA	First level of ALS licensure
MHIC	Maine Health Information Center
Paramedic	Fourth level of ALS licensure

APPENDIX A

HOSPITAL CATEGORIZATION LEVELS

CRITERIA FOR ACUTE CARDIAC INJURIES:

Level I: Emergency department life support unit offers basic and advanced life support; does not have monitored special care beds, but portable monitors are available for use.

Level II: Special (cardiac) care unit with monitored secial cardiac care beds in addition to Level I capabilities. Monitoring of rhythm may be done in-house or by a remote regional facility. Nurse is trained to advanced cardiac life support capability in addition to certification in basic life support.

Level III: Regional referral center. In addition to capabilities of Level II facility, must have:

1. Diagnostic capability to include cardiac catheterization laboratory and angiography.
2. Other monitoring capabilities.
3. Direct monitoring of central venous and arterial pressures.

Level IV: In addition to capabilities of Level III facility, must have:

1. Capability to provide mechanical assistance to the failing circulation.
2. Capability for emergency open heart surgery.

HOSPITAL CATEGORIZATION LEVELS

CRITERIA FOR MULTIPLE TRAUMA INJURIES:

Level I: Twenty-four hour injury observation, physician available within 30 minutes, constant surveillance, and expert nursing care. Inpatient capabilities may include two-bed special care unit, limited neurological/neurosurgical coverage, and limited or not specialized arteriography.

Level II: Twenty-four hour neurosurgical coverage, arteriography capability, surgical intensive care unit, and broad medical and surgical specialty coverage.

APPENDIX B

BEVER-VEENKER
ILLNESS-INJURY SEVERITY INDEX

ATTRIBUTE	SCORE 0	1	2	3
PULSE	61-99	≤60 ≥100-140	>140 OR IRREGULAR	ABSENT
SYSTOLOC DIASTOLIC	101-149 60-89	80-100, >150-200 90-120	<80, >200 >120	ABSENT
SKIN COLOR	DRY AND NORMAL	REDDISH COLORATION	ASHEN AND/OR PALE/OR MOIST	CYANOTIC
RESPIRATORY CONDITIONS	12-20 RESPIRATIONS	>20 RESPIRATIONS	<12 OR LABORED BREATHING OR CHEST PAINS	ABSENT RESPIRATIONS
CONSCIOUSNESS	ALERT AND ORIENTED	INCOHERENT OR OBTUNDED	DIFFICULT TO AWAKEN	UNCONSCIOUS
BLEEDING	NONE	CONTROLLABLE	HARD TO CONTROL	UNCONTROLLABLE

ATTRIBUTE	SCORE 1	2	3	4
REGION OF INJURY		EXTREMITIES, BACK	CHEST	HEAD, NECK ABDOMEN
TYPE OF INJURY	LACERATION CONTUSION	BURN OR FRACTURE	STAB WOUND	BLUNT TRAUMA MISSLE

1 POINT -- PATIENT WITH PRIOR HISTORY
1 POINT -- PATIENT <2 YEARS OR >60 YEARS OF AGE

Bever, D.L., and Veenker, C. H., 1979, "An Illness-Injury Severity Index for non-medical personnel." EMT Journal, 3:45:49.

MODIFIED BEVER-VEENKER ILLNESS-INJURY SEVERITY INDEX

Maine run report codes were translated into a modified IISI score using the following scores.

RUN REPORT ATTRIBUTES	1	2	3
PULSE	1-60 or 100-140	>141	0
SYSTOLOIC	80-100 or 150-200	1-79 or 200	(not used)
DIASTOLIC	90-120	120	00
RESPIRATIONS	> 20	1-11	0
SKIN	hot, warm, other	moist, pale, sweaty	cool/ clammy
CONSCIOUSNESS			
Motor Response	(not used)	inappropriate	none
Eye Opening Response	voice command	painful stimulus	none
Verbal Response	Inappropriate or unintelligible	(not used)	none
Pupillary Response	Constricted or sluggish	non-reactive	dilated/ fixed
(all other run report codes for these fields are scored 0)			
BLEEDING	Controlled	(not used)	(not used)
AGE	1 yr - or >60 yr	1 point	
PRIOR HISTORY	(not used)		

Region of Injury and Type of Injury were not scored at all. While certain attributes (e.g., head, burn) were readily available from the coded data, others (e.g., abdomen, fracture) were not. Rather than skewing these scores on the basis of two known attributes, it was elected to understate the scores in deference to the 11 unknown attributes.

Missing values for the scored variables were treated as being within the normal range, the assumption being that a significant variation from normal would be recorded. In any case, the effect is to understate the score.

APPENDIX C

OVERVIEW OF AMBULANCE RUN REPORT SYSTEM

An overview of the ambulance run report data system is depicted in the data flow chart in Attachment 1. The ambulance run report consists of four carbonless sheets printed in multi-copy sets. Information about the patient assessment, treatment at the scene and enroute, as well as related comments are completed by the ambulance personnel before copy one is handed over to emergency department personnel. This copy of the run report is intended for insertion into the emergency department or inpatient record but it is not considered to be the official version of the emergency event. Copy one has a detachable tearsheet on which emergency department personnel record information about status and care as well as disposition upon discharge from the emergency department. When completed, this tearsheet is detached for mailing to the EMS Data/Research Unit in pre-paid, addressed mailers supplied by EMS.

The ambulance service personnel complete other, non-patient assessment and treatment data elements, such as dispatch time and total mileage. Copy two is filed in the ambulance service records as the official version of the emergency event.

Ambulance service personnel return copy three, the research copy, to the EMS Data/Research Unit in pre-paid addressed mailers supplied by EMS. The patient name is not readable on this copy in order to protect patient confidentiality.

Copy four is an extra copy provided to the ambulance service for individual recordkeeping needs.

Advanced Cardiac Life Support treatment is recorded on a separate sheet. This report is completed only by personnel trained at the cardiac level and is always used in conjunction with the standard ambulance run report.

Both the standard ambulance run report and the ACLS form are distributed to ambulance services within the state at no charge. It is understood by the ambulance services that compensation for these forms is return of the completed research copy to the EMS Data/Research Unit. Examples of the two reports forms are included in Attachments 2 and 3.

Data Processing

Processing of the reseach copy (copy three) and of the tearsheet takes place in the EMS Data/Research Unit. Two full-time data clerks/research assistants handle the records received from each ambulance service. Each day's receipt of records from each ambulance service is logged in. A tally sheet is created which notes the total number of records recieved for each month. This sheet tracks the group of run reports through the phases of review and data entry. The reports are arranged into chronological order and reviewed for accuracy and legibililty. The data clerks are frequently required to enter missing data based on the narrative recorded in the description section of the run report. When accompanied by an ACLS treatment sheet, the data clerks abstract and transfer relevant information onto the standard run report, thus, allowing computerization of this information. Ambulance service identity, county/town of residence, county/town of accident, destination, and crew member identity is coded by the data clerks. As with run reports, tearsheets are also logged in via tally sheets, coded and reviewed for completeness. If the patient is transferred from the emergency department of the first hospital, the identity of the second facility is also coded.

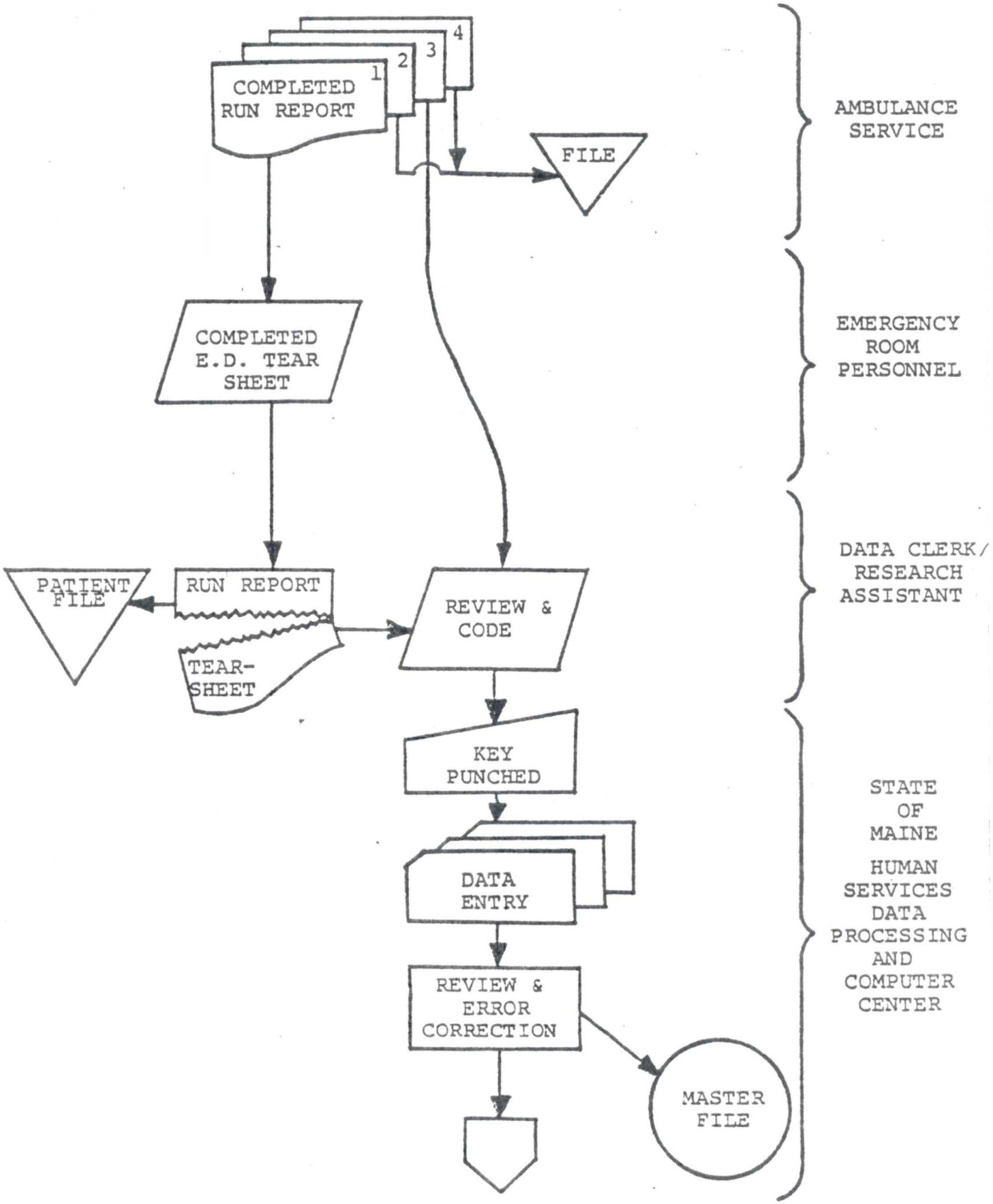
After the run reports and the tearsheets are processed at the Data Unit, a clerk from the State of Maine Department of Human Services Data Processing Center collects and delivers them to the State key punch center. The records are keyed directly onto disks with subsequent transfer to tape for data entry. This tape is delivered to the State Computer Center and appended to the ambulance run report master file. The master file stores data by date of event and run report number within the transactions for each month. (Data entry instructions and edit specifications are described in Attachment 4.)

Quarterly and annual reports based upon the data received are routinely distributed to the ambulance services, hospital emergency departments and regional EMS offices. These reports are produced at the State Computer Center and distributed by EMS/MHIC. (See samples of output reports in Attachment 5.)

ATTACHMENT 1

AMBULANCE RUN REPORT

DATA FLOW CHART



PRESS DOWN, YOU ARE MAKING THREE COPIES

253837 | Mo. | Day | Year | M T W Th F S Sun | SERVICE NAME: ATTACHMENT 2 | SERVICE NO. | VEHICLE NO. | SERVICE RUN NO.

NAME | STATE MEDICAID NUMBER | MEDICARE NUMBER

STREET OR R.F.D. | INSURANCE CARRIER

CITY/TOWN | STATE | ZIP | HOSPITAL PATIENT I.D. NUMBER

AGE/DATE OF BIRTH | ☐ Male ☐ Female | PHONE | ☐ RESPONSIBLE FINANCIAL PARTY | ☐ NEXT OF KIN

INCIDENT LOCATION: ADDRESS | CITY/TOWN | ADDRESS

TRANSPORTED TO: | ☐ CARE/TRANSPORTATION REFUSED SIGNATURE | CREW NAMES/NUMBERS

TREATING/FAMILY PHYSICIAN | TOWN | WITNESS

TRANSPORTATION PROBLEMS

AMBULANCE REQUESTED BY:
☐ Citizen Direct
☐ Fire
☐ Police
☐ Special Access
☐ Telephone Operator

POLICE NOTIFIED: ☐ Yes ☐ No

TIME		MILEAGE
	Call Received	
	Enroute	
	At Scene	
	From Scene	
	At Destination	
	At Station	

TYPE ILLNESS/INJURY
☐ Trauma
☐ Head
☐ Spinal
☐ Burn
☐ Cardiac
☐ Poisoning
☐ Respiratory
☐ Behavioral
☐ Neonate
☐ Other:

AID FIRST GIVEN BY:
☐ Bystander/Relative
☐ Police
☐ Fire
☐ Medical Personnel

AID GIVEN BEFORE AMB/RESCUE ARRIVED
☐ None
☐ Cleared Airway
☐ CPR
☐ Controlled Bleeding
☐ Immobilization
☐ Treatment for Shock
☐ Gave Medications
☐ Moved/Walked Patient
☐ Burn Care
☐ Other:

TYPE OF RUN
☐ Emergency Transport
☐ Routine Transfer
☐ Emergency Transfer
☐ No Transport

TIME	PULSE	RESP	BP	PUPILLARY RESPONSE	SKIN		VERBAL RESPONSE	MOTOR RESPONSE	EYE OPENING RESP
						AT SCENE	___Appropriate ___Inappropriate ___Unintelligible ___None	___Appropriate ___Inappropriate ___None	___Spontaneous ___Voice Command ___Painful Stimulus ___None
						ENROUTE	___Appropriate ___Inappropriate ___Unintelligible ___None	___Appropriate ___Inappropriate ___None	___Spontaneous ___Voice Command ___Painful Stimulus ___None

DESCRIBE: CAUSE, LOCATION OF SYMPTOMS, PAST MEDICAL HISTORY

253837 TIME ONSET _____

PATIENT'S SUSPECTED PROBLEM | ☐ ALLERGIES | ☐ ON MEDICATIONS

Hospital Notified: ☐ No ☐ Yes Time_____ | Phys. Direct. By: ☐ None ☐ Radio ☐ Tel. ☐ Written Order/Protocol ☐ Verbal Order/Protocol

✓	AIRWAY MAINTENANCE	TIME	✓	TRAUMA	I.D.	DRUGS	Route	Time	Dose	Time	Dose
	Cleared Manually			Extrication							
	Artificial Respiration			Cervical Immobilization							
	CPR			Long Board							
	Suction			Restraints							
	Oxygen—L.P. Min.			Traction Splinting							
	Oropharyngeal Airway			General Splinting							
	CIRCULATION										
	Controlled Hemorrhaging			OB Non Delivery							
				OB Delivery		Esophageal Intubation					
				Psychological First Aid		MAST Trousers					

NAME OF E.D. TREATING PHYSICIAN | SIGNATURES

08/80

COPY 1--HOSPITAL

253837 | Month | Day | Year | EMERGENCY DEPARTMENT REPORT | Name of Hospital

Type Illness/Injury | E.D. Record Number | In-Patient Record Number

TIME	PULSE	RESP	BP	PUPILLARY RESPONSE	SKIN	VERBAL RESPONSE	MOTOR RESPONSE	EYE OPENING RESPONSE
						___Appropriate ___Inappropriate ___Unintelligible ___None	___Appropriate ___Inappropriate ___None	___Spontaneous ___Voice Command ___Painful Stimulus ___None

TREATMENT: ☐ None ☐ Medical ☐ Surgical ☐ Psychological ☐ Other

Patient Disposition

DISCHARGED: ☐ Nursing Home ☐ Home ☐ Other

HOSPITALIZED: ☐ ICU/CCU ☐ General

DIED: ☐

TRANSFERRED TO: ☐ ECF ☐ Hospital_____

Indications for Transfer (As Stated in Protocol)

RUN REPORT NUMBER		ADVANCED CARDIAC LIFE SUPPORT TREATMENT REPORT						SERVICE RUN NUMBER MO DAY YEAR
I.D.	TIME							
		CPR TERMINATED WHEN PATIENT ☐ CONSCIOUS ☐ EXPIRED		PULSE	RESP	BP	PUPILS	SKIN
		MEDICAL CONTROL ESTABLISHED WITH: (PHYSICIAN'S NAME) AT: (INSTITUTION)						
		OXYGEN STARTED USING LPM BY:						
		INITIAL EKG RHYTHM: TIME ____ EOA: ☐ SUCCESSFUL ☐ UNSUCCESSFUL						
		IV STARTED USING: SITE:						

		EKG RHYTHM	COUNTER SHOCK	EKG RHYTHM	COMMENTS

MEDICATIONS (INDICATE DOSAGE)							
I.D.	ROUTE	TIME					
		SODIUM BICARBONATE					
		EPINEPHRINE					
		ATROPINE					
		LIDOCAINE					
		CALCIUM CHLORIDE					
		ISUPREL					

Signature: _____
PHYSICIAN

_____
EMT

COPY 1 - HOSPITAL

ATTACHMENT 4

EMS AMBULANCE RUN REPORTS

Data Entry Instructions

Item No.	Name	Beginning Position	No. of Positions	Comments
Key-Fields.				
1	NOMBA	1	6	- if absent and entering run-report, enter printed number from "Description" area of form. Else enter nothing, clip a note onto the form and return to EMS
2	DATED	7	6	- MMDDYY - range: 110178-123185 - no partial entries - zero-fill leading blanks (1/1/81 = 010181)
Mainpart.				
2a	DAI	13	1	- range: 1-7
3	AMBID	14	3	- zero-fill leading blanks (10 = 010)
4	TRUCKNO	17	1	- any value
5	HLOC	18	5	- CCTTT (county/town) - left-justify if only 4 char. are coded (1234 = 1234Ø)
6	AGE	23	2	- if > 99, enter 99
7	SEX	25	1	- 1 = Male, 2 = Female
8	ALOC	26	5	- CCTTT (county/town) - left-justify if only 4 char. are coded (1234 = 1234Ø)
10	IDNO	31	9	- any value
11	DESTCOD	40	3	- zero-fill leading blanks (4 = 004)
12	REFUSED	43	1	- 1 = refused transport 2 = otherwise
13	EMT1	44	2	- zero-fill leading blanks
14	EMT2	46	2	- zero-fill leading blaks
15	EMT3	48	2	- zero-fill leading blanks
16	EMT4	50	2	- zero-fill leading blanks
17	INJURY	52	10	- range: at least one 1 to all ones - if all blanks, leave blank; else enter 0 wherever a 1 does not appear
18	AIDGVN	62	1	- range: 1-4
19	TYPAID	63	10	- range: at least one 1, to all ones - if all blanks, leave blank else enter 0 wherever a 1 does not appear

Item No.	Name	Beginning Position	No. of Positions	Comments
20	REQUEST	73	1	- range: 1-5
21	TYPRUN	74	1	- range: 1-4
22	RECVT	75	4	- range: 0001-2400 - zero-fill leading blanks
23	SCENET	79	4	- range: 0001-2400 - zero-fill leading blanks
24	DESTNT	83	4	- range: 0001-2400 - zero-fill leading blanks
25	RECVM	87	5	- zero-fill leading blanks
26	SCENEM	92	5	- zero-fill leading blanks
27	DESTNM	97	5	- zero-fill leading blanks
28	TIME	102	4	- range: 0001-2400 - zero-fill leading blanks
29	PULSE	106	3	- range: 000-250 or "DOA" - zero-fill leading blanks
30	RESP	109	3	- range: 000-200 - zero-fill leading blanks
31	BPSYS	112	3	- range: 000-300 - zero-fill leading blanks
32	BPDIA	115	3	- range: 000-300 - zero-fill leading blanks
33	PUPIL	118	1	- range: 1-9
34	SKIN	119	1	- range: 1-9
35	VERB	120	1	- range: 1-4
36	MOTOR	121	1	- range: 1-3
37	EYE	122	1	- range: 1-4
39	DOCDIR	123	1	- range: 1-5
40	TRMT	124	20	- range: at least one 1, t all ones - if all blanks, leave blan else enter 0 wherever a 1 does not appear
41	DEMT1	144	2	- zero-fill leading blanks
42	DEMT2	146	2	- zero-fill leading blanks
43	EOA	148	2	- zero-fill leading blanks
44	MAST	150	2	- zero-fill leading blanks

Tearoff.

*****when entering a tearsheet, always key the tearsheet number into positions 1-6 of the record (as for Item No. 1, above), then continue with Tearoff fields, beginning in positior 152*****

45	ED-DATE	152	6	- MMDDYY - range: 110178-123185 - no partial entries - zero-fill leading blanks (5/3/82 = 050382)
46	RECHOSP	158	3	- zero-fill leading blanks (1 = 001)
47	ILLINJ	161	3	- zero-fill leading blanks
48	EDREC	164	7	- any value

Item No.	Name	Beginning Position	No. of Positions	Comments
47	INPTREC	171	9	- any value
48	TIMER	180	4	- range: 0001-2400 - zero-fill leading blanks
49	PULSER	184	3	- range: 000-250 - zero-fill leading blanks
50	RESPER	187	3	- range: 000-200 - zero-fill leading blanks
51	BPSYSER	190	3	- range: 000-300 - zero-fill leading blanks
52	BPDIAER	193	3	- range: 000-300 - zero-fill leading blanks
53	PUPILER	196	1	- range: 1-9
54	SKINER	197	1	- range: 1-9
55	VERBER	198	1	- range: 1-4
56	MOTORER	199	1	- range: 1-3
57	EYER	200	1	- range: 1-4
58	ERTRTMT	201	1	- range: 1-6 - multiple entries = 6
59	DISDES	202	1	- range: 1-8
60	TRANS	203	3	- zero-fill leading blanks
61	filler	206	14	- blanks
Control-Fields.				
62	RUN-RPT-SW	220	1	- range: 1, blank, or "*" - if Run-Report is being entered, key in 1
63	TEARSHEET-SW	221	1	- range: 1, blank, or "*" - if tearsheet is being entered, key in 1
64	ORIG-REC	222	1	- range: "Y" or blank - if change is being entered, key in "Y"

General Instructions

- If a field is all blanks, leave it blank-----do not fill with zeroes or nines
- If a field has non-blank entries, right-justify and pad left with zeroes unless otherwise instructed (see "COMMEMTS" for details)
- If Item No. 1 (NOMBA) is absent or incomplete from run-report, enter number printed in "DESCRIPTION" area of form; else enter nothing; return form to EMS with an explanatory note.

- When keying in a Run-Report, enter 1 in position 220
- When keying in a Tearsheet, enter 1 in position 221 and enter report number 1-6
- When keying in a change, enter "Y" in position 222 and appropriate control/key fields (see instructions on change sheets)
- If a field is illegible or there is any doubt about its contents or how to enter it, leave it blank-----inquire with any questions.

jmh

06/81

Edit Specifications

Program EMSEDT

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
Key-Fields.				
1	NOMBA	1-6	X(6)	- numeric - reject if absent or invalid* - error message: INVALID RPT NUM
2	DATED	7-12	X(6)/9(6)	- numeric - MMDDYY - range 110178-123185 (781101-851231) - no partial entries - reject if absent or invalid - INVALID RR DATE
Mainpart.				
2a	DAI	13	X	- numeric - range 1-7 - reject if absent or invalid - BAD DAY-OF-WEEK
3	AMBID	14-16	XXX	- numeric valid ID# (see EMS-Services-By-Region table in library) - reject if absent or invalid - BAD SERVICE NUM
4	TRUCKNO	17	X	- any alphanumeric value - do not even flag**
5	HLOC	18-22	X(5)	- numeric blanks - CCTTT (county/town) - must be valid codes (check against county/town file) - flag if present and invalid - BAD RESIDENCE
6	AGE	23-24	XX	- numeric or blanks - flag if present and invalid - INVALID AGE
7	SEX	25	X	- numeric or blank - 1 = Male, 2 = Female - flag if present and invalid - INVALID SEX

* reject = write to error file, reject entire record
** flag = write to both error file and masterfile

NOTE: If any field is to be wiped out, it must be entered on the appropriate form (MHIC/DP-1.0) as all asterisks. An asterisk in either/both RUN-RPT-SW and/or TEARSHEET-SW will result in the corresponding area of the record or the entire record being wiped out.

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
8	ALOC	26-30	X(5)	- numeric - CCTTT (county/town) - must be valid codes and within valid prime/backup territories for AMBID listed in 4 (above) (check against AMB-SERVICE-REC) - convert MEDCU census tract numbers (20) to valid CCTTT code (see EMS-MEDCU-TABLE) - reject if absent or invalid - INVALID ALOC - OUT OF AMB AREA
9	IDNO	31-39	X(9)	- any alphanumeric value - do not even flag
10	DESTCOD	40-42	XXX	- numeric - must be valid codes (from EMS-DESTINATION-TABLE) - tear sheet need not be present with the following codes (see EMS-NO-TS-TABLE): 004 = no transport 010 = Pineland 014 = other 058 = private physician 059 = health center 065 = nursing home 066 = home 067 = mental health 068 = Togus VA Hospital 069 = Loring AFB 070 = Brunswick Naval Air Station 077 = round trip 088 = mid-route exchange 099 = out-of-state - reject if absent or invalid - BAD DEST-CODE
11	REFUSED	43	X	- numeric or blank - 1 = refused transport, 2 = otherwise - if 1, 10(above) and 20(below) must equal 04 - flag if present and invalid - BAD TRANS REFUSE
12	EMTI	44-45	XX	- numeric - flag if absent or invalid - INVALID EMTI

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
13	EMT2	46-47	XX	- numeric or blank - flag if present and invalid - INVALID EMT2
14	EMT3	48-49	XX	- numeric or blank - flag if present and invalid - INVALID EMT3
15	EMT4	50-51	XX	- numeric or blank - flag if present and invalid - INVALID EMT4
16	INJURY	52-61	X(10)	- numeric - set up as a table (PIC X, occurs 10) - range all zeroes to all ones - cannot be all zeroes if 18 (below) has a value of 1 in any position other than pos. 63 - cannot be all zeroes if 20 (below) equals 1 or 3 - reject if absent or invalid - INVALID INJURY
17	AIDGVN	62	X	- numeric or blank - blank allowed if pos. 63 of 18 (below) equals 1 - range 1-4 (or blank) - flag if present and invalid - BAD FIRST-AID
18	TYPAID	63-72	X(10)	- numeric - set up as a table (PIC X, OCCURS 10) - range all zeroes to all ones - if 17 (above) is 1-4, there must be coded here a 1 somewhere other than in pos. 63 - if pos. 63 is not 1, 16 (above) must be coded with at least one non-zero position - reject if absent or invalid - INVALID TYPAID
19	REQUEST	73	X	- numeric or blank - range 1-5 (or blank) - flag if present and invalid - BAD AID REQUEST
20	TYPRUN	74	X	- numeric - range 1-4 - if 2 or 4, tear sheet will be absent - must be 4 if 10 (above) equals 04

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
20 (cont'd)	TYPRUN	74	X	or if 11 (above) equals 1 - if 1 or 3, 16 (above) must have at least one non-zero position - reject if absent or invalid - INVALID TYPERUN
21	RECVT	75-78	XXXX/9999	- numeric or blank - range 0001-2400 or blanks - flag if present and invalid - BAD RECVD TIME
22	SCENET	79-82	XXXX/9999	- same as 21 (above) - BAD SCENE TIME
23	DESTNT	83-86	XXXX/9999	- same as 21 (above) - BAD DEST TIME
24	RECVM	87-91	X(5)/9(5)	- numeric or blanks - flag if present and invalid - BAD RECVD MILES
25	SCENEM	92-96	X(5(/9(5)	- same as 24 (above) - BAD SCENE MILES
26	DESTNM	97-101	X(5)/9(5)	- same as 24 (above) - BAD DEST MILES
27	TIME	102-105	XXXX/9999	- numeric or blanks - range 0001-2400 or blanks - must be $\geq$ 22 (above) - flag if present and invalid - BAD VITALS TIME
28	PULSE	106-108	XXX/999	- numeric, "DOA," or blanks - range 000-250, "DOA," or blanks - flag if present and invalid - BAD RR PULSE
29	RESP	109-111	XXX/999	- numeric or blanks - range 000-200 or blanks - flag if present and invalid - BAD RR RESP
30	BPSYS	112-114	XXX/999	- numeric or blanks - range 000-300 or blanks - flag if present and invalid - BAD RR BPSYS

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
31	BPDIA	115-117	XXX/999	- numeric or blanks - range 000-300 or blanks - flag if present and invalid - BAD RR BPDIA
32	PUPIL	118	X	- numeric or blanks - range 1-9 or blanks - flag if present and invalid - BAD RR PUPIL
33	SKIN	119	X	- numeric and blank - range 1-9 or blank - flag if present and invalid - BAD RR SKIN
34	VERB	120	X	- numeric and blank - range 1-4 or blank - flag if present and invalid - BAD RR VERBAL
35	MOTOR	121	X	- numeric blank - range 1-3 or blank - flag if present and invalid - BAD RR MOTOR
36	EYE	122	X	- numeric or blank - range 1-4 blank - flag if present and invalid - BAD RR EYE RESP
*** If 27-36 (above) all are absent, flag entire group with one message ***				- BAD RR VITALS
37	DOCDIR	123	X	- numeric or blank - range 1-5 or blank - flag if present and invalid - INVALID DOCDIR
38	TRMT	124-143	X(20)	- numeric or blank - set up as a table (PIC X, OCCURS 20) - range all zeroes to all ones - flag if present and invalid - INVALID TRMT
39	DEMTI	144-145	XX	- numeric or blank - if anything is coded in 39-42, coding must match up with 11-14 (above) - flag if present and invalid - BAD IV-EMT

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
40	DEMT2	146-147	XX	- same as 39 (above) - BAD DEFIB-EMT
41	EOA	148-149	XX	- same as 39 (above) - BAD EOA-EMT
42	MAST	150-151	XX	- same as 41 (above) - BAD MAST-EMT

Tearoff.

*** Tear sheet (Items No. 43-61) may not be present--see 10 and 20 (above) ***

43	ED-DATE	152-157	X(6)	- numeric - MMDDYY - range 110178-123185 (781101-851231) - no partial entries - must match or be within 2 days of 2 (above) - reject tearsheet if absent or invalid - BAD TS DATE
44	RECHOSP	158-160	XXX	- numeric - must be valid code (see EMS-DESTINATION-TABLE) - must match 10 (above) - reject if absent or invalid - BAD RECVG HOSP
45	ILLINJ	161-163	XXX	- numeric or blanks - flag if present and invalid - BAD TS ILL-INJ
46	EDREC	164-170	X(7)	- any alphanumeric value - do not even flag
47	INPTREC	171-179	X(9)	- any alphanumeric value - if present, 59 (below) must equal 4 or 5 - flag if present and invalid - BAD INPT-REC-NO
48	TIMER	180-183	XXXX/9999	- numeric or blanks - range 0001-2400 or blanks - flag if present and invalid - BAD TS VIT-TIME
49	PULSER	184-186	XXX/999	- numeric or blanks - range 000-250 or blanks - flag if present and invalid - BAD TS PULSE

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
50	RESPER	187-189	XXX/999	- numeric or blanks - range 000-200 or blanks - flag if present and invalid - BAD TS RESP
51	BPSYSER	190-192	XXX/999	- numeric or blanks - range 000-300 or blanks - flag if present and invalid - BAD TS BPSYS
52	BPDIAER	193-195	XXX/999	- numeric or blanks - range 000-300 or blanks - flag if present and invalid - BAD TS BPDIA
53	PUPILER	196	X	- numeric or blank - range 1-9 or blank - flag if present and invalid - BAD TS PUPIL
54	SKINER	197	X	- numeric or blank - range 1-9 or blank - flag if present and invalid - BAD TS SKIN
55	VERBER	198	X	- numeric or blank - range 1-4 or blank - flag if present and invalid - BAD TS VERBAL
56	MOTORER	199	X	- numeric or blank - range 1-3 or blank - flag if present and invalid - BAD TS MOTOR
57	EYER	200	X	- numeric or blank - range 1-4 or blank - flag if present and invalid - BAD TS EYE-RESP
*** If 48-57 (above) all are absent, flag entire group with one message ***				- BAD TS VITALS
58	ERTRMT	201	X	- numeric or blank - range 1-6 of blank - flag if present and invalid - BAD ED TRTMT
59	DISPDES	202	X	- numeric - range 1-8 - reject tearsheet if absent or invalid - BAD DISP CODE

EMS AMBULANCE RUN REPORTS

Edit Specifications

ITEM NO.	NAME	COLUMNS	PICTURE	EDIT SPECS
60	TRANS	203-205	XXX	- numeric or blank - must be blanks if 59 (above) equals 1-7 - must be present if 59 (above) equals 8 - will match 44 (above) only if 44 equals 039 (MMMC) or 015/030 (AGH/GGH) - flag if present and invalid - BAD TRANSFER
61	filler	206-219	14	- blanks
Control Fields.				
62	RUN-RPT-SW	220	X	- blank if no run report - "1" if RR is present - "*" if RR is to be blanked out - flag if present and invalid - BAD RR-SWITCH
63	TEARSHEET-SW	221	X	- blank if no tearsheet - "1" if TS is present - "*" if TS is to be blanked out - flag if present and invalid - BAD TS-SWITCH
64	ORIG-REC	222	X	- "Y" if correction to record already on masterfile, blank otherwise - flag if present and invalid - BAD CHG CODE

Other Error Messages:

- NO TS OR RR: blank record or change entered for nonexistent report number
- RR REJECTED: run report contains severe error
- TS REJECTED: tearsheet contains severe error

EMSCMP

08/26/80

MAINE DEPARTMENT OF HUMAN SERVICES

EMERGENCY MEDICAL SERVICES PROJECT

TOTAL RUNS PER TYPE OF RUN

04/01/80 - 06/30/80

REGION

SERVICE	TOTAL RUNS	EMERGENCY TRANSPORT	ROUTINE TRANSFER	EMERGENCY TRANSFER	NO TRANSPORT	UNKNOWN
	240	135	81	17	6	1
*** REGION TOTALS: ***						
	2390	1217	915	144	107	7
***** STATEWIDE TOTALS: *****						
	11878	7004	2862	510	1472	30

This report breaks the total number of runs into the type of run as reported by the run reports for the time period listed below the report heading.

MAINE DEPARTMENT OF HUMAN SERVICES

EMERGENCY MEDICAL SERVICES PROJECT

NUMBER OF RUNS PER TYPE ILLNESS/INJURY

04/01/80 - 06/30/80

REGION

SERVICE	TOTAL RUNS	TRAUMA	HEAD	SPINAL	BURN	CARDIAC	POISONING	RESPIRATORY	BEHAVIORIAL	NEONATE	OTHER	UNKNOWN
	240	55	13	6	1	37	1	23	6	1	59	64
*** REGION TOTALS: ***												
	2390	430	173	72	8	259	25	192	91	11	634	805
***** STATEWIDE TOTALS: *****												
	11878	2292	912	393	66	1339	156	996	497	63	3992	2716

This report lists the total number of runs by the type illness/injury for the time period listed below the heading. Since multiple injuries often appear on the run reports, the sum of the type illness/injury may be more than the total number of runs.

MAINE DEPARTMENT OF HUMAN SERVICES
EMERGENCY MEDICAL SERVICES PROJECT
SOURCES OF CPR AID
04/01/80 - 06/30/80

REGION

SERVICE	TOTAL RUNS	CPR BEFORE AMB/RESCUE ARRIVAL	CPR BY SERVICE PERSONNEL
	240	1	2
*** REGION TOTALS: ***			
	2390	16	26
***** STATEWIDE TOTALS: *****			
	11878	61	110

The Sources of CPR Aid report includes the number of run reports which indicated that CPR was administered either before the ambulnace/rescue arrived or by service personnel during the time period listed below the heading.

MAINE DEPARTMENT OF HUMAN SERVICES

EMERGENCY MEDICAL SERVICES PROJECT

AVERAGE RESPONSE TIMES BY TYPE OF RUN

04/01/80 - 06/30/80

REGION

SERVICE	TOTAL RUNS	********** AVERAGE RESPONSE TIMES ********** EMERGENCY TRANSPORT	ROUTINE TRANSFER	EMERGENCY TRANSFER	RESP TIME UNKNOWN	NO TRANSPORT	UNKNOWN TYPE RUN
	240	:05	:10	:03	100	6	1
*** REGION TOTALS: ***							
	2390	:10	:08	:08	811	107	7
***** STATEWIDE TOTALS: *****							
	11878	:11	:15	:13	2617	1472	30

The Average Response Time by Type of Run shows the average response time for each type of run for the time period listed below the report heading. To determine response time, both Call Received and At Scene must be completed on the run reports. Response Time Unknown is the total number of runs for which the response time was partially or totally missing.

MAINE DEPARTMENT OF HUMAN SERVICES
EMERGENCY MEDICAL SERVICES PROJECT
VITAL SIGNS COMPLETION ANALYSIS
04/01/80 - 06/30/80

REGION

SERVICE	TOTAL EMERGENCY RUNS	VITAL SIGNS			
		PULSE	RESPIRATION	BLOOD PRESSURE SYS	BLOOD PRESSURE DIA
	152	111 - 73%	101 - 66%	108 - 71%	91 - 60%
*** REGION TOTALS: ***					
	1361	1000 - 73%	811 - 60%	946 - 70%	888 - 65%
***** STATEWIDE TOTALS: *****					
	7514	5585 - 74%	4021 - 54%	5080 - 68%	4507 - 60%

The Vital Sign Completion Analysis report lists the total number of emergency runs (emergency transports and transfers) for the time period listed below the heading. Listed next is the number and percent of these reports on which the pulse, respiration and blood pressure were completed.

MAINE DEPARTMENT OF HUMAN SERVICES

EMERGENCY MEDICAL SERVICES PROJECT

TEAR SHEET COMPLIANCE ANALYSIS

01/01/81 - 03/31/81

HOSPITAL 5

********** RUN REPORTS WITH TEARSHEETS *********

EMERGENCY TRANSPORTS	EMERGENCY TRANSFERS	ROUTINE TRANSFERS	TEARSHEETS WITH RR	TEARSHEETS WITHOUT RR
3	0	0	3	1

TEARSHEET SUMMARY DATA

	TOTAL	E.D. PT. #	INPT. #
DISCHARGED (1-3)	1	0	0
HOSPITALIZED (4-5)	1	0	0
DIED (6)	0	0	0
TRANSFERRED (7-8)	0	0	0
UNKNOWN (BLANK)	2	0	0

HOSPITAL 5 TOTAL: 52 RR, 4 TS

REGION 5 TOTAL: 404 RR, 235 TS

MAINE DEPARTMENT OF HUMAN SERVICES
EMERGENCY MEDICAL SERVICES PROJECT
TOTAL RUNS PER TYPE OF RUN
01/01/81 - 03/31/81

REGION 5

SERVICE	TOTAL RUNS	EMERGENCY TRANSPORT	ROUTINE TRANSFER	EMERGENCY TRANSFER	NO TRANSPORT	UNKNOWN
017	165	61	77	13	13	1
040	30	27	2	1	0	0
149	66	35	27	2	2	0
360	187	72	73	6	36	0
388	28	19	3	2	4	0
437	71	56	7	5	3	0
525	33	20	8	3	2	0
720	98	47	45	1	5	0
*** REGION 5 TOTALS: ***						
	678	337	242	33	65	1
***** STATEWIDE TOTALS: *****						
	14619	8225	4061	584	1661	88

MAINE DEPARTMENT OF HUMAN SERVICES
EMERGENCY MEDICAL SERVICES PROJECT
NUMBER OF RUNS PER TYPE ILLNESS/INJURY
01/01/81 - 03/31/81

REGION 5

SERVICE	TOTAL RUNS	TRAUMA	HEAD	SPINAL	BURN	CARDIAC	POISONING	RESPIRATORY	BEHAVIORIAL	NEONATE	OTHER	UNKNOWN
017	165	11	4	3	0	20	0	15	3	0	66	53
040	30	7	4	4	0	8	1	6	1	0	9	0
149	66	15	2	1	0	3	1	3	0	0	50	4
360	187	24	11	9	0	34	1	13	7	4	89	16
388	28	2	2	2	0	6	0	5	0	0	11	2
437	71	3	3	3	0	7	1	17	3	1	46	0
525	33	3	2	3	0	10	0	4	0	0	18	0
720	98	6	4	3	0	9	1	11	3	1	34	29
*** REGION 5 TOTALS: ***												
	678	71	32	28	0	97	5	74	17	6	323	104
***** STATEWIDE TOTALS: *****												
	14619	2867	997	611	75	1954	188	1607	618	108	5357	2063

MAINE DEPARTMENT OF HUMAN SERVICES
EMERGENCY MEDICAL SERVICES PROJECT
SOURCES OF CPR AID
01/01/81 - 03/31/81

REGION 5

SERVICE	TOTAL RUNS	CPR BEFORE AMB/RESCUE ARRIVAL	CPR BY SERVICE PERSONNEL
017	165	1	3
040	30	0	0
149	66	1	0
360	187	1	3
388	28	0	0
437	71	0	2
525	33	1	1
720	98	0	0
*** REGION 5 TOTALS: ***	678	4	9
***** STATEWIDE TOTALS: *****	14619	91	175

MAINE DEPARTMENT OF HUMAN SERVICES

EMERGENCY MEDICAL SERVICES PROJECT

AVERAGE RESPONSE TIMES BY TYPE OF RUN

01/01/81 - 03/31/81

REGION 5

SERVICE	TOTAL RUNS	********** AVERAGE RESPONSE TIMES ********** EMERGENCY TRANSPORT	ROUTINE TRANSFER	EMERGENCY TRANSFER	RESP TIME UNKNOWN	NO TRANSPORT	UNKNOWN TYPE RUN
017	165	:15	:56	:42	62	13	1
040	30	:33	:07	:07	1	0	0
149	66	:10	:13	:05	17	2	0
360	187	:07	:29	:09	8	36	0
388	28	:13	:02	:04	7	4	0
437	71	:06	:02	:03	0	3	0
525	33	:16	:18	1:17	2	2	0
720	98	:00	:00	:00	93	5	0
*** REGION 5 TOTALS: ***							
	678	:13	:16	:18	190	65	1
***** STATEWIDE TOTALS: *****							
	14619	:15	:17	:11	3160	1661	88

MAINE DEPARTMENT OF HUMAN SERVICES

EMERGENCY MEDICAL SERVICES PROJECT

VITAL SIGNS COMPLETION ANALYSIS

01/01/81 - 03/31/81

REGION 5

SERVICE	TOTAL EMERGENCY RUNS	VITAL SIGNS			
		PULSE	RESPIRATION	BLOOD PRESSURE SYS	BLOOD PRESSURE DIA
017	74	47 - 64%	20 - 27%	44 - 59%	45 - 61%
040	28	25 - 89%	19 - 68%	24 - 86%	23 - 82%
149	37	34 - 92%	34 - 92%	29 - 78%	28 - 76%
360	78	50 - 64%	46 - 59%	45 - 58%	41 - 53%
388	21	20 - 95%	10 - 48%	21 - 100%	20 - 95%
437	61	48 - 79%	44 - 72%	50 - 82%	48 - 79%
525	23	22 - 96%	13 - 57%	20 - 87%	18 - 78%
720	48	15 - 31%	10 - 21%	13 - 27%	13 - 27%
*** REGION 5 TOTALS: ***					
	370	261 - 71%	196 - 53%	246 - 66%	236 - 64%
***** STATEWIDE TOTALS: *****					
	8809	7090 - 80%	5528 - 63%	6328 - 72%	5567 - 63%

APPENDIX D

Ridit Analysis

Ridit analysis is a statistical technique that takes advantage of ordering within a population which may not conform to a refined measurement system or which is subjective in nature. Virtually the only assumption made in ridit analysis is that the discrete categories represent intervals of an underlying continuum. It is inappropriate to use the ridit technique for populations with a dichotomous classification (e.g., "yes" and "no"). No assumption is made concerning the normality of the distribution. This technique permits reduction of subjective data to a form which can be manipulated statistically. Apart from the single initial ridit operation shown, the computations are the usual means and variances of the t-test family of statistical methods.

Ridits are relative to an empirical distribution. The first three letters stand for Relative to an Identified Distribution. In other words, ridits are based upon the observed distribution of a response variable for a specified set of units. Ridits represent probabilities derived from distribution-free methods based on ranks.

The first step in the use of ridit is the difficult but crucial choice of the identified reference distribution. Ocassionally, the study series as a whole will serve as a reference set because it is homogeneous and representative of some larger population. However. it is not wise to automatically use the totality of observations if the reference set is not homogeneous and therefore not representative. It is possible to go through the motions for any specified set, but the resulting numbers may be meaningless in terms of the context of the study. The choice of the reference set depends on several factors and some compromise may be necessary. The reference set should be large enough. at least 100 cases, to insure that the ridits will be stable. It should minimize antifactual effects. It is desireable to have a series which will span the full range of the response variable.

Once the reference distribution has been chosen, the calculations consist of assigning numerical values (ridits) to each graded category. The ridit measures the intensity of the characteristic represented by that category. Familiar statistical operations, such as calculation of the mean, variance. and confidence interval. may then be computed. Calculations may be performed according to the appropriate formula, but one must remember that the numbers being used are not measurements such as those of the ruler. If one is using ridits solely for qualitative conclusions, as would be obtained from tests of significance.

there is little need to be concerned with the peculiarities of the subjective scales. If, on the other hand, one wishes to derive quantitative results, the mean ridit has a probabililty interpretation. It is an estimate of the chance that an individual in a comparison group is "worse off" or "better off" than an individual in the reference class.

RIDIT VALUES OF REFERENCE GROUP

The calculation of ridit values is explained in the following example. The calculation of ridits is a simple, routine process. Column 1 gives the distribution of the individuals in an "identified distribution."

CARDIAC Severity Level	IISI Score	Column 1	2	3	4	5
1	0-3	30				
2	4-6	76				
3	7-11	88				
4	12+	62				

Column 1 = The frequency distribution in the identified distribution (reference class)

Column 2 is generated by entering one-half of the corresponding amount from Column 1.

CARDIAC

Severity Level	IISI Score	Column 1	2	3	4	5
1	0-3	30	15			
2	4-6	76	38			
3	4-11	88	44			
4	12+	62	31			

Column 2 = One-half of the corresponding entry in column 1

Column 3 begins with a 0 placed in the first position. The second position is the sum of the first position entries in columns 1 and 3. In the example this is 30 (30+0). The third position is the sum of the second position entries in columns 1 and 3. In the example this is 106 (76 + 30). This process is continued through the last position of the column.

CARDIAC

Severity Level	IISI Score	Column 1	2	3	4	5
1	0-3	30	15	0		
2	4-6	76	38	30		
3	7-11	88	44	106		
4	12+	62	31	194		

Column 3 = The cumulate of column 1 (displaced one category downward)

Column 4 is generated as the sum of corresponding positions of columns 2 and 3.

CARDIAC

Severity Level	IISI Score	1	2	Column 3	4	5
1	0-3	30	15	0	15	
2	4-6	76	38	30	68	
3	7-11	88	44	106	150	
4	12+	62	31	194	225	

Column 4 = Column 2 added to column 3

Column 5, the ridit value, is generated by dividing the corresponding value in column 4 by the total of column 1.

CARDIAC

Severity Level	IISI Score	1	2	Column 3	4	5
1	0-3	30	15	0	15	0.0586
2	4-6	76	38	30	68	0.2656
3	7-11	88	44	106	150	0.5859
4	12+	62	31	194	225	0.8789
		256				

Column 5 = The entry in column 4 divided by the total of column 1. These numbers are the ridits.

The final values are the ridits associated with the various categories. The ridit for a category then is nothing more than the proportion of all subjects from the reference group falling in the lower ranking categories plus one half the proportion falling in the given category. The ridits are calculated only for the reference group. These are then used in analysis of comparison groups.

MEAN RIDIT FOR COMPARISON GROUPS

Given the distribution of a comparison group over the same categories, the mean ridit for that group may be calculated. Using the example given, calculation of the mean ridit of a comparison group would proceed as follows.

The ridits associated with each point are entered in column 1.

CARDIAC

Severity Level	IISI Score	1 ridit
1	0-3	0.0586
2	4-6	0.2656
3	7-11	0.5859
4	12+	0.8789

The comparison group values, with total, are entered in column 2.

CARDIAC

Severity Level	IISI Score	1	2 Comparison Group A
1	0-3	0.0586	1,421
2	4-6	0.2656	508
3	7-11	0.5859	64
4	12+	0.8789	31
			2,024

Column 3 is generated by multiplication of the corresponding entries in columns 1 and 2. Column 3 is then totaled.

CARDIAC

Severity Level	IISI Score	1	2 Comparison Group A	3 (1) x (2)
1	0-3	0.0586	1,421	83.2706
2	4-6	0.2656	508	134.9248
3	7-11	0.5859	64	37.4976
4	12+	0.8789	31	27.2459
			2,024	282.9389

The mean ridit of the comparison group is then calculated as the quotient of the column 3 total divided by the column 2 total.

CARDIAC

Severity Level	IISI Score	1	2 Comparison Group A	3 (1) x (2)	
1	0-3	0.0586	1,421	83.2706	
2	4-6	0.2656	508	134.9248	
3	7-11	0.5859	64	37.4976	
4	12+	0.8789	31	27.2459	
			2,024	282.9389	$\bar{r}_A = 0.1398$

Since the mean ridit ($\bar{r}_A$) for comparison group A is less than 0.5, the comparison group may be considered to be "better off" than the reference group. More specifically, the group represented above has a lower average severity score than does the reference group. The significance of this value is determined by calculating first the standard error of the mean ridit followed by the z-score for this mean ridit. The z-score is then checked against a table of normal distribution in order to establish the significance level.

Standard Error of Mean Ridit for Comparison Groups

The formula for standard error (s.e.) of the mean ridit for comparison groups is given below in the example using comparison group A.

$$\text{s.e. } (\bar{r}) = \frac{1}{2\sqrt{3N}}$$

$$\text{s.e. } (\bar{r}_A) = \frac{1}{2\sqrt{3(2,024)}}$$

$$\text{s.e. } (\bar{r}_A) = \frac{1}{155.8461}$$

$$\text{s.e. } (\bar{r}_A) = 0.0064$$

Z Score of Mean Ridit for Comparison Groups

The significance of the difference between the mean ridit for a comparison group and the standard value of 0.5 is tested using a z score.

$$Z = \frac{\bar{r} - 0.5}{\text{s.e. } (\bar{r})}$$

$$Z = \frac{0.1398 - 0.5}{0.0064}$$

$$Z = \frac{-0.3602}{0.0064}$$

$$Z = -56.2813$$

Using a table of normal distribution, this value of Z for comparison group A is found to be significant at the $p < 0.0001$ level.

From the mean ridit for comparison group A, it was seen that the comparison group had lower severity scores than the reference group, i.e. the comparison group was "better off". The Z score demonstrates that this finding is statistically significant.

Comparison of Comparison Groups

To compare one group with another with neither as the reference group, the mean ridit for each of the groups is calculated. Calculations for a second comparison, group B, are presented below.

Cardiac Severity Level	IISI Score	RIDITS 1	COMPARISON GROUP B 2	3	
1	0-3	0.0586	27	1.5822	
2	4-6	0.2656	119	31.6064	
3	7-11	0.5859	554	324.5886	
4	12+	0.8789	139	122.1671	
			839	479.9443	$\bar{r}_B = 0.5720$

Since the mean ridit ($\bar{r}_B$) for comparison group B is greater than 0.5, this comparison group may be considered to be slightly "worse off" than the reference group. Specifically, this comparison group has a higher average severity score than does the reference group. Using the standard error of the mean and Z score formulas, the statistical significance of the "worse off" evaluation is learned.

$$\text{s.e.}(\bar{r}) = \frac{1}{2\sqrt{3N}} \qquad Z = \frac{\bar{r} - 0.5}{\text{s.e.}(\bar{r})}$$

$$\text{s.e.}(\bar{r}_B) = \frac{1}{2\sqrt{3(839)}} \qquad Z = \frac{0.5720 - 0.5}{0.0100}$$

$$\text{s.e.}(\bar{r}_B) = 0.0100 \qquad Z = 7.2000$$

The Z score when checked in a table of normal distribution demonstrates statistical significance at the $p < 0.0001$ level. This indicates that comparison group B had significantly higher severity score than the reference group.

In order to compare group A with group B, the mean ridits calculated above ($\bar{r}_A = 0.1398$ and $\bar{r}_B = 0.5720$) are used to compute the mean ridit of the difference of the two groups ($\bar{r}_{A-B}$).

$$\bar{r}_{A-B} = \bar{r}_A - \bar{r}_B + 0.5$$

$$\bar{r}_{A-B} = 0.1398 - 0.5720 + 0.5$$

$$\bar{r}_{A-B} = 0.0678$$

The standard error (s.e.) of this comparison mean ridit ($\bar{r}_A - \bar{r}_B$) is computed from the following formula.

$$\text{s.e.}\ (\bar{r}_A - \bar{r}_B) = \frac{\sqrt{N_A + N_B}}{2\sqrt{3N_AN_B}}$$

$$\text{s.e.}(\bar{r}_A - \bar{r}_B) = \frac{\sqrt{2024 + 839}}{2\sqrt{3(2024)(839)}}$$

$$\text{s.e.}(\bar{r}_A - \bar{r}_B) = \frac{53.5070}{4514.1591}$$

$$\text{s.e.}(\bar{r}_A - \bar{r}_B) = 0.0119$$

In order to determine the significance of the difference between comparison groups A and B, the Z score is calculated using the following formula.

$$Z = \frac{\bar{r}_A - \bar{r}_B}{s.e.(\bar{r}_A - \bar{r}_B)}$$

$$Z = \frac{0.1398 - 0.5720}{0.0119}$$

$$Z = -36.3193$$

Using the table for normal distribution, the Z score is significant at $p < 0.0001$, indicating that the comparison group A is significantly "better off" than comparison group B.

These formulas constitute the primary tools for using ridits in conjunction with comparison groups. With them, reference groups and infinite comparison groups may be constructed and evaluated for any data set.

References

Bross, D.J., 1958, How to use ridit analysis. Biometrics, March pp. 18-38.

Fleiss, J.L., 1973, Statistical Methods for Rates and Proportions, pp. 41-43. 102-107. New York: John Wiley & Sons.

APPENDEX E

DATA SET I

	Hospital Level I						Hospital Level II						Hospital Level III						Hospital Level IV						Hospital Level Unknown					
	≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
TRAUMA																														
Age Groups																														
0 - 4	67	0	24	0	21	0	91	0	15	0	16	0	NOT APPLICABLE						NOT APPLICABLE						93	0	8	0	12	0
5 - 17	541	2	155	0	170	0	551	13	144	2	95	3													228	0	27	0	62	1
18 - 44	1313	15	395	4	378	3	1404	68	322	19	307	11													513	3	93	0	115	2
45 - 64	397	5	119	2	122	1	426	11	96	5	82	1													132	0	25	0	27	0
65+	767	4	213	3	222	0	538	8	123	1	78	2													206	0	58	0	42	0
Unknown	68	2	30	1	50	0	30	0	8	1	11	0													166	3	21	0	79	3
HEART																														
Age Groups																														
0 - 4	2	0	0	0	0	0	5	0	1	0	1	0	1	0	0	0	1	0	6	1	3	0	3	0	3	0	3	0	4	0
5 - 17	0	0	0	0	2	0	9	3	3	0	0	0	5	1	2	1	0	0	8	0	2	0	2	0	3	0	0	1	0	0
18 - 44	13	0	7	0	11	0	167	38	40	10	55	8	66	17	14	3	4	0	50	18	14	4	12	2	21	0	9	0	9	0
45 - 64	37	1	22	0	36	0	514	166	148	42	157	22	165	77	38	13	32	1	172	105	54	19	24	5	95	4	38	2	24	0
65+	101	4	52	0	73	2	1140	324	327	63	316	36	297	146	92	16	42	5	230	125	56	28	27	6	217	8	82	5	77	0
Unknown	15	0	4	1	8	0	65	7	21	2	42	3	9	1	1	0	1	0	8	2	4	0	1	0	47	2	14	2	23	1

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET I: CELL SETS WITH MINIMUM OF 5 CASES PER CELL

TYPE CASE	HOSP LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY LEVEL	BLS				ALS			
					TOTAL	LIVE	DIE	UNK	TOTAL	LIVE	DIE	UNK
TRAUMA	I	≤ 15	18-44		1313	642	3	668	15	2	0	13
			45-64		397	176	2	219	5	1	0	4
	II	≤ 15	5-17		551	226	1	324	13	5	0	8
			18-44		1404	524	1	879	68	22	1	45
			45-64		426	156	0	270	11	4	1	6
			65+		538	141	1	396	8	1	0	7
		> 15	18-44		322	66	2	254	19	1	0	18
			45-64		96	18	0	78	5	0	0	0
		UNK	18-44		307	126	0	181	11	1	1	9
CARDIAC	II	≤ 15	18-44		167	68	7	92	38	8	10	20
			45-64		514	105	31	378	166	27	24	115
			65+		1140	127	54	959	324	39	37	248
			UNK		65	7	7	51	7	2	1	4
		> 15	18-44		40	7	1	32	10	0	0	10
			45-64		148	25	6	117	42	3	1	38
			65+		327	22	7	298	63	3	2	58
		UNK	18-44		55	15	4	36	8	2	0	6
			45-64		157	26	6	125	22	0	3	19
			65+		316	48	10	258	36	1	1	34
	III	≤ 15	18-44		66	30	3	33	17	12	2	3
			45-64		165	46	3	116	77	33	14	30
			65+		297	65	10	222	146	52	24	70
		> 15	45-64		38	5	1	32	13	2	2	9
			65+		92	13	2	77	16	6	0	10
		UNK	65+		42	4	1	37	5	0	0	5
	IV	≤ 15	18-44		50	8	0	42	18	3	0	15
			45-64		172	6	0	166	105	6	10	89
			65+		230	9	0	221	125	1	3	121
		> 15	45-64		54	2	0	52	19	0	1	18
			65+		56	2	0	54	28	0	2	26
		UNK	45-64		24	1	0	23	5	0	0	5
			65+		27	1	0	26	6	0	0	6
	UNK	≤ 15	65+		217	0	0	217	8	0	0	8
		> 15	65+		82	0	0	82	5	0	0	5

APPENDIX F

DATA SET II

	Hospital Level II						Hospital Level III					
	15 Min		15 Min		Unknown		15 Min		15 Min		Unknown	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
TRAUMA												
Age Groups												
0 - 4	11	0	0	0	1	0	Not Applicable					
5 - 17	70	2	2	0	4	0						
18 - 44	207	17	8	0	3	0						
45 - 64	79	6	2	0	3	0						
65+	83	2	1	1	0	0						
Unknown	7	0	0	0	1	0						
HEART												
Age Groups												
0 - 4	Not Applicable						0	0	0	0	0	0
5 - 17							2	0	0	0	0	0
18 - 44							17	14	0	0	0	0
45 - 64							36	39	0	1	0	1
65+							57	75	2	1	1	1
Unknown							2	0	0	0	0	0

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET II: CELL SETS AVAILABLE FOR ANALYSIS

TYPE CASE	HOSP LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY LEVEL	BLS TOTAL	BLS LIVE	BLS DIE	BLS UNK	ALS TOTAL	ALS LIVE	ALS DIE	ALS UNK
TRAUMA	II	$\leq$ 15	18-44		207	200	2	5	17	16	1	0
			45-64		79	75	0	4	6	4	2	0
CARDIAC	III	$\leq$15	18-44		17	11	2	4	14	12	2	0
			45-64		36	30	3	3	39	27	10	2
			65+		57	45	8	4	75	49	18	8

APPENDIX F

DATA SET II

	Hospital Level II						Hospital Level III					
	15 Min		15 Min		Unknown		15 Min		15 Min		Unknown	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
TRAUMA												
Age Groups												
0 - 4	11	0	0	0	1	0	Not Applicable					
5 - 17	70	2	2	0	4	0						
18 - 44	207	17	8	0	3	0						
45 - 64	79	6	2	0	3	0						
65+	83	2	1	1	0	0						
Unknown	7	0	0	0	1	0						
HEART												
Age Groups												
0 - 4	Not Applicable						0	0	0	0	0	0
5 - 17							2	0	0	0	0	0
18 - 44							17	14	0	0	0	0
45 - 64							36	39	0	1	0	1
65+							57	75	2	1	1	1
Unknown							2	0	0	0	0	0

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET II: CELL SETS AVAILABLE FOR ANALYSIS

TYPE CASE	HOSP LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY LEVEL	BLS				ALS			
					TOTAL	LIVE	DIE	UNK	TOTAL	LIVE	DIE	UNK
TRAUMA	II	≤ 15	18-44		207	200	2	5	17	16	1	0
			45-64		79	75	0	4	6	4	2	0
CARDIAC	III	≤15	18-44		17	11	2	4	14	12	2	0
			45-64		36	30	3	3	39	27	10	2
			65+		57	45	8	4	75	49	18	8

DATA SET II - RIDIT Calculations (discussion on p. 13)

Reference Group = Total BLS Cardiac Cases

Comparison Group = Cardiac Level III ≤15 min 65+ Cases

	BLS	RIDIT	ALS
Live	91	0.3889	49
Unknown	12	0.8291	8
Die IP	8	0.9145	5
Die ER	6	0.9744	13
Total	117		75

$\bar{r} = 0.5724$
s.e.$(\bar{r}) = 0.0333$
$z = 2.1709$
$p < 0.03$

Reference Group = BLS Cardiac Level III Cases

Comparison Group = Cardiac Level III ≤15 min 65+ Cases

	BLS	RIDIT	ALS
Live	45	0.3947	49
Unknown	4	0.8246	8
Die IP	6	0.9123	5
Die ER	2	0.9825	13
Total	57		75

$\bar{r} = 0.5770$
s.e.$(\bar{r}) = 0.0333$
$z = 2.3088$
$p < 0.02$

APPENDIX G

Data Set III

Background of Data Collection: A companion data set for 1979-1980 data was available from another project evaluating EMS effectiveness in Maine. This project, sponsored jointly by the Center for Health Systems Research and Analysis at the University of Wisconsin and EMS/MHIC, employs registered nurses to trace and abstract run report, emergency department and inpatient records for emergency trauma and cardiac cases treated at 27 participating hospitals. Patients included in Data Set III met the following criteria:

1. Patient was either an inpatient or an emergency department patient at one of 27 designated Maine hospitals during the period January 1979 through December 1980.

2. Discharge diagnostic codes met the project specifications. (See code listing Attachment 6 and 7)

3. Patient age was greater than 36 months.

4. Transfer patients not treated at hospitals participating in the project were excluded.

The primary feeder hospitals as well as the major referral centers within the State of Maine are included in the 27 participating hospitals which are located in all areas of the State. There is no significant difference between those hospitals participating in the project and those which do not other than a sharply reduced number of eligible cases available within each hospital. Based upon the acceptable codes, the 1980 hospital discharge data set yielded 4,580 cardiac cases and 1,266 trauma cases for all of the 46 hospitals in the state. When reduced to those 27 hospitals participating, 79.0% (3,619) of the cardiac cases and 87.1% (1,103) of the trauma cases were eligible for inclusion in the 1980 data set. The eligible codes are listed in Attachment 6 and 7.

After the records are screened for eligibility, a further selection algorithm is imposed. Every eligible trauma case is included. The cardiac cases included are: all emergency department deaths and all transfers from participating sending to participating receiving hospitals. For hospitals with under 200 short term beds, 100% of the cardiac deaths are included, while for hospitals with 200 or more beds, 50% of the deaths are selected. Of cardiac patients discharged alive, hospitals with 200 or more beds select 25% of the patients, with 50 through 199 beds select 50% of the patients. Hospitals with fewer than 50

beds include all cases. At the time eligibility is determined, all cardiac records are assigned a random number, which is used in this proportional selection process.

The cases in Data Set III have the additional benefit of including run reports from ambulance services not participating in the run report system, some of which provide ALS treatment.

The validity and reliability of the information within Data Set III is high because the data was collected by registered nurses with emergency room and/or critical care experience, who were further trained in the extraction of specific information. These abstractors gathered information from all available records: the ambulance run report, emergency department records, all portions of the inpatient records and from death records, when appropriate.

One group of patients is omitted from Data Set III. The patient transported by ambulance and provided ALS treatment who is not admitted but discharged home or to a non-acute care facility is not potentially included within the data set. The patient transported by ambulance who is not admitted but is transferred or dies before admission is potentially included in the data set.

Attachment 6

CODE LISTS FOR CASES ELIGIBLE FOR DATA SET III

CARDIAC CODES

ICDA-8	ICD-9-CM	
410.0 - 410.9	410.0 - 410.9	Acute myocardial infarction
427.3	426.0, 426.11, 426.12	Atrioventricular block
427.5	427.1	Paroxysmal ventricular tachycardia
427.6	427.41, 427.42	Ventricular fibrillation & flutter
	427.5	Cardiac arrest
427.9	427.9	Cardiac dysrhythmia

Attachment 7

TRAUMA CODES

ICDA-8	ICD-9-CM	
800.1	800.5 - 800.9	Fracture of vault of skull
801.0, 801.1 801.9	801.0 - 801.9	Fracture of base of skull
	803.0 - 803.9	Unqualified skull fracture
804.0	804.0 - 804.9	Multiple fractures involving skull or face with other bones
806.0 - 806.9	806.0 - 806.9	Fracture of vertebral column with spinal cord injury
807.1 - 807.9	807.1 - 807.6	Fracture of rib(s), sternum, larynx, and trachea
809.1, 809.9	809.1	Fracture of bones of trunk, open
851.0 - 851.1 851.9	851.0 - 851.9	Cerebral laceration and contusion
852.0 - 852.5	852.0 - 852.5	Subarachnoid, subdural and extradural hemorrhage following injury
853.0 - 853.1	853.0 - 853.1	Other unspecified intracranial hemorrhage following injury
8060.0 - 860.1 860.9	860.0 - 860.5	Traumatic pneumothorax and hemothorax
861.0 - 861.3 861.9	861.0 - 861.3	Injury to heart and lung
862.0 - 862.1 862.9	862.0 - 862.3 862.8 - 862.9	Injury to other and unspecified intrathoracic organs
863.0 - 863.1 863.9	863.0 - 863.5 863.8 - 863.9	Injury to gastrointestinal tract
864.0, 864.1 864.9	864.0, 864.1	Injury to liver
865.0, 865.1 865.9	865.0-865.1	Injury to spleen
866.0, 866.1 866.9	866.0 - 866.1	Injury to kidney
867.0 - 867.1 867.9	867.0 - 867.9	Injury to pelvic organs
868.1, 868.9	868.1	Injury to other intra-abdominal organs or:
	868.13	Peritoneum
	868.14	Retroperitoneum
	868.19	Other and multiple intra-abdominal organs
869.0, 869.1 869.9	869.0, 869.1	Internal injury to unspecified or ill-defined organs
897.0, 897.1 897.9	897	Traumatic amputation of leg(s) (complete) (partial)
904.0 - 904.2 904.9, 879.1 874.0, 874.1 874.9	900.0, 900.1 900.8, 900.9	Injury to blood vessels of head and neck

DATA SET III TRAUMA

Age Groups/ Severity		Hospital Level I						Hospital Level II						Hospital Level III					
		≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown	
		BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
0 - 4	Moderate	0	0	0	0	0	0	1	0	0	0	0	0						
	Severe	1	0	0	0	0	0	0	0	0	0	0	0						
5 - 17	Moderate	1	0	0	0	1	0	8	0	0	0	4	1						
	Severe	3	0	0	0	1	0	12	2	0	0	4	0						
18 - 44	Moderate	5	0	0	0	2	0	10	0	2	0	6	1						
	Severe	3	2	4	0	2	0	22	9	1	3	6	3						
45 - 64	Moderate	0	0	0	0	0	0	1	0	0	0	0	0						
	Severe	2	1	0	0	2	0	7	0	2	0	2	0						
65+	Moderate	2	0	0	0	0	0	4	0	0	0	3	0						
	Severe	0	0	0	0	1	0	10	2	0	1	1	1						
Unknown	Moderate	0	0	0	0	0	0	0	0	0	0	0	0						
	Severe	0	0	0	0	0	0	0	0	0	0	0	0						

Hospital Level IV						Hospital Level Unknown					
≤ 15 Min		>15 Min		Unknown		≤ 15 Min		>15 Min		Unknown	
BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS

NOT APPLICABLE

NONE

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET III CARDIAC

Age Group/ Severity		Hospital Level I						Hospital Level II						Hospital Level III						Hospital Level IV						Hospital Level Unknown					
		≤ 15 Min		> 15 Min		Unknown		≤ 15 Min		> 15 Min		Unknown		≤ 15 Min		> 15 Min		Unknown		≤ 15 Min		> 15 Min		Unknown		≤ 15 Min		> 15 Min		Unknown	
		BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
0 - 4	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5 - 17	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Severe	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18 - 44	Moderate	0	0	0	0	1	0	2	0	1	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0
	Severe	0	0	0	0	0	0	4	1	0	0	1	1	1	1	0	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0
45 - 64	Moderate	8	0	1	0	1	0	11	2	2	0	4	0	1	0	1	0	1	0	2	2	0	0	0	0	2	1	0	0	2	1
	Severe	4	2	0	0	5	0	22	12	3	1	7	1	3	5	0	0	2	1	3	14	0	1	0	3	0	0	0	0	0	0
65+	Moderate	9	1	2	0	7	1	21	5	4	0	10	0	4	0	0	0	1	0	5	3	0	1	2	0	0	0	0	0	0	0
	Severe	10	2	1	0	4	0	38	18	7	1	8	0	9	6	1	0	5	0	7	20	1	0	1	6	0	0	0	0	0	0
Unknown	Moderate	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Severe	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

NONE

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET III: CELL SETS WITH MINIMUM OF 5 CASES PER CELL

TYPE CASE	HOSP LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY LEVEL	TOTAL	LIVE	UNK	INPT DIE	ED DIE	
TRAUMA	II	≤ 15	18-44	SEVERE	22	20	0	1	1	BLS
					9	5	0	0	4	ALS
CARDIAC	II	≤ 15	45-64	SEVERE	23	7	0	7	8	BLS
					12	1	0	1	10	ALS
			65+	MODERATE	21	14	0	7	0	BLS
					5	5	0	0	0	ALS
				SEVERE	38	9	0	15	14	BLS
					18	5	0	4	9	ALS
	III	≤15	65+	SEVERE	9	3	0	2	4	BLS
					6	1	0	0	5	ALS
	IV	≤ 15	65+	SEVERE	7	1	0	3	3	BLS
					20	3	0	5	12	ALS
REFERENCE GROUPS										
TRAUMA	ALL				136	113	0	15	8	BLS
	II				106	90	0	15	1	BLS
CARDIAC	ALL				255	127	0	59	69	BLS
	II				145	66	0	40	39	BLS
	III				30	13	0	6	11	BLS
	IV				26	14	0	5	7	BLS

DATA SET III: OUTCOMES BY SEVERITY LEVELS

TYPE CASE	SEVERITY LEVEL	TOTAL	LIVE	UNK	INPT DIE	ED DIE	
TRAUMA	1	2	1	0	0	1	BLS
		0	0	0	0	0	ALS
	2	48	47	0	1	0	BLS
		2	2	0	0	0	ALS
	3	77	64	0	12	1	BLS
		19	15	0	0	4	ALS
	4	9	1	0	2	6	BLS
		5	0	0	0	5	ALS
CARDIAC	1	30	24	0	5	1	BLS
		3	2	0	0	1	ALS
	2	75	58	0	14	3	BLS
		16	10	0	3	3	ALS
	3	88	41	0	30	17	BLS
		22	9	0	5	8	ALS
	4	62	4	0	10	48	BLS
		75	5	0	8	62	ALS

Data Set III: RIDIT CALCULATIONS (discussion on p.14)

Reference Group = Total BLS Cardiac Cases

Comparison Group = ALS Level			II	II	II	III	IV
		Response	≤15	>15	≤15	≤15	>15
		Age	45-64	65+	65+	65+	65+
	BLS	RIDIT	Severity	Severe	Moderate	Severe	Severe	Severe
Live	127	0.2490		1	5	5	1	3
Unknown	0	0.4980		0	0	0	0	0
Die IP	59	0.6137		1	0	4	0	15
Die ER	69	0.8647		10	0	9	5	12
TOTAL	255			12	5	18	6	20
			$\bar{r}$ =	0.7925	0.2490	0.6379	0.7621	0.6776
			s.e.($\bar{r}$) =	0.0833	0.1291	0.0680	0.1179	0.0527
			z =	3.5098	-1.9441	2.0268	2.2239	3.3706
			p	<0.001	<0.10	<0.05	<0.05	<0.001

Reference Group = BLS Cardiac Level II Cases

Comparison Group = ALS Level II ≤15 min response

	BLS	RIDIT	Age	45-64	65+	65+
			Severity	Severe	Moderate	Severity
Live	66	0.2276		1	5	5
Unknown	0	0.4552		0	0	0
DIE IP	40	0.5931		1	0	4
DIE ER	39	0.8655		10	0	9
Total	145			12	5	18
			$\bar{r}$ =	0.7897	0.2276	0.6278
			s.e.($\bar{r}$) =	0.0833	0.1291	0.0680
			z =	3.4759	-2.1101	1.8779
			p	<0.001	<0.05	<0.10

Reference Group = BLS Cardiac Level III Cases

Comparison Group = ALS Cardiac Level III 15 min 65+ Severe

	BLS	RIDIT	ALS
Live	13	0.2167	1
Unknown	0	0.4333	0
Die IP	6	0.5333	0
Die ER	11	0.8167	5
Total	30		6

$\bar{r} = 0.7167$
$s.e.(\bar{r}) = 0.1179$
$Z = 1.8385$
$p < 0.0.10$

Reference Group = BLS Cardiac Level IV Cases

Comparison Group = ALS Cardiac Level IV 15 min 65+ Severe

	BLS	RIDIT	ALS
Live	14	0.2692	3
Unknown	0	0.5385	0
Die IP	5	0.6346	15
Die ER	7	0.8654	12
Total	26		20

$\bar{r} = 0.6904$
$s.e.(\bar{r}) = 0.0527$
$Z = 3.6123$
$p < 0.001$

APPENDIX H

Data Set IV

Special Study of "Disposition Unknown"

During the evalution of Data Set IV, questions were raised concerning the volume of records with unknown disposition data. Lack of disposition data occurs for several reasons. The run report tearsheet which records disposition may not have been returned to EMS/MHIC. This is true for some hospitals and all non-acute care facilities, the termination of many routine transfers. The run report tearsheet, though returned, may not record disposition. The "no transport" runs have no tearsheets submitted and, therefore, no disposition data. They include patients, a) who require no further care than that given on the scene, b) who refuse care and/or transportation, or c) who are dead at the scene. Each of these causes is more likely to be the case for live outcomes than dead ones. It was therefore, assumed that the "dispositon unknown" group was no worse off, in terms of survival rate, than the known disposition group.

The next step was to determine the minimum number of "dead" outcomes necessary for the BLS survival rate to equal the ALS survival rate. This number was calculated as the ALS death rate multiplied by the total number of BLS cases. From this equivalent number of BLS deaths was subtracted the number of known BLS deaths. The remaining figure was then identified as the minimum number of "deaths" for the BLS unknown disposition group necessary to equal the ALS survival rate.

DATA SET IV: TRAUMA CASES

	Live	Die	Unknown	Total
ALS	110	4	125	239
BLS	6,459	13	8,855	15,327
TOTAL	6,569	17	8,980	15,566

ALS death rate = 4 ÷ 114 = 0.0350 = r

r x BLS total = 0.0350 x 15,327 = 536.4 Equivalent = 536

Equivalent - BLS Deaths = 536 - 13 = 523 Minimum = 523

DATA SET IV: CARDIAC CASES

	Live	Die	Unknown	Total
ALS	435	79	319	833
BLS	2,638	157	4,080	6,875
TOTAL	3,073	236	4,399	7,708

ALS death rate = 79 ÷ 514 = 0.1536 = r

r x BLS total = 0.1536 x 6,875 = 1,056.0 Equivalent = 1,056

Equivalent - BLS Deaths = 1,056 - 157 = 899 Minimum = 899

A fourfold table, as shown below, was constructed in order to test the hypothesis that the BLS "unknown" group was not different from the BLS "known" group.

Four Fold Table

BLS "Unknown"	BLS Minimum
BLS "Known"	BLS Die

For both trauma and cardiac cases in Data Set IV, the hypothesis was rejected at the $p < 0.0001$ level of significance.

RESULTS OF FOUR-FOLD TABLE CALCULATIONS

BLS	TRAUMA	CARDIAC
Unknown	8,855	6,875
Known	6,472	2,795
Minimum	523	899
Die	13	157
X^2	339.4	94.0
$p <$	0.0001	0.0001

Source: 1980 Maine Ambulance Run Report System

For the cardiac cases, the possibility that the initial assumption was erroneous was considered. Since the "no transport" runs included patients found dead and since cardiac patients more frequently than trauma cases might be in this condition, further investigation was undertaken. Based upon an anticipated characteristic (death) occurence between 20% and 50% and a 95% confidence interval, the sample size could range from 256 to 400 records. A systematic selection of the first and every fifteenth record from the BLS cardiac "unknown" group yielded 396 cases. These run reports were manually reviewed to determine whether or

not the patient was alive or dead at the termination of prehospital care. In cases of doubt, the most severe outcome was selected. Of the sample selected and examined, 21 patients died. Chi-square technique on a four-fold table similar to that previously described demonstrated no difference between this sample and the entire BLS cardiac group with known disposition.

RESULTS OF "UNKNOWN" DISPOSITION CASES

BLS	CARDIAC
Unknown	296
Known	2,795
Minimum	21
Die	157
X^2	0.06
p	Not significant

DATA SET IV-A: CARDIAC CASES

	HOSPITAL LEVEL I						HOSPITAL LEVEL II						HOSPITAL LEVEL III						HOSPITAL LEVEL IV						HOSPITAL LEVEL UNKNOWN					
	0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
AGE GROUP 0																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	4	0	7	0	42	1	13	1	62	1	37	0	14	0	39	1
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	12	1	3	0	5	0	65	6	12	2	25	2	24	0	2	0	5	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	4	1	2	0	2	0	1	0	0	0	0	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	12	1	2	1	5	0	16	1	2	0	3	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
AGE GROUP 1																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4	0	0	0	1	0	3	0	1	0	1	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	24	0	2	0	13	0	19	0	0	0	4	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4	0	1	0	1	0	2	0	0	0	0	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AGE GROUP 2																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	20	0	2	0	5	0	3	1	1	0	1	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	29	3	5	1	7	0	11	0	1	0	3	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	5	0	2	0	0	0	1	0	1	0	0	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0
AGE GROUP 3																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	3	0	9	0	94	4	20	2	45	4	33	0	5	0	8	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	13	0	6	0	8	0	240	21	40	1	73	6	44	1	2	1	9	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	36	9	5	0	5	1	3	0	0	0	1	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	7	6	1	0	6	0	4	0	0	0	2	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	0	0	0	0	0	0	0
AGE GROUP 4																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	5	0	12	0	139	15	29	5	50	4	34	1	13	0	15	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	35	0	15	0	28	0	554	111	97	13	139	16	89	3	14	3	23	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	8	1	7	0	5	0	119	37	15	2	30	4	12	1	0	0	1	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	19	5	0	7	4	28	1	8	0	1	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	9	12	4	0	2	1	5	0	1	0	0	0
AGE GROUP 5																														
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	151	2	52	0	96	2	1421	230	268	24	420	27	243	2	75	4	118	3
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	40	2	11	0	23	1	508	100	78	10	126	14	33	1	5	1	9	1
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	5	0	64	31	9	1	18	1	34	5	8	0	8	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	1	1	31	27	3	1	2	4	19	0	5	0	3	0

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET IV-A: TRAUMA CASES

	HOSPITAL LEVEL I						HOSPITAL LEVEL II						HOSPITAL LEVEL III						HOSPITAL LEVEL IV						HOSPITAL LEVEL UNKNOWN					
	0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN		0-15 MIN		15+ MIN		UNKNOWN	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
AGE GROUP 0																														
SEVERITY 0	54	0	18	0	68	0	13	0	4	0	10	0													165	0	9	0	94	0
SEVERITY 1	58	2	10	0	22	0	31	1	4	1	8	0													40	0	2	0	11	0
SEVERITY 2	1	0	0	0	1	0	2	0	0	0	0	0													16	0	0	0	5	0
AGE GROUP 1																														
SEVERITY 0	25	0	1	0	8	0	26	0	3	0	3	0													25	0	1	0	5	0
SEVERITY 1	77	0	15	0	18	0	106	1	8	0	20	0													100	0	4	0	15	0
SEVERITY 2	0	0	0	0	0	0	1	0	1	0	0	0													1	0	0	0	0	0
AGE GROUP 2																														
SEVERITY 0	319	0	47	0	126	0	304	1	34	0	59	0													180	0	7	0	53	0
SEVERITY 1	454	2	77	2	126	1	437	10	61	2	78	1													103	0	9	0	28	1
SEVERITY 2	11	0	1	0	5	0	12	3	2	0	2	1													3	0	0	0	0	0
AGE GROUP 3																														
SEVERITY 0	821	5	140	2	291	1	737	12	97	0	181	4													433	2	44	0	97	1
SEVERITY 1	1197	20	205	1	304	6	1168	51	161	10	227	10													214	3	24	0	65	0
SEVERITY 2	17	1	3	0	7	1	11	9	3	3	5	0													6	0	4	0	2	0
SEVERITY 3	0	0	0	0	0	0	1	1	0	0	0	0													0	0	0	0	0	0
AGE GROUP 4																														
SEVERITY 0	203	2	40	1	102	1	184	4	29	0	45	0													93	0	13	0	23	1
SEVERITY 1	456	4	76	3	122	2	442	11	58	3	59	2													89	0	12	1	25	0
SEVERITY 2	7	2	0	0	4	0	4	3	1	0	1	0													3	0	2	0	2	0
AGE GROUP 5																														
SEVERITY 1	1144	8	183	1	345	1	773	13	88	0	112	2													284	0	57	0	98	0
SEVERITY 2	32	0	4	0	8	0	10	2	2	0	2	0													8	0	1	0	3	0

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET IV-A CELL SETS WITH MINIMUM OF 5 CASES PER CELL

TYPE CASE	HOSP LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY LEVEL	BLS TOTAL	BLS LIVE	BLS DIE	BLS UNK	ALS TOTAL	ALS LIVE	ALS DIE	ALS UNK
TRAUMA	I	≤ 15	18-44	Unknown	821	452	0	369	5	3	0	2
				Level 1	1197	721	2	474	20	10	0	10
			65+	Level 1	1144	606	1	537	8	4	0	4
		Unknown	18-44	Level 1	304	165	0	139	6	3	0	3
	II	≤ 15	5-17	Level 1	437	219	1	217	10	5	0	5
			18-44	Unknown	737	249	0	488	12	4	0	8
				Level 1	1168	613	0	555	51	30	0	21
				Level 2	11	6	0	5	9	5	0	4
			45-64	Level 1	442	212	0	230	11	6	0	5
			65+	Level 1	773	272	0	501	13	1	0	12
		> 15	18-44	Level 1	161	73	1	87	10	5	0	5
		Unknown	18-44	Level 1	227	113	4	114	10	5	1	4
CARDIAC	IV	≤ 15	Unk.	Level 1	65	30	2	33	6	4	1	1
			18-44	Level 1	240	142	0	98	21	10	0	11
				Level 2	36	20	1	15	9	5	1	3
				Level 3	7	1	3	3	6	1	5	0
			45-64	Unknown	139	59	5	75	15	8	0	7
				Level 1	554	307	10	237	111	65	4	42
				Level 2	119	72	2	45	37	26	2	9
				Level 3	27	5	11	11	19	2	10	7
				Level 4	9	1	4	4	12	1	7	4
			65+	Level 1	1421	686	26	709	230	136	6	88
				Level 2	508	268	10	230	100	58	4	38
				Level 3	64	29	4	31	31	9	14	8
				Level 4	31	4	14	13	27	5	14	8
		> 15	45-64	Unknown	29	7	0	22	5	2	1	2
				Level 1	97	55	1	41	13	7	6	1
			65+	Level 1	268	109	3	156	24	14	0	10
				Level 2	78	39	0	39	10	7	0	3
		Unknown	18-44	Level 1	73	36	1	36	6	4	0	2
			45-64	Level 1	139	65	1	73	16	11	1	4
			65+	Level 1	420	163	4	253	27	16	1	10
				Level 2	126	50	4	72	14	11	0	3
	Unk	≤ 15	65+	Level 3	34	0	0	34	5	0	0	5

DATA SET IV-B: CARDIAC CASES

	HOSPITAL LEVEL I						HOSPITAL LEVEL II						HOSPITAL LEVEL III						HOSPITAL LEVEL IV						HOSPITAL LEVEL UNKNOWN					
	0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
AGE GROUP 0																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	11	0	7	0	36	1	19	1	62	1	29	0	22	0	39	1
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	9	0	6	1	5	0	41	3	36	5	25	2	20	0	6	0	5	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	5	1	2	0	1	0	0	0	0	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	11	1	3	1	5	0	12	1	6	0	3	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
AGE GROUP 1																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	2	0	1	0	2	0	2	0	1	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	5	0	17	0	9	0	13	0	13	0	6	0	4	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	3	0	2	0	1	0	2	0	0	0	0	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
AGE GROUP 2																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	1	0	16	0	6	0	5	0	2	0	2	1	1	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	20	3	14	1	7	0	9	0	3	0	3	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	5	0	0	0	1	0	1	0	0	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0
AGE GROUP 3																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	8	0	9	0	73	2	41	4	45	4	29	0	9	0	8	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	6	0	13	0	8	0	162	14	118	8	73	6	39	1	7	1	9	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	29	8	12	1	5	1	1	0	2	0	1	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	5	4	3	2	6	0	3	0	1	0	2	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	1	0	0	0	0	0	0	0	0
AGE GROUP 4																														
SEVERITY 0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	12	0	12	0	99	9	69	11	50	4	27	1	20	0	15	0
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	20	0	30	0	28	0	405	81	246	43	139	16	66	1	37	5	23	0
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	2	1	13	0	5	0	82	30	52	9	30	4	6	1	6	0	1	0
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	16	12	3	7	4	19	0	17	1	1	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7	11	6	1	2	1	4	0	2	0	0	0
AGE GROUP 5																														
SEVERITY 1	0	0	0	0	0	0	0	0	0	0	0	0	80	2	123	0	96	2	937	181	752	73	420	27	169	2	149	4	118	3
SEVERITY 2	0	0	0	0	0	0	0	0	0	0	0	0	23	1	28	1	23	1	350	79	236	31	126	14	23	1	15	1	9	1
SEVERITY 3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	1	5	0	48	22	25	10	18	1	16	4	26	1	8	0
SEVERITY 4	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	1	1	27	24	7	4	2	4	14	0	10	0	3	0

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET IV-B: TRAUMA CASES

	HOSPITAL LEVEL I						HOSPITAL LEVEL II						HOSPITAL LEVEL III						HOSPITAL LEVEL IV						HOSPITAL LEVEL UNKNOWN					
	0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN		0-8 MIN		9+ MIN		UNKNOWN	
	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS	BLS	ALS
AGE GROUP 0																														
SEVERITY 0	32	0	40	0	68	0	13	0	4	0	10	0													133	0	40	0	93	0
SEVERITY 1	38	1	30	1	22	0	21	0	14	2	8	0													27	0	15	0	11	0
SEVERITY 2	1	0	0	0	1	0	2	0	0	0	0	0													7	0	8	0	5	0
AGE GROUP 1																														
SEVERITY 0	21	0	5	0	8	0	24	0	5	0	3	0													20	0	6	0	5	0
SEVERITY 1	67	0	25	0	18	0	82	0	32	1	20	0													84	0	20	0	14	0
SEVERITY 2	0	0	0	0	0	0	0	0	2	0	0	0													1	0	0	0	0	0
AGE GROUP 2																														
SEVERITY 0	231	0	135	0	126	0	231	0	107	1	59	0													159	0	26	0	53	0
SEVERITY 1	318	1	213	3	126	1	324	6	174	6	78	1													86	0	26	0	28	1
SEVERITY 2	10	0	2	0	5	0	8	2	6	1	2	1													2	0	1	0	0	0
AGE GROUP 3																														
SEVERITY 0	559	4	402	3	291	1	579	8	255	4	181	4													359	2	116	0	97	1
SEVERITY 1	826	14	576	7	304	6	885	32	444	29	227	10													169	0	66	3	65	0
SEVERITY 2	12	1	8	0	7	1	11	6	3	6	5	0													4	0	6	0	2	0
SEVERITY 3	0	0	0	0	0	0	1	1	0	0	0	0													0	0	0	0	0	0
AGE GROUP 4																														
SEVERITY 0	135	2	108	1	102	1	146	2	67	2	45	0													79	0	27	0	27	1
SEVERITY 1	303	4	229	3	122	2	348	7	152	7	59	2													70	0	31	1	24	0
SEVERITY 2	6	1	1	1	4	0	3	3	2	0	1	0													2	0	2	0	2	0
AGE GROUP 5																														
SEVERITY 1	786	7	541	2	345	1	600	11	261	2	112	2													208	0	121	0	94	0
SEVERITY 2	22	0	14	0	8	0	7	2	5	0	2	0													5	0	1	0	2	0

SOURCE: 1980 MAINE AMBULANCE RUN REPORT DATA

DATA SET IV-B CELL SETS WITH MINIMUM OF 5 CASES PER CELL

TYPE CASE	HOSP LEVEL	RESPONSE TIME	AGE GROUP	SEVERITY LEVEL	BLS TOTAL	BLS LIVE	BLS DIE	BLS UNK	ALS TOTAL	ALS LIVE	ALS DIE	ALS UNK
TRAUMA	I	≤ 8	18-44	Level 1	826	489	1	336	14	5	0	9
			65+	Level 1	786	400	0	386	7	3	0	4
		≥ 8	18-44	Level 1	576	352	1	223	7	5	0	2
		Unknown	18-44	Level 1	304	165	0	139	6	3	0	3
	II	≤ 8	5-17	Level 1	324	158	1	165	6	3	0	3
			18-44	Unknown	579	175	0	404	8	3	0	5
				Level 1	885	445	0	440	32	21	0	11
				Level 2	11	6	0	5	6	4	0	2
			45-64	Level 1	348	167	0	181	7	3	0	4
			65+	Level 1	600	198	0	402	11	1	0	10
		> 8	5-17	Level 1	174	92	0	82	6	4	0	2
			18-44	Level 1	444	241	1	202	29	14	0	15
			45-64	Level 1	152	64	0	88	7	3	0	4
		Unknown	18-44	Level 1	227	113	0	114	10	5	1	4
CARDIAC	IV	≤ 8	18-44	Level 1	162	96	0	66	14	7	0	7
				Level 2	29	17	1	11	8	5	1	2
			45-64	Unknown	99	47	0	52	9	5	0	4
				Level 1	405	238	8	159	81	46	4	31
				Level 2	82	51	2	29	30	20	2	8
				Level 3	20	4	9	7	16	2	8	6
				Level 4	7	1	4	2	11	1	6	4
			65+	Level 1	937	450	21	466	181	111	3	67
				Level 2	350	180	7	163	79	47	3	29
				Level 3	48	20	3	25	22	8	10	4
				Level 4	27	4	10	13	24	5	11	8
		> 8	Unk.	Level 1	36	15	2	19	5	3	1	1
			18-44	Level 1	118	67	1	50	8	4	0	4
			45-64	Unknown	69	19	5	45	11	5	1	5
				Level 1	246	124	3	119	43	25	0	18
				Level 2	52	30	0	22	9	8	0	1
			65+	Level 1	752	345	8	399	73	39	3	31
				Level 2	236	127	3	106	31	18	1	12
				Level 3	25	12	1	12	10	2	4	4
		Unknown	18-44	Level 1	73	36	1	36	6	4	0	2
			45-64	Level 1	139	65	1	73	16	11	1	4
			65+	Level 1	420	163	4	253	27	16	1	10
				Level 2	126	50	4	72	14	3	0	11
	Unk.	> 8	45-64	Level 1	37	0	0	37	5	0	0	5