Changes in COVID-19 Treatment Patterns Over the Course of 2020

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BACKGROUND

The rapid spread of the novel Sars-CoV-2 virus left clinicians rushing to find an effective treatment strategy for patients with severe disease. Facing a pressing clinical need but lacking any approved treatments, clinicians looked to repurposing existing treatments hypothesized to inhibit viral replication or interrupt virus-associated systemic inflammatory reactions.[1] Common medications used before the development of targeted monoclonal antibodies, included antibiotics, antimalarials, antivirals, corticosteroids, and other immunomodulators.[2,3]
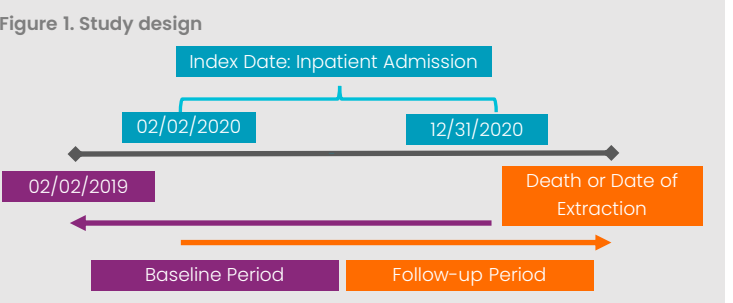
OBJECTIVE

This retrospective medical chart review explores how COVID-19 care patterns for patients hospitalized in the US changed over the course of 2020.

METHODS

Data source: Medical charts from 3 healthcare organizations

Patient Selection

* Patients hospitalized with laboratory confirmed COVID-19 between 02/02/2020 and 12/31/2020

Figure 1. Study design

Index Date: Inpatient Admission
02/02/2020 — 12/31/2020
02/02/2019
Death or Date of Extraction
Baseline Period
Follow-up Period

Patient Stratification

* Three cohorts based on the month of first COVID-19 hospitalization
  * Early: February-April
  * Middle: May-August
  * Late: September-December

Measures

* Characteristics: Age, BMI, gender, race, and ethnicity
* Medications
  * Azithromycin (as a monotherapy), corticosteroids (dexamethasone and methylprednisolone), hydroxychloroquine, remdesivir, and tocilizumab
  * Azithromycin monotherapy was only defined as a COVID-19 therapy when the patient had no record of infection other than COVID-19
  * Use of anticoagulants was captured but not included in the line of therapy analysis
* Line of therapy (LOT)
  * The 1st LOT included all drugs started on the same day
  * The addition or switch to a new drug defined the start of a new LOT
  * A LOT ended at death, end of follow-up, or the start of a new LOT
  * Patients were followed for up to 3 LOT

Table 1. Patient characteristics

	Early 2020		Mid 2020		Late 2020	
	N=75		N=223		N=111	
Age (mean, SD)	67.7	15.4	60.4	17.3	63.0	17.4
BMI[a] (mean, SD)	32.0	9.4	33.5	9.7	31.5	9.7
Male[b] (N, %)	38	50.7	135	60.5	62	55.9
Race (N, %)						
Black	25	33.3	67	30.0	13	11.7
White	49	65.3	143	64.1	92	82.9
Other/Unknown	2	2.7	13	5.8	6	5.4
Ethnicity (N, %)						
Hispanic or Latino	11	14.7	37	16.6	17	15.3
Not Hispanic or Latino	58	77.3	169	75.8	91	82.0
Unknown	6	8.0	17	7.6	3	2.7

[a] BMI was available for 404 of 409 patients. [b] one female to male transgender patient was grouped as male.

Table 2. Treatment characteristics

	Early 2020		Mid 2020		Late 2020	
	N=75		N=223		N=111	
New anticoagulant use (N, %)	58	77.3	195	87.4	97	87.4
Chest X-rays per day[a] (mean, SD)	0.5	0.3	0.4	0.3	0.5	0.3
Clinical Trial Enrollment (N, %)	9	12.0	32	14.3	1	0.9
≥1 ICU Admission (N, %)	35	46.7	64	28.7	24	21.6
Invasive Mechanical Ventilation (N, %)	24	32.0	32	14.3	15	13.5
Prone Ventilation (N, %)	9	12.0	8	3.6	4	3.6
Died	23	30.7	44	19.7	20	18.0
Death Due to COVID	20	26.7	30	13.5	11	9.9
Time to Death (mean, SD)	15.6	24.8	21.8	22.1	25.5	43.3

[a] per day of hospitalization.

* Additional outcomes
  * Other supportive care: chest x-rays, clinical trial enrollment, ICU admission, invasive mechanical ventilation, and prone ventilation
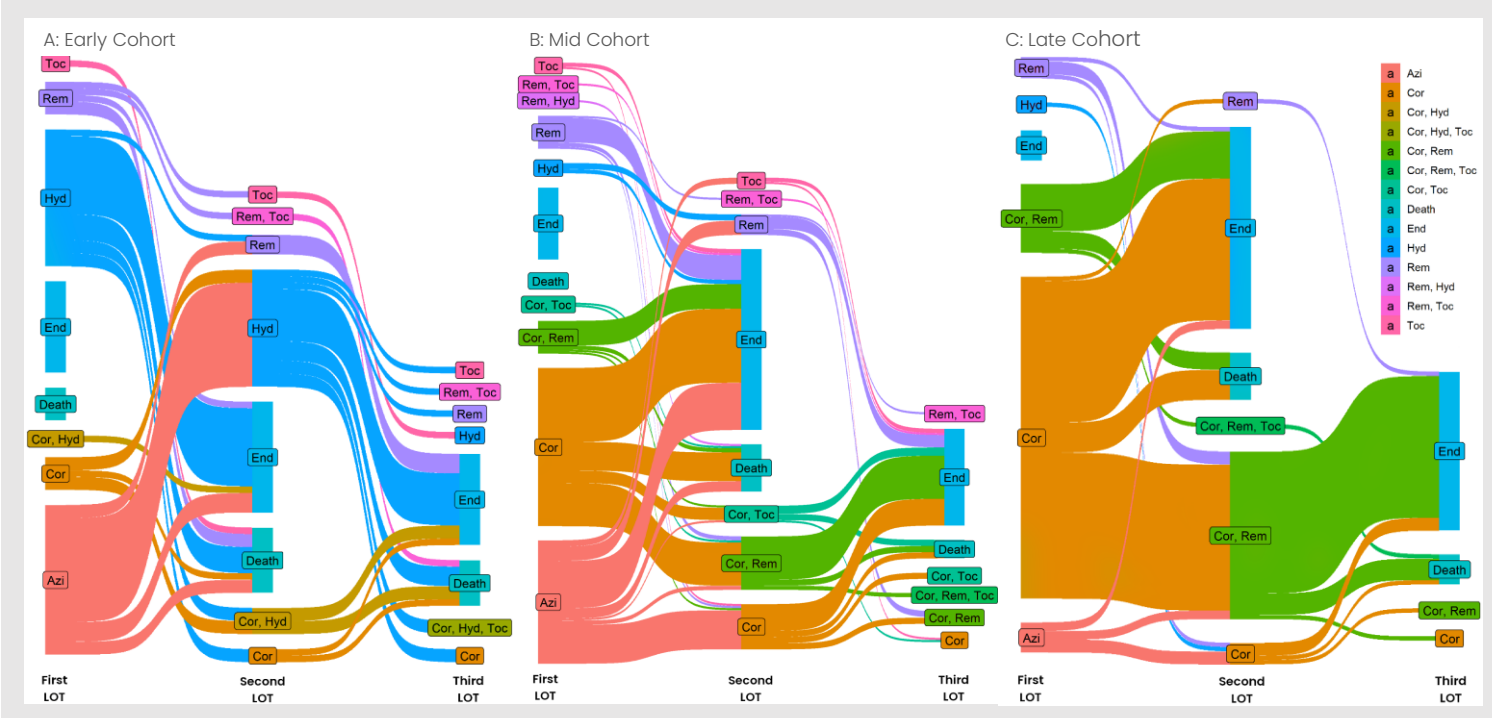 * Death and death due to COVID-19

Statistics

* Data processing was conducted in SAS version 9.4. Sankey diagrams were prepared in R version 4.1.1

RESULTS

* Overall, 75 patients were hospitalized in the early period, 223 in the middle period, and 111 in the late period (Table 1)
  * Patients were on average 62.5 (SD: 17.2) years old, 57.3% were male, 69.5% were White, and 77.8% were not Hispanic or Latino
  * Mean BMI was over 30 for all cohorts

Lines of Therapy

* Among patients hospitalized between Feb and April, azithromycin (30.7%) and hydroxychloroquine (28.0%) were the most common first LOT, and 69.6% of patients who started on azithromycin switched or were augmented with hydroxychloroquine (Figure 2A)
* Corticosteroids were the most common first LOT in middle (34.5%) and late (67.6%) 2020 (Figure 2B and 2C) and 27.3% (middle) and 45.3% (late) of patients on corticosteroids were later augmented with remdesivir

Figure 2. Sankey diagrams of lines of therapy (LOT)

A: Early Cohort

B: Mid Cohort

C: Late Cohort

First LOT — Second LOT — Third LOT

Azi, Cor, Cor, Hyd, Cor, Hyd, Toc, Cor, Rem, Cor, Rem, Toc, Cor, Toc, Death, End, Hyd, Rem, Rem, Hyd, Rem, Toc, Toc

* By late 2020
  * Patients were predominantly treated with corticosteroids or corticosteroids plus remdesivir
  * Only 1 patient (0.9%) received hydroxychloroquine and only 7 (6.3%) received azithromycin monotherapy
* The number of unique drug combinations decreased from 8 and 10 in early and middle 2020, respectively, to 6 in late 2020
  * Similarly, the number of unique care pathways decreased from 28 and 41 in early and middle 2020, respectively, to 17 in late 2020

Other Treatment Patterns

* New anticoagulant use was common
  * Occurring in 77.3% of patients in early 2020, and 87.4% in middle and late 2020 (Table 2)
* The frequency of chest x-rays was steady at 0.4-0.5 scans per day
* Clinical trial enrollment was most common in mid 2020 (14.3%) and least common in late 2020 (0.9%)
* Use of any invasive mechanical ventilation (32.0%) and prone ventilation specifically (12.0%) were most common in early 2020
* Overall, 61 (14.9%) patients died due to COVID-19, but the mortality rate decreased from 26.7% in early 2020 to 9.9% in late 2020
  * The lower mortality in late 2020 may be due to less available follow-up data

CONCLUSIONS

* Treatment patterns evolved over the course of 2020 with 1st line azithromycin and hydroxychloroquine being replaced with 1st line corticosteroids
* The most variation in care was observed 4-7 months after the arrival of SARS-CoV-2 in the US

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3. Fan X, Johnson BH, Johnston SS, Elangovanraaj N, Coplan P, Khanna R. Evolving Treatment Patterns for Hospitalized COVID-19 Patients in the United States in April 2020–July 2020. Int J Gen Med. 2021;14:267-271.

DISCLOSURES