

## **Rural Critical Care**

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**Purpose:** To propose a unifying concept called "rural critical care" (RCC) to enable appropriate planning for providing care to critically ill or injured rural patients.

**Rationale:** Rural hospitals staffed primarily by family physicians provide primary emergency health care to the geographic majority of Canada, Australia and the United States. In recent decades there has been improved training for rural physicians and nurses in the care of seriously ill or injured patients, rapidly decreasing cost and complexity of critical care procedures, and greater awareness that patient outcome improves when appropriate care is provided early. We feel that there is a growing need for a unifying definition which considers the total rural context of critical care.

**Proposal:** We define rural critical care (RCC) as the level of care provided in a rural community hospital for seriously ill or injured patients during initial assessment and stabilization, during subsequent interhospital transfer, or during subsequent admission to the local rural hospital. This definition is used to discuss the need for such service in rural communities, staffing, training, equipment, regionalization of health services delivery, and research.

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### *Introduction*

Rural physicians (usually family physicians), nurses and emergency medical technicians provide primary health care to the geographic majority of Canada, Australia and the United States<sup>1</sup>. Physicians and nurses usually are the first hospital staff to encounter rural patients with serious illness and injury. They must accurately distinguish these patients from the large numbers of less critical outpatients, accurately diagnose their problems, and promptly provide appropriate treatment in the local hospital or during interhospital transfer.

There is rapid evolution in rural acute care on several fronts: our growing understanding of the rural context of emergency medicine<sup>2-5</sup>, improved training for rural nurses and physicians<sup>4,6</sup>, the decreasing cost and improving ease of use of critical care drugs and equipment previously restricted to urban tertiary care hospital settings<sup>7</sup>, the fiscal downsizing going on in health care<sup>1</sup>, and the dramatic health service delivery changes emerging from health care reform<sup>1,8,9</sup>. As a result of these forces, some small rural hospitals are becoming capable of managing increasingly complex patients in their home communities, while critical care delivery in other communities could deteriorate<sup>4,10,11</sup>. Seriously ill and injured patients have a better chance of surviving intact if they receive optimum care early, whether they are transferred to an urban centre for further management or not<sup>12</sup>.

A variety of different advanced life support (ALS) courses and other education programs teach partially redundant aspects of the management of critical patients to rural providers, often without special consideration of the rural context in which they work<sup>6,13,14</sup>. In this paper we suggest the unifying term "rural critical care" (RCC), and demonstrate the value of this concept for preparing to manage critically ill and injured persons in rural communities.

### *Definition of Rural Critical Care (RCC)*

We propose that RCC is: "*the level of care provided in a rural community hospital for seriously ill or injured patients during initial assessment and stabilization, during*

*subsequent admission to the local rural hospital, or during subsequent interhospital transfer".*

### ***The Rural Context of Critical Care***

The "rural context" is a complex, fuzzy, important set of issues that impact all aspects of health care delivery in rural communities<sup>3,5</sup>. Table 1 shows key aspects of the rural hospital context of RCC. RCC is not simply tertiary care transplanted into a rural hospital, nor is it simply an extension of ALS thinking. RCC requires appropriate staff training, equipment, drug formulary and procedures to allow rural nurses and physicians to manage seriously ill or injured patients in a rural community. RCC allows rural providers to be fully in control of the patients' problems using resources suited to the rural context.

The RCC concept seems to take the advanced life support (ALS) one step further. In ALS courses providers are taught to stabilize patients and to definitively treat immediate life-threatening problems. The ALS course curricula usually do not, however, teach providers to provide care past initial stabilization and into subsequent admission or interhospital transfer, both key facets in the rural context of critical care.

To deliver RCC, rural nurses and physicians must possess a clearly definable subset of the skills and knowledge which in total is unique to the rural context. RCC is not intended to replace urban-based care when that care is necessary. The patient must be transferred without delay when definitive treatment is not available in the rural community. RCC can be used to optimize the patient's condition on arrival at the receiving hospital. Speedy assessment and preparation for transport is a key aspect of the rural context of RCC. On the other hand, advances in training and technology now allow rural physicians and nurses to use RCC to care for more patients in their home hospitals, possibly reducing overall costs and improving the patient's experience by allowing friends and family to visit. These RCC context issues require further research.

### ***Community Need for RCC***

The growing literature on rural hospital emergency outpatient care allowed us to construct Figure 1 as a basis for discussing the need for RCC in rural communities. These estimates appear to be the first published synthesis of data showing the wide-area role of rural hospitals in critical outpatient care. We combined evidence from a variety of studies in Canadian, Australian and American settings to estimate the number and acuity of unscheduled emergency outpatients managed in rural hospitals in the Province of Alberta, Canada<sup>1,2,10,11,16,19-26</sup>.

If the estimates in Figure 1 are precise, then 20 critical patients were managed at the 104\* rural hospitals in Alberta every day, and 10 of those were definitively treated each day in rural hospitals without transfer to an urban centre. The numbers also show that rural hospitals transfer on average fewer patients than some observers might have imagined. Up to 50% of critical patients were kept in small rural hospitals in Canada and

Australia<sup>10,11</sup>. In a survey of rural Alberta hospitals, half kept uncomplicated acute myocardial infarction patients after thrombolysis<sup>27</sup>. Such patients often require more intensive monitoring during the initial stages of their illness than is available through ALS procedures alone. As acute care facilities in urban centres shrink, the need for improved ability to keep rural patients in their home hospitals is rising.

More research needs to be done to validate Figure 1 because the definitions for urgency were so variable between studies, because the utilization of so few rural hospitals have been studied in sufficient detail, and because the starting estimate of 750,000 emergency visits per year, although it was determined by province-wide accounting in 1992-93, probably was affected by variable reporting practices in some rural hospitals<sup>1</sup>.

There is some preliminary outcome data showing that properly supported rural physicians can make a significant difference in emergency patient outcome, even in transferred patients<sup>22</sup>. We believe that rural hospital staff equipped for RCC not only should be able to care for all serious patients more effectively, but also should be able to triage undifferentiated emergency outpatients more accurately because the rural ED staff who use RCC might better understand the pathophysiology of emergency disorders.

Much of the literature related to RCC has focused on trauma. Trauma surgeons have convincingly shown that, while early transfer is critical for some traumatic disorders, advanced trauma life support (ATLS) procedures alone can make a major difference in outcome for trauma victims in rural settings<sup>12</sup>. Furthermore, the great majority of trauma rural ED trauma patients do not require transfer to an urban trauma centre<sup>10</sup>. Rural providers properly supported with RCC should be able to better distinguish patients who need expensive transfers.

Rural hospitals must have RCC capability for all types of problems, both medical and trauma. Trauma accounts for only one third of rural hospital emergencies in all three countries, whereas a wide variety of non-traumatic emergencies are twice as common<sup>10,11,19,16,21,22,28</sup>.

### *Equipping Rural Hospitals for RCC*

Table 2 shows our recommendations for the equipment needed to provide RCC in a rural hospital, and Table 3 shows the laboratory processing that we feel should be available on site. Specialized trays should be maintained for procedures so that staff do not have to search for the right equipment. A detailed discussion of the formulary and equipment needed for emergency cardiovascular medicine in rural hospitals is available elsewhere<sup>7</sup>.

RCC equipment must be easy to use because rural nurses and physicians are generalists who cover all areas of health care in their rural communities. The cost, ease of use and reliability of appropriate devices is rapidly improving, making them much

more suitable for use in rural hospitals. The learning curve for each procedure must be shallow and short. The devices should be portable so that they can be used anywhere in the hospital and during interhospital transfers. RCC equipment must be inexpensive. Bedside laboratory tests that previously required specialized technicians are now available in portable machines or dipstick systems suitable for use by nurses and physicians. Examples include glucose level, urinalysis, serum electrolytes, blood urea nitrogen and blood gas analysis. We find that the devices shown in Table 2 greatly increase our confidence in managing seriously ill or injured patients in our rural hospitals, and we believe they can reduce the system cost of health service delivery. More research is needed to determine their true value and effectiveness in this setting, however.

Geography is the prime determinant of the rural context. Communication systems therefore are fundamentally important. All rural hospitals delivering RCC should be equipped to communicate with air and ground ambulances (radio and telephone), and with remote specialists (telephone and fax). Soon new technologies will be widely available to assist RCC providers, including digital transmission of radiographs and video teleconferencing.

### *Staffing and Training Issues*

Most providers in both professions still have to learn their trade on the job because nursing schools, medical schools and residency training programs in Canada and Australia have tended not to provide focused pre-licensure training for rural practice<sup>4,13,29</sup>. For example, RCC skills and knowledge are taught in a basic form to all family medicine residents in Canada as they rotate through urban tertiary care emergency rooms and intensive care units, but they are not taught to deliver that care in the rural context. Some rural physicians enter practice with advanced training in surgery, anesthesia, emergency medicine and internal medicine, but there are few programs for nurses or physicians that teach these skills in the rural context either<sup>4,5,8,30</sup>.

Rural nurses, rural physicians and urban training centres have increasingly recognized the need for post-graduate continuing education to cope with the realities of rural acute care<sup>4,5,9-11,14,29,31,32</sup>. For decades there has been a growing availability of post-graduate continuing education programs offered by urban centres for rural providers, ranging from traditional ALS courses to an increasing number of specialized programs. The great majority of rural physicians recognize the need for critical care continuing education: 97% of the 48% of rural physicians working in rural hospitals in Alberta who responded to a survey had taken at least one ALS course<sup>5</sup>. These courses usually do not consider the rural context of emergency medicine<sup>13,14</sup>. Further work and cooperation between a variety of agencies is needed to bring these disparate initiatives together as a single, effective critical care training program for rural practice<sup>4</sup>.

## *Regionalization*

Regionalization appears to be the rationalization of health care resources across multiple adjacent communities to ensure fiscally efficient, humane, and clinically sound patient care. Regions often contain a number of rural communities and at least one urban centre, potentially creating competition for limited resources between urban and rural hospitals. Table 4 shows some of the regionalization issues that impact RCC in Canada, Australia and the United States. The process of regionalization is only beginning in most Canadian jurisdictions, where it seems to be guided primarily by fiscal concerns. While it will take many years to sort out the conflicting issues to ensure that prompt, effective, fiscally efficient RCC can be delivered in rural regions, significant advances are being made<sup>4,9</sup>. There is a pressing need for more clinically focused research into RCC to guide regionalization decisions appropriately<sup>1,11</sup>.

## *Barriers to RCC*

Some of the barriers to RCC have been discovered by research into rural thrombolytic therapy. Thrombolysis was adopted immediately in some rural hospitals, but still is not offered in many, even though immediate thrombolysis has been established as standard of care for acute myocardial infarction. Thrombolysis is not used as much as it should for a number of reasons that vary from community to community<sup>27,33</sup>. These include inadequate nursing resources, resistance to change by either nurses or physicians, fear of complications, tiny facilities with extremely low rates of encountering critical patients, and lack of time to learn a new procedure.

We suspect that RCC might be resisted by health system managers who inappropriately fear the cost, and by urban centres who might argue that rural hospitals simply should not manage seriously ill or injured patients. Such resistance might be due to a lack of understanding about the services already being provided by rural physicians and nurses, and misconceptions about the cost of supporting rural hospitals<sup>4,10,11,19,15</sup>. More clinically focused research into rural RCC is needed to balance fiscal decisions<sup>1,4,9</sup>.

## *Conclusions*

The RCC concept appears to be a useful way to conceptualize the training, staffing, inventory, regional organization and research needed to care for seriously ill or injured people in rural communities. RCC already exists in some rural hospitals in Canada, Australia and the United States. More research is needed to determine which rural hospitals should be equipped for RCC, and which devices and drugs are most appropriate. A consensus should be sought on RCC staffing, equipping and training issues. Educators can use the RCC concept to design appropriate training for rural nurses and physicians. Planners guiding the regionalization and health care reform process should consider prompt patient access to RCC in rural communities.

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