

TelEmergency: Distance Emergency Care in Rural Emergency Departments Using Nurse Practitioners

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J Emerg Nurs 2006;32:388-93.
0099-1767/\$32.00

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doi: 10.1016/j.jen.2006.05.022

Providing quality emergency care in rural hospitals with low patient volumes can be cost prohibitive. Additionally, recruiting and retaining physicians in these rural areas is difficult. Mississippi, a mostly rural state, shares this nationwide problem: There simply are not enough Board Certified Emergency Medicine physicians to serve rural hospitals in the state. As a result, emergency departments have been staffed with physicians and/or nurse practitioners (NPs) who are not trained in emergency medicine, often are temporary employees, and are not invested in the community. Nevertheless, rural hospitals are burdened financially when they attempt to retain these contract providers.

Patients, hospitals, and communities in Mississippi were dissatisfied with this staffing method, its cost, and the level of care provided. A telemedicine system that uses NPs and the emergency department at the University of Mississippi Medical Center (UMMC) has become a viable alternative and has provided effective, appropriate, emergency care to these rural hospitals.

The program presented in this article, TelEmergency, combines specially educated family nurse practitioners (FNPs) via a telemedicine link with the emergency medicine (EM) physicians at UMMC. It provides increased access and improved quality of care to hospital emergency departments across Mississippi. An analysis of the first 2 years of operation shows positive patient outcomes, cost-effectiveness, and user satisfaction.

Pre-implementation

The program began as a grant application to The Bower Foundation in the summer of 2001. Prior to program

implementation, regulatory board approvals and funding had to be obtained. In Mississippi, the State Board of Medical Licensure and the State Board of Nursing jointly promulgate NP practice. The concept of using FNP's to staff rural emergency departments while their collaborating physician was stationed miles away was a deviation from the standard of NP practice in this state. Once funding was obtained, the Medical and Nursing Boards approved the TelEmergency system as a 1-year pilot study. The Bower Foundation provided the initial funding for the purchase and installation of the required telemedicine network equipment in the initial 10 TelEmergency hospitals and for the education of 25 FNP's. Additional funding was provided later by the Mississippi State Department of Health.

Implementation

To begin implementation, potential sites for the TE system were identified by reviewing the rural emergency departments' physician staffing, patient volume, acuity, and need for an alternative for ED coverage. A presentation to the Delta Rural Health Network, comprised of numerous rural hospital administrators, allowed us to acquire our target group. Once these potential hospital sites were identified, the UMMC medical director, the NP director, the information technology administrator, and the business manager made a site visit to each hospital to assess the feasibility of the program at that site. The team assessed patient volume and acuity, current medical staff coverage, and laboratory and radiology resources.

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After nearly a year of performing site demonstrations of the proposed telemedicine system to the hospitals' administrators, physicians, NP's, community leaders, and public officials, UMMC gained support from several hospitals across Mississippi for implementation of this new concept in the provision of emergency medical care. These demonstrations provided information on the telemedicine

TABLE 1
NP requirements for TelEmergency program

1. Master's degree in nursing from an accredited institution (NLN or CCNE)
2. Nationally certified and/or recertified FNP
3. Evidence of current unrestricted license (RN and NP) to practice in the United States and eligibility for licensure in Mississippi
4. One complete year of clinical experience as an NP preferred
5. Documentation of current Advanced Cardiac Life Support, Pediatric Advanced Life Support, and Basic Cardiac Life Support
6. Prefer second certification as acute care NP
7. Must be willing to register for the acute care post-master's program if not dually certified
8. Completion of the Mississippi Nurse's Association Controlled Substance Workshop and obtain DEA certificate prior to staffing hospitals
9. Complete application/requirements to attend the educational program for "Nurse Practitioners in the Emergency Department Setting"
10. Meet privileges and credentialing requirements at the employing rural hospital

technology available, the role and education of the NP, as well as the ongoing quality assurance program that would be implemented.

Once the hospitals were identified, the FNP's who would staff the rural emergency departments had to be selected. From the beginning of this initiative, we knew that the success of this program would depend largely on the FNP's practicing in the system.

To assess the population of FNP's interested in working in this program, an information packet explaining the program and NP requirements was sent to all registered FNP's in Mississippi. FNP's were targeted because the program requires treatment of patients of all ages. (In Mississippi, acute care NP's are not allowed to treat patients who are younger than 12 years of age.) Additional marketing of the program was achieved with the publication of an article in the Mississippi Nurses Association newsletter. This publication detailed the FNP entrance requirements, as well as the unique didactic and clinical training required upon acceptance to the program (Table 1). The response to this publicity was enthusiastic, and interviews were awarded to 65 FNP's from across Mississippi.

In October 2003, 20 of the 23 FNP's completed the 7-month educational program that included an EM lecture series, procedure and cadaver laboratories, written examinations, and a clinical residency. The EM physicians at UMMC conducted this education and supervised the residency. The program allowed FNP's an opportunity to develop their EM skills and to interact with the emergency physicians who soon would be their collaborating physicians. The clinical residency was a minimum of 135 hours in length; however, the number of clinical hours could be increased based on the nurse's experience and skill level. A procedure log was maintained by each FNP to track emergency procedures, such as intubations, during the clinical residency.

As the sole health care provider in the rural emergency department, the FNP evaluates and treats the ED patients either independently or in collaboration with the UMMC TelEmergency physician. The UMMC emergency physicians and NP director for the program collaborated to develop FNP-EM physician protocols to guide the practice of consultation at the remote sites.

To increase public awareness, a press conference, newspaper coverage, a Web site, and lectures were utilized prior to implementation of the program at the first 4 hospitals in October 2003. News of the positive experience of these hospitals quickly spread, and UMMC slowly brought on additional sites. At each site, it took several months prior to implementation to select and educate the FNP's, install the telemedicine network, and complete the contractual agreements.

As anticipated, each site had different staffing needs. Some hospitals planned to cover their emergency department with the TelEmergency system and FNP's at all times, whereas others would use the system only on weekends and holidays. Many of the sites' coverage needs increased as the program proved itself. By March 2004, 7 hospitals were utilizing the TelEmergency system. An additional 2 hospitals were successfully contracted by August 2004.

Additional training programs are coordinated as a new site is contracted or when a current site has additional staffing needs. The FNP's who meet entrance requirements, complete a successful interview, and contract with one of the active TE hospitals are accepted into the training program. (The educational program is only available for FNP's working in the TelEmergency system.) Currently, a new



FIGURE 1
The Teleemergency control center at UMMC allows the emergency medicine physician to speak to patients, FNP's, and nursing staff in rural emergency departments as well as view radiology images, recommend additional tests, assist during a resuscitation or complicated procedure, or review EKG and laboratory results.

class of FNP's is trained each semester, and an estimated 30 hospitals in Mississippi meet criteria for TelEmergency.

In the participating rural emergency department, a camera is located in the patient examination room. A television in the room displays the UMMC EM physician to the patient, NP, and nursing staff. The NP initiates the consult with a simple touch pad located near the camera. The EM physician can interact with the patient and can give verbal orders easily over the system.

The EM physician is stationed at the TelEmergency control center at UMMC and is immediately available when an NP calls. A dedicated physician is assigned to the TelEmergency control room except during the low-volume hours of 2 AM until 10 AM, when 1 of 2 EM physicians in the UMMC emergency department is responsible for TelEmergency consultations. As additional hospitals are added, the physician staffing for the TelEmergency control room will be adjusted.

The control center is located in the emergency department at UMMC (Figure 1). A plasma screen displays the rural emergency departments that are utilizing the

TelEmergency system. The EM physician uses a touch panel to control the cameras at both the control center and in the rural ED examination rooms and to prioritize consult requests from all the rural sites. This queue of pending consults is designed to list the calls in order of the time of consult unless there is a STAT consult, in which case that one is moved to the top of the queue.

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Once a call enters the queue, the EM physician simply touches the name of the site in the queue and a point-to-point call is executed. Once in the call, the EM physician has complete control over the remote camera and can interact with the NP, nursing staff, and patient at the rural emergency department.

During a TelEmergency consult, the physician and patient may speak to each other directly. The EM physician may view radiology images over a separate radiology system, may recommend additional tests, assist during a resuscitation or complicated procedure, or review EKG and laboratory results. The physician and NP collaboratively determine the plan of care for patients treated through the TelEmergency system.

Outcomes

In the first 2 years, 10 hospitals have contracted for TelEmergency services. In addition, TelEmergency is used to provide emergency medical coverage to the Mississippi State Capitol when the State Legislature is in session. Currently 2 other hospitals are pursuing implementation of TelEmergency services. More hospitals are expected to participate if additional grant funding for implementation becomes available.

As of August 2005, 26,483 patients have been treated utilizing the TelEmergency system. Of these patients, 12,221 patients (46%) required consultation with UMMC EM physicians via the telemedicine system. The remaining 14,262 patients (54%) were evaluated and treated independently by the FNP's. Further evaluation of the patient population revealed that 76% of patients were discharged home, 15% of patients were admitted locally, 8% of patients required transfer to another facility for a higher level of care, 0.9% left against medical advice, and the remaining 0.1% of patients had nonpreventable deaths. During this time, all types of patient visits were recorded with the majority categorized as follows: 15% upper respiratory infection, 12% gastrointestinal, 11% musculoskeletal, 7% pulmonary, and 6% general medicine cases. Twenty-five percent of the patient population was 25 years of age or younger. The hospital administrators reported anecdotally that the ED volume and number of admissions were consistent, if not increased, with the ED volume and number of admissions prior to implementation of the system.

Two UMMC emergency physicians reviewed all patient deaths for performance improvement issues. Fifty-three nonpreventable deaths have been reported during this 2-year period. No preventable deaths have been identified since the program's inception. A quarterly FNP educational offering provides an opportunity to discuss any performance improvement issues related to patient care, patient flow, or technology. These sessions also allow for feedback from FNP's about their experience at the user level.

One of the few telemedicine systems in the country to provide real-time emergency care, TelEmergency has provided a cost-effective method for improving access to quality emergency care for patients in rural Mississippi.

Thirty-six FNP's have completed the TelEmergency training program since its inception in the fall of 2003. Of those 36 FNP's, 26 currently are working in the system. Various career and personal reasons have been cited by the FNP's who have resigned from the program. Relocation has

TABLE 2

Patient Satisfaction Questionnaire results (n = 398)

- **93.6%** of patients are comfortable or very comfortable with the care they received through the TelEmergency system
- **98.7%** of patients never had any trouble seeing or hearing the UMMC physician over the TelEmergency system
- **87.3%** of patients believed the care they received through the TelEmergency system was the same as or better than from a physician alone
- **91.2%** of patients are more likely to come back to this ED because of the TelEmergency system
- **85.6%** of patients rated their overall experience with TelEmergency as good or excellent

TABLE 3

Hospital Administrator Satisfaction Survey results (n = 10)

- **100%** believed that the level of care in their ED increased or stayed the same on the TelEmergency shift
- **87.5%** believed that it costs less or about the same to cover their ED with TelEmergency than with a physician
- **85.7%** believed their overall ED volume had increased or stayed the same since TelEmergency was implemented
- **85.7%** believed that their number of hospital admissions from the ED stayed the same or increased
- **87.5%** are not concerned at all about a technical failure with the TelEmergency system
- **87.5%** have an overall good or excellent opinion of TelEmergency

been the primary reason for this FNP attrition. Further evaluation of FNP satisfaction will be essential.

Of the NPs in the program, 7 are dually certified as both a family and adult acute care NP. The average age of the participating NPs is 44.4 years. The average number of years of NP experience is 8.45.

The discharging nurse completed patient satisfaction questionnaires for TelEmergency patients. Overall, the survey results revealed that patients were satisfied with the use of an NP and a telemedicine system for their emergency medical care (Table 2). Results from hospital administrator surveys are listed in Table 3 and reveal satisfaction with the system.

The financial impact of the TelEmergency system on the participating rural hospitals was critical to the success of

TABLE 4

Financial impact analysis criteria

- Billing for NP charts
- Chart documentation
- Coding of ED charts
- Length of stay of patients
- Consultation rates
- Patient transfer rates
- Admission rate
- Patient outcomes
- Staffing costs (NP and other ED staff)
- Payor mix
- Administrative cost/time
- Availability of ED staffing

the program. It was important that it be a cost-effective alternative to staffing the emergency department with physicians. In one site there was a 28% decrease in the health care provider cost by utilizing an FNP instead of a physician. However, other financial gain was realized with the addition of an electronic medical record (Table 4). A medical record coding audit of charts pre-implementation and post-implementation of the electronic charting system revealed an average increase of 54% in the billable charge for the care provided. Anecdotally, the overall financial impact of the program has been positive. However, a more in-depth analysis is needed.

Future implications

One of the few telemedicine systems in the country to provide real-time emergency care, TelEmergency has provided a cost-effective method for improving access to quality emergency care for patients in rural Mississippi. Expansion of the program to additional rural emergency departments is expected and will continue until an operational maximum is reached. Program expansion is not limited to the specialty of emergency medicine; other specialties are being considered at this time.

Education for additional FNPs, as well as ongoing continuing education for FNPs, is required; the content of the education needs to be monitored and tailored to the needs of FNPs in rural emergency departments. The recent approval by the ENA to develop a national standardized

examination for the emergency NP is a critical development in the future educational requirements of FNPs in the TelEmergency program.¹ Future involvement with ENA in developing this national FNP standardized examination will be important to FNPs practicing in the TelEmergency program.

Research on patient outcomes, financial impact, and user satisfaction is essential; however, preliminary data suggest that the TelEmergency program has been a success for Mississippi's rural emergency departments.

REFERENCE

1. Emergency Nurses Association. Emergency Nurses Association 2005 General Assembly Resolution Number 05-04: National Standardized Emergency Nurse Practitioner Examination [online; 2005; retrieved 20 Apr 2006]. Available from: URL: <http://www.ena.org/>