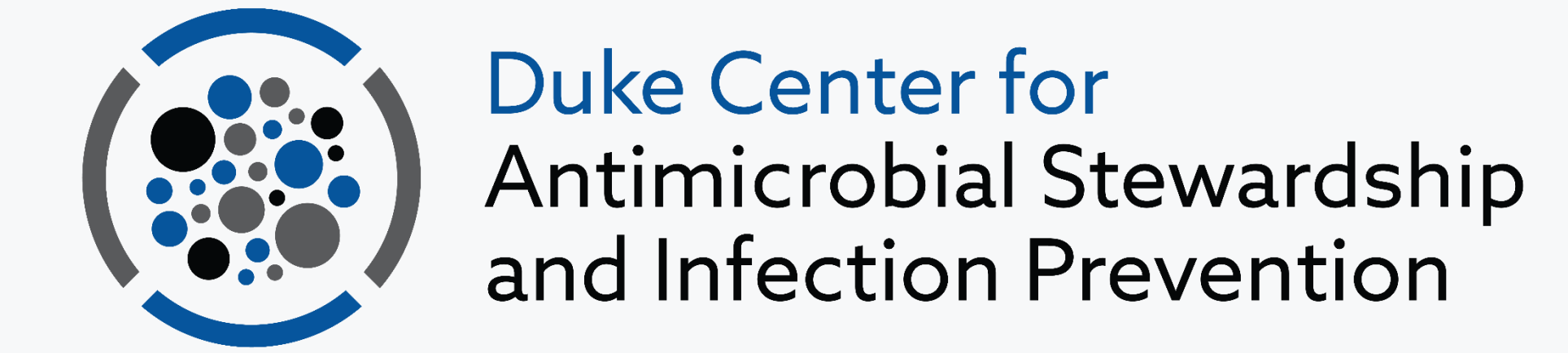


Pandemic Hits: Evaluation of an Antimicrobial Stewardship Program Website for Hospital Communication During the COVID-19 Pandemic



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Abstract

Background: Antibiotic Stewardship Programs (ASPs) assist front-line clinicians in synthesizing emerging data and establishing best practices. Our ASP team directly maintained and edited an internal web application, Duke CustomID®, to disseminate updated guideline, policy, and drug information during COVID-19. We aimed to describe website engagement and maintenance during the dynamic pandemic period.

Methods: We performed a descriptive, time-series analysis using Google Analytics software to measure engagement with Duke CustomID® during a 1-year pre-pandemic period through the Omicron surge: January 2019 to March 2022. We measured total page views (or "hits"), COVID-specific page hits, and days requiring COVID-specific page edits by week. Given fluctuations in hospitalization rates, we defined the primary outcome as the rate of hits divided by total hospitalizations. Weekly data were assessed graphically with positive COVID tests and COVID hospitalizations. We used negative binomial regression to quantify the association between COVID hospitalizations and hit rates and to trend engagement over time, adjusted for seasonality. We stratified data by COVID page and calculated a hit/edit ratio.

Results: Engagement with CustomID® increased during the pandemic period, especially during surges (Figure). Hits in the pre-pandemic period were median 1707 (range 1165-2354) per week, and hit rates median 1.95 per hospitalization (range 1.40-2.86). Peaks were observed in March 2020 (hit rate 4.59) and January 2022 (hit rate 3.87). On average, for every 100 COVID hospitalizations, the hit rate increased by 0.08 (0.004-0.16, p=0.04). Engagement slowly increased over the study period (relative rate week 1 versus 170: 1.15, 95% confidence interval 1.02-1.28, p=0.02). COVID page edits per week had a median of 2 (range 0-12). Adult Inpatient Guidelines and COVID Monoclonal Antibody pages had highest use (Table).

Conclusions: Our ASP's website was a highly utilized, practical tool for disseminating practice-changing information during the pandemic. Use increased over time and especially during surges. An electronic reference customized for local practice and rapidly updated by ASPs offers critical support for front-line clinicians.

Background

- Duke CustomID® is an internal web application designed to disseminate institution-specific clinical guidance for antimicrobials (e.g. local guidelines, antibiograms, dosing, and hospital policy).
- Clinical management of COVID-19 required frequent changes in practice recommendations including new therapeutics.
- **MAIN AIM:** To quantify user engagement and effort required to maintain CustomID preceding and during the COVID-19 pandemic.

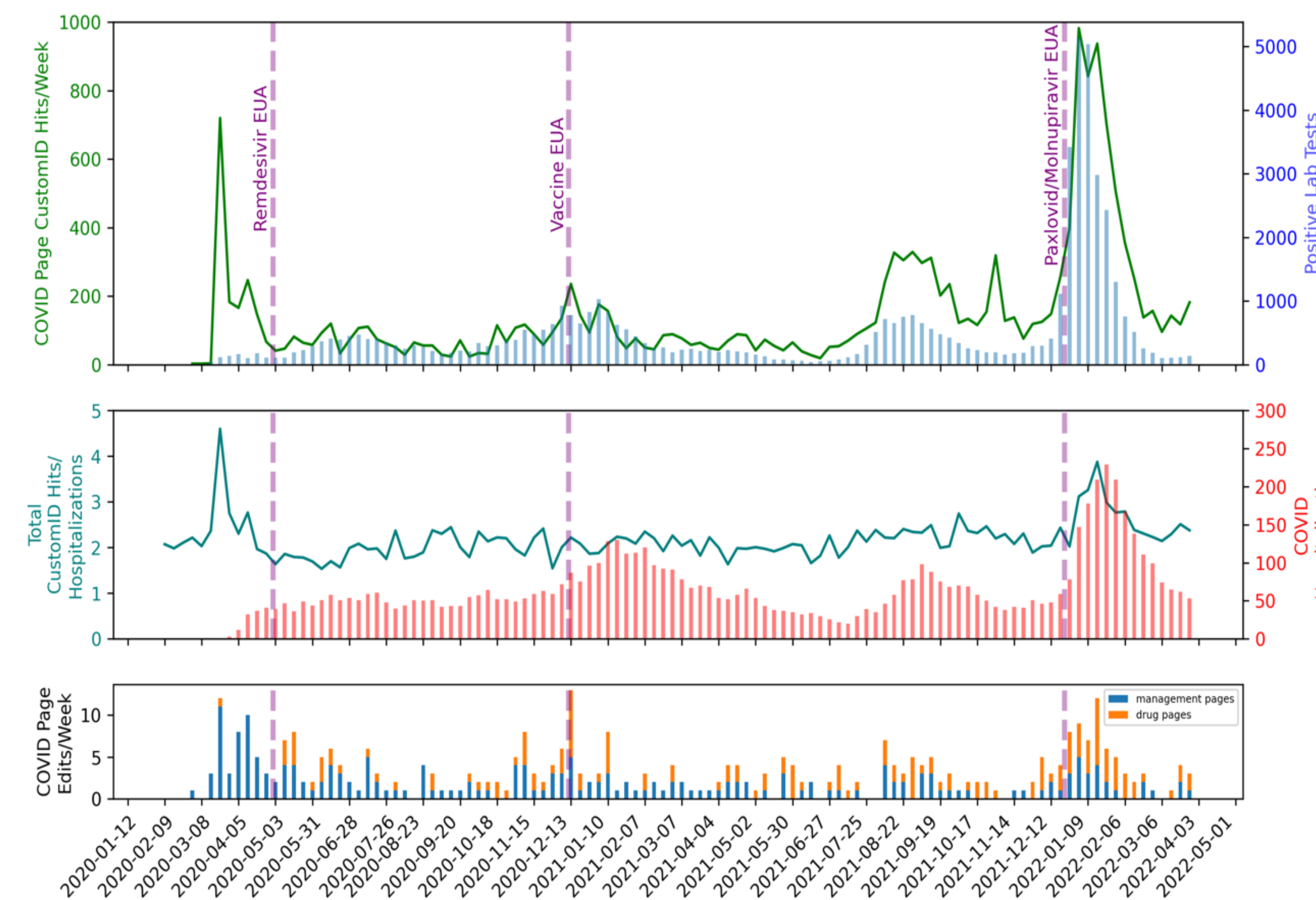
Results

- Median CustomID® hits in the pre-pandemic period were 1707 per week (range 1165-2354), and median hit rates were 1.95 per hospitalization (range 1.40-2.86)
- During COVID-19, peak hit rates occurred in March 2020 (4.59) and January 2022 (3.87) (Figure).
- Hit rates increased by 0.08 (0.004-0.16, p=0.04) for every 100 COVID hospitalizations.
- Engagement slowly increased over the study period: relative hit rate week 1 versus 170: 1.15 (95% confidence interval 1.02-1.28, p=0.02)
- Site maintenance required a median of 2 COVID page edits per week (Figure, Table):
 - Guideline pages were efficient in hits/edit ratio due to high engagement.
 - Monoclonal antibody page required many edits but also had high engagement.
 - COVID Research Protocol list required many edits but had limited engagement.

Table. COVID-19-specific pages on Duke CustomID with total hits, edits, and ratio

| Page Name | Date of Initial Posting | Total Hits | Total Edits | Hits/Edits Ratio |
|------------------------------------|-------------------------|------------|-------------|------------------|
| All Guideline Pages (N=7) | | | | |
| Adult Hospitalized COVID Guideline | 3/20/2020 | 4120 | 29 | 142 |
| Ambulatory COVID Guideline | 12/29/2021 | 1152 | 11 | 104 |
| COVID Research Protocols | 3/23/2020 | 1282 | 133 | 9 |
| Pediatric COVID Guideline | 3/24/2020 | 502 | 13 | 38 |
| COVID Prophylaxis Guideline | 3/20/2020 | 330 | 4 | 82 |
| COVID Antimicrobial Guideline | 3/20/2020 | 254 | 3 | 84 |
| Asymptomatic COVID Guideline | 1/17/2022 | 106 | 1 | 106 |
| All Drug Pages (N=8) | | | | |
| COVID Monoclonal Antibodies | 11/10/2020 | 2659 | 50 | 68 |
| Remdesivir | 5/12/2020 | 2216 | 23 | 96 |
| COVID Vaccines | 12/12/2020 | 1478 | 32 | 46 |
| Baricitinib | 11/20/2020 | 1021 | 7 | 145 |
| Tocilizumab | 7/1/2021 | 297 | 8 | 37 |
| Paxlovid | 12/22/2021 | 272 | 5 | 54 |
| Molnupiravir | 12/27/2021 | 179 | 4 | 44 |
| Convalescent Plasma | 8/31/2020 | 125 | 5 | 25 |

Figure. Weekly CustomID hits, and edits relative to positive tests and hospitalizations



Top: COVID-specific CustomID hits per week (Green), Positive COVID tests per week (Blue) over time
Middle: Total custom ID page hits relative to total hospitalizations per week (teal), COVID hospitalizations (Red)
Bottom: Number of edits to COVID-specific CustomID pages per week, stratified by management pages and drug pages

Several dates of significance are highlighted including the Emergency Use Authorizations (EUA) for remdesivir, the COVID Vaccines, and Paxlovid



Methods

- Study Design: Time series analysis
- Study Period: Jan 2019 – March 2022
- Setting: Duke University Hospital (1,048 beds)
- Primary Outcome: Rate of Hits / Total hospitalizations
- User engagement was measured as page views or hits
- Effort for maintenance was measured as page edits. Efficiency as hits/edits ratio.
- Counts per week included positive COVID tests, COVID hospitalizations, Total hospitalizations, Total CustomID hits, COVID-specific hits, number of edits per COVID page
- Descriptive statistics evaluating hits/week, hits/total hospitalizations/week, and edits/week.
- Hit/edit ratios for each page related to COVID-19
- Negative binomial regression to assess 1) association between COVID hospitalizations and engagement, and 2) engagement over time, adjusted for seasonality.

Conclusions

- Duke ASET quickly disseminated guidance on practice changes during the COVID-19 pandemic using CustomID as a communication tool.
- Engagement increased during the pandemic, especially during key moments of practice change, new therapeutics, and case surges.
- Site maintenance was relatively efficient. Most pages required a small number of edits.
- ASPs dedicate significant time and resources to development of guideline and educational materials. Web-based tools and analytics allow ASPs to rapidly disseminate information, assess engagement, and optimize both content and personnel effort.
- Future studies could evaluate other metrics to optimize content for hospital staff (e.g. bounce rate, session duration, user search terms).