Bracing for the Wave: a Multi-Institutional Survey Analysis of Inpatient Workforce Adaptations in the First Phase of COVID-19

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BACKGROUND: Medical centers across the country have had to rapidly adapt clinician staffing strategies to accommodate large influxes of patients with the coronavirus disease 2019 (COVID-19).

OBJECTIVE: We sought to understand the adaptations and staffing strategies that US academic medical centers employed in the inpatient setting early in the spread of COVID-19, and to assess whether those changes were sustained during the first phase of the pandemic.

DESIGN: Cross-sectional survey assessing organization-level, team-level, and clinician-level inpatient workforce adaptations.

PARTICIPANTS: Hospital medicine leadership at 27 academic medical centers in the USA.

KEY RESULTS: Twenty-seven of 36 centers responded to the survey (75%). Widespread practices included frequent staffing reassessment, organization-level changes such as geographic cohorting and redeployment of non-hospitalists, and exempting high-risk healthcare workers from direct care of patients with COVID-19. Several practices were implemented but discontinued, such as reduction of non-essential services, indicating that they were less sustainable for large centers.

CONCLUSION: These findings provide guidance for inpatient leaders seeking to identify sustainable practices for COVID-19 inpatient workforce planning.

KEY WORDS: COVID-19; workforce planning; implementation science.

INTRODUCTION

Coronavirus disease 2019 (COVID-19) forced academic medical centers (AMCs) to quickly accommodate a large

influx of ill patients. Though descriptions of "surge planning" have been published, few publications describe workforce modifications across the broad landscape of hospital medicine.[1–6] We sought to understand clinician workforce adaptations employed by AMCs from the start of the pandemic through mid-May 2020, to inform responses to future surges of COVID-19 or other epidemics.

METHODS

We surveyed institutions in the Hospital Medicine Reengineering Network (HOMERuN), a network of over 60 sites.[7] HOMERuN leadership mobilized the network to share practices by creating the "COVID-19 Collaborative," which was composed of several workgroups.

This work was deemed non-human subject research by Northwestern University's Institutional Review Board.

Survey Development. Our survey was developed in three steps. First, documents related to planned inpatient workforce modifications were collected from 12 HOMERuN institutions. Institutions were recruited during HOMERuN COVID-19 Collaborative all-participant calls, and contribution of documents was voluntary. The documents included staffing plans related to clinician redeployment, training materials, guidelines on patient cohorting, and use of alternative care sites. We identified and categorized inpatient adaptations and summarized the findings for each site. This information was discussed on two HOMERuN all-participant calls, during which additional adaptations were also identified. The workgroup then developed a final survey (Appendix Figure 1).

We divided adaptations into three categories. Descriptions of adaptations can be found in Appendix Table 1. Organization-level adaptations included staffing strategy reassessments, geographic cohorting of COVID-19 patients, care team restructuring, expanded bed capacity, non-essential service reduction, use of inpatient virtual visits, transfer of patients to other facilities, and use of community surge areas. Team-level adaptations included redeploying clinicians (residents, fellows, advanced practice practitioners (APPs), non-hospitalists), redeploying hospitalists to intensive care settings, hospitalist supervision of other clinicians, and hiring locum tenens physicians. Clinician-level adaptations included surveying clinicians for illness and exempting high-risk clinicians from COVID-19 care. We did not specify a definition of "clinician." For each adaptation, respondents chose from the following descriptors: (1) implemented and still utilized, (2) implemented and discontinued, (3) planned but never implemented, and (4) never planned by the time of the survey. The survey tool is shown in Appendix Figure 1.

Survey Distribution. Our survey, combined with questions developed by other COVID-19 Collaborative workgroups, was sent to senior leaders at 36 AMCs participating in the COVID-19 Collaborative.[8] This report describes responses to the workforce planning questions. Survey responses were submitted from May 18 to 21, 2020 using REDCap (Research Electronic Data Capture).[9, 10]

Geographic Data Analysis. We examined the association between survey responses and state COVID-19 cumulative case rate. Data from the COVID-19 Data Repository by the Center for Systems Science and Engineering (CSSE) at Johns Hopkins University and the US Census Bureau's 2018 American Community Survey were used to quantify geographic differences in COVID-19 cumulative and incident rates by state during the study period.[11,12]

Chi-square tests were used to assess differences between institutional use of each adaptation and COVID-19 cumulative case rate by state per 100,000 inhabitants.

RESULTS

Twenty-nine centers responded to the full survey, though two sites did not complete the workforce questions and were excluded. One center did not self-identify but completed the survey, so was included. The 27 included centers ranged in size from 247 to 1397 beds; 19 had > 500 beds and five had 300–499 beds. Centers spanned 19 states and included level-one trauma centers, tertiary referral centers, safety net, and private hospitals.

Organization-Level Adaptations. Table 1 summarizes our results. Many respondents (59%) reported daily reassessment of staffing strategy; the remainder reassessed weekly. Several implemented adaptations were still in use by respondents: geographic cohorting (85%), team expansion/restructuring (63%), virtual inpatient visits (59%), and increased patient care units/beds (56%). Non-essential service reduction was planned by 81%; 67% implemented this change and 26% discontinued it. Half (48%) of AMCs planned to use community surge areas; 18% utilized them and 11% reported ongoing use. Most centers (63%) did not change frequency of clinician rotations.

Team-Level Adaptations. Centers planned redeployment of residents (86%), non-hospitalists (96%), and APPs (85%), though most stopped redeployment by the time of the survey. Many centers planned redeployment of hospitalists to intensive care settings (67%), redeployment of fellows to COVID-19 direct care (66%), and hospitalist supervision of non-hospitalist clinicians (78%). A minority implemented and continued to utilize these changes (30%, 26%, and 7% respectively).

Clinician-Level Adaptations. Most centers (81%) exempted clinicians at high risk for COVID-19 disease from caring for COVID-19+ patients. Healthcare worker surveillance for COVID-19 was reported by 67% of AMCs.

Association Between Adaptations and COVID-19 Case Rates. Figure 1 shows cumulative and incident rates of COVID-19 infection by state, and geographic distribution of participating AMCs. This information provides a snapshot of the COVID-19 burden at the time of the survey, as well as a longer view of the prior experience with COVID-19 since the start of the pandemic. Figure 2 shows survey results arranged according to cumulative case rate per 100,000 inhabitants.

DISCUSSION

In this survey of diverse AMCs conducted during the first wave of COVID-19, we identified a number of planned/implemented organization-, team-, and clinician-level adaptations. Institutions reported rapidly implementing organization-level changes. This is notable, as AMCs anecdotally report that changes such as geographic cohorting typically require long-term planning.

Commonly utilized team-level adaptations included redeployment of non-hospitalist internal medicine clinicians (residents, fellows, non-hospitalist internal medicine attendings, and APPs). Residents and APPs were more commonly redeployed than non-hospitalist attendings, perhaps speaking to the importance of familiarity

Table 1 Organization-Level, Team-Level, and Clinician-Level Adaptations. N = 27

	Planned, n (%)[†]	Yes, still utilizing, n (%)	Yes, but discontinued, n (%)	Planned, but not implemented, n (%)	Never planned, n (%)
Organization-level adaptation					
Geographic cohorting	25 (93)	23 (85)	1 (4)	1 (4)	2 (7)
Restructure or expand teams	23 (85)	17 (63)	3 (11)	3 (11)	4 (15)
Decrease team census*	16 (59)	13 (48)	2 (7)	1 (4)	10 (37)
Change in rotation frequency	10 (37)	7 (26)	1 (4)	2 (7)	17 (63)
Increase patient care units/beds covered?	23 (85)	15 (56)	1 (4)	7 (26)	4 (15)
Reduction in non-essential services[‡]	22 (81)	11 (41)	7 (26)	4 (15)	5 (19)
Virtual visits	18 (67)	16 (59)	1 (4)	1 (4)	9 (33)
Transfer patients to other facilities	16 (59)	7 (26)	4 (15)	5 (19)	11 (41)
Community surge areas	13 (48)	3 (11)	2 (7)	8 (30)	14 (52)
Decrease documentation requirements	16 (59)	10 (37)	2 (7)	4 (15)	11 (41)
Team-level adaptation					
Redeployment of residents*	23 (85)	13 (48)	5 (19)	5 (19)	3 (11)
Added/redeployed fellows	18 (67)	7 (26)	2 (7)	9 (33)	9 (33)
Added/redeployed APPs	23 (85)	9 (33)	5 (19)	9 (33)	4 (15)
Added/redeployed non-hospitalists	26 (96)	9 (33)	2 (7)	15 (56)	1 (4)
Hospitalists caring for critically ill patients	18 (67)	8 (30)	1 (4)	9 (33)	9 (33)
Hospitalists supervising other clinicians	21 (78)	2 (7)	1 (4)	18 (67)	6 (22)
Locum tenens*	2 (7)	0	2 (7)	0	24 (89)
Clinician-level adaptation					
Healthcare worker surveillance	18 (67)	18 (67)	0	0	9 (33)
Exempt providers at high risk from care of COVID-19 patients	24 (89)	22 (81)	0	2 (7)	3 (11)
Staffing reassessment	Weekly	Daily			
How frequently have you reassessed your staffing strategy?	11 (41)	16 (59)			

*One center did not respond to this question
[†]"Planned" combines "Yes, still utilizing," "Yes, but discontinued," and "Planned, but not implemented"
[‡]Non-essential service examples: surgical co-management, pre-operative assessments

with inpatient workflows. Many centers planned hospitalist supervision of other clinicians, but few implemented it. Use of locum tenens was rare.

By assessing continued use of adaptations, our analysis builds on prior work describing COVID-19-related workforce changes.[13] Reduction in non-essential services was not sustained even in areas with higher case rates, perhaps reflecting the financial impact or the possibility that organizations developed safe practices for these services. Interestingly, centers located in the same city did not always adopt the same strategies, speaking to the importance of institutional context. This finding also underscores the siloes that exist among hospital systems in similar geographic areas, and may represent an opportunity to create networks among hospitals or hospital systems to share best practice and standardize care or assist resource-limited hospitals.

Our study has limitations. This cross-sectional work provides an overview of responses to COVID-19 at one point in time, but does not address the response to subsequent waves. The survey was completed in May 2020, before some regions experienced high rates of COVID-19. Because we focused on AMCs, our findings may not apply to community hospitals. Lastly, the multiple-choice format limited centers' ability to add detail to responses. Future data collection will create a more complete picture of the workforce planning strategies used during later phases of COVID-19. The financial impact of surge planning adaptations is another important area that may have shaped operational decisions.

CONCLUSION

In this work, we characterize the initial inpatient response of AMCs to the COVID-19 pandemic. Given that COVID-19 is likely part of the future landscape, it is essential to understand how organizations adapt to increasing case volumes, and whether adaptations are sustainable. Our findings provide guidance to AMCs as they refine their practices. Future studies

a Incident Case Rate per 100,000 Population by State from May 14th to May 21st
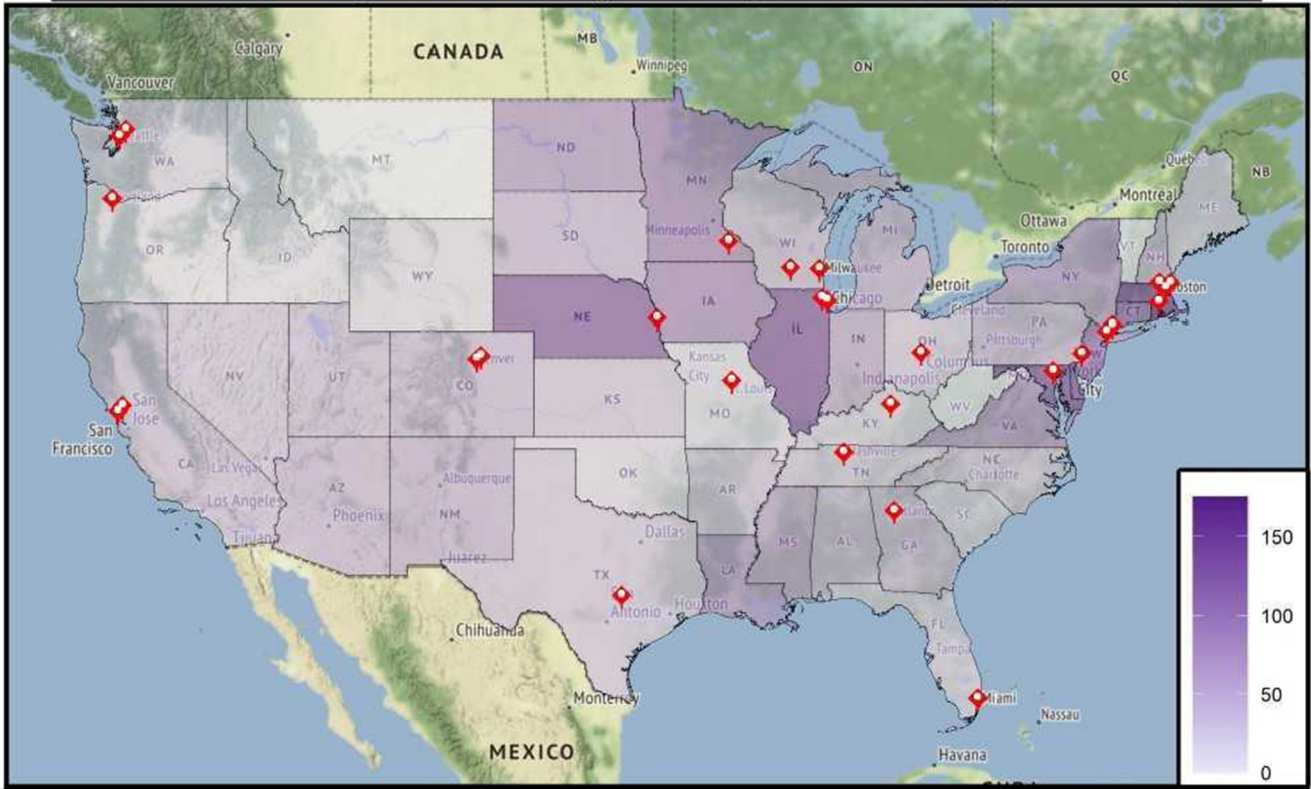
b Cumulative Case Rate per 100,000 Population by State as of May 21st

Figure 1 Geographic distribution of surveyed centers. a Incident (May 14–21, 2020) and b Cumulative case rates of COVID-19 per 100,000 inhabitants, by state.
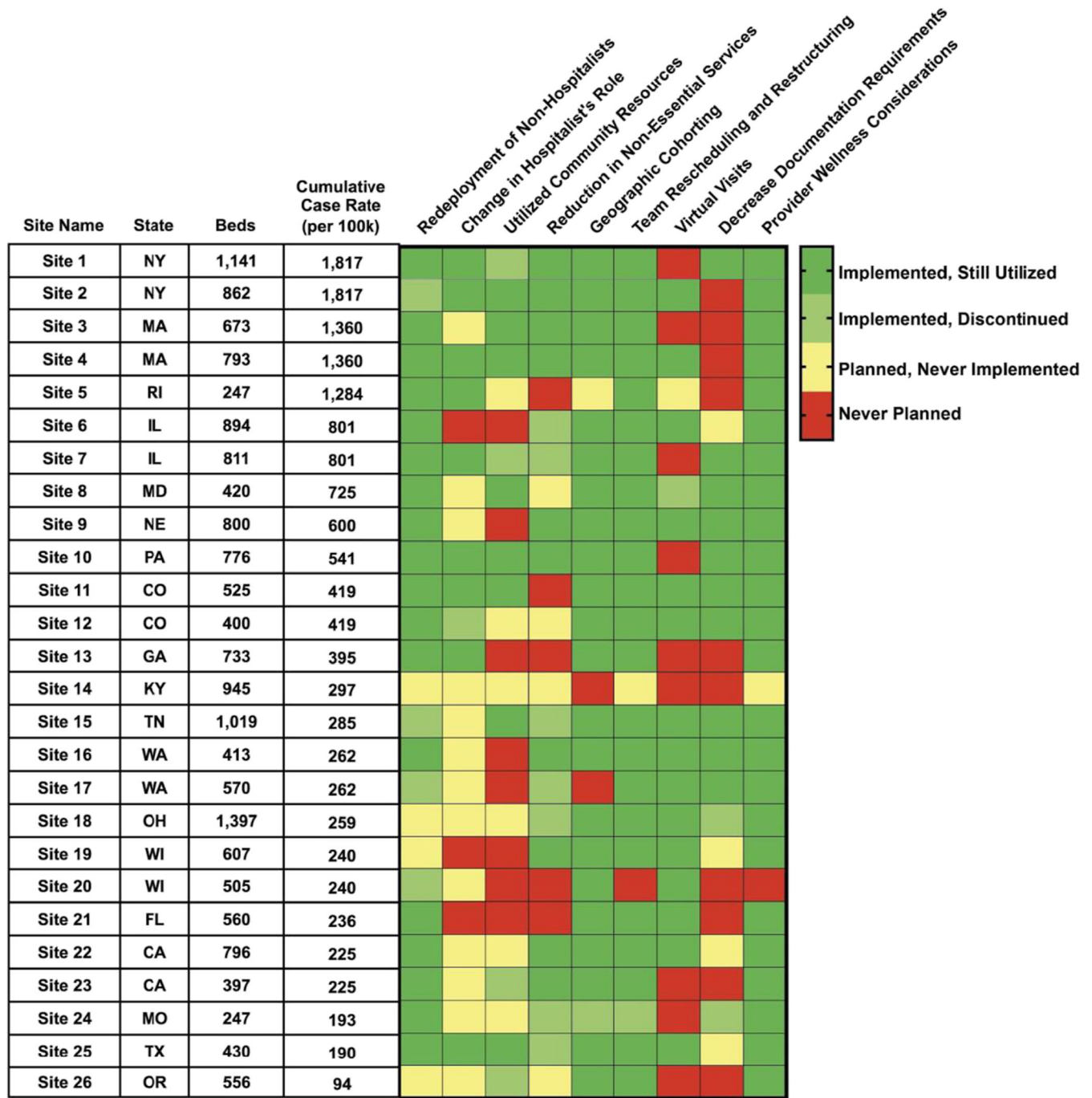
Site Name	State	Beds	Cumulative Case Rate (per 100k)
Site 1	NY	1,141	1,817
Site 2	NY	862	1,817
Site 3	MA	673	1,360
Site 4	MA	793	1,360
Site 5	RI	247	1,284
Site 6	IL	894	801
Site 7	IL	811	801
Site 8	MD	420	725
Site 9	NE	800	600
Site 10	PA	776	541
Site 11	CO	525	419
Site 12	CO	400	419
Site 13	GA	733	395
Site 14	KY	945	297
Site 15	TN	1,019	285
Site 16	WA	413	262
Site 17	WA	570	262
Site 18	OH	1,397	259
Site 19	WI	607	240
Site 20	WI	505	240
Site 21	FL	560	236
Site 22	CA	796	225
Site 23	CA	397	225
Site 24	MO	247	193
Site 25	TX	430	190
Site 26	OR	556	94

Column categories (heatmap): Redeployment of Non-Hospitalists; Change in Hospitalist's Role; Utilized Community Resources; Reduction in Non-Essential Services; Geographic Cohorting; Team Rescheduling and Restructuring; Virtual Visits; Decrease Documentation Requirements; Provider Wellness Considerations

Legend: Implemented, Still Utilized; Implemented, Discontinued; Planned, Never Implemented; Never Planned

Figure 2 Site-specific workforce planning adaptation and implementation by site, organized by state cumulative case rate per 100,000 inhabitants. Survey questions were consolidated into the following categories: redeployment of non-hospitalists = added/redeployed non-hospitalists, APPs, fellows, residents; change in hospitalist's role = hospitalists supervising other clinicians, hospitalists caring for critically ill patients; utilized community resources = community surge areas, facility transfers; team rescheduling and restructuring = increase patient care units/beds covered, decrease team census, change in rotation frequency, restructure or expand team; provider wellness considerations = healthcare worker surveillance, exempt providers at high risk from care of COVID-19 patients. The following represent individual survey questions: reduction in non-essential services, geographic cohorting, virtual visits, decrease documentation requirements.

will be needed to understand the rationale for continued use, evolution, or discontinuation of particular strategies, and to target adaptations to the care settings best served by them.

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Declarations:

Disclaimer: *The views expressed do not represent the position of the Department of Veterans Affairs or other organizations affiliated with the authors.*

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