

The Good Neighbor Rescue Program: Utilizing Volunteers to Perform Cardiopulmonary Resuscitation in a Rural Community

John W. Bachman, MD
Rochester, Minnesota

The Good Neighbor Rescue Program utilizes volunteers who pay for their basic life support training. Acting as first responders during cardiac emergencies, they become involved in the emergency care of seriously ill patients. In the program described, they participated in saving two lives during the first two years of the program. They reduced the time for trained help to arrive at the scene in 90 percent of the emergencies. The program requires coordination of existing resources within the rural community, is inexpensive, and is heavily dependent on volunteerism. The program complements the goals of providing basic life support to cardiac victims before the arrival of an ambulance and of providing advanced life support at the scene.

Cardiovascular disease remains the leading cause of death in the United States, outnumbering the next two causes combined.¹ One reason for such a high death rate is that most of these deaths occur in communities far from medical help.² These deaths occur suddenly and often without warning. In one in four of the victims, sudden death is the first indication of cardiovascular disease.²

The mechanism of sudden death is cardiac electrical instability. Studies have demonstrated the feasibility of resuscitating these victims by rapid-acting emergency systems.³ The survival rate, as

measured by hospital dismissal of victims of witnessed cardiac arrest in communities with paramedics, is as high as 23 percent.⁴⁻⁷ Analysis of outcome of witnessed cardiac arrest has shown that survival is dependent on two factors: the arrival of cardiopulmonary resuscitation (CPR), and the arrival of advanced life support. When CPR was initiated within four minutes and advanced life support was provided within eight minutes, more than 30 percent of the patients survived.⁴⁻⁷ If either time was exceeded, the chances of survival decreased dramatically. The advantage of having bystanders who know CPR and use it has been amply demonstrated.^{8,9} Although there was no significant difference in frequency of defibrillation of ventricular fibrillation (67 percent of victims were defibrillated when bystanders were present and 61 percent when they were not), survival was greatly improved (43 percent with bystander aid and 22 per-

From the Division of Family Medicine, Mayo Clinic and Mayo Foundation, Rochester, Minnesota. Requests for reprints should be addressed to Dr. John W. Bachman, Mayo Clinic, 200 First Street, SW, Rochester, MN 55905.

cent without such aid). Also, the victim was awake on admission with bystander help 50 percent of the time compared with 6 percent without bystander help. Complications within the hospital were also reduced.⁸

Most communities that have paramedics also have members of a first-responder system trained in basic life support. Usually these are firemen, who arrive first. The paramedics arrive later. The first responders, who are trained in CPR, are probably more effective than the bystanders.⁴

Because of distances and the cost of emergency support programs, successful cardiac resuscitation in rural areas generally has been lacking.⁷ Innovations will be needed for improvement to be realized. This paper describes the two-year experience in upgrading basic life support applications in a rural community. Advanced life support methods are also discussed.

The Program

Zumbrota, Minnesota, is a community of approximately 2,000 people in which there are a 23-bed hospital and an ambulance managed by community members. The surrounding 15-mile radius has another town of 2,000 people and three towns of 500 each. Between these towns are farms and small townships. The population of the townships seldom exceeds 50 persons—primarily farmers and farm-support people. The population within a 15-mile radius of Zumbrota is less than 9,000 people.

Goals

In 1979, the two family physicians at the Mayo Clinic satellite in Zumbrota considered setting up a basic life support system. They discussed the possibility with the local medical community, and all agreed that the project should be started. One of the family physicians was placed in charge of the research aspect. The following factors were considered essential to the program: (1) the system should be inexpensive, (2) the system should allow

persons well trained in basic life support to arrive at the scene before the ambulance arrives, (3) the government, and bureaucracy in general, should be avoided while the project is being set up, and (4) all cases should be documented and results noted.

Training and Recruitment of Personnel

Nurses, hospital employees, volunteer firemen, teachers, and National Guardsmen were recruited. Recruitment was done primarily by CPR instructors and through a speakers' bureau. Those who were recruited paid \$10 for training in basic life support and were requested to keep their training current.

The corps of trained volunteers was given the name "Good Neighbors." The system was entitled "The Good Neighbor Rescue Program." Each Good Neighbor was given two metallic stickers, one to display at home and the other to display at work. The volunteers were also to inform neighbors of their status.

The home and workplace of each Good Neighbor were noted on a map located in the hospital, the town's dispatching center. To identify each location, a small marker indicating when the person was present (day or night) and the training status of the Good Neighbor (registered nurse, emergency medical technician, fireman, or layman) was pinned to the map.*

Looking at the map, one could decide rapidly which volunteer had the highest probability of being nearest an emergency. A book containing the pin numbers, names, and telephone numbers of the Good Neighbors was placed near the map.

Activation of the System for a Cardiac Emergency

Cardiac emergencies were defined as chest pain, a witnessed cardiac arrest, or need for CPR

*Pins were obtained from the Labelon Company, Canandaigua, NY 14424.

at the location. Nurses were allowed the discretion of dispatching the Good Neighbors to assist in noncardiac events.

All telephone calls for dispatching the ambulance came to the hospital in Zumbrota. The nurses' station in the hospital would notify a volunteer emergency medical technician by means of a radio-pager system. In cardiac emergencies three emergency medical technicians were called. If the emergency was in Zumbrota, the volunteers went either to the scene or to the ambulance, depending on where they were at the time of the emergency. If the emergency was in town, one volunteer would use the ambulance while the others would drive their cars directly to the scene. If the emergency was outside the town limits, all three volunteers would use the ambulance. The interval from call-in to the time the ambulance left the garage was usually less than three minutes. This quick response was possible because several volunteers carried radio-pagers and many of the volunteers lived less than a mile from the garage that housed the ambulance. Police and sheriffs' departments monitored the emergency channel and also participated in the cardiac emergency.

A nurse usually both dispatched the ambulance and activated the emergency effort. By utilizing a hospital loudspeaker, the nurse summoned help from employees of the hospital. Employees were trained to determine the victim's location and to contact the nearest Good Neighbors. Generally, three Good Neighbors would be sent to the scene. During actual emergencies, the time of activation of the Good Neighbors could not be measured. During drills, however, the time interval from call-in to the calling of a Good Neighbor was less than 45 seconds. One reason for this short time interval was that several employees were contacted, and each could use the telephones at the nurses' station or in the hospital rooms. Drills were conducted periodically to ensure that the system remained efficient.

Documentation

After the system was activated, Good Neighbors were contacted by Mayo Clinic employees.

These employees conducted a standard interview to determine the impressions and reactions of the Good Neighbors. Data were compiled by review of emergency room and ambulance records and by collection of responses of witnesses of an emergency. The times of responses from all these sources were tabulated. One survey was done of the Good Neighbors after one year of the program. The Good Neighbors received mailings twice a year informing them of progress, mistakes, and retraining classes that were available in the area. The cost of the mailings was minimized by having senior citizens in the community home address the envelopes. The CPR instructors and a physician would meet regularly to discuss weaknesses in the system and methods of improving it. Such input led to innovations that helped upgrade the system.

Results

Sixty victims were encountered during the two-year period. The type of patients seen by the Good Neighbors varied, with those having cardiac arrest being the most common (Table 1). The outcomes of the 60 cases in which Good Neighbors were involved within a two-year period could be grouped into three categories: dead on arrival (23 cases), hospitalized (34 cases), and treated as outpatients (3 cases). The response intervals were calculated from the time the emergency was recognized or the person collapsed from a cardiac arrest to the arrival of a Good Neighbor (Figure 1), of an ambulance (Figure 2), and of the advanced life support (Figure 3). The responses to a questionnaire sent to 180 Good Neighbors are summarized in Table 2.

Good Neighbors or trained personnel arrived before the ambulance in more than 90 percent of the 60 cases. The Good Neighbors did not arrive before the ambulance only when incorrect information had been furnished or when the emergency occurred at night.

The Good Neighbors participated in two instances in which the patients were saved: one occurred 7 miles and the other 8 miles from Zumbrota. Each involved a witnessed cardiac arrest in which bystanders performed CPR initially, with

Table 1. Distribution of 60 Emergency Cases Involving Good Neighbors	
Case	Number
Witnessed cardiac arrest	15
Chest pain	13
Unwitnessed cardiac arrest	8
Syncope*	8
Congestive heart failure	2
Pacemaker malfunction	2
Cerebrovascular accident	2
Sudden infant death syndrome	2
Gastrointestinal bleeding	2
Seizure	2
Suicide attempt	1
Pneumothorax	1
Motor vehicle accident	1
Hip fracture	1
Total	60

*Fainting, alcoholism, and hyperventilation

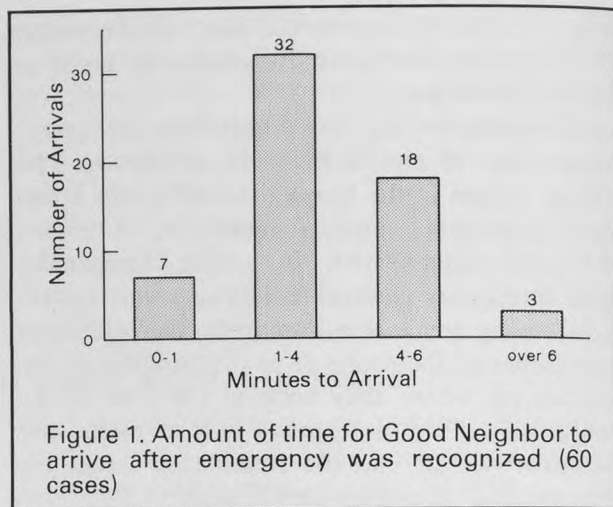


Figure 1. Amount of time for Good Neighbor to arrive after emergency was recognized (60 cases)

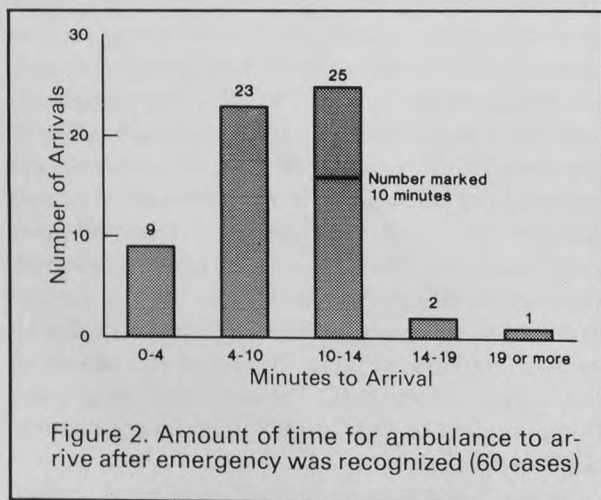


Figure 2. Amount of time for ambulance to arrive after emergency was recognized (60 cases)

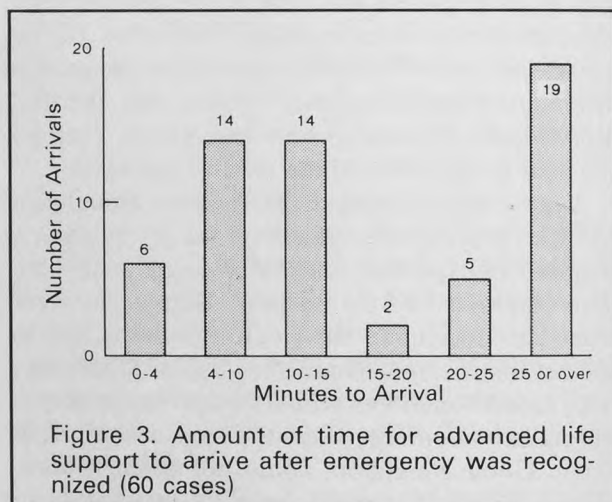


Figure 3. Amount of time for advanced life support to arrive after emergency was recognized (60 cases)

the Good Neighbors providing help later.

In another situation of a witnessed cardiac arrest, the Good Neighbors arrived in approximately three minutes and applied CPR. The patient was

defibrillated at the scene and was able to be converted to a tachycardia rhythm with respirations. The patient then went back to ventricular fibrillation and died when the defibrillator did not function.

Aside from applying CPR in witnessed cardiac arrest, the Good Neighbors provided assistance by directing the ambulance driver to the scene either by hand signals or by using the flashing warning lights on their cars. They usually assumed a leadership role in calming the onlookers, and took

Question	Response (%)	
	Yes	No
Would you like to have more course work?	36	64
Would you like to have a kit?	57	43
Do neighbors know that you can help?	50	50
Did you know CPR before becoming a Good Neighbor?	67	33
How did you become a Good Neighbor?		
Speakers bureau		65
Already CPR instructors		30
Newspaper or other		5
Would you like to become a CPR instructor?*	10	90
Did you utilize the gold stickers on your house and/or at work?	46	54
Did you give information regarding CPR to your neighbors?	34	66
*Note from prior question that 30% of the respondents already were CPR instructors		

charge of the situation until the ambulance arrived. In 6 (10 percent) of the 60 cases, the Good Neighbors actively transported relatives to the hospital, and often waited with them, providing reassurance.

When the cost and benefits of the program are considered, it is important for physicians to ensure that the program remains organized and coordinated and that it is publicized through speaking at public programs. Most of the work is done by community leaders. The actual cost of the program was only \$159 for supplies and mailings.

Because of the program, some patients have been seen at the hospital earlier than they otherwise would have been. This indirect benefit was realized because some members of the community would seek the advice of Good Neighbors concerning such symptoms as chest pain and shortness of breath. In turn, the Good Neighbors would advise such persons to seek medical attention.

Some difficulties were experienced in the Good Neighbor Rescue Program. In one instance CPR was stopped when a registered nurse not affiliated with the program told the Good Neighbors they should discontinue CPR. During the first two years of the program, there were five instances of

Good Neighbors refusing to go to the scene. This usually was related to leaving children alone at home, or to presumed denial by the volunteer when confronted with the necessity of reacting to an emergency. In instances of noncardiac events the hospital nurse usually considered it prudent to send a registered nurse or a physician to the scene. One of the concerns in the program was that Good Neighbors would be called for nonemergencies, for example, simple fainting episodes. This did occur but did not affect the efficiency of the program.

Discussion

The program described met the goals that were set. It was inexpensive, allowed basic life support to be applied before the arrival of the ambulance, and did not involve a great deal of bureaucracy. The program also showed that victims often could be reached within four minutes (39 of 60 occasions).

The importance of a community having a rapid-activating basic life support system has been demonstrated. It would be a mistake, though, to assume that such a system in itself makes a significant impact. Aside from the basic life support system, rapid access to a dispatcher from the community and provisions for doing advanced life support in the field are needed.

Advanced life support response times for the entire two-year period were very slow. One should note, however, that for cardiac arrests during the past year, physicians accompanied the ambulance or police car. Of the two lives that were saved, both were done at the scene, with a response time of 10 minutes for advanced life support.

In providing advanced life support in the field, the Zumbrota community had two major developments. The first was the attempt to have physicians ride in the ambulance or a police car when responding to a cardiac arrest. This decision was made one year after the Good Neighbor Program started and after it was learned that advanced life support response time was slow. The second development occurred at the end of the two-year study. All volunteer ambulance drivers were trained in defibrillation techniques. Eight of the 10 drivers taking the course passed the test, which was conducted by physicians in the emergency group at the Mayo Clinic. The driver was to use this skill if the physician were not in the ambulance. Experience elsewhere demonstrates probable benefit from this type of training.¹⁰

Finally, the program is being constantly analyzed. Prior to this program, ambulance runs were reviewed, but innovation was seldom attempted. Currently, after each cardiac arrest, innovations and improvements are made. The recording of response times led to the discovery of problems in the community's response to emergencies. The resources to save lives were within the community—only coordination of these resources was needed.

Because of these efforts in the Zumbrota community, other rural communities have planned similar programs. In some instances the rural communities use existing radio-pager systems with volunteer firemen (Balsam Lake and Carlton), automatic dialers (Silver Bay), or trained police patrols (Grand Rapids). Each community's development of a basic life support system is different. The same is true for the development of advanced life support systems. Experimentation

in defibrillation by emergency medical technicians in rural communities is currently being done through at least one center (University of Iowa, Iowa City). In many rural towns physicians or nurses respond to emergencies to provide this service with or without modifications (Zumbrota, Big Fork).

It will be necessary to continue to search the literature for further innovations. In the meantime, family physicians in rural communities who deal with ambulance services may wish to analyze their systems and potential resources to determine whether innovations to improve response times are worth pursuing.

References

1. Alderson MR: International Mortality Statistics. New York, Facts on File, 1981
2. Kuller LH: Sudden death—definition and epidemiologic considerations. *Prog Cardiovasc Dis* 23:1, 1980
3. Eisenberg MS, Bergner L, Hearne T: Out-of-hospital cardiac arrest: A review of major studies and a proposed uniform reporting system. *Am J Public Health* 70:236, 1980
4. Cobb LA, Werner JA, Trobaugh GB: Sudden cardiac death: I. A decade's experience with out-of-hospital resuscitation. *Mod Concepts Cardiovasc Dis* 49:31, 1980
5. Eisenberg M, Bergner L, Hallstrom A: Paramedic programs and out-of-hospital cardiac arrest: I. Factors associated with successful resuscitation. *Am J Public Health* 69:30, 1979
6. Eisenberg M, Bergner L, Hallstrom A: Paramedic programs and out-of-hospital cardiac arrest: II. Impact on community mortality. *Am J Public Health* 69:39, 1979
7. Eisenberg MS, Bergner L, Hallstrom A: Cardiac resuscitation in the community: Importance of rapid provision and implications for program planning. *JAMA* 241:1905, 1979
8. Thompson RG, Hallstrom AP, Cobb LA: Bystander-initiated cardiopulmonary resuscitation in the management of ventricular fibrillation. *Ann Intern Med* 90:737, 1979
9. Lund I, Skulberg A: Cardiopulmonary resuscitation by lay people. *Lancet* 2:702, 1976
10. Eisenberg MS, Copass MK, Hallstrom AP, et al: Treatment of out-of-hospital cardiac arrests with rapid defibrillation by emergency medical technicians. *N Engl J Med* 302:1379, 1980