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April 2024

Navigating the Pandemic

Hospital Resource Allocation and Preparedness During the Next COVID-19

How did COVID-19 affect our country?

- Impact on Patient Well-being
  - 1,181,600 deaths in the US alone, since Jan 1, 2020
  - “Long COVID” symptoms lasted 12 weeks or longer in 1 in every 10 patients
- Financial Burden
  - Total estimated COVID-related health expenditure cost is $214 billion
  - $5.13 trillion in government expenditures
  - Average cost of a patient with COVID19 in 2020 and 2021
    - Non-ICU Patients $16,131
    - ICU $56,677
- Workforce Burnout and PTSD
  - Nation-wide self-reported healthcare worker burnout has been on the increase since 2019
  - Reporting an increased workload and burnout was correlated to an intent to leave the job
  - 34% of healthcare workers display signs of PTSD and 14% display signs of severe PTSD

(Aiyegbusi et al., 2020; Andhavarapu et al., 2022; Centers for Disease Control and Prevention, 2024; Rotenstein et al., 2023; Walmsley et al., 2023; World Health Organization, 2022)

How did US hospitals respond to COVID-19?

- Federal and State involvement
  - Emergency protocol and public health emergency announcement
  - Activated emergency-response licensure laws
  - Large portions of funding from bills sent towards research and vaccine creation
- No national endorsement of tracking apps
- Haphazard dissemination of information or resources for country wide use until late 2022
- Up to 70% of hospital nonessential functions were shut down, reallocated, or consumed by COVID-19 and other emergent services
- 43,000 healthcare workers left the hospital within the first 3 months of COVID-19
- Increased ventilator sharing and production within the first year of COVD-19
- Increased approval and use of experimental, new telehealth

(Bergquist et al., 2020)

U.S. Hospital Response to COVID-19

Positive Actions Taken:

- 98% of hospitals initiated incident command centers, with hierarchal command systems and allocation of resources and staffing to the most effected areas.
- 95% of hospitals canceled all elective procedure by April, 2020.
- 84.4% of hospital used system-wide triage systems to gauge those most in need of care, resources, and equipment. By April, all triage systems within previously trained hospital systems were being utilized for managing ICU admission decisions, equipment utilization or extracorporeal membrane oxygenation therapy, system hospital transfers, staffing, and medication distribution, elective procedures.
- 63.4% of hospitals extended critical care delivery into clinical spaces not typically utilized for ICU care (e.g., stepdown units, wards, perioperative areas)

(Mathews et al., 2021)

Negative Actions Taken:

However, with ICU capacity increased, staff to patient ratios increased despite staffing shortages

- 57.1% of hospitals studied in the end of 2020 were exceeding original patient bed allowances, 38% of hospitals increasing patient to nurse staffing ratios beyond policy limits.
- Although tiered staffing models were initiated in over 2/3 of all hospitals, staffing reallocation could not meet the demands of the staff leaving or getting sick. This left patient to staff ratios even higher and contributed to healthcare worker burnout.

Minimal hospitals implemented creative ventilator sharing or transportation measures when in deficit of machines.

- Only 25% of hospitals implemented the use of transport ventilators, anesthesia/operating room machines, and non-invasive ventilator machines modified for use via artificial airways.

In summary…

- Inadequate surge capacity planning and resource allocation plans for repeated waves of critically ill patients over the next two years
  - Response tactics, emergency laws, funding, and policy were initiated in the immediate follow out.
- Death's related to COVID-19 were not stabilized in the US until late 2021/early 2022
- No federal mandate or current research on the application or implementation of the emergency interventions utilized.
- Ineffective staffing pools, healthcare emergency training, or resource stockpiling
- A lack of communication between the governmental entities hit the heaviest with critically ill patients
  - Wuhan, China, the Lombardy region of Italy, and New York City

(Mathews et al., 2021)

How did hospitals *around the world* respond to COVID-19?

GERMANY

- Early studies on testing and vaccine creation to implement test-trace-quarantine protocol by January, 2020
  - Digital "telecommunication" tracking of much of the population was in place by April
- Decentralized lab and testing centers focused on the country wide goal of testing and vaccine creation
- Hospital systems had stock bad, available ICU spaces, and extra trained staff prior to COVID-19
  - Small hospitals already had stocked ICU equipment, trained staffing, and protocols in place.
  - Ventilator production increased following news that Italy and other EU country were struggling
- Country was insured and familiar with online telehealth

April-June, 2020: Death toll related to COVID-19 stabilized

(Nazrul Islam et al., 2020)

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Focused on early, country-wide, hospital-based interventions. Germany's hospitals were ready for extensive patient loads and decentralized healthcare long before the COVID-19 pandemic.

April-June, 2020: Death toll related to COVID-19 stabilized

(Nazrul Islam et al., 2020)

How did hospitals *around the world* respond to COVID-19?

CHINA

- Extreme lock-downs (shutting down railway stations and airports within January and February)
- COVID-19 tracking and reporting apps
- Built new hospitals in major cities or rebranded other community areas, expanding bed capacity in Wuhan by 3,000
- Early communication between cities about resource production, and storage and mobilization of staff to major cities
- Government paid the ”personal burden” of medical bills after Jan 30, 2020

October, 2020: Death toll related to COVID-19 stabilized

(Nazrul Islam et al., 2020)

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  and Feb
- COVID
- Built ne
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- Early c
  mobiliz
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Focused on effective lockdowns, paired with electronic tracking and communication between smaller and larger cities. Furthermore, governmental infrastructures quickly built to meet community demands

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0, 2020

October, 2020: Death toll related to COVID-19 stabilized

(Nazrul Islam et al., 2020)

How did hospitals *around the world* respond to COVID-19?

RWANDA

- Previous experience with HIV/AIDs and Ebola outbreaks educated the country on how bast to respond to the pandemic
- All COVID-19 treatment was free, according to its already established community-based health insurance program utilized by 90% of the population
- Built 17 treatment enter in rural communities who would not have had access to ICU level care
  - "Drive-through" community testing periodically
  - Quarantine in clinics, not at home
- Country-wide quarantine for all private and public events by February
  - Extreme tactics have been used to enforce these rules
- Utilized clinic robots for basic health assessment skills, due to the limited hospital staffing to reach rural communities

Death toll related to COVID-19 stabilized within 2 months

(Johns Hopkins University & Medicine, 2023; Nazrul Islam et al., 2020)

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Focused on enacting previously-constructed emergency protocols. Furthermore, they used creative problem solving and innovative technology to meet their country's specific needs.

Death toll related to COVID-19 stabilized within 2 months

(Johns Hopkins University & Medicine, 2023; Nazrul Islam et al., 2020)

Future Framework for Research

Further research is necessary to better to prepare our hospitals, train our staff, and support our country during the next national emergency.

- Efficacy of dissemination of information between countries and cities, like China
- Training staff to adapt emergency resource allocation and tiered staffing models, like Germany and Rwanda
    - Training staff in emergency triage and educating them on a variety of skills that can be used in other healthcare units
    - Training staff to be mentally prepared and healthy enough for another national emergency
    - Building adequate healthcare worker staffing pools for allocation in emergencies
- Federal and state-based stock-piling of healthcare resources, like Germany
- Effective collection of reliable data, like Rwanda

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