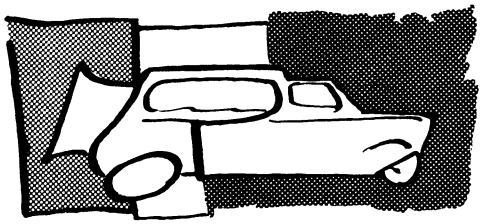
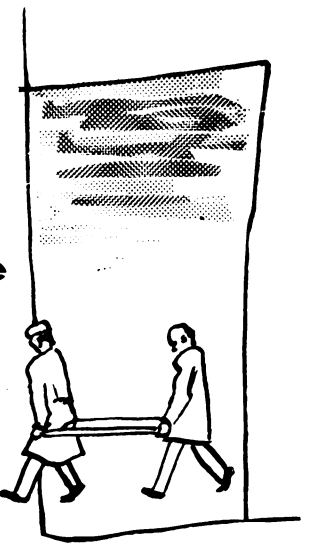
Ambulance Service in Seattle





S. P. LEHMAN, M.D., M.P.H., and K. H. HOLLINGSWORTH, B.S.

Survey of Service

IN 1953, Seattle, Wash., began to appraise the King County emergency ambulance service on the basis of costs, efficiency, and in relation to traffic hazards. Traffic casualties were singled out since they represent more than two-fifths of the total accidental deaths in the United States and are the main recipients of emergency ambulance service (*1*).

Since 1892, Seattle, Wash., has recognized the importance of ambulance service for its residents. Back in those days, the ambulance was a wagon used to carry patients to the smallpox isolation hospital, known as the "suspect house." Today 20 well-equipped ambulances are supplied by four independent privately owned companies to answer emergency calls in the city.

A supplementary survey was conducted in July 1958 to compare the ambulance service in Seattle with other cities. A questionnaire prepared by the Seattle-King County Health Department was distributed to the 113 cities in the United States and western Canada whose estimated population numbered over 100,000. Ninety-nine local health departments, or 88 percent, returned the questionnaires, and their answers supplied the following information:

- Thirty cities rely solely on city, county, or State-owned equipment to supply ambulance service. Further communication with these cities revealed that their equipment varies from the typical ambulance to station wagons, vans, and specially equipped police cars.
- Thirteen cities use private companies under contract at a fixed annual fee as their exclusive suppliers of ambulance service.
- Thirty-two cities use privately owned ambulances without any formal contract arrangement. In some cases, this service costs the city

Dr. Lehman is director of public health in Seattle. Mr. Hollingsworth is a senior medical student serving in the division of health education of the Seattle-King County Department of Public Health.

Table 1. Percentage distribution of emergency reporting sources in Seattle, Wash., 1956–58

Reporting service	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
Private physician	28	0. 6	11	0. 2	15	0. 3
Telephone operator	7		8		14	
Citizen	606	13	639	13	516	10
Police	3, 799	81	3, 965	81	4, 193	85
Other	279	6	280	6	201	4
Total	4, 719		4, 903		4, 939	

nothing, since only private companies operate, with no official city intervention or contract. In others, the city reimburses the private ambulance owner on a per call basis.

• Twenty-three cities make use of several types of ambulance service, supplementing municipally owned vehicles with privately owned or contracted ambulances.

The annual cost of ambulance service does not seem to correlate with population, number of vehicles, calls per year, or type of service used. In many cases, cost estimates are unavailable, especially when the ambulance service is a division of the police department with patrol cars and personnel used for both emergency calls and police business.

In most cities, the police work closely with ambulance services. In 60 cities, dispatching is done by the police department. The role of the police dispatcher is an important one. A patrol car is usually called to the scene of an emergency before an ambulance, whether the emergency is a traffic accident, street fight, or other unusual disturbance. The patrolman ascertains the need for an ambulance, orders the dispatcher to send one, and attests to the need for speed and the use of a siren. The fire department dispatches ambulances in 7 cities, and 23 cities rely on a telephone call to start the emergency vehicle on its way.

Growth

Seattle's ambulance service has improved with experience and growth. In 1899, the board of health asked the city council to establish an ambulance service officially (*2, 3*).

Eighteen years later, in 1917, the annual report of the department of health carried the following paragraph:

"The ambulance service has been very efficient during the past year. We have one well-equipped ambulance that answers any emergency call to any part of the city. There is only one cot in the ambulance but, when necessary, two patients can be transferred. There is in the ambulance, a lung motor, emergency kit with all necessary instruments, medicine and dressings for any emergency case, and also padded emergency splints for fractures. They can be temporarily applied for the transportation. The ambulance is driven by the police department and kept in the police garage. With the cooperation of the police department, a stretcher is carried on the patrol car [which accompanies the ambulance] and a good many calls are made by the patrol and the patient transferred very comfortably. When the ambulance is out and a second emergency call comes, a doctor always accompanies the patrol" (*4*).

On January 1, 1925, the city-operated ambulance service was changed to a contract system with a "well-established and reliable firm,"

Table 2. Cost to the city of emergency ambulance service, Seattle, Wash., 1953–58

Year	Calls processed	Calls paid by city	Percent	Cost per call	Total cost
1953	3, 784	2, 400	63	$7. 00	$16, 800
1954	3, 943	2, 342	59	8. 00	18, 096
1955	4, 437	2, 698	61	8. 00	18, 990
1956	4, 719	3, 049	65	8. 00	24, 396
1957	4, 903	2, 892	59	8. 00	23, 000
1958	4, 939	2, 698	55	10. 00	26, 976

Table 3. Outcome of emergency ambulance calls, Seattle, Wash., 1956–58

Disposition of patient	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
Jail	42	0. 9	50	1	20	0. 4
Private hospital	676	14	759	15	1, 036	21
Sanatorium					1	
King County Hospital	3, 688	78	3, 690	75	3, 497	71
Refused call [1]	34		42		27	
Other transportation [1]	12		31		7	
Unknown	267	6	330	7	351	7
Total	4, 719		4, 903		4, 939	

[1] From 34 to 73 patients refused a city-dispatched ambulance or used other transportation, but in all these cases the city was still under agreement to pay for the call.

Shepard Ambulance Service, at a saving of about $3,000 per year. The contract called for supplying emergency ambulances from a central and north-end location, and, in addition, an ambulance from 7 p.m. to 7 a.m. at the Public Safety Building. Interns at the City Emergency Hospital, opened in 1909, rode the vehicle until just before World War II when, because of extreme doctor shortage, it became necessary to staff the ambulances with orderlies. For this contract service, Seattle paid $1,000 per month in 1944, and $1,100 monthly in 1945.

The contract system with Shepard Ambulance Service ended in the summer of 1947. On July 1 of that year, three ambulance firms were engaged, to be reimbursed on a per call basis for uncollectible emergency runs. A Shepard ambulance continued to operate at night from the Public Safety Building.

The current system is essentially the same as the one established in 1947. The city neither owns nor operates any ambulances.

Method of Operation

The four independent, privately owned companies who supply the 20 ambulances which answer Seattle's emergency calls have established, by their own agreement, six zones within the city limits. Each company or branch office of a company handles emergency calls in one assigned zone. All emergency calls are channeled by two-way radio to a dispatcher, on duty 24 hours a day at City Emergency Hospital, now the jail infirmary since the opening of the King County Hospital in 1931. The dispatcher calls the appropriate company for the zone in which the accident occurs. If the company has no equipment available, the dis-

Table 4. Frequency of calls for emergency ambulance service, in 3-hour intervals, Seattle, Wash., 1956–58

Time of call	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
12 midnight–3 a.m	568	12	585	12	512	10
3 a.m.–6 a.m	210	5	227	5	222	5
6 a.m.–9 a.m	376	8	440	9	351	7
9 a.m.–12 noon	566	12	624	13	607	12
12 noon–3 p.m	694	15	796	16	786	16
3 p.m.–6 p.m	865	18	860	18	985	20
6 p.m.–9 p.m	797	17	741	15	846	17
9 p.m.–12 midnight	626	13	629	12	629	13
Unknown	17		1		1	
Total	4, 719	100	4, 903	100	4, 939	100

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patcher calls for an ambulance from a neighboring zone.

The police department is Seattle's main source of calls to the central dispatcher (table 1). All calls are accepted, however, with the exception of calls for service resulting from accidents and illness occurring in industrial establishments, for nonemergency service, and for patients, other than traffic casualties, who are recipients of public welfare. Industrial firms must make their own arrangements for emergency service. Nonemergency service is not considered a city responsibility and, in the same way, persons receiving public welfare are considered private cases since a request from a physician must be made to the welfare department before ambulance service can be authorized.

Although the city's contract with the companies supplying ambulance service does not contain specific regulations, certain rules governing the service have been agreed upon by the participants. They are:

1. The participating companies must maintain and keep in service at least two ambulances at all times.

2. The crew of an ambulance on call must consist of a driver and an assistant, one of whom must hold a Red Cross first aid certificate or other certificate of equal standing or have had enough actual experience to compensate for a certificate.

3. The following accessories shall be carried in each ambulance: invalid couch-type bed on wheels; stretcher for second patient on floor or hanger; bandages, tourniquets, and splints; oxygen; and clean linen and blankets for two patients.

4. Communication procedures require that only company offices which maintain two-way radio dispatch service or the central dispatch office contact ambulance drivers. Under no circumstances may one company transfer calls to another; rerouting is to be handled exclusively by central dispatch. And all calls must be handled promptly.

5. Participating companies must carry insurance in the amounts of $50,000 and $100,000 for public liability and $10,000 for property damage. The required insurance coverage must be certified in writing to the health department by the insurance carrier, who must also stipulate the amount of insurance coverage for each accident and each individual, and agree to notify the department immediately of policy cancellation or change.

6. Companies are to collect payment for calls within 90 days, and prevailing rates are to be charged. The city will reimburse the companies for unpaid-for calls at the end of the 90-day period. Rates to be charged the city are established by the health department each year. When two persons are carried, the company will be paid by the city for only one person. When collection is made from one person in instances where two persons were carried, the company shall not collect from the city for the second person.

7. Reasons for curtailing or discontinuing the services of an ambulance company are: re-

Table 5. Age of patients to whom emergency ambulance service was given, Seattle, Wash., 1956–58

Age (years)	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
0–5	89	2	104	2	101	2
6–10	127	3	100	2	105	2
11–20	312	7	286	6	309	6
21–30	560	12	493	10	404	8
31–40	502	11	521	10	511	11
41–50	588	12	534	11	515	11
51–60	593	12	619	13	605	12
61–70	331	7	377	8	315	6
Over 70	252	5	245	5	227	5
Unknown	1, 365	29	1, 624	33	1, 847	37
Total	4, 719	100	4, 903	100	4, 939	100

Table 6. Causes given for emergency ambulance service in Seattle, Wash., 1956–58

Causes	1956		1957		1958	
	Number	Percent	Number	Percent	Number	Percent
Diabetes	60	1	56	1	63	1
Nervous diseases	559	11	533	10	528	10
Heart conditions	338	7	384	7	311	6
Respiratory diseases	2	----	1	----	3	----
Digestive diseases	12	----	2	----	7	----
Birth	60	1	51	1	54	1
Alcoholism	497	10	370	7	536	11
Causes unknown	1, 244	25	1, 448	28	1, 296	25
Traffic accidents	1, 390	28	1, 607	30	1, 615	32
Poison, drugs, foodstuffs, utility gas	82	2	57	1	66	1
Accidental falls	383	8	368	7	367	2
Other accidents	102	2	96	2	91	7
Mechanical suffocation	6	----	4	----	5	----
Drowning and submersion	2	----	5	----	7	----
Suicide	136	3	136	3	129	2
Homicide	124	2	137	3	126	2
Total	4, 997	100	5, 255	100	5, 231	100

NOTE: For some patients more than one condition was reported.

ceiving and answering calls from other than regular channels; tuning in on police calls; poor condition of ambulance, equipment, and supplies; failure to supply trained crew; unnecessary delay in answering calls; and failure to carry and keep in force proper amount of insurance.

8. Rulings of the director of public health shall be final.

Table 2 shows the number of emergency ambulance requests since 1953 and the number of calls paid for by the city. The city bears the expense of between 59 and 65 percent of all emergency calls dispatched by the City Emergency Hospital. The cost in 1958 was $26,976.

The cost of the present program, however, is less expensive than a city owned and operated service would be. A new Cadillac Superior ambulance costs about $10,000, f.o.b. factory, and to equip the city with a fleet comparable to the one now available would cost about $200,000. Maintenance expense and salaries for drivers and attendants would swell this amount. With the present system, the city cooperates with private enterprise instead of competing with it, has satisfactory ambulance service at relatively low cost, and is supplied with a combined fleet of 20 vehicles at strategic locations.

In the past 3 years, approximately 75 percent of all emergency calls were routed to King County Hospital, with less than 21 percent going to private institutions (table 3).

Table 4 shows the frequency of calls at 3-hour intervals round-the-clock. Tables 5 and 6 reveal the ages of patients and the reasons given for requiring ambulance service.

Traffic Demands

A MAJOR ISSUE in supplying any city with emergency transportation for ill or injured patients is the need for sirens and flashing red lights to permit ambulances the right-of-way. Speed beyond posted limits is another facet of the same issue. Both medical and nonmedical agencies are concerned.

In Seattle, the law is clear regarding attainment of the right-of-way. Both the ordinances of the city and the laws of the State of Washington demand that ambulances and other emergency vehicles give "audible signal by siren, exhaust whistle, or bell."

Proponents of noise abatement believe that the reduction or elimination of the use of the ambulance siren will aid in the achievement of their ultimate objective. Two courses of action may be taken to accomplish this purpose: repeal of existing laws which give ambulances the

opportunity to gain the right-of-way; or imposition of strict limitations on ambulance movement, listing certain situations in which the right-of-way should be granted. Consideration must be given to the exercise of sound medical judgment by a well-trained medical person in the second course mentioned, a person with more training than the average ambulance attendant.

In order to gain the right-of-way, a certain amount of noise must be created. The earliest ordinance prohibiting unnecessary noise was enacted in Stamford, Conn., in 1926, but sections of city ordinances have dealt with the subject since 1891 (*5*). In a 1930 study by the New York Noise Abatement Council, fire, police, and ambulance sirens constituted 4.12 percent of 11,068 complaints of noise in a city with a network of elevated, subway, and trolley cars.

It has also been mentioned that ambulance sirens and the warning devices of the police and fire departments may be confused with a civil defense alert. In 1950, New York City ambulance sirens were removed specifically for this reason, but a year later the order was rescinded.

Many people believe that, in addition to creating undesirable noise by the use of sirens, the right-of-way privilege given to emergency ambulances increases accidents at intersections. In Seattle, permission is given to ambulances to disregard stop signs and traffic signals if they give the "audible signal" specified in State and local laws.

Although the total number is not available, the Seattle police department has records of seven injuries and six instances of property damage from traffic accidents involving ambulances in 1958. In 1957, there were five injuries and nine instances of property damage. The four participating ambulance companies report a collective total of nine traffic accidents in the past 3 years. None of these was fatal. It is reported that six of the accidents occurred at an intersection while the ambulance was operating with siren and red lights. Two operators said that the accidents were the result of "too little siren" and could have been avoided if the siren had been blown louder.

A study was undertaken in New York City to prove that revoking right-of-way privileges would reduce traffic accidents involving ambulances (*6*). In 1949–50, there was 1 accident in every 972 calls when sirens were in use and ambulance drivers were permitted to ignore traffic regulations. When sirens were removed in 1950–51 due to possible confusion with civil defense air raid signals, the ratio climbed to 1 accident in 715 calls, with the drivers still being permitted to ignore traffic regulations. In May 1953, the order was rescinded, sirens were restored, and right-of-way privileges remained in force. From June through September of that year, the ratio rose to 1 accident in 690 calls. The study began in October and continued through December 1953, a period of 3 months during which time all ambulances in the city adhered to traffic regulations and operated without sirens. Accidents declined 52 percent, or to 1 in 1,460 calls. During 1953–54, there was a further decline to 1 accident in 2,380 calls. Allegedly, denial of right-of-way privileges did not decrease the efficiency of emergency ambulance service in New York City.

In Seattle, the four operating ambulance companies are aware of the controversy on right-of-way privileges. Sirens are used in answering a call only when specified by the physician or city dispatcher. In transporting a patient to the hospital, use of red lights and siren is directed by the police, the attending physician, or, lacking these, by the ambulance attendant. The companies state that right-of-way is refused unless a siren and red lights are used and, without right-of-way privileges, a delay of from 30 to 60 minutes may result. In a peak-hour traffic situation, the delay may be even longer.

Seattle's experience with the "speeding ambulance" is limited. Three of the four operating companies require police escort before operators may exceed city speed limits. These companies believe the extra speed is not necessary if the ambulances are allowed free passage along thoroughfares and are given right-of-way through traffic signals and intersections.

City Ordinances

In replying to a questionnaire on emergency ambulance service prepared by the Seattle

health department in July 1958 and distributed to 113 cities in the United States and western Canada with an estimated population of over 100,000, 30 cities supplied copies of local ordinances governing ambulance operation. These ordinances primarily govern the licensing and control of ambulance operators, but it is apparent that many traffic regulations are applied in an attempt to reduce accidents involving ambulances on call.

No statistically accurate or valid appraisal of traffic laws regulating emergency ambulance service is possible from an evaluation of only 30 local ordinances. But it was noted that some cities had no restrictions on speed of operation while others limited ambulances to a speed 10 miles per hour over the posted limits.

Kansas City, Mo., conducted a study in 1954 of traffic regulations governing ambulances in 54 cities, located in 29 States. From 52 of the 54 cities, it was learned that 26 required ambulances to observe the same speed limits as other passenger vehicles. Thirteen cities required a speed consistent with safety, five specified no speed limit, and three limited ambulances to a maximum speed of 40 miles per hour. Forty of 49 cities did not permit ambulances to run red lights and stop signs, 16 allowed them to ignore such regulations in an emergency. Twelve cities allowed the right-of-way privilege if an audible warning or red lights were used, 10 if the vehicles slowed down at intersections, and 9 if the ambulance was operated "under safety conditions" (*7*).

It has been noted by one observer that an ambulance traveling 30 miles per hour takes 10 minutes to go 5 miles, yet to arrive at its destination 5 minutes earlier the vehicle would have to travel at double this speed or 60 miles per hour over the same course. A study conducted by Curry at Hurley Hospital, Flint, Mich., of 2,500 consecutive ambulance runs failed to show that 5 minutes would have influenced the course of a single injury (*8*). It was found that haste was unnecessary in 98.2 percent of the cases; they could have been transported according to traffic regulations. In 1.8 percent, expeditious handling was necessary, but the speeding ambulance could have increased injuries. In only one case was haste necessary to save life. Curry concluded that ambulances should observe local speed laws, should use sirens, and should have the right-of-way.

Young, in his 238-page book entitled "Transportation of the Injured," states, in a chapter on ambulance safety, that "certainly the siren as an emergency warning device is here to stay. Additional accidents and perhaps even fatal delay could result in urgent cases without such a device. But indiscriminate use of a siren should be avoided, and, even when using it, adherence to normal traffic regulations is the safest policy" (*9*). Young further states, "From the medical standpoint, there are few emergencies that require speeding to a hospital if first aid is properly rendered on-the-spot."

Driver Training

THE AMBULANCE driver and attendant are initially responsible for the care of casualties. It is important, therefore, that their training be commensurate with their responsibility.

With the limited resource of a first aid certificate or its equivalent in experience, Seattle crews are called upon to care for the patient at the accident scene and en route to the hospital. And the driver may be called upon to decide the speed he will use, either a slow cautious trip at the imposed speed limits and obeying traffic signals, a journey within the speed limits but using the siren and red lights, or a trip of maximum swiftness making full use of privileges of right-of-way and right to exceed the speed limit.

After interviews, it has been suggested that ambulance drivers and attendants in Seattle are not sufficiently trained to make such decisions and prefer to be directed by physicians or police officers. But it is readily apparent that policemen are no better prepared to judge such situations than ambulance crews.

More advanced training of ambulance attendants has been advocated by many officials. Perhaps the most vocal in expressing this view is Dr. George J. Curry, chairman of both the Subcommittee on Transportation of the In-

jured and the Subcommittee for Regional Committees on Trauma of the American College of Surgeons. Curry has published several provocative papers on the emergency care of the injured (*8*, *10–14*) and in each, he has stressed the need for thorough and continual education of ambulance attendants.

An educational program was begun in Flint, Mich., in 1949, with the American College of Surgeons arranging a series of lectures and demonstrations. Expeditious and standardized handling of common injuries was discussed. The educational program was motivated by amendment of local ordinances governing the qualifications of ambulance attendants and regulating equipment to be used in first aid treatment, providing penalties for violations. Ambulance attendants participating in the program were each awarded a certificate of fitness which required renewal annually (*8*).

A general community plan for action by Curry suggests:

1. Adoption of a city ordinance requiring certificates of proficiency for ambulance attendants.

2. Educational programs for ambulance attendants under the sponsorship of the county medical society, the Regional Committee on Trauma of the American College of Surgeons, or the hospital staff organizations. Such programs can be arranged either directly by the sponsoring groups or through the Red Cross under the sponsorship of specialized organizations. Instruction can be given by physicians in training as residents in local hospitals. In communities lacking hospital house staffs or a hospital, young physicians in the area could serve.

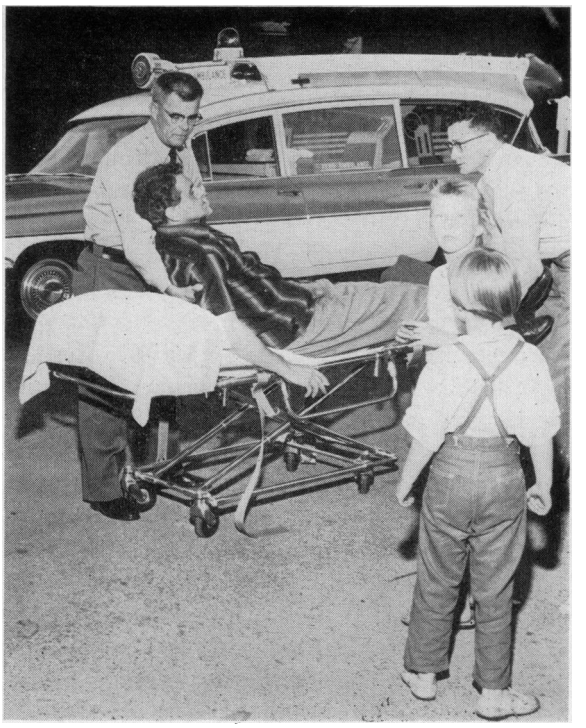
3. A receiving department chart of cases, recording the quality of transportation.

4. Biannual inspection of all ambulance equipment.

5. A well-organized emergency receiving department and efficient organization of hospital care.

6. Delegation of the entire problem to willing workers.

Young devoted one-half of his book, "Transportation of the Injured," to first aid and the ambulance attendant (*9*). Young believes that the duties of the dispatcher are by no means



unimportant, saying "all calls for an emergency ambulance are urgent until proven otherwise. The urgency of the request should be ascertained by the dispatcher, who should always find out as much as possible about the emergency before sending the ambulance. Those assigned to dispatch emergency ambulances should have first aid training; they can then give essential, lifesaving information to the caller. This practice is soundly recommended. In addition, the dispatcher should ask that someone be available at the scene to assist in locating the injured person quickly."

Seattle's medical community has taken a keen interest in its emergency ambulance program, particularly in speeding and the use of sirens. Dr. Quin B. DeMarsh, president of the King County Medical Society, is currently a member of a surveillance committee studying safety and use of sirens in gaining right-of-way in traffic in the city and other municipalities of 100,000 population. Spontaneous interest by physicians has been augmented by inquiries from the Regional Committee on Trauma of the American College of Surgeons and by community efforts in traffic safety such as the Seattle-King County Safety Council.

DeMarsh has suggested that if the solution

for excessive speed and indiscriminate use of sirens is not found through legal curtailment, an intensive educational program for ambulance drivers and attendants may be the answer. It is apparent that regular surveillance of emergency calls should be accomplished in this community, if the present ambulance system is continued. Both educational and disciplinary measures may be needed to correct the abuses reported in specific cases. Public authorities should take an active role in correcting irregular practices.

Summary

Emergency ambulance service in Seattle has progressed since 1892 from one wagon to a fleet of 20 well-equipped ambulances supplied by four privately owned companies. The city contracts for this service, agreeing to pay for each call remaining unpaid 90 days after the emergency.

The Seattle-King County Department of Health surveyed ambulance service in Seattle in 1953 and in 113 cities in the United States and western Canada with a population of 100,000 in 1958. The current system of operation was influenced by these survey findings.

Analyses of emergency calls in Seattle by source, cost, disposition, time, age of patients, and cause of emergency indicate that police report most casualties; costs per call and total costs have risen with population growth; the majority of all patients are taken to a hospital; the most frequent hours for emergencies are from 3 p.m. to 6 p.m.; persons between 51 and 60 years of age use ambulance service the most; and either traffic accidents or unknown causes are given as the reason in about one-third of the emergencies.

Traffic regulation of ambulances in emergencies is controversial. State and local laws require use of an audible signal to gain right-of-way privileges in Seattle. Studies on speed and noise abatement in other localities have established that speed of delivery of the patient to the hospital rarely has important implications in recovery. Adherence to normal traffic regulations is advocated by some authorities. Emergency ambulances in New York City, operating without sirens and obeying all traffic regulations, reduced accidents involving these vehicles 52 per cent during a 3-month period in 1953–54.

Advance training of ambulance drivers is presented as a possible solution to problems of ambulance operation. It is suggested that education under the guidance of experienced physicians and other professional personnel in the community will promote the exercise of better judgment by ambulance attendants.

REFERENCES

(1) Anderson, M.: Injuries caused by motor vehicles, a statistical analysis. California Med. 86: 115–118, February 1957.

(2) Seattle municipal reports. Annual reports published by order of Mayor and City Council. Seattle, Wash., Koch & Oakley Printing Co.

(3) Seattle Health Department: Annual reports, prior to 1901. Seattle-King County Department of Public Health.

(4) Seattle Department of Public Health: Annual report, 1917.

(5) National Noise Abatement Council: Anti-noise ordinances and other measures for elimination of unnecessary noise in U.S. cities. New York, N.Y., 32 pp.

(6) Magelaner, I., and McElroy, M.: Are ambulance sirens necessary? Hospitals 29: 89–90, 172, April 1955.

(7) Bureau of Municipal Research: Operation of emergency vehicles. Syracuse, N.Y., 1955, 12 pp.

(8) Curry, G. J., and Lyttle, S. N.: The speeding ambulance. Am. J. Surg. 95: 507–511, April 1958.

(9) Young, Carl B., Jr.: Transportation of the injured. Springfield, Ill., Charles C. Thomas, 1958, pp. 175–176.

(10) Curry, G. J.: Traffic accidents and safety. J. Michigan M. Soc. 56: 1139 (1957).

(11) Curry, G. J., and Lyttle, S. N.: Traffic safety. Chicago, National Safety Council, August 1958, p. 7.

(12) Curry, G. J.: Emergency care of traffic casualties. Mod. Med. 24: 73 (1956).

(13) Curry, G. J.: Responsibility to the injured. Postgrad. Med. 19: 298 (1956).

(14) Curry, G. J.: The ambulance attendant, his qualifications and training. Bull. Am. Coll. Surgeons 4: 465–467 (1956).