Date: June 4, 2020

Presenter: Jessica Dekhtyar, MD; Jessica Pacifico, MD; Keron Lezama, MD; Shitij Arora, MD

Activity Title: Medicine Grand Rounds: The Inpatient Medical Service During the COVID-19 Pandemic

Location: Zoom Conference

This activity is made possible in part by an educational grant: N/A

DISCLOSURES

Course Director’s/Moderator’s
Dr Elizabeth Kitsis has no relevant financial relationships with an ACCME-defined commercial interest within the past 12 months.

Presenter’s
Drs Dekhtyar, Pacifico, Lezama and Arora have no relevant financial relationships with an ACCME-defined commercial interest within the past 12 months.

OBJECTIVES

• Review the existing literature on use of corticosteroids in COVID-19
• Understand the impact of corticosteroids on COVID-19 outcomes
Montefiore Medical Center
During COVID Crisis

Dr. Jessica Pacifico: Moses
Dr. Keron Lezama: Weiler
Dr. Jessica Dekhtyar: The Hutch
Dr. Shitij Arora: Corticosteroids

Division of Hospital Medicine
June 4th, 2020
Hospital Medicine at Moses during COVID

Dr. Jessica Pacifico, MD
Associate Director Moses Medicine Service
Hospital Medicine at Moses during COVID

- Medicine service expansion
  - Department of Medicine
    - Grand Hall and TLC
    - Non-DOM
      - Pediatrics, Neurology, Oncology, Family Medicine

- Creating Standards
  - EPIC
  - Protocols
  - Mentorship
Medicine Service Expansion – DOM

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Location</th>
<th>Usual Use</th>
<th>Beds</th>
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<tbody>
<tr>
<td>Moses</td>
<td>Grand Hall</td>
<td>Gatherings</td>
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<tr>
<td>Forman 7B</td>
<td>Surgery</td>
<td></td>
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</table>
Medicine Service Expansion - non-DOM

- Pediatrics: CHAM 8 (40 beds)
- Neurology: TLC (16 beds)
- Oncology: NW 3 (15 beds)
- Family Medicine: Forman 7AW (13 beds)
  - Forman 7B2 (11 beds)
  - NW 8 (12 beds)

Bar chart showing the distribution of departments with the following numbers:
- Other Depts: 122
- Medicine: 59
- Normal: 0
Medicine Service Expansion

New team ➔

1. Physician staffing
   DOM, non-DOM, allied
2. Nursing
3. Patient logistics
   Team in EPIC
   Bed assignments
   Admission pager
Medicine Service Expansion – DOM

- Klau 5
- Klau 4
- NW3
- NW4
- Klau 6
- NW8
- NW5
- NW6
- Klau 7
- Klau 8
Medicine Housestaff Restructuring

- Recalled from all activities
- Staffing - 3 residents → 2
- Census - 16 to 12 → 13
- Schedule
- Code team
- Med consult service
Medicine service expansion

350 → 531 patients
21 teams → 35 teams
Grand Hall and TLC

• Can the space safely accommodate patients and staff?
• Which patients go there?
• Who works there?
Grand Hall and TLC

- Nursing
- Medicine team and pediatrics team
- SW, care management
- Patient logistics
- Engineering
- IT
- Telecommunications
- Pharmacy
- Infection control
- Environmental services
- Phlebotomy
- Rehab and PT
- Imaging and cardiology
- Security
- Transport
Grand Hall and TLC

- Open 4/2-4/20
- 166 discharges
- No Codes
Creating standards

- EPIC
  - Admission order set
  - Note template
- Protocols
- Mentorship
COVID admission order set
COVID admission order set

To: Mary Ellen Lindros; Erick Oran; JESSICA L PACIFICO; Lucia R. Wolgast; Matthew Berger; Benjamin B Koo; Jessica Dekhtyar; Inessa Gendllina; David Esses; Priya Nori; William Southern; Michelle Gong; Barry Zingman; Sumit Kapoor; Adam Keene; Stefanie Forest; Theresa Madaline

Cc: Adam Cole

Tue 4/14/2020 5:49 PM

These changes are now in PRoDuction

Stan Reissman, MSW
Senior Analyst

Montefiore IT
COVID note template

Results: ***
@LABRCNTIP(WBC,HGB,HCT,PLT)@
@LABRCNTIP(NA,K,CL,CO2,BUN,CREATININE,EGFR,GFR
AA,GFRNONAA,GLU,CALCIUM)@
@LABRCNTIP(ALKPHOS:3,BILITOT:3,BILIDIR:3,PROT:3,AL
BUMIN:3,ALT:3,AST:3)@
@RESUFAST(TROPONINT:3)@

INFLAMMATORY MARKERS:
@LABRCNTIP(CRP:3)@
@RESUFAST(LDH:3)@
@RESUFAST(DDIMER:3)@

Micro:
@MICROBIOLOGYCULTURE7DAYS@
Protocols: Using Inpatient Epic

Adding patients to “my list”

1. Click “Patient Lists” on the top left under the EPIC logo
2. Under “Available Lists” open “Moses Hospital” then “Provider Care Teams”
3. Under here you will find the name of the team you are looking for eg. “Moses Medicine Hospitalists Kla 8” or “Moses Medicine HS Blue”
4. Click and drag that team under “My Patients”

Other reconciliation

Pre-reconciled prior to discharge
- “Stop” for each medication
- “edit/modify” for each medication
- “new” for each medication
- “recipes” for medications
- “choose” for medications
- “drug order” for medications

Table of contents

1. Signing into EPIC
2. Adding patients
3. Assigning your patients
4. Printing my “Patient Lists”
5. Customizing EPIC
6. Using the H&P
7. Using the Progress Notes
8. Placing Inpatient Orders
9. Ordering COVID-19 Tests
10. Admission steps
11. Discharging steps
12. Signing home
Protocols

Management of shortness of breath at the end of life:
- Dyspnea is a subjective and can only be assessed through patient report. Respiratory rate and pulse oximetry in normal range do not mean that the patient is not experiencing dyspnea
- Surrogate markers for nonverbal patients:
  - Respiratory > 25
  - Use of accessory muscles of breathing
- When dyspnea is refractory to disease specific interventions, opioid therapy is a safe and effective treatment. Respiratory depression is uncommon when opioids are carefully titrated.

General interventions
- Upright positioning
- Fan or window open, if possible
- Minimize IV fluids – avoid at end of life
- When goal is to optimize comfort, ABG, EKG, imaging, routine laboratory testing, and pulse oximetry are not indicated
- Avoid O2 via facemask, which can cause discomfort and worsen symptoms. Recommend nasal cannula only, avoid flows greater than 4-6L/min.

Recommendations for Medication Management

Opioid naïve
- Morphone 5mg po trial dose. If well tolerated, schedule Q 4 hours standing; hold for sedation
- For patients unable to tolerate oral dose, recommend 2mg IV trial dose. If well tolerated, schedule Q 4 hours standing; hold for sedation

Older adults or CO2 retention
- Reduce starting dose in half (1mg SQ/IV or 2.5mg po, morphine sol)
- Patient on stable opioid regimen
- Morphone short acting tableau, 10% of the patient’s daily dose (24-hour morphine equivalents) for breakthrough symptoms (Morphine oral IV is 3:1)
- Refractory
- Titrate dose by 24-50% for effect based on patient report or goal respiratory symptoms rate 15-22 breaths/minute
- Renal
- Avoid morphine due to risk of toxic metabolites
- Recommend hydromorphone 0.2mg IV or 1mg po (Hydromorphone oral IV is 5:1)
- Renal insufficiency
- Avoid opioids in renal insufficiency
- Test creatinine and correct if indicated

Hemodynamically
- Use with caution, especially in CO2 retention. Treat with opioids first, then use for refractory anxiety associated with dyspnea
- Consider lorazepam 0.25mg po, IV may titrate to 1 mg for effect


Palliative Extubation/Ventilator Withdrawal Guideline

STEP 1. Preparation

BASIC COVID CARE

Initial care
- CBC, BMP, liver tests, PT/PTT, LDH, procalcitonin, D-dimer, CRP, ferritin, troponin, CK, pro BNP
- ABG if hypoxic
- UA/Urine culture, blood culture x2, sputum culture
- EKG
- Start broad spectrum antibiotics if superimposed bacterial infection suspected
- Discuss and document code status, identify H/P/surrogate

Daily care
- CBC, BMP, trend liver tests and coag if needed
- Troponin, EKG every other day (or with chest pain/palpitations/new suspected HF)
- Continue to follow infectious work up results
- Can trend CRP, LDH, D-dimer, procalcitonin if useful for prognostication
- Q4 vitals unless stable and then decrease frequency
- Shock, AKI, decompensated HF – check WBC, daily weights
- Repeat CRP with clinical deterioration
- Cautious IV use
- DVT prophylaxis unless contraindicated
- Avoid NSAIIDs due to risk for AKI for hospitalized patients

Respiratory care
- Goal O2 sat 92-96%, can titrate up to 6L nasal cannula if not at goal, check daily room air O2 set
- Can transition from NC to NRB, HNRC as needed for hypoxia or work of breathing
- Avoid nebulfizers, CPAP/BIPAP as possible (they are aerosolizing)
- Steroids per steroid protocol

Consult HIE: always refer to most recent ID treatment protocol, available on intranet
- E consult: Consideration of enrollment into clinical trial
- Consult: Can consider if no clinical improvement after 3 days of treatment i.e. question about antibiotics for bacterial superinfection

Consult cardiology HIE:
- Elevated biomarkers
- Significantly abnormal EKG compared to baseline
- Significant arrhythmia (HR >150)
- New onset HF

Consult renal HIE:
- AKI that is not responsive to IVF (and obstruction ruled out): obtain UA, urines, urine protein to creatinine ratio
- Renal transplant
- ESRD on HD

Consult pulmonary HIE:
- SBT/Diffusion candidates

Montefiore THE UNIVERSITY HOSPITAL
Albert Einstein College of Medicine of Yeshiva University
### COVID19 Treatment Plans

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Mentorship

• CHAM
• COVID advisor
• COVID hotline

Dr. Laurel Mohrmann  
Dr. Sameen Farooq
Thank you!
Hospital Medicine at Weiler during COVID-19

Keron Lezama, MD
Director Weiler Medicine Service
Outline

• Weiler Pre-COVID-19
• Weiler Expansion
• Command Center
• Troughput/Triage
Weiler Layout Pre-COVID

Teaching

- 11S
  - 10S (2)
  - 9S (2)
  - 8S (1)
  - 7S (2)
  - Admission Unit

Non-Med

- 11N
  - 10N (2)
  - 9N (2)
  - 8N (1,1)
  - 2N (2)

Hospitalist
Weiler Pre-COVID-19

- 9 Hospitalist Teams
- 6 Housestaff Teaching Teams
- ED Hospitalist Program
- Voluntary Physician Service (PA support)
- 9 Units
- ~240 patients
Weiler Layout - Expansion

11S (1,+1) - Day Room
10S (2,+1) - Day Room
9S (2,+1) - Day Room
8S (1) - Day Room
7S (2) - Admission Unit

11N (1,+1)
10N (1,+1)
9N (2)
8N (1,1)

2N (2)
GMY (+2)
PACU
Weiler Expansion

- 9 Hospitalist Teams
- 6 Housestaff Teaching Teams
- ED Hospitalist Program
- Voluntary Physician Service (PA support)
- 7 Surge teams
- 11 Units + new surge areas

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<th>Location</th>
<th>Usual Use</th>
<th>Beds</th>
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<tr>
<td>2 North East</td>
<td>Rehab Gym</td>
<td>21</td>
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<tr>
<td>Day Rooms</td>
<td>Patient/family waiting areas</td>
<td>16</td>
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<tr>
<td>10 North</td>
<td>Surgery</td>
<td>6</td>
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<tr>
<td>11 North</td>
<td>Surgery</td>
<td>30</td>
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<tr>
<td>11 South</td>
<td>Onc/GYN</td>
<td>28</td>
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<tr>
<td>PACU</td>
<td>Post-op care</td>
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Weiler Gym – 2NE

- Constructed in 3 days
- 21 beds
- Patients clinically improving or awaiting discharge
- Screened by Hospitalist for eligibility
Day Rooms

• Constructed over a weekend

• 4 days rooms on 4 floors each with 4 beds

• Acuity dictated changes in admission workflow
Weiler Command Center

• Multidisciplinary leadership “War Room”

• Adopted from “mass casualty drill”

• Formalized 3/8

• Established workflows, protocols, contingency plans
Throughput

- Created bed capacity for pending wave of admissions
  - Collaboration with Social Work, Case Management and Post-acute care facilities

- Utilized internal bed capacity most efficiently and safely
  - 2NE/Gym transfers, Dayrooms
  - Hutch
### Attending vs. Case Manager

**Attending**

- Case Manager

  **“drag and drop”**

### Triage vs. Hospitalist

**Triage**

**Hospitalist**
Throughput

• Created bed capacity for pending wave of admissions
  – Collaboration with Social Work, Case Management and Post-acute care facilities

• Utilized internal bed capacity most efficiently and safely
  – 2NE/Gym transfers, Dayrooms
  – Hutch

• Javits Center, USS Comfort
ED Hospitalist Program

- Three ED Hospitalists present in ED 24/7
- Capacity – up to 45 patients boarded in the ED
- Allowed ED team to focus on stabilizing acute patients
- Provided ongoing care for pts in COVID+ cohort zone
- Assisted in triaging pts for inter-facility ED transfers
- Hosted 4 volunteer physicians – Einstein Alumni
Thank You
The Hutch:
A conversion of an ambulatory center to a COVID hospital
The Hutch Tower II

- 12 Floors
- OR and PACU
- Outpatient Offices
Hutch Hospital Timeline

March 11
- First COVID patient at MMC

Montefiore Medical Center COVID Cases
Hutch Hospital Timeline

March 11
- First COVID patient at MMC

March 19
- Worrisome projections
- Hutch talks begin

March 21
- Jess D named Medical Director of Hutch
- Jess P takes over Moses Medicine

March 24
- Hutch opens

April 3
- Hutch census peaks

April 10
- Hutch closes

MMC Predicted Daily Census of Covid-19 Hospitalized Patients

50% Surge Beds
Licensed Beds

Montefiore
THE UNIVERSITY HOSPITAL
Albert Einstein College of Medicine of Yeshiva University
Hutch Hospital Timeline

March 11
- First COVID patient

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- Worrisome projections
- Hutch talks begin

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- Hospital Medicine enters the Hutch

Montefiore Medical Center COVID Cases
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Montefiore Medical Center COVID Cases
Hutch Hospital Timeline

- **March 11**
  - First COVID patient
- **March 19**
  - Worrisome projections
  - Hutch talks begin
- **March 21**
  - Hospital Medicine enters Hutch
- **March 24**
  - Hutch opens
- **April 3**
  - Hutch census peaks
- **April 10**
  - Hutch closes

Montefiore Medical Center COVID Cases
Charge: Open 200 beds

Needs Assessment:

✓ Beds and Space
✓ Equipment
✓ Staff
✓ Processes
### March 21
- Hospital Medicine enters Hutch

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<tr>
<td>Beds and Space</td>
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<tr>
<td>Stretchers</td>
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<tr>
<td>Equipment</td>
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<td>Some Oxygen</td>
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<td>Some Medications</td>
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<td>Nurses, Phlebotomy, Radiology, Clerical, EVS</td>
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<td>------------</td>
</tr>
<tr>
<td>March 11</td>
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<tr>
<td>March 19</td>
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<tr>
<td>March 21</td>
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<tr>
<td>March 24</td>
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<td>April 3</td>
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<tr>
<td>Beds/Space</td>
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<tr>
<td>Equipment</td>
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<tr>
<td>Medications&lt;br&gt;More Oxygen&lt;br&gt;Negative Pressure</td>
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<tr>
<td>Staff</td>
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March 11
• First COVID patient at MMC

March 19
• COVID cases rise
• Worrisome projections
• Talks begin of Hutch’s conversion

March 21
Hospital Medicine Enters Hutch

March 24
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April 3
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<thead>
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<td>Equipment</td>
<td>Medications, More Oxygen, Negative Pressure</td>
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<td>Staff</td>
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<td>Processes</td>
<td>Transfer Codes, Discharge, Death</td>
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- Pharmacy
- Engineering
- Moses Hospitalists
- Residents
- E-consult Services
- Patient Logistics
- Social Work
- Morgue
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<tr>
<td>April 10</td>
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- **Transfer Criteria**
- **Screening Process**
- **Communication**
  - Epic Shared Lists

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Hutch Closes

Hutch ICU

• Hutch Anesthesia/ICU staff redeployed
• No one on site to intubate
• Modify triage criteria
• Create reverse transfer process
March 11  
- First COVID patient is admitted to Montefiore Medical Center

March 19  
- COVID cases rise
- Worrisome projections
- Talks begin of Hutch’s conversion

March 21  
- Hospital Medicine Enters Hutch

March 24  
- Hutch opens

April 3  
- Hutch Census Peaks

April 10  
- Hutch closes

Hutch Closes on April 10:  
- MMC COVID census begins to plateau  
- Low acuity units created at each hospital  
- Staff redeployed to other sites
Hospital Medicine Communication

- Divisional Daily Email
- Regular leadership visits to the floors
- Twice weekly nightly Q&A
- Nightly conference call updates
- Group texts
- Protocol Portal

- Quickly disseminate information
- Provide support
- Keep people close
Thank you
Corticosteroids in COVID-19

Research in Progress

Shitij Arora MD FACP
Associate Professor of Medicine
Division of Hospital Medicine
Rationale

The HyperInflammatory Phenotype

What “kills” COVID-19 patients is dysregulated systemic inflammation. There is no evidence linking delayed viral clearance to worsened outcome in critically ill COVID-19 patients, and it is unlikely that it would have a more negative impact than the host’s own “cytokine storm”.

Rationale- Theoretical Model
What we know..

Administration of methylprednisolone reduced the risk of death (HR = 0.38; 95% CI 0.20-0.72; P=0.003).

Overview of the available data

- 4 retrospective studies look at mortality association
- unadjusted analysis
- 1 study looked into clinical deterioration as an outcome
- Steroids with 3.0 OR CD, majority of patients with mild disease
Current Recommendations: Steroids in COVID-19?

*Weak recommendation, low quality evidence

Against*

Against*
Our Hypothesis

• Corticosteroid treatment is associated with reduced mortality in patients who have the hyper-inflammatory phenotype.

• Corticosteroid treatment is associated with early C-reactive protein reduction compared to untreated patients.

• Proportional reduction in CRP is an independent predictor of survival in patients treated with corticosteroids.
Pilot data

Reduction in CRP correlated with improvement in Hypoxemia
Outcomes Study

- Examined 1806 patients admitted with COVID
- Cohort study: compared patients who got systemic glucocorticoids vs. those that did not
- Study groups were similar: demographics, comorbidities, clinical findings, labs
- Primary Outcome: Death or Mechanical Ventilation
- Overall No Benefit:

  Unadjusted OR= 1.13
  Adjusted OR= 1.00

Figure 1. Odds of Mortality or Ventilation by Sub-Group

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<thead>
<tr>
<th>Subgroup</th>
<th>Odds Ratio (95% CI)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 0-40</td>
<td>2.00 (0.97, 4.15)</td>
<td>229</td>
</tr>
<tr>
<td>Age 41-70</td>
<td>1.26 (0.96, 1.65)</td>
<td>883</td>
</tr>
<tr>
<td>Age &gt;70</td>
<td>0.86 (0.64, 1.17)</td>
<td>694</td>
</tr>
<tr>
<td>Diabetes (No)</td>
<td>0.99 (0.73, 1.33)</td>
<td>974</td>
</tr>
<tr>
<td>Diabetes (Yes)</td>
<td>1.11 (0.86, 1.42)</td>
<td>832</td>
</tr>
<tr>
<td>Glucose &lt;140 mg/dL</td>
<td>0.90 (0.66, 1.24)</td>
<td>889</td>
</tr>
<tr>
<td>Glucose 140-300 mg/dL</td>
<td>1.17 (0.84, 1.63)</td>
<td>507</td>
</tr>
<tr>
<td>Glucose &gt;300 mg/dL</td>
<td>1.31 (0.75, 2.29)</td>
<td>147</td>
</tr>
<tr>
<td>C-Reactive Protein 0-9.9 mg/dL</td>
<td>1.52 (1.15, 2.02)</td>
<td>807</td>
</tr>
<tr>
<td>C-Reactive Protein 10-19.9 mg/dL</td>
<td>1.01 (0.72, 1.42)</td>
<td>442</td>
</tr>
<tr>
<td>C-Reactive Protein ≥20.0 mg/dL</td>
<td>0.53 (0.33, 0.86)</td>
<td>198</td>
</tr>
<tr>
<td>D-Dimer &lt;3.0 mcg/mL</td>
<td>1.09 (0.87, 1.36)</td>
<td>681</td>
</tr>
<tr>
<td>D-Dimer ≥3.0 mcg/mL</td>
<td>0.89 (0.62, 1.28)</td>
<td>1125</td>
</tr>
<tr>
<td>Troponin T 0.0 - 0.09 ng/mL</td>
<td>1.11 (0.92, 1.35)</td>
<td>1673</td>
</tr>
<tr>
<td>Troponin T ≥0.1 ng/mL</td>
<td>0.58 (0.22, 1.48)</td>
<td>133</td>
</tr>
</tbody>
</table>

Results

Glucocorticoids Significantly Reduce Serum C-Reactive Protein Within 72 Hours
Results

Event-Free Survival by CRP Response

- ΔCRP > -25% (N=58)
- -50% < ΔCRP < -25% (N=37)
- ΔCRP < -50% (N=65)
Results

Death or Mechanical Ventilation

<table>
<thead>
<tr>
<th>CRP Non-Responders (N=95)</th>
<th>CRP Responders (N=65)</th>
</tr>
</thead>
<tbody>
<tr>
<td>34.7%</td>
<td>15.4%</td>
</tr>
</tbody>
</table>
Results: WBC Subsets

**Lymphocytes**

Lymphocytes (Auto Diff%) Trend in 289 COVID Patients Treated with Glucocorticoids at Montefiore Medical Center

- Received Glucocorticoids - Died or Intubated (N=108)
- Received Glucocorticoids - Survived and Not Intubated (N=181)

**Neutrophils**

Neutrophil % Trend in 289 COVID Patients Treated with Glucocorticoids at Montefiore Medical Center

- Received Glucocorticoids - Died or Intubated (N=108)
- Received Glucocorticoids - Survived and Not Intubated (N=181)
Results: Change in Lymphocytes

Event-Free Survival by Change in Lymphocyte Percentage

- ΔLYM% > 50% (N=24)
- -50% < ΔLYM% < 50% (N=126)
- ΔLYM% < -50% (N=52)
Conclusions

- Corticosteroid treatment is associated with reduced mortality in those with the admission CRP is >20mg/dl
- A reduction in CRP by >50% within 72h of therapy is associated with improved survival.
Ongoing Research

• Identifying other predictors associated with therapeutic response, focus on hematologic variables such as lymphocytes, N/L ratio and monocytes

• Identifying other variables that would help us identify the subset of patients who would benefit most from corticosteroids, focus on severity of hypoxemia (SF ratio)
Our team

Multidisciplinary Collaboration

- Andrei Assa (Bioinformatics)
- Zhu (Jenny) Cui (PGY1)
- Zachary Merritt (PGY2)
- Sichen Liu (PGY2)
- Erica Chung (PGY2)
- Hashim Mustehsan (PGY3)
- Yelena Averbukh (Wakefield)
- William Southern (Moses)

- Bibi Ayesha (Rheumatology)
- Anand Kumthekar (Rheumatology)
- Margaret Mccort (ID)
- Brianna Norton (DGIM)
Saw/Learned

- Unlimited Commitment
- Cooperation and Interdisciplinary Support
- Leadership
- Mission & Duty

Now & Going Forward

- Continue What Worked
- Deep Cleaning
- Planning for Next Wave
- 14 Research Projects
YOU HAVE 48 HOURS TO REGISTER AND COMPLETE EVALUATION FORM FOR THIS ACTIVITY

PASSCODE for this RSS Activity Event is:

25LARS

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