CHNC Educational Web Series:

Emergency Preparedness and Disaster Management for NICUs

CHNC
Children's Hospitals Neonatal Consortium

Welcome to the Emergency Preparedness and Disaster Management web series!

This series is developed in collaboration with the CHNC Educational Advisory Committee, CHNC Transport Focus Group, and the Pediatric Pandemic Network.

Calls occur the 2nd Wednesday of each month
3-4pm CT / 4-5pm ET

Next call will be **December** 10, 2025, 3-4pm CT / 4-5pm ET

If you are registered for this call, you should have all the 2025 invites on your calendar. If you need to register, please reach out to eac@thechnc.org

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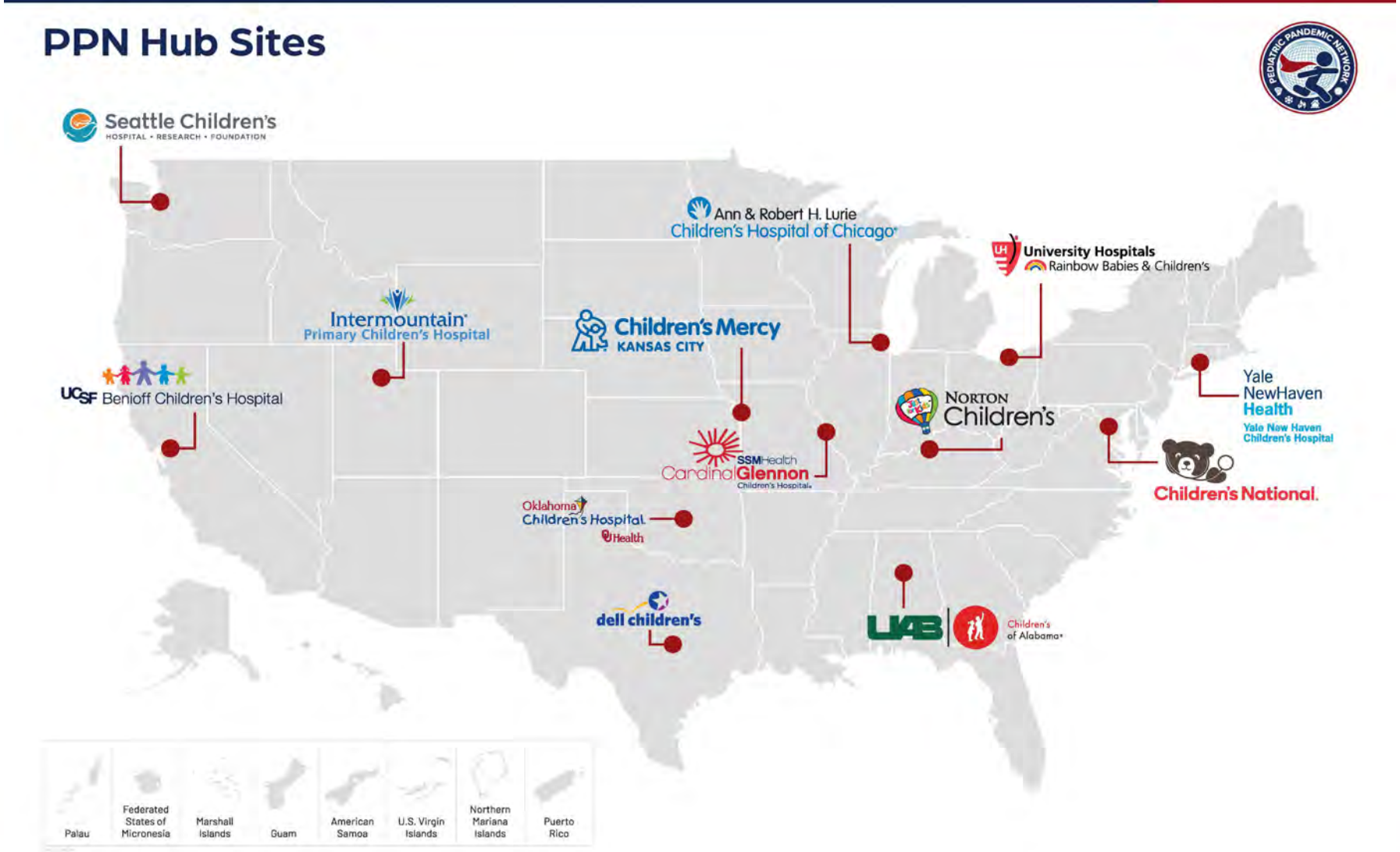
Pediatric Pandemic Network



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Developing a Framework for Crisis: Ethical Considerations for Emergency Preparedness in the NICU

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NORTHWESTERN UNIVERSITY

Outline

- The unique NICU environment
- Definitions
- Disasters, Resource Scarcity, and Crisis standards of care
- Ethical frameworks for resource allocation
- The duties and obligations of children's hospitals and pediatric clinicians
- Consolidation of pediatric care
- Impacts of emergency care on families and clinicians
- Neonatal "Lessons Learned"
- Conclusions and case for discussion

A "typical" day in the NICU

Typical ethical considerations for the NICU

- Focused on individual patient encounters
- Rooted in the relationship between medical teams and families
  - These relationships are optimized when they include:
    - Mutual trust
    - Respect for parent decision-making authority
    - Shared responsibility
    - Respectful and open communication

Daboval, *Pediatrics and Neonatology*, 2022

When disaster strikes...

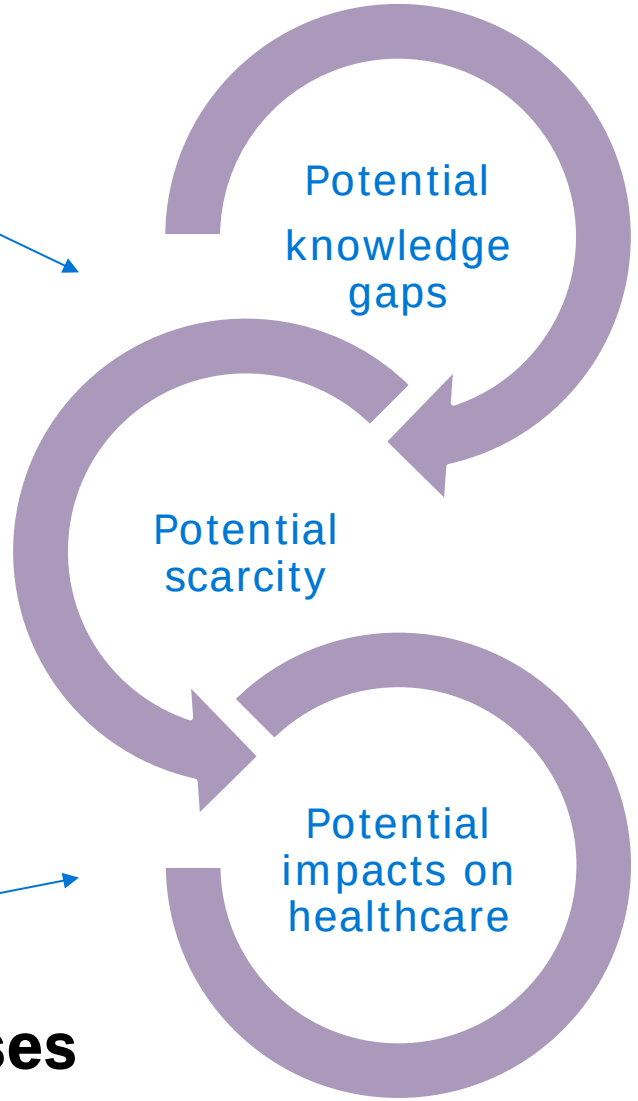
Bioterrorist events

Natural disasters

Cybersecurity strike

Industrial disasters

Pandemic infectious diseases



Barfield, *Pediatrics*, 2017

We care for vulnerable patients

- Small size
- Physiologic immaturity
- Baseline dependence on technology
  - Thermoregulation
  - Nutritional supplementation
  - Medication administration
  - Cardiorespiratory monitoring
  - Diagnostic information
  - Physiologic support

Barfield, *Pediatrics*, 2017

Wi-Care Newborn Baby Mover Apron | Buy Best Wi-Care Newborn Baby Mover Apron Equipment Today! : Evolve Emergency Preparedness

Technology dependence begets more vulnerabilities

Healthcare has become dependent on technology

- Internet-connected systems
  - The “Internet of Medical Things”
- Crucial for continuity of operations
- Rapidly evolving technology
- Large workforces, complex human factors

Cartwright, AJ. *J Clin Mon and Comp*. 2023

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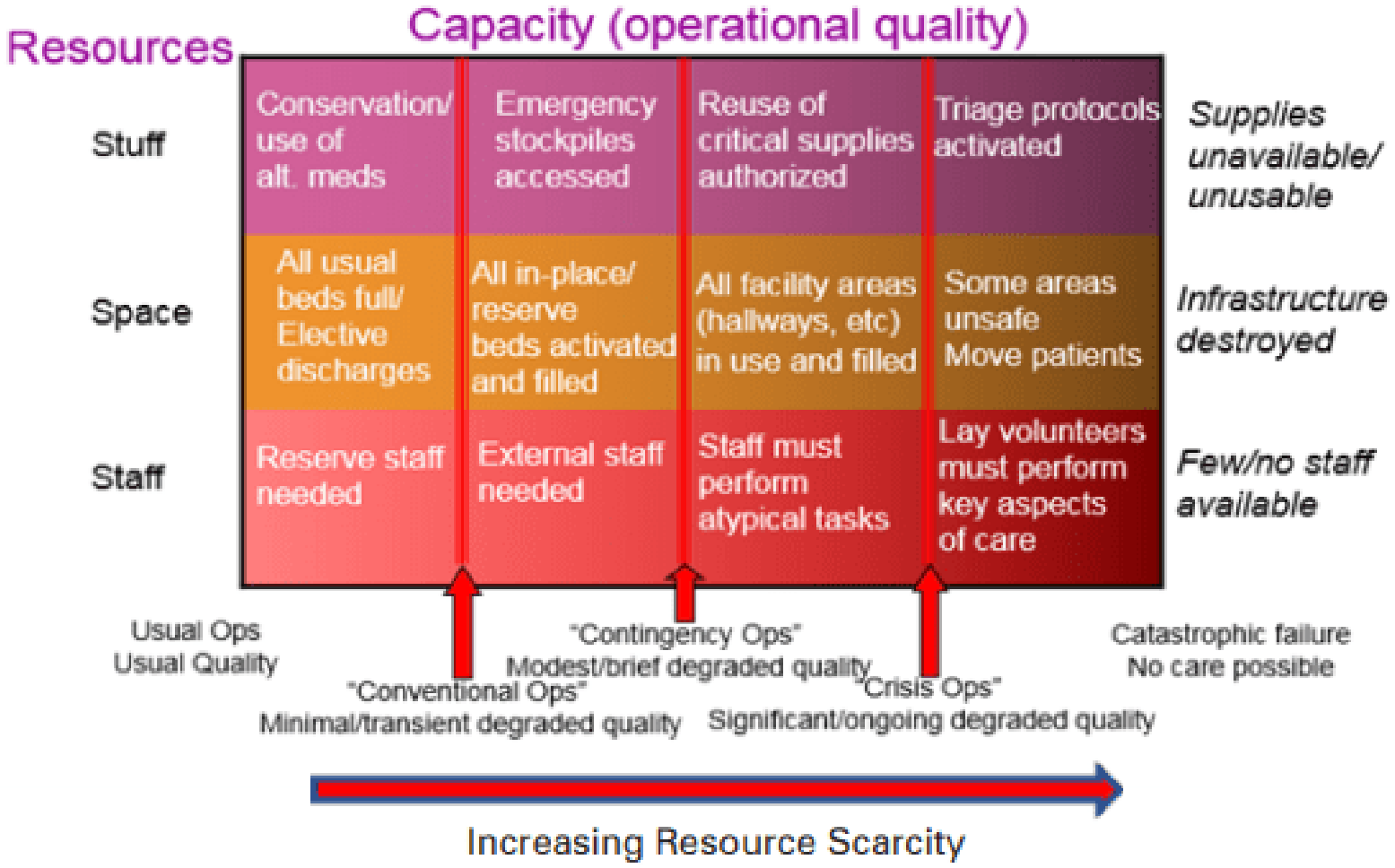
Rising case counts, evolving scarcity, tough decisions

Crisis Standards of Care



https://www.thehastingscenter.org/ethicalframeworkcovid19/

Triage protocols

a. 48 Hour Clinical Assessment Chart

Step 3 - Ventilator Time Trials (48 Hour Assessment)[1]	
Color Code and Level of Access	**Assessment of Mortality Risk/ Organ Failure**
Blue No ventilator provided.[2] Use alternative forms of medical intervention and/or palliative care or discharge. Reassess if resources become available.	Exclusion criterion OR SOFA > 11 OR SOFA 8 – 11 and No Change in SOFA Score Compared to the Initial Assessment[3]
Red Highest Use lifesaving resources as available.	SOFA < 7 and Decrease in SOFA Score Compared to the Initial Assessment[4] OR SOFA < 11 and Decrease in SOFA Score Compared to the Initial Assessment[5]
Yellow Intermediate Use lifesaving resources as available.	SOFA < 7 and No Change in SOFA Score Compared to the Initial Assessment
Green Use alternative forms of medical intervention or defer or discharge. Reassess as needed.	No longer ventilator dependent / Actively weaning from ventilator

[1] If a patient develops a condition on the exclusion criteria list at any time from the initial assessment to the 48 hour assessment, change color code to blue. Remove the patient from the ventilator and provide alternative forms of medical intervention and/or palliative care.
[2] A patient assigned a blue color code is removed from the ventilator and alternative forms of medical intervention and/or palliative care are provided.
[3] The patient remains significantly ill.
[4] These criteria apply to a patient who was placed into the red category at the initial assessment.
[5] These criteria apply to a patient who was placed into the yellow category at the initial assessment but because a ventilator was available the patient began ventilator therapy.

https://www.health.ny.gov/regulations/task_force/reports_publications/docs/ventilator_guidelines.pdf

Principles

- Beneficence
  - The duty to try to bring about those improvements in physical or psychological health that medicine can achieve
- Nonmaleficence
  - Going about these activities in ways that prevent further injury or reduce its risk
- Patient Autonomy
  - Respect for persons affirms that each and every person has moral value and dignity in his or her own right
  - One implication of respect for persons is a respect for personal autonomy, this is, acknowledging the moral right of every individual to choose and follow his or her own plan of life and actions
- Justice
  - Those moral and social theories that attempt to distribute the benefits and burdens of a social system in a fair and equitable way among all participants in the system

Crisis Standards of Care

- Utilitarianism
  - Greatest good for the greatest number of people
- Rebalancing how principles are prioritized
  - From autonomy towards justice
  - Beneficence
    - Individual to society
  - Solidarity
- Least restrictive means

Other helpful considerations/frameworks

From the ANA Code of Ethics for Nurses:

- "No emergency changes the basic standards of practice, code of ethics, competence or values of the profession"

From the University of Toronto Joint Centre for Bioethics Pandemic Influenza working group

- Ethical decision-making process
  - Accountability
  - Inclusiveness
  - Openness and transparency
  - Reasonableness
  - Responsiveness

Jorgensen, *JOGNN*, 2010

Proposed resource allocation frameworks

Allocation principle	Description	Pros	Cons
Sickest first	Prioritizes the sickest, i.e., those who have greatest need for treatment at a specific moment in time.	Intuitively obvious; sickest are also worst-off	Ignores post-treatment prognosis
Waiting list	Allocates services according to the individual's position on the waiting list. Also known as 'first-come, first-served' principle.	Equality of opportunities; no discontinued interventions	Ignores relevant differences between individuals; favours the well-off; susceptible to corruption
Prognosis	Prioritizes those with favourable prognosis, hence, those with the highest survival probability and duration.	Intuitively obvious; saves most life years	Does not consider distribution and number of lives saved
Behaviour	Prioritizes those who did not engage in risky behaviours that caused their condition or affected it negatively.	Promotes healthy life style; promotes individual responsibility	Reasons for individual behaviour ignored; conflict with liberty rights
Instrumental value	Prioritizes those who's function is essential to keep up fundamental services, e.g., health care professionals. Relevant, e.g., during pandemics.	Serves saving most lives	Can encourage abuse of system
Combination of criteria	This allocation scheme includes a combination of criteria such as age (youngest first), prognosis and lottery.	Considers several morally relevant criteria; appropriate distributive justice	Discriminates older people
Youngest first	Prioritizes young over old individuals.	Prioritizes worst-off; hard to corrupt	Ignores relevant other principles
Lottery	Allocates medical services randomly among those who are in need of treatment.	Equal opportunities; little knowledge about recipients needed; easy to handle; resistant against corruption	Blind against other factors; treating people equally often fails to treat them as equals
Reciprocity	Prioritizes those who have voluntarily provided societal services in the past.	Justice to people who have provided contributions in the past	Requires complex inquiries
Monetary contribution	Prioritizes those who contribute to the costs of medical treatment.	Relieves public health system; reduces costs; reflects common societal principle that those who need more pay more	Favours wealthy people; undermines societal solidarity; makes allocation to worst-offs impossible

Krutli, *PlosOne*, 2016

Triage: Benefits and biases for newborn infants

- "Fair innings" or Life-cycle arguments
- Time-based assessments for resource allocation
- Considerations of disability

Table 2. Disaster Triage Categories[9]

Category	Description
Red (emergent)	Critical, life-threatening, immediate intervention required to save life
Yellow (urgent, immediate)	Acute and stable but may deteriorate, requires treatment within 20 min to 2 h
Green (nonurgent, delayed)	Injured but stable, unlikely to deteriorate if not treated in 2 h (walking wounded)
Black (expectant)	Dead or expected to die, nonsalvageable with currently available resources

Haeri, *Obstetrics and Gynecology*, 2015
Haward, *AJOB*, 2020

General duties of children's hospitals

- Duty to treat
  - Duty of rescue
    - Providers need to intervene in order to help those without assistance
  - Duty of fidelity
    - Promoting patients' good
- Duty of solidarity
  - Duty of stewardship
    - Responsibly using resources to mitigate shortages
- Duties of justice
  - Providing fair and equitable care with transparency and trustworthiness

Paquette, *J Hospital Medicine*, 2020

Contingency Care

Crisis Standards of Care

- Mitigation attempts no longer suffice
- Even greater duties of solidarity

- Unique role of children's hospitals
  - Accepting any child for whom there is capacity
  - Decompress other systems
  - Prevent all patients entering triage

Paquette, *J Hospital Medicine*, 2020

Were there pandemic-related shifts in care?

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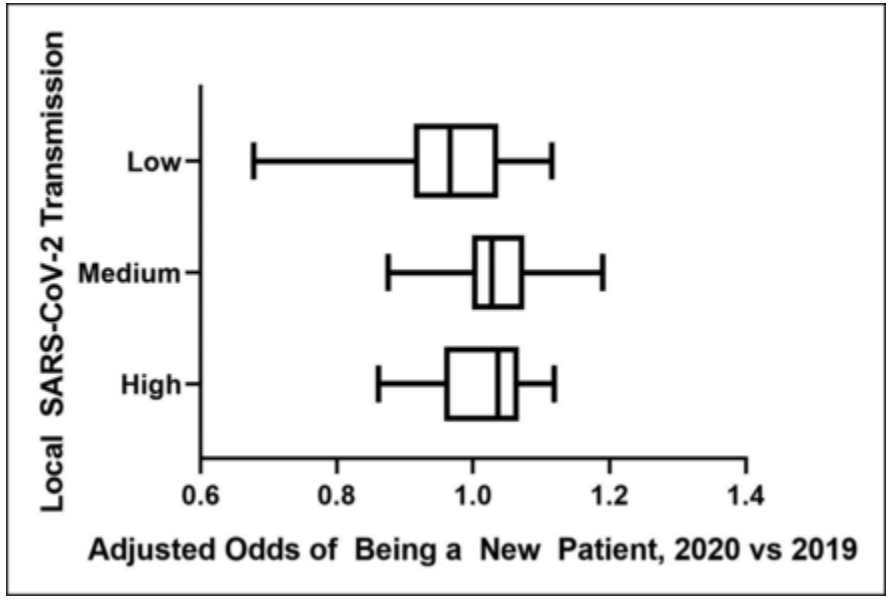
Table 3. Odds of Being a New Patient			
	Unadjusted, OR (95% CI)	**Adjusted, Without APR-DRG, OR (95% CI)**	**Adjusted, With APR-DRG, OR (95% CI)**
Study Period			
Control (2019)	Ref	Ref	Ref
Pandemic (2020)	1.07 (1.05, 1.09)	1.08 (1.05, 1.1)	1.00 (0.98, 1.02)

APR-DRG, All Patients Refined Diagnosis Related Group. CI, Confidence interval. OR, Odds ratio.

Clark, *Hospital Pediatrics,* 2021

Categorizing hospitals by local rates of COVID-19



Clark, *Hospital Pediatrics,* 2021

Why was there not more consolidation of care?

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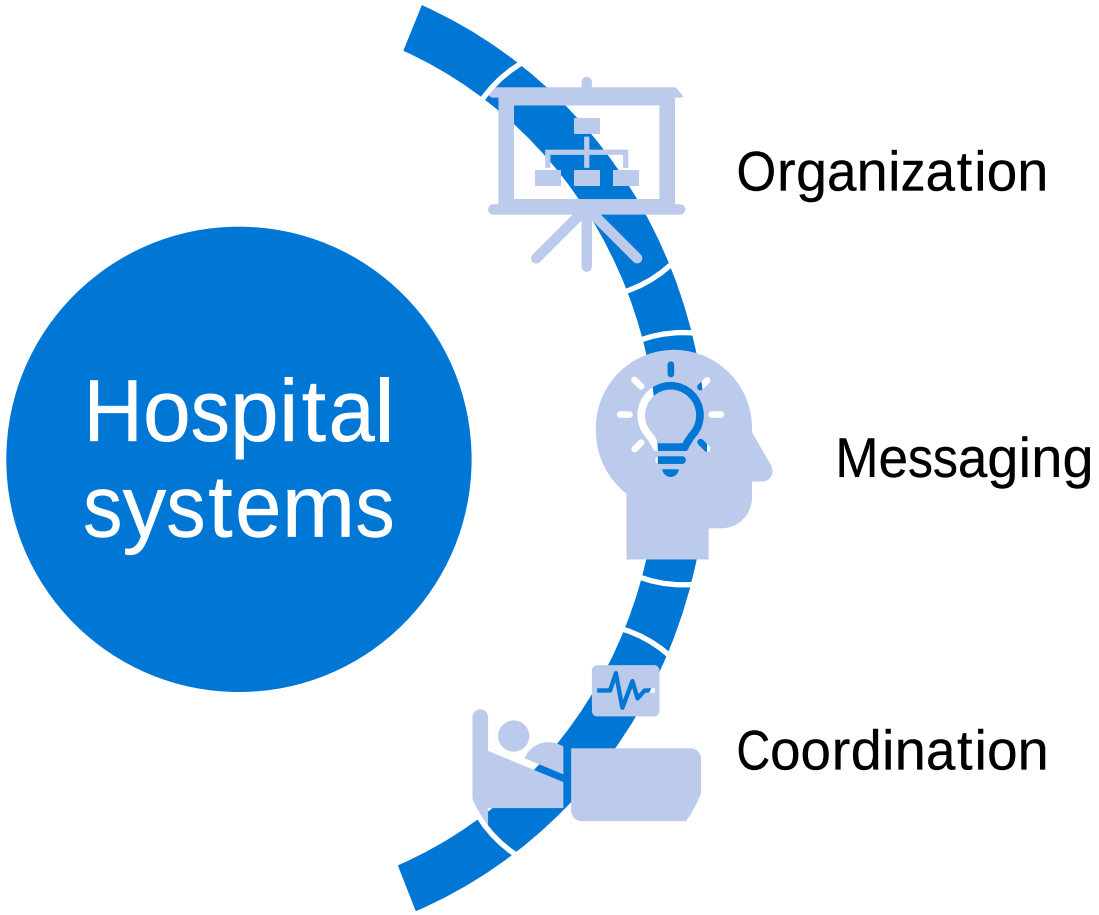
- Consolidation is likely tricky to measure
  - Dramatic decrease in transmission of viral infectious disease
  - Reduction of pediatric hospitalizations may have obviated the need for consolidation

- Individual level factors
  - Outpatient care choices
  - Medical complexity
- Systemic factors
  - Unique patterns in numbers of local hospitals, bed availability, and resource strain

Logistical barriers to consolidation



Regionalization of perinatal care

- Might the NICU have an advantage in consolidation?
  - Systems designed to move patients between levels of care
  - Processes most streamlined to move towards advanced care, triggered by patient acuity
  - Less coordination in the other direction, or between sites that have similar levels of care
  - But the framework is there!

- One challenge – it can be hard to consider NICU patients as a set-aside population in the setting of a widespread disaster

Impacts of emergency care on families

- Psychosocial needs beyond what may be anticipated in usual care conditions
  - Stress of disaster preparedness
  - Post-event stress, anxiety, depression, or grief
    - Linked to increased risk for preterm birth and impaired fetal growth
    - Increased incidence in violence against women
  - Difficultly appreciating paradigm shifts in care

- Exacerbated by restricting parents from the NICU
  - Global study of parent experiences during Covid pandemic
    - 2,100 participants across 56 countries
      - 40% not allowed to have support person join perinatal appointments
      - 21% experienced complete parental restriction from their hospitalized infant
      - Breastfeeding support mostly maintain, though some participants reported being discouraged from breastfeeding
      - All participants reported increased stress

Role for NICUs in preparing families?

- How ready are the parents of our patients?
  - Study of household emergency preparedness (HEP)
    - Parents across all demographic categories reported being unprepared for a disaster

- Can we help?
  - HEP education by a healthcare provider
    - Providing information about developing a communication or evacuation plan
    - Providing resources that can be obtained from government agencies

Nurse-Clarke, *Adv Neonatal Care*, 2022

Impacts of emergency care on staff

- NICU systems are built to optimize care
- Shift in mindset
  - "Good is good enough"
- Personal impacts
  - Fear for safety
  - Uncertainty regarding friends/family/pets/property in the local area
  - Long hours
  - Challenging physical conditions
    - Loss of sleep
    - Food/water
    - Extreme temperatures

NICU staff stayed behind to care for 19 babies as Hurricane Laura hit | CNN

Public/parents perception of crisis states

vs

Fears of liability

- For volunteers in a crisis
  - Laws related to volunteerism, licensure and credentialing practices, scope or practice, and liability
    - Emergency Management Assistance Compact
    - Uniform Emergency Practitioners Act
    - Public Readiness and Emergency Preparedness Act (PREP Act)
- For employees of an impacted hospital
  - No definite protective laws

Jorgensen, *JOGNN*, 2010

Crisis standards versus “reasonable standard of care”

- Definition of standard of care
  - “actions of diagnosis, treatment, or technique that a physician should generally follow for an individual patient's trauma, presentation, or illness”
  - From a legal standpoint
    - Duty of care
    - Breach of duty
    - Causation
    - Damages

- Situations where government officials may not declare an official emergency
  - Perhaps “standard” is enough

Caruso, Neurosurgery, 2022

Defining moral distress

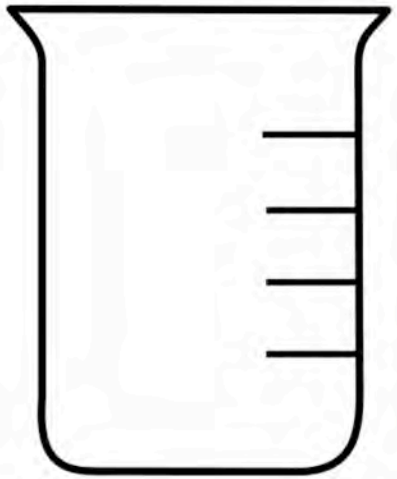
- Classic definition:
  - A clinician knows the morally right course of action to take but is unable to pursue that course due to outside factors (systematic, interpersonal)
- In other words:
  - Clinicians feel constrained to provide (often burdensome) care they believe not to be in the patient's interests, because of factors outside of their control

- Associated with burnout, poor job retention, and possibly adverse patient outcomes

Jameton 1994; Prentice 2021

Moral Distress

Moral Distress
Extrinsic factors
+
disproportionate care
+ lack of resources
+ medical hierarchy
+ inadequate skill set
+ negative ethical environment
+ stressful environment



Moral Resilience = capacity to tolerate moral distress

+ flexibility
+ moral sensitivity
+ sense of purpose
+ willingness to engage with different views

Personal factors
+ self care (sleep, exercise, mindfulness, etc.)

Prentice, *Seminars in Fetal and Neonatal Medicine*, 2018

Moving forward

- We need to continue to plan, for this surge and for the next pandemic
  - Immediate response to emergency conditions

- Capacity for adapting to surge states
  - Tools to identify the availability of resources
  - Plans for messaging when resources or patients need to be differently mobilized
  - Anticipating barriers to optimizing resources across a region

Neonatal "Lessons Learned"

- Keeping parents together with their hospitalized infants should be prioritized
  - Supports breastfeeding and bonding
  - Thermoregulation through kangaroo care
  - Parents can assist in routine care/feeding
  - Postpartum parent/infant joint isolation
  - Systems for contact when separation is unavoidable

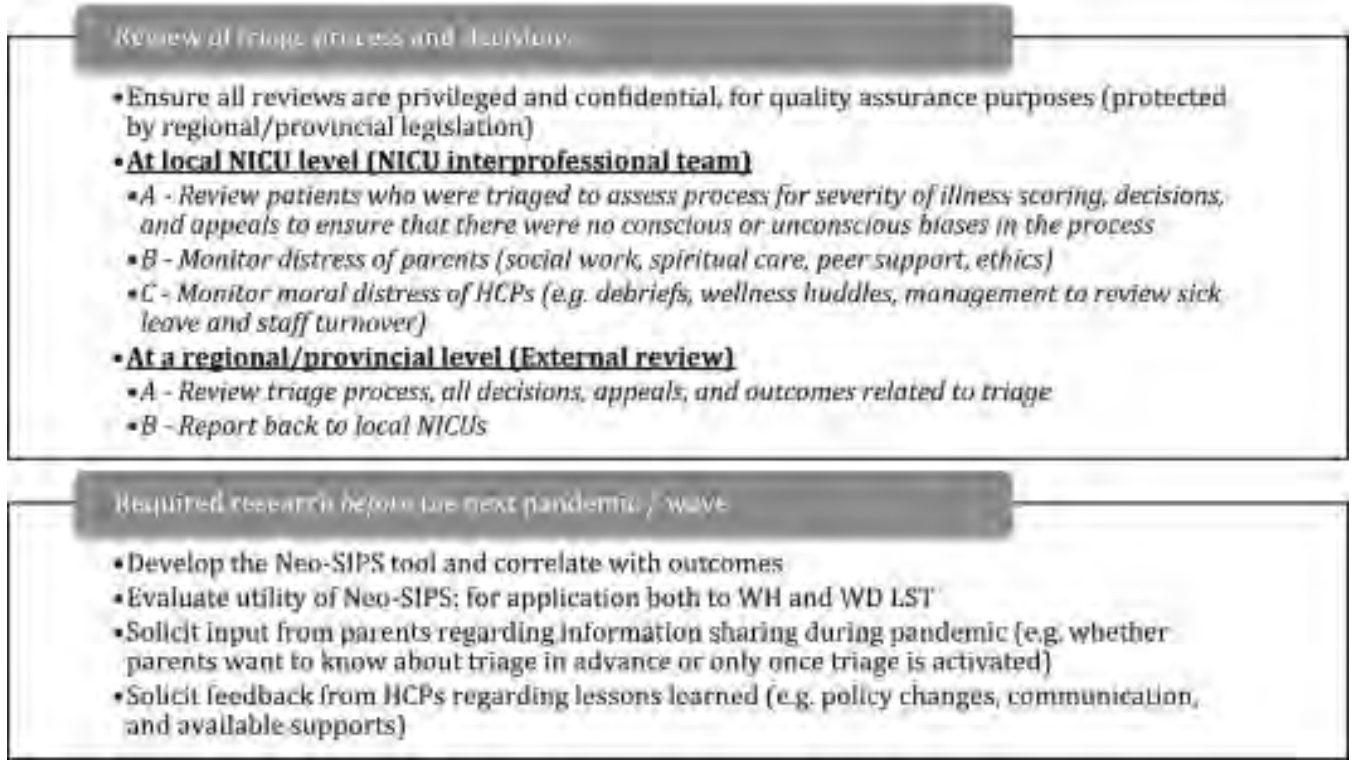
- Once put together, plans should be carefully examined and tested
  - Allocation protocols which deprioritize the most critically ill infants risk exacerbating existing racial disparities
    - Testing allocation policies using medical models with sample patient populations that reflect
    - Eliciting community feedback

Neonatal "Lessons Learned"

- Neonatal triage
  - Activation should be protocolized
  - Considerations
    - Epidemiological data
    - Physical space
    - Equipment
    - Time
    - Available personnel
  - Triage team with neonatology expertise
  - Transparency
    - Clear communication with parents
  - Research towards development of a neonatal-specific severity of illness/prognostic score

Neonatal “Lessons Learned”

- Learning from our mistakes



Daboval, *Pediatrics and Neonatology*, 2022

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Thank you!

Would you be willing to share your own "lessons" and considerations?

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2. You must be logged in to your Pediatric Pandemic Network (PPN) CE website account to claim credit.
3. Log in to PPN CE website at ce.pedspandemicnetwork.org (create an account on OpenPPN, the PPN's single sign-on app).
4. Set up your profile:
    - ✓ Select "profession" (i.e. nurse, physician, etc…)
    - ✓ Input mobile number used to text attendance code
5. Go to pending activities (Click My Account > My Activities > Pending Activities) and complete the course evaluation.
6. Generate and download CE certificate

Credit can be claimed up to 60 days from the date of the live event.

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