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FEATURE ARTICLE

A Case Map Reduces Time to Administration of Thrombolytic Therapy in Patients Experiencing an Acute Myocardial Infarction

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As one of the first hospitals in northwest Arkansas to begin administering thrombolytic therapy to patients with heart attack, or acute myocardial infarction (AMI), Crawford Memorial Hospital (CMH) first administered streptokinase to a patient experiencing an AMI on April 26, 1984. A national standard in lytic therapy was set in 1992 by the National Heart Attack Alert Program Coordinating Committee. The committee set a benchmark of having every appropriate AMI patient receive thrombolytic therapy within 30 minutes of hospital arrival. To monitor quality in lytic therapy administration, CMH began to participate in the National Registry for Myocardial Infarction (NRMI), in January 1995. The first quarter of data revealed a median door-to-drug time (time from arrival at hospital to administration of drug) of 67 minutes.

As a quality improvement project, a research experiment was conducted to assess the effect of a case map, also referred to as a clinical pathway, on time to administration of thrombolytic therapy. A case map is a written management plan that provides the ideal sequence and timing of health care staff actions to achieve optimal patient outcomes with minimal variation in care. The researcher developed a case map designed to increase efficiency in delivery of thrombolytic agents. The research was conducted throughout an 18-month period from July 1995 until December 1996. Median time to administration of thrombolytic therapy was reduced from 64 minutes to 25 minutes as a result of case map use ($p = 0.028$). In this article, research findings are presented regarding the use of case maps in thrombolytic therapy, as well as implications for practice.

In 1995, CMH, a 103-bed hospital located in northwest Arkansas, recognized a need to decrease its time to administration of thrombolytic agents to AMI, or heart attack, patients. In January 1995, the hospital began to measure times to administration of thrombolytic agents through its participation in the National Registry for Myocardial Infarction 2 (NRMI 2).[1] "[This] is a multicenter observational study designed to collect, analyze, and disseminate cross-sectional data on patients experiencing AMI. The goal of NRMI 2 is to improve AMI patient care at the individual hospital level through evaluation of outcomes data and assessment of care delivery systems."[1] As of September 30, 1996, it had included data on 388,589 patients at 1,509 centers. According to NRMI 2, for the 12-month period ending September 1996, the national median door-to-drug time for thrombolytic therapy administration was 39 minutes. The 25th percentile was 25 minutes, and the 75th percentile was 60 minutes. In the state of Arkansas, the NRMI 2 reported a median door-to-drug time of 35 minutes. The 25th percentile was 22 minutes, and the 75th percentile was 55 minutes. Figure 1 is a bar graph prepared by ClinTrials Research that depicts the national and state data for Arkansas regarding door-to-drug times.

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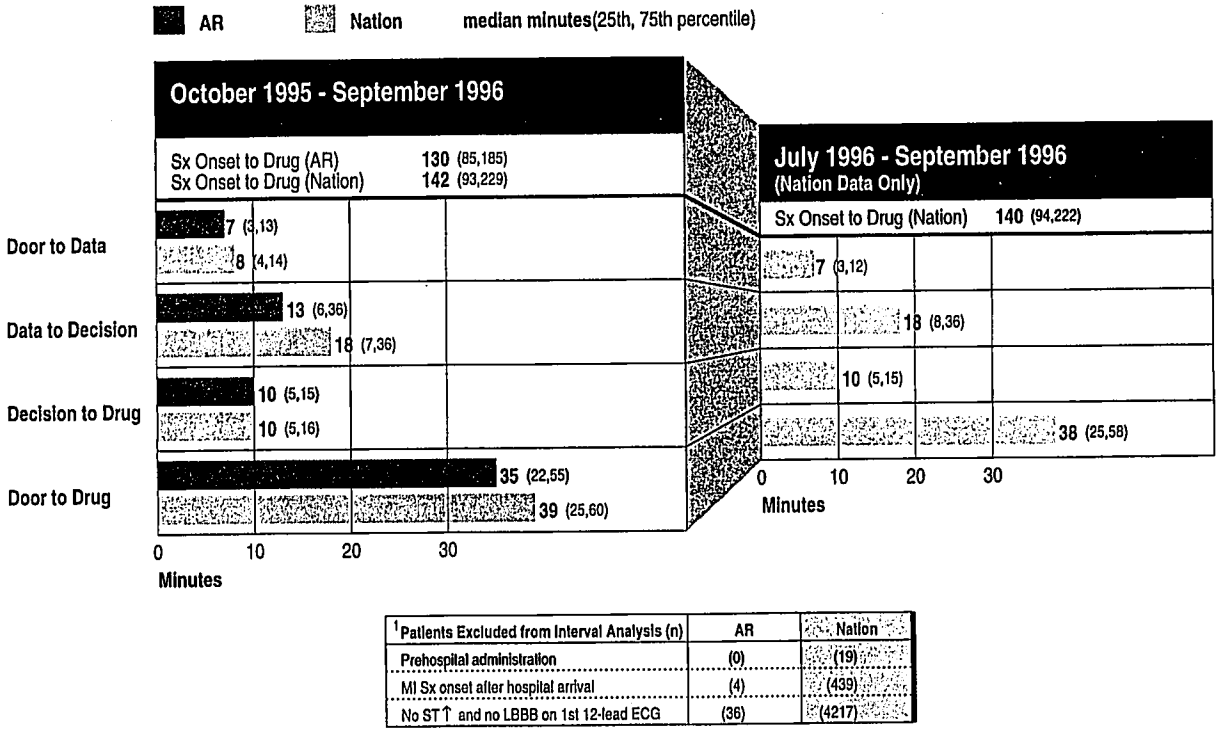
7: Interval Times to IV Thrombolysis[1]



[1]Patients Excluded from Interval Analysis (n)	AR	Nation
Prehospital administration	(0)	(19)
MI Sx onset after hospital arrival	(4)	(439)
No ST↑ and no LBBB on 1st 12-lead ECG	(36)	(4217)

FIGURE 1
Nontransfer Inpatients.

ClinTrials is located in Lexington, Kentucky, and is the statistical company for NRMI 2. The first quarter of data at CMH revealed that median time to drug administration was 67 minutes (NRMI 2). Median time to administration in other participating Arkansas hospitals was 40 minutes, and the national standard set by the National Heart Attack Alert Program (NHAAP) Coordinating Committee was 30 minutes (1994).[2] This standard of achieving a 30-minute door-to-drug time for administration of thrombolytic agents to patients with a clear diagnosis of AMI had been set in 1992. The standard was set because medical research had proven that patient outcomes improve when time to administration of thrombolytic therapy is reduced.[3] Crawford Memorial Hospital's median time to drug administration was 37 minutes longer than the standard set by the NHAAP Coordinating Committee. The hospital clearly needed to analyze and improve the process for thrombolytic therapy administration.

As an initial quality improvement effort, the hospital adopted recommendations made by the NHAAP regarding ways to decrease door-to-drug time. These recommendations included performance of electrocardiograms within 5 minutes of hospital arrival on all chest pain patients older than age 30, and moving the administration of thrombolytic therapy from intensive care to the emergency department. A Nurse First program initiated by the hospital's owners, Health Management Associates, also contributed to initial reductions in times before implementation of the case map. Each patient who presented to the emergency department for care was greeted and triaged by a nurse rather than a clerk. The most recent and dramatic reduction in door-to-drug time occurred with the implementation of a thrombolytic therapy case map. Data collected and statistical analysis thereof are presented in this article.

Literature Review

The number one cause of death in America is cardiovascular disease. Each year, 1.5 million Americans will suffer an AMI. More than 500,000 of these patients will die. Of these deaths, one half will occur before the patient reaches a hospital.[4] A tremendous

amount of research is underway to fight heart disease. The most promising research was begun in the early 1950s, when it was first hypothesized that most cases of AMI were caused by a sudden obstruction of a coronary artery by a thrombus or clot at the site of a ruptured atherosclerotic plaque.[3] It was suggested at that time that activating the body's natural clot-dissolving, or fibrinolytic, system might be a promising treatment for AMI patients. In 1958, the first study assessing the use of thrombolytic or clot-dissolving substances in treating AMI was published.[5] Another important study was completed by Reimer et al in 1977.[6] They provided evidence, in a canine animal model, that the damage done to the heart in an AMI takes approximately 6 hours to reach completion. When the infarction becomes complete in 6 hours, the damage is permanent and irreversible. That section of heart muscle is dead and cannot repair itself. After the coronary artery is occluded, the damage begins at the inner lining of the heart muscle, or endocardium. It then proceeds, in a wave-like pattern, across the heart muscle to the outer layer, or epicardium, of the heart. It is called, therefore, the wavefront phenomenon. If intervention is made to restore blood flow within this 6-hour period, any heart muscle within the ischemic area that is still viable will be salvaged.

The first large, well designed research study that proved thrombolytic therapy reduced the mortality rate in patients with AMI was the Gruppo Italiano per Lo Studio Della Streptochinasi nell'Infarto Miocardico. This study also proved that this benefit was time dependent.[7] It was a controlled, multicenter, unblinded trial using 11,806 patients in 176 coronary care units who were enrolled throughout a 17-month period. Patients were treated as much as 12 hours from symptom onset. In the group of patients who received lytic therapy, there was an 18% reduction in mortality rate at 21 days ($p = 0.0002$). A subgroup analysis performed in the study assessed patients treated within 3 hours of symptom onset; the in-hospital mortality rate was reduced by 23% ($p = 0.0005$). In patients treated within 1 hour of symptom onset, in-hospital mortality rate was reduced by 47% ($p = 0.0001$).

Since the Gruppo Italiano per Lo Studio Della Streptochinasi nell'Infarto Miocardico was published, the entire paradigm for treating AMI patients has changed. Before that study, treatment of these patients consisted only of bedrest, sedation, pain relief, and treatment of complications such as arrhythmias and congestive heart failure.[8] Now, time to administration of thrombolytic agents is the most important concern. Therefore, emergency and cardiac care specialists have been studying every source of delay in administering these agents.

The two most commonly used thrombolytic agents are streptokinase and tissue plasminogen activator.[3] Streptokinase is an enzyme derived from streptococcal bacterial cultures. Tissue plasminogen activator is a naturally occurring enzyme produced by a number of tissues in the body. It is manufactured by Genentech and produced using recombinant DNA techniques. Pharmacy cost at CMH for a dose of streptokinase is approximately $300, whereas tissue plasminogen activator costs approximately $2,200.[9] According the 1993 GUSTO trial,[10] 10 lives are saved for every 1,000 patients treated with tissue plasminogen activator rather than streptokinase; however, one additional stroke occurs. This leaves the medical community with somewhat of an ethical dilemma regarding choice of lytic agent.

Since the beginning of the thrombolytic era, death within the first few weeks of treatment from AMI has decreased, from 10–15% to 5–10%.[11] Although dramatic results have been achieved, approximately 20% of patients receiving lytic therapy do not respond with reperfusion of the involved artery. In addition, of arteries that reperfuse, approximately 15% will reocclude within the next few hours to days.[12] The most significant complication of lytic therapy is bleeding, the rate of which approaches 6%. In addition, approximately 1% of patients will have a disabling stroke caused by intracranial bleeding.[10] These shortcomings and complications leave much research to be done in the area of lytic therapy research. Mitchell et al[13] reported in June 1996 on three northern California hospitals attempting to improve door-to-drug times. Improvements in mean times in these three hospitals were from 111 to 51 minutes, 101 to 49 minutes, and 94 to 49 minutes. None of these facilities were consistently reaching the 30-minute NHAAP goal.

Within hospitals, time delays in administering lytic therapy have been measured within three intervals. The points in time that divide these three intervals are referred to as "the four D's."[2] They are the door time, data time, decision time, and drug time. The door time is the time when a person presents for care at the emergency department door. Proper training of triage personnel is the major factor in reducing this time. Data time is the time when a short clinical history has been taken and an electrocardiogram has been presented to the physician for interpretation. Quick performance of an electrocardiogram is important in reducing data time delay. Decision time is the time that the decision to administer thrombolytic therapy is made. Factors important in reducing this delay include authority of the emergency physician to make this decision and proper training of the physician in administration of thrombolytic agents. The fourth and last time point is drug time. This is the time

when the drug is actually administered into the patients intravenous line. Sources of delay in administering the drug include lack of training of nursing personnel, not keeping the drug near the cardiac care area, and unnecessarily moving the patient from the emergency department to the intensive care unit before administering the drug.

Clearly, a decrease in door-to-drug time is being sought by many facilities in which there is still room for improvement. There are no data the researcher is aware of to report specifically regarding the use of a case map as an instrument for decreasing time to thrombolytic therapy. Although some organizations have used various protocols and standardized forms for thrombolytic therapy administration, none is concise and meant to be used at the bedside.

Implementation of a Case Map

A possible solution to quickly moving patients through the series of time intervals referred to as "the four D's" is to implement a written care plan that guides the multidisciplinary team. This care plan, referred to as a case map, would provide interpatient consistency in care, education, for those inexperienced in thrombolytic agent use, and a simple way to document physician's orders and interventions made. This proposed method of reducing time to administration of thrombolytic agents is yet to be documented in the medical literature.

An important characteristic for a map in a time-dependent critical care situation is that it be simple and brief. It should not be overloaded with information that is not absolutely necessary for completion of the task at hand: Quickly delivering thrombolytic agents to appropriate patients. The thrombolytic therapy map was designed so that health care professionals with little or no experience delivering lytic therapy would be comfortable following a step-by-step procedure. The map records important times such as that of symptom onset, triage time, and electrocardiogram performance. It guides the staff through a list of contraindications. It also prompts for standard therapies such as nitroglycerine, oxygen, and aspirin. Mixing instructions for the lytic agent are also included. Physician-prompted orders are in bold type, making this information easy for the physician to identify and address. Information included elsewhere in the record, and information not absolutely necessary for AMI care should not be included. Excessive complexity delays the race against the clock.

An important issue to be resolved was physician acceptance and staff buy-in of the map. The hospital had a good track record with case maps, as described in a previous article in *Nursing Case Management,* by Brinkman et al.[14] Our use of maps in Fast Track Transurethral Resection of the Prostate resulted in a reduction of length of stay by greater than 40%. Getting good results in this previous effort, combined with physician leadership by the researcher in constructing the map, paved the way for use of maps in thrombolytic agent delivery.

The researcher constructed and had approved as policy a case map for thrombolytic therapy. The map was constructed using other case maps as guides. The therapy protocol was evidence based and supported by the latest medical literature. Flexibility for individual physicians to alter therapy according to their preferences was built into the map. The CMH map in Figure 2 assists in adherence to protocol and doubles as physician's orders and nursing documentation record. The thrombolytic therapy case map was approved for use by the Continuum of Care Committee, a multidisciplinary hospital committee, on April 1, 1996.

Quality Improvement Study

Research Question

The question that was answered to fulfill the purpose of this research is: Did implementation of a case map for thrombolytic therapy assist the emergency department professionals in decreasing time to administration of thrombolytic agents in eligible patients with AMI? In a more broad sense, this study addressed the issue of whether a case map improved patient outcomes in a particular clinical setting.

Operational Definitions

Dependent and Independent Variables

The independent variable in this study was use of a case map on patients experiencing AMI and fitting eligibility criteria for receipt of thrombolytic agents. The first group of AMI patients did not have a case map as part of their medical record and care protocol. The second group of AMI patients had a case map as part of their medical record and care protocol. The dependent variable in this study was door-to-drug time for thrombolytic therapy administration. These times were statistically analyzed and compared between the two groups of patients.

Hypotheses and Sample

Hypotheses

H_0: The case map has no effect on door-to-drug times.

H_1: The case map has an effect on door-to-drug times.

CMH - THROMBOLYTIC THERAPY - Case Map - Page 1 - TRIAGE / E.R. - (Revised 09/12/96)

	PHYSICIAN **(Physician's orders are in bold)**	TIME

INITIAL ASSESSMENT→

ADDRESSOGRAPH ▼

Stat EKG for all patients with signs or symptoms suggestive of acute MI.
Notify physician immediately.
Time of symptom onset: ____________ Triage time: ____________________

CHECKLIST FOR THROMBOLYTIC THERAPY

ABSOLUTE CONTRAINDICATIONS:

Y	N	Active internal bleeding
Y	N	Suspected aortic dissection
Y	N	Recent (within 10 days) prolonged CPR (> 10 min.)
Y	N	Diabetic hemorrhagic retinopathy
Y	N	Persistent uncontrolled HTN > 180/110 or at discretion of MD
Y	N	History of CVA known to be hemorrhagic (within 2 months)
Y	N	Intracranial Neoplasm, AVM, or Aneurysm

RELATIVE CONTRAINDICATIONS:

Y	N	Recent trauma or surgery (within 10 days)
Y	N	Active peptic ulcer
Y	N	Known bleeding diathesis or current use of anticoagulants
Y	N	Significant liver dysfunction
Y	N	Pregnancy
Y	N	Recent arterial puncture (within 10 days)
Y	N	Advanced age, over 75 years old

ALLERGIES:____________________

HISTORY OF RECEIVING THROMBOLYTIC THERAPY:

Y N UNSURE If yes, drug received:____________________
Date received:____________________

MEDICATIONS→

NTG 0.4 mg S/L stat then q5 min prn chest pain, if systolic BP > 90
Chewable ASA, 160 mg, if not contraindicated
Establish 3 normal saline upper extremity IV's / HL's or one double lumen IV catheter in each upper extremity (no larger than 18 gauge). TKO rate. Draw lab work from angioaccess before thrombolytic agent is given.
O^2 4L / min by nasal cannula.
NTG infusion -- start at 5 mcg/min then double dose every 5 min. Titrate to relief of chest pain.
Max. Dose: 200 mcg/min. Maintain systolic BP:______ Y N
Thrombolytic agent (Page and beep House Supervisor): Y N
(a) **Streptokinase--accelerated** Y N
Premed:
Solucortef 100 mg IV push
Reconstitution:
Slowly add 5 cc NaCl or D5W injection directing the liquid to the side of each of two streptokinase 750,000 unit vials. DO NOT SHAKE. Roll and tilt the vial gently. Slight flocculation is Okay.
Administer 750,000 units IVP over 5 min. Repeat in 30 min.
(b) **TPA - accelerated** Y N
Dilute TPA 100 mg vial with 100 cc of SWFI diluent provided. Swirl gently. DO NOT SHAKE.
Administer TPA: 15 mg (15 ml.) IV push over 1 - 2 min
Then administer ________ mg (0.75 mg/kg) over 30 min. Do not exceed 50 mg.
Then administer ________ mg (0.5 mg/kg) over 60 min. Do not exceed 35 mg.
Total dose equal to or less than 100 mg over 90 minutes.
Heparin 5000 unit IV bolus within first hour of TPA, then begin heparin infusion per CMH protocol. Y N
MgS04 2 g in 100 cc D5W over 15 min. IVPB Y N
Beta blocker:
Metoprolol 5 mg q 5 min. X 3 doses IV, then, in 15 min., 50 mg p.o Y N
Other beta blocker: ____________________ Y N
Morphine Sulfate 3 to 5 mg IV, then 2 mg IV q5 min. prn pain. Y N

TESTS→

Laboratory work to be drawn from angioaccess before administration of thrombolytic therapy:
CBC
CHEM 27
MG
PT, PTT
CPK with isoenzymes
UA
CXR

PHYSICIAN: ______________________________ **NURSE:** ______________________________

F:\WPDATA\NSGA\CASEMAPS\TPA.996

FIGURE 2
Crawford Memorial Hospital thrombolytic therapy case map.

Table 1
Criteria for Thrombolytic Therapy Administration and Inclusion in the Study

Chest pain or chest-pain-equivalent syndrome consistent with acute myocardial infarction > 20 minutes, but ≤6 hours unrelieved with sublingual nitroglycerin
and
Electrocardiographic evidence of acute myocardial infarction
ST segment elevation of
at least 1 mm in at least 2 contiguous limb leads
or
at least 2 mm in at least 2 contiguous precordial leads
or
ST segment depression of at least 2 mm in leads V_1 and V_2
or
New or presumed new left bundle branch block
and
No contraindications as noted on the case map

Scope

The research was conducted from July 1995 until December 1996 at CMH in Van Buren, Arkansas. All patients who presented to the emergency department with an AMI and fit criteria for receipt of thrombolytic agents were entered into the study. Criteria for receipt of thrombolytic agents and entry into the study are listed in Table 1.

Limitations

The groups under study had relatively small sizes (n = 11 and n = 19), and the data were not distributed normally. Therefore, statistical efficiency was less than optimal.

No control group was used. One of the benefits of using a case map is that it familiarizes the nursing and physician staff with the current therapy for AMI patients. Once the staff becomes familiar with the map and protocol, it is thought to improve their memory of the protocol. If a control group of patients with no map was treated by the same nursing staff as patients with a map during the same time frame, increased familiarity with the map and its protocols would bias the staff in favor of performing more quickly than expected in the control group.

Variance monitoring was introduced. The limitation this imposes is that time to lytic therapy administration may have been affected by factors other than the independent variable of use of a case map. One of the benefits of using case maps is that they enhance quality of care delivery by allowing variances from the standard of care to be more easily monitored. Variances from the 30-minute standard for thrombolytic therapy administration were recorded and communicated to the staff. With each variance communication, the staff members involved were queried for performance improvement ideas. Subsequent reductions in time to therapy may have been due somewhat to variance monitoring and performance improvement activities rather than solely due to case map use. The quality improvement effort was an intervening variable that emerged as a function of the independent variable of case map use.

General Procedures

An experimental research field study with no control group was used to gather data. The population of patients under study was divided into a no-case map group that contained 11 patients and a case map group that contained 19 patients. One group contained those patients presenting for care before case map implementation, and the other group contained those patients presenting for care after map implementation. The case map was implemented as policy halfway through the monitoring period, on April 1, 1996.

Door-to-drug times were measured and compared for the two groups of patients receiving thrombolytic therapy. Door-to-drug time is the time interval from the patient's first hospital arrival until the thrombolytic agent is actually administered into the patient's intravenous line.

The instrument used to record door-to-drug times was an Excel for Windows spreadsheet, a product of Microsoft. The statistical analysis was performed

Table 2
Door to Drug Times in Order of Ascending Magnitude

Times With No Map (July 1995–March 1996)	Times With Map (April 1996–December 1996)
15	10
23	12
24	15
26	15
29	18
64	20
80	20
105	22
108	24
111	25
136	25
	30
	32
	32
	32
	45
	55
	55
	61

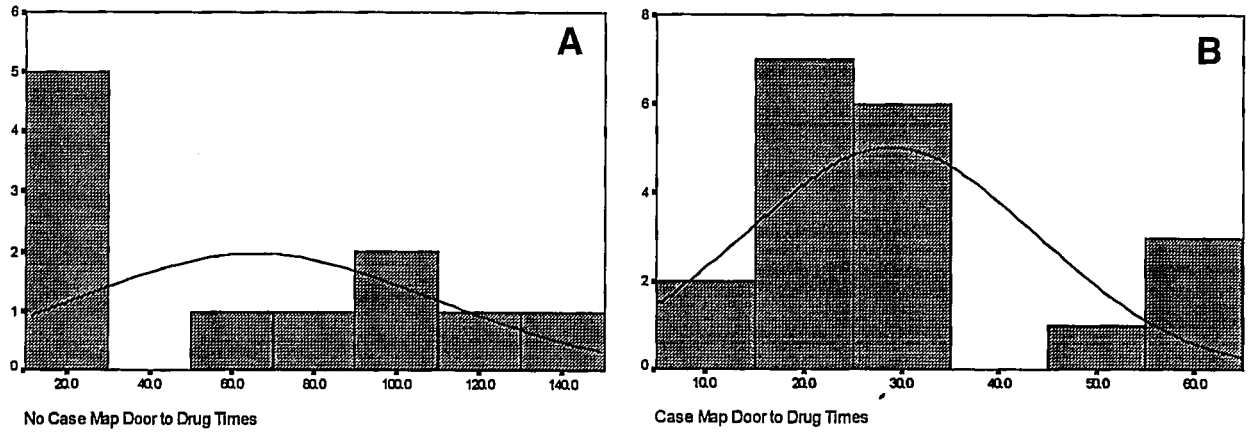


FIGURE 3
A. Histogram with superimposed normal curve of door-to-drug times before case map implementation. SD = 44.26; mean = 65.5; n = 11. **B.** Histogram with superimposed normal curve of door-to-drug times recorded after case map implementation. SD = 15.07; mean = 28.8; n = 19.

with SPSS (Redmond, WA) for Windows (Microsoft, Chicago, IL), Release 6.1.3.

Sampling Methods and Procedures

Data for this study were collected by reviewing the medical record of all CMH patients to whom a thrombolytic drug was administered to treat an AMI. The door-to-drug time interval was calculated and recorded on an Excel spreadsheet. This time interval was calculated by subtracting the time recorded for injection of the drug into the patient's intravenous line from the door time. The door time was the time of the patient's first hospital arrival recorded in writing by the nurse responsible for the initial triage of the patient. This time was recorded in the patient's medical record on the emergency department nurse's notes. Also on this record is the time of other interventions, including administration of the thrombolytic agent. At CMH, a Nurse First program assures that each patient is greeted by a nurse, not a clerk, at the entrance to the emergency department. This ensures accuracy in the triage time, which is also the "door time" or time of first hospital arrival.

Analytical Methods

The Mann-Whitney test, also known as the Wilcoxon test, was used to analyze the data for a statistically significant difference in times between the two groups. This test evaluates two independent unpaired samples for the hypothesis that they come from populations having the same distribution.[15]

Results and Findings

A total of 33 patients received urgent thrombolytic therapy for AMI at CMH between July 1995 and December 1996. Of these 33 patients receiving lytic therapy during the study period, 3 were excluded from the study because they presented in an atypical fashion.

The thrombolytic therapy case map, included as Figure 2, was implemented as emergency department and hospital policy on April 1, 1996. This was the halfway point of the study period. Table 2 is a list of door-to-drug times for the two groups of patients, those presenting before the case map was implemented and those presenting after. Times are listed in order of ascending magnitude.

Door-to-drug times for 11 patients receiving lytic therapy from July 1995 to March 1996, inclusive, were analyzed in the no-case-map group. Times ranged from 15 minutes to 136 minutes for this group. The mean, median, and standard deviations for this group were 65.5, 64, and 44 minutes, respectively. There were no outliers.

Door-to-drug times for 19 patients receiving lytic therapy from April 1996 to December 1996, inclu-

----- Mann-Whitney U - Wilcoxon Rank Sum W Test

TIME by MAP — Door to Drug Time Case Map?

Mean Rank	Sum of Ranks	Cases			
20.14	221.5	11 MAP	=	0	NO MAP
12.82	243.5	19 MAP	=	1	MAP
		30 Total			

U	W	Exact** 2 (One-Tailed P)	Z	2-Tailed P
53.5	243.5	.0264	-2.1978	.0280

FIGURE 4
SPSS for Windows-generated data analysis. **This exact *p* value is not corrected for ties.

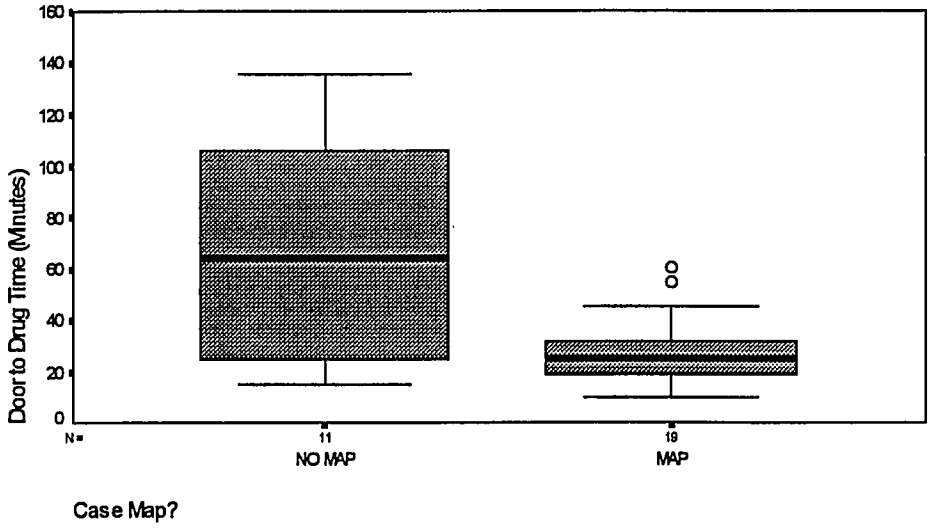


FIGURE 5
Box plot comparison of the range of data, medians, 25th and 75th percentiles, and outliers.

sive, were analyzed in the case-map group. Times ranged from 10 minutes to 61 minutes. The mean, median, and standard deviations for the group were 28.8, 25, 15 minutes, respectively. There were three outliers, two at 55 minutes, and one at 61 minutes. These were included in the data analysis. The SPSS-generated histograms of door-to-drug times without and with the case map are included in Figure 3. Figures 4 through 7 depict numerical and graphical SPSS-generated statistical data.

In view of the statistical significance of the findings, $p = 0.028$, it is concluded that use of the case map had an effect on door-to-drug times for patients receiving thrombolytic therapy. The null hypothesis (H_0) is therefore rejected, and the research hypothesis (H_1) is accepted at a significance level of 2.8%. This difference in times is further illustrated by the reduction in median door to drug time from 64 minutes to 25 minutes. This reduction of lytic therapy administration time to 25 minutes exceeds the goal of 30 minutes set by the National Heart Attack Alert Program Coordinating Committee.[1]

CONCLUSION

This project is one of only a few that have been done that have proven that patient outcomes are improved with the use of a case map. Several factors possibly contributed to the map's effectiveness. First, the sequence of events that occur diagnostically and therapeutically when a patient presents to the emergency department with chest pain represents one of the greatest paradigm changes in the history of modern medicine. It has been difficult to alter the critical thinking pattern of nurses and physicians to support interventions that decrease door-to-drug time. A case map with a written protocol guiding the emergency team assisted the team in altering their approach to these special patients. Second, the sequence of events in these cases is relatively consistent from patient to patient. Third, the details of contraindications, medications administered, and sequences of events in lytic therapy administration are difficult to remember, especially in a small community hospital where the process only occurs two to three times per month. Therefore, it is recommended to management that case maps be used in situations where the following factors are present: (a) therapeutic interventions that represent paradigm shifts, (b) therapeutic interventions that have patient-to-patient consistency in sequence of events, and (c) therapeutic interventions that are complex and infrequently performed.

When management embraces a quality improvement effort, it must pursue this in a systematic manner through a very well defined sequence of events. In this project, a source of questionable quality was identified. This quality deficiency was identified by comparing lytic therapy door-to-drug times with those at other facilities. The times were also compared with a standard set by a panel of nationally recognized experts. A plan of action was then undertaken that was postulated to result in an improvement in quality. This plan included the use of research methods that would withstand scrutiny. Data were collected throughout a time period sufficient to generate a rea-

TIME Door to Drug Time
By MAP 0 NO MAP

Valid cases: 11.0 Missing cases: .0 Percent missing: .0

Mean	65.5455	Std Err	13.3453	Min	15.0000	Skewness	.2764
Median	64.0000	Variance	1959.073	Max	136.0000	S E Skew	.6607
5% Trim	64.4394	Std Dev	44.2614	Range	121.0000	Kurtosis	-1.7001
95% CI for Mean (35.8102, 95.2807)				IQR	84.0000	S E Kurt	1.2794

FIGURE 6
SPSS-generated descriptive statistical analysis of door-to-drug times before implementation of the case map.

TIME Door to Drug Time By MAP 1 MAP							
Valid cases: 19.0 Missing cases: .0 Percent missing: .0							
Mean	28.8421	Std Err	3.4584	Min	10.0000	Skewness	.9677
Median	25.0000	Variance	227.2515	Max	61.0000	S E Skew	.5238
5% Trim	28.1023	Std Dev	15.0749	Range	51.0000	Kurtosis	.0085
95% CI for Mean (21.5763, 36.1080)				IQR	14.0000	S E Kurt	1.0143

FIGURE 7
SPSS-generated descriptive statistical analysis of door-to-drug times after implementation of the case map.

sonable sample size, and these data were analyzed using sound statistical methods. The finding that quality had been significantly improved was made available for interested parties and was presented in a way that did not destroy patient confidentiality. This type of effort must become more than an isolated individual project, it must become a lifestyle.

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