

Evaluation of the H-E-A-R System
in Washtenaw County

Final Report
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ABSTRACT

A radio communication system was installed during 1970 which permitted direct conversations between ambulance attendants and hospital emergency room personnel throughout Washtenaw County. In conjunction with this program the radio net was monitored for a period of four months, and the transcribed information compared with hospital and ambulance written records.

It is concluded that the new system provided a useful measure of early warning to emergency rooms about the arrival of patients (average 9.2 minutes), and that the radio system itself contributed to improved rapport among the medical services in the county.

EVALUATION OF THE H-E-A-R SYSTEM IN WASHTENAW COUNTY

INTRODUCTION

IN MID-1970 A MOBILE AND FIXED BASE RADIO SYSTEM HEAR * WAS INSTALLED IN SEVERAL HOSPITALS AND IN AMBULANCES SERVING THE LOCAL COMMUNITY IN ORDER TO PERMIT DIRECT COMMUNICATION BETWEEN THE AMBULANCE ATTENDANTS AND EMERGENCY ROOM PERSONNEL (AND OTHERS) IN THE HOSPITALS. PRIOR TO THIS TIME SUCH COMMUNICATION COULD BE ESTABLISHED ONLY INDIRECTLY THROUGH A DISPATCHER. IT WAS INTENDED THAT THE NEW SERVICE WOULD ADD A NEW DIMENSION TO THE EMERGENCY MEDICAL CAPABILITIES OF THE COUNTY.

THE HEAR SYSTEM INCORPORATES A CODED DIAL CALLING TECHNIQUE WHICH, IN THIS INSTALLATION, ALLOWS THE AMBULANCE ATTENDANT TO SELECTIVELY CALL THE CHOSEN HOSPITAL. IN THE EMERGENCY ROOM THE CALL CAN BE HANDLED MUCH LIKE AN ORDINARY TELEPHONE CALL (ALTHOUGH FULL DUPLEX OPERATION IS NOT PROVIDED), AND THE EMERGENCY ROOM PERSONNEL ARE NOT REQUIRED TO MONITOR A RADIO CHANNEL IN THE USUAL SENSE. THE CHANNEL ASSIGNED FOR THIS PURPOSE WAS NOT COMPLETELY CLEAR, I.E., THERE WERE NEARBY COMMUNITIES ALSO USING THE CHANNEL FOR HOSPITAL COMMUNICATIONS PURPOSES, BUT THIS TRAFFIC SHOULD NOT BE HEARD BY THE BASE STATIONS AT ALL AND WAS NOT SO GREAT AS TO BE OBJECTIONABLE TO THE AMBULANCE OPERATORS.

IT WOULD HAVE BEEN DESIRABLE TO HAVE OBTAINED SOME INFORMATION ON THE OPERATION OF THE AMBULANCE SYSTEM PRIOR TO THE INSTALLATION OF THIS RADIO EQUIPMENT FOR COMPARISON WITH THE EXPERIMENTAL PERIOD. IF THIS HAD BEEN POSSIBLE WE COULD HAVE COMPARED SUCH ITEMS AS THE TIME REQUIRED FOR ARRANGING ASSISTANCE IN UNLOADING, THE TIME REQUIRED TO GET INTRAVENOUS FLUIDS STARTED, ETC., FOR THE BEFORE AND AFTER PERIODS. SUCH INFORMATION WAS NOT OBTAINED FOR THE PRIOR PERIOD, HOWEVER, AND THIS EVALUATION IS BASED PRIMARILY ON TABULAR DATA FROM THE AFTER PERIOD AND ON CERTAIN ANECDOTAL EVIDENCE OF THE SYSTEM'S UTILITY.

THE METHOD USED WAS TO OBTAIN THREE SETS OF INFORMATION-- FROM THE MONITORING OF THE RADIO CHANNEL, FROM THE REPORTS COMPLETED BY THE AMBULANCE ATTENDANTS, AND FROM THE HOSPITALS' RADIO LOGS. A DIGITAL FILE OF INFORMATION CODED FROM THESE THREE SOURCES WAS CONSTRUCTED AND THE ANALYSES OF THESE SETS OF DATA ARE PRESENTED IN THIS REPORT.

A TOTAL OF 922 AMBULANCE TRANSPORTATION CASES HAVE BEEN

* A COPYRIGHTED MOTOROLA ACRONYM FOR HOSPITAL EMERGENCY ADMINISTRATIVE RADIO.

OBSERVED (NOT ALL OF WHICH INVOLVED THE HEAR SYSTEM, OF WHICH THE AMBULANCE ATTENDANT'S REPORT WAS PRESENT IN 292, A RADIO TRANSMISSION TRANSCRIPTION IN 558, AND EMERGENCY ROOM DATA IN 371. THE FORMAT OF THE RECORDED DATA IS PRESENTED AS APPENDIX A TO THIS REPORT. DATA FORMS FOR THE AMBULANCE ATTENDANTS AND HOSPITALS ARE PRESENTED AS APPENDICES B AND C RESPECTIVELY. THE COUNTY HEALTH DEPARTMENT HAS SELECTED THE FORM AS DOCUMENTATION NECESSARY ON EACH CONVEYANCE UNDER THE COUNTY ORDINANCE REGULATING AMBULANCE SERVICES. APPENDIX D CONTAINS A DIAGRAMMATIC SKETCH OF THE COUNTY INDICATING THE NUMBER AND TRANSPORT TIME FOR AMBULANCE RUNS SERVING THE VARIOUS SECTIONS OF THE COUNTY.

DISCUSSION

FOUR RATHER SPECIFIC PURPOSES OF THIS INSTALLATION CAN BE STATED:

(1) TO PREPARE THE EMERGENCY ROOM AND ITS PERSONNEL FOR THE ARRIVAL OF A SPECIFIC PATIENT--THUS SAVING TIME IN BEGINNING TREATMENT AT THE HOSPITAL.

(2) TO PERMIT THE ATTENDANT TO CHECK ON THE AVAILABILITY OF FACILITIES AT THE HOSPITAL.

(3) TO ASSURE APPROPRIATE MEASURES EN ROUTE (I.E. TO PROVIDE MEDICAL ADVICE TO THE ATTENDANT).

(4) TO COORDINATE HEAVY LOADS AND DISASTER SITUATIONS.

PRIOR TO THE BEGINNING OF THIS RADIO SERVICE SEVERAL POTENTIAL PROBLEMS WERE DISCERNED. THERE WAS AN EXPRESSED RELUCTANCE ON THE PART OF THE PHYSICIANS AT THE SEVERALS HOSPITALS TO COMMIT THEMSELVES TO GIVING MEDICAL ADVICE BY RADIO. FURTHER, THERE WAS A RELUCTANCE TO RECOGNIZE THE SYSTEM AS A TOOL OF THE HOSPITAL WHICH WOULD PERMIT IT TO ENHANCE ITS EMERGENCY CARE CAPABILITIES. A CHALLENGE TO THE COUNTY HEALTH DEPARTMENT AND TO THE COORDINATORS OF THIS PROGRAM WAS TO DISPEL THESE PROBLEMS. IT WAS HOPED THAT THE DATA COLLECTION AND EVALUATION WOULD LEAD THE MEDICAL PERSONNEL OF THE COMMUNITY TO THE CONCLUSION THAT THE SYSTEM WAS A USEFUL ADDITON. EACH OF THESE POINTS WILL BE DISCUSSED IN MORE DETAIL BELOW.

TO PREPARE THE EMERGENCY ROOM FOR ARRIVAL

HOSPITAL EMERGENCY ROOMS HAVE TYPICALLY BEEN SURPRISED BY EACH ARRIVAL, AND HAVE BEEN DEVELOPED TO RESPOND TO SUCH SURPRISES. IT SEEMS LOGICAL THAT EARLY WARNING OF NEW PATIENTS, PARTICULARLY THOSE REQUIRING IMMEDIATE INTENSIVE CARE, WOULD PERMIT MORE EFFECTIVE OPERATION. THE CARDIAC UNIT COULD BE PREPARED FOR THE CORONARY PATIENT, INTRAVENOUS FLUIDS COULD BE READY FOR THE PATIENT IN SHOCK, OR A MEDICAL SPECIALIST COULD BE AT HAND TO TREAT A SPECIFIC INJURY.

SEVERAL MEASURES HAVE BEEN DERIVED IN THIS STUDY. THE

AVERAGE TIME BETWEEN THE AMBULANCE'S INITIAL CALL TO THE EMERGENCY ROOM AND ITS ARRIVAL AT THE HOSPITAL WAS 9.2 MINUTES. MOST OFTEN THE CALL WAS SIMPLY A NOTIFICATION THAT THE AMBULANCE WAS EN ROUTE, BUT ON OCCASION IT INCLUDED SPECIFIC REPORTS. THUS THE EMERGENCY ROOM IS AWARE OF THE INCOMING EMERGENCY AND HAS FIRST INFORMATION ON THE KIND OF EMERGENCY AN AVERAGE OF 9 MINUTES EARLIER THAN WITHOUT THE DIRECT RADIO COMMUNICATION. THIS TIME IS SUFFICIENT TO ALLOW CONSIDERABLE PREPARATORY ACTION IN THE EMERGENCY ROOM. THUS THE EMERGENCY ROOM IS AWARE OF THE INCOMING EMERGENCY AND HAS FIRST INFORMATION ON THE KIND OF EMERGENCY AN AVERAGE OF 9 MINUTES EARLIER THAN WITHOUT THE DIRECT RADIO COMMUNICATION. THIS TIME IS SUFFICIENT TO ALLOW CONSIDERABLE PREPARATORY ACTION IN THE EMERGENCY ROOM. TABLES 1, 2, AND 3 HAVE BEEN PREPARED FROM THE RECORDED RADIO TRANSMISSIONS AND SHOW THE NATURE OF THE REQUESTS, SUGGESTIONS, AND RESPONSES.

CHECK ON AVAILABILITY OF FACILITIES

OF THE 558 RECORDED CONVEYANCES IN WHICH THE SYSTEM WAS USED, 13 WERE DIRECTED TO ANOTHER HOSPITAL--USUALLY BECAUSE OF A FILLED OR OVERLY BUSY EMERGENCY ROOM. THE TIME SAVED BY THESE REDIRECTIONS CANNOT BE EASILY DETERMINED, ALTHOUGH IT WILL USUALLY HAVE BEEN MORE THAN JUST THE INTER-HOSPITAL TRANSIT TIME. THE FIRST RECEIVING HOSPITAL, EVEN WHEN IT IS UNABLE TO ACCEPT THE PATIENT, MAY FEEL CONSTRAINED TO PROVIDE SOME MINIMAL TREATMENT WHICH WILL ADD TO THE TOTAL TIME BEFORE ARRIVAL AT THE FINAL EMERGENCY ROOM.

THIS POINT IS PERHAPS BETTER ILLUSTRATED BY AN ANECDOTE. AN AMBULANCE HAD PICKED UP A PATIENT SUFFERING FROM A GUNSHOT WOUND OF THE HEAD. IMMEDIATELY AFTER LEAVING THE SCENE OF THE ACCIDENT THE ATTENDANT CALLED THE EMERGENCY ROOM OF THE NEAREST HOSPITAL, DESCRIBED THE WOUND, AND GAVE HIS ESTIMATED TIME OF ARRIVAL TO THE RESPONDING PHYSICIAN. THE PHYSICIAN SUGGESTED STRONGLY TO THE ATTENDANT THAT THE PATIENT BE TAKEN WITHOUT DELAY TO A LARGER HOSPITAL WHERE A NEUROSURGEON WOULD BE AVAILABLE. THE ATTENDANT QUESTIONED THIS ADVICE, AND ASKED IF HE SHOULD NOT STOP FIRST AT THE NEARBY HOSPITAL TO START INTRAVENOUS FLUIDS OR A BLOOD TRANSFUSION. THE PHYSICIAN THEN TOLD HIM THAT PATIENTS DO NOT BLEED TO DEATH FROM BULLET WOUNDS TO THE HEAD, AND THAT HE SHOULD TAKE HIM TO THE PLACE WHERE HE COULD GET APPROPRIATE CARE. AND IT WAS DONE. THIS ANECDOTE ALSO APPLIES TO THE NEXT POINT DISCUSSED BELOW.

ASSURE APPROPRIATE MEASURES EN ROUTE

AT THE OUTSET OF THIS PROGRAM THERE WAS SOME RELUCTANCE ON THE PART OF MANY PHYSICIANS ABOUT RECOMMENDING TREATMENT BY RADIO. THERE WAS A SIMILAR RELUCTANCE AT THE HOSPITAL TO TAKE ACTION ON THE BASIS OF A RADIO MESSAGE FROM THE AMBULANCE. THE MEDICAL PROFESSION IN MANY PARTS OF THE UNITED STATES HAS NOT

CONSIDERED THE AMBULANCE TO BE AN INTEGRAL PART OF THE MEDICAL CARE SYSTEM. SEVERAL AUTHORITIES HAVE ESTIMATED THAT SOME 20% OF THE AUTOMOTIVE INJURIES WHICH RESULT IN DEATH COULD BE SURVIVED IF THE TREATMENT BY THE TOTAL EMERGENCY SYSTEM WERE ADEQUATE AND TIMELY. ACCEPTANCE OF THE AMBULANCE AND ITS ATTENDANTS AS A TRUE PART OF THE EMERGENCY CARE SYSTEM WOULD SEEM TO BE A PREREQUISITE TO THIS ACHIEVEMENT

A NUMBER OF FACTORS COMBINED TO BRING ABOUT A RAPPORT BETWEEN ATTENDANTS ~~CONCERNED CITIZENS MEETS FREQUENTLY TO DISCUSS EMERGENCY CARE IN THE COUNTY. PHYSICIANS IN THE SEVERAL HOSPITALS ALSO MEET PERIODICALLY WITH AMBULANCE ATTENDANTS TO CRITIQUE PARTICULAR CASES AND DISCUSS SPECIFIC PROBLEMS. DURING THE EVALUATION PERIOD THE FORMERLY~~ AND PHYSICIANS IN THIS COUNTY. A WEEKLY ADVANCED TRAINING COURSE FOR AMBULANCE PERSONNEL WAS CONDUCTED BY A TEAM OF LOCAL PHYSICIANS. THE EMERGENCY MEDICAL SERVICES COUNCIL OF WASHTENAW COUNTY, COMPOSED OF REPRESENTATIVES OF THE AMBULANCE SERVICES, THE MEDICAL PROFESSION, AND OTHER CONCERNED CITIZENS MEETS FREQUENTLY TO DISCUSS EMERGENCY CARE IN THE COUNTY. PHYSICIANS IN THE SEVERAL HOSPITALS ALSO MEET PERIODICALLY WITH AMBULANCE ATTENDANTS TO CRITIQUE PARTICULAR CASES AND DISCUSS SPECIFIC PROBLEMS. DURING THE EVALUATION PERIOD THE FORMERLY RELUCTANT PHYSICIANS BEGAN TO ANSWER THE CALLS, TO DISCUSS EMERGENCY TREATMENT PROCEDURES OVER THE RADIO, AND TO PREPARE IN ADVANCE FOR PATIENT ARRIVALS. OF THE 381 RESPONSES TO RADIO CALLS RECORDED IN THE HOSPITALS, 12 INVOLVED READING EQUIPMENT FOR THE PATIENT, IN 10 CASES ANOTHER PATIENT WAS MOVED TO MAKE ROOM, IN 42 CASES A PARTICULAR PHYSICIAN WAS NOTIFIED PRIOR TO ARRIVAL, AND IN MANY CASES "NORMAL" PREPARATIONS (I.E., ASSURANCE THAT THERE WAS ROOM AVAILABLE, ANTICIPATED ARRIVAL OF THE PATIENT) WERE MADE. BY THE END OF THE DATA TAKING PROGRAM A RAPPORT HAD BEEN ESTABLISHED AMONG THE VARIOUS ARMS OF EMERGENCY MEDICAL TREATMENT WHICH WAS OBSERVABLE.

NOTE THAT THE USEFULNESS OF THE HEAR SYSTEM IS ENHANCED BY BETTER UNDERSTANDING AMONG THE SEVERAL PARTIES USING IT, AND THE BETTER UNDERSTANDING IS ENHANCED BY THE USE OF THE HEAR SYSTEM. THUS THIS IS A SORT OF BOOTSTRAP OPERATION WHICH CAN BE EXPECTED TO CONTINUE TO IMPROVE RAPPORT, AND IN TURN THE LEVEL OF CARE OF PATIENTS IN THE AREA SERVED BY HEAR.

COORDINATE HEAVY LOAD AND DISASTER SITUATIONS

ONE OF THE EXPECTED USES OF THE HEAR SYSTEM WAS THE COORDINATION OF FACILITIES DURING A MAJOR EMERGENCY SUCH AS AN EXPLOSION OR COMMERCIAL AIRCRAFT ACCIDENT. THIS ASPECT OF THE SYSTEM WAS FORTUNATELY NOT TESTED DIRECTLY DURING THE EXPERIMENTAL PERIOD, ALTHOUGH THERE WAS ONE CIVIL DEFENSE DISASTER SIMULATION CONDUCTED IN THE EARLY SPRING OF 1971.

COMMUNICATION AMONG HOSPITALS WAS POSSIBLE USING THE HEAR SYSTEM AS A BACKUP FOR NORMAL TELEPHONE FACILITIES. AND SOME SIMULATED TRAFFIC WAS HANDLED OVER THE HEAR NET. WHILE THERE IS NO WAY OF MEASURING THE VALUE OR EFFECTIVENESS OF HEAR IN A DISASTER SITUATION, IT CAN BE CONFIRMED THAT THE EXPECTED CHANNELS (HOSPITAL TO HOSPITAL, HOSPITAL TO AMBULANCE, ETC.) WERE OPERABLE WITHOUT DIFFICULTY.

SUMMARY

WHILE THERE IS NO CLEAR WAY TO STATE EITHER THE DOLLAR VALUE OR THE VALUE IN LIVES SAVED OF THE HEAR OPERATION IN WASHTENAW COUNTY, THE FOLLOWING POSITIVE POINTS CAN BE OBSERVED:

(1) AN AVERAGE WARNING TIME TO THE EMERGENCY ROOM OF 9.2 MINUTES WAS PROVIDED FOR AMBULANCE TRANSPORTED PATIENTS.

(2) IN FOUR MONTHS THERE WERE 13 CASES ROUTED TO AN ALTERNATE HOSPITAL SAVING A SUBSTANTIAL AMOUNT OF TIME IN GETTING THESE PATIENTS TO DEFINITIVE CARE

(3) IN 64 CASES THERE SOME SPECIFIC ACTION AT THE HOSPITAL IN PREPARATION OF THE ARRIVAL--NOTIFICATION OF A PHYSICIAN, SETTING UP EQUIPMENT, MAKING ROOM FOR THE PATIENT, ETC.

(4) RAPPORT AMONG THE SEVERAL ELEMENTS OF THE EMERGENCY MEDICAL CARE SYSTEM WAS ENHANCED BY THE USE OF THE HEAR SYSTEM, AND VICE VERSA. THE BEST MEASURE OF THIS WAS THE INCREASED COMMUNICATION OVER THE HEAR NET, AND THE INCREASE IN RESPONSE (IN TERMS OF MEDICAL DISCUSSION AND ADVICE) BY THE EMERGENCY ROOM PERSONNEL TOWARD THE END OF THE DATA TAKING PROGRAM.

Table 1: Attendant Requests for Assistance
at Emergency Room Entrance

Stretcher	4
Help in Unloading	2
Help in Handling Patient	4
Power for Special Equipment	1
Special Equipment	1

Table 2: Attendant Suggestions to
Emergency Room

Have I.V. Ready	4
Have Cardiac Team Ready	1
Notify a Specific Doctor	21
Have a Surgeon Ready	2
Other	35

Table 3: Emergency Room Response
(Via Radio)

Standing by or Thank you	395
Direct to Specific Entrance	34
Direct to Another Hospital	13
First Aid Advice	1
Preparations Started	8
Notify Specific Doctor	7
Can't Understand	3

APPENDIX A

H.E.A.R. DATA CODING

<u>Variable #</u>	<u>Description</u>	<u>Field Width</u>
1	Sequence Number Unique for each patient and consists of case number followed by Patient Number.	5
2	Case ID Coded sequentially for each ambulance run.	4
3	Patient Number	1
4	Ambulance Form Data Code: 0 data not present 1 data present	1
5	Transcription Data Code: 0 data not present 1 data present	1
6	E.R. data Code: 0 data not present 1 data present	1
7	Number of Patients Code: Number of Patients conveyed	1

Ambulance Form Data

8*	Month Code: 01 January 02 February 03 March 04 April 05 May 06 June 07 July 08 August 09 September 10 October 11 November 12 December 98 Missing Data	2
9	Day of Month Code: 01 : : : 31 98 Missing Data	2
10	Year Code: last two digits of year 98 Missing Data	2

* If an ambulance Attendant form is not present, columns 10-80 should be left blank. If any data source is absent all columns for that source are filled with 9's.

- 11 Age 2
Codes: Actual age of patient
if less than one year old code as 00
97 age \geq 97
98 Missing Data
- 12 Sex 1
Code: 1 male
2 female
8 missing data
- 13 Hospital accepting patient 1
Code: 0 none
1 Beyer
2 Chelsea
3 Saline
4 St. Joseph
5 U of M
6 Veteran's
7 Other
8 Missing Data
- 14 Time of arrival at scene 4
Code: Time of day in 24 hour clock
8888 missing data
- 15 Time of departure from scene 4
Code: time in 24 hour clock
8888 missing data
- 16 Time of 1st Radio Call 4
Code: time in 24 hour clock
8888 missing data
- 17 Time of 2nd radio call 4
Code: time in 24 hour clock
8888 missing data
- 18 Time of arrival at hospital 4
Code: time in 24 hour clock
8888 missing data
- 19 Emergency location 1
Code; 1 traffic
2 industrial
8 missing data
- 20 Emergency Type 1
Code: 1 Injury
2 Illness
3 Both (1&2)
8 Missing data

21	First Call Use	1
	Code: 0 none	
	1 Alert EM Room	
	2 Describe Problem	
	3 Describe Aid	
	4 Request Advice	
	5 Other	
	6 No Response	
	8 Missing Data	
22	First Call Hospital	1
	Code: use same codes as in column 20	
23	Second Call Use	1
	Code: same as first call use V21	
24	Second Call Hospital	1
	Code: same as first call Hospital V22	
25	Third Call Use	1
	Code: same as first call use V21	
26	Third Call Hospital	1
	Code: same as first call hospital V22	
27	Aid Own Initiative-First Response	2
	Code: 1 Airway Assist	
	2 Control Bleeding + Bandaging	
	3 Splint	
	4 Long Board	
	5 Short Board	
	6 Cervical Collar	
	7 Oxygen	
	8 Suction	
	9 Artif. Resp.	
	10 CRP	
	11 HLR	
	12 Delivered Baby	
	13 Shock Treatment	
	14 Transfer	
	15 Sand Bags	
	16 Directed to specific entrance	
	97 Other	
	98 Missing Data	
	00 None	
28	Aid Own Initiative-Second Response	2
	Code: Same as first response V27	

- 29 Aid Own Initiative-Third Response 2
Code: Same as for first response V27
- 30 Aid Radio Advice 2
Code: same as for first response V27
- 31 Splint Type 1
Code: 1 Board (Rigid)
2 Air Splint
3 Thomas Splint
4 Leg Splint
5
6
7 Other
8 Missing data or none
- 32 Equipment left with Patient 1
Code: 0 Cervical collar
1 Airway
2 Roll Kling
3 Leg Splint
4 Backboard
5 Resuscitube
6 Air splint
7 Other
8 Missing data or none
- 33 Suspected Injury/Illness - First Response 2
Code: 00 None
01 Head
02 Neck
03 Back
04 Chest
05 Abdomen
06 Pelvis
07 Upper Ext.
08 Lower Ext.
09 Burn
10 Stroke (CVA)
11 Cardiac
12 DOA
13 Shoulder
14 Overdose
15 Respiration
16 Eye injury
17 Hip
18 Seizure
19 Lacerations
20 Carbon monoxide poisoning

- 21 Other poisoning
- 22 Mental
- 23 Diabetes
- 24 Appendicitis
- 25 Fracture
- 26 Rectum bleeding
- 27 Meningitis
- 28 Cancer
- 29 Fever
- 30 Drunk
- 31 Ulcers
- 32 Pregnancy
- 33 Internal
- 34 Shock
- 97 Other
- 98 Missing data

- 34 Suspected Illness/Injury - Second Response 2
Code: same as for first Response V33
- 35 Suspected Illness/Injury - Third Response 2
Code: same as for first response V33
- 36 Patient Condition 1
Code: 1 Conscious
2 Unconscious
3 Incoherent
4 Vomited
5 Convulsive
6 DOA
7 Depressed (mental)
8 Missing Data
- 37 Vomited 1
Code: 1 No
2 Yes
8 Missing (when col 65 is 8 also)
- 38 Systolic Blood Pressure (Before Slash) 3
Code: 001 Normal
002 High
003 Low
004 - 887 Use Actual Value
888 Missing Data
- 39 Diastolic Blood Pressure (after slash) 3
Code: 004-887 Use Actual Value
888 Missing Data

40 Pulse 3
Code: 001 Normal
002 Fast
003 Slow
004 Strong
005 Weak
006 Absent (no pulse)
007 - 887 Use actual Value
888 Missing Data

41 Transported Codes 1
Code: 1 On abdomen
2 On back
3 On side
4 Sitting
5 Feet elevated
6 Head elevated
7 Other
8 Missing data

42 Victim Trapped 1
Code: 1 Yes
2 No
8 Missing data

43 Tools Needed 1
Code: 1 yes
2 no
8 missing data

44 Tools Available 1
Code: 1 yes
2 no
8 missing data

This variable is meaningful only when
77 and 78 are coded 1.

45 Ambulance Company 1
Code: 1 Superior
2 Washtenaw
3 Other
8 Missing Data

Transcription Data

46 Month 2
Code: same as V8

47	Day of Month Code: same as V9	2
48	Year Code: same as V10	2
49	Time (hr.min) of call Use 24 hour clock 8888 Missing data	4
50	Hospital Called, 1st call 0 None 1 Beyer 2 Chelsea 3 Saline 4 St. Joseph 5 U of M 6 Veteran's 7 Other 8: Missing data	1
51	Hospital Called, 2nd call code same as V50	1
52	Victim Age Code: Age in years 97 Age > 97 98 Missing data	2
53	Victim Sex Code: 1 male 2 female 8 missing data	1
54	Type of Call Code: 0 Interhospital Information 1 Traffic Accident 2 Industrial Injuries 3 Illness 4 Radio test 5 Dispatcher to Driver 6 Patient Transfer 7 Injury 8 Other or unreadable response 9 Missing Data	1

- 55 Injury/Illness - First Response 2
Code: 01 Undefined Injury
02 Undefined Illness
03 Head Injury
04 Back Injury
05 Neck Injury
06 Fractures
07 Lacerations
08 Internal Injuries
09 Pregnancy
10 Burns
11 Drugs or Overdose
12 Respiratory Problems
13 Chest
14 Shoulder
15 CVA
16 Abdomen
17 Shock
18 Shaken up
19 Seizure
20 Cardiac
21 Poisoning
22 Mental
23 Cancer
24 Gunshot
96 Other
97 None
98 Missing Data
- 56 Injury/Illness - Second Response
Code: same as V55
- 57 Patient Condition 1
Code: 1 Conscious
2 Unconscious
3 Partial Paralysis
4 Incoherent
5 Nauseous & Vomit
6 Convulsive
7 DOA
8 Missing Data
- 58 First Aid (Primary) 1
Code: 0 Other
1 Oxygen
2 Splints/Backboard
3 Bandage/Con. Bleeding
4 Restraints
5 Suction
6 Cervical Collar
7 CPR
8 Missing Data

- 59 Attendant Request for Assistance at ER Entrance 1
Code: 1 Stretcher
2 Help in unloading
3 Help in handling patient
4 Power for special equipment
5 Special equipment
7 None
8 Missing data
- 60 Attendant Suggestions to ER 1
Code: 0 None
1 Have IV ready
2 Have Cardiac team ready
3 Notify specific doctor
4 Have surgeon ready
7 Other
8 Missing Data
- 61 ER Response 1
Code: 0 Standing by or thank you
1 Direct to specific entrance
2 Direct to another hospital
3 First Aid advise
4 Preparations started
5 Nofity specific doctor
6 Couldn't understand message
7 Other
8 Missing Data
- 62 Caller 1
Code: 0 Superior Ambulance
1 Washtenaw Ambulance
2 Another hospital
3 Superior Dispatcher
8 Other
9 Missing Data
- 63 Estimated Time of Arrival in Minutes 2
97 None
98 Missing data
- 64 Hospital 1
Code: 1 Beyer
3 Saline
4 St. Joseph
5 U of M
8 Missing Data
- 65 Month 2
Code same as V8

66	Day of Month Code same as V9	2
67	Year Code same as V10	2
68	Time of Radio Call Code: Time in 24 hour clock 8888 Missing data	4
69	Time of Arrival of Victim Code: Time in 24 hour clock 8888 Missing data	4 4
70	Radio Call Received Code: 1 yes 2 no 8 Missing data	1
71	Type of Emergency Code: 1 Traffic 2 Industrial 3 Illness 4 Transfer 5 Interhospital Information 6 Emergency Arrival 7 Dispatcher 8 Other 9 Missing Data	1
72	Physician Notified Before Arrival Code: 1 yes 2 no 8 Missing data	1
73	Patient Disposition Code: 1 Admitted 2 Treated & Released 3 No Treatment 4 Transferred to another hospital after receiving 8 Missing data	1
74	Victim's Age 98 Missing data	2
75	Sex 1 male 2 female 8 Missing data	1

76	Injury/Illness	2
	01 Undefined injury	
	02 Undefined Illness	
	03 Head	
	04 Back	
	05 Neck	
	06 Fracture	
	07 Lacerations/contusions/abrasions	
	08 Internal	
	09 Pregnancy	
	10 Burns	
	11 Drugs	
	12 Respiration problem	
	13 Chest	
	14 Shoulder	
	15 CVA	
	16 Stomach pains	
	17 Cardiac	
	18 Shock	
	19 Delivered baby	
	20 Passed out	
	21 Muscular strain	
	22 Dislocated joint	
	23 Seizure	
	24 GSW	
	25 Convulsions	
	96 Other	
	97 None	
	98 Missing data	
77	Injury/Illness - 2nd response Code same as V76	2
78	Patients Condition:	1
	1 Conscious	
	2 Unconscious	
	3 Partial Paralysis	
	4 Vomiting	
	7 DOA	
	8 Missing Data	
79	Response to Radio (1st)	1
	0 None	
	1 Sent to different hospital	
	2 Waited	
	3 Readied equipment	
	4 Normal preparation	
	5 Moved other patients to make room	
	6 Radioed medical (or 1st air advice)	
	7 Other	
	8 Missing	

80	Response to Radio (2nd) Code same as V79	1
81	ETA = # of minutes 98 Missing data 97 none - ,arrival not expected (sent to other destination etc.)	2
82	Time - arrival at scene to arrival at hospital (min.) 98 Time 98 or 0 99 Missing Data	2
83	Time - Depart Scene to Arrival at Hospital (min.) same as V82	2
84	Time at Scene (min.) Same as V82	2
85	Time - 1st radio call to arrival at hospital (min.) same as V82	2
86	Time - 2nd radio call to arrival at hospital (min.) Same as V82	2
87	Time - 1st to 2nd Radio call (min.) same as V82	2
88	Time - Depart Scene to 1st Radio Call (Min.)	2
89	Time - From Receipt of 1st Call to Arrival of victim (min)	2
90	Time - Arrival at Hospital (From attendant form) 00 - 2400-0100 : : 24 - 2300-2400	2
91	Time - Time of Radio Call (from transcription data) Same as V90	2
92	Time - Time of Arrival at Hospital (from E.R. Data)	2

APPENDIX B

AMBULANCE ATTENDANT FORM

ATTENDANT REPORT

Registration No. _____

Date / /

Victim's Name _____ Age _____ Male Female

Location of Call _____

Home Ad. _____ Phone _____

Medicade No. _____ Medicare No. _____

HOSPITAL Beyer 1 Chelsea 2 Saline 3 St. Joe. 4 U of M 5 Vet. 6 _____ 7	TIME OF: Depart Scene _____ AM <input type="checkbox"/> PM <input type="checkbox"/> 1st Radio Call _____ Arrive Hospital _____	EMERGENCY Traffic <input type="checkbox"/> Industrial <input type="checkbox"/> Non Traffic: Injury <input type="checkbox"/> Illness <input type="checkbox"/>
--	--	--

USE OF HEAR

Enter Hospital No. _____

1st Call	2nd Call	3rd Call
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Alert EM Room

Describe Problem

Describe Aid

Request Advice

Other

No Response

AID (check 3 most important)

	Own Initiative	Radio Advice
Airway Assist	<input type="checkbox"/>	<input type="checkbox"/>
Control Bleeding	<input type="checkbox"/>	<input type="checkbox"/>
Splint	<input type="checkbox"/>	<input type="checkbox"/>
Long board	<input type="checkbox"/>	<input type="checkbox"/>
Short board	<input type="checkbox"/>	<input type="checkbox"/>
Cervical Collar	<input type="checkbox"/>	<input type="checkbox"/>
Oxygen	<input type="checkbox"/>	<input type="checkbox"/>
Suction	<input type="checkbox"/>	<input type="checkbox"/>
Artif. Resp.	<input type="checkbox"/>	<input type="checkbox"/>
CPR	<input type="checkbox"/>	<input type="checkbox"/>
HLR	<input type="checkbox"/>	<input type="checkbox"/>
Delivered Baby	<input type="checkbox"/>	<input type="checkbox"/>
Shock Treatment	<input type="checkbox"/>	<input type="checkbox"/>
Transfer	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

Type _____

Equipment Left with Patient _____

SUSPECTED INJURY/ILLNESS

Enter 3 Most Serious

Head <input type="checkbox"/>	Up Ext. <input type="checkbox"/>
Neck <input type="checkbox"/>	Low. Ext. <input type="checkbox"/>
Back <input type="checkbox"/>	Burn <input type="checkbox"/>
Chest <input type="checkbox"/>	Stroke <input type="checkbox"/>
Abdomen <input type="checkbox"/>	Cardiac <input type="checkbox"/>
Pelvis <input type="checkbox"/>	DOA <input type="checkbox"/>
Other _____	

CONDITION OF VICTIM UPON ARRIVAL AT SCENE OR DURING TRANSPORTATION

Conscious <input type="checkbox"/>
Unconscious <input type="checkbox"/>
Incoherent <input type="checkbox"/>
Vomited <input type="checkbox"/>
Convulsive <input type="checkbox"/>
DOA <input type="checkbox"/>

Blood Pressure _____ / _____ Pulse _____

REMARKS

Transported: On Abdomen

On Back

On Side

Sitting

Feet Elevated

Head Elevated

Victim Yes <input type="checkbox"/>	Tools Needed Yes <input type="checkbox"/>	Necessary Tools Yes <input type="checkbox"/>
Trapped No <input type="checkbox"/>	for Extrication No <input type="checkbox"/>	Available No <input type="checkbox"/>

Amb. Co. _____ Driver _____ Attendant _____

APPENDIX C

EMERGENCY ROOM RADIO LOG

EMERGENCY ROOM RADIO LOG

CALL RECEIVED
TIME STAMP

NAME OF PATIENT

PATIENT NUMBER

TIME OF ARRIVAL

AM
 PM

TYPE OF CALL

EMERGENCY ARRIVAL

TRANSFER

INTERHOSPITAL INFORMATION

ACTION INITIATED BEFORE ARRIVAL OF AMBULANCE

LIST OF MEDICAL OR FIRST AID ADVICE GIVEN BY RADIO OR OTHER USE OF RADIO

APPENDIX D

MAP OF TIME TO HOSPITAL

<p>LYNDON <u>27.4</u> 19 cases</p>	<p>DEXTER <u>17.2</u> 51 cases</p>	<p>WEBSTER <u>12.5</u> 6</p>	<p>NORTHFIELD <u>12.3</u> 30</p>	<p>SALEM <u>14.8</u> 12</p>
<p><u>16.0</u> 30 Chelsea</p> <p>SYLVAN <u>25.5</u> 19</p>	<p>LIMA <u>17.6</u> 14</p>	<p><u>10.2</u> 15 Dexter</p> <p>SCIO + <u>8.6</u> 68</p>	<p><u>10.0</u> 26 ANN ARBOR</p> <p>Ann Arbor <u>4.3</u> 439</p>	<p>SUPERIOR <u>10.1</u> 34</p>
<p>SHARON <u>11.7</u> 11</p>	<p>FREEDOM <u>16.4</u> 7</p>	<p>LODI <u>8.8</u> 6</p>	<p>+ PITTSFIELD <u>9.2</u> 71</p>	<p><u>6.7</u> 229 + Ypsilanti YPSILANTI <u>7.5</u> 207</p>
<p><u>23.3</u> 16 Manchester</p> <p>MANCHESTER <u>64</u> 2</p>	<p>BRIDGEWATER <u>18.3</u> 3</p>	<p>+11.1 <u>32</u> Saline</p> <p>SALINE <u>9.4</u> 26</p>	<p>YORK <u>14.5</u> 39 Milan</p> <p><u>17.7</u> 57</p>	<p>AUGUSTA <u>12.9</u> 24</p>

Washtenaw County
Average Travel Time to Hospital
Superior Code 3 runs - 1970

County Mean 9.1 minutes
Number of cases 1508