

## **Service Delivery to Respiratory Illness in COVID-19 Pandemic in Relation to Swallowing Dysfunction**

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### **Introduction**

Coronavirus disease (COVID-19) is an infectious disease caused by a newly discovered coronavirus. Most people infected with the COVID-19 virus experience mild to moderate respiratory illness and recover without requiring special treatment. Older people and those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease and cancer are more likely to develop serious illness (WHO-2020) [1]. Most estimates of the incubation period of COVID-19 ranges from 1 - 14 days, most commonly around 5 days according to (WHO-April 13<sup>th</sup> 2020). However, this estimation may change as we learn more about the virus [2].

COVID-19 virus spreads primarily through droplets of saliva or discharge from nose when an infected person coughs or sneezes. COVID-19 is closely related to severe acute respiratory syndrome (SARS) which swept around the world in 2002 to 2003. Later, in 2012 middle east respiratory syndrome was emerged. But COVID-19 is different from these two other virus. In this people are carrying the disease and displaying symptoms, making it even harder to control in 2019 - 2020. It has spread to nearly every country in the world. It first emerged in china in December 2019 and spread exponentially throughout the world [3,4].

Coronavirus affects the Respiratory system by showing few common symptoms like fever, cough and cold and the investigations for the causes and vaccinations are still going on. In COVID-19 patient's with respiratory illness or patients who are compromised in their respiratory status, may progress to a secondary dysphagia. 1 in 17 of general population will develop some form of dysphagia in their lifetime [5]. In general, 16 - 23% of population got effected with dysphagia between the age of 29 - 32 years and increasing to 27% in those over 76 years [6]. If the patient respiratory is compromised with respiration while swallowing, food/liquids they may aspirate. Prolonged or undiagnosed aspiration will lead to pneumonia. It occurs due to the improper co-ordination of timing and breathing while swallowing.

The aim of the article is to discuss the relation between the respiration and dysphagia and to form a general standard protocol while dealing with patients in this COVID-19 pandemic. Before knowing anything about dysphagia one should understand about normal swallowing and dysphagia in relation with respiratory issues.

### **Normal swallowing**

Swallowing is a complex function that affects the physical and mental health of all human beings. Dysphagia is an important alarm symptom; however, the epidemiology remains poorly defined.

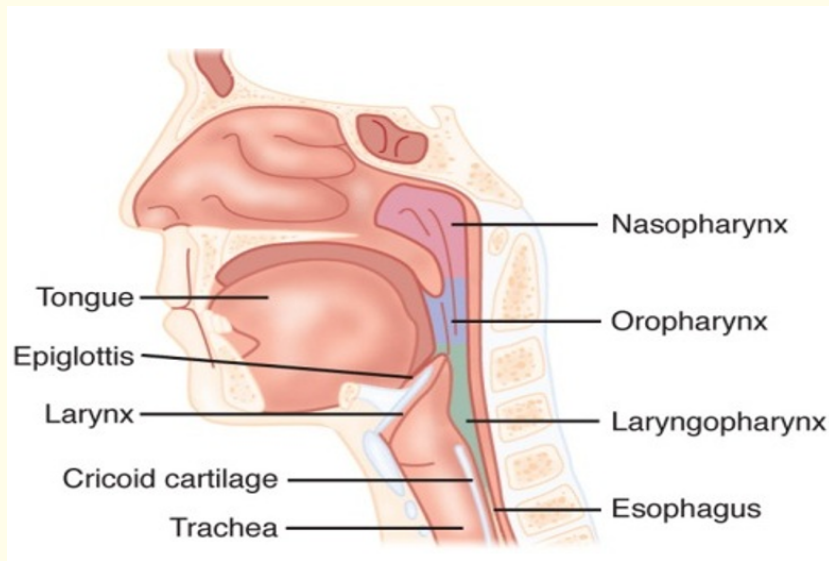


Figure 1

**Swallowing has four sequential co-ordinated phases:** The oral preparatory phase, the oral propulsive phase, the pharyngeal phase and oesophageal phase. Each phase as described below:

1. **Oral preparatory phase:** During this phase, food in the oral cavity is manipulated and masticated in preparation for swallowing. The back of the tongue controls the position of the food, preventing it from falling into pharynx.
2. **Oral propulsive phase:** During the oral propulsive, the tongue transfers the bolus of food to the pharynx, triggering the pharyngeal swallow.
3. **Pharyngeal phase:** During the pharyngeal phase, complex and co-ordinated movements of the tongue and pharyngeal structures propel the bolus from the pharynx into the oesophagus. The closing of the vocal cords and the backward movement of the epiglottis prevents food/liquid from entering the trachea.
4. **Oesophageal phase:** During the oesophageal phase of swallowing, coordinated contractions of the oesophageal muscle move the bolus through the oesophagus towards the stomach [7].

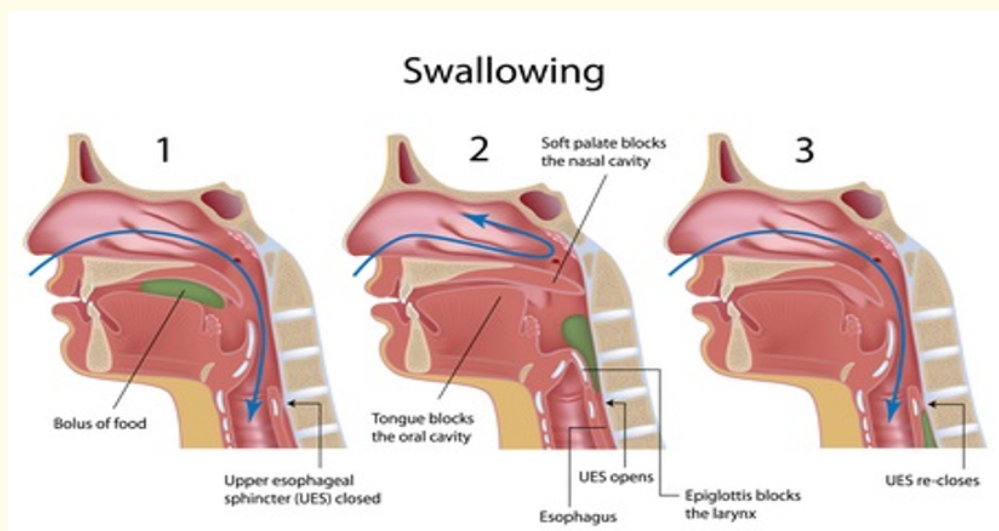


Figure 2

**Prevalence of dysphagia**

Disordered swallowing, or dysphagia, can develop from lesions in certain areas of the cortex and brainstem that control the swallowing function or damage to the associated cranial nerves. It is a common problem observed in patients with stroke and head injury. According to dozier, dysphagia affects at least 12% of patients in acute care hospitals and more than 50% of those in chronic care settings [8].

The presence of dysphagia is associated with aspiration induced chest infections and increases the risk of serious respiratory consequences such as pneumonia. Identification of the patient at risk of aspiration is important from a clinical viewpoint. Due to the risk of aspiration, a significant number of dysphagia patients are fed with a nasogastric tube and/or intravenous fluids. Dysphagia can significantly impact a person’s quality of life as well as their health status. Researches says that prevalence rate of dysphagia in general population is about 11% and 40 - 70% in stroke patients, 60 - 80% patients with neurodegenerative disease and up to 13% of adults aged 65 and older > 51% of institutionalized elderly patients. 60 - 70% of patients who undergo radiotherapy for head and neck cancer and 70% in patients with COPD.

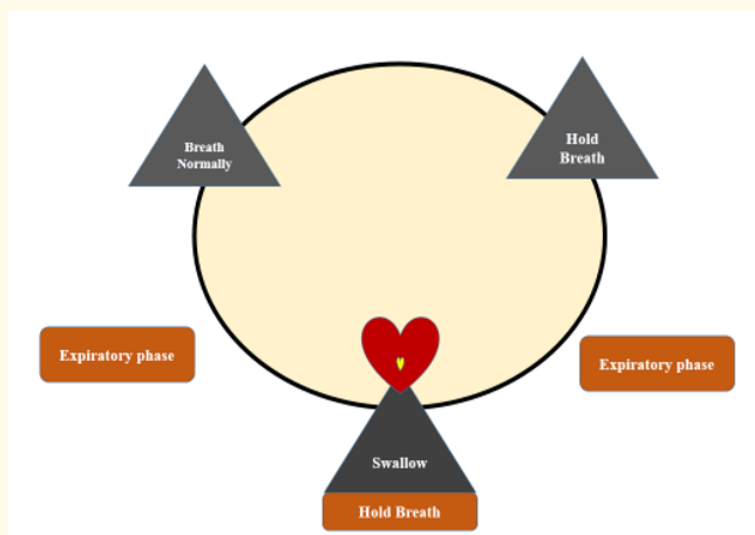
**Swallowing dysfunction and its mechanism**

Swallowing and breathing are closely related and synergy of structures is needed for airway protection during the swallowing process to prevent the aspiration of food contents and thus prevent pulmonary complications. The swallowing apnea (0.5 and 1.0s) is described as an important mechanism of airway protection.

Chronic obstructive pulmonary disease (COPD) is a major public health problem with high and increasing prevalence. According to World Health Organization (WHO) estimates, 80 million people have moderate to severe chronic obstructive pulmonary disease (COPD). Pulmonary changes can be a detrimental factor to coordination between breathing and swallowing. Swallowing apnea requires a reorganization of the breathing pattern when swallowing. This can be limited by the typical respiratory changes observed in patients with chronic obstructive pulmonary disease (COPD) [9].

The following figure is simplified description of the usual swallowing pattern in healthy adults. Swallowing initiates during the expiratory phase of the breathing cycle. Swallowing interrupts exhalation (swallow apnea), and once the swallow has been completed, breathing resumes with exhalation.

In people with respiratory illness often have trouble with this timing. The airway closing during swallowing is called an apneic period. During a whole meal, there are hundreds of these apneic periods. Sometimes, when people have lung disease, this causes increased shortness of breath and fatigue. This fatigue may result in poor timing between respirations and swallowing. Sometimes, a person with acute respiratory illness/COPD or pulmonary disease may inhale instead of exhale after the swallow which causes penetration or “aspiration” of food or liquid into the trachea or the larynx. This can cause aspiration pneumonia. 15% to 20% of patients with COPD may have some degree of aspiration pneumonia [9].



**Figure 2**

### Swallowing dysfunction/dysphagia in patients with respiratory illness

In the management of patients with COPD, prevention of exacerbation is one of most important goals because it has serious impacts on the morbidity, mortality and healthcare costs associated with COPD. Therefore, identifying and reducing the risk factors associated with COPD exacerbation are major therapeutic targets in clinical settings and it is commonly seen in middle-aged or older adults who smoke. Many people do not realize they have it. The breathing problems tend to get gradually worse over time and can limit their normal activities, although treatment can help keep the condition under control. The total deaths from COPD are projected to increase by 30% over the next 10 years, unless urgent measures are taken to reduce the risk factors, particularly tobacco use. Estimates indicate that by 2030, COPD may become the third leading cause of death [9,10].

#### Respiratory illness affecting swallowing in COVID-19:

- Basically, in patients with respiratory illness they have issue with time management and in controlling the breath while swallowing. Due to which it may show the effect on their swallowing pattern and further it may lead to aspiration if neglected.
- Sometimes they may have increased mastication, increased respiration rate and rhythm during chewing, could cause air hunger and likelihood of inhalation during swallow.
- Delayed pharyngeal response, decreased tongue retraction, reduced laryngeal elevation, could lead to residue in oral /pharyngeal cavity and which may lead to aspiration.
- Increased fatigue, incoordination, weakness of upper aero digestive tract musculature and sensory impairment, could increase the risk of aspirating during inhalation.
- Increased inspiration after liquid swallow and increased apneic pause duration, may lead to the increased risk from air hunger during prolonged chewing times plus common co-occurring oropharyngeal dysphagia in respiratory illness is equal to higher risk of aspiration.

#### Causes of dysphagia:

1. Stroke
2. Head injury
3. Spinal cord injury
4. Muscular dystrophy
5. Cerebral palsy
6. Parkinson's disease
7. Motor neuron disease
8. Multiple sclerosis
9. Myasthenia gravis

10. Alzheimer's disease
11. Tumors of the head and neck, and their treatments (Chemotherapy/Radiotherapy)
12. Lung disease/COPD.

### Dysphagia in COVID-19

If you find any of the following signs, there is a need to consult a dysphagia specialist or your primary physician:

1. Dyspnoea
2. Sore throat/cough
3. Odynophagia
4. Malnutrition and weakness
5. Altered sensorium
6. Drooling
7. Difficulty chewing
8. Choking
9. Food left in the mouth
10. Feeling of lump in the throat
11. Changes in eating habits
12. Notable delay initiating the swallow
13. Wet gurgling voice
14. Spiking a fever
15. Changes in respiration
16. Coughing with medication of after a meal
17. Chest X-Ray revealing infiltrate
18. Heartburn
19. Chest pain
20. Hoarse voice.

**Swallowing difficulty in COVID-19 can further lead to:** COVID-19 patients may have loss of appetite, dysphagia, diarrhoea and tachypnoea makes their intake even worse. This leads to malnourishment on admission to the healthcare facility reference.

**Protocol for dysphagia assessment and management in COVID-19**

1. The medical speech language pathologist (SLP) would take self-precautions before examining the patient, if no personal protective equipment's (PPE'S) available try to avoid seeing the patient.
2. PPE-kit should contain:
  1. Scrubs and closed -toe shoes
  2. Gloves
  3. Gown
  4. Apron
  5. Respiratory mask-N95
  6. Face shield
  7. Goggles+ surgical face mask
3. Avoid doing objective evaluations like video fluoroscopy, fiber-optic endoscopic swallow evaluation, tracheostomy inner tube changes/cleaning/speaking value trial until the infection and risk of transmission is reduced. These procedures have the highest risk of droplet generation transmission of infection.
4. The medical SLP should avoid testing the gag reflex, voluntary cough task, cough reflex testing, cervical auscultation and tracheostomy suction while performing clinical bed side swallow evaluation.
5. The medical SLP should maintain < 10 minutes of interaction with the patient and also should maintain physical distance.
6. The medical SLP will be doing the clinical bed side swallow evaluation and dye test at bed side and also recommend for chest- X-ray as a base line requirement only if the patients GCS is E4M6 VT/VA.
7. If the patient appears to be critical/if the patient's GCS is at or less than E2 M4VA/VT, the swallow evaluation is not recommended. A re-reference would be appreciated in that case. Till then patient nutrition levels is to be maintained through non-oral mode of nutrition i.e. Ryle's tube feeding.
8. While doing the clinical swallow evaluation the medical SLP needs to maintain at least a feet distance (i.e. a one hand distance) from the patient and make a visual perception instead of laryngeal palpation, only observe for number of swallows and listen to the voice quality by asking the patient to count from 1 to 10 and check out for respiration rate by monitoring the saturation probe.
9. While evaluating sit/stand side to the patient with a proper physical distance and also take the patient impression after

swallowing status. If possible consider the compensatory strategies in order to avoid the time barrier.

10. Swallow evaluation would be done firstly with blended consistency for the protective reasons. Thin liquids would be included in the evaluation only when the patient seems to be 100% safe with the blended textured food.
11. For confirmation of the findings, especially in cases of no aspiration or mild aspiration, swallow evaluations could be repeated the next alternative day.
12. The results of the assessment would be mentioned in the file by the medical SLP.
13. If the patient fails the swallow test and Aspirating then patient would be recommended with RT feeds.
14. If the patient passes the swallow test, oral diet would be recommended based on the result. The food would be given by the nursing staff or self-based on the patient general condition.
15. After swallowing evaluation the results are graded Based on the "National Outcome Measurement Scale-NOMS" 7 point Rating scale.
16. Later, the dietician would also be informed about the same for any sort of diet changes or modifications.
17. At the same time the primary team and family members should also be informed about the status of Dysphagia Evaluation and about further plan of action.
18. If the patient fails the swallow test and if he is alert enough to participate in the swallowing exercises, swallow therapy would be initiated for him/her.
19. If the patient is participative and with adequate comprehension, swallowing exercises/oro-motor exercises would be initiated by the medical SLP either at direct contact with patient or through telephonic/video consultation.
20. The patients who require swallowing exercises would be followed up daily or on alternate days depending on the severity of the problem and the infection state either directly or through Tele-consultation.
21. Swallowing therapy would be continued till the swallowing abilities are attained to maximum possible extent or till the patient is admitted in the hospital.
22. Printed handouts with pictures of swallowing exercises would be given for further reference.
23. If patient has any voice issues, voice therapy should be done along with the swallow therapy.
24. The patients for whom oral diet has been initiated would be on regular follow up to check out for the oral intake regularly.
25. At the time of discharge, chest-X-ray should be repeated again and explain about the current status at the time of discharge and also take sign of the patient or by family members on the concern form which explains about the current status of the patient before getting discharge.
26. At the same time patient or their family members were given with self-rating scale to check out with their anxiety and swallowing issues with some questionnaires'. All records should be kept confidential and used as data for research purpose after

taking concern from patient and their family members.

27. Wash your hands frequently by following all hand washing steps for every 10 - 15 minutes and also wash before and after touching patients and patient surroundings, patient's files, doors at IPD/OPD/ICU entrance. Also wash your hands whenever moving around from one place to another in hospital settings.
28. Maintain social distance 2 meters whenever counselling the care takers or while talking to your colleagues.
29. Mostly try to avoid using any therapeutic materials and auscultation for patient use. If in case you used any material or stethoscope for cervical auscultation while doing swallow evaluation, do sanitise the material and stethoscope before and after patient use.
30. Also make sure that your room doors, window, table are sanitised regularly before and after taking any session.

**Swallow tips for respiratory illness patients with COVID-19:**

1. Eat at a slow rate.
2. Put the fork/spoon down between bites to help slow down.
3. Avoid straw feeding.
4. Avoid consecutive drinking of liquids as this requires sustaining airway closure which is difficult for people with lung disease.
5. Do not eat when you feel shortness of breathing, stop eating immediately and do recovery breathing first (pursed lip breathing).
6. Make sure that you exhale after swallowing.
7. Do not exercise immediately prior to eating.
8. Take small bites and sips.
9. Always eat in an upright position and do not lie down right after eating (90 degree).
10. Do not talk and eat at the same time. Speech requires coordinated timing of the breathing as does swallowing. Precise timing of both these mechanisms is too difficult for people with lung disease.
11. Protect airway using chin tuck or with any other swallow maneuvers as recommended by dysphagia specialist.
12. Increase oral transit with 60 degree recline posture (take precautions that increased apnea does not result from these techniques).
13. Manage xerostomia by alternating sips and bites to clear residue and/or recommending medication to replace saliva.
14. Swallowing twice to decrease the amount of residue.



15. Patients with laryngeal penetration during sequential swallows decrease liquid bolus size to 10 ml and discontinue sequential swallowing.
16. Remain upright after eating and elevating the head of the bed to reduce GERD [11].

### Note

The need of this article, COVID-19 Pandemic in relation with swallowing dysfunction is only to make aware about the situation and how to handle the patients in current situation. This article is not recommending any legal advices it is only a general information and guidelines showing how to deliver their services in current situation and how to manage with oropharyngeal dysphagia in Respiratory illness.

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