Convalescent plasma early in disease course improves survival in COVID-19

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Background

- Convalescent plasma (CP) has been described as a potential therapy for coronavirus disease 2019 (COVID-19)
- Given paucity of data, we sought to describe characteristics of CP recipients in survivors and non-survivors

Methodology

- Retrospective review of electronic medical records which included hospitalized patient with a positive SARS-CoV-2 PCR test who received CP at an 890-bed quaternary care hospital in Southeast Michigan between March-May 2020
- Data collected included: demographics, co-morbidities, mSOFA score, laboratory values, and treatment
- Outcome assessed was clinical status based on an 8-point ordinal scale[a] at Day 30 post CP
- These values were recorded on admission, the date of CP (day 1), day 3, 7, and day 30 post-CP
- Patient outcomes were stratified by ordinal scale score and compared using Mann-Whitney U tests to examine differences in clinical characteristics
- *Ordinal Scale score*
  - *1-4 ("meaningful survivor")*
  - *5-7 ("survivor")*
  - *8 ("non-survivor")*

Table 1: Characteristics based on Ordinal Scale at Day 30 (n=28)

Characteristics	Ordinal scale 1-4 (n = 6)	Ordinal Scale 5-7 (n = 9)	Ordinal Scale 8 (n = 13)	P value
Age (median)	**63.5**	**62**	**71**	**0.0226**
Male gender n (%)	3 (50%)	8 (89%)	9 (69%)	0.2731
BMI (median)	28.75	31.9	26.4	0.1573
Number of days after positive PCR test to date of receiving CP: median, (IQR)	10 (7-13)	28 (8-31)	15 (8-16)	0.3699
Race n (%)				0.8101
- Black	2 (33%)	6 (66.7%)	7 (54%)	
- White	2 (33%)	1 (11%)	3 (23%)	
- Hispanic	0	0	1 (7.5%)	
- Other	2 (33%)	2 (22%)	2 (15.4)	
Treatments n (%)				
- Hydroxychloroquine	5 (83%)	7 (78%)	9 (69%)	1.0000
- Azithromycin	0	2 (22%)	1 (7.7%)	0.5714
- Doxycycline	1 (16.7%)	6 (67%)	8 (62%)	0.1369
- Methylprednisolone	3 (50%)	7 (77.8%)	10 (77%)	0.4849
- Prednisone	4 (66.7%)	5 (55.6%)	7 (54%)	1.0000
- Remdesivir	2 (33%)	1 (11%)	3 (23%)	0.6199
Co-morbidities n (%)				
- Lung disease	1 (16.7%)	5 (55.6%)	7 (54%)	0.3022
- Immunodeficiency	1 (16.7%)	1 (11%)	1 (7.7%)	1.0000
- Cardiovascular disease	0	3 (33%)	3 (23%)	0.3466
- Chronic kidney disease	1 (16.7)	7 (77.8%)	8 (61.5%)	0.0872
- COPD	0	1(11.1%)	3 (23%)	0.5200
- Hypertension	3 (50%)	7 (77.8%)	8 (61.5)	0.6078
- Asthma	0	2 (22%)	0	0.1349
- Cancer	0	0	2 (15.4%)	0.6905
- Diabetes	2 (33.3%)	6 (66.7%)	6 (46.2%)	0.5015
mSOFA on admission (median)	**2.5**	**5**	**6**	**0.0564**

[a]Clinical status using ordinal scale:
8) Death
7) Hospitalized, on invasive mechanical ventilation or extracorporeal membrane oxygenation (ECMO)
6) Hospitalized, on non-invasive ventilation or high flow oxygen devices
5) Hospitalized, requiring supplemental oxygen
4) Hospitalized, not requiring supplemental oxygen – requiring ongoing medical care
3) Hospitalized, not requiring supplemental oxygen – no longer requires ongoing medical care
2) Not hospitalized, limitation on activities and/or requiring home oxygen
1) Not hospitalized, no limitation on activities

Table 2: Clinical Status stratified based on Ordinal Scale at Day 30

Clinical Status (median)	Ordinal scale 1-4 (n = 6)	Ordinal Scale 5-7 (n = 9)	Ordinal Scale 8 (n = 13)	P value
- On admission	**5**	**5**	**6**	**0.0623**
- On day 1 of CP	**6**	**7**	**7**	**0.0055**
- On day 3 of CP	**5.5**	**7**	**7**	**<.0001**
- On day 7 of CP	**2.5**	**7**	**8**	**<.0001**
- On day 30 of CP	**1.5**	**7**	**8**	**<.0001**

Results

- Results of our study are summarized in Table 1 & 2
- Non-survivors were older than survivors (62 vs 71 years; p=0.026)
- There was no statistically significant difference between patient gender, race, number of days from positive PCR test to CP, treatments, and co-morbidities
- There was a trend toward higher mSOFA score on admission in non- survivors (p=0.056)
- A lower ordinal scale score on the date of receiving CP was significantly associated with meaningful survivorship (6 vs 7, p=0.005)

Conclusion

- Patients who have a lower ordinal scale score on the date of CP administration and early in the disease course with lower mSOFA scores are most likely to have meaningful survivorship at day 30
- Future studies should evaluate optimal timing and outcomes for CP therapy in COVID-19