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HEALTH CARE ISSUES IN RURAL AREAS

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1. INTRODUCTION

Healthcare in rural areas is an important topic of study; quality healthcare is a need of all people, both rural and urban. Proper first-response care and the transportation of trauma victims to emergency hospitals are extremely important for the victim's chances of survival. Physician quality and availability, as well as availability of services are also important concerns in rural areas.

Based on health research literature, this paper provides a review of concerns and status of the quality of emergency service personnel; transport issues, such as response time and instances of inappropriate transport; and the quality and availability of trained personnel at the receiving hospital. Current literature concerning issues related to healthcare in rural areas is reviewed below, with an emphasis on rural-urban differences. Topics examined include the types of trauma that are more prevalent in rural areas compared to urban areas and how these types of trauma are handled by emergency service personnel. Specific medical conditions such as myocardial infarctions and strokes also are examined, as well as healthcare issues related to children and adolescents. The review concludes by examining issues related to hospital quality, financial viability, and implementation of new technologies in rural areas. The major goal of this paper is to cover the broad spectrum of healthcare as a rural resource, and note the challenges facing rural areas.

2. TRANSPORTATION OF AND CARE FOR TRAUMA VICTIMS

Providing care to victims of trauma is an important first step in their treatment. Ambulance services must be able to respond to emergencies rapidly, and to this end, it seems logical to state that the farther a responding ambulance is away from a scene, the longer a patient goes without care, and faces longer transport time to the hospital. Furthermore, the professionals staffing the ambulance should have the highest levels of training possible in order to provide the most comprehensive treatment upon arrival at a trauma scene, as this first contact with emergency medical service (EMS) personnel can greatly affect the patient's chance of survival (Corfield *et al.,* 2006). Rural and remote locations provide a formidable challenge to EMS operations due to the physical distance that must be traveled in order to reach the patient (Whitelaw *et al.,* 2006). Properly integrating the retrieval service with the receiving facility is also important, since delivery of pertinent information on the patient's condition also has an effect on survival. This task is more difficult to accomplish in rural areas than in urban areas, as technological advances are less likely to be adopted and implemented by independent rural facilities, including EMS and hospitals alike (Culler *et al.,* 2006). This section will examine

issues concerning emergency transport, as well as some specific conditions with which emergency departments in rural areas must cope.

Compared to urban communities, rural communities have been shown to have disproportionately higher injury and mortality rates for injuries resulting from motor vehicle accidents, occupational accidents, drowning, accidental firearm injuries, residential accidents, and electrocutions, fatality rates in rural areas are more than twice that of urban areas (Peek-Asa *et al.,* 2004). Of these causes of death, motor vehicle crashes in rural areas are the highest, accounting for 61 percent of all traffic fatalities in the United States, while rural miles traveled accounts for only 39 percent of all miles traveled (NHTSA, 2001). Peek-Asa *et al.* (2004) noted that traffic fatality rates in rural counties across the United States are nearly double that of urban counties, with head-on collisions, and collisions with farm machinery being the leading causes of traffic fatalities in rural areas. The authors further observed that rural residents were less likely to wear seat belts, make use of child restraint devices, and more likely to consume alcohol before driving than urban residents; all of which increased the likelihood of dying in a traffic accident.

Peek-Asa *et al.* (2004) reported that rural residents are more likely to be pronounced dead at the scene of the accident than urban residents, due to the remote locations of rural accidents. The reason why most rural residents are pronounced dead is because of the long delays in emergency medical care reaching the victim. Further, the distance that typically must be traveled from the scene to the nearest emergency department greatly increases the chance of death during transport.

Corfield *et al.* (2006) examined the performance of a rural emergency retrieval service after its first year of operation in rural west Scotland. This type of service is carried out by aircraft (helicopter, airplane, and seaplane), and is responsible for caring for and removing injured individuals in areas that are difficult to reach through conventional means (*i.e*., motor vehicle). The five community (rural) hospitals in the area examined are charged with providing potential trauma-related and critical care to 32,700 residents; 40 actual cases were used in their study that covered one calendar year (1 October 2004 to 30 September 2005).

The primary problem with injured individuals in remote locations is that they are often transferred without being stabilized or provided with appropriate intubation to protect the airway. Establishment of a retrieval service in remote rural locations greatly decreased patient scores on several indices related to patient condition upon arrival at a hospital. A decrease of the index value denoted a more stable condition, and consequently, an increased chance of survival (Corfield *et al.,* 2006). This study highlighted the difficulty EMS' face in providing care to remote locations, but concluded that if proper care and transport can be provided, mortality rates for trauma victims in rural and remote locations can be reduced.

As transportation of trauma victims in rural areas is an important contribution to the chance of patient survival, monitoring the extent of use of ambulance services in rural areas is another important factor in improving survival. Patterson *et al.* (2006a) developed the expected annual emergency miles per ambulance (EXAMB) index to provide a uniform measure of EMS infrastructure concerning ambulance use. The index is calculated by multiplying the number of days in a year by the expected number of emergency transports per day multiplied by the expected round-trip mileage, all divided by the total number of ambulances available in the county. Sixteen states responded to the author's survey and results were calculated for each state and stratified by rurality, where rurality was defined using (spell-out) United States Department of Agriculture Rural/Urban Continuum codes (RUCs). Results showed that Mississippi, South Carolina, and Washington, all states exhibiting higher levels of rurality than other states in the study area, showed higher EXAMB values, which indicate that rural areas are likely to have higher EMS usage.

However, the authors provided several important caveats along with their results. First, it is possible for urban areas to show high EXAMB values if the area has very few ambulances, low physician to population ratios, high poverty, and/or high mortality rates. Second, since data reporting across states is not uniform, it is virtually meaningless to use the EXAMB index to compare performance of EMS operations across states; however, it can be used to make intra-state comparisons across counties (Patterson *et al.,* 2006a). Other important limitations of the index included problems tracking usage of EMS units that serve multiple counties, using total number of EMS units as opposed to actual hours those units are available to respond to calls, and using population to normalize the index when in some cases, population of the county may shift with season changes. The authors also noted that EXAMB values "may indicate lower EMS availability, low levels of health care resources, or high population need and demand at the county level" (Patterson *et al.,* 2006a, 108). The authors concluded by stating that the EXAMB, while in need of refinement, may at present be able to identify counties that have health care and/or emergency response capability concerns.

Instances of unnecessary transport via ambulance are a problem for EMS operations, especially in rural areas. Patterson *et al.* (2006b) and Poltavski and Muus (2005) examined such cases; the former in regard to children ages 0 to 17, and the latter in respect to transport of children with moderate to severe head injuries. Patterson *et al.* (2006b) found that rural residents in South Carolina are more likely to request unnecessary transport by ambulance than urban residents, and that 16 percent of all transports were deemed unnecessary. This is due in part to rural residents limited access to health care and emergency services, which Patterson *et al.* (2006b, 533) stated may result in parents and guardians having "a lower threshold for perceiving a child's condition as 'emergent' or 'urgent' than urban residents." Additionally, rural residents are more likely to prefer ambulance transport as opposed to alternative means of transport to hospitals (Patterson *et al.,* 2006b). Similar to the findings of Patterson *et al.* (2006b) study, Poltavski and Muus (2005), in examining cases of moderate to severe head trauma in children, found that higher incidences of inappropriate transport occurred in rural areas as opposed to urban areas, and that adequate care might not always be provided given the greater distances EMS units generally have to travel in order to reach trauma victims.

2.1 TRANSPORT OF CARDIAC PATIENTS

Transportation to a hospital via an EMS, as stated earlier, can increase the chance of patient survival. However, this not always the case. Herlitz *et al.* (2006) noted that victims of acute chest pain in rural areas commonly have large myocardial infarctions (MI) during transport to the hospital than patients in urban areas. The authors offered possible explanations for this. First, victims of acute chest pain in rural areas are generally older residents, who are more likely to visit a general practitioner at the onset of chest pain. This means that by the time an ambulance reaches those residents, their chances of being in an advanced state of MI are greater. The desire to seek out the advice of a general practitioner rather than summon an EMS may be tied to the idea that older residents of rural areas are generally seen as more traditional (Rye, 2006), preferring the country doctor's care to transport via ambulance to an urban area. Second, patients in rural areas are, again, more likely to be older, and have a previous history of angina (chest pain and/or tightness due to insufficient blood flow), diabetes, MI, or some other heart-related condition than residents in urban areas (Herlitz *et al.,* 2006). These two considerations provide additional challenges to EMS operations in rural areas, as the treatment of acute chest pain presents differently in rural areas as opposed to urban areas. As such, rural EMS calls require a modified skill set for emergency medical technicians (EMTs) and paramedics, which may not always be present, thus furthering the chance of sub-standard care in rural areas (Karlson *et al.,* 2002).

Ellerbeck *et al.* (2004) examined the quality and organization of care for acute myocardial infarction (AMI) victims in rural hospitals in Kansas. Their survey was administered to 45 of the 55 critical access hospitals in rural Kansas, as well as 12 of the 20 critical access hospitals in urban areas. Critical access hospitals are operations that are approved to receive reimbursements from Medicare and Medicaid, which reduces the hospital's chance of being forced to close. The results of the study showed that rural emergency departments see very few cases, usually one or two, of AMI each month, making it difficult for administrators to justify spending money on improvement for this type of trauma. Results of the survey showed that 39 percent of rural hospitals have not been able to implement improvement measures due to a lack of specialized physicians on staff. Procedures that are normally performed by certified cardiologists are difficult for untrained personnel to perform, and as a result many AMI victims are transferred to larger urban hospitals once their condition is stabilized.

This is not unique to the study area, as the authors note that of Medicare patients nationwide, 17 percent of AMI admissions in urban hospitals are transfers from rural areas (Ellerbeck *et al.,* 2004). In a similar study of patients diagnosed with acute cardiac ischemia (ACI), which can generally be described as chest pain or angina resulting from the patient suffering from ischemic heart disease, Westfall *et al.* (2006) noted that rural hospitals, which usually lack advanced cardiac services, often transfer such patients to larger urban trauma centers. Additionally, without the benefit of the acute cardiac ischemia time-intensive prediction instrument (ACI-TIPI), many rural emergency departments discharge patients prematurely, and consequently, not properly treated for ACI (Westfall *et al.,* 2006).

2.2 STROKE

Stroke is the third leading cause of death in the United States, killing approximately 160,000 people each year (Okon *et al.,* 2006). Rural hospitals are less likely to have the equipment available to deal with stroke victims, and as such, there are more cases of death resulting from stroke in rural areas as opposed to urban areas. Okon *et al.* (2006) examined rural hospitals in frontier counties in Montana and northern Wyoming, and found that only 39 percent had computed tomography (CT) equipment available 24 hours a day, and slightly less than half (44 percent) had an established emergency department protocol for dealing with stroke victims. These figures stand in contrast to urban hospitals, of which 75 percent reported 24-hour CT availability, and 92 percent reported an established stroke- care protocol. None of the frontier community's rural hospitals in the study area met the established criteria to be considered a primary stroke care center, which again, makes transfer after stabilization the most appropriate course of action for rural hospitals dealing with stroke victims (Okon *et al.,* 2006).

3. EMERGENCY PHYSICIAN AVAILABILITY AND QUALITY

The review provided above highlights the idea that hospitals and EMS services in rural areas in comparison to urban areas are at a disadvantage when it comes to the availability of equipment necessary and properly trained personnel to deal with certain types of trauma. In reviewing the literature concerning emergency department training programs for physicians, and the staffing of emergency departments with qualified physicians, a similar disparity was found. For example, Cheng and Fernandez (2005) examined the prevalence of residency programs for emergency medicine in rural states and discovered that emergency medicine is the least represented program in such states. The author's study area considered the states of Alaska, Idaho, North and South Dakota, Oregon, Kansas, Montana, Nebraska, Nevada, New Mexico, Utah, and Wyoming, which were categorized as rural using 2000 census data. Of the 12 states examined, only two had an emergency medicine residency program. The authors concluded, however, that emergency medicine is a fairly new specialty, and as it grows, so too may the number of residency programs in rural states.

Wadman *et al.* (2005) reported similar findings in the rural states of Nebraska, North and South Dakota, West Virginia, and New Mexico. Their study showed that only 7.5 percent of emergency department physicians had completed a residency program in emergency medicine, and only 12 percent were board certified in emergency medicine, compared to 50 and 33 percent in urban areas respectively. The authors concluded that possible reasons for these discrepancies include a shortage of emergency physicians (EPs) willing to work in rural areas usually due to fewer opportunities for advancement, and a general shortage of adequately trained emergency physicians in the United States as a whole. Rural emergency departments are less likely than urban areas to staff trained EPs (Anonymous, 2006) and projections into the next few decades indicate that EPs will continue to migrate to urban centers to practice, which may further hamper the efforts of rural hospitals to provide quality emergency care (Wadman *et al.,* 2005).

Krug (2005) examined the role of the pediatrician in providing emergency care to children in lieu of a trained EP. According to his study, rural EMS directors are likely to be primary care physicians, with little or no training in pediatrics. This can cause problems in developing proper care protocols, since 37 percent of patient visits to ERs in rural areas are 24 years old or younger (Krug, 2005). Due to different lifestyles led by children in rural areas (*i.e.*, exposure to farm machinery and farm animals, rural road travel, isolated recreation opportunities), the needs of children in emergency situations differ in rural areas as opposed to urban areas. Krug (2005) provided an extensive list of considerations EMS directors need to consider in order to improve the pediatric care in ERs, including improved communication between the ER and the pediatric unit (if one exists in that location), care during transport, appropriate levels of training in pediatric emergency medicine for EMS personnel, appropriate emergency care equipment, levels of pediatric training of responding personnel upon arrival to the hospital, psychological needs of children, and rehabilitation to name just a few. Krug (2005) concluded by stating that pediatricians can and should make themselves available to rural EMS directors in order for their hospital ERs to better address the needs of children who require emergency care.

4. HOSPITAL QUALITY, FINANCIAL VIABILITY, AND TECHNOLOGY

While the quality of emergency care is an important factor in survival for trauma victims, the overall quality of care for recovering patients, and patients with chronic illnesses is just as important. As will be reviewed in this section, the situation concerning hospital quality, financial viability of rural hospitals, the availability of physicians in rural areas, and the application of technological advancements such as IT and telemedicine networks in rural areas are similar to that concerning emergency care. There exists what Ellerbeck *et al.* (2004, 363) referred to as a "quality chasm," or a difference between what should be done, and what is done; this is more pronounced in rural hospitals.

Moscovice *et al.* (2004) developed a conceptual model for measuring the quality of care provided in rural hospitals. The authors defined rural hospital quality as "the degree to which organizational structures and processes increase the likelihood of positive health outcomes for individuals (Moscovice *et al.,* 2004, 384). The authors further stated that a high-quality rural hospital will have procedures in place that maximize the quality of care for the individual patient. The model developed consists of three major components: structure, process, and outcome. Structure refers to the physical facilities, personnel staffing, and organization of the hospital. Process deals with the actual delivery of care to the patient, which can be further divided into technical and social components (*i.e.*, proper delivery of drugs and accurate record-keeping respectively). Finally, outcomes (*i.e.*, mortality, morbidity, post-operative infections) are simply that: the end-results of structure and process.

The model developed by Moscovice *et al.* (2004) incorporated 13 categories across the three components comprised of a total of 68 quality measures. The categories examined included such considerations as medication management, surgical conditions, emergency room mortality rates, admission rates, and length of stay. The expert panel that reviewed the categories concluded that the measurement tool must ultimately be useful for both internal improvement and external benchmarking (comparison between hospitals). As stated, the model developed is a conceptual one, so no real data from actual hospitals were examined. The authors concluded that the development of comprehensive quality measurement tools such as this one are important to the future viability of rural hospitals, given the challenges facing such organizations.

The availability of physicians is another hardship facing rural residents and hospitals in rural areas. Menachemi *et al.* (2005) examined the changes that have taken place concerning access to family physicians in rural Florida. A survey was administered to 1,965 rural physicians in Florida, and the results of the study were taken from the 204 physicians who reported that they spend "the majority of their time practicing family medicine" (Menachemi *et al.,* 2005, 55). Almost 50 percent of the respondents reported a decrease in the number of patient services they provide within the last year. Hospital-based surgical procedures were reduced by 41 percent, office-based surgical procedures by 28 percent, and emergency care procedures by 51 percent. Securing medical liability insurance was an important factor in the respondents decision to reduce services, with 84 percent stating that it had "a lot," or "some" effect on their decision (Menachemi *et al.,* 2005, 56). The study also took into consideration the size of the rural community, and found that there was no statistically significant relationship between the amount of service and/or procedure reduction and size of the community; reductions were uniform across all communities categorized as rural.

Menachemi *et al.* (2005) further examined rural Florida physician's plans concerning the continuation of their practice in their current community. The authors found that 12 percent had plans to leave within two years, while 45 percent reported plans to leave within two to five years. Of the 12 percent planning on vacating their current practice within two years, 39 percent declared the decision was directly related to practice issues. Liability insurance also played an important role, with 74 percent stating that difficulty in obtaining such insurance had either "a lot" or "some" influence on their decision to leave (Menachemi *et al*., 2005, 56). As has been stated previously, access to healthcare in rural areas is already limited. The example of rural Florida raises the question of how rural residents will obtain for themselves and their families access to a general practicing physician. In the absence of such physicians, travel to urban areas for routine medical care and simple procedures will become more commonplace. Almost half of the respondents reported that they were no longer treating new Medicaid patients, who are generally older and/or less affluent. With less access to local physicians this demographic will also have to travel (possibly long distances) to urban areas to receive treatment; a burden that could manifest itself not only health-wise, but financially as well. The loss of revenue for rural hospitals resulting from physicians reducing or eliminating services will likely put further strain on the financial health of such institutions (Menachemi *et al.,* 2005).

Information technology and telemedicine may be able to provide physicians, nurses, and emergency response personnel better opportunities to treat the injured and sick in rural areas. The advent of information management through the application of technology should allow hospitals to better track patient's progress, identify potentially harmful drug interactions, and in general, reduce record-related errors that can lead to further complication of the patient's condition.

Telemedicine is the concept of providing care instructions and diagnoses from a remote location based on medical information and images shared over an internet connection. The use

of the ever-increasing high-speed internet connections is allowing more rural hospitals to properly diagnose and treat patients who may have otherwise been misdiagnosed, or sent home without proper treatment (Lambrecht, 1997; Schafermeyer, 1997). For example, Choi *et al.* (2004) examined the case of the use of an advanced practicing nurse (APN) providing immediate and necessary care to a stroke victim as directed by an emergency physician via a telemedicine network. The authors concluded that with proper training, APNs are well-suited to delivery initial care for stroke victims with assistance supported by a telemedicine network. Furthermore, these networks represent a useful and cost-effective method for rural hospitals to provide an increased level of quality in their care to victims of acute trauma.

Telemedicine networks also have the ability to allow for more complete diagnoses at rural hospitals, which could reduce the number of unnecessary transfers to urban areas (Tachakra *et al.,* 2002). Kumar *et al.* (2006) examined the role of a telemedicine network in Australia that allows patients to present themselves via the internet, and receive a teleconsultation. Results of the study revealed that over the network, consultation time was reduced from two hours and 45 minutes to just 30 minutes. Furthermore, the ability to present for a teleconsultation is thought to be related to the 15 percent drop in emergency room cases dealing with eye injuries.

Implementing up-to-date ITs has been associated with improved patient safety (Culler *et al.,* 2006). According to the Institute of Medicine (2000), medical error accounts for 98,000 deaths annually in American hospitals. Reducing this number is of paramount importance for hospital administrators, staff physicians, nurses, pharmacists, and any other individual involved in the emergency or day-to-day care of a patient (Gaba, 2000). The authors continued on to describe three major roadblocks that may prevent hospitals from embracing new technology. First, purchasing, setting up and activating, as well as maintaining new ITs can be costly, and take away financial resources from other areas such as emergency care and diagnostic equipment. Second, new ITs are often associated with a substantial learning curve, which may take physicians' and nurses' attention away from their healthcare duties. Finally, state and federal regulations make it difficult to link patient information, which is the primary goal of an integrated IT network. Results of the Culler *et al.* (2006) study showed that urban hospitals had a significantly higher number of applications computerized than did rural hospitals. However, rural hospitals that are associated with a larger multi-hospital system had a significantly higher number of advanced IT systems and applications than smaller, independent hospitals. Culler *et al.* (2006) concluded by stating that since accreditation requirements are increasingly requiring hospitals to adopt IT systems, rural hospitals that may be unable to do so are likely to fall further behind, and the risk of closure becomes more realistic. It can be stated with a good deal of certainty that the implementation of new technology in rural hospitals will be a critical element in their struggle to provide the best possible healthcare to rural residents.

5. CONCLUSION

This review has examined healthcare as a resource in rural areas, while highlighting the difference between the quality of such care when compared to urban areas. Timely response to trauma victims has been shown to be an important factor in their chances of survival, and as such, it is important for EMS services in rural areas to work to improve not only their response time, but the quality of care a victim receives at the scene of an accident. Attracting properly trained emergency response and care personnel is another major concern for rural hospitals. Migration of emergency physicians into urban areas is expected to continue in coming years, and in order to compensate, rural EMS directors must take advantage of every opportunity to provide additional training to the staff of rural ERs.

With more and more physicians becoming less willing to practice in rural areas, the availability of quality healthcare in such areas will likely become more difficult to find. This will affect older and less affluent residents the most, as they will take on additional financial burdens of

traveling to urban centers to receive routine treatment. Rural hospitals must be willing to incorporate modern IT solutions into their operations in order to maintain a high level of quality in their care. However, telemedicine is providing rural hospitals with the ability to utilize the expertise of specialists in urban areas when diagnosing and treating patients who otherwise would have had to been transferred to a larger urban hospital. These are just some of the challenges facing rural hospitals. Rural health care is an important resource for rural residents, and as such, it is vital that hospital administrators stay attune to the ever-changing healthcare system in the United States, and attempt to provide the best quality healthcare possible for the rural residents their hospitals serve.

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