

## COMMENTARY

# Regional disaster planning for neonatology

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A recent article in the journal<sup>1</sup> pointed out a significant problem for neonatology: when patients of different ages, but similar prognoses, were triaged, neonates fared significantly worse than older children and adults. The neonatal patients fared less well than all age groups except 80-year-old patients. Existing neonatal scoring systems designed for research or outcomes prediction do not work well when applied after the first hours of life.<sup>2,3</sup> This does not bode well for our patients if Hospital Incident Command Systems are left to triage their care.

The Joint Commission<sup>4</sup> defines a disaster as ‘... a type of emergency that, due to its complexity, scope, or duration, threatens the organization’s capabilities and requires *outside assistance* (emphasis added) to sustain [patient] care, safety, or security functions.’ This definition of disaster implies the need for regional cooperation and assistance. In the aftermath of recent disasters (for example 11 September 2001; Hurricanes Katrina/Rita 2005; Texas floods 2007; Earthquakes in Szechuan 2008, Haiti and Chile 2010) and near disasters (Severe Acute Respiratory Syndrome 2003; H1N1 2009), it should be clear that there are opportunities for significant improvement in our capabilities to respond as a region to a disaster. Though hospitals and Newborn Intensive Care Units (NICU) may have developed specific protocols for responding to an internal emergency, few, if any, hospitals or NICUs have plans to respond collaboratively as a region to a widespread disaster affecting multiple healthcare facilities.

Unlike our colleagues working in either the Emergency Department or Adult Intensive Care Units, we would not likely be confronted with an influx of patients from mass casualty events; it is hard to imagine an event causing a large number of injured neonates. Though influenza, including H1N1, can be severe for pregnant women,<sup>5–7</sup> pandemics have not been documented to cause sudden, marked increases in premature deliveries.<sup>8–10</sup> Neonatology needs to prepare for more likely disasters that

would have significant impact on NICUs. These can be divided into three broad scenarios:

1. The acute need to transfer large numbers of neonates from hospitals forced to evacuate to the nearest, largely full, but still functioning, NICUs;
2. A marked increase in patient/provider ratio in the event of pandemic flu, bio-terror, and so on, impacting on NICU staff; or
3. Increased patient load from obstetrical patients diverted from closed or inaccessible delivery sites to remaining already largely full centers.

Planning for regional cooperation during a likely future disaster necessitates a shift in perspective from traditional triage systems, which seek to maximize resources and patient survival at a single institution or locale, toward a resource-based triage plan that would facilitate communication, transportation, and resource allocation between NICUs throughout a region, or ‘Fourth Order’ triage.<sup>11</sup> The Working Group on Emergency Mass Critical Care of the Society of Critical Care Medicine<sup>12</sup> looking at preparations for adult patients ‘recognizes that formal or informal regional coordination of hospital response efforts ... is not yet sufficiently advanced for meaningful functionality...’ Furthermore, they stated that ‘Hospitals in such a crisis would need to have the agility and autonomy to make a shift to emergency critical care practices on an institutional level, but it would be far more effective, clear, and fair if all hospitals in a city or region affected by such a crisis made the switch to emergency critical care practices at the same time. Criteria for declaring a critical care crisis as well as the nature of the changes in care standards ideally would be publicly discussed and transparent to hospital staff and the community before implementation...’ As for triage, they stated that ‘An ideal triage system is based on data collected at hospital admission, requires little or no laboratory testing, and has been proven to predict hospital survival ... however, such a scoring system does not currently exist,’ and recommend ‘such protocols should be developed on a regional basis...’ The Task Force for Mass Critical Care Summit, commenting on planning for Emergency Mass Critical Care (EMCC), recommended that ‘Every hospital with an ICU should plan and prepare to provide EMCC and should do so in coordination with regional hospital planning efforts.’<sup>13</sup>

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In their analysis of triage during Katrina, Klein *et al.*<sup>14</sup> stated that this ‘experience clearly emphasizes that triage assessment tools should be developed ... for access to definitive care and resources ...’ A resource-based triage system (for example TRAIN<sup>15</sup>) appropriate for neonates, needs to be created and in place before the next major disaster to enable regional cooperation. This system would have to be agreed on and understood in advance by all hospitals in the region. Patients could be categorized routinely either on rounds or automatically by electronic medical record systems. Thus, should an emergency evacuation be needed, triaging would already be in place.

Mattox,<sup>16</sup> reviewing lessons learned from Katrina, makes two relevant points. One is the challenge of communication after such a disaster. A system for coding resource needs would provide a rapid, shorthand method of communicating the number of patients requiring transport and the resources they will need at the receiving institution. It would also identify candidates for rapid discharge, freeing up scarce resources. The other major lesson is that for the first 48–96 h, the disaster response will need to be local. Those hospitals that are still both functional and accessible will be called on to provide assistance to those hospitals needing to evacuate. This requires the development of the second important part of a Fourth Order triage system—a region-wide process for defining, describing, and allocating ‘Surge Capacity’. Once patients can be categorized by their resource needs, a simple method for rapidly finding appropriate beds to meet those needs will have to be available. Proposals to simply double or quadruple capacity<sup>17</sup> may be appropriate for some units, but may be totally inappropriate for other older facilities. It would be both impractical and unethical to have different hospitals provide ‘Surge Capacity’ beds that have markedly different capabilities without making these differences clear to those individuals assigning patients to these surge beds.

Standards already exist for defining the physical requirements for providing different levels of neonatal care.<sup>18,19</sup> We believe that criteria can and should be developed for ‘Surge Capacity’ standards. Hospitals could then apply these prospectively to their physical plant and determine what their Surge Capacity should be in the event of a disaster. Ideally, these beds could be coded by resource availability in a method matched to the way patients are coded for resource need. These Surge Capacity numbers could then be made available to a central clearing house, so that if and when a disaster necessitates their use, these beds could be readily identified and located.

Once a region adopts these two tools, the movement of neonates from one hospital to another in a disaster would be facilitated. A central Regional Emergency Operations Center could rapidly assess the number and location of patients requiring different resources, and the number and location of beds capable of meeting those needs. Another advantage of resource-based triage is that once resource needs are assessed, even if timely patient

transport is impossible (for example because of lack of ambulances<sup>20</sup>), resources can be brought to hospitals needing them using more readily available modes of transport (for example police car, back of a pick-up truck). Thus, it might be more practical in certain situations to bring gas cylinders and generators to, rather than transport ventilated neonates from, a hospital.

Arranging resource-based triage in neonatology would require minimal expense and resource allocation. The first step is simple—we need to have the appropriate professional bodies (for example AAP, Section on Perinatal Pediatrics) agree on and endorse this concept and the development of this kind of tool. The second step is slightly more difficult. Arranging for a central clearing house would require a minimal expense for establishing and maintaining a computer system for the collection and storage of these data, with secure web-based back-up. In our region, this could readily be ‘piggy backed’ on the existing Northern California Perinatal Transport System, which already tracks bed availability in NICUs throughout northern California and is updated daily. This pre-existing database could easily be modified to add ‘Surge Capacity’ numbers for each of these NICUs and up-to-date patient census reports that incorporate the triage system. Similar systems exist in other parts of the country and could be modified for disaster planning. Setting up new systems for other regions would not be prohibitively expensive.

The situation may still arise in which there are too many sick neonates and not enough resources available. No matter what system is used, this is always a risk: what happens in an Adult Intensive Care Unit when there are patients with the same illness severity score, but not enough ventilators? However, the likelihood of that occurring is decreased if resources are pooled across a region, and allocated efficiently and appropriately. Thus, the argument against resource-based regional planning because there may be a situation in which there will not be adequate resources applies to all potential triage systems. We feel that, ethically, the best way to avoid the need for ‘austere care’ is to pool resources over a wide enough area to lower the risk of this happening.

### Conclusion

Janvier *et al.*<sup>1</sup> have shown us the danger in relying on others to triage our NICU patients. Triage systems for adults are not applicable to neonates, and yet a better system for neonates does not exist. Neonatology needs to focus on these issues. We suggest that resource-based triage plans be developed and adopted by NICUs collaboratively around the country. Choosing *not* to act in even these minimal ways would be unethical. We hope that this article will help move us toward that end and look forward to a robust discussion of this important issue.

## Conflict of interest

The authors declare no conflict of interest.

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