LINCARE
A Linde company

Making an Advanced Respiratory Referral

nhv®
Non-Invasive Home Ventilation

Navigating Care for Progressive Respiratory Illnesses

Helping to reduce hospital admissions and improve health-related quality of life.

Lincare's mission is driven by our passion to maximize the clinical success rate of patient outcomes and to help reduce hospital readmissions for chronic respiratory exacerbations. Lincare uses advanced respiratory techniques and devices in conjunction with the highest standards of service and support to enhance our patients' ability to manage their condition while staying active and engaged in their care.

Effective ventilation coupled with the Lincare continuum of care can help patients achieve an improved health-related quality of life and greater independence. Patients referred to Lincare will receive state-of-the-art ventilation equipment. Patients also receive clinical monitoring and follow-up from a licensed clinical specialist. Being home is an integral part of staying well, and Lincare can help to bridge the gap from hospital to home.

Commonly covered diagnoses

- Chronic respiratory failure as a consequence of COPD
- ALS
- Muscular dystrophy
- Poliomyelitis
- Myasthenia gravis
- Disorders of the diaphragm – other disorders of the lung
- Kyphoscoliosis
- Restrictive thoracic and neuromuscular disorders

Bilevel/RAD

Please include medical record documentation with the following information.

Chronic respiratory failure consequent to COPD:

Hospital discharge

Bilevel with or without a backup rate

- Diagnosis of acute on chronic respiratory failure due to COPD
- Physician's note indicates need for bilevel device and without it there will be rapid clinical deterioration
- Patient requires a RAD within the 24-hour period prior to hospital discharge
- The treating clinician determines that the patient is at risk of rapid symptom exacerbation or rise in $PaCO_2$ after discharge

Non-hospital discharge

- Medical record documentation to support evaluation of the patient within 12 months prior to starting therapy

Bilevel without a backup rate

- $PaCO_2 \geq 52$ mm Hg by ABG while awake and breathing prescribed FiO_2
- Sleep apnea must not be the predominant cause of the elevated CO_2 levels

Bilevel with a backup rate

- $PaCO_2 \geq 52$ mm Hg by ABG while awake and breathing prescribed FiO_2
- Sleep apnea must not be the predominant cause of the elevated CO_2 levels
- One of the following characteristics should also be noted in the patient's record:
  - Stable COPD should also be noted in the patient's record
  - Hypercapnia present for at least two weeks post-hospitalization after resolution of an exacerbation of COPD requiring acute non-invasive ventilation using a RAD device

Restrictive thoracic and neuromuscular disorders:

• Medical record documentation to support evaluation of the patient within 12 months prior to starting therapy

Bilevel with or without a backup rate

A. There is documentation in the beneficiary's medical record of a neuromuscular disease or a severe thoracic cage abnormality

B. One of the following:

1. An arterial blood gas $PaCO_2$, done while awake and breathing the beneficiary's prescribed FiO_2 is greater than or equal to 45 mm Hg
2. Sleep oximetry demonstrates oxygen saturation less than or equal to 88% for greater than or equal to five minutes of nocturnal recording time done while breathing the beneficiary's prescribed recommended FiO_2. Minimum recording time of two hours
3. For a neuromuscular disease (only), either:
   - Maximal inspiratory pressure is less than 60 cm H_20; ***or***
   - Forced vital capacity is less than 50% predicted

C. Chronic obstructive pulmonary disease does not contribute significantly to the beneficiary's pulmonary limitation

Central sleep apnea or complex sleep apnea:

Bilevel with or without a backup rate

A complete facility-based, attended PSG is performed documenting the following:

A. The diagnosis of central sleep apnea or complex sleep apnea

B. Significant improvement of the sleep-associated hypoventilation with the use of an E0470 or E0471 device on the settings that will be prescribed for initial use at home, while breathing the beneficiary's prescribed liter flow

Hypoventilation syndrome:

Bilevel without a backup rate

Criteria A is met in addition to either criteria B or C:

A. An initial arterial blood gas $PaCO_2$, done while awake and breathing the beneficiary's prescribed liter flow, is greater than or equal to 45 mm Hg and spirometry shows an FEV1/FVC greater than or equal to 70%

EITHER

B. An arterial blood gas $PaCO_2$, done during sleep or immediately upon awakening, and breathing the beneficiary's prescribed liter flow, shows the beneficiary's $PaCO_2$ worsened greater than or equal to 7 mm Hg compared to the original result

C. While using E0470, a facility-based PSG demonstrates oxygen saturation less than or equal to 88% for greater than or equal to a cumulative five minutes of nocturnal recording time. Minimum recording time of two hours. Additionally, it must be determined that obstructive upper airway events are not the predominant cause of issue

Bilevel with a backup rate

Criteria A is met, and either criterion B or C are met:

A. A covered E0470 device is being used, and spirometry shows an FEV1/FVC greater than or equal to 70%

EITHER

B. An arterial blood gas $PaCO_2$, done during sleep or immediately upon awakening, and breathing the beneficiary's prescribed liter flow, shows the beneficiary's $PaCO_2$ worsened greater than or equal to 7 mm Hg compared to the original result

C. While using E0470, a facility-based PSG demonstrates oxygen saturation less than or equal to 88% for greater than or equal to a cumulative five minutes of nocturnal recording time. Minimum recording time of two hours. Additionally, it must be determined that obstructive upper airway events are not the predominant cause of issue

https://www.cms.gov/medicare-coverage-database/view/lcd.aspx?LCDId=33800

Ventilators

Please include medical record documentation with the following information.

Chronic respiratory failure consequent to COPD:

Hospital discharge

- Diagnosis of acute on chronic respiratory failure due to COPD
- Patient requires a ventilator, mechanical ventilator, or non-invasive ventilator due to the severity of the covered diagnosis
- Patient's need exceeds the capabilities of a bilevel and requires use of a ventilator within 24-hour period prior to hospital discharge
- The patient's medical record documentation establish the patient is at risk for rapid symptom exacerbations or rise in $PaCO_2$ after discharge

Non-hospital discharge

- Medical record documentation to support evaluation of the patient within 12 months prior to starting therapy
- Diagnosis of chronic respiratory failure due to COPD
- Patient requires a ventilator, mechanical ventilator, or non-invasive ventilator due to the severity of the covered diagnosis
- ABG $PaCO_2$ ≥ 52 mm Hg during awake hours while breathing his/her prescribed FiO_2
- Medical record documentation supports sleep apnea is not the predominant cause of the hypercapnia (formal sleep testing is not required if, per the treating clinician, the patient does not experience sleep apnea as the predominant cause of the hypercapnia)
- The patient demonstrates ***at least one*** of the following characteristics:
  - Requires oxygen therapy at an FiO_2 ≥36% or ≥4L nasally; ***or***
  - Requires ventilatory support for more than 8 hours per 24-hour period; ***or***
  - Requires the alarms and internal battery of an HMV, because the patient is unable to effectively breathe on their own for more than a few hours and the unrecognized interruption of ventilatory support is likely to cause a life-threatening condition if the patient or caregiver cannot be otherwise alerted as determined by the treating clinician; ***or***
- Per the treating clinician, none of the below are likely to be achieved with consistent use of a RAD with backup rate feature for at least 4 hours per 24-hour period on at least 70% of days because the patient's needs exceed the capabilities of a RAD as justified by the patient's medical condition:
  - Normalization (< 46 mm Hg) of $PaCO_2$; ***or***
  - Stabilization of a rising $PaCO_2$; ***or***
  - 20% reduction in $PaCO_2$ from baseline value; ***or***
  - Improvement of ***at least one*** of the following patient symptoms associated with chronic hypercapnia:
    - headache
    - fatigue
    - shortness of breath
    - confusion
    - sleep quality

Restrictive thoracic and neuromuscular disorders:

- Medical record documentation to support evaluation of the patient within 12 months prior to starting therapy
- Patient requires a ventilator, mechanical ventilator, or non-invasive mechanical ventilator due to the severity of covered diagnosis
- Ventilator is required to decrease work of breathing, improve pulmonary status and prevent the interruption of respiratory support, which could lead to serious harm, i.e., decline in health status, worsening condition, increase risk of CO_2 retention, and untimely readmissions
- If CPAP/RAD tried, indicate why it is no longer effective

https://www.cms.gov/medicare-coverage-database/view/ncacal-decision-memo.aspx?proposed=N&ncaid=315

IBW and tidal volumes

Males

HEIGHT (ft-in)(in)	IBW	4 ml	5 ml	6 ml	7 ml	8 ml
4' 0" (48)	22.4	90	112	134	157	179
4' 1" (49)	24.7	99	124	148	173	198
4' 2" (50)	27	108	135	162	189	216
4' 3" (51)	29.3	117	147	176	205	234
4' 4" (51)	31.6	126	158	190	221	253
4' 5" (53)	33.9	136	170	203	237	271
4' 6" (54)	36.2	145	181	217	253	290
4' 7" (55)	38.5	154	193	231	270	308
4' 8" (56)	40.8	163	204	245	286	326
4' 9" (57)	43.1	172	216	259	302	345
4' 10" (58)	45.4	182	227	272	318	363
4' 11" (59)	47.7	191	239	286	334	382
5' 0" (60)	50	200	250	300	350	400
5' 1" (61)	52.3	209	262	314	366	418
5' 2" (62)	54.6	218	273	328	382	437
5' 3" (63)	56.9	228	285	341	398	455
5' 4" (64)	59.2	237	296	355	414	474
5' 5" (65)	61.5	246	308	369	431	492
5' 6" (66)	63.8	255	319	383	447	510
5' 7" (67)	66.1	264	331	397	463	529
5' 8" (68)	68.4	274	342	410	479	547
5' 9" (69)	70.7	283	354	424	495	566
5' 10" (70)	73	292	365	438	511	584
5' 11" (71)	75.3	301	377	452	527	602
6' 0" (72)	77.6	310	388	466	543	621
6' 1" (73)	79.9	320	400	479	559	639
6' 2" (74)	82.2	329	411	493	575	658
6' 3" (75)	84.5	338	423	507	592	676
6' 4" (76)	86.8	347	434	521	608	694
6' 5" (77)	89.1	356	446	535	624	713
6' 6" (78)	91.4	366	457	548	640	731
6' 7" (79)	93.7	375	469	562	656	750
6' 8" (80)	96	384	480	576	672	768
6' 9" (81)	98.3	393	492	590	688	786
6' 10" (82)	100.6	402	503	604	704	805
6' 11" (83)	102.9	412	515	617	720	823
7' 0" (84)	105.2	421	526	631	736	842

Females

HEIGHT (ft-in)(in)	IBW	4 ml	5 ml	6 ml	7 ml	8 ml
4' 0" (48)	17.9	72	90	107	125	143
4' 1" (49)	20.2	81	101	121	141	162
4' 2" (50)	22.5	90	113	135	158	180
4' 3" (51)	24.8	99	124	149	174	198
4' 4" (51)	27.1	108	136	163	190	217
4' 5" (53)	29.4	118	147	176	206	235
4' 6" (54)	31.7	127	159	190	222	254
4' 7" (55)	34	136	170	204	238	272
4' 8" (56)	36.3	145	182	218	254	290
4' 9" (57)	38.6	154	193	232	270	309
4' 10" (58)	40.9	164	205	245	286	327
4' 11" (59)	43.2	173	216	259	302	346
5' 0" (60)	45.5	182	228	273	319	364
5' 1" (61)	47.8	191	239	287	335	382
5' 2" (62)	50.1	200	251	301	351	401
5' 3" (63)	52.4	210	262	314	367	419
5' 4" (64)	54.7	219	274	328	383	438
5' 5" (65)	57	228	285	342	399	456
5' 6" (66)	59.3	237	297	356	415	474
5' 7" (67)	61.6	246	308	370	431	493
5' 8" (68)	63.9	256	320	383	447	511
5' 9" (69)	66.2	265	331	397	463	530
5' 10" (70)	68.5	274	343	411	480	548
5' 11" (71)	70.8	283	354	425	496	566
6' 0" (72)	73.1	292	366	439	512	585
6' 1" (73)	75.4	302	377	452	528	603
6' 2" (74)	77.7	311	389	466	544	622
6' 3" (75)	80	320	400	480	560	640
6' 4" (76)	82.3	329	412	494	576	658
6' 5" (77)	84.6	338	423	508	592	677
6' 6" (78)	86.9	348	435	521	608	695
6' 7" (79)	89.2	357	446	535	624	714
6' 8" (80)	91.5	366	458	549	641	732
6' 9" (81)	93.8	375	469	563	657	750
6' 10" (82)	96.1	384	481	577	673	769
6' 11" (83)	98.4	394	492	590	689	787
7' 0" (84)	100.7	403	504	604	705	806

*Source: National Heart, Lung, Blood Institute ARDS Network, www.ardsnet.org

BOS-MAR-MAR-007505 Rev 2

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Breas Vivo 45LS

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Vivo 45LS Suggested Settings

COPD

Below are Vivo 45LS initial setup parameters for patients with COPD who need Noninvasive Ventilation (NIV) as suggested by Dr. Nicholas S Hill MD.

	COPD Patients
PSV(TgV)+AE mode	
Min PS	4 cmH_2O
Max PS	25 cmH_2O
Breath Rate	12/min
Min EPAP	5 cmH_2O (higher if severe OSA)
Max EPAP	20 cmH_2O
Pressure Limit	45 cmH_2O
Target Volume	8 ml/kg IBW
Below settings RT to set	
Minimum Inspiratory Time	Off
Maximum Inspiratory Time	1.0 seconds
Back up Insp Time	1.0 seconds
Rise Time	Setting "2" or adjust to patient comfort 1 = Fast Flow 9 = Slow Flow
Inspiratory Trigger	Setting "3" or to patient comfort 1 = Most Sensitive 9 = Least Sensitive
Expiratory Trigger	Setting "1 to 3" or to patient comfort Smaller number = Shorter Ti Larger number = Longer Ti

Intended use: The Vivo 45LS ventilator (with or without the SpO_2 and CO_2 sensors) is intended to provide continuous or intermittent ventilatory support for the care of individuals who require mechanical ventilation. Specifically, the ventilator is applicable for pediatric through adult patients weighing more than 5 kg (11 lbs.), however, the mouthpiece ventilation modes are for adult patients only. The Vivo 45LS with the SpO_2 sensor is intended to measure functional oxygen saturation of arterial hemoglobin ($\%SpO_2$) and pulse rate. The Vivo 45LS with the CO_2 sensor is intended to measure CO_2 in the inspiratory and expiratory gas. The device is intended to be used in home, institution, hospitals and portable applications such as wheelchairs and gurneys. It may be used for both invasive and non-invasive ventilation. The Vivo 45LS is not intended to be used as an emergency transport or critical care ventilator.

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SUGGESTED INITIAL SETTINGS

Example Preset 1
Non-Invasive Ventilation

Mode	**Vol. Targeted-PS**
Patient Type	**Adult**
Humidification	**HME or Humidifier**
Circuit Type	**Valveless**
Breath Rate	**10-15 BPM**
Inspiratory Time	**0.8-1.5 Seconds**
Tidal Volume	**6-8 mL/kg (IBW)**
Pressure Adj. Rate	**Slow**
MIN PS	**4-6 cmH2O**
MAX PS	**20-25 cmH2O**
IntelliPAP	**ON**
MIN PEEP	**5 cmH2O**
MAX PEEP	**15cmH2O**
Flow Trigger	**2.0-3.0 L/min***
Flow Cycle	**50-65%**
Time Cycle	**1.5-2.0 Seconds***
Rise Time	**2 or 3***
Alarms	**(set alarms according to your protocol)**
Inspiratory Pressure	**(High) 50 cmH2O**

*Always titrate to achieve optimal patient response (WOB, RR, SpO2, etc.) comfort/tolerance, and patient-ventilator synchrony.

Example Preset 2
High Flow Therapy

Mode	**SIMV- Pressure**
Patient Type	**Adult**
High Flow	**ON**
Flow[1]	**20-30 L/min**** **titrate to protocol or consider suggestions below**
Alarms	**(set alarms according to your protocol)**
High Insp. Pressure	
Patient Circuit Discon.	
High Pressure Delay	

**Start liter flow between 20-30 L/min. Titrate to the highest flow tolerated by the patient, ideally associated with a decrease in respiratory rate and an improvement in patient reported comfort. Set O2 liter flow as ordered or titrate liter flow to maintain an SpO2 88-92% if approved by the ordering physician.[1,2]

1. Roca, O., Li, J. & Mauri, T. High-flow nasal cannula: evolving practices and novel clinical and physiological insights. Intensive Care Med (2024). https://doi.org/10.1007/s00134-024-07386-8
2. Criner GJ, Criner LH, George SA, Thomas JK, Jacobs MR. Feasibility of Using Daily Home High-Flow Nasal Therapy in COPD Patients Following a Recent COPD Hospitalization. Chronic Obstr Pulm Dis. 2022 Jan 27;9(1):4-14. doi: 10.15326/ jcopdf.2021.0236. PMID: 34748694; PMCID: PMC8893969.

ResMed® Astral™

Life support conversion recommendations

Trilogy™ AVAPS AE settings	Astral™ PS/SVt conversion example	ResMed iVAPS™* conversion example
Tidal Volume (Vte) *Example: 500 mL*	**Safety Vt = Tidal Volume:** *Example: 500 mL*	**Target Va: Set Avg Vt = prescribed Vt** *Example: 500 mL*
Maximum Pressure Support (PS Max) *Example: PS max = 25 cmH_2O*	**PS Max = PS Max** *Example: Set at 25 cmH_2O*	**Max PS = PS Max** *Example: Set at 25 cmH_20*
Minimum Pressure Support (PS Min) *Example: PS Min = 6 cmH_2O*	**PS = PS Min** *Example: Set at 6 cmH_2O*	**Min PS = PS Min** *Example: Set at 6 cmH_20*
Expiratory Positive Airway Pressure Maximum (EPAP Max) *Example: EPAP = 15 cmH_2O*	N/A	**EPAP Max = Max EPAP** *Example: Set at 15 cmH_20*
Expiratory Positive Airway Pressure Minimum (EPAP Min) *Example: EPAP = 5 cmH_2O*	**PEEP = EPAP** *Example: Set PEEP at 5 cmH_2O*	**EPAP Min = EPAP Min** *Example: Set at 5 cmH_2O*
Respiratory Rate *Example: BPM = Auto*	**Respiratory Rate = RR** *Example: 15 bpm*	**Target Pt Rate (RR)†** *Example: 15 bpm*

Pressure Support with Safety Tidal Volume (PS/SVt) and iVAPS modes

PS/SVt and iVAPS are commonly utilized modes with COPD patients. Both modes are similar to Trilogy AVAPS, as AVAPS is also a VAPS mode.

Primary PS/SVt and iVAPS settings. Below are primary settings to be prescribed for PS with Safety Vt:

PS/Min PS: Pressure Support. Set as the minimum pressure support requirement, also equivalent to Trilogy PS Min

PS Max/Max PS: Pressure Support Maximum. Set as the maximum pressure support allowable/limit, equivalent to Trilogy PS Max

PEEP/EPAP: Positive End-Expiratory Pressure, also equivalent to Trilogy EPAP

RR: Respiratory Rate to be set as a traditional back-up rate, equivalent to Trilogy Rate

Target Pt RR: Target Patient Rate to be set equivalent to patient's spontaneous respiratory rate or at device default of 15 bpm

SVt/Avg Vt: Volume guarantee, set at 6–8 mL/kg IBW or equivalent to Trilogy Tidal Volume on an AVAPS prescription

* intelligent Volume-Assured Pressure Support (iVAPS) therapy mode is indicated for patients weighing 30 kg (66 lbs) and above

† There is no Min/Max EPAP or Auto backup rate in PS/SVt or iVAPS. EPAP/PEEP and RR/Target Patient Rate should be set per physician's orders.

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Working together to help your patients achieve an improved health-related quality of life.

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