Welcome to the Front Lines of the Fight Against COVID-19

A TOWN HALL CONVERSATION

We will begin at 10 a.m.
COVID-19
Effect on the Heart & Vessels

William A. Zoghbi MD, MACC
Professor and Chairman, Department of Cardiology
Elkins Family Distinguished Chair in Cardiac Health
Houston Methodist Hospital
SARS-CoV-2 Symptoms
Involve most Organ Systems

- *25% Asymptomatic*
- *50% Mild symptoms*
- *15% Moderate symptoms*

- Chest pain 4%
- Shortness of Breath 10%
- Palpitations 3%

- Fever 88%
- Fatigue 38%
- Chills 11%

- Headache 14%
- Anosmia 60%
- Sore throat 14%
- Dry cough 68%
- Productive cough 33%
- Dyspnea 19%
- Nausea/emesis 5%
- Diarrhea 4-14%
- Myalgias 15%
Cardiac Involvement

SARS-CoV-2 → Immunopathology, Hyperinflammation → Direct Myocardial Injury → Respiratory failure, Hypoxemia

Biomarkers of injury
- Arrhythmias
- Acute Coronary Syndromes
- HFrEF, HFrEF
Damaging the heart
Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection has the potential to directly and indirectly induce cardiac damage.

The Spike protein can bind with ACE2 receptors in vessels throughout the body, enhancing clot formation.
Risk Factors & Mortality in COVID-19

Risk Factors:

- Age
- High Blood pressure
- Diabetes
- Heart Disease
- Obesity
- Lung disease
- Other co-Morbidities

Case Fatality Rate Increases with Age

Estimated case fatality risk in Hubei, China, January-February 2020

*Among all symptomatic and asymptomatic infections
Source: Adjusted age-specific case fatality ratio during the Covid-19 epidemic in Hubei, China, January and February 2020, medRxiv
Risk Factors in COVID-19 Associated with Worse Outcome

Maddaloni Circ 2020
Involvement of The Heart and Vessels in COVID-19

- Myocarditis
- Acute Myocardial Infarction
- Arrhythmias
- Venous thromboembolism / Pulmonary embolism
- Stroke
- Heart failure / cardiogenic shock

Canadian Journal of Cardiology 36 (2020) 1068e1080
Echocardiograms- Heart Function

Normal

COVID-19
Heart Failure
CARDIAC DYSFUNCTION
LEFT vs RIGHT VENTRICLE INVOLVEMENT?

Spectrum of Major Echocardiographic Abnormalities in Patients With Myocardial Injury and COVID-19

N = 309

- LV wall motion abnormalities (N = 45; 23.7%)
- Right ventricular dysfunction (N = 50; 26.3%)
- Pericardial effusion (N = 22; 7.2%)
- Diastolic dysfunction grade II or III (N = 25; 13.2%)
- LV global dysfunction (N = 35; 18.4%)

Giustino G et al. JACC 2020; 76(18):2043-2055.
26 patients underwent CMR- median 47 days after COVID-19 symptoms onset

Reported cardiac symptoms (chest pain/palpitations) after recovering from COVID-19

Abnormal CMR- 58%
Myocardial edema- 54%
Focal fibrosis- Late gadolinium enhancement (LGE)- 31%

Huang L, et al. JACC Img. 2020; 13: 2330-2339
High Prevalence of Pericardial Involvement in College Student Athletes Recovering From COVID-19

Daniel Brito, MD,⁎ a Scott Meester, MD,⁎ a Naveena Yanamala, MS, PhD,⁎ b Heenaben B. Patel, MBBS,⁎ c Brenden J. Balcić, MD,⁎ Grace Casaclang-Verzosa, MD,⁎ Karthik Seetharam, MD,⁎ Diego Riveros, MD,⁎ Robert James Beto II, MD,⁎ Sudarshan Balla, MD,⁎ Aaron J. Monseau, MD,⁎ Partho P. Sengupta, MD, DM⁎

54 consecutive student athletes with COVID
66% moderate COVID-19 related symptoms
40% athletes with pericardial late enhancements with associated pericardial effusion.
Of the individuals with pericardial enhancements, 6 (12.5%) had reduced global longitudinal strain and/or an increased native $T_1$
ARRHYTHMIAS IN COVID-19

Accompany Severity of the Illness & Cardiac Involvement

• Atrial Fibrillation
• Tachycardia
• Heart Block
• Ventricular Tachycardia
• Cardiac Arrest
ADULT CONGENTIAL HEART DISEASE?

Moderate/Severe COVID-19 Infection Associated with:

- Genetic Syndrome
- ACHD Physiologic Stage C
- Pulmonary Hypertension
- Obesity
Prevalence and Impact of Myocardial Injury in Patients Hospitalized With COVID-19 Infection

Anuradha Lala, MD, a,b,c Kipp W. Johnson, PhD, a,c,d James L. Januzzi, MD, a,c,d Adam J. Russak, MD, a,c,d Ishan Paranjpe, BS, a Felix Richter, PhD, a,c,d Shan Zhao, MD, PhD, a,c,d Sulaiman Somani, BS, a, Tielman Van Vleck, PhD, a Akhil Vaid, MD, a,c,d Fayaz Chaudhry, MS, a Jessica K. De Freitas, BS, a,c,d Zahi A. Fayad, PhD, a,c,d; Sean P. Finn, MD, a Matthew Levin, MD, a,c,d,c,f Alexander Charney, MD, PhD, a,c,d,c,f Emilia Bagiella, PhD, a,c,d,c,f Jagat Narula, MD, PhD, a,c,d,c,f Benjamin S. Glicksberg, PhD, a,c,d,c,f Girish Nadkarni, MD, MPH, a,c,d,c,f Donna M. Mancini, MD, a,c,d,c,f Valentin Fuster, MD, PhD, a,c,d,c,f on behalf of the Mount Sinai COVID Informatics Center

2736 COVID patients

506 (19%) patients died during hospitalization

985 (36%) elevated troponin within 24 hours

Mild Elevation >0.03-0.09
HR 1.75; 95% CI: 1.37 to 2.24

High Elevation >0.09 ng/dl
HR: 3.03; 95% CI: 2.42 to 3.80
What we know about the long term consequences of getting COVID-19
Persistent Symptoms in Patients After Acute COVID-19

143 Patients Admitted with COVID-19
72% with PNA
2 Week LOS

2 Months post discharge
• 12% completely free of any COVID-19–related symptoms
• 32% had 1-2 symptoms
• 55% had 3 or more symptoms

JAMA. Published online July 09, 2020. doi:10.1001/jama.2020.12603

MAJORITY OF HOSPITALIZED PATIENTS DON’T RECOVER IN 2 MONTHS
WHY PROLONGED SYMPTOMS WITH COVID-19?

**Neurologic**
- Headaches
- Dizziness
- Encephalopathy
- Guillain-Barré
- Ageusia
- Myalgia
- Anosmia
- Stroke

**Thromboembolism**
- Deep vein thrombosis
- Pulmonary embolism
- Catheter-related thrombosis

**Cardiac**
- Takotsubo cardiomyopathy
- Myocardial injury/myocarditis
- Cardiac arrhythmias
- Cardiogenic shock
- Myocardial ischemia
- Acute cor pulmonale

**Renal**
- Acute kidney injury
- Proteinuria
- Hematuria

**Hepatic**
- Elevated aminotransferases
- Elevated bilirubin

**Endocrine**
- Hyperglycemia
- Diabetic ketoacidosis

**Gastrointestinal**
- Diarrhea
- Nausea/vomiting
- Abdominal pain
- Anorexia

**Dermatological**
- Petechiae
- Livedo reticularis
- Erythematous rash
- Urticaria
- Vesicles
- Parnio-like lesions
Vascular Manifestations - Endothelial dysfunction and thrombosis

- SARS-CoV-2 infects endothelial cells through binding to ACE2 receptor
- Vascular inflammation
- Can lead to vasoconstriction
- Activation of platelets can lead to thrombosis and potential emboli (4-8%)

COVID-19 Effect on the Heart & Vessels

- SARS-CoV-2 can cause heart damage either directly, through an inflammatory process, microthrombi or indirectly because of severe lung damage
- COVID-19 can be associated with myocardial infarction, heart failure, pericarditis or arrhythmias
- Vascular thrombosis (arterial and venous) is seen in COVID-19
- Prognosis is worse in patients where the heart and other organs are more severely affected
- Long term prognosis awaits further observational studies

We are following COVID-19 patients in the CURATOR Registry in the Houston Methodist System with acute and long term comprehensive studies.
Nationwide Appeal from the American College of Cardiology

CORONAVIRUS AND YOUR HEART

Most of us are worried about the new coronavirus. DON'T IGNORE HEART SYMPTOMS, ESPECIALLY IF YOU HAVE A HEART CONDITION.

GETTING CARE IS CRITICAL ➞ You'll get better faster. You'll limit damage to your health.

HEART ATTACK
- Chest Pain
- Difficulty breathing
- Discomfort in chest, arms, back, neck, shoulder or jaw

STROKE
- Numbness, weakness or loss of movement in your face, leg or arm, especially on one side
- Confusion, trouble speaking or understanding
- Loss of balance

CALL 911
If you think you are having a HEART ATTACK or STROKE. Heart attacks and strokes don't stop during a pandemic. Hospitals have safety measures to protect you from infection.

CALL YOUR DOCTOR if you have a heart condition and have questions or think you need a health visit. DON'T DELAY routine care. You may be able to get advice over the telephone or use telehealth for a virtual visit.

For more information about the new coronavirus for people with heart conditions, visit CardioSmart.org/Coronavirus @CardioSmart
COVID-19 Impact on Surgical Services

Dr. A. Osama Gaber
Chair, Department of Surgery
Houston Methodist Hospital
Surgery Faces the Coronavirus

• In early 2020 the Coronavirus started spreading into the United States

• In March 2020 our community cancelled part of the Houston Rodeo to limit the spread of the disease
We Faced Amazing Challenges

- Supplies and testing
  - Respiratory supplies
  - Laboratory reagents and supplies
  - Price gouging
  - Disinfectant wipes

- Knowledge gaps
  - Transmission and structure of the virus
  - Droplet or aerosol
  - Intubation and operation and transmission

- Patient / staff care challenges
  - Delay in diagnosis
  - Virtual care
  - Keeping a healthy staff

- Operational challenges
  - Finances, through put, protection of families

- The Governor's Executive Order
  - All licensed health care professionals and all licensed health care facilities shall postpone all surgeries and procedures that are not medically necessary to diagnose or correct a serious medical condition of, or to preserve the life of, a patient who without timely performance of the surgery or procedure would be at risk for serious adverse medical consequences or death, as determined by the patient’s physician
You do not have to be great to start, but you have to start to be great.
HMH SURGERY VISION & MISSION

Vision:
To become the leading academic surgical department in the region

Mission:
To lead research and innovation in surgical expertise while providing unparalled care to our patients, and education for the next generation of surgeons.

Strategic Priorities

Organizational Excellence
- Evolve care delivery into centers rather than practices
- Integrate surgical services across system
- Expand service offerings
- Re-examine departmental resources and revenue streams

Education & Professional Development
- Integrate residents/fellows into department productivity
- Capitalize on EnMed
- Emphasize faculty development
- Explore expanding educational offerings in MITIE

Discovery & Research
- Create a division of surgical sciences
- Increase research funding
- Recruit research faculty
- Enhance research opportunities within department

Clinical Excellence
- Grow robotic surgery
- Recruit and retain clinical faculty
- Optimize APP utilization
- Enhance Patient experience
- Create competitive advantage for centers of excellence

Collaboration & Community Integration
- Establish deeper collaboration with non-PO physicians and programs
- Grow philanthropic support
- Enhance department’s national and international reputation

We as surgeons share the belief that all human life is sacred. We are devoted to saving, preserving, and improving life regardless of race, color, creed, gender, sexual orientation, and/or place of origin. We also embrace diversity in education, research, employment and every other human endeavor. Racism needs to be recognized & eradicated.
<table>
<thead>
<tr>
<th>DEPARTMENT ASSETS, SPECIALTIES AND FACULTY</th>
</tr>
</thead>
<tbody>
<tr>
<td>• <strong>Bariatrics/MIS</strong></td>
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<tr>
<td>• Vadim Sherman</td>
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<td>• Nabil Tarlq</td>
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<td>• Patrick Reardon</td>
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<td>• Lee Morris</td>
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<td>• Dosbra Harvey (PCP)</td>
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<td>• <strong>ACS/Critical Care</strong></td>
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<td>• Sylvia Martinez</td>
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<td>• Daniel Bonville</td>
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<td>• Hina Faisal</td>
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<td>• Atya Dhala</td>
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<td>• Roderrio Oviedo</td>
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<td>• Nicole Tapia (Dec 7)</td>
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<td>• <strong>Thoracic Surgery</strong></td>
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<td>• Ray Chihara</td>
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<td>• Edward Chan</td>
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<td>• <strong>General Surgery/Surgical Oncology</strong></td>
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<td>• Osama Gaber</td>
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<td>• Jitesh Joshi</td>
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<td>• <strong>West</strong></td>
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<td>• SueEllen Arentz</td>
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<td>• Carla Braxton</td>
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<td>• Minh Nguyen</td>
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<td>• Van-Hien Tran</td>
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<td>• Laura Choi</td>
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<td>• Warren Ellsworth</td>
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<td>• Rodger Brown</td>
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<td>• <strong>Woodlands</strong></td>
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<td>• Steven “Ben” Albright</td>
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<td>• Steven Gordon</td>
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<td>• <strong>HM Affiliated Surgeons</strong></td>
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<td>• <strong>Research Faculty</strong></td>
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<td>• Xian Chang Li</td>
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<td>• Luping Huang</td>
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<td>• Malgorzata Kloc Stepekowska</td>
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<td>• Zhiqiang Zhang</td>
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<td>• Linda Moore</td>
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<td>• Joshua Swan</td>
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<td>• Stephen Jones</td>
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</table>
## ASSETS: QUALITY METRICS

Mortality, LOS and Readmission
May 2020 YTD, April 2020 Observed*

<table>
<thead>
<tr>
<th>General Surgery Services</th>
<th>2018 3617</th>
<th>2019 3901</th>
<th>2020 YTD May 1162</th>
<th>2020 Goals</th>
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</thead>
<tbody>
<tr>
<td>Mortality Index</td>
<td>.43 (52)</td>
<td>.43 (56)</td>
<td>.29 (30)</td>
<td>.62 (95th percentile)</td>
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<tr>
<td>LOS Index</td>
<td>.90</td>
<td>.85</td>
<td>.81</td>
<td>.87 (80th percentile)</td>
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<tr>
<td>Readmission</td>
<td>11.67%</td>
<td>11.4%</td>
<td>12.3 %*</td>
<td>10.3% (50th percentile)</td>
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<table>
<thead>
<tr>
<th>Thoracic Surgery Services</th>
<th>2018 223</th>
<th>2019 299</th>
<th>2020 YTD May 94</th>
<th>2020 Goals</th>
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<tbody>
<tr>
<td>Mortality Index</td>
<td>0.43 (3)</td>
<td>0.25 (2)</td>
<td>.29 (1)</td>
<td>0.17 (90th percentile)</td>
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<tr>
<td>LOS Index</td>
<td>.78</td>
<td>.87</td>
<td>.75</td>
<td>.82 (80th percentile)</td>
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<tr>
<td>Readmission</td>
<td>6.76%</td>
<td>8.1%</td>
<td>10.8%*</td>
<td>6.5% (50th percentile)</td>
</tr>
</tbody>
</table>

Source: HMH Quality Matrix, May 2020 YTD DW
Methodist Transplant Center
Volume Life to Date

ASSETS: TRANSPLANT

Transplants

1963 - 1983 Avg


570
614

Volume to Date

0 100 200 300 400 500 600

1963 - 1983 Avg
We went to work

- Provide top quality surgical care to COVID and non-COVID patients
- Become part of the solution for COVID infections
- Execute on our mission, in care, innovation, education, research and community relations
# 2020 COVID-19 ACCOMPLISHMENTS

## Ongoing Surgery – Transplant – Hepatology Clinical Trials

<table>
<thead>
<tr>
<th>Title/Topic</th>
<th>PI name</th>
<th>Target/Mechanism of Action</th>
<th>COVID Stage</th>
<th>Inpt or Outpt?</th>
</tr>
</thead>
<tbody>
<tr>
<td>RLF-100 for the Prevention and Treatment of Acute Lung Injury/Acute Respiratory Distress Syndrome in COVID-19 (NeuroRX)</td>
<td>Youssef</td>
<td>Vasoactive Intestinal Polypeptide (VIP)</td>
<td>Severe</td>
<td>Inpatient</td>
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<tr>
<td>Clazakizumab E_IND request: Anti IL6 for use in COVID Patients</td>
<td>Huang</td>
<td>IL-6</td>
<td>Moderate</td>
<td>Inpatient</td>
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<tr>
<td>A Randomized, Double-blind, Placebo-Controlled, Phase 2 Study to Evaluate the Efficacy and Safety of LY3819253 in Participants with Mild to Moderate COVID-19 Illness</td>
<td>Huang</td>
<td>anti-SARS-CoV2 IgG1 antibody</td>
<td>Mild/Moderate</td>
<td>Outpatient</td>
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<tr>
<td>A prospective, controlled, randomized study to compare the efficacy of a chloroquine analog (GNS561) versus standard of care in patients with advanced or metastatic cancer and SARS-CoV-2 (COVID-19) infection</td>
<td>Abdelrahim</td>
<td>Anti-Viral (PPT-1 modulator/inhibitor)</td>
<td>Mild/Moderate</td>
<td>Outpatient</td>
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## 2019 and 2020 METRICS

<table>
<thead>
<tr>
<th>Grants</th>
<th>2019</th>
<th>2020</th>
<th>Applied for amount or awarded</th>
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<td>Grants submitted 2019</td>
<td>39</td>
<td>20</td>
<td>$19,467,446.48</td>
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<td>Grants awarded 2019</td>
<td>12</td>
<td>10</td>
<td>$2,829,123.00</td>
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<tr>
<td>Grants submitted 2020</td>
<td>20</td>
<td></td>
<td>$17,759,003.98</td>
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<tr>
<td>Grants awarded 2020</td>
<td>10</td>
<td></td>
<td>$1,577,890.00</td>
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### Clinical Trials

<table>
<thead>
<tr>
<th></th>
<th>2019</th>
<th>2020</th>
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<tbody>
<tr>
<td>Surgery</td>
<td>43</td>
<td>49</td>
<td></td>
</tr>
</tbody>
</table>

Payments for Clinical Trials Received to Date 2020: $660,374.87
FELLOWSHIP PROGRAMS

Surgical Critical Care Fellowship
- Current Status: Initial Accreditation with ACGME
- First fellow graduation in July 2020
- One year program with 2 fellows
- Program Director: Constance Mobley, MD, PhD, FACS

Advanced GI/MIS Bariatric Fellowship
- Current Status: Continued Accreditation with MIS Fellowship Council
- Began in 1996
- One year program with 2 fellows
- Program Director: Patrick Reardon, MD, FACS

Multi-Organ Abdominal Transplantation Fellowship
- Current Status: Continued Accreditation with ASTS
- Began in 2014
- Two year program with one fellow per year
- Program Director: Osama Gaber, MD, FACS, FAST
### AGCME SURVEY RESULTS

#### 2018-2019 Survey Results *(2019-2020 results not yet received)*

<table>
<thead>
<tr>
<th>Evaluation Category</th>
<th>Program Average</th>
<th>National Average</th>
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</thead>
<tbody>
<tr>
<td>Clinical and Educational Work</td>
<td>4.7</td>
<td>4.8</td>
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<tr>
<td>Faculty</td>
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<td>Evaluation</td>
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<td>Educational Content</td>
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<td>Resources</td>
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<tr>
<td>Patient Safety/Teamwork</td>
<td>4.6</td>
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</tbody>
</table>

- At or above national average in 5 categories
- 89% of residents reported an overall positive or very positive evaluation of the program
Scholarly Activities

Increased number of publications

2018 65 publications
2019 70 publications
2020 exceeded 70 publications already

Finances and Revenue

• Almost back to 2019 activity levels in surgery, and expect to exceed them by the end of December
• Maintaining the budget very close to planned with a small (1-2%) variance
Our critical care intensivists worked 24/7 to cover hospital COVID units while our general surgeons with critical care credentials picked up extra shifts to cover the SLICU.

Our ambulatory/outpatient Advanced Practice Providers signed up for extra shifts or transferred to the inpatient units to provide much needed staffing coverage (despite not having worked inpatient units in years).

Non-clinical staff joined the Labor Pool to assist with screening and other functions while others flexed their hours to allow the department to continue operations, minimizing financial impact.
FACULTY AWARDS AND ACCOLADES 2020

*HM System Quality & Patient Safety – Unparalleled Quality Award*
*Outstanding Service Faculty Teaching Award*
*I CARE Gold Badge*

*ASTS Health Disparities Research Education Program (HDREP) Scholar Award*
*I CARE Gold Badge*

*Exemplary Service Faculty Teaching Award*
New Faculty Appointment
Mei Rui, PhD

• BA, Yale University
• MM, Yale School of Music
• AD, Yale School of Music
• DMA, Stony Brook University
• Artist in Residence: Yellowbarn, Putney, VT
• Research Scientist at Center for Performing Arts Medicine
• MUSICARE support [video message and a Mozart duet](#)
Joshua T. Swan, PharmD, MPH, FCCM, BCPS

- Associate Professor in Surgery on the Investigative Track
- BS, University of Mississippi
- PharmD, University of Mississippi
- MPH Epidemiology, UT Health Sciences
Nicole Tapia, MD

- Trauma and Surgical Critical Care Director, HCA Houston Healthcare Kingwood
- BA, UT Austin
- MD, UT San Antonio
- Residency and Critical Care Fellowship, Baylor College of Medicine
• Fellow of the American College of Surgeons
• Fellow of the American Society for Metabolic and Bariatric Surgery
• Diplomate of the American Board of Surgery
We Continue to Battle the Coronavirus
WHAT IS THE CURRENT RATE OF COVID transmission IN HOUSTON?
Houston Area Rt Estimate Trend

**Rt estimate**

This graph shows the R(t) over time. R(t) is a measure of contagiousness or how many people one COVID-19 person infects. If R(t)>1, the epidemic is increasing. If R(t)<1, the epidemic is declining. There is higher alert if the whole interval is above the horizontal line at 1. For **Houston**, the rate of contagiousness is **1.05**; the epidemic is **increasing**.
DAILY NEW COVID-19 POSITIVE CASES
Greater Houston Area

Daily new COVID-19 cases last 30 days, Houston MSA

Monitoring threshold:
Threshold is exceeded by the occurrence of a positive daily growth rate (averaged over 7 days) in the new daily case trend

Current status:
9 days of positive daily growth rate (averaged over 7 days) in the new daily case trend

Note: Data for MFRS current as of 12/7 pending update
This document is solely intended to share insights and best practices rather than specific recommendations. Individual institution data is shown as reported and has not been independently verified.
Confirmed COVID-19 Lab Tests

Houston Methodist Testing Trend
TMC Dashboards

**TOTAL TMC COVID-19 POSITIVE PATIENTS IN HOSPITAL**

COVID-19 positive patients in TMC hospitals (Med Surg & ICU)

- **Nov MS**  - **Dec MS**  - 7-day trend of COVID-19 patients in ICU & Med Surg
- **Nov ICU**  - **Dec ICU**

- **COVID-19 positive patients in TMC hospitals**
- **Nov MS**  - **Dec MS**  - 7-day trend of COVID-19 patients in ICU & Med Surg
- **Nov ICU**  - **Dec ICU**

**December 8, 2020**

**Current status:**
0.6% total daily growth rate (averaged over 7 days) in COVID-19 patients TMC hospitals

- 2.5% ICU daily growth rate
- -0.2% Med Surg daily growth rate

**Notes:**
While new daily cases may fluctuate for a variety of reasons (e.g., testing), the number of COVID-19 positive patients being treated in med surg and ICU shows an objective view of how COVID-19 impacts hospital systems.
Emergency Use Authorization Criteria

- Positive SARS-CoV-2 viral test
- Mild to moderate symptoms
- At increased risk for progression to severe COVID-19 and/or hospitalization
  - BMI $\geq 35$
  - Chronic kidney disease
  - Diabetes
  - Immunosuppressive disease and/or treatment
  - Age $\geq 65$
  - Age $\geq 55$ AND cardiovascular disease, hypertension, and COPD/chronic respiratory disease
- Within 10 days of symptom onset
I have been following Sweden in the news. What do you think about their approach to controlling the virus?
Sweden Imposes Mandatory COVID-19 Measures

Sweden toughens up on COVID-19 restrictions as cases surge

By Jackie Salo

December 6, 2020 | 12:05pm | Updated

Passengers are crammed into a packed subway car in the middle of the ongoing COVID-19 pandemic in Stockholm

Daily confirmed Covid-19 deaths, seven-day rolling average

6 per million people

- U.S.
- Sweden

Percent change in gross domestic product

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<thead>
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</tr>
</thead>
<tbody>
<tr>
<td>Denmark</td>
<td>-6%</td>
<td>-2%</td>
<td>-1%</td>
<td>-2%</td>
<td>-3%</td>
<td>-4%</td>
<td>-5%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
</tr>
<tr>
<td>Finland</td>
<td>-6%</td>
<td>-2%</td>
<td>-1%</td>
<td>-2%</td>
<td>-3%</td>
<td>-4%</td>
<td>-5%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
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</tr>
<tr>
<td>Norway</td>
<td>-6%</td>
<td>-2%</td>
<td>-1%</td>
<td>-2%</td>
<td>-3%</td>
<td>-4%</td>
<td>-5%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
</tr>
<tr>
<td>Sweden</td>
<td>-6%</td>
<td>-2%</td>
<td>-1%</td>
<td>-2%</td>
<td>-3%</td>
<td>-4%</td>
<td>-5%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
<td>-6%</td>
</tr>
</tbody>
</table>

Economic Downturn

Sweden's gross domestic product and unemployment rate have reached the worst levels in a decade.

A number of medical observers have suggested that in fact the number of infected individuals is as much as 8x the number in the official counts, given the very large number of asymptomatic or very mild cases. Do you have a view on this? If it were the case, what are the implications for how we are dealing with the pandemic?
Estimate of un-Diagnosed COVID-19

Substantial underestimation of SARS-CoV-2 infection in the United States

ARTICLE
https://www.nature.com/articles/s41467-020-18272-4
OPEN
IS HOLIDAY TRAVEL SAFE?

HOW LONG SHOULD ADULT WORKING CHILDREN QUARANTINE BEFORE THEY VISIT ELDERLY PARENTS OVER CHRISTMAS?
COVID-19 Precautions – Holiday Safety

The safest way to celebrate the holidays this year is to celebrate with people in your household. If you do plan to spend the holidays with people outside your household, take steps to make your celebration safer.

Safest Options

- Gather only with those in your household
- Host a virtual celebration

Least Safe Options

- Gather with individuals outside your “bubble”
- At a minimum, follow CDC recommendations

Safest Options:

- Create a “holiday bubble” using social distancing and testing
- Bubble is only as strong as the weakest link

COVID-19 Precautions – Spread of COVID-19 After a Gathering

Lack of consistent mask use and social distancing at a wedding reception in rural Maine led to multiple COVID-19 outbreaks and deaths.

- Local community: 27 cases, 1 death
- Long-term care facility: 38 cases, 6 deaths
- Correctional facility: 82 cases, 0 deaths

Slow the spread of COVID-19:
- Avoid large gatherings
- Stay home when sick
- Wear masks
- Stay 6 feet from others

https://www.cdc.gov/mmwr/volumes/69/wr/mm6945a5.htm/
WHAT ARE YOUR RECOMMENDATIONS FOR HOW TO SAFELY INVITE PEOPLE INTO MY HOME TO DO NECESSARY REPAIRS DURING THE PANDEMIC?

IN ADDITION TO OPENING WINDOWS, ETC. WHILE THE REPAIRS ARE ONGOING, SHOULD I DO ANY SPECIAL CLEANING AFTERWARD?
What you need to know

- Ask the service provider to wear a mask.
- You and other household members should wear masks.
- Stay at least 6 feet from the service provider, and limit interactions between the service provider and other household members and pets.
- After the service is completed, clean and disinfect any surfaces in your home that may have been touched by the service provider.

HOW LONG ARE YOU CONTAGIOUS TO OTHERS AFTER YOU TEST POSITIVE FOR COVID?
“Although SARS-CoV-2 RNA shedding in respiratory and stool samples can be prolonged, duration of viable virus is relatively short-lived. SARS-CoV-2 titres in the upper respiratory tract peak in the first week of illness.”
Do you agree with the updated CDC quarantine guidelines?
The efficacy of quarantine to reduce the transmission of infectious disease depends on how compliant people are. Is a shorter quarantine time with higher compliance more effective than the “gold standard” with lower compliance?

<table>
<thead>
<tr>
<th>Length of Quarantine</th>
<th>Estimated Post-Quarantine Residual Transmission Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 days</td>
<td>0-3%</td>
</tr>
<tr>
<td>10 days</td>
<td>1-10%</td>
</tr>
<tr>
<td>7 days w/ negative test</td>
<td>5-12%</td>
</tr>
</tbody>
</table>

“If we can increase compliance with quarantine but also make sure we have a quarantine policy that allows us to catch as many cases as we can, that’s the best of both worlds.” - Assn. Public Health Officials

“The current recommended 14-day quarantine period is the most conservative regimen and should be maintained whenever possible.” – Greater Houston Area Public Health Authority
Any new recommendations for schools? Any updates to transmission of the virus among teens? Is contact tracing among teens fruitful? Are quarantine times appropriate?

What is the impact of COVID on toddlers – risk of sending young children to small school settings? What is the likelihood of children transferring COVID to elder family members?
AAMC Report: Kids, Schools and COVID-19: What we know – and what we don’t

• The virus spreads in schools — but schools are rarely superspreaders

• School outbreaks typically come from the community — not vice versa
  – Many school outbreaks have been tied to social gatherings among school children outside of school

• Children transmit the virus — but not as often as adults do
  – Children carry large amounts of the virus in their respiratory systems, they transmit the virus, but not as effectively as adults

• Behavioral challenges matter — sometimes as much as biology
  – Mask compliance, washing hands and maintaining distance
ACTIVELY ENGAGED IN PHYSICAL THERAPY AT METHODIST ORTHOPEDIC, NOTHING URGENT, SHOULD I STOP GOING TO THAT AND ANYTHING INVOLVING A GYM UNTIL THE SPRING OF NEXT YEAR?
actively engaged in physical therapy at methodist orthopedic, nothing urgent, should i stop going to that and anything involving a gym until the spring of next year?

it is necessary to continue to receive any medical treatments, preventive and therapeutic. houston methodist is safe and you should continue to access medical care when you need it!
How Immunity Develops

Innate immune system

Adaptive immune system

Long-lasting immune “memory”
# Vaccine Progress: Frontrunners

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Antibody Response (Phase 1 - 2)</th>
<th>T Cell Response (Phase 1 – 2)</th>
<th>Technology</th>
<th>N of Doses</th>
<th>EUA Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderna</td>
<td>100% (2x – 8x CP)</td>
<td>100%</td>
<td>mRNA</td>
<td>2</td>
<td>December 17, 2020</td>
</tr>
</tbody>
</table>
| Pfizer / BioNTech        | 100% (5x – 30x CP)              | 94%                           | mRNA       | 2          | December 10, 2020\n*Granted in UK December 1 & in Canada December 9*

CP = convalescent plasma
## Vaccine Progress: Second Wave

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Antibody Response</th>
<th>T Cell Response</th>
<th>N of Doses</th>
<th>Technology</th>
<th>EUA Target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxford / Astra Zeneca</td>
<td>100% (= CP)</td>
<td>100%</td>
<td>2</td>
<td>Adenovirus Ad5 vector</td>
<td>December 2020 (UK)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Q1 2021 (US)</td>
</tr>
<tr>
<td>Novavax</td>
<td>100% (2x CP)</td>
<td>100% (subgroup)</td>
<td>2</td>
<td>Peptide / nanoparticle</td>
<td>Q1 2021</td>
</tr>
<tr>
<td>J &amp; J</td>
<td>100%</td>
<td>82%</td>
<td>1</td>
<td>Adenovirus Ad26 vector</td>
<td>Q1 2021</td>
</tr>
<tr>
<td>Inovio</td>
<td>94% overall</td>
<td>94% overall</td>
<td>2</td>
<td>DNA + electroporation</td>
<td>Q1 2021?</td>
</tr>
<tr>
<td>COVAXX</td>
<td></td>
<td></td>
<td></td>
<td>Synthetic peptide multi-epitope</td>
<td>Still in Phase 1</td>
</tr>
<tr>
<td>COVI-Vac</td>
<td></td>
<td></td>
<td></td>
<td>Intranasal live attenuated vaccine</td>
<td>Starting Phase 1</td>
</tr>
<tr>
<td>And many others, e.g.:</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sputnik V ICL</td>
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<tr>
<td>CanSino Sanofi, GSK</td>
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<tr>
<td>CNBG1 CNBG2</td>
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<tr>
<td>Novartis Medicago</td>
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<tr>
<td>Curevac Sinovac</td>
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</tbody>
</table>

• Pfizer
  – 43,538 enrolled and randomized to vaccine or placebo
  – 170 infections so far, 162 in placebo group → 95% protection
  – 10 severe cases, 9 in placebo group → 90% protection
  – Appears to be effective in all age and ethnic groups
  – Unknowns
    • Prevents infection or only symptomatic illness? (key issue for transmission)
    • Duration of protection?
  – Safety profile appears excellent
    • Reactogenic effects
    • Two allergic reactions in UK?
  – Logistics: Two doses & extreme cold chain (stable for 6 mos at -70º C, 5 days at 2-8º C, 2 hrs at 25º C)
Vaccine Updates

No. with events/No. at risk
A: 611514 2131530 3761654 3920461 4119314 4218377 4317702 4417110 4415464 4714036 4812169 4912541 4915403 4913574 501465 501505 508
B: 61258 2322179 3322070 7352236 9772205 1231212 1481737 1661703 1821526 2021327 2221209 2321194 2420471 2520294 2673301 2740146 273296 2750

Note: "S" indicates subjects with severe COVID-19 or COVID-19 leading to hospitalization.

PFIZER CONFIDENTIAL SDTM Creation: 17NOV2020 (10.40) Source Data: adc19ef Table Generation: 17NOV2020 (21.40)
(Cutoff Date: 14NOV2020, Snapshot Date: 16NOV2020) Output File: Anda3_unblinded/C4591061_Befficacy_PA_164/adcl9ef_5001_km_d1_aad
Moderna

- > 30,000 enrolled and randomized to vaccine or placebo
- 196 infections so far, 185 in placebo group → 94.1% protection
- 30 severe cases, all in placebo group → 100% protection
- Similar efficacy in all groups (preliminary review)
- Unknowns
  - Prevents infection or only symptomatic illness? (key issue for transmission)
  - Duration of protection?
- Safety profile appears excellent (few details yet)
- Logistics: Two doses & cold chain needed (stable in freezer for 6 mos, refrigerator for 30 days, room temp for 12 hrs)
How mRNA Vaccines Work

The vaccine spurs healthy cells to produce viral proteins that stimulate a potent immune response.

1. Scientists generated an mRNA sequence that codes for the virus spike protein.
2. The RNA sequence, a blueprint for making the spike, is swathed in a lipid coating for delivery.
3. Once it arrives, cells read the information in the mRNA sequence to produce millions of copies of the spike protein.
4. The protein fragments spur the immune system to produce antibodies that can protect when a real virus enters the body.

Sources: Pfizer, Bloomberg research
Vaccine Updates: Pfizer

The Pfizer/BioNTech Vaccination Process

Vaccination process for the Pfizer/BioNTech Covid-19 BNT162b2 vaccine

- **Day 1**: 1st dose
- **Day 12**: Start to build immunity
- **Day 21**: 2nd dose
- **Day 28**: Full immunity

Source: Pfizer/BioNTech via BBC

Margaret Keenan, 91 yo, first clinical Pfizer vaccination
Adverse Reactions: Severe “Reactogenic” Effects

• More likely after second dose
• Controllable with anti-inflammatories (Tylenol, Motrin, etc.)
• High fever (39 – 40°C) in 2%
• Pfizer (company press release November 18, 2020)
  – Fatigue (3.8%)
  – Headache (2%)
• Moderna (company press release November 16, 2020)
  – Fatigue (9.7%)
  – Muscle pain (8.9%)
  – Joint pain (5.2%)
  – Headache (4.5%)
# Pfizer Vaccine
## FDA Safety Overview

<table>
<thead>
<tr>
<th>Adverse Effect (AE)</th>
<th>Vaccine Group</th>
<th>Placebo Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solicited inject site AE</td>
<td>73%</td>
<td>11%</td>
</tr>
<tr>
<td>Solicited systemic AE</td>
<td>70%</td>
<td>34%</td>
</tr>
<tr>
<td>Unsolicited non-serious AE</td>
<td>27%</td>
<td>13%</td>
</tr>
<tr>
<td>Serious AE</td>
<td>0.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Withdrawal for AE</td>
<td>0.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Allergic reaction</td>
<td>0.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Death</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>
Pfizer Vaccine 18 – 55 yo Group
Mild – Moderate “Reactogenic” Effects

<table>
<thead>
<tr>
<th>Adverse Effect</th>
<th>Vaccine Group</th>
<th>Placebo Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever &lt; 39º C</td>
<td>14%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Fatigue</td>
<td>55%</td>
<td>22%</td>
</tr>
<tr>
<td>Headache</td>
<td>49%</td>
<td>23%</td>
</tr>
<tr>
<td>Chills</td>
<td>33%</td>
<td>4%</td>
</tr>
<tr>
<td>GI</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>35%</td>
<td>8%</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>21%</td>
<td>5%</td>
</tr>
<tr>
<td>Pain / Anti-inflammatory Medication</td>
<td>45%</td>
<td>13%</td>
</tr>
</tbody>
</table>
### Pfizer Vaccine > 55 yo Group
Mild – Moderate “Reactogenic” Effects

<table>
<thead>
<tr>
<th>Adverse Effect</th>
<th>Vaccine Group</th>
<th>Placebo Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fever &lt; 39° C</td>
<td>11%</td>
<td>0.2%</td>
</tr>
<tr>
<td>Fatigue</td>
<td>48%</td>
<td>17%</td>
</tr>
<tr>
<td>Headache</td>
<td>38%</td>
<td>14%</td>
</tr>
<tr>
<td>Chills</td>
<td>22%</td>
<td>3%</td>
</tr>
<tr>
<td>GI</td>
<td>9%</td>
<td>6%</td>
</tr>
<tr>
<td>Myalgia</td>
<td>28%</td>
<td>5%</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>18%</td>
<td>4%</td>
</tr>
<tr>
<td>Pain / Anti-inflammatory Medication</td>
<td>38%</td>
<td>10%</td>
</tr>
</tbody>
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### Work Group Proposed Interim Phase 1 Sequence

<table>
<thead>
<tr>
<th>Phase 1a</th>
<th>Health care personnel</th>
<th>LTDCF residents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1b</td>
<td>Essential workers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(examples: Education Sector, Food &amp; Agriculture, Utilities, Police, Firefighters, Corrections Officers, Transportation)</td>
<td></td>
</tr>
<tr>
<td>Phase 1c</td>
<td>Adults with high-risk medical conditions</td>
<td>Adults 65+</td>
</tr>
</tbody>
</table>

**Time**
The first phase of the programme
Offer vaccination

1. Residents in a care home for older adults and their carers
2. All those 80 years of age and over. Frontline health and social care workers
3. All those 75 years of age and over
4. All those 70 years of age and over. Clinically extremely vulnerable individuals
5. All those 65 years of age and over
6. All individuals aged 16 years to 64 years with underlying health conditions which put them at higher risk of serious disease and mortality
7. All those 60 years of age and over
8. All those 55 years of age and over
9. All those 50 years of age and over
• Protecting health care workers who fill a critical role in caring for and preserving the lives of COVID-19 patients and maintaining the health care infrastructure for all who need it.

• Protecting frontline workers who are at greater risk of contracting COVID-19 due to the nature of their work providing critical services and preserving the economy.

• Protecting vulnerable populations who are at greater risk of severe disease and death if they contract COVID-19.

• Mitigating health inequities due to factors such as demographics, poverty, insurance status and geography.

• Data-driven allocations using the best available scientific evidence and epidemiology at the time, allowing for flexibility for local conditions.

• Geographic diversity through a balanced approach that considers access in urban and rural communities and in affected ZIP codes.

• Transparency through sharing allocations with the public and seeking public feedback.
Vaccine Scientific Committee advice on priority tiers

- Tier 1:
  - Health care workers with high-risk exposure (3 sub-tiers)
  - Government mandates (e.g., Long Term Care, first responders)

- Tier 2:
  - Health care workers with moderate-risk exposure

- Tier 3:
  - Health care workers with low-risk exposure and general population
    - HCWs likely will be prioritized for reasons of operational efficiency

- Within Tiers, if vaccine is limited, prioritize based on health risks (age & co-existing conditions)
Obstacles?

• Reluctance to accept vaccination
  – Political issues
  – Concerns about potential side effects

• Logistics challenges
  – Supplies (borosilicate glass vials, needles, syringes, etc.)
  – Cold chain of refrigeration
  – Air freight capacity (8,000 jumbo jets)
  – Paperwork, customs, health regulations, etc.
  – Organizing administration sites, records, personnel
  – Monitoring safety, side effects
If we want things to remain the same, some things will have to change:
- Masks and preventive measures needed until population is immune and transmission controlled
- Even then, masks in flu season or high-risk situations will still be advisable

If all goes well, population immunity is likely by end of Q2 or Q3:
- A big “IF”
- Schools return in the fall
- Travel and leisure gradually return to something resembling antebellum “normal”

Learning from our mistakes – we must:
- Rebuild early warning / early response capabilities
- Invest in vaccine and infectious disease research
- Repair communication among government, health care and public
- Seek dialogue and consensus about health priorities and social contracts
- Foster trust in science and understanding of people’s needs and work
THANK YOU FOR ATTENDING OUR TOWN HALL CONVERSATION

If you would like more information about the Houston Methodist DeBakey Heart & Vascular Center, the Department of Surgery or The Society for Leading Medicine, please contact foundation@houstonmethodist.org

Take care and be well