Pennsylvania Society of Anesthesiologists COVID-19 Webinar

Panelists:

Richard C. Month, MD, FASA – President

Michael He, MD – Chair, Ad-hoc Committee on COVID-19

Gordon Morewood, MD – Vice President, Professional Affairs

Joe Galassi, MD – Co-Chair, Committee on Governmental Affairs

Joshua Atkins, MD, PhD – Chair, Bylaws Committee

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Disclaimer:

The items we discuss today are provided for informational purposes only and do not constitute medical or legal advice. Items we discuss today may be contrary to CDC guidance or may involve off-label use of medications or equipment. You should consult with your own medical or legal counsel should you have further questions.

The opinions shared during this webinar represent the opinions of the speakers and do not represent the official position of their practices or employers, the Pennsylvania Society of Anesthesiologists, the American Society of Anesthesiologists, or the Pennsylvania Medical Society.

Status in Pennsylvania One Week Ago

- As of 11:59pm 3/21/20
  - Total Cases: 479 (up from 371)
  - Total Deaths: 2 (one in Allegheny, one in Northampton)
  - Breakdown by County: 33/67

Philadelphia	91	York	10	Wayne	2
Montgomery	87	Luzerne	7	Butler	1
Delaware	43	Washington	7	Centre	1
Allegheny	40 (1)	Lackawanna	6	Columbia	1
Bucks	32	Lancaster	6	Dauphin	1
Monroe	31	Adams	5	Fayette	1
Chester	23	Westmoreland	4	Franklin	1
Northampton	21 (1)	Beaver	3	Mercer	1
Lehigh	19	Lebanon	3	Montour	1
Berks	13	Pike	3	Potter	1
Cumberland	11	Erie	2	Schuylkill	1

Web: http://www,psanes.org
Twitter: @psanesth
Facebook: @PSAnesth
E-mail: info@psanes.org

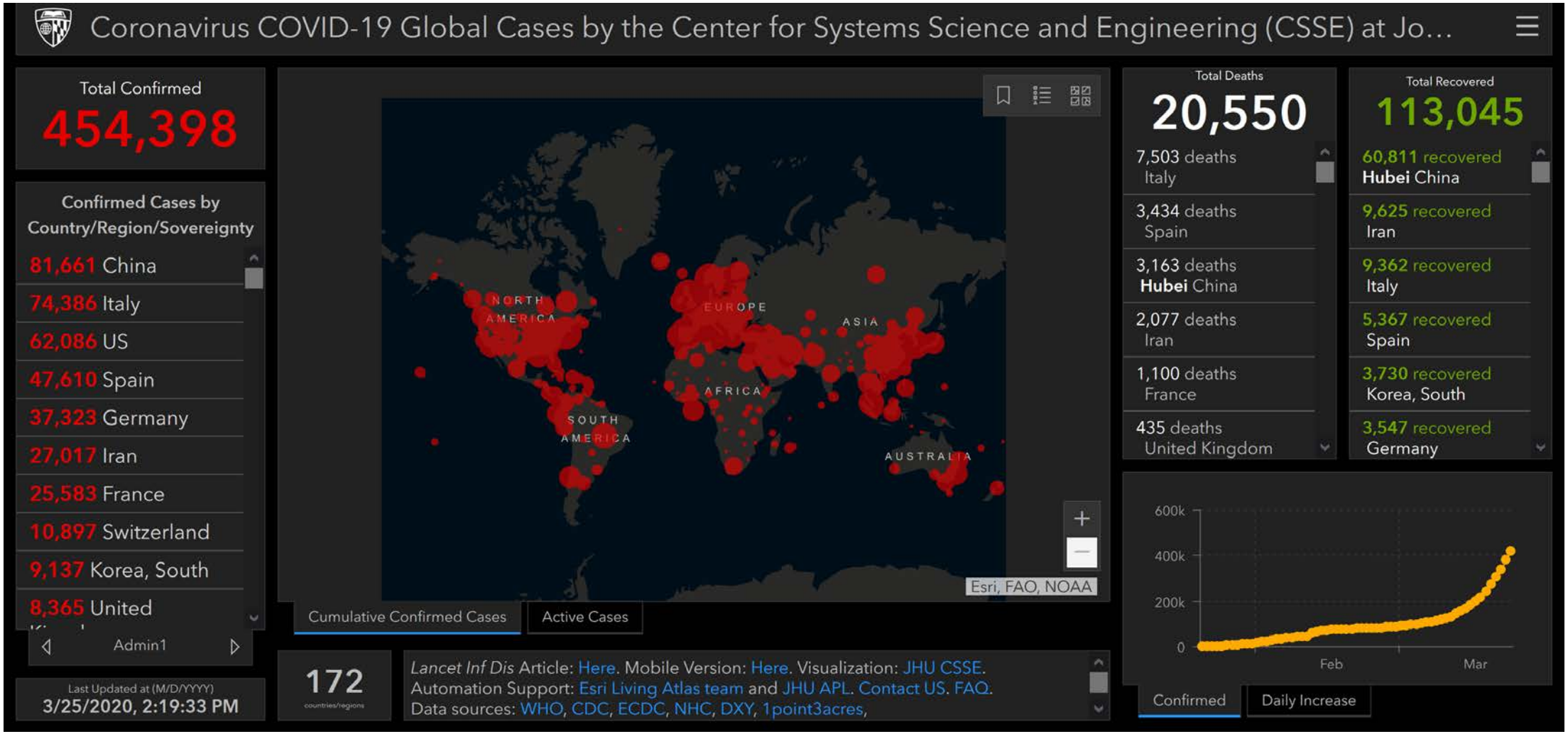
Status in Pennsylvania Today

- As of 11:59pm 3/27/20
  - Total Cases: 2751 (about 33% increase per day)
  - Total Deaths: 34
  - Breakdown by County: 56/67

- Key Statistics
  - Positive Tests: 53% < 49yo
  - Hospital Admissions:
    - 25% < 49yo;
    - 52% < 64 yo

Philadelphia	709 (5)	York	37	Mercer	6	Cameron	1
Montgomery	411 (5)	Pike	27 (1)	Wayne	6	Clarion	1
Delaware	226 (4)	Dauphin	23	Montour	5	Huntingdon	1
Allegheny	219 (2)	Washington	23	Columbia	4	Juniata	1
Bucks	152	Beaver	22	Bradford	3	Mckean	1
Chester	116	Cumberland	22 (1)	Carbon	3	Northumberland	1
Lehigh	109 (3)	Schuylkill	16	Armstrong	2	Perry	1
Monroe	106 (2)	Centre	15	Blair	2	Snyder	1
Northampton	94 (4)	Lebanon	15	Clearfield	2	Susquehanna	1
Berks	65	Fayette	10	Crawford	2	Tioga	1
Luzerne	65 (2)	Adams	8	Indiana	2	Warren	1
Lackawanna	51 (2)	Lawrence	8	Lycoming	2		
Lancaster	45 (1)	Erie	7	Potter	2		
Butler	41 (2)	Franklin	7	Somerset	2		
Westmoreland	41	Greene	6	Cambria	1		

Johns-Hopkins COVID-19 Tracker



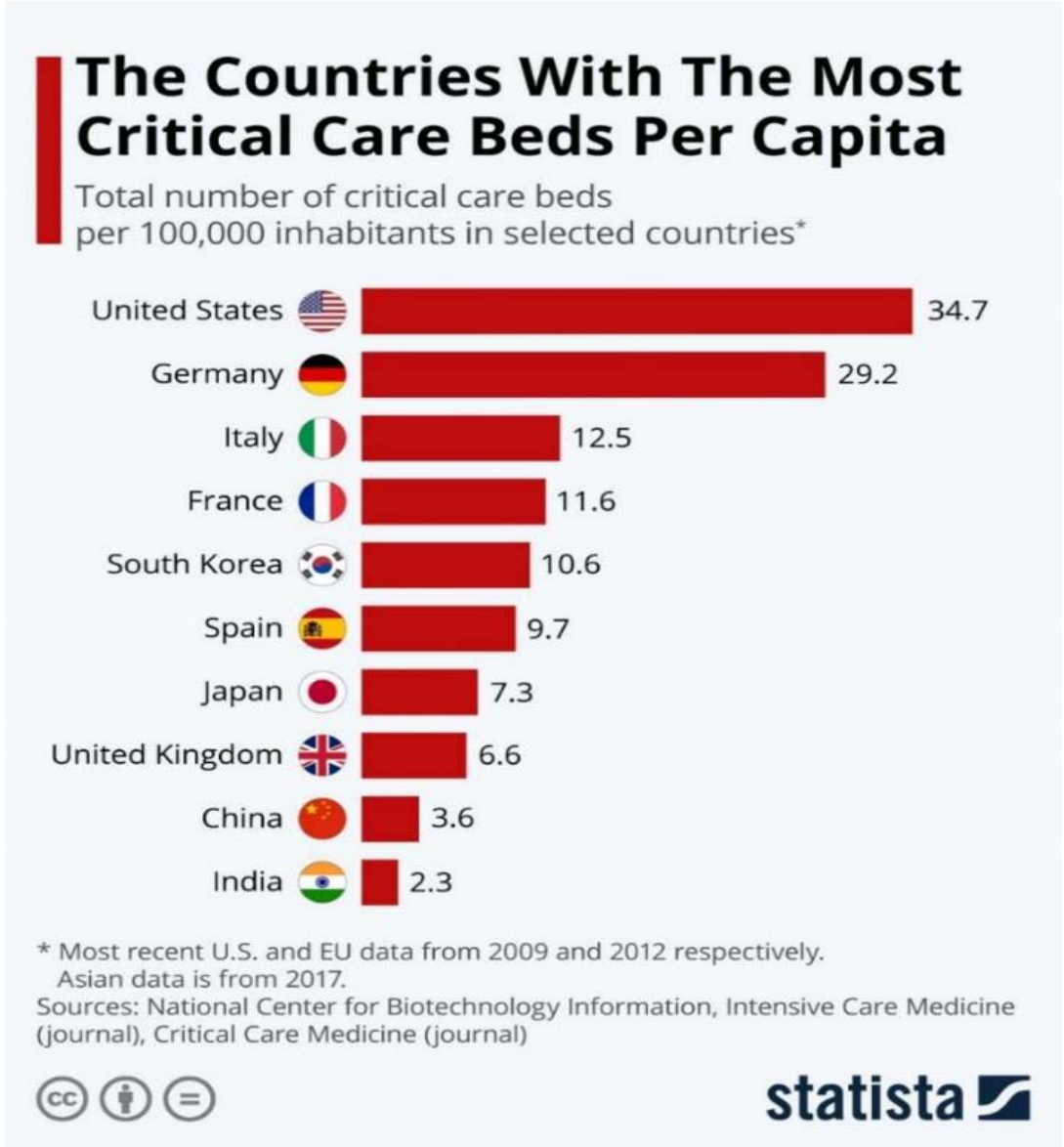
https://coronavirus.jhu.edu/map.html

ICU Surge Planning

2018 Survey by American Hospital Association

- 5256 registered AHA hospitals in U.S.
- 2704 hospitals delivery ICU services
- 534,964 acute care beds including 96,596 ICU beds
- ICU beds include med-surg, cardiac, trauma, neuro, peds, neonatal, step-down, and burn
- Only 68,558 adult beds

AHA Hospital Statistics 2020 Edition. Chicago, IL, American Hospital Association, 2020.


The Countries With The Most Critical Care Beds Per Capita
Total number of critical care beds per 100,000 inhabitants in selected countries*
United States 34.7
Germany 29.2
Italy 12.5
France 11.6
South Korea 10.6
Spain 9.7
Japan 7.3
United Kingdom 6.6
China 3.6
India 2.3
* Most recent U.S. and EU data from 2009 and 2012 respectively.
Asian data is from 2017.
Sources: National Center for Biotechnology Information, Intensive Care Medicine (journal), Critical Care Medicine (journal)
statista

Estimated hospitalization rates from AHA

- 4.8 million hospitalized
- 1.9 million ICU admissions
- 960,000 need ventilator support

Gold JP, Biddinger PD, Lawler J, et al. What Healthcare leaders need to know: Preparing for the COVID-19. Chicago, IL, American Hospital Association; National Ebola Training and Education Center, 2020, webinar.

Estimated number of mechanical ventilators

- Approximately 200,000 mechanical ventilation devices including
  - 62,000 full-featured ICU ventilators
  - 98,000 older basic ventilators (includes noninvasive ventilators)
  - Anesthesia machines

Rubinson L, Vaughn F, Nelson S, et al. Mechanical ventilators in US acute care hospitals. Disaster Med Public Health Prep. 2010;4(3):199-206.

Critical Care Staff

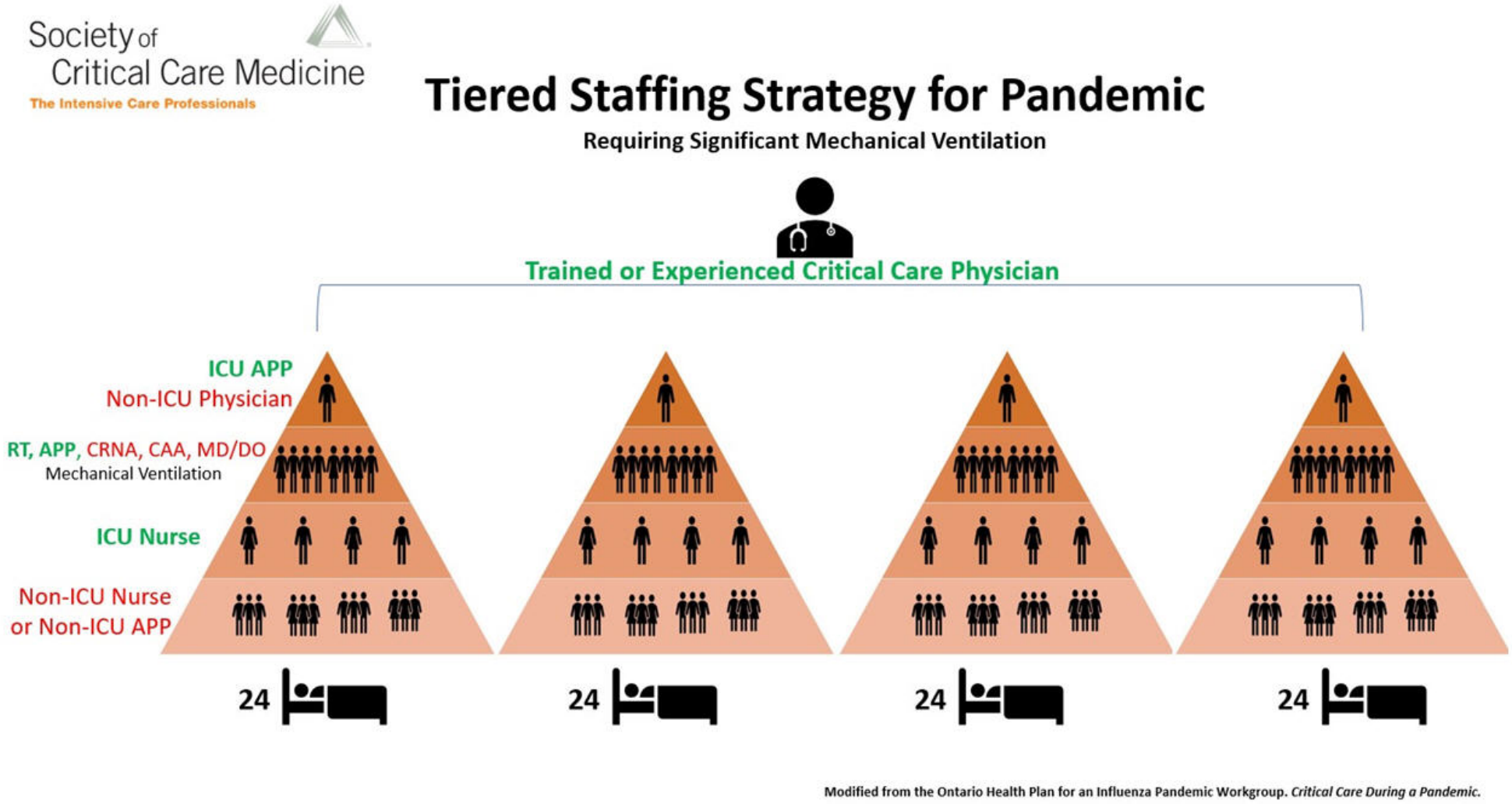
- Estimated 20,000 full time intensivists
- Estimated 34,000 critical care APPs
- Estimated max capacity to care for 135,000 ventilated patients

Halpern NA, Tan KS, DeWitt M, Pastores SM. Intensivists in U.S. acute care hospitals. Crit Care Med. 2019 Apr;47(4):517-525.

Kleinpell RM, Grabenkort WR, et al. Nurse practitioners and physician assistants in acute and critical care: a concise review of the literature and data 2008-2019. *Crit Care Med*. 2019;47(10):1442-1449.

- More critical care personnel are urgently needed.
- Staff must be stratified by critical care experience and trained immediately.

Tiered Model for ICU staffing



Tier 1: Intensivist

Tier 2: CCNP, Non-Critical-Care Anesthesiologist

Tier 3: NP/PA, CRNAs, RTs, Physicians without Critical Care experience

Tier 4: ICU nurses

Tier 5: Non-ICU nurses, in team capacity with above

- Anesthesiologists will be asked to help with ventilator management, line placements, pressor management, etc., in consultation with intensivists.
- Especially the case when ICU surge into OR and other settings.

Tiered Model for Beds

Example:

Tier 0: COVID-19 patients in negative pressure rooms

Tier 1: Cohort COVID patients in isolated unit

Tier 2: Overflow into Pre-procedure area or PACU

Tier 3: Overflow into OR

Tier 4: Permanent or temporary staging areas (Trailers, Tents)

Tier 5: Consider doubling patients in rooms

Using Anesthesia Machines as ICU Ventilators

American Society of Anesthesiologists | apsf Anesthesia Patient Safety Foundation

Setup and Monitoring Instructions – Anesthesia Machine as an ICU Ventilator

SETUP

- Insure manual ventilation device readily available
- Connect/Check Central Gas Supplies
  - Check Line pressure – 45 psi or better
  - Full E-cylinders of oxygen and air as backup
  - Remove nitrous oxide hoses and cylinders
  - Bellows ventilators configured for compressed air supply Biomed can do with manufacturer guidelines
- Scavenger
  - Connect to suction or allow to enter patient room
- Vaporizers
  - Remove or drain
- Configure machine with disposables
  - Breathing Circuit
  - Filters
    - HMEF on airway, gas sampling on machine side
    - Second filter on the expiratory limb if possible (required if no filter on airway)
  - **??** Active humidifiers NOT recommended but may be needed if no HME. Will require special monitoring if placed.
  - Large (3 Liter) Reservoir Bag
  - Gas analyzer for oxygen and carbon dioxide
- Perform Self Test
  - Compliance measurement essential – do not change disposables after this
  - Confirm no errors
- Check alarms, set limits, set to max volume
  NOTE: Defaults may not apply to ICU patients
  - Inspired CO2 alarm at 5 mmHg
  - Expired CO2 alarm for permissive hypercapnia
  - Pressure alarms – High and low if apnea pressure alarm
  - Volume/Minute Ventilation
- Set APL valve to 0 cmH20

INITIATE THERAPY

- Fresh Gas Flow Options
  - Option 1: Low fresh gas flow to conserve oxygen
    - Preserves humidity
    - **CO2 Absorbent must be available and maintained**
    - **Inspired CO2 Alarm must be set to 5 mmHg**
  - Option 2: Fresh gas flow => minute ventilation
    - No CO2 Absorbent needed (increase FGF if Inspired CO2 present)
    - Humidification is essential – consider active humidifier
- Setting Oxygen Concentration
  - Electronic Flowmeters – Set delivered concentration and monitor inspired oxygen that results
  - Mechanical Flowmeters
    - Air/oxygen mix needed for delivered O2 concentration (see table)
  - Inspired oxygen concentration will need to be monitored especially during low flows - it will be less than the set concentration
- Set Ventilator (See CCM guidance)
  - Ventilation Mode
  - Settings
    - Rate
    - Volume
    - I:E Ratio
    - PEEP
- Start Ventilator
  - **SET SPIROMETRY LOOP REFERENCE IF AVAILABLE WHEN VENTILATION STARTED**
  - **NOTE PRESSURE AND FLOW WAVEFORMS – CONSIDER PHOTO OF BASELINE SCREEN**
  - Record monitored values
    - Pressure – Volume relationships
    - Gas concentrations as expect

3/26/2020

asahq.org/ventilators

Setup and Monitoring Instructions – Anesthesia Machine as an ICU Ventilator

MONITORING SCHEDULE (Record manually time and value if EMR not connected to machine)

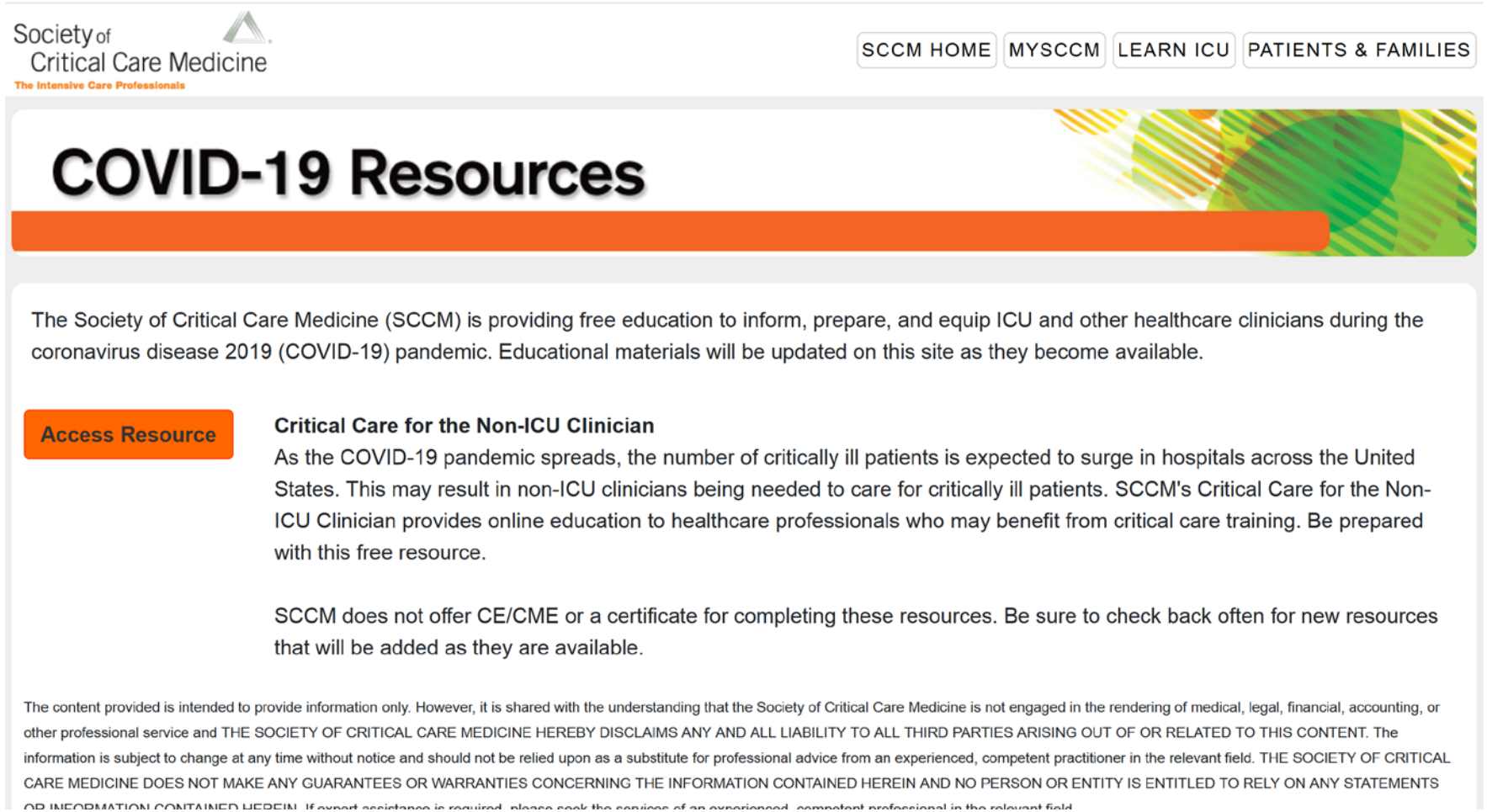
Task	Continuous	Hourly	q 4 hours	q 24 hours
Alarms	X			
CO2 Absorbent		X		
Monitored Parameters • Insp Oxygen • Insp and Exp CO2 • Insp Pressure • Tidal Volume • Spirometry • *Agent concentration*		X		
Inspect for humidity and secretions • Filters • Water trap		X		
Check Vap Fill if Sedating				
Change Filter/HME			X	
Increase FGF to MV or above for 15 minutes			X	
Perform Self Test*				X

*Anesthesia machine WILL NOT provide ventilation during the self-test. An alternate ventilation strategy that can be maintained for several minutes is required. Consider transport ventilator if manual ventilation bag not likely to be successful. Power to the machine should be cycled between every patient and at least every 25 days.

3/26/2020

http://www.asahq.org/ventilators

COVID-19 Critical Care Resource



https://www.sccm.org/disaster

Other things to consider

- How do you convert an OR to an ICU room?
- Are there enough ICU beds for the OR, PACU, and other satellite locations?
- Availability of negative pressure or install Hepa filters
- Will monitoring equipment designed for the OR communicate with critical care flowsheets?
- Centralized location for equipment and donning/doffing
- Cross-training staff on ventilators
- Know manufacturer's recommendations on using anesthesia machines as ICU ventilators

Question and Answer