March 25, 2020

# CTS INSPIRATIONS

## CTS NEWS

### President's Message

*"I do the very best I know how – the very best I can; and I mean to keep on doing so until the end."* - Abraham Lincoln

The words of the 16th president of the United States could not be ever more applicable today as it was back then when he led a turbulent nation through the American Civil War. Presently we too, as a nation are experiencing troubling times. We are bombarded with frequent reminders on how a novel virus has been able to not only afflict illness and death but change the daily life of Americans and halt the world's most influential economy. It has also encouraged brief reflections on the importance of our basic needs like toilet paper and allowed us to witness the darker side of humanity through acts of unnecessary violence when those basic needs are in jeopardy.

But through the dark clouds, we see a beam of light, as Americans, we have united to do what we can to minimize the spread of COVID19. We have taken it upon ourselves to accept social distancing and started to focus more on spending time with those in our household, participate in activities that would enhance a healthier lifestyle and utilize technology via the web or phone to stay connected. I encourage our CTS members to continue to seek and support the positive behaviors that have united us as a nation. As we test more Americans, it is expected to see the number of positive COVID19 cases rise. It also makes absolute sense that we will have an increase of reported critically ill patients with COVID19, but that should not alarm us or cause us to overreact. This country has faced and survived much worse and we need to remember that.

As medical professionals we all have taken various re-iterations of the Hippocratic oath, what I would like to further expand on is that "doing no harm" also applies to the mental state of our patients and our community. If we as a medical community through our communications and actions are lacking patience, composure, common sense, hope and resolve, to whom can our patients turn for encouragement to calm the rising tide of anxiety. We all have our personal beliefs and biases, but we can all agree that there are positive things in life and that those things should also be remembered. We may be facing a toilet paper drought, but at least we have running water, a roof over our heads, food to eat, and a way to stay warm during those cold nights. I believe it is our obligation and duty as medical professionals to be that beacon of light and strength for our patients.

Through adversity and disappointments, don't forget to be positive and remind our patients about the things that make this nation great. Let us, as health care providers continue to do the very best we know how – the

very best we can; and keep on doing so until the end.

Doing our very best requires us to be informed of the right information. For clinical resources on COVID19 from ATS click here, for clinical resources on COVID19 from CHEST click here. Also being released this week from the American College of Chest Physicians (ACCP) is the Ethical Triage of Resources in COVID 19. CTS's Clinical Practice Chair Asha Devereaux, in addition to other national experts in the pulmonary and critical care field, helped put this resource together. When it is available we will provide this document to all our members in addition to putting it on our CTS website.

As the epidemic expands, so too will the number of patients who will need to be evaluated by our outpatient colleagues. Patients with mild disease can and should be managed at home. CTS has prepared resources, including specific talking points, to help clarify the confusion caused by the torrent of constantly evolving information that is being disseminated through traditional and social media. We are pursuing partnerships with the American Lung Association California (ALAC), to assist in communicating priority messages to our clinicians in addition to being a source of contact for communities throughout California. Our team is also strategizing and interacting with other California medical societies (i.e., California Society for Respiratory Care, Southern California American College of Physicians, California American College of Cardiology, California Chapter of American College of Emergency Physicians, California Medical Association, American Lung Association) to be a platform of support and resource during this COVID19 crisis. We are all in this together and greatness is only possible through working together.

If you would like to be part of this positive initiative and have questions on how to partner with CTS, please feel free to contact us at https://calthoracic.org/contact/.

May God continue to bless this great nation.

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CTS President
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## EDITOR'S NOTE:

COVID-19 information continues to pour forth at a furious pace, through social and traditional media sources, personal emails, Slack channels. The healthcare profession is not immune to rumor, gossip and unsubstantiated evidence. CTS is dedicated to providing our community with the highest quality, rigorous resources to improve practice and patient care.

**TABLE OF CONTENTS**

# CTS GUIDE TO OUTPATIENT WORKUP/MANAGEMENT OF COVID-19

## Updated 3/21/2020

## General Principles

1. **Coronavirus Disease 2019 (COVID-19) is caused by SARS-CoV-2, a novel coronavirus first reported in December 2019 in China.** The incubation period ranges from 2-14 days with a reported median of about 5 days.

2. **There is no one test or symptom(s) that is 100% sensitive or specific for COVID-19.** COVID-19 should be considered as part of the differential for any patient presenting with signs/symptoms of a viral illness. While upper/lower respiratory symptoms and fever are most common, there are patients who initially present with GI symptoms or who are afebrile and go on to develop more classic symptoms a couple days later. Sensitivity of currently available COVID-19 screening is improved with proper sampling--cotton swabs should not be used.

3. **To date, there is no vaccine and no specific antiviral medicine to prevent or treat COVID-2019.** WHO does not recommend self-medication with any medicines, including anti-biotics, as a prevention or cure for COVID-19. The use of any medication for which efficacy has not been demonstrated in controlled clinical trials is not recommended for mild cases of COVID-19 treated in the outpatient setting.

4. As with any viral illness, **patients with mild disease* and no risk factors for serious ill-ness** can be given instructions to care for themselves at home.** Some reports suggest the potential for clinical deterioration during the second week of illness and recommend that patients at risk for severe disease get a home pulse ox.

5. C**urrent medication regimens for patients (without evidence of COVID-19) with pre-existing conditions such as asthma/COPD, heart failure, rheumatologic diseases do not need to be changed.** This includes the use of inhaled corticosteroids (ICS) in asthma, ACE-I/ARBs and immunomodulatory drugs.

**Table of Contents**

## 6. Overview:

The coronaviruses are a large family of viruses that usually cause mild to moderate upper-respiratory tract illnesses, like the common cold, in people.

Most coronaviruses circulate among animals including pigs, camels, bats and cats. Only seven coronaviruses are known to cause human disease, four of which are mild.

Three of the coronaviruses have been associated with serious disease in people. These diseases are SARS (severe acute respiratory syndrome), which emerged in late 2002 and disappeared by 2004; MERS (Middle East respiratory syndrome), which emerged in 2012 and remains in circulation in camels; and COVID-19 (Coronavirus disease 2019). COVID-19 is caused by the novel coronavirus SARS-CoV-2. Based on genetic sequencing, the virus is thought to have originated in November 2019 in the city of Wuhan, China. There is no evidence to indicate that the virus originated in a laboratory. (1)

The number of cases continues to rapidly rise in the state of California. On March 19, 2020, the state ordered all residents to stay at home or place of residence unless they are required to maintain continuity of operations in 16 identified federal critical infrastructure sectors. https://www.cisa.gov/identifying-critical-infrastructure-during-covid-19

Current medication regimens for patients (without evidence of COVID-19) with pre-existing conditions such as asthma/COPD, heart failure, rheumatologic diseases do not need to be changed. This includes the use of inhaled corticosteroids (ICS) in asthma and ACE-I/ARBs. There is no evidence that routine discontinuing treatment is of any benefit. For patients on immunomodulatory therapies, any changes should be made in close consultation with the patient's physician as discontinuing these medications may result in loss of response when the agent is reintroduced.

## 7. Spectrum of disease:

A recent analysis by Johns Hopkins Public Health indicates that slightly >97% of people who develop symptoms of SARS-CoV-2 infection will do so within 11-12 days of exposure, with a median incubation period of about 5 days. In contrast, human coronaviruses that cause common colds have mean incubation periods of about three days. (2) Public health recommendations of a 14-day quarantine period are designed to minimize both transmission as well as the individual and societal costs of quarantine.

COVID-19 should be considered as part of the differential for any patient presenting with signs/symptoms of a viral illness. While upper/lower respiratory symptoms and fever are most common, there are patients who initially present with GI symptoms or who are afebrile and go on to develop more classic symptoms a couple days later.

The spectrum of illness ranges from mild to critical. Most infections are not severe.

- Mild (no or mild pneumonia) reported in 81%.
- Severe disease (e.g., with dyspnea, hypoxia, or >50% lung involvement on imaging within 24 to 48 hours) reported in 14%
- Critical disease (e.g., with respiratory failure, shock, or multi-organ dysfunction) reported in 5%.
- The overall case fatality rate was 2.3% no deaths were reported among noncritical cases.

Note, that these data are based on a Chinese cohort of >72,000, up through February 2020 that was published in JAMA. (4) Case fatality rates do vary between countries. Based on CDC/MMWR report looking at severe outcomes in patients with COVID-19 from Feb 12 - Mar 16, it appears that US case fatality rate may be slightly lower, holding steady at 1.3% (5). Importantly, *severe illness leading to hospitalization, including ICU admission and death, can occur in adults of any age with COVID-19*. (5)

**8. Presenting Signs and Symptoms:**

*COVID-19 should be considered as part of the differential for any patient presenting with signs/ symptoms of a viral illness. While upper/lower respiratory symptoms and fever are most common, there are patients who initially present with GI symptoms or who are afebrile who develop more classic symptoms a couple days later.*

Constitutional

1. **Fever** (77-98%). The fever course among patients with COVID-19 may be prolonged and intermittent. Patients can be afebrile at presentation.
2. Myalgia (11-15%)
3. Headache (8-34%)

Upper respiratory

1. Rhinorrhea (5-24%)
2. Sore throat (5-14%)

Lower respiratory

1. **Cough** (68-82%)
2. Dyspnea (3-64%)
3. Sputum (14-56%)
4. Hemoptysis (1-5%)

Gastrointestinal *(can be initial presentation*)

1. Nausea/vomiting (1-10%)
2. Diarrhea (2-8%)
3. Loss of appetite (reported as a negative prognostic sign)

**9. COVID-19 Screening:**

Testing is not required in mild disease (see below) unless there are risk factors for severe disease, or the patient is in close contact with someone at risk of severe illness.

Estimates of testing sensitivity are as low as 64-75%. Sensitivity can be decreased by low viral load or *inadequate sampling*. Samples initially negative may become positive with later testing, as symptoms worsen. Also, some patients appear to have primarily lower respiratory tract disease.

You no longer need to rule out influenza in order to test for COVID-19. Estimates of co-infection are as high as 5%. Depending on the lab, two samples may be required if respiratory pathogen or influenza testing is requested in addition to COVID-19

**Swirl and Twirl —** a good nasopharyngeal swab requires several seconds of swirling and twirling. Do not use a cotton swab!

**The CDC guidance for obtaining an influenza swab should be followed for COVID-19 testing**:
Materials
Sterile Dacron/nylon swab
Viral transport media tube (should contain 1-3 ML of sterile viral transport medium)
Proper PPE
Procedure
- Tilt patient's head back 70 degrees.
- Insert swab into nostril. (Swab should reach depth equal to distance from nostrils to outer opening of the ear.) **Leave swab in place for several seconds to absorb secretions.**
- Slowly remove swab while rotating it.
- Place tip of swab into sterile viral transport media tube and snap/cut off the applicator stick
Video demonstration: https://www.youtube.com/watch?v=DVJNWefmHjE

**Other testing:**
In general, laboratory testing has **not** been found to be helpful to rule in or rule out COVID-19; but may provide circumstantial evidence
CBC
1. leukocytosis (24 - 30%) or leukocytopenia (9-25%)
2. lymphopenia (83%)
3. thrombocytopenia (36%) (associated with poor prognosis?)

Other labs
1. LFTs (elevated AST/ALT 34%)
2. LDH
3. CRP elevated (If normal, look for another cause of symptoms)
4. Procalcitonin

**Radiology (not necessary in mild disease)**

CXR abnormal in 60% (77% if severe), chest CT abnormal in 86% (95% if severe)
- Unilateral findings on CXR or CT in 14-25% (especially if mild or early in disease)
- Most common findings: GGO and patchy consolidation (>50%), peripheral distribution >50%
- Nodules, lymphadenopathy, cystic changes, effusion in <10%

**10. Triage:**

One of the most important decisions that must be made during an outpatient evaluation is whether the patient should be admitted/sent for further respiratory evaluation or can be sent home. These decisions may be affected by the situation in your local ER/Urgent Care and hospital.

***MILD DISEASE/absence of risk factors**
Afebrile
No hypoxia or evidence of pneumonia
No malaise, confusion, lethargy

****Risk factors for SEVERE/FATAL DISEASE**

Environmental risks
-High-risk travel or known COVID exposure within 14 days
-Health care workers
-Institutional home setting (nursing home, dormitory, shelter, prison, etc.), outpatient dialysis center patient
Patient-related risks
-Age > 60
-Immunocompromised (oncology, transplant, immunosuppressive meds, HIV, other known immunodeficiency)
-Pregnancy
-Chronic lung disease
-Cirrhosis
-Cardiovascular disease
-End stage renal disease
-Diabetes
-Hypertension

Criteria for home care (CDC)

- The patient is stable enough to receive care at home.
- Appropriate caregivers are available at home.
- There is a separate bedroom where the patient can recover without sharing immediate space with others.
- Resources for access to food and other necessities are available.
- The patient and other household members have access to appropriate, recommended personal protective equipment (at a minimum, gloves and facemask) and are capable of adhering to precautions recommended as part of home care or isolation (e.g., respiratory hygiene and cough etiquette, hand hygiene).
- There are household members who may be at increased risk of complications from COVID-19 infection (e.g., people >65 years old, young children, pregnant women, people who are immunocompromised or who have chronic heart, lung, or kidney conditions).

**If moderate disease and/or risk factors present, consider further evaluation including labs, CXR or send to Urgent Care/ER.**

**11. Treatment:**

To date, there is no vaccine and no specific antiviral medicine to prevent or treat COVID-2019. WHO does not recommend self-medication with any medicines, including antibiotics, as a prevention or cure for COVID-19.

1. Given the lack of controlled trials, and potential for toxicity, the use of chloroquine or hydroxychloroquine is not recommended. In particular, recent data exploring the use of azithromycin + hydroxychloroquine should be interpreted with extreme caution.
2. Although WHO backed off on their recommendation to avoid NSAIDs in COVID infection (March 19, 2020), there is no good data to support the use of NSAIDs during acute respiratory infections. Use of NSAIDs is associated with increased risk of heart attack and stroke in adults. In

3. No data to indicate that ICS need to be stopped in asthmatics. (7)
4. Smoking cessation should continue to be recommended.
5. In most cases, there is no need to specifically treat fever.

Treatment remains limited to supportive care, as for any mild viral illness.
*Due to the potential for clinical deterioration during the second week of illness, some protocols recommend that patients at risk for severe disease get a home pulse ox*

1. Rest.
2. Drink plenty of clear fluids -- water, broth, and sports drinks
3. Consider using a humidifier or saline spray to help with a stuffy nose.
4. Supplements
    a. Vitamin C (doses > 2000 mg can cause kidney stones, diarrhea nd nausea)
    b. Zinc
        1. Food sources include red meat, poultry, oysters, fortified cereals, whole grains, beans and nuts
        2. Tolerable upper limit (includes dietary intake) for adults 19 years and up = 40 mg
        3. Supplements come in pill and liquid form
        4. 3-5 days
    c. Medicinal mushrooms
        1. Dried or fresh (chaga, maitake, reishi are the foundations, also cordyceps, enoki, royal sun blue, turkey tail and lion's mane
        2. Capsules and other preparations are commercially available for those who don't cook

**12. References:**


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2. Stephen A. Lauer, Kyra H. Grantz, Qifang Bi, Forrest K. Jones, Qulu Zheng, Hannah R. Meredith, Andrew S. Azman, Nicholas G. Reich, Justin Lessler. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: Estimation and Application. *Annals of Internal Medicine*, 2020; DOI: 10.7326/M20-0504
3. Wu Z, McGoogan JM. Characteristics of and Important Lessons From the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases From the Chinese Center for Disease Control and Prevention. JAMA 2020.
4. Severe Outcomes Among Patients with Coronavirus Disease 2019 (COVID-19) — United States, February 12–March 16, 2020. MMWR Morb Mortal Wkly Rep. ePub: 18 March 2020
5. Global COVID-10 Case Fatality Rates https://www.cebm.net/global-covid-19-case-fatality-rates/
6. https://www.cdc.gov/coronavirus/2019-ncov/hcp/therapeutic-options.html
7. NSAIDS in Acute Respiratory Infections. https://www.cebm.net/oxford-covid-19/nsaids-in-acute-respiratory-infection/
8. Inhaled Corticosteroids in Asthma during the COVID-19 outbreak https://www.cebm.net/using-inhaled-steroids-in-asthma-during-the-covid-19-outbreak/

# Pulmonary Rehabilitation Resources in a Complex and Rapidly Changing World

Prepared by Chris Garvey NP, Anne Holland PT, PhD and Judy Corn, MSEd, ATS Staff

Nearly every aspect of life has changed dramatically in a matter of days. This new world order impacts providers, patients and our communities. Pulmonary rehabilitation (PR) is not immune to these changes. As Jean Bourbeau MD https://rimuhc.ca/-/jean-bourbeau-md-msc-frcp-c- has taught us, behavior change and self-management training should target a framework of adaptation, and adaptation is likely a key approach to PR during the COVID 19 pandemic.

**We cannot endorse a specific approach to PR during the current challenges**. **Users are advised to inform patients that the resources below should only be used with involvement and agreement of their provider. To date, home PR alternatives have not had a robust body of evidence to suggest they are a substitute for center-based PR. A key concept is that, for the immediate future, PR is unlikely to be delivered with the patient and the provider face-to-face.** The following approaches are offered as possible models to help patients initiate or continue rehabilitative programs in collaboration with a clinical team. This document is shared to help provide options in the current challenging circumstances and should not be considered an endorsement of any individual program model.

A number of remotely delivered PR models are available, with some published evidence of their efficacy. Remote PR should deliver the essential components of pulmonary rehabilitation, including exercise training, education, and behavior change.

1. Anne Holland PT, PhD and her group have developed a home-based rehabilitation model that is telephone based, using highly structured calls delivered by a health professional trained in Motivational Interviewing. The details are on the website https://homebaserehab.net/

2. The UCSF PR program has transitioned to a zoom https://zoom.us video-based exercise training model coordinated by Chris Garvey NP and Julia Rigler RRT. The approach targets stable patients who have been screened as clinically appropriate for this approach (e.g., those without cardiovascular contraindications, fall risk, cognitive impairment, etc. based on AACVPR PR Guidelines 5th edition). Below are strategies that may have a role for a PR program's needs.

**ACSM FITT Aerobic Recommendations for Those with COPD**

| FITT | AEROBIC EXERCISE |
|---|---|
| Frequency | 3-5 days/week |
| Intensity | Moderate intensity (i.e., 4-6 on the Borg C-R 10 Scale). |
| Time | 20-60 minutes/day. If the 20-60 minute durations are not achievable, accumulate ≥20 minutes of exercise interspersed with intermittent exercise rest periods of lower intensity work or rest. |
| Type | Common aerobic modes including walking (free or treadmill), stationary cycling, and upper body ergometry. |

ACSM: American College of Sports Medicine
FITT: Frequency, Intensity, Time, Type

**ACSM FITT Resistive Exercise Recommendations for COPD and Asthma**

| FITT | RESISTANCE EXERCISE |
|---|---|
| Frequency | 2-3 days/week |
| Intensity | Assessment of dyspnea and / or RPE using a validated scale may be considered. |
| Time | *Strength:* 2-4 sets, 8-12 repetitions<br>*Endurance:* ≤2 sets for 15-20 repetitions. |
| Type | Elastic bands, free weight, or body weight exercises. |

Key: RM = repetition maximum, RPE = rating of perceived exertion

An inexpensive "**resistive circuit"** may be developed if space is available. An example of this type of resistive circuit training could include the following stations:

1) Free weights (chair and dumbbells of varying weights required).
2) Bands/tubes (chair and elastic bands/tubes of various tensions required).
3) Hand-grip squeeze station (tennis balls, squeeze balls and/or handgrip devices required).
4) Leg-lift station with ankle weights or weighted shopping bags (chair and ankle weights or cloth shopping bags with full cans or stones required).
5) Patient performing resistive exercises using their body weight such as standing leg lifts, arm circles, chair raises, wall pushups, squats* and / or sit to stand* (stable chair required).

For frail or deconditioned patients, use knee extensions without weights.
*initial squats and sit to stand require supervision for proper form.

**When to Stop Exercise and Seek Help**

- Breathlessness, fatigue and/or weakness beyond normal levels that does not improve with rest or usual management (e.g., oxygen, rescue inhaler or nebulizer, tripod position)
- Chest pain or tightness
- Muscle pain that does not improv
- Feeling dizzy or faint
- Leg pain, weakness, and/or cramping
- Sweating more than usual with exercise implementation

3. **https://www.livingwellwithcopd.com/** is an online PR resource that provides helpful tools, handouts and materials found under the "Rehabilitation" tab.

The section on "PR Program" has been enriched with the contributors' collective experience, with pre-existing resources, as well as consultation and feedback from the larger respiratory community. This PR Program includes web-based comprehensive resources with reference guides for all the elements of PR:

i) Pre-program evaluation & physician consultation
ii) Exercise program & prescription
iii) Self-management behavior modification intervention
iv) Post-program evaluation
v) Follow-up and keeping a healthy lifestyle in the long-term

The Livebetter PR Program supports healthcare professionals with i) prescription of exercises, ii) exercise tracking, iii) maintenance and iv) gradual return to exercise at home when patient have stopped exercise training, including acute exacerbations (see the tab "Rehabilitation - Exercise maintenance at home under Healthy Lifestyle, a Guide for the gradual return to exercise"). Thanks to Jean Bourbeau MD for providing this resource.

4. **Livebetter.org** is an online resource developed by the American Thoracic Society and the Gawlicki Family Foundation to increase public awareness of PR by informing and educating individuals with chronic lung disease about potential benefits of PR.

5. **An Electronic Medical Record (EMR) Draft Note** for video visit documentation below may be updated to potentially meet PR program needs. There are no current plans for reimbursement of home PR models in the US.

   **Video Visit for Home Exercise** performed this visit using real-time Telehealth tools, including a live video connection between my location and the patient's location. Prior to initiating the session, I obtained informed verbal consent to perform this visit using Telehealth tools and answered all the questions about the Telehealth interaction.

   Name ***
   DX ***
   Video visit via Zoom conducted from *** to ***
   Medication changes? ***
   Subjective findings:
   Reviewed home exercise program with patient per individualized guidelines for aerobic and resistance exercises.
   Home Exercise progress:
   Aerobic home exercise program***
   Resistance/strength home exercise program ***
   Mobility***
   During video visit we focused on ***. Pt able to do ***
   Plan***

**Below is information from Centers for Medicare and Medicaid (CMS). There is no clear position on billing video visits for PR at this point.**

https://news.thoracic.org/washington-letter/2020/cms-expands-telehealth-services-and-other-options-for-e-visits-effective-march-6,-2020.php

To read the **Fact Sheet** on this announcement, please click here.

**To read the Frequently Asked Questions on this announcement, please click here.**

The authors thank Richard Casaburi PhD MD, Linda Nici MD, Richard ZuWallack MD and Grace Anne Dorney Koppel MA, JD for their helpful insights.

CSRC UPDATE
by Krystal Craddock BSRC, RRT, RRT-ACCS, RRT-NPS, AE-C, CCM
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March 23, 2020

COVID-19 and keeping HCW's at lower risk during AGP's

**Recent publications regarding recommendations for AGP's and COVID:**

- All studies that have been conducted regarding exhaled dispersion distance and bacterial count were not differentiated between bioaerosol (generated by patients during coughing, breathing, talking, or laughing) and medical aerosol (MDI, DPI, SVN, HFNC, etc.). (Li, 2020).

- The following expert consensus recommendations on all those high-risk treatments, based on the current evidence as well as the resource limitation in some areas, with the aim to reduce the nosocomial transmission and optimize the treatment for the COVID-19 pneumonia patients from the Respiratory Care Committee of the Chinese Thoracic Society include:

1. Standard prevention and protection, and patient isolation;
2. Patient wearing mask during HFNC treatment;
3. Using dual limb ventilator with filters placed at the ventilator outlets, or using heat-moisture exchanger (HME) instead of heated humidification in single limb ventilator with HME placed between exhalation port and mask;
4. Avoid using mask with exhalation port on the mask;
5. Placing filter between resuscitator and mask or artificial airway;
6. For spontaneous breathing patients, placing mask for patients during bronchoscopy examination; for patients receiving noninvasive ventilation, using the special mask with bronchoscopy port to perform bronchoscopy;
7. Using sedation and paralytics during intubation, cuff pressure should be maintained between 25-30 cmH(2)O;
8. In-line suction catheter is recommended, and it can be used for one week;
9. Dual-limb heated wire circuits are recommended and only changed with visible soiled;
10. For patients who need breathing support during transportation, placing an HME between ventilator and patient;
11. PSV is recommended for implementing spontaneous breathing trial (SBT), avoid using T-piece to do SBT;
12. When tracheotomy patients are weaned from ventilator, HME should be used, avoid using T-piece or tracheostomy mask;
13. Avoid unnecessary bronchial hygiene therapy;
14. For patients who need aerosol therapy, dry powder inhaler metered dose inhaler with spacer is recommended for spontaneous breathing patients; while vibrating mesh nebulizer is recommended for ventilated patients and additional filter is recommended to be placed at the expiratory port of ventilation during nebulization.

Li, J. (2020). Evidence based recommendations on preventing nosocomial transmission for clinicians while taking care of coronavirus infected patients. *ISAM.*

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## HIGH-FLOW NASAL CANNULA (HFNC) EVIDENCE:

- There is VERY LITTLE evidence surrounding this topic.
- In the one systematic review by Tran et al. (2012), I further researched their definition of HFNC and they DID NOT define it, meaning it could be a heated humidified 60 LPM device as we utilize, or a 15 LPM bubble device (Rabound et al., 2010).
- All other studies are in vivo studies, with mouth closed and a tight cannula seal around the nares.
- Current recommendations based on this limited data suggest placing a loop mask on the patient over their HFNC to decrease risk of exhaled dispersion distance (Li, 2020).
- **Based on our findings, at UCD, we continue to recommend HFNC be considered an AGP and require airborne isolation during this therapy.**

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