

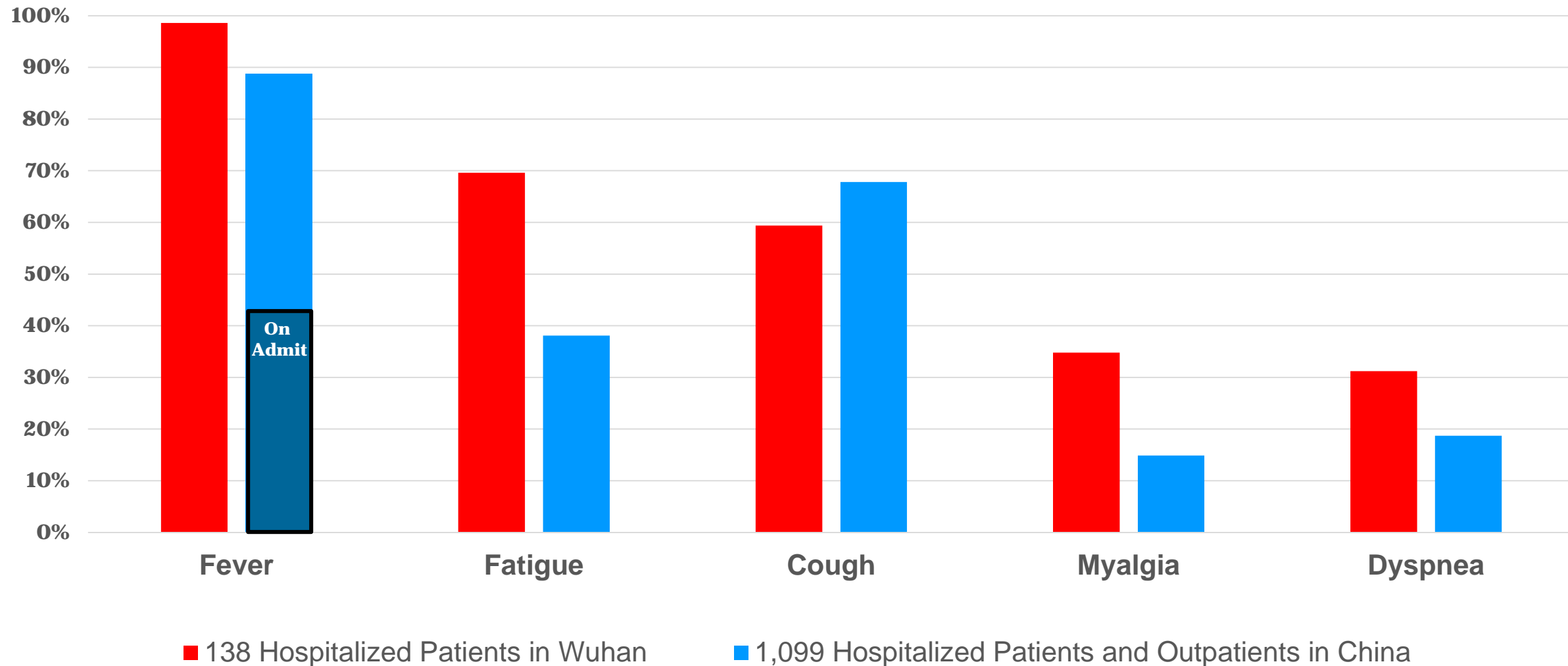
Clinical Aspects of COVID-19

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Common Clinical Manifestations of COVID-19



■ Wang D, et al. JAMA February 7, 2020

■ Guan W, et al. NEJM February 28, 2020

Other Symptoms and Signs in COVID-19

Other Reported Symptoms

- Headache
- Rhinorrhea
- Sore throat
- Conjunctivitis
- Anosmia
- Dysgeusia
- Nausea
- Vomiting
- Abdominal pain
- Diarrhea

Laboratory findings

- Leukopenia
- Lymphopenia
- Leukocytosis can occur
- Elevated transaminase levels
- Elevated LDH
- Elevated ferritin, D-dimer, CRP

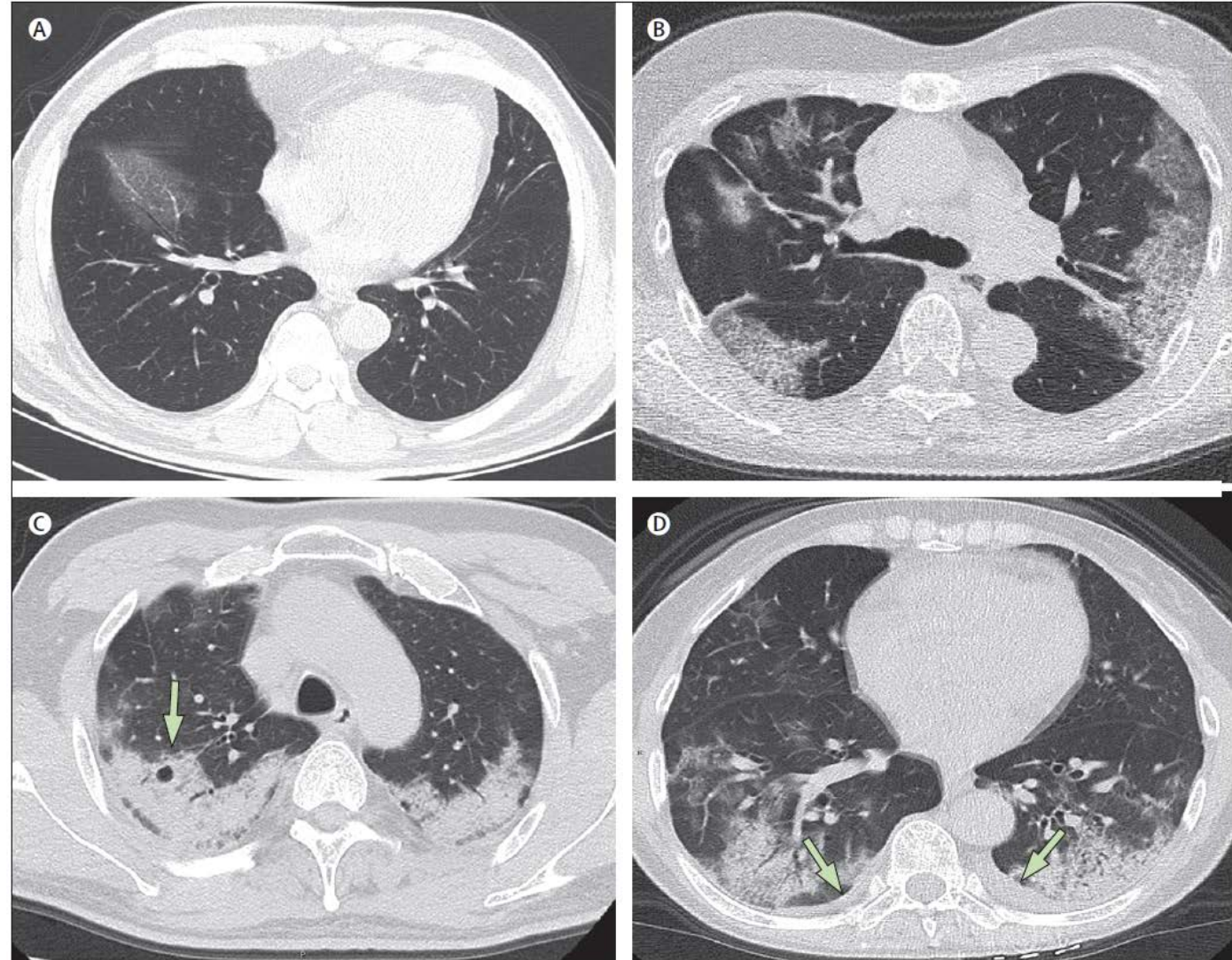
Chest X-ray findings:

- Ground glass opacities
- Consolidation

Radiographic Findings in COVID-19

Chest CT:

- A. Focal ground-glass opacity
- B. Bilateral, peripheral ground-glass opacities, septal thickening
- C. Bilateral consolidation pattern with a round cystic change
- D. Bilateral, peripheral mixed pattern with air bronchograms and pleural effusions.



(Shi H, et al. Lancet, February 24, 2020)

Diagnostic Tests for COVID-19

- SARS-CoV-2 PCR is the current test of choice
- Virus may be detected before clinical symptoms
- PCR testing of a nasopharyngeal swab is a highly sensitive test when properly collected and at the appropriate time of disease
- There are reports of initially negative testing and discordance between anatomic sites (e.g. nasopharynx versus sputum)
- Serologic studies are in development and will be helpful to determine the full spectrum of disease and the extent of the epidemic

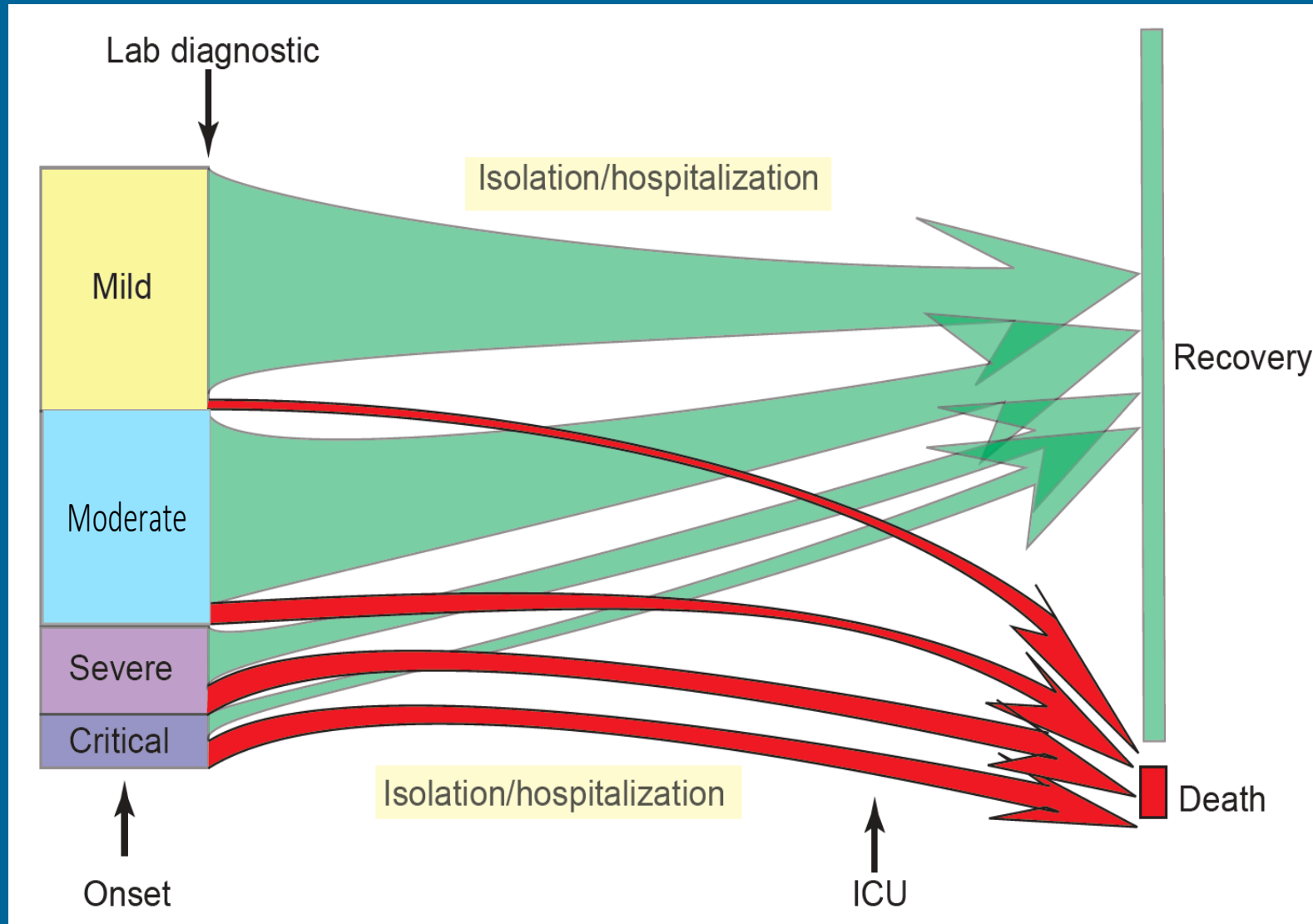
Spectrum of Illness with COVID-19

- Symptomatic disease may be mild, moderate, severe, or critical
- The infection may be asymptomatic

The Diamond Princess

- 3,711 passengers and crew
- 712 (19.2%) tested + for SARS-CoV-2
 - 331 (46.5%) were asymptomatic at the time of testing
 - 381 (53.5%) were symptomatic
 - 37 (5.2%) symptomatic patients required intensive care
 - 9 (1.2%) patients died

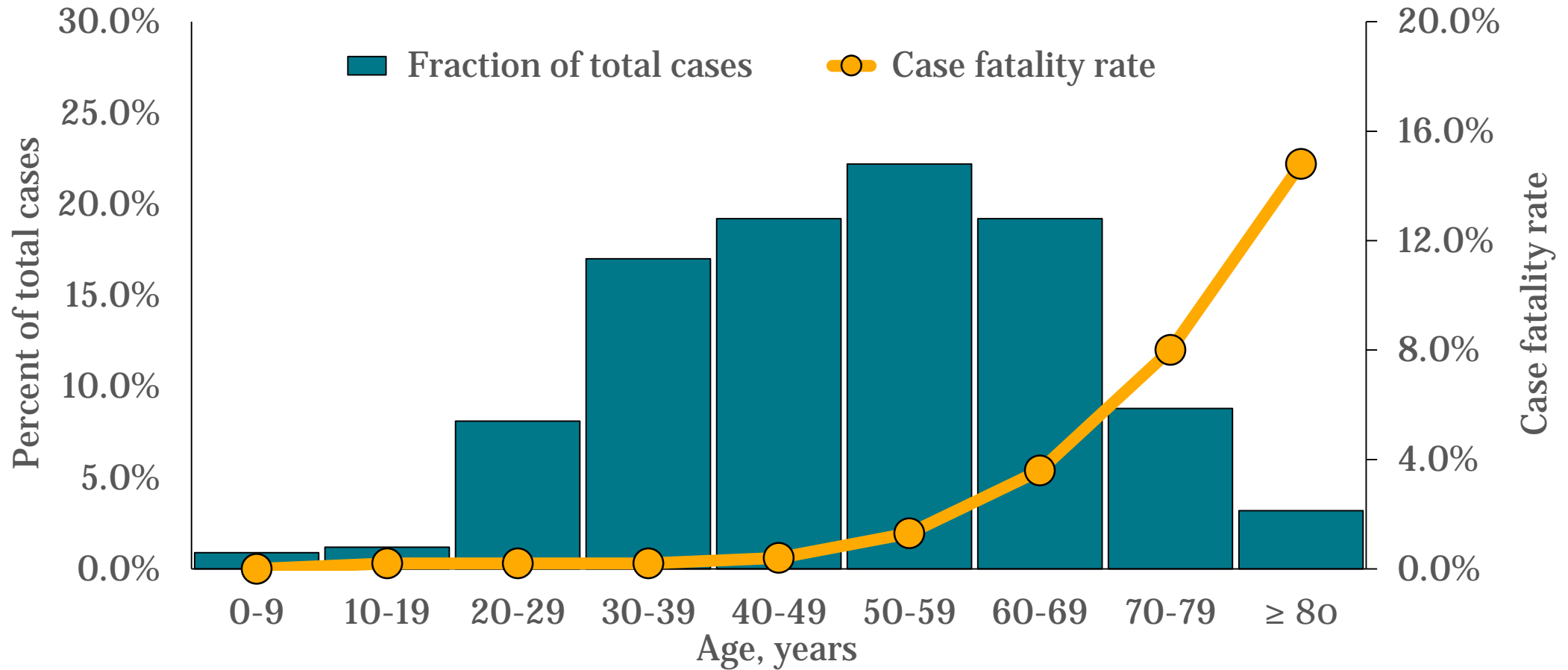
Clinical Progression and Recovery



Factors Associated with the Risk of Severe Disease

- Older age
- Cardiovascular Disease
- Chronic lung disease
- Hypertension
- Diabetes mellitus
- Cancer
- Gender (male > female)
- ?Immunocompromising diseases and medications
- ?HIV infection

Age Distribution and Case Fatality Rate of COVID-19: China through 11-Feb-2020 (N = 44,672 confirmed cases)



John Brooks, CROI 2020, Boston, March 8 – 11, 2020. Adapted from Zhang 2020, China CDC Weekly Rep:2(8):113-122

Hospitalization, ICU Admission, and Case-Fatality for 2,499 COVID-19 Cases in the U.S., February 12-March 16, 2020

Age Group (Number of Cases)	Hospitalization (%)	ICU Admission (%)	Case-Fatality (%)
0-19 (123)	1.6-2.5	0	0
20-44 (705)	14.3-20.8	2.0-4.2	0.1-0.2
45-54 (429)	21.2-28.3	5.4-10.4	0.5-0.8
55-64 (429)	20.5-30.1	4.7-11.2	1.4-2.6
65-74 (409)	28.6-43.5	8.1-18.8	2.7-4.9
75-84 (210)	30.5-58.7	10.5-31.0	4.3-10.5
≥ 85 (144)	31.3-70.3	6.3-29.0	10.4-27.3
Total (2,499)	20.7-31.4	4.9-11.5	1.8-3.4

Co-Morbidities and Risk of Death

China: In an analysis of 1,023 deaths due to COVID-19:

- The case-fatality rate was higher for persons with cardiovascular disease (10.5%), diabetes mellitus (7%), chronic respiratory disease (6%), HTN (6%), and cancer (6%)
- Persons without comorbidities had a case-fatality rate of 0.9%¹

Italy: In an analysis of 355 deaths due to COVID-19:

- Underlying diseases included ischemic heart disease (30%), diabetes mellitus (20%), malignancy (20%), atrial fibrillation (7%), stroke (10%), and dementia (7%)
- Persons who died had a mean number of 2.7 preexisting diseases
- Only 3 (0.8%) of 355 deaths were in persons without comorbidities²

United States:

- Among COVID-19 patients with complete health information, 173 (94%) of 184 deaths occurred in persons with at least one underlying health condition³

1. The Novel Coronavirus Emergency Response Epidemiology Team. CCDC Weekly Vol. 2, No. 8

2. Onder G, et al. JAMA March 23, 2020

3. CDC COVID-19 Response Team, MMWR, March 31, 2020

Complications of COVID-19

Complications

- ARDS
- Acute cardiac injury (elevated troponins, myocarditis, arrhythmias)
- Acute kidney injury
- Shock/DIC
- Death

Laboratory Factors Associated with Severe Disease:

- Severe lymphopenia
- Leukocytosis
- Elevations in D-Dimer, LDH, CRP, and ferritin
- Prolonged prothrombin time

Clinical Management of Inpatients with COVID-19

- A large portion of the current treatment approach is supportive including management of complications such as cardiac injury, acute kidney injury, progressive pneumonia, secondary infections, and ARDS

As of 3/31/20 at 14:30	UCH	DHMC	VAMC	CHCO
Persons Under Investigation (PUI)	10	56	2	15 (cleared)
COVID+	80	31	5	3
Floor	38	18	5	0
ICU	42	13	4	0
Mechanical ventilation	39	14	4	0

Data prepared by: L Heery MS3, M Huang MD, E Poeschla MD, S Zimmer MD (UCH), B Adams MS3, K Branche MS3, S Muramoto MS3, M Spear MS3 (DH), M Ho MD, S Haeger MS4, S Powers MS4, M Klausner MS3 (VA), D Hyman MD, MMM (CHCO)

Areas of Uncertainty in Management

- The role of empiric antibacterial therapy
- The importance of testing for coinfections
- Mechanisms by which age, gender, and comorbidities affect outcome
- Management of persons who are immunosuppressed
- The impact of pregnancy on outcome
- Safe admission and discharge criteria
- Management of the hyperinflammatory syndrome
- The role of antiviral therapy and immunomodulators
- Whether infection confers immunity

Clinical Resources

- CDC: Interim Clinical Guidance for Management of Patients with Confirmed Coronavirus Disease (COVID-19) (last updated 3/30/20)
- WHO: Clinical management of severe acute respiratory infection when COVID-19 is suspected (last updated 3/13/20)
- Many society links (IDSA, ACP, ATS, Society of Hospital Medicine, and others)
- University of Colorado/UCHealth links including DOM and ID
- NIH/HHS Panel on Guidelines for the Management of COVID-19 (in development, publication pending)