

DEVELOPMENT AND PILOT OF AN MPOX SEVERITY SCORING SYSTEM (MPOX-SSS)

Jason Zucker¹, Jacob McLean¹, Esther Huang¹, Clare DeLaurentis¹, Shauna Gunaratne¹, Kate Stoeckle², Marshall Glesby², Tim Wilkin², William Fischer³, Inger Damon⁴, John T. Brooks⁴

¹Department of Medicine, Division of Infectious Diseases, Columbia University Irving Medical Center,

²Department of Medicine, Division of Infectious Diseases, Weil Cornell Medical Center,

³Department of Medicine, Division of Pulmonary Diseases and Critical Care Medicine, University of North Carolina School of Medicine

⁴Centers for Disease Control and Prevention

Background

- Clinical severity scores facilitate standardized quantitative comparison of disease severity between groups of patients to understand risk factors for severe illness and evaluate treatment efficacy.
- Relevant severity scoring tools are:
 - Discriminatory across the spectrum of illness
 - Parsimonious
 - Easy to use
 - Universally applicable
- Prior mpox severity scores, based on numbers of skin lesions and individual functional capacity, have been less applicable to the 2022 outbreak.

Methods

- Expert opinion and literature review were performed to develop an initial MPOX-SSS.
- An initial set of possible variables was refined based on data availability, prior association with severity, and parameter correlation.
- We piloted this MPOX-SSS via a retrospective chart review at a single academic urban medical center and compared scores using the Wilcoxon rank sum test.

Proposed Severity Scoring System for Active Mpox

NSTRCTIONS

For each of the 7 variables (rows), score the person's current status for that variable by placing an "X" in that box.

Scoring:

- For each check box, the score for that variable that equals the Grade (example: 10-100 lesions total is Grade 2 and thus lesions would be score as a "2".
- Sum the scores for each row to get a total severity score (should range 0 – 23) and then enter the value at top of completed form.

MPOX SEVERITY SCORE:

Parameter	Grade 0 (0 points)	Grade 1 (1 point)	Grade 2 (2 points)	Grade 3 (3 points)	Grade 4 (4 points)
Active lesion ¹ burden, number (total)	0	1-9	10-99	>100	
Lesion burden, extent of body involvement: - Head/neck - Chest/abdomen - Back - Groin/buttocks/anus - Left arm - Left hand - Right arm - Right hand - Left leg - Left foot - Right leg - Right foot	0	1-3	4-6	7-9	10-12
Confluent lesion(s) with diameter ≥2 cm	No		Yes		
Treatment for bacterial superinfection	No		Yes		
Mucosal areas affected ² (4 anatomic locations) - Anorectal - Oropharyngeal - Genital (solely mucosal)³ - Ocular lesion	0		1 location	2 locations	≥3 locations
Level of care		Outpatient	Inpatient, non-ICU related to MPX	Inpatient, ICU related to MPX	Death
Pain, analgesia requirement	No pain meds	Outpatient, OTC pain meds (incl. topical)	Outpatient, prescribed pain meds (incl. topical)	Inpatient, oral pain meds	Inpatient, IV pain meds

Notes:

¹ Document only pox lesions. Healed lesions (scab absent and fresh skin present) should not be included. Likewise, rash from erythema multiforme or any other cause should not be included.

² Includes proctitis, urethritis, oropharyngitis in the absence of lesions

³ Excludes epithelialized penis shaft, epithelialized vulva, and perineum

Results

Table 1: Patient Characteristics N=200	
Age (median, IQR)	34 (29, 41)
Age	
18-25	14 (7.0%)
26-35	103 (52%)
36-45	58 (29%)
>45	25 (12%)
Sex at Birth Male	198 (99%)
Gender Identity*	
Male	157 (97%)
Female	4 (2.5%)
Other	1 (0.6%)
Gender of Sex Partners**	
Men	147 (88%)
Women	6 (3.6%)
Men and Women	14 (8.4%)
Race and Ethnicity	
Black or African American	56 (28%)
Hispanic	76 (38%)
White	37 (18%)
Other	31 (16%)
Treated with Tecovirimat	115 (57%)
Patient Living with HIV	98 (49%)
Patient with CD4<200 or VL >1000	19 (9.5%)
Patient taking PrEP	56 (28%)

Data available for: *n=162, **n = 167

Table 2: Severity Score At Presentation by HIV Status						
Characteristic	MPOX-SSS Point Value	N	Overall (n, %)	Patients with HIV N= 98 (n, %)	Patients without HIV N = 102 (n, %)	p-value HIV pos to HIV neg
Lesion burden (Number)		174				0.9
1-9	1		84 (48%)	42 (51%)	42 (46%)	
10-99	2		86 (49%)	39 (47%)	47 (52%)	
>=100	3		4 (2.3%)	2 (2.4%)	2 (2.2%)	
Extent of body involvement		200				0.4
1-3 areas	1		96 (48%)	0 (0%)	0 (0%)	
4-6 areas	2		54 (27%)	51 (52%)	45 (44%)	
7-9 areas	3		31 (16%)	23 (23%)	31 (30%)	
10-12 areas	4		19 (9.5%)	13 (13%)	18 (18%)	
Confluent lesion(s) present	2	186	22 (12%)	11 (11%)	8 (7.8%)	0.11
Bacterial superinfection	2	200	68 (34%)	7 (7.9%)	15 (15%)	0.59
Mucosal areas affected		199		27 (28%)	41 (40%)	0.3
None	0		66 (33%)	36 (37%)	30 (30%)	
1 location	2		122 (61%)	55 (56%)	67 (66%)	
2 locations	3		11 (5.5%)	7 (7.1%)	4 (4.0%)	
>=3 Location	4		0 (0%)	0 (0%)	0 (0%)	
Level of care required		200				0.8
Outpatient	1		179 (90%)	87 (89%)	92 (90%)	
Inpatient, non-ICU related to MPX	2		21 (10%)	11 (11%)	10 (9.8%)	
Inpatient, ICU related to MPX	3		0 (0%)	0 (0%)	0 (0%)	
Death	4		0 (0%)	0 (0%)	0 (0%)	
Pain, analgesia requirement		200				0.3
Outpatient, none	0		65 (32%)	36 (37%)	29 (28%)	
Outpatient, OTCs	1		58 (29%)	25 (26%)	33 (32%)	
Outpatient, prescribed	2		63 (32%)	29 (30%)	34 (33%)	
Inpatient, oral meds	3		8 (4.0%)	3 (3.1%)	5 (4.9%)	
Inpatient, IV meds	4		6 (3.0%)	5 (5.1%)	1 (1.0%)	
Severity Score		172 (86%)				0.12
Mean(SD)			8.4 (3.3)	8.0(3.5)	8.7(3.0)	
Median (IQR)			8 (6.0, 11.0)	8.0 (5.0, 11)	9.0 (7.0, 10.8)	

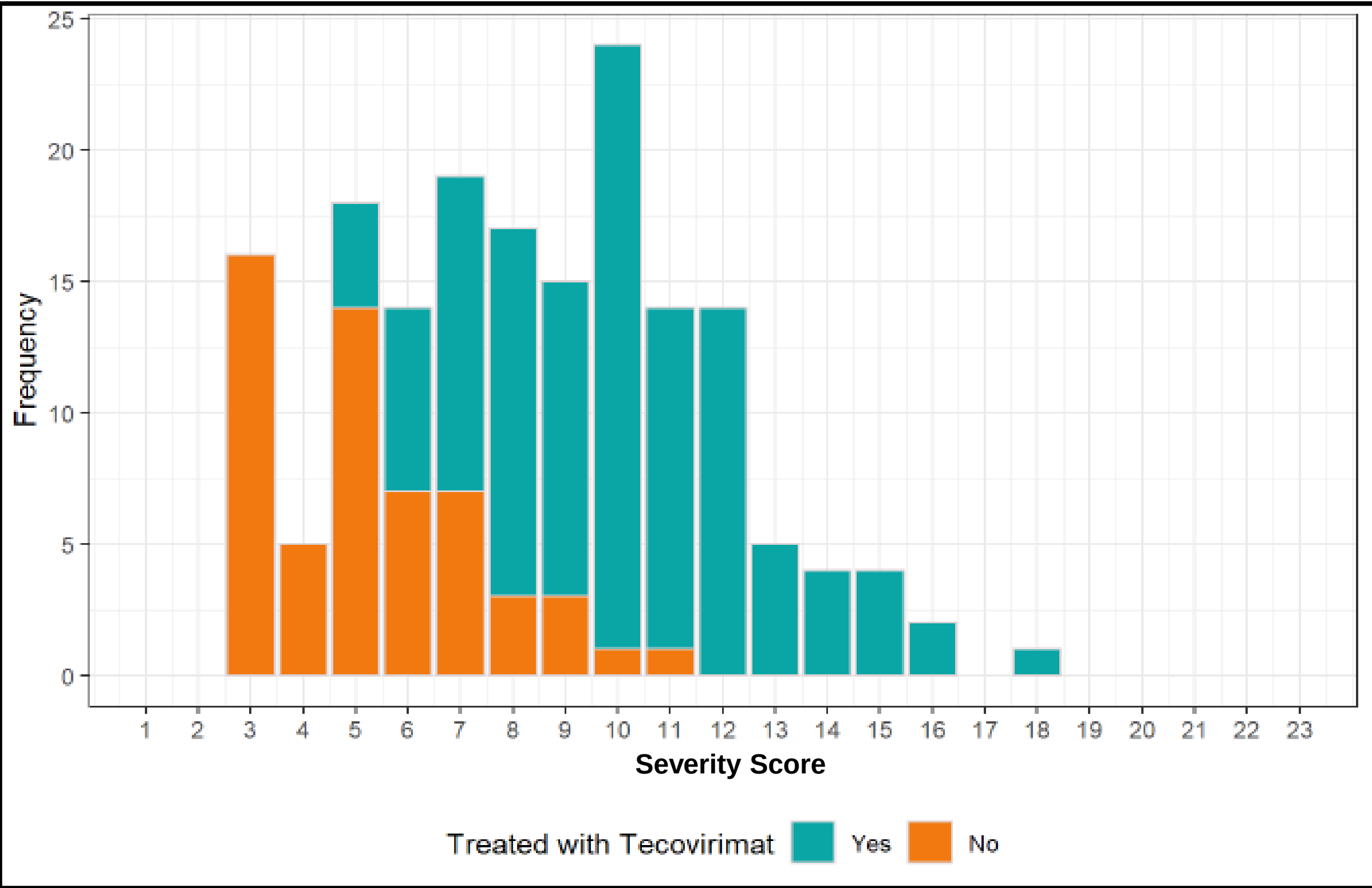
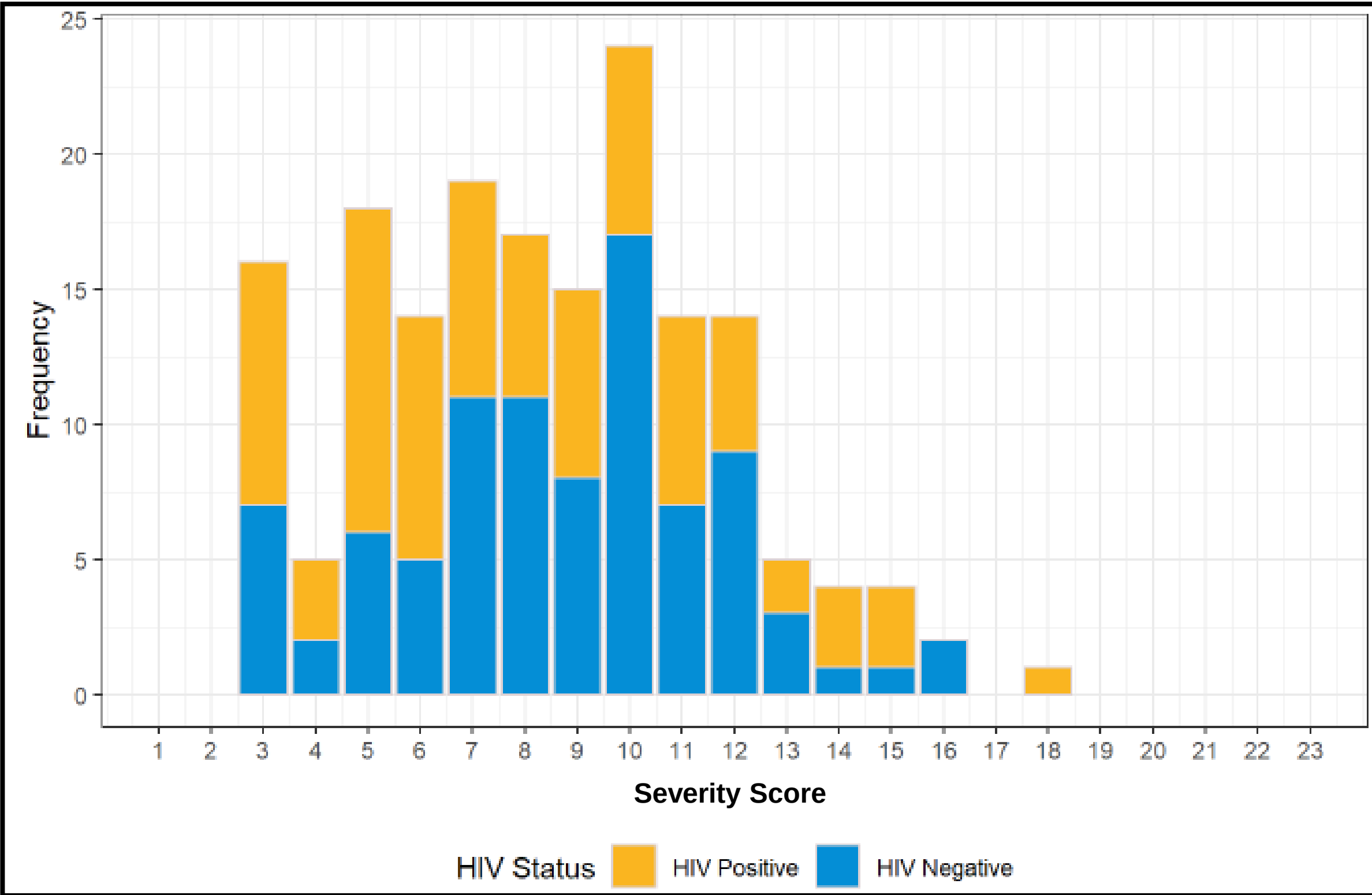


Figure 1: Distribution of severity scores **1A (Left)** By HIV status **1B (Right):** By treatment status
Scores were higher in patients treated with tecovirimat (10 vs 4, p<0.001), patients with CD4 counts <200 cells/mm³ (10 vs 8, p=0.073), and patients presenting >3 days after symptom onset (9 vs 6, p=0.007).

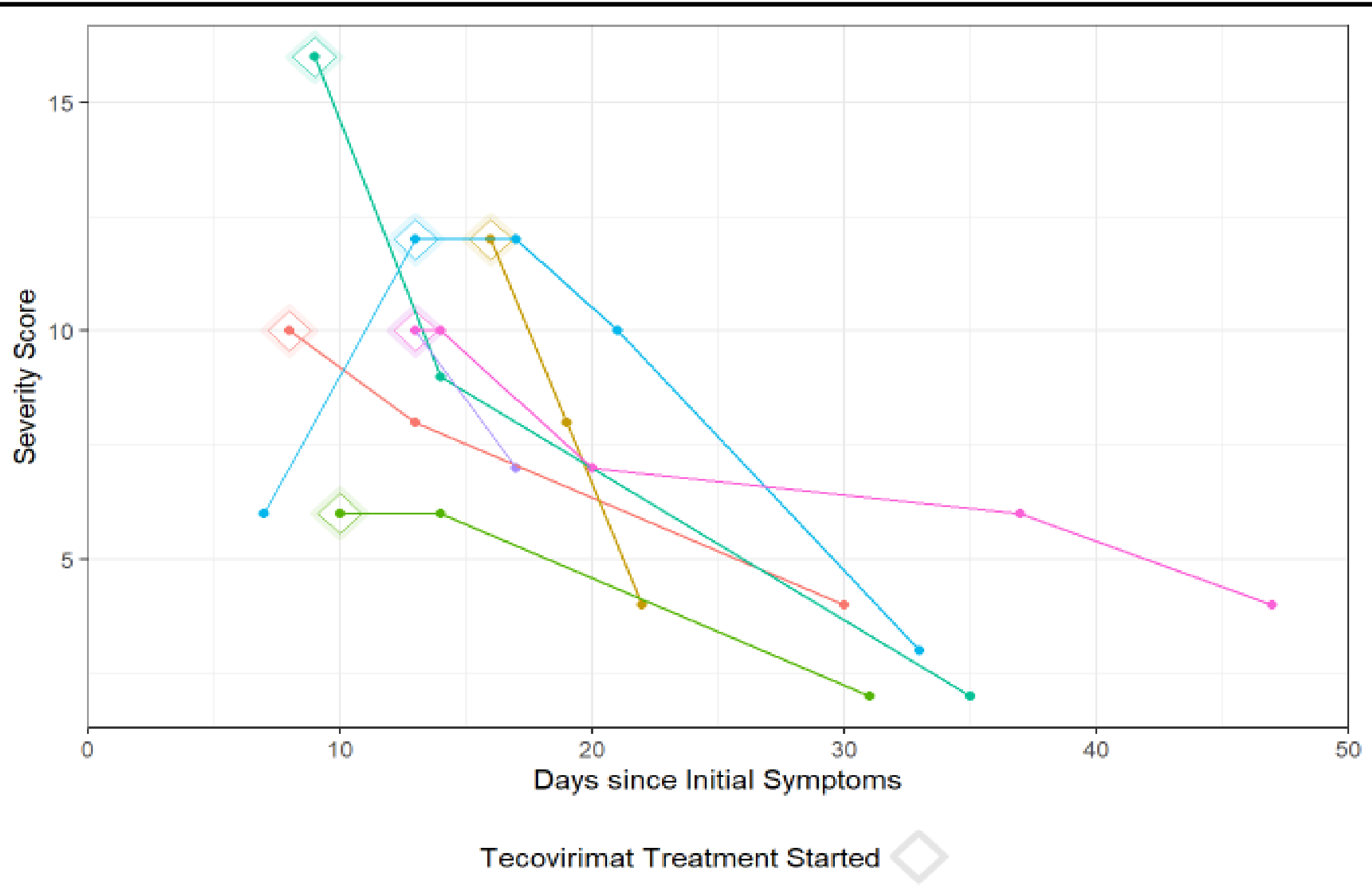


Figure 2: Severity score from time since initial symptoms.
For a subset of individuals with multiple visits for mpox, changes in MPOX-SSS scores were detected and concordant with clinical experience

Conclusion

- Our pilot MPOX-SSS was able to produce a severity score retrospectively from 86% of charts, demonstrated good discrimination with statistically higher scores in groups expected to have more severe disease, and was able to distinguish change over time for individual patients that correlated with clinical illness.
- **In the future we propose this tool be assessed for utility in prospective clinical trials of mpox treatment, in prospective observational cohort studies, and in retrospective comparisons of illness caused by different mpox clades.**
- To learn more and download the MPOX-SSS Tool go to <https://mpoxseverityscore.com/>