Adaptability on Shifting Ground: a Rapid Qualitative Assessment of Multi-institutional Inpatient Surge Planning and Workforce Deployment During the COVID-19 Pandemic

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BACKGROUND: During the initial wave of COVID-19 hospitalizations, care delivery and workforce adaptations were rapidly implemented. In response to subsequent surges of patients, institutions have deployed, modified, and/or discontinued their workforce plans.

OBJECTIVE: Using rapid qualitative methods, we sought to explore hospitalists' experiences with workforce deployment, types of clinicians deployed, and challenges encountered with subsequent iterations of surge planning during the COVID-19 pandemic across a collaborative of hospital medicine groups.

APPROACH: Using rapid qualitative methods, focus groups were conducted in partnership with the Hospital Medicine Reengineering Network (HOMERuN). We interviewed physicians, advanced practice providers (APP), and physician researchers about (1) ongoing adaptations to the workforce as a result of the COVID-19 pandemic, (2) current struggles with workforce planning, and (3) evolution of workforce planning.

KEY RESULTS: We conducted five focus groups with 33 individuals from 24 institutions, representing 52% of HOMERuN sites. A variety of adaptations was described by participants, some common across institutions and others specific to the institution's location and context. Adaptations implemented shifted from the first waves of COVID patients to subsequent waves. Three global themes also emerged: (1) adaptability and comfort with dynamic change, (2) the importance of the unique hospitalist skillset for effective surge planning and redeployment, and (3) the lack of universal solutions.

CONCLUSIONS: Hospital workforce adaptations to the COVID pandemic continued to evolve. While few approaches were universally effective in managing surges of patients, and successful adaptations were highly context dependent, the ability to navigate a complex system, adaptability, and comfort in a chaotic, dynamic environment were themes considered most critical to successful surge management. However, resource constraints and sustained high workload levels raised issues of burnout.

KEY WORDS: COVID-19; hospital medicine; workforce planning; surge planning; focus groups; qualitative.

INTRODUCTION

Hospitalists have been at the forefront of the pandemic, serving as clinicians and operational leaders.[1,2] The COVID-19 pandemic required addressing the influx of patients to not only emergency departments, but also to medical wards and intensive care units. As a result, existing disaster plans had to be rapidly modified and deployed to address surges in inpatient volume, often by hospitalists in collaboration with other stakeholders across healthcare organizations.[1] A variety of organization-, team-, and individual-level adaptations were rapidly implemented in response to surges of patients during the first wave of the COVID-19 pandemic in March and April 2020.[3,4] Initial strategies included reduction of non-essential services, geographic cohorting of patients in respiratory isolation units (RIUs), implementing technology for communicating with and evaluating patients to reduce clinical staff exposure, allowing healthcare workers to opt out of direct care of COVID-19 patients, and deployment of healthcare workers

from other specialties.[3–5] However, many of these strategies may not be sustainable practices.

In preparation for surge events, logistical planning for diagnostic testing, ensuring the availability of PPE, developing strategies for patient triage and cohorting, developing clinical protocols, addressing the physical and mental wellness of healthcare workers, developing communication plans, and surge planning specifically around key resources—physical space and beds, clinical and operational staff, equipment, and system coordination—should be addressed.[6–8] However, plans addressing these domains must be both systematic and highly adaptable.[6]

In the subsequent months, most areas of the USA experienced a second, and sometimes third, wave of patients requiring hospitalization for COVID-19.[9] In response to these additional surges and continual significant challenges with the testing and treatment of COVID patients while also maintaining a safe work environment, institutions have updated, modified, and/or discontinued adaptations made earlier in the pandemic.[4,10,11] Our work provides novel insights regarding the ongoing challenges of sustained surges, the types of adaptations that have not been sustainable, and the new ways that the hospitalist skillset has been applied as the pandemic continues.

While a growing literature describes initial adaptations employed by hospitals and hospitalists,[1,3,12–14] further updates to workforce deployment and care processes with subsequent COVID-19 surges have not been described. This rapid qualitative evaluation of the inpatient surge planning and workforce deployment across multiple hospital medicine groups provides insight into the direct experience of hospital medicine clinicians and leaders who were responsible for both the development of surge plans and the delivery of care to patients in the setting of the implementation of surge plans. These focus groups were conducted as a part of efforts by the Hospital Medicine Reengineering Network (HOMERuN) collaborative to rapidly collect and disseminate information needed by hospitalists to respond to the COVID-19 pandemic.[15] Rapid qualitative methods are uniquely suited for quick assessment and evaluation while ensuring the same rigor of more traditional qualitative methods in time-sensitive situations.[16–19]

The constraints and demand on hospital medicine clinicians are different from those felt by intensivists and emergency department staff. The participants of these focus groups describe adaptations of different groups, insight into the challenges of an evolving pandemic and continual surges of patients, and insight into their experience, as both surge planners and frontline clinicians, with the solutions implemented.

METHODS

Human Subjects

The Colorado Multiple Institutional Review Board reviewed and approved this study as exempt from IRB review (COMIRB #: 21-4873).

Study Design

On December 4, 2020, we conducted five semi-structured focus groups with hospitalist physicians, advanced practice providers (APP), and hospitalist physician researchers participating in the Hospital Medicine Reengineering Network (HOMERuN),[20] a collaborative of hospitals, hospitalists, and multidisciplinary care teams founded in 2011. HOMERuN is a consortium of academic medical centers, primarily in urban settings, though geographically diverse with participating sites from the Northeast, Southeast, Midwest, West, and Northwest, as previously described by Auerbach et al.[20] This group mobilized to create workgroups that collated and shared best practices for the COVID-19 pandemic. These focus groups explored the changes in each participating hospital's approach to workforce deployment and organization of care during the COVID-19 pandemic, and identified the types of workforce and surge planning issues with which hospitalists are currently grappling.

Setting and Participants

Participants of the monthly HOMERuN collaborative call were electronically notified in advance that focus groups would be conducted during the next regularly scheduled Zoom call (December 4, 2020). Hospitalist physicians, APPs, hospitalist physician researchers, residents, and patient representatives participating in the Hospital Medicine Reengineering Network (HOMERuN) and present for the monthly collaborative call were included in the focus groups. The only exclusion criterion was refusal to participate. Individuals present for the call were not offered any incentive to participate.

At the start of the meeting, individuals who elected to call in were informed again of the plan to conduct focus groups, which would be recorded, and offered the chance to ask questions of moderators. If the attendees agreed to proceed, they were placed in a separate virtual breakout room for focus group participation, with a moderator assigned to each room. Each focus group was approximately 30 min in duration and had approximately six participants.

Interview Guide

The focus group guide was developed by the members of the HOMERuN workforce planning workgroup, convened in March 2020 to assess workforce and organizational adaptations undertaken in response to COVID-19. We asked participants to consider the following questions: (1) What adaptations have proved most useful to you? (2) What are you struggling with right now? (3) What are you changing now? (4) What important changes occurred between your first surge and later waves? Moderator Guide shown in the Appendix.

Data Collection

Prior to beginning each focus group, participants granted permission to record the conversation. During the focus

groups, the moderators (MB, DW, GA, SK, AL, MS, AK) made field notes and observations to supplement the audio recordings. The audio recordings and field notes were used for the analysis rather than transcriptions of the focus groups.

Analysis

Our analysis was conducted in a two-step process using a rapid qualitative analytic approach.[19,21–25] First, a team member who did not participate in the specific focus group used a standard template to create a summary of each group's session, incorporating both the audio recording and the moderator's field notes (MB, GA, SK, AL, MS, AK, LL). Second, all workgroup team members participated in creating an analysis matrix [21] of the summaries of each focus group. Each row was a focus group and each column referred to a unique question we asked each focus group. One workgroup member completed the matrix by logging key points summarized for each focus groups' discussion of each question into the matrix (AK). Individually, workgroup members then identified themes and subthemes across all focus group discussions of each question (MB, GA, SK, AL, MS, AK, LL). As a group, workgroup team members then met to discuss and reach consensus regarding themes identified (MB, DW, GA, SK, AL, MS, AK, LL). As the focus groups were conducted simultaneously, all data were used in the analysis rather than in considering data saturation. Member checking, a technique for confirming the credibility of results, was conducted.[26] Two members of the workgroup who participated in a focus group but who did not moderate a focus group, create a summary, or participate in the analysis reviewed the findings to confirm the themes reflected their experience as a focus group participant (SE, KK).

RESULTS

Physicians, APPs, and physician researchers from 24 hospitals participated, representing 52% of HOMERuN sites, with 29 (88%) hospitalist physicians, three (9%) in another category (an APP, a resident, and a patient representative), and one (3%) unidentified participant. All but one of the hospitals represented were academic hospitals. One participant reported working at a VA hospital. Four hospitals had two participant representatives, one hospital had six participants, and 19 had one participant representative in attendance.

Participants described a variety of adaptations, some common across institutions and others specific to the institution's location and context. Adaptations implemented shifted from the first waves of COVID patients to subsequent waves. Table 1 summarizes these adaptations and Figure 1 illustrates changes from initial to subsequent waves of patients. Table 2 highlights exemplar quotes for themes identified across the domains explored during the focus groups.

Adaptations That Have Proved Most Useful

Managing High-Capacity Situations. All groups discussed how they approached the decision to add capacity to care for a rapid increase in patients. Overall occupancy across the system or department census was often used to make decisions about adding providers to a particular site or deploying providers to other hospitals in the system. Often a decision to add capacity was dependent on how stretched providers felt, as opposed to specific triggers based on provider-to-patient ratios (which was felt to be challenging to define). Tiered surge plans were a commonly used adaptation for adding capacity, developed with guidance from institutional stakeholders, although participants described significant variability in such plans, with a range in the number of tiers from three to 36 levels. One participant described using triagists to direct patient flow and manage capacity, and this was noted to be helpful.

Recruitment and Staffing Strategies. Goodwill and volunteerism were insufficient to maintain adequate staffing over time. Some participants noted additional payments or compensation for working additional shifts. A number of participants described shifting from an opt-in approach for caring for COVID patients to an opt-out approach. Participants also described a shift from trying to cohort COVID patients on a small number of teams to distributing COVID patients to specialty teams depending on the patient's primary complaint. This shift was intended to more uniformly distribute work across a broader group of clinicians. From initial to subsequent waves, geographic cohorting was reported as less operationally feasible because numbers of non-COVID patients were rising concomitantly with COVID numbers, and hospitals were typically at or beyond 100% utilization. Both APPs and non-hospitalists were deployed to extend admitting capacity, with varied models including direct care for COVID patients under the supervision of hospitalists or working remotely to write notes for the primary team. Several innovative staffing models were described. Examples included a virtualist model,[27] in which attending physicians rounded from home using iPads and called families to provide updates, or hiring "COVID-ists." A flexible APP deployment model was also described where assignments were made based on both clinical expertise and patient census. When patient volumes were high, APPs were used for independent clinical care of patients, while at other times APPs were redeployed to care coordination tasks.

Learners. At first, hospitals sought to protect resident education, using physician attendings or APPs to care for COVID patients. Some participants described residents being asked to flex up to meet demand, but this request was felt to be at the expense of education. One participant described distributing housestaff across all teams rather than maintaining teaching and non-teaching teams. Other

Table 1 Adaptations

Description	Adaptations					
Common	Tiered surge plans	Redeployed non-hospitalists, including APPs and GIM/subspecialists	Reliance on hospitalist APPs	Specialist consult teams taking COVID-positive patients based on primary disease complaint	COVID care pathways and order sets	Plan for collating and disseminating COVID–related evidence and guidelines on a regular basis
Locally specific	Redeployment of residents	COVIDist model	Redeployment of hospitalists to other hospitals in system	Field hospitals	Training boot camps for non-hospitalists	LTAC converted to COVID hospital
Not considered functional/feasible	Using subspecialists to care for COVID patients exclusively	Geographic cohorting of COVID and non-COVID patients				

participants reported that housestaff were only in the ICUs. Most participants described excluding learners from COVID care, at least at first, because using residents required ACGME emergency authorization, though many reported wanting to include learners in the care of COVID patients particularly during subsequent waves. Participants recognized the value of residents or high-functioning interns who know how to manage inpatient logistics to support the care team.
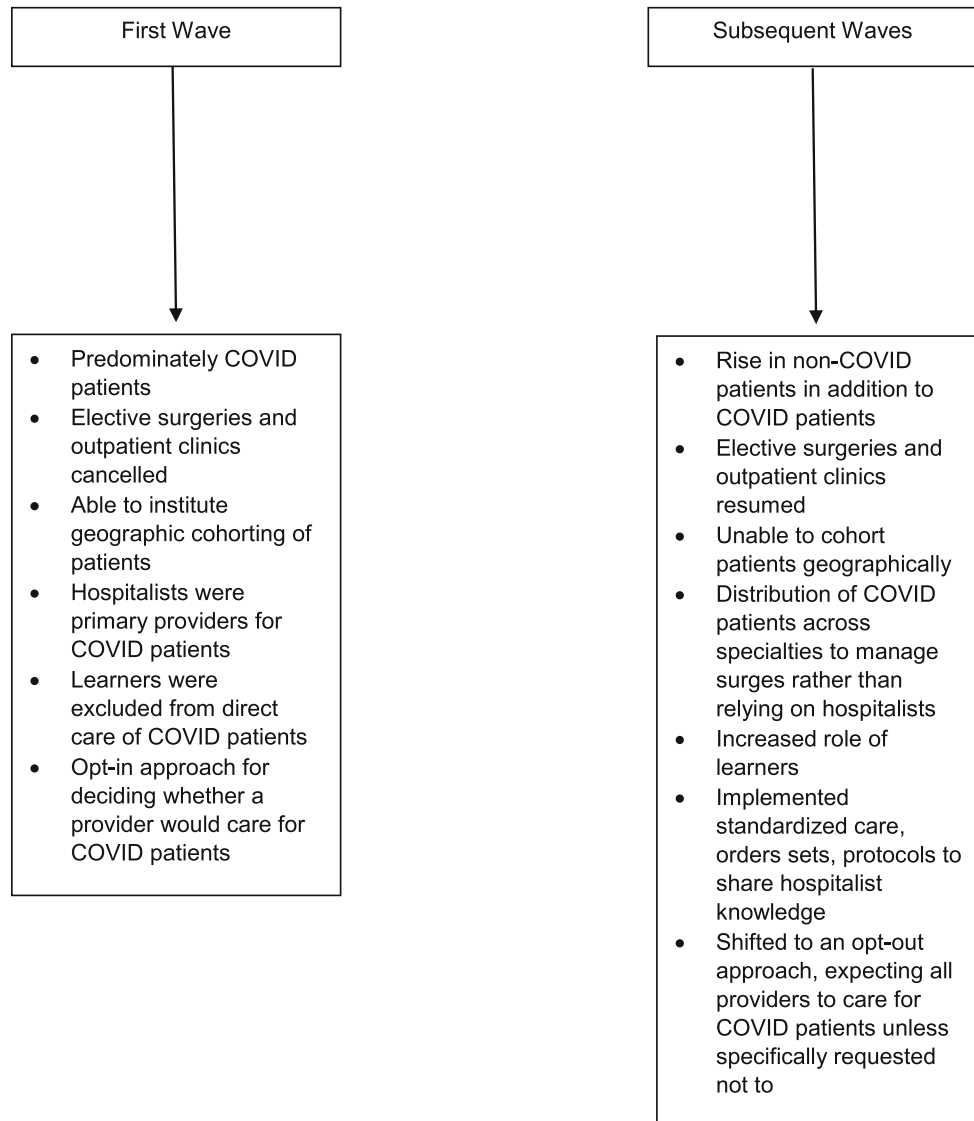

First Wave

- Predominately COVID patients
- Elective surgeries and outpatient clinics cancelled
- Able to institute geographic cohorting of patients
- Hospitalists were primary providers for COVID patients
- Learners were excluded from direct care of COVID patients
- Opt-in approach for deciding whether a provider would care for COVID patients

Subsequent Waves

- Rise in non-COVID patients in addition to COVID patients
- Elective surgeries and outpatient clinics resumed
- Unable to cohort patients geographically
- Distribution of COVID patients across specialties to manage surges rather than relying on hospitalists
- Increased role of learners
- Implemented standardized care, orders sets, protocols to share hospitalist knowledge
- Shifted to an opt-out approach, expecting all providers to care for COVID patients unless specifically requested not to

Figure 1 Changes over time.

Table 2 Themes Identified Across Domains

Domain	Theme	Quote
What adaptations have proved most useful?	Approaches to deciding to add capacity	"We can fluctuate by ~30 patients per day overnight…The beautiful thing about all of our medicine admissions filtering through a triagist is that it allows us to turn these systems on and off really quickly…it allows us to "down-flex" the overall plan pretty easily because there is one person who dictates patient flow and capacity" (Focus group 5, advanced practice provider)
	Recruitment and staffing strategies	"What worked really well in the Spring was redistribution of APPs. We have a robust APP pool for the general medicine service and a chief PA who ran the deployment service really well. Residents were put more in ICU-level care, and we staffed the floor COVID teams with attending physicians working with two PAs…We had a lot of inpatient subspecialists (cardiologists, oncologists) help with inpatient COVID work" (Focus group 4, attending physician)
	Learners	"There was a desire by the residents actually to take care of the patients. They felt they were on the outside looking in. we tried to set up restrictions on what does rounding look like, what types of patients they're seeing." (Focus group 5, attending physician)
	Delivery settings outside of hospital	"We have been running a field hospital, where we can send some of the less sick patients who maybe just need oxygen or IV medications but who can otherwise not be at home but not sick enough to be in the hospital but they go there for a while to convalesce." (Focus group 2, attending physician)
	Communication strategies	"With the first big flare we were doing huddles every morning with our teams and colleagues about how we were going to handle this and who is standing up additional teams and this communication piece was really key." (Focus group 5, attending physician)
What are you struggling with right now?	Resource constraints	"Nursing seems to be our limiting issue for all three hospitals. The ability to have nurses to staff everywhere seems to be more the limiting factor – not so much the doctors or beds." (Focus group 5, attending physician) "We had a 'peak' in April which we now refer to as 'cute'. It's actually bad now where our hospitals are completely full with 2 ICU beds in the entire city." (Focus group 3, attending physician) "Our big issues are space! Finding places for people to work and maintaining social distancing." (Focus group 4, attending physician)
	Ongoing struggle to determine the best workforce deployment strategies	"The hospital is full and there is no decrease in the number of non-COVID patients. The surgery census is higher than ever, and we are a trauma center so trauma patients are still coming in because people are out. This means that the tiered approach cannot be implemented because most of the elective procedures are still happening." (Focus group 5, attending physician) "There are a lot of institutional-level surge definitions but none of those really capture the on-the-ground local things and so we have some plans for how to expand by 8 to 10 patients here and there but they feel like things that, once you enact it, kind of has to stay for a week or two because you are pulling someone in or creating a new team or a new role or something and so we have been looking on a very local level for how we might create a trigger that can give us enough information about whether we should go up a level…and our only trigger right now is pain, how horrible does it feel and do you think we should do this or not" (Focus group 2, attending physician)
What important changes occurred between your first surge and later waves?	Changes in attitudes/moral issues/burnout	"Last time we relied on a lot of volunteerism from a lot of people and now that a lot of people are burning out it's going to have to be more uniform about how we distribute the work so that we don't tax peoples' good will more than we need to." (Focus group 5, attending physician)
	Burnout increasingly constrained the ability to adapt.	"The good will is gone. A lot of people did a lot of heroic stuff back in the spring and now people are tired. Our census is full even without COVID patients. Even if you cancel surgeries, you still need more people to do the work." (Focus group 3, attending physician)

Delivery Settings Outside of Hospital. One participant described setting up a field hospital but only for certain patients who were mobile and did not have any behavioral health issues. Another participant described converting a long-term acute-care (LTAC) hospital to a COVID hospital, which was considered very successful. A number of participants reported redistributing both patients and providers across a system of hospitals to manage surges in volume.

Communication Strategies. Participants described the importance of robust communication, including checking in with hospitalist and ICU colleagues and communication about current COVID-19 evidence and treatment guidelines. However, participants reported struggling to decide what the right frequency of communication might be, titrated to surge level, anxiety level, and knowledge level. Clinical pathways, order sets, and protocols were used to communicate current treatment guidelines as new clinical staff were deployed.

Persistent Struggles

Resource Constraints. These included insufficient negative pressure rooms, limited ICU capacity, and shortages in nursing and respiratory therapy staff. The most common concerns noted were nursing and respiratory therapy turnover. Organizations described significant attention paid to maintaining nursing ratios. Participants were concerned that even if there were sufficient beds or provider workforce, other disciplines within the hospital, such as nursing or respiratory therapy, were short-staffed and unable to adequately handle surges in volume. From the first wave to subsequent waves, participants described struggling with a surge in non-COVID patients and a concomitant resumption of elective surgeries and outpatient clinics, which decreased available beds, staff, and other resources for COVID patients. Space limitation was an issue not only for patient care, but also for providers attempting to distance from each other. Clinicians were in need of space to practice social distancing, especially given institutional rules about where staff were allowed to eat or take breaks. Finally, there was concern that a lack of redundancy in staffing plans made it difficult to flex up to cover shifts when hospitalists were unable to work.

Ongoing Struggle to Determine the Best Workforce Deployment Strategies. This was particularly true regarding the role of residents and balancing resident service and educational activities. Some found over time that trainees were more eager to care for COVID patients than originally thought, that leaving residents out of the workforce had unforeseen consequences, and that they could be included in the workforce safely. Participants reported having to continue to work on methods to determine the best workforce redeployment strategies and how to most effectively reorient new or returning workforce members. The higher non-COVID patient volume (including surgical/procedural and non-COVID medical patients) after the first wave complicated decision-making. Ultimately, there was a fixed workforce with limited ability to flex upwards without major structural changes (i.e., the workforce that was originally available from canceling clinics, canceling surgeries, etc. became less available and were now also facing increased volumes).

Important Changes that Occurred Between the First Surge and Later Waves

Changes in Attitudes/Moral Issues/Burnout. Participants described heavy reliance on goodwill and volunteerism with the first wave, but that with later waves, providers were fatigued and goodwill had faded. Local factors that influenced decisions about team size, number of teams, and which providers staffed teams included the use of care protocols, order sets, and guidelines to support redeployed clinicians and hospitalist supervision of redeployed clinicians as well as burnout among providers. There were differing opinions on running workloads higher than normal versus trying to find/add in additional providers to manage the high numbers of patients. Participants reported that deploying subspecialists with historically less inpatient experience was challenging because subspecialists often lacked the hospital systems knowledge required to deliver inpatient care (i.e., working knowledge of how to navigate the electronic health record and other operational factors). To support specialists caring for COVID patients, participants described creating a COVID consult service to answer any COVID-specific questions and provide COVID-specific medical management as opposed to admitting patients to a COVID-specific team.

Burnout Increasingly Constrained the Ability to Adapt. Participants discussed the challenge of continued changes on a workforce experiencing burnout. Participants also described a normalization of caring for COVID patients that allowed a larger group of clinicians to be involved in COVID care. However, there was concern that these continual higher volumes are contributing to reduced morale, fatigue, and burnout, though it is unclear whether COVID or non-COVID volumes are the bigger issue.

Global Themes

Three global themes emerged across discussions of all questions: (1) adaptability and comfort with dynamic change, (2) the importance of the hospitalist skillset to effective surge planning and workforce deployment, and (3) the lack of universal solutions, in which there is no easy way to surge.

The healthcare workforce was redeployed in a variety of ways as the situation evolved. Iterative improvements were made with each fluctuation in COVID-19 patient volumes, and participants reported that their hospitalist groups become more comfortable with dynamic change over time. Factors affecting level of comfort with change included communication, degree of burnout, and the number and types of innovations. Adaptations both fostered and reinforced more functional collaborations and partnerships with clinical colleagues, and participants reported being able to continue to leverage improved collaborations in the future. Systems knowledge and systems process improvement have always been central to

hospitalist work.[28–30] Participants felt that this skillset was critical to successful adaptations and augmented the hospitalist clinical skillset. The importance of tacit, implicit contextual knowledge in a time of rapid change was also apparent, and was felt to be a key reason why some clinicians were highly valued. However, there were no universal solutions described—the success of any one tactic for surge planning was highly dependent on the context in which it was applied. Challenges resulted from insufficient staffing and resources, often requiring clinical staff to flex up to meet demand, or flex into new roles that are not familiar or comfortable.

DISCUSSION

In this rapid qualitative evaluation of continued institutional adaptations in response to second and third waves of COVID-19, participants described a variety of useful adaptations but also described continued ongoing struggles. Despite multiple iterations of surge practices across multiple institutions, there were limited universal solutions to manage the surges beyond ensuring sufficient staffing as the ultimate crisis was a lack of resources (providers and other ancillary staff and sometimes critical other resources) to match the magnitude of the surge.

Prior to the COVID-19 pandemic, hospitals associated with academic medical centers commonly struggled with hospital capacity strain, or patient volume in excess of the available beds, clinical staff, and equipment.[31] Previous work has noted that hospital capacity strain is complex and difficult to predict and the interventions that were perceived to have worked the best when facing strain were to ensure appropriate resources; however, less costly solutions were often deployed.[31] These decisions unfortunately negatively impact the workforce, and some studies have suggested that they may lead to negative patient outcomes as well as operational outcomes. COVID-19 has further stressed an already strained system. Work by Aiken et al. as well as Elliot et al. has highlighted that when workloads exceed certain thresholds, quality and operational outcomes decline.[32–34] Kamalahmadi et al. noted that it may actually be in the institution's financial interest to lower census thresholds to optimize patient flow.[35]

Despite continual innovation and a comfort with dynamic change, hospitals and hospitalists struggled to figure out how to best maximize the workforce for current and future surges in the setting of insufficient workforce, primarily because there is no perfect approach to navigating surges in patient volume without having a sufficient workforce supply. Predicting when the surge occurs is also challenging especially when complicated by a baseline increase in patients needing hospital care. Additionally, communicating surge needs was complicated as thresholds varied and were challenging to define in the setting of a continually evolving situation.

It was starkly apparent that agile systems that are capable of rapid adaptation were vital for meeting the demands of the dynamic US healthcare environment during the first and subsequent waves of COVID-19 hospitalizations and the hospitals in this study clearly adapted rapidly. Participants described the importance of creativity in designing approaches for local problems and comfort with a dynamic atmosphere in which consistent change was accepted as the new normal. Although there were a number of commonalities, such as using volunteers, APP staff, or the use of field hospitals, no single adaptation emerged across focus groups as a universal approach. High-level recommendations exist in the literature for managing an influx of patients due to a disaster or pandemic[36,37]; however, a one-size approach fitting all situations does not exist. Hospitals can learn from one another, but will have to adapt in response to the contextual factors at their hospital.

The hospitalist skillset, beyond the clinical knowledge required for delivering high-quality inpatient care to medically complex patients, includes operational expertise and an ability to navigate complex systems.[28,38] In rapidly evolving, high-uncertainty situations like the pandemic, relationships provide the basis for effective communication, sense-making, and learning.[28,38] Hospitalists uniquely hold the relational and operational knowledge to be most effective under such conditions since they constantly navigate healthcare systems issues and are involved in managing process improvements for the inpatient setting.

As identified by participants in our focus groups, system constraints like staffing shortages and insufficient or irregular communication inhibited the ability of the workforce to innovate. As COVID-19 unfortunately becomes the norm of hospital care with likely intermittent upticks in patient numbers, hospital systems and hospitalists groups must begin to evolve their surge strategies to ensure proper staffing with sufficient flexibility to manage these surges in less disruptive ways.

Adaptations considered useful across participants include creating tiered surge plans, redeploying non-hospitalist physicians, APPs, and subspecialists to care for COVID-19 patients, redistributing COVID patients to specialist consult teams based on patients' primary disease complaint, frequently collating and disseminating updated COVID-related evidence and guidelines, and creating and sharing COVID care pathways and order sets to standardize treatment. While most participants described excluding learners from COVID care, participants recognized the value of residents or high-functioning interns and many reported seeking to include learners in the care of COVID patients during subsequent waves. Finally, some participants described developing plans to care for COVID patients outside of the traditional hospital setting, including field hospitals and long-term acute-care hospitals converted to COVID patient care.

Our work has several strengths. This study employed rapid qualitative methods, useful in dynamic, real-world situations where the insights gathered are vital for immediate real-time application.[19,21–25] While the methods we used were not designed to quantify the strategies described by participants, qualitative analysis allows a deeper understanding of the

context in which various strategies were implemented, the perspectives of frontline physicians and APPs as well as those developing operational plans, and the role of hospital medicine in the response to the COVID-19 pandemic. We interviewed a diverse cross section of hospitalists including physicians involved not only in frontline clinical care but also in COVID-related adaptations, APPs, and physician researchers. At the time the focus groups were conducted, each participant had been involved in one or more surges of the COVID-19 pandemic.

Because our participants were limited to members of the HOMERuN, our results may not be completely applicable to non-academic settings. In addition, there was a potential for participation bias if hospitalists who attended the meeting and participated in the focus groups were different in some way from those who did not attend and/or participate in the focus groups. The focus groups included physicians, APPs, and physician researchers working in the field of hospital medicine, so we did not capture the voice of the providers from other specialties. While participants represented hospitals from across the USA, individuals who elected to call in were assured during the focus groups that we would protect their confidentiality so we did not collect and analyze the qualitative data in such a way that we can assign specific institutions to specific solutions described.

Finally, while these focus groups were conducted more than a year ago, continual surges of patients and diminishing resources including space and clinical staff have necessitated adapting and evolving surge plans. Disseminating the findings from these focus groups would provide additional information, ideas, and potentially useful adaptations as hospitals and hospitalists across the country are faced with the ongoing challenges of the COVID-19 pandemic.

CONCLUSION

Hospitals continued to evolve in the ways they have adapted to the challenges of the COVID pandemic. Few approaches were universally effective in managing surges of COVID-19 patients, and successful adaptations were highly context dependent. Hospitalists' local systems knowledge has uniquely positioned them to manage ongoing adaptations in response to COVID-19, but resource constraints and sustained high workload levels raised issues of burnout. The findings of this rapid qualitative evaluation bring to light the challenge of creating single solutions that will be applicable across hospitals that operate in different ways, and underscore the need for further research to identify particular workflows that are associated with improved patient-relevant outcomes.

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REFERENCES

1. Bowden K, Burnham EL, Keniston A, et al. Harnessing the Power of Hospitalists in Operational Disaster Planning: COVID-19. *J Gen Intern Med.* 2020;35(9):2732-2737.
2. Persoff J, Ornoff D, Little C. The Role of Hospital Medicine in Emergency Preparedness: A Framework for Hospitalist Leadership in Disaster

Preparedness, Response, and Recovery. *J Hosp Med.* 2018;13(10):713-718.

3. Auerbach A, O'Leary KJ, Greysen SR, et al. Hospital Ward Adaptation During the COVID-19 Pandemic: A National Survey of Academic Medical Centers. *J Hosp Med.* 2020;15(8):483-488.

4. Linker AS, Kulkarni SA, Astik GJ, Keniston A, Sakumoto M, Eid SM, Burden M, Leykum LK; HOMERuN COVID-19 Collaborative Working Group. Bracing for the Wave: a Multi-Institutional Survey Analysis of Inpatient Workforce Adaptations in the First Phase of COVID-19. *J Gen Intern Med.* 2021;36(11):3456-3461.

5. Kumar SI, Borok Z. Filling the Bench: Faculty Surge Deployment in Response to the Covid-19 Pandemic. NEJM Catalyst. Published 10/29/2020. Accessed 1/20/2022.

6. Anesi GL, Lynch Y, Evans L. A Conceptual and Adaptable Approach to Hospital Preparedness for Acute Surge Events Due to Emerging Infectious Diseases. *Crit Care Explor.* 2020;2(4):e0110-e0110.

7. Vranas KC, Golden SE, Mathews KS, et al. The Influence of the COVID-19 Pandemic on ICU Organization, Care Processes, and Frontline Clinician Experiences: A Qualitative Study. *Chest.* 2021;160(5):1714-1728.

8. Coates A, Fuad AO, Hodgson A, Bourgeault IL. Health workforce strategies in response to major health events: a rapid scoping review with lessons learned for the response to the COVID-19 pandemic. *Hum Resour Health.* 2021;19(1):154.

9. Roser Max RH, Ortiz-Ospina E, Hasell J. Coronavirus Pandemic (COVID-19). https://ourworldindata.org/coronavirus. Published 2020. Accessed 2/28/2021.

10. Washington DC: Office of the Inspector General; April 3, 2020. Report no. OEI-06-20-00300.

11. Mhango M, Dzobo M, Chitungo I, Dzinamarira T. COVID-19 Risk Factors Among Health Workers: A Rapid Review. *Safety Health Work.* 2020;11(3):262-265.

12. Garg M, Wray CM. Hospital Medicine Management in the Time of COVID-19: Preparing for a Sprint and a Marathon. *J Hosp Med.* 2020;15(5):305-307.

13. Biala D, Siegel EJ, Silver L, Schindel B, Smith KM. Deployed: Pediatric Residents Caring for Adults During COVID-19's First Wave in New York City. *J Hosp Med.* 2020;15(12):763-764.

14. Bloom-Feshbach K, Berger RE, Dubroff RP, McNairy ML, Kim A, Evans AT. The Virtual Hospitalist: a Critical Innovation During the COVID-19 Crisis. *J Gen Intern Med.* 2021:1-4.

15. HOMERuN. http://hospitalinnovate.org Accessed July 23, 2017.

16. Beebe J. Rapid qualitative inquiry : a field guide to team-based assessment / James Beebe. 2nd ed. Lanham, Maryland: Rowman & Littlefield; 2014.

17. Gale RC, Wu J, Erhardt T, et al. Comparison of rapid vs in-depth qualitative analytic methods from a process evaluation of academic detailing in the Veterans Health Administration. *Implementation Science.* 2019;14(1):11.

18. Lewinski AA, Crowley MJ, Miller C, et al. Applied Rapid Qualitative Analysis to Develop a Contextually Appropriate Intervention and Increase the Likelihood of Uptake. *Med Care.* 2021;59.

19. Hamilton A. Qualitative methods in rapid turn-around health services research. Paper presented at: Veterans Affairs (VA) Health Services Research & Development Cyberseminar; 12/11/2013, 2013.

20. Auerbach AD, Patel MS, Metlay JP, et al. The Hospital Medicine Reengineering Network (HOMERuN): a learning organization focused on improving hospital care. *Acad Med.* 2014;89(3):415-420.

21. Averill JB. Matrix analysis as a complementary analytic strategy in qualitative inquiry. *Qual Health Res.* 2002;12(6):855-866.

22. Brown DR, Hernández A, Saint-Jean G, et al. A participatory action research pilot study of urban health disparities using rapid assessment response and evaluation. *Am J Public Health.* 2008;98(1):28-38.

23. Burks DJ, Robbins R, Durtschi JP. American Indian gay, bisexual and two-spirit men: a rapid assessment of HIV/AIDS risk factors, barriers to prevention and culturally-sensitive intervention. *Cult Health Sex.* 2011;13(3):283-298.

24. Vindrola-Padros C, Chisnall G, Cooper S, et al. Carrying Out Rapid Qualitative Research During a Pandemic: Emerging Lessons From COVID-19. *Qual Health Res.* 2020;30(14):2192-2204.

25. Zuchowski JL, Chrystal JG, Hamilton AB, et al. Coordinating Care Across Health Care Systems for Veterans With Gynecologic Malignancies: A Qualitative Analysis. *Med Care.* 2017;55 Suppl 7 Suppl 1:S53-s60.

26. Birt L, Scott S, Cavers D, Campbell C, Walter F. Member Checking: A Tool to Enhance Trustworthiness or Merely a Nod to Validation? *Qual Health Res.* 2016;26(13):1802-1811.

27. Bloom-Feshbach K, Berger RE, Dubroff RP, McNairy ML, Kim A, Evans AT. The Virtual Hospitalist: a Critical Innovation During the COVID-19 Crisis. *J Gen Intern Med.* 2021;36(6):1771-1774.

28. Wachter RM, Goldman L. The emerging role of "hospitalists" in the American health care system. *N Engl J Med.* 1996;335(7):514-517.

29. Wachter RM, Goldman L. Zero to 50,000 - The 20th Anniversary of the Hospitalist. *N Engl J Med.* 2016;375(11):1009-1011.

30. The core competencies in hospital medicine: a framework for curriculum development by the Society of Hospital Medicine. *J Hosp Med.* 2006;1:2-95.

31. Arogyaswamy S VN, Keniston A, Apgar S, Bowden K, Diaz M, Kantor M, McBeth L, Burden M. Hospital-capacity strain: A qualitative analysis of solutions utilized by academic medical centers. *J Gen Intern Med.*

32. Aiken LH, Clarke SP, Sloane DM, Sochalski J, Silber JH. Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *JAMA.* 2002;288(16):1987-1993.

33. Aiken LH, Clarke SP, Sloane DM. Hospital staffing, organization, and quality of care: cross-national findings. *Int J Qual Health Care.* 2002;14(1):5-13.

34. Elliott DJ, Young RS, Brice J, Aguiar R, Kolm P. Effect of hospitalist workload on the quality and efficiency of care. *JAMA Intern Med.* 2014;174(5):786-793.

35. Kamalahmadi M, Bretthauer K, Helm J, et al. Mixing It Up: Operational Impact of Hospitalist Caseload and Case-mix. *Baruch College Zicklin School of Business Research Paper No 2019-10-02.* 2019.

36. Hick JL, Einav S, Hanfling D, et al. Surge capacity principles: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest.* 2014;146(4 Suppl):e1S-e16S.

37. Einav S, Hick JL, Hanfling D, et al. Surge capacity logistics: care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest.* 2014;146(4 Suppl):e17S-43S.

38. O'Leary KJ, Williams MV. The evolution and future of hospital medicine. *Mt Sinai J Med.* 2008;75(5):418-423.