Long COVID

Urban Fire Forum
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COVID-19 Pandemic
- Worldwide and US burden

- Global burden
  - 223.3M cases
  - 4.6M deaths

- US burden
  - 40.7M cases
  - 656,447 deaths

- Fire Service
  - ???? cases
  - 170+ deaths

Data as of 9/12/2021
There are 9 firefighters who have not had their age registered.
COVID-19 TOOLKIT

Behavioral Health Resources

Legislative Resources

FAQs

FAQs (en français)

Infographics

Infographies (en français)

Preparing for a COVID-19 Economy Toolkit

Contact Us

Counts are unofficial. Data are collected from voluntary surveys of IAFF local leadership. Numbers may fluctuate.

Data as of 9/12/2021
COVID Concerns in FS

• ↑Risk of COVID-19 contact/spread
  • Routinely engages with community
  • Live in group living quarters

• Implications of COVID for return to work
• Effect on performance/safety on fire ground based on cardiovascular responses to firefighting

<table>
<thead>
<tr>
<th>Cardiac</th>
<th>Vascular</th>
<th>Blood/Coagulatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>↑ Heart rate</td>
<td>↑ Arterial stiffness</td>
<td>↓ Immune function (NK cell)</td>
</tr>
<tr>
<td>↑ Cardiac work</td>
<td>↑ Blood flow</td>
<td>↑ Clotting potential</td>
</tr>
<tr>
<td>↑ Diastolic dysfunction</td>
<td>↑ Endothelial dysfunction</td>
<td>↑ Increased Inflammation</td>
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</tbody>
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COVID-19 Overview

- **Virus infection** → **Virus replication** → **Immune response** → **Acute symptoms** → **Prolonged symptoms**

**Acute symptoms**
- Fever
- Dyspnea
- Fatigue
- Cough
- Headache
- Myalgia
- Sore throat
- Vomiting
- Dizziness

**“Cytokine Storm”**

**Prolonged symptoms**
- “COVID Long”
  - Wide-ranging symptoms
  - Lasts >12 wks

**Death**

**Recovery (severity)**

**Lung epithelial cell**
COVID-19 Overview

- Severity and its predictors

Infection → Replication → Immune response → Acute symptoms → Prolonged symptoms

**Stage 1: Mild**
- Infection via ACE2 receptors
- Symptoms: fever, dry cough

**Stage 2: Pulmonary**
- ↑Inflammation, “cytokine storm”
- Symptoms: SOB, hypoxia

**Stage 3: Hyperinflammation**
- Severe inflammatory response
- Symptoms: Acute respiratory distress, systemic inflammatory response, multi-organ failure

Predictors of severity:
- Healthy lifestyle/diet
- Therapeutic success
- Early diagnosis
- Vaccination status
- Viral load (Delta variant/vaccination)
- Older age
- Cardiovascular disease
- Obesity, Type 2 diabetes
- Inflammation/inflammatory conditions
- Endothelial dysfunction
- Other

Predictors of severity:
- "COVID Long"
- Wide-ranging symptoms
- Lasts >12 wks
Long COVID

Serious **long-term** health consequences of COVID-19 are emerging in medical/scientific journals

- 1/4 have symptoms >1 month
- 1/10 have symptoms >3 months (**Long Haulers, Long Covid**)
- In *outpatients with mild disease*, 30% had persistent symptoms after 6-9 months

• Broad range of overlapping and potentially debilitating symptoms
• Mechanisms are poorly understood
  • Impacts multiple system and often involves inflammation, thrombosis, and autoimmunity.

Long COVID

Clinical conditions - independent of disease severity

- Clotting disorders (stroke, myocardial infarctions, PE)
- Hypertension and related disorders
- Pulmonary congestion, fibrosis
- Cardiac damage
- Excessive Immune response (autoimmune)
- Metabolic syndrome
- Neurological disorders
- Other

Endothelial Function

- **Endothelium** lines all blood vessels.
  - Limits movement in and out of blood vessel
  - Immune function/Inflammation
  - Coagulation
  - Vessel diameter – blood pressure control
Role of the **endothelium** in COVID-19

- COVID-19 binds endothelial ACE2 receptors

![Diagram showing the role of the endothelium in COVID-19 symptoms]

- **↑Permeability**
- **↑Immune activation & inflammation**
- **↑Prothrombotic environment**
- **↓Blood pressure control**

**Endothelial contribution to COVID-19 symptoms**

- Acute respiratory distress syndrome
- Cardiac damage
  - Acute coronary syndrome
  - Heart failure
  - Arrhythmia
- Thromboembolism
- Vasoplegia
- Immune exhaustion
COVID-19 Pathophysiology
- Endothelial function and COVID-19 symptomology

Infection → Replication → Immune response → Acute symptoms → Prolonged symptoms

- Inflammation
- "Cytokine Storm"

Acute symptoms:
- Fever
- Dyspnea
- Fatigue
- Cough
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- Myalgia
- Sore throat
- Vomiting
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Prolonged symptoms:
- "COVID Long"
- Wide-ranging symptoms
  - Lasts 12wks

Endothelium
COVID LONG Prevention/Treatment

Infection → Replication → Immune response → Acute symptoms → Prolonged symptoms

- **Acute symptoms**: Fever, Dyspnea, Fatigue, Cough, Headache, Myalgia, Sore throat, Vomiting, Dizziness
- **Prolonged symptoms**: “COVID Long” Wide-ranging symptoms Lasts >3-4 wks

“Blood Pressure Meds? (regulate ACE-2)
Pressing Questions for the Fire Service

• Emerging disease with a great deal that is unknown
• Surveillance Efforts are Incomplete – IAFF, IAFC, NFFF, USFA
• Incomplete information- portion of COVID-19 infected who were:
  • Asymptomatic
  • Mildly sick
  • Moderately sick (including missing work)
  • Severally ill (not hospitalized)
  • Severely ill (hospitalized; required oxygen or did not require oxygen; intubated)
  • Fatal outcome (over 170 as of 9/20/21)

• Impact of Severity of COVID-19 and COVID- Long on Return to Work and subsequent CV risk
Moving Forward

• 360 Size UP

• Gather information – synthesize and share

• Be attentive to risks – collaborate with others to put risks in context

• Be prepared to act – use information to mitigate ongoing risk
Thank you

Questions?

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