

ICEES+ COVID-19 Feature Variables

ICEES+ API CONFIG FILES:

<https://github.com/NCATS-Tangerine/icees-api/tree/master/config>

ICEES+ API YAML FILE:

<https://github.com/NCATS-Tangerine/icees-api/blob/master/config/features.yml>

[N3C Phenotype GitHub Repo](#) - Use the LOINC, ICD, and SNOMED codes located in the N3C Phenotype GitHub repo; do NOT use the OMOP-specific codes provided in the same repo

Primary patient categories - These categories are based on a combination of the data elements located in the N3C Phenotype GitHub Repo

Lab-confirmed Positive	Lab-confirmed Negative	Suspected Positive	Possible Positive
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Clinical Data Elements and Clinical Course

Variable, n(%) unless otherwise indicated	Enumeration		FHIR Element (1=currently captured)
Age, mean +/- SD	Currently captured and categorized	Add new variable 'AgeInteger', integer = 0 (min), 89 (max)	1
Smoking Status	Integer = 0 (no), 1 (yes)		1
Charlson Comorbidity Index, median (IQR)	Integer = 0 (min score), 37 (max score)		?

Diagnoses	Integer = 0 (no), 1 (yes)		
HypertensionDx			
Chronic Kidney Disease			
Coronary Artery Disease			
Heart Failure			
Chronic Obstructive Pulmonary Disease			
Liver Disease			
Cancer			
HIV Infection			
Clinical Course			
Hospital LOS, median (IQR)	Integer, range unknown	Map to Biolink Type “Outcome” as placeholder	
ICU	Integer = 0 (no), 1 (yes)	Map to Biolink Type “Outcome” as placeholder	

Ventilator	Integer = 0 (no), 1 (yes)		
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Laboratory Results - Inflammatory markers, Blood gases, and Oxygen delivery

Variable, grouped by patient	Enumeration		FHIR ELEMENT
Erythrocyte Sedimentation Rate (ESR), mm/hr	String = Low, Normal, High		
Procalcitonin, ng/mL	String = Low, Normal, High		
Ferritin, units	String = Low, Normal, High		
C-reactive Protein (CRP), units	String = Low, Normal, High		
D-dimer, units	String = Low, Normal, High		
LDH, units	String = Low, Normal, High		
IL-6, units	String = Low, Normal, High		
pH	String = Low, Normal, High		
pCO2, mmHg (arterial/venous)	String = Low, Normal, High		

pO2, mmHg (arterial)	String = Low, Normal, High		
pO2/FiO2 ratio	String = Low, Normal, High		
SpO2/FiO2 ratio	String = Low, Normal, High		
Base deficit	String = Low, Normal, High		
Lactate, mmol/L	String = Low, Normal, High		
SvO2, [units]	String = Low, Normal, High		

Laboratory Results - Hematology

Variable, grouped by patient	Enumeration		FHIR ELEMENT
White blood cell count, cells 10³/uL	String = Low, Normal, High		

Absolute neutrophil count (ANC), cells 10³/uL	String = Low, Normal, High		
Absolute lymphocyte count (ALC), cells 10³/uL	String = Low, Normal, High		
Hemoglobin, [units]	String = Low, Normal, High		
Platelet count, [units]	String = Low, Normal, High		
Blood Type	String = A+, A-, B+, B-, AB+, AB-, O+, O-		
A ⁺			
A ⁻			
B ⁺			
B ⁻			
AB ⁺			
AB ⁻			
O ⁺			
O ⁻			

Laboratory Results - Electrolytes and Organ Injury/Dysfunction Biomarkers

Variable, grouped by patient	Enumeration	invasive vent)	FHIR ELEMENT
Serum Sodium, [units]	String = Low, Normal, High		
Serum Potassium, [units]	String = Low, Normal, High		
Serum Chloride, [units]	String = Low, Normal, High		
Serum Bicarbonate, [units]	String = Low, Normal, High		
Blood Urea Nitrogen, [units]	String = Low, Normal, High		
Serum Creatinine, [units]	String = Low, Normal, High		
Serum Glucose, [units]	String = Low, Normal, High		
ALT, [units]	String = Low, Normal, High		
AST, [units]	String = Low, Normal, High		
Troponin [type], [units]	String = Low, Normal, High		
Brain Natriuretic Peptide [type], [units]	String = Low, Normal, High		
CK [type], [units]	String = Low, Normal, High		

Hgb A1C, [units]	String = Low, Normal, High		
Estimated GFR, [units]	Integer = units (range unknown)		

Medications/Treatments

Variable, n(%) unless otherwise indicated	Enumeration		FHIR ELEMENT
Respiratory Support	Integer = 0 (no), 1 (yes)		
Supplemental Oxygen			
HF NC			
NIPPV			
Invasive Ventilation			
Nitric Oxide or Flolan			
Cardiovascular Support (yes/no)	Integer = 0 (no), 1 (yes)		
Amiodarone gtt			
Dopamine gtt			
Dobutamine gtt			

Epinephrine gtt			
Esmolol gtt			
Isoproterenol gtt			
Levosimendan gtt			
Milrinone gtt			
Norepinephrine gtt			
Phenylephrine gtt			
Vasopressin gtt			
ECLS			
CRRT/HD	Integer = 0 (no), 1 (yes)		
Anti-infectives (yes/no)	Integer = 0 (no), 1 (yes)		
Remdesivir			
Hydroxychloroquine			
Antibiotics			
Immunomodulation	Integer = 0 (no), 1 (yes)		
Dexamethasone			
Prednisone/Methylprednisolone			

IVIG			
Convalescent Plasma			
Anakinra			
Tocilizumab			

ADDITIONAL DATA ELEMENTS, INCLUDING UNC-SPECIFIC DATA ELEMENTS:

Variable	Enumeration	FHIR ELEMENT
WHO Severity Score	Integer = 1 (min), 10 (max)	
Influenza 7-point Clinical-Status Score	Integer = 1 (min), 7 (max)	
FeverDx	Integer = 0 (no), 1 (yes)	
Isolation Flag	Integer = 0 (no), 1 (yes)	
Discharge Status	String (enum unknown)	
FEV1, FVC, FEV1FVC Labs	String = Low, Normal, High	
PCD Dx	Integer = 0 (no), 1 (yes)	Unrelated to N3C, but relevant to ICEES+ Translator use case; ICD code is imprecise, Q34.8
UNC PCD Registry		
Neonatal respiratory distress after term (or near-term) birth	Integer = 0 (no), 1 (yes)	Don't worry about 'term'; just capture 'neonatal respiratory distress syndrome'
Laterality defect (situs inversus or heterotaxy)	Integer = 0 (no), 1 (yes)	
Daily wet cough before 6 months of age	Integer = 0 (no), 1 (yes)	Don't worry about age or chronicity; just capture 'wet cough'

Middle ear disease	Integer = 0 (no), 1 (yes)	
Chronic nasal congestion before 6 months of age	Integer = 0 (no), 1 (yes)	Don't worry about age; just capture 'chronic nasal congestion'
Bronchiectasis	Integer = 0 (no), 1 (yes)	
Male infertility due to sperm tail dysfunction	Integer = 0 (no), 1 (yes)	
Low nasal nitric oxide levels (< 77 nL/min)	Integer = 0 (no), 1 (yes)	We won't be able to capture this
Defective ciliary ultrastructure	Integer = 0 (no), 1 (yes)	We won't be able to capture this
Cystic fibrosis	Integer = 0 (no), 1 (yes)	
Antibiotics	Integer = 0 (no), 1 (yes)	We may not be able to capture this as a general class and may need to be more specific
DILI Dx	Integer = 0 (no), 1 (yes)	Unrelated to N3C, but relevant to ICEES+ Translator use case