



Operational framework for rural hospitals during a pandemic

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ABSTRACT

It is now evident that a second wave of the COVID-19 pandemic has developed. The unfortunate reality is that those in rural areas may be impacted the hardest. Ethical decision making may look the same for rural areas as urban areas, but this is far from accurate. This practice article is focused on why the challenges are different and how rural hospitals might manage their unique circumstances and constraints. A step-wise decision-making framework is also proposed.

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Introduction

During the COVID-19 crisis, hospitals and health care providers have been desperately trying to ‘flatten the curve’. Throughout the world, however, there are valid fears that subsequent waves of the pandemic will continue to occur [1]. Many countries that were already struggling to balance competing needs of costs, quality, sustainability, comprehensiveness, and continuity of care in their health care systems [2], may consequently be stretched even further [3].

For urban areas, the COVID-19 crisis can be addressed by applying evidence-based frameworks, such as proposed by The Hastings Center [4], White and Lo [5], the American College of Chest Physicians [6], and the Canadian Anesthesiologists’ Society [7]. However, while the dilemmas may look the same for rural areas, the context for decision making is not. Thus, metrocentric frameworks such as these may not be very helpful in rural settings that are resource poor [8] or resource constrained [6]. Further, the hallmark of a rural community is that everyone seems to know everyone [9]. Therefore, ethical decisions in rural health care are rarely abstract; they are concrete decisions that often affect friends, neighbours, and colleagues [9]. Thus we propose a decision making framework and team approach to maximize the potential to maintain provider-patient relationships during care in austere and unprecedented times [10].

Rural context: people and communities

Rural communities in the USA and Canada are characterized by older and poorer residents who

report more pre-existing comorbidities, riskier health behaviors, poorer health status and health outcomes, and significant barriers to accessing health care [11,12,13]. As a whole, rural communities report more chronic health conditions such as diabetes, end-stage renal disease, high blood pressure, high cholesterol, COPD, mental illness, and cancer, when compared to their urban counterparts [12]. Rural communities, which represent about 20% of the American population (approximately 60 million people) and 18% of the Canadian population (approximately 6.7 million people), rely on health care services that are often understaffed, underfunded, and have limited critical care capabilities [11,12,14,15]. With recent and widespread rural hospital closures, many rural residents are facing long travel times, which often cause delays in seeking medical assistance [12,16]. There is an urgent need to address the wide discrepancies between urban and rural hospital policies on conventional, contingency, and crisis management, as rural communities are inherently more vulnerable and may have unique sequelae from pandemic decision making due to the demographics of their population.

Rural context: Hospitals and health care

Challenges for rural health care delivery are more complicated than simply low population density, geography, and accessibility issues [17]. Research indicates that rural areas face different structural challenges (e.g. health system abilities; organizational capacities) [8]. These challenges can make managing critical patients, tracking strategic reserves of supplies (e.g. tests, medications, PPE), and defining specific

Table 1. Rural Critical Response (RCR) Implementation Strategies

Core Activity	Implementation Strategies
<p>Communicate institutional protocols that are responsive to the immediate and short-term future needs of the hospital and the community.</p>	<p>a) Adjust policies and practices in the context of the stage of the pandemic and local community circumstances (e.g. number of confirmed/suspect cases).</p> <p>b) Design plans to cohort patients, dedicate isolated units, and to safely designate use of medical equipment to decrease the risk of contamination, viral exposure, and unnecessary PPE usage when possible.</p> <p>c) Develop a tiered staffing model in the event of an excessive patient load (surge), which places the most valuably trained individuals with oversight of other skilled providers [24]. For example, staff with critical care training may be scarce in rural areas, which becomes problematic during the inevitable surge of critically ill patients during a pandemic. A tiered model could place one intensivist overseeing available non-critical care trained physicians. These physicians could then each oversee available advanced practice providers. Similarly, one nurse trained in critical/intensive care could oversee other available nurses who do not have specific training. If tele-health capabilities are available, providers such as critical care physicians or other specialists could be sourced remotely from other institutions [25].</p> <p>d) All surgeries that can be delayed should be in Levels 1 & 2 of the crisis response. [26]</p>
<p>Collate with a simple system to inventory and track important resources, potentiate surpluses, and understand trigger points within an organization and across collaborating institutions.</p>	<p>a) Identify where potential surpluses may exist and specific processes to reallocate them if needed.</p> <p>b) Establish trigger points (e.g. nature, duration, and severity of scarcity) to indicate when to conserve and when to allocate specific resources.</p> <p>c) Seek out other sources of scarce resources in the community for procurement, such as auto-body shops, construction businesses, and post-secondary institutions who may be able to provide/donate additional protective gear.</p>
<p>Collaborate with other rural health care institutions and larger tertiary facilities to explore all sources of support and previously established protocols.</p>	<p>a) Identify where/when remote interventions could be utilized (e.g. for e-consultation with specialty services that may not be available on-site, such as telemedicine) and explore the available infrastructure needed to implement this type of communication, if not already in place. [17]</p> <p>b) Identify existing evidence-based practice/management algorithms or other policies/practices already in place at the various locales to avoid duplication of work.</p> <p>c) In rural hospitals, formally trained health care ethics professionals may not be readily available on-site as full-time employees [11, 27]. Previously existing clinical ethics committees within hospitals can directly advise clinicians concerning difficult ethical decisions in complex patient care situations and also proactively help to develop additional evidence-based policies for the institution or regional hospital system. Librarians can be a valuable resource to gather evidence-based information to inform ethical decision making [28].</p>
<p>Explore creative and collaborative measures that may need to be used to further prepare and respond to subsequent waves or surges.</p>	<p>a) Health care staff can be trained and reassigned to atypical tasks.</p> <p>b) Identify members of the community whose skills could be integrated for use in the hospital setting such as paramedics, firefighters, dentists, veterinarians, health care professions students, and/or retired healthcare workers. Lay volunteers and/or students in health and social service workers programs may be needed to provide basic care or tasks.</p> <p>c) External health care staff (or even the military) may need to be brought in to assist in a crisis.</p>

pathways for care quite different for rural hospitals. This means that they cannot always turn to the best practice literature and find solutions that resonate with their circumstances. Further, rural areas also have geographical challenges (e.g. transport to a larger center being hours away, even by plane) that may be further impacted by extreme weather conditions (e.g. winter storms, ice roads) [17]. Such conditions can impact the safe and timely transportation of patients to tertiary care centres. Finally, reliable internet and even phone connections cannot always be assumed. Therefore, even communication to and with the community may be difficult.

Operational framework

This *practice article* commentary is an attempt to provide contextualized guidance for hospitals in rural areas with suggestions for navigation of day-to-day operations and decision making. As the pandemic continues to affect rural portions of the USA and Canada, community specific operational plans and processes will be required to contend with the clinical challenges and strains on hospital senior leadership teams and the communities they serve. One of the biggest difficulties encountered will be a lack of resources, both in equipment and personnel [11]. Therefore plans to address operational decision making in

rural hospitals is needed. The other conundrum will be determining who will be charged with the responsibility of deciding how to assemble an efficient, coherent, and ongoing response. Indeed, evidence in the literature can be found to corroborate the fact that confusion over command and control is one of the known areas of failure during previous emergency medical responses to major incidents [18]. We therefore suggest that a team effort would be most appropriate.

Crisis levels in a rural context

During the pandemic, crisis levels have been identified using various staged approaches. For example, in Ontario, Canada, a framework for identifying the COVID status in communities includes: green (standard measures in place); yellow (protect, strengthened measures in place); orange (restrict, intermediate measures in place), red (control, stringent measures in place), and grey (lockdown, maximum measures in place) [19]. These levels should not be applied with broad strokes across entire provinces, states, or regions because context matters in a pandemic. Decisions to protect entire communities also places restrictions on individual's needs to work, see their family members, and access necessary goods and services.

However, having commonly understood crisis levels can provide the language to communicate risk quickly and to be responsive (rather than reactive) to the local pandemic circumstances. We suggest a simple three level approach for rural hospitals. The first level (or phase) has been reached when less than 2% of the community is COVID-19 positive; the second level occurs when over 2% of the populations has tested positive; and the third level (or final phase) is reached after 10% of the community is infected [20]. Consideration should also be given to EMS capabilities, as many rural EMS organizations felt that events with 10 or fewer victims would overload them [21]. The above parameters can obviously be adjusted accordingly based on available emergency services.

Corresponding strategies in a rural context

Operational strategies mainly involve decisions about staff, space, and stuff [4]. Staff includes health care providers and auxiliary staff, the need for external supports, retraining staff to do atypical task, as well as lay volunteers that may be needed in crisis to provide basic care [4]. Space includes beds, planned discharges, use of designated areas, policies limiting organizational traffic and visitation, and strategies to move and cohort patients [4]. Stuff includes critical resources and emergency stockpiles of items such as

medications, PPE, procedures to sanitize and reuse supplies, and triage protocols [4]. Researchers from China, note that hospitals must consider demands (such as staff, space, and supplies) as well as anticipate difficulties and propose solutions [22]. For example Qiu and colleagues [22] suggest that hospitals must anticipate the heavy workloads of a pandemic for their staff and consider proactive measures against burnout (e.g. no shift longer than 6–8 h), set up psychological supports for health care workers, and explore options for a reserve medical rescue team to staff the facility.

The first and most important strategy for each and every level of crisis is communication, which has also been shown to be a weak spot during emergency medical responses to major incidents [18]. Communication with hospital staff, patients, families, collaborators, and the community needs to be timely, accessible, and present critical information simply. At **Level One**, the corresponding strategies involve assessment of the resources at hand and planning for means of maximizing essential care delivery. Daily metrics for emergency stockpiles of 'stuff' - personal protective equipment (PPE), bed capacity, and on-hand critical care equipment (e.g. ventilators) - are important indicators to track. Hospital capacity for space can be maximized by timely patient discharges, decanting areas for future cohorting of positive patients, and limiting visitors and movement within the organization. Staffing at this level is considered to be adequate, although in rural settings it may routinely run short as a rule. At **Level Two**, the corresponding strategies involve mitigating risk and maximizing safety. Designated space is now utilized to fully cohort positive and patients and those who are suspected and symptomatic. A no visitor policy may be put in place, with the exception of end-of-life visitation. Staff and staff are still adequate but are at risk for depletion and should be maximized for high needs areas. Hospitals may consider suspending elective surgeries due to limited capacity and protecting scarce resource (PPE and blood). At **Level Three**, the corresponding strategies involve a complete focus on surge operations. Staff and space may be insufficient or at risk to properly maintain the patient load. Staff should be limited on-site with all non-essential staff working remotely and no visitors (perhaps rare exceptions). Active sourcing of essential 'stuff' and 'staff' may need to occur from collaborating partnerships and/or urban centres.

Rural critical response committee

For transparency's sake, no individual health care provider or senior leader should make independent decisions regarding allocation of scarce resources (e.g. personal protective equipment [PPE], ventilators, advanced oxygen devices such as high flow oxygen,

medications, dialysis machines, and blood products) [4,5]. One recommendation is that rural hospitals set up an ad-hoc Rural Critical Response (RCR) committee, whose aim is to manage critical resource demands [20]. Although local expertise may be at a premium, guidance and representation should be sought from a variety of health care experts and leaders in the community including critical care providers, hospitalists, palliative care specialists, community members, librarians, public health officials, infectious disease/infection control specialists, laboratory/diagnostics services, nurses, respiratory therapists, allied health, materials and supply chain management, legal services, ethicists, emergency medical services (EMS), police, and community government officials. Ideally this committee would include multidisciplinary representation as well as possibly a patient/family advisor. Further support may be garnered from partnerships with other rural or tertiary-care hospitals and/or other external resources (e.g. academic institutions). The ideal is to coordinate a truly regional rural response among collaborating health care institution with fluid sharing of resources and personnel, both physically and remotely/electronically, as dictated by shifts in patient surges and rural hospitals' institutional capacity to respond. Unfortunately, the actual process of regionalization of a rural response is in its infancy as noted by a tabletop exercise of a pandemic avian influenza scenario conducted with seventeen rural hospitals in Texas [23]. This highlights the need to begin the organization of this process immediately as preferably it should be in place before the local advent of the pandemic.

Ideally, all committee members would have an equal vote, with the majority vote prevailing. The RCR committee should implement and widely communicate outcomes for four key steps (see Figure 1).

Further considerations

In terms of the ethics of rationing, various allocation theories exist in the literature, such as first-come-first-serve; a lottery system; prognosis for short-term survival; prognosis of long-term survival; life-cycle (age); and, value to others in a pandemic. One of the most common paradigms for the allocation of resources and treatment restriction decisions is based primarily on the greatest likelihood for medical benefit as determined by expected incremental increases in short-term and long-term survival. These choices should be based on scientific evidence, be consistent with ethical guidelines (e.g. compassion, beneficence, justice, respect), and should go beyond the minimum legal and governing standards. The RCR committee could play a vital role in determining which of these allocation strategies is most appropriate for their facility, community, region, and system. Once a strategy is determined, this would also help relieve the severe pressure placed on individual providers, who may encounter a high level of stress when asked to make critical life and death decisions in isolation. This may also alleviate the potential for future legal ramifications as scarce resources are rationed [29].

Research indicates that those who have died (so far) from COVID-19 were predominantly patients with other co-morbidities prior to contracting the virus [29]. These known indicators may guide the RCR committee in making decisions for patients as individuals and on a population-level, focusing on potential for quality of life, co-morbidity indicators, and scarce resource consumption. The committee's decisions can also help determine whether the focus will be on saving those with the most likelihood of survival to discharge from the hospital and to live longest in the community, or on saving the largest number of patients per se (i.e. utilitarian principle).

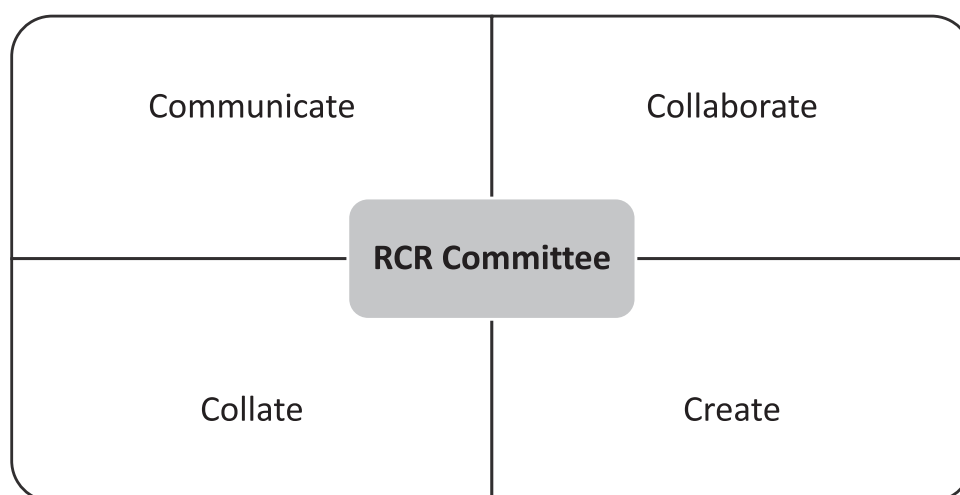


Figure 1. Rural Critical Response (RCR) Committee's Core Activities

It is recommended that the RCR committee remain in place post-pandemic as an ongoing source of organizational support to guide recovery efforts. Lastly, in a rural setting it may be the same individuals whose expertise is required in a number of different areas during a crisis. Thus the work structure and processes of these committees should be as streamlined as possible to reduce the risk for burnout and exhaustion. The strength of previously established and longstanding hospital and community relationships in rural health care systems can be drawn upon to collaboratively face the challenges, anticipated and unknown, during a pandemic.

Discussion

In rural hospitals across the USA and Canada, opportunities to uphold health care delivery (e.g. routine and emergent care) continue to be possible despite the multitude of unique constraints related to a pandemic. We suggest that lessons learned by rural hospitals during the first wave of the COVID-19 pandemic, be applied to committee-based decision making and policy changes to adeptly adapt to the needs of a subsequent waves. The decision making framework (see [Appendix A](#)) of the RCR committee seeks to utilize the existing capacity and leverage organizational and individual strengths. With three levels of crisis, we suggested measures, with evidence-based rationale, to implement responsive patient care and responsible decision making strategies.

Conclusion

Globally, health care systems, hospitals, and health care providers are charged with making ethically defensible decisions under unprecedented circumstances during the COVID-19 pandemic. These challenges are further exacerbated by the everyday realities of rural environments where financial, resource, and staffing issues were already impacting basic care delivery. However, strategic and collective approaches in rural areas may hold potential to maximize efforts and outcomes.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Appendix A

Crisis levels & corresponding strategies

Crisis Levels	LEVEL 1	LEVEL 2	LEVEL 3
	Early in crisis/ at risk <2% positive cases in community, reducing patient volume.	Mitigating high risk >2% to <10% positive cases in community, increasing patient volume.	Surge >10% positive cases in community, high patient volume.
Communicate Collate Operational Strategies	<ul style="list-style-type: none"> Essential 'early crisis' operations. Staffing is adequate to reduced capacity. Stuff- assess supplies/ equipment and track metrics daily. Maximize potential for 'space.' 	Collaborate Create <ul style="list-style-type: none"> Essential 'at risk' operations. Staffing and scheduling are based on high needs areas. Stuff- still adequate but at risk for depletion. Designated space(s) in use to cohort positive patients and maximize safety. 	<ul style="list-style-type: none"> Essential 'surge' operations. Stuff/Staff insufficient or at risk to maintain current patient load. Staff to receive training for expanded scope of practice and atypical tasks. Space-identified 'hot zones' within organization where positive patients are cohorted; emergency procedures only.