Supplementary Materials for Nath et al.

Supplemental Methods

SARS-CoV2 testing
For SARS-CoV2 testing at MSKCC, nasopharyngeal (NP) swab samples were collected using flocked swabs (Copan Diagnostics, Murrieta, CA) and placed in viral transport media. Total nucleic acids were extracted from NP swabs using the automated NucliSENS easyMag (bioMerieux, Durham, NC), with real-time RT-PCR amplification performed on an ABI 7500 Fast (Applied Biosystems, Foster City, CA) using a laboratory-developed test based on the CDC protocol targeting the nucleocapsid gene (N1 and N2) and the human RNase P gene as an internal control. Results were valid only if the RNase P gene was detected, and positive if both N1 and N2 were detected. Additionally, rapid RT-PCR was performed using the Xpert Xpress SARS-CoV-2 test (Cepheid, Sunnyvale, CA) targeting the N and E gene and interpreted per the manufacturer’s instructions. SARS-CoV-2 testing at the University of Washington Virology Laboratory was performed on a number of different emergency use authorized assays, including the laboratory-developed CDC-based LDT (N1/N2), WHO-based LDT (E/RdRp), Hologic Panther Fusion, Hologic Aptima (TMA), Roche cobas, and DiaSorin Simplexa, depending on the month of the pandemic and reagent availability. These assays have been shown to have comparable performance characteristics, as described previously.1,2

References
1. Lieberman JA, Pepper G, Naccache SN, Huang ML, Jerome KR, Greninger AL. Comparison of Commercially Available and Laboratory-Developed Assays for In Vitro Detection of SARS-CoV-2 in Clinical Laboratories. J Clin Microbiol. 2020;58(8).
2. Nalla AK, Casto AM, Huang MW, et al. Comparative Performance of SARS-CoV-2 Detection Assays Using Seven Different Primer-Probe Sets and One Assay Kit. J Clin Microbiol. 2020;58(6).
### Late Cohort panel A, B, C

#### Supplemental Table 1. Patients with Severe Events Within 30 Days of Discharge from UCC

| Patient # | Return to UCC* | Intubation* | Death* |
|-----------|----------------|-------------|--------|
| Patient #1 | Day 3          | Day 6       | N/A    |
| Patient #2 | Day 12         | Day 15      | N/A    |
| Patient #3 | Day 15         | Day 18, 22, 23 | Day 33, 77 |
| Patient #4 | Day 9          | N/A         | Day 25 |
| Patient #5 | Day 4**        | Day 5**     | N/A    |

*Day of event since first positive COVID-19 result  
**Occurred at outside facility

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#### Supplemental Table 2. Mortality rate in study cohort over time

| Time | March 2020 | April 2020 | May 2020 |
|------|------------|------------|----------|
| <30 days | 25%       | 8%         | 8%       |
| 30-60 days | 1%       | 9%         | 8%       |
| >60 days   | 1%         | 5%         | 4%       |

#### Supplemental Table 3. Rate of severe events in study cohort over time

| Time        | March 2020 | April 2020 | May 2020 |
|-------------|------------|------------|----------|
| Severe events | 39%       | 28%        | 15%      |
| No severe events | 61%     | 72%        | 85%      |

#### Supplemental Table 4. Characteristics associated with death within 30 days of UCC visit (n=255)

| Characteristic          | Death, yes n (%) | Death, no n (%) | P value |
|-------------------------|------------------|-----------------|---------|
| Cancer type             |                  |                 | 0.03    |
| Hematological           | 5 (7)            | 62 (93)         |         |
| Lung                    | 8 (28)           | 21 (72)         |         |
| Other solid             | 25 (16)          | 134 (84)        |         |
| Radiology findings      |                  |                 | 0.03    |
| Negative                | 3 (6)            | 47 (94)         |         |
| Positive                | 28 (19)          | 118 (81)        |         |
| Inconclusive            | 6 (26)           | 17 (74)         |         |
| Cardiac comorbidities*  |                  |                 | 0.03    |
Late Cohort panel A, B, C

| Test                                      | None | One or more |
|-------------------------------------------|------|-------------|
| Albumin                                   | 10 (9) | 100 (91) |
| ≤3.8 g/dL                                 | 27 (23) | 92 (77) |
| >3.8 g/dL                                 | 1 (2) | 57 (98) |
| Alkaline phosphatase                      |      |            |
| ≤130 U/L                                  | 15 (11) | 121 (89) |
| >130 U/L                                  | 13 (32) | 27 (68) |
| Aspartate aminotransferase                |      |            |
| ≤37 U/L                                   | 9 (9) | 86 (91) |
| >37 U/L                                   | 16 (24) | 51 (76) |
| Blood urea nitrogen                       |      |            |
| ≤20 mg/dL                                 | 17 (10) | 161 (90) |
| >20 mg/dL                                 | 20 (27) | 53 (73) |
| Chloride                                  |      |            |
| <98 mEq/L                                 | 11 (25) | 33 (75) |
| >109 mEq/L                                | 2 (33) | 4 (67) |
| 98-109 mEq/L                              | 23 (12) | 171 (88) |
| Glucose                                   |      |            |
| ≤140 mg/dL                                | 22 (11) | 172 (89) |
| >140 mg/dL                                | 15 (27) | 40 (73) |
| Hemoglobin                                |      |            |
| ≤12.5 g/dL                                | 30 (19) | 131 (81) |
| >12.5 g/dL                                | 6 (7) | 86 (93) |
| Sodium                                    |      |            |
| ≤133 mEq/L                                | 15 (28) | 38 (72) |
| >133 mEq/L                                | 21 (11) | 170 (89) |
| Oxygen saturation (SpO2)                  |      |            |
| <89.9%                                    | 7 (30) | 16 (70) |
| >94.9%                                    | 13 (9) | 137 (91) |
| 89.9-94.9%                                | 18 (22) | 64 (78) |
| Respiratory rate                          |      |            |
| ≤20 breaths per minute                    | 23 (11) | 190 (89) |
| >20 breaths per minute                    | 15 (37) | 26 (63) |
| Temperature                               |      |            |
| ≤38.3°C                                   | 28 (13) | 194 (87) |
| >38.3°C                                   | 10 (30) | 23 (70) |
| Troponin                                  |      |            |
| ≤0.02 ng/mL                               | 2 (5) | 37 (95) |
| 0.03-0.64 ng/mL                           | 12 (43) | 16 (57) |
| >0.64 ng/mL                               | 0 (0) | 3 (100) |

*Cardiac comorbidities defined as atherosclerosis, congestive heart failure, coronary artery disease, deep vein thrombosis, hypertension, peripheral artery disease, atrial fibrillation, cardiac arrhythmia (NOS), valvular heart disease, history of coronary artery bypass, balloon angioplasty or percutaneous coronary intervention, history of myocardial infarction, history of thromboembolism*
### Supplemental Table 5. Characteristics associated with severe events (n=255)

| Characteristic                      | Severe outcome, yes n (%) | Severe outcome, no n (%) | P value |
|-------------------------------------|---------------------------|--------------------------|---------|
| **Sex**                             |                           |                          | 0.03    |
| Male                                | 35 (26)                   | 101 (74)                 |         |
| Female                              | 46 (39)                   | 73 (61)                  |         |
| **Smoker**                          |                           |                          | 0.03    |
| Former/current/unknown              | 46 (39)                   | 73 (61)                  |         |
| Never                               | 35 (26)                   | 101 (74)                 |         |
| **Radiology**                       |                           |                          | 0.0005  |
| Negative                            | 6 (12)                    | 44 (88)                  |         |
| Positive                            | 57 (39)                   | 89 (61)                  |         |
| Inconclusive                        | 10 (43)                   | 13 (57)                  |         |
| **Radiology infiltrates**           |                           |                          | 0.04    |
| Bilateral                           | 45 (45)                   | 56 (55)                  |         |
| Unilateral                          | 12 (27)                   | 33 (73)                  |         |
| **Dyspnea**                         |                           |                          | 0.01    |
| 40 (41)                             |                           | 57 (59)                  |         |
| **Absolute neutrophils**            |                           |                          | 0.008   |
| <1.5 K/mcL                          | 4 (17)                    | 19 (83)                  |         |
| >7.5 K/mcL                          | 22 (46)                   | 26 (54)                  |         |
| 1.5-7.5 K/mcL                       | 51 (29)                   | 127 (71)                 |         |
| **Aspartate aminotransferase**      |                           |                          | 0.0006  |
| ≤37 U/L                             | 44 (30)                   | 104 (70)                 |         |
| >37 U/L                             | 12 (43)                   | 16 (57)                  |         |
| **Albumin**                         |                           |                          | 1.00E-06|
| ≤3.8 g/dL                           | 52 (44)                   | 67 (56)                  |         |
| >3.8 g/dL                           | 5 (9)                     | 53 (91)                  |         |
| **Alkaline phosphatase**            |                           |                          | 0.001   |
| ≤130 U/L                            | 35 (26)                   | 101 (74)                 |         |
| >130 U/L                            | 21 (52)                   | 19 (48)                  |         |
| **Blood urea nitrogen**             |                           |                          | 0.0005  |
| ≤20 mg/dL                           | 44 (25)                   | 134 (75)                 |         |
| >20 mg/dL                           | 35 (48)                   | 38 (52)                  |         |
| **Calcium**                         |                           |                          | 0.002   |
| ≤8.5 mg/dL                          | 28 (47)                   | 31 (53)                  |         |
| >8.5 mg/dL                          | 51 (27)                   | 139 (73)                 |         |
| **Chloride**                        |                           |                          | 0.001   |
| <98 mEq/L                           | 22 (50)                   | 22 (50)                  |         |
| >109 mEq/L                          | 4 (67)                    | 2 (33)                   |         |
| 98-109 mEq/L                        | 51 (26)                   | 143 (74)                 |         |
Late Cohort panel A, B, C

| Characteristics | Creatinine | Glucose | Sodium | WBC | Lactic acid | Oxygen saturation (SpO2) | Respiratory rate | Neutrophil-lymphocyte ratio | Troponin |
|-----------------|------------|---------|--------|-----|-------------|------------------------|-----------------|-----------------------------|----------|
| ≤1.2 mg/dL      | 49 (27%)   | 51 (26%) | 25 (47%) | 12 (20%) | 42 (29%) | ≤89.9% 19 (83%) | ≤20 breaths/minute 52 (24%) | ≤3 12 (18%) | >0.64 ng/mL 2 (67%) |
| >1.2 mg/dL      | 31 (45%)   | 135 (73%) | 28 (51%) | 49 (32%) | 105 (71%) | >94.9% 30 (20%) | >20 breaths/minute 28 (68%) | >3 65 (36%) | ≤0.64 ng/mL 9 (23%) |
| ≤140 mg/dL      | 31 (26%)   | 143 (74%) | 22 (55%) | 49 (32%) | 103 (68%) | 89-94.9% 32 (39%) | Respiration rate 0 | >3 65 (36%) | ≤0.02 ng/mL 9 (23%) |
| >140 mg/dL      | 28 (51%)   | 27 (49%) | 22 (55%) | 24 (33%) | 21 (47%) | ≥20 breaths/minute 161 (76%) | >20 breaths/minute 28 (68%) | >3 65 (36%) | 0.03-0.64 ng/mL 19 (68%) |

Supplemental Table 6. Selected predictors for death within 30 days by stepwise logistic regression from demographic, clinical, basic lab panel, and vital sign measurements

| Characteristics | Odds ratio (95% CI) | P value | Score |
|-----------------|---------------------|---------|-------|
| BUN >20 mg/dL   | 4.78 (1.84,12.42)   | 0.001   | 2     |
| Glucose >140 mg/dL | 7.7 (2.47,24.08)  | 0.0004  | 2     |
| HGB <12.5 g/dL  | 5.91 (1.71,20.5)    | 0.005   | 2     |
| Sodium <133 mEq/L | 2.68 (1.7,21)    | 0.05    | 1     |
| Respiratory rate >20 breaths/minute | 9.32 (3.06,28.43) | 8e-05   | 2     |
| Temperature >38.3°C | 4.93 (1.51,16.05) | 0.008   | 2     |
| Positive radiology | 4.23 (1.11,16.1)  | 0.03    | 1     |
Late Cohort panel A, B, C

| Characteristics                        | Odds ratio (95% CI) | P value | Score |
|----------------------------------------|---------------------|---------|-------|
| Preexisting lung disease on radiology  | 5.47 (0.96,31.32)   | 0.05    | 2     |
| Solid tumor (non-lung or heme)         | 3.62 (1.23,10.64)   | 0.02    | 1     |

Supplemental Table 7. Predictors for no severe events (i.e., “beneficial characteristics”) selected by stepwise logistic regression using basic lab panel

| Characteristics                        | Odds ratio (95% CI) | P value | Score |
|----------------------------------------|---------------------|---------|-------|
| BUN <20 mg/dL                          | 2.7 (1.33,5.51)     | 0.006   | 1     |
| Calcium >8.5 mg/dL                     | 3.57 (1.65,7.72)    | 0.001   | 1     |
| Glucose <140 mg/dL                     | 3.89 (1.68,9.02)    | 0.001   | 1     |
| WBC 4-10.9 K/mcL                       | 0.46 (0.19,1.12)    | 0.08    | -1    |
| WBC >10.9 K/mcL                        | 0.31 (0.10.97)      | 0.04    | -1    |
| Oxygen Saturation 89.9-94.9% SpO2      | 10.5 (2.22,49.54)   | 0.003   | 2     |
| Oxygen Saturation >94.9% SpO2         | 17.1 (3.99,73.26)   | 0.0001  | 3     |
| Respiratory Rate <20 breaths/ minute   | 2.98 (1.16,7.62)    | 0.02    | 1     |
| Negative radiology                     | 2.53 (1.13,5.64)    | 0.02    | 1     |
| Solid (non-lung or heme)               | 3.44 (1.7,6.96)     | 0.08    | -1    |

Supplemental Table 8. Variance inflation factors (VIF) of predictors of death within 30 day used in the final logistic regression model

| Characteristic                          | Variance Inflation Factor (VIF) |
|----------------------------------------|---------------------------------|
| Albumin <3.8 g/dL                      | 1.12                            |
| BUN >20 mg/dL                          | 1.14                            |
| Glucose >140 mg/dL                     | 1.53                            |
| HGB <12.5 g/dL                         | 1.16                            |
| Sodium <133 mEq/L                      | 1.13                            |
| Respiratory rate >20 breaths per minute| 1.40                            |
| Temperature >38.3°C                    | 1.23                            |
| Positive radiology                     | 1.73                            |
| Preexisting lung disease on radiology  | 1.67                            |
| Solid tumors (non-lung or heme)        | 1.29                            |

Supplemental Table 9. Variance inflation factors (VIF) of predictors of no severe events (i.e., “beneficial characteristics”) day used in the final logistic regression model.

| Characteristic                          | Variance Inflation Factor (VIF) |
|----------------------------------------|---------------------------------|
| Albumin ≥ 3.8 g/dL                     | 1.13                            |
| AST ≤ 37 U/L                           | 1.1                             |
| BUN ≤ 20 mg/dL                         | 1.06                            |
| Calcium >8.5 mg/dL                     | 1.14                            |
| Glucose ≤ 140 mg/dL                    | 1.14                            |
Late Cohort panel A, B, C

|                              |     |
|------------------------------|-----|
| Oxygen saturation 89.9-94.9% SpO2 | 4.02|
| Oxygen saturation >94.9% SpO2 | 4.04|
| Respiratory rate ≤ 20 breaths/minute | 1.13|
| Neutrophil-lymphocyte ratio <3 | 1.12|
| Negative radiology           | 1.1 |

Supplemental Table 10. Patient demographic and clinical characteristics (University of Washington Emergency Department cohort, n=29)

|                              | n (%) |
|------------------------------|-------|
| Sex                          |       |
| Female                       | 12 (41) |
| Male                         | 17 (59) |
| Race                         |       |
| White                        | 27 (93) |
| Black                        | 2 (7)  |
| Comorbidities*               |       |
| Cardiac                      | 24 (83) |
| Endocrine/nutritional/metabolic | 7 (24) |
| Pulmonary                    | 9 (31)  |
| Immunocompromised            | 0 (0)  |
| Neurological                 | 4 (14) |
| Infectious                   | 0 (0)  |
| Renal                        | 9 (31) |
| Smoking status               |       |
| Never smoker                 | 14 (48) |
| Smoker (former/current/unknown) | 15 (52) |
| Cancer type                  |       |
| Hematological                | 9 (31) |
| Lung                         | 2 (7)  |
| Other solid                  | 19 (62) |
| Severe event (including death) |       |
| Yes                          | 16 (55) |
| No                           | 13 (45) |
| Disposition from UCC, initial visit |       |
| Admitted at first UCC visit  | 27 (94) |
| Admitted <2 days after discharge | 1 (3)  |
| Admitted 2-7 days after discharge | 1 (3)  |
| Discharged and never admitted | 0 (0)  |
| Time from first UCC visit to death |       |
| <30 days                     | 11 (38) |
| NA                           | 18 (72) |
| Radiology findings           |       |
Late Cohort panel A, B, C

| Category                                        | Count (Percentage) |
|------------------------------------------------|--------------------|
| **Negative**                                    | 10 (34)            |
| **Positive**                                    | 17 (59)            |
| Inconclusive (i.e., extensive lung disease)     | 2 (7)              |

**Radiology findings (n=17)**

| Type                | Count (Percentage) |
|---------------------|--------------------|
| Bilateral infiltrates | 13 (76)           |
| Unilateral infiltrates | 4 (24)            |

**ICU admission with mechanical ventilation (n=16 with severe events)**

| State   | Count (Percentage) |
|---------|--------------------|
| Alive   | 0 (0)              |
| Dead    | 1 (6)              |

**ICU admission without mechanical ventilation (n=16 with severe events)**

| State   | Count (Percentage) |
|---------|--------------------|
| Alive   | 5 (31)             |
| Dead    | 2 (13)             |

**Non-ICU patient death (n=16 with severe events)**

| Type                | Count (Percentage) |
|---------------------|--------------------|
| No mechanical ventilation | 8 (50)             |
| Mechanical ventilation | 0 (0)              |

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**Supplemental Figure 1.** Distribution of risk scores in MSKCC cohort (n=255) using basic panel.

(a) Distribution of risk scores for mortality within 30 days in patients admitted at first UCC visit (left) and discharged from initial visit (middle), and probability of an outcome based on risk score (right). (b) Distribution of risk scores for no severe events within 30 days (i.e., safe discharge) in patients admitted at first UCC visit (left) and discharged from initial visit (middle).
Late Cohort panel A, B, C

and probability of an outcome based on risk score (right). Red curves use estimated baseline risk in March; blue curves use estimated baseline risk in April/May.

**Basic Panel**

**a. Death within 30 days**

**b. Severe events**

**Supplemental Figure 2.** Receiving operating curve (ROC) for predicting (a) mortality within 30 days (b) no severe events (i.e., safe discharge) using the basic panel, demographics, clinical characteristics and imaging studies in the MSKCC cohort and a validation cohort. Estimated ROC curves in the validation cohort were based on the multivariate model in Tables 2 and 3. For left panels, blue curves: ROC at each replication for 5-fold cross validation; red curves: are average ROC curves.
Supplemental Figure 3. Distribution of risk scores in MSKCC late cohort plotted against 30 day mortality using complete panel (N=108). Distribution of risk scores and mortality within 30 days in all patients (left), those admitted at first UCC visit (middle), and discharged upon initial visit (right).