Prior Authorization Review Panel
MCO Policy Submission

A separate copy of this form must accompany each policy submitted for review. Policies submitted without this form will not be considered for review.

Plan: Aetna Better Health

Policy Number: 0479

Policy Name: Respiratory Devices: Incentive Spirometers, Vaporizers and Intermittent Positive Pressure Breathing Machines

Effective Date: 07/17/2018

Submission Date: 09/01/2019

Revision Date: 07/17/2018

Type of Submission – Check all that apply:

☐ New Policy
☐ Revised Policy*
☒ Annual Review – No Revisions
☐ Statewide PDL

*All revisions to the policy must be highlighted using track changes throughout the document.

Please provide any clarifying information for the policy below:

CPB 0479 Respiratory Devices: Incentive Spirometers, Vaporizers and Intermittent Positive Pressure Breathing Machines

Clinical content was last revised on 07/17/2018. No additional non-clinical updates were made by Corporate since the last PARP submission.

Name of Authorized Individual (Please type or print):
Dr. Bernard Lewin, M.D.

Signature of Authorized Individual:

Revised July 22, 2019
Respiratory Devices: Incentive Spirometers, Vaporizers and Intermittent Positive Pressure Breathing Machines

*Please see amendment for Pennsylvania Medicaid at the end of this CPB.*

**Incentive Spirometers**

Aetna considers incentive spirometers as medically necessary durable medical equipment (DME) for post-operative use for members with neuromuscular or chest wall diseases.

Aetna considers incentive spirometers experimental and investigational for all other indications (including the following; not an all-inclusive list) because its effectiveness for indications other than the ones listed above has not been established.

- Pre-operative use to prevent post-operative decrease in lung function following bariatric surgery
- Prevention of atelectasis following laparotomy/upper-abdominal surgery, neurosurgery, or after coronary artery bypass graft surgery
Intermittent Positive Pressure Breathing (IPPB) Machines

Consistent with Centers for Medicare & Medicaid Services (CMS) guidelines, Aetna considers intermittent positive pressure breathing (IPPB) machines medically necessary DME for members with asthma, chronic obstructive pulmonary disease (COPD) and other respiratory diseases.

Aetna considers IPPB experimental and investigational for all other indications (including the following; not an all-inclusive list) because its effectiveness for these indications remains unproven.

- Improvements in lung function and ventilation in persons with spinal cord injury
- Treatment of croup in children

Note: A fluidic breathing assistor is also considered medically necessary DME when IPPB is used for nebulization or aerosolization.

See CPB 0067 - Chest Physiotherapy and Airway Clearance Devices also (../1_99/0067.html).

Vaporizers

Aetna does not cover vaporizers because they are not considered primarily medical in nature.

Background

Atelectasis is a common problem in post-operative patients and those with neuromuscular or chest wall disease. Because atelectasis in some patients appears to be due to repeated small inspirations, deeper breaths may be helpful. Incentive spirometers encourage expansion of the lungs as much as possible above spontaneous breathing; these have proved to be beneficial in controlled studies.
The use of intermittent positive pressure breathing (IPPB) has been declining because the benefit has been difficult to demonstrate in most patients. Although sometimes used to deliver bronchodilator medications, IPPB is usually intended to prevent or treat atelectasis. In objective studies, patients can improve atelectasis if and only if IPPB can increase the depth of breathing more than the patient alone can achieve. Intermittent positive pressure breathing can be tried in patients with respiratory muscle weakness due to neuromuscular disease, those with chest wall abnormalities, and after abdominal surgery. In general, the literature suggests that incentive spirometry should be tried first and IPPB used only when there is proof that larger inspired volumes can be reached with this technique. Intermittent positive pressure breathing is contraindicated in persons with untreated tension pneumothorax.

In a systematic review, Pasquina et al (2003) examined if respiratory physiotherapy, including IPPB, prevented pulmonary complications after cardiac surgery. The authors concluded that the usefulness of respiratory physiotherapy for the prevention of pulmonary complications after cardiac surgery remains unproved. Large randomized studies are needed with no intervention controls, clinically relevant end points, and reasonable follow-up periods. Indeed, the American Association for Respiratory Care (AARC)'s clinical practice guideline on IPPB (Sorenson et al, 2003) did not list prophylactic respiratory physiotherapy following cardiac surgery as a recommended indication for IPPB.

Pasquina and colleagues (2006) examined the efficacy of respiratory physiotherapy for prevention of pulmonary complications after abdominal surgery. These investigators searched in databases and bibliographies for articles in all languages through November 2005. Randomized trials were included if they investigated prophylactic respiratory physiotherapy and pulmonary outcomes, and if the follow-up was at least 2 days. Efficacy data were expressed as risk differences (RDs) and number needed to treat (NNT), with 95 % confidence intervals (CIs); 35 trials tested respiratory physiotherapy treatments. Of 13 trials with a "no intervention" control group, 9 studies (n = 883) did not report on significant differences, and 4 studies (n = 528) did: in 1 study, the incidence of pneumonia was decreased from 37.3 to 13.7 % with deep breathing, directed cough, and postural drainage (RD, 23.6 %; 95 % CI: 7 % to 40 %; NNT, 4.3; 95 % CI: 2.5 to 14); in 1 study, the incidence of atelectasis was decreased from 39 % to 15 % with deep breathing and directed cough (RD, 24 %; 95 % CI: 5 % to 43 %; NNT, 4.2; 95 % CI: 2.4 to 18); in 1 study, the incidence of atelectasis was decreased from 77 % to 59 % with deep breathing,
directed cough, and postural drainage (RD, 18 %; 95 % CI: 5 % to 31 %; NNT, 5.6; 95 % CI: 3.3 to 19); in 1 study, the incidence of unspecified pulmonary complications was decreased from 47.7 % to 21.4 - 22.2 % with IPPB, or incentive spirometry, or deep breathing with directed cough (RD, 25.5 % to 26.3 %; NNT, 3.8 to 3.9). A total of 22 trials (n = 2,734) compared physiotherapy treatments without no intervention control subjects; no conclusions could be drawn. The authors concluded that there are only a few trials that support the usefulness of prophylactic respiratory physiotherapy. The routine use of respiratory physiotherapy after abdominal surgery does not seem to be justified.

In an unblinded, randomized cross-over study, Laffont et al (2008) examined if IPPB improved lung compliance, work of breathing, and respiratory function in patients with recent high spinal cord injury (SCI). A total of 14 patients with SCI caused by trauma within the last 6 months and located between C5 and T6 were included in the study. Two months of IPPB and 2 months of conventional treatment were evaluated prospectively in random order in patients with SCI. Non-invasive lung function tests and arterial blood gas measurements were obtained repeatedly in all patients. Repeated measurements of dynamic lung compliance and work of breathing as measured by computing the area enclosed between the inspiratory esophageal pressure-tidal volume curve, and the theoretical chest wall static pressure-volume curve were performed in 7 patients. Intermittent positive pressure breathing had no long-term effects on vital capacity (52.1 % +/- 11.3 % versus 54.5 % +/- 12.5 %, after conventional treatment and IPPB, respectively; p = 0.27), lung compliance (66.4 +/- 48.9 ml/cmH(2)O versus 70.3 +/- 38.4 ml/cmH(2)O; p = 0.56), or other lung function tests. Intermittent positive pressure breathing did not exert short-term effects on lung compliance or work of breathing. The authors concluded that IPPB produced no immediate or long-term improvements in lung function or ventilatory mechanics in patients with recent SCI.

In a Cochrane review, Guimaraes and colleagues (2009) evaluated the effects of incentive spirometry (IS) compared to no such therapy (or other therapy) on all-cause post-operative pulmonary complications (atelectasis, acute respiratory inadequacy) and mortality in adult patients admitted for upper abdominal surgery. These investigators searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2006, Issue 3), MEDLINE, EMBASE, and LILACS (from inception to July 2006). They included randomized controlled trials of IS in adult patients admitted for any type of upper abdominal surgery, including patients undergoing laparoscopic procedures. Two authors independently
assessed trial quality and extracted data. These researchers included 11 studies with a total of 1,754 subjects. Many trials were of only moderate methodological quality and did not report on compliance with the prescribed therapy. Data from only 1,160 patients could be included in the meta-analysis. Three trials (n = 120) compared the effects of IS with no respiratory treatment; 2 trials (n = 194) compared IS with deep breathing exercises; 2 trials (n = 946) compared IS with other chest physiotherapy. All showed no evidence of a statistically significant effect of IS. There was no evidence that IS is effective in the prevention of pulmonary complications. The authors concluded that there is no evidence regarding the effectiveness of the use of IS for the prevention of post-operative pulmonary complications in upper abdominal surgery. They noted that this review underlines the urgent need to conduct well-designed trials in this field. There is a need for large randomized trials of high methodological rigour in order to define any benefit from the use of IS regarding mortality.

Ludwig and colleagues (2011) examined if atelectasis can be avoided and if post-operative lung function is improved following major lung resections with the use of IPPB. Prospective analysis was carried out in 135 patients operated on between 2007 and 2009; 55 received IPPB and 80 did not receive IPPB. Pre- and post-operative lung function tests were similar in both groups. Pulmonary complications were observed in 19% of patients without IPPB and 27% of those who received this treatment. The authors were unable to find evidence that additional improvement in post-operative pulmonary function is achieved when adding IPPB to the standard physical therapy.

Cattano et al (2010) examined if a systematic use of IS prior to surgery could help patients to preserve their respiratory function better in the post-operative period. A total of 41 morbidly obese (body mass index [BMI] greater than 40 kg/m²) candidates for laparoscopic bariatric surgery were consented in the study. All patients were taught how to use an incentive spirometer but then were randomized blindly into 2 groups. The control group was instructed to use the incentive spirometer for 3 breaths, once-daily. The treatment group was requested to use the incentive spirometer for 10 breaths, 5 times per day. Twenty experimental (mean BMI of 48.9 +/- 5.67 kg/m²) and 21 control patients (mean BMI of 48.3 +/- 6.96 kg/m²) were studied. The initial mean inspiratory capacity (IC) was 2,155 +/- 650.08 (SD) cc and 2,171 +/- 762.98 cc in the experimental and control groups, respectively. On the day of surgery, the mean IC was 2,275 +/- 777.56 cc versus 2,254.76 +/- 808.84 cc, respectively. On post-operative day 1, both groups
experienced a significant drop of their IC, with volumes of 1,458 +/- 613.87 cc (t-test, p < 0.001) and 1,557.89 +/- 814.67 cc (t-test, p < 0.010), respectively. The authors concluded that these findings suggested that pre-operative use of the IS does not lead to significant improvements of inspiratory capacity and that it is a not a useful resource to prevent post-operative decrease in lung function.

Carvalho et al (2011) performed a systematic review to evaluate the evidence of the use of IS for the prevention of post-operative pulmonary complications and for the recovery of pulmonary function in patients undergoing abdominal, cardiac and thoracic surgeries. Searches were performed in the following databases: Medline, Embase, Web of Science, PEDro and Scopus to select randomized controlled trials in which IS was used in pre- and/or post-operative in order to prevent post-operative pulmonary complications and/or recover lung function after abdominal, cardiac and thoracic surgery. Two reviewers independently assessed all studies. In addition, the studies quality was assessed using the PEDro scale. A total of 30 studies were included (14 abdominal, 13 cardiac and 3 thoracic surgery; n = 3,370 patients). In the analysis of the methodological quality, studies achieved a PEDro average score of 5.6, 4.7 and 4.8 points in abdominal, cardiac and thoracic surgeries, respectively. Five studies (3 abdominal, 1 cardiac and 1 thoracic surgery) compared the effect of the IS with control group (no intervention) and no difference was detected in the evaluated outcomes. The authors concluded that there was no evidence to support the use of IS in the management of surgical patients.

The AARC's clinical practice guideline on "Incentive spirometry" (Restrepo et al, 2011) provided the following recommendations:

- IS alone is not recommended for routine use in the pre-operative and post-operative setting to prevent post-operative pulmonary complications.
- Routine use of IS to prevent atelectasis in patients after upper-abdominal surgery is not recommended.
- Routine use of IS to prevent atelectasis after coronary artery bypass graft surgery is not recommended.

Contraindications of IS include:

- Patients who can not be instructed or supervised to assure appropriate of the device
- Patients in whom co-operation is absent or patients unable to understand or demonstrate proper use of the device
  - Very young patients and others with developmental delays
  - Patients who are confused or delirious
  - Patients who are heavily sedated or comatose

- Patients unable to deep breathe effectively due to pain, diaphragmatic dysfunction, or opiate analgesia
- Patients unable to generate adequate inspiration with a vital capacity less than 10 ml/kg or an inspiratory capacity less than 33 % of predicted normal

In a Cochrane review, Freitas et al (2012) compared the effects of IS for preventing post-operative pulmonary complications in adults undergoing coronary artery bypass graft (CABG). These investigators searched CENTRAL and DARE on The Cochrane Library (Issue 2 of 4 2011), MEDLINE OVID (1948 to May 2011), EMBASE (1980 to Week 20 2011), LILACS (1982 to July 2011), the Physiotherapy Evidence Database (PEDro) (1980 to July 2011), Allied & Complementary Medicine (AMED) (1985 to May 2011), CINAHL (1982 to May 2011). Randomized controlled trials comparing IS with any type of prophylactic physiotherapy for prevention of post-operative pulmonary complications in adults undergoing CABG were selected. Two reviewers independently evaluated trial quality using the guidelines of the Cochrane Handbook for Systematic Reviews and extracted data from included trials. For continuous outcomes, they used the generic inverse variance method for meta-analysis; and for dichotomous data they used the Peto Odds Ratio. This update of the 2007 review included 592 participants from 7 studies (2 new and 1 that had been excluded in the previous review in 2007. There was no evidence of a difference between groups in the incidence of any pulmonary complications and functional capacity between treatment with IS and treatment with physical therapy, positive pressure breathing techniques (including continuous positive airway pressure (CPAP), bilevel positive airway pressure (BiPAP) and IPPB, active cycle of breathing techniques (ACBT) or pre-operative patient education. Patients treated with IS had worse pulmonary function and arterial oxygenation compared with positive pressure breathing. Based on these studies there was no improvement in the muscle strength between groups who received IS demonstrated by maximal inspiratory pressure and maximal expiratory pressure. The authors concluded that this review suggested that there is no evidence of benefit from IS in reducing pulmonary complications and in decreasing the negative effects on
pulmonary function in patients undergoing CABG. In view of the modest number of patients studied, methodological shortcomings and poor reporting of the included trials, these results should still be interpreted cautiously. An appropriately powered trial of high methodological rigor is needed to determine if there are patients who may derive benefit from IS following CABG.

do Nascimento et al (2014) assessed the effect of IS, compared to no such therapy or other therapy, on post-operative pulmonary complications and mortality in adults undergoing upper abdominal surgery. Secondary objectives were to evaluate the effects of IS, compared to no therapy or other therapy, on other post-operative complications, adverse events, and spirometric parameters. These investigators searched the Cochrane Central Register of Controlled Trials (CENTRAL) (The Cochrane Library 2013, Issue 8), MEDLINE, EMBASE, and LILACS (from inception to August 2013). There were no language restrictions. The date of the most recent search was August 12, 2013. The original search was performed in June 2006. These researchers included randomized controlled trails (RCTs) of IS in adult patients admitted for any type of upper abdominal surgery, including patients undergoing laparoscopic procedures. Two authors independently assessed trial quality and extracted data. They included 12 studies with a total of 1,834 participants in this updated review. The methodological quality of the included studies was difficult to assess as it was poorly reported, so the predominant classification of bias was “unclear”; the studies did not report on compliance with the prescribed therapy. They were able to include data from only 1,160 patients in the meta-analysis. Four trials (n = 152) compared the effects of IS with no respiratory treatment. These researchers found no statistically significant difference between the participants receiving IS and those who had no respiratory treatment for clinical complications (relative risk (RR) 0.59, 95 % CI: 0.30 to 1.18). Two trials (n = 194) compared IS with deep breathing exercises (DBE). In the meta-analysis, there were no statistically significant differences between participants receiving IS compared to those receiving DBE for respiratory failure (RR 0.67, 95 % CI: 0.04 to 10.50). Two trials (n = 946) compared IS with other chest physiotherapy. These researchers found no statistically significant differences between the participants receiving IS compared to those receiving physiotherapy in the risk of developing a pulmonary condition or the type of complication. There was no evidence that incentive spirometry is effective in the prevention of pulmonary complications. The authors concluded that there is low quality evidence regarding the lack of effectiveness of IS for prevention of post-
operative pulmonary complications in patients after upper abdominal surgery. They stated that this review underlined the urgent need to conduct well-designed trials in this field.

Tyson and colleagues (2015) noted that changes in pulmonary dynamics following laparotomy are well documented. Deep breathing exercises, with or without IS, may help counteract post-operative decreased vital capacity (VC); however, the evidence for the role of IS in the prevention of post-operative atelectasis is inconclusive. Furthermore, data are scarce regarding the prevention of post-operative atelectasis in sub-Saharan Africa. In a RCT, these researchers determined the effect of the use of IS on pulmonary function following exploratory laparotomy as measured by forced vital capacity (FVC). This was a single-center, RCT performed at Kamuzu Central Hospital, Lilongwe, Malawi. Study participants were adult patients who underwent exploratory laparotomy and were randomized into the intervention or control groups (standard of care) from February 1 to November 30, 2013. All patients received routine post-operative care, including instructions for deep breathing and early ambulation. These researchers used bi-variate analysis to compare outcomes between the intervention and control groups. Adult patients who underwent exploratory laparotomy participated in post-operative deep breathing exercises. Patients in the intervention group received incentive spirometers. These investigators assessed pulmonary function using a peak flow meter to measure FVC in both groups of patients. Secondary outcomes, such as hospital length of stay and mortality, were obtained from the medical records. A total of 150 patients were randomized (75 in each arm). The median age in the intervention and control groups was 35 years (interquartile range of 28 to 53 years) and 33 years (interquartile range of 23 to 46 years), respectively. Men predominated in both groups, and most patients underwent emergency procedures (78.7 % in the intervention group and 84.0 % in the control group). Mean initial FVC did not differ significantly between the intervention and control groups (0.92 and 0.90 L, respectively; p = 0.82 [95 % CI: 0.52 to 2.29]). Although patients in the intervention group tended to have higher final FVC measurements, the change between the first and last measured FVC was not statistically significant (0.29 and 0.25 L, respectively; p = 0.68 [95 % CI: 0.65 to 1.95]). Likewise, hospital length of stay did not differ significantly between groups. Overall post-operative mortality was 6.0 %, with a higher mortality rate in the control group compared with the intervention group (10.7 % and 1.3 %, respectively; p = 0.02 [95 % CI: 0.01 to 0.92]). The authors concluded that education and provision of IS for unmonitored
patient use does not result in statistically significant improvement in pulmonary dynamics following laparotomy. They would not recommend the addition of IS to the current standard of care in this resource-constrained environment.

In a Cochrane review, Bjornson et al (2013) evaluated the effectiveness (measured by croup scores, rate of intubation and health care utilization such as rate of hospitalization) and safety (frequency and severity of side effects) of nebulized epinephrine versus placebo in children with croup, evaluated in an emergency department (ED) or hospital setting. These investigators searched CENTRAL 2013, Issue 6, MEDLINE (1966 to Week 3 of June 2013), EMBASE (1980 to July 2013), Web of Science (1974 to July 2013), CINAHL (1982 to July 2013) and Scopus (1996 to July 2013); RCTs or quasi-RCTs of children with croup evaluated in an ED or admitted to hospital were selected for analysis. Comparisons were: nebulized epinephrine versus placebo, racemic nebulized epinephrine versus L-epinephrine (an isomer) and nebulized epinephrine delivered by IPPB versus nebulized epinephrine without IPPB. Primary outcome was change in croup score post-treatment. Secondary outcomes were rate and duration of intubation and hospitalization, croup return visit, parental anxiety and side effects. Two authors independently identified potentially relevant studies by title and abstract (when available) and examined relevant studies using a priori inclusion criteria, followed by methodological quality assessment. One author extracted data while the second checked accuracy. These researchers used the standard methodological procedures expected by the Cochrane Collaboration. A total of 8 studies (225 participants) were included. In general, children included in the studies were young (average age of less than 2 years in the majority of included studies). Severity of croup was described as moderate-to-severe in all included studies. Six studies took place in the inpatient setting, 1 in the ED and 1 setting was not specified. Six of the 8 studies were deemed to have a low-risk of bias and the risk of bias was unclear in the remaining 2 studies. Nebulized epinephrine was associated with croup score improvement 30 minutes post-treatment (3 RCTs, standardized mean difference (SMD) -0.94; 95 % CI: -1.37 to -0.51; I(2) statistic = 0 %). This effect was not significant 2 and 6 hours post-treatment. Nebulized epinephrine was associated with significantly shorter hospital stay than placebo (1 RCT, MD -32.0 hours; 95 % CI: -59.1 to -4.9). Comparing racemic and L-epinephrine, no difference in croup score was found after 30 minutes (SMD 0.33; 95 % CI: -0.42 to 1.08). After 2 hours, L-epinephrine showed significant reduction compared with racemic epinephrine (1 RCT, SMD 0.87; 95 % CI: 0.09 to 1.65). There was no significant difference in croup score between administration of nebulized...
epinephrine via IPPB versus nebulization alone at 30 minutes (1 RCT, SMD -0.14; 95 % CI: -1.24 to 0.95) or 2 hours (SMD -0.72; 95 % CI: -1.86 to 0.42). None of the studies sought or reported data on adverse effects. The authors concluded that nebulized epinephrine is associated with clinically and statistically significant transient reduction of symptoms of croup 30 minutes post-treatment. Evidence does not favor racemic epinephrine or L-epinephrine, or IPPB over simple nebulization. Moreover, they noted that data and analyses were limited by the small number of relevant studies and total number of participants and thus most outcomes contained data from very few or even single studies.

An UpToDate review on “Croup: Pharmacologic and supportive interventions” (Woods, 2014a) stated that “Administration of epinephrine does not alter the natural history of croup in the short (>2 hours) or longer term (24 to 36 hours). In the studies described above, racemic epinephrine was administered either by nebulization alone or by nebulization combined with intermittent positive pressure breaths. Another study compared these two methods [nebulization alone or by nebulization combined with IPPB] of administration and found them to be similarly effective”. Furthermore, an UpToDate review on “Croup: Approach to management” (Woods, 2014b) does not mention IPPB as a therapeutic option.

Incentive Spirometry After Bariatric Surgery:

Pantel and colleagues (2017) stated that the combination of obesity and foregut surgery puts patients undergoing bariatric surgery at high risk for post-operative pulmonary complications. Post-operative IS was a ubiquitous practice; however, little evidence exists on its effectiveness. In a randomized, non-inferiority, clinical trial, these researchers determined the effect of post-operative IS on hypoxemia, arterial oxygen saturation (Sao2) level, and pulmonary complications after bariatric surgery. This study enrolled patients undergoing bariatric surgery from May 1, 2015, to June 30, 2016. Patients were randomized to post-operative IS (control group) or clinical observation (test group) at a single-center tertiary referral teaching hospital. Analysis was based on the evaluable population. The controls received the standard of care with IS use 10 times every hour while awake. The test group did not receive an IS device or these orders. The primary outcome was frequency of hypoxemia, defined as an Sao2 level of less than 92 % without supplementation at 6, 12, and 24 post-operative hours. Secondary outcomes were Sao2 levels at these times and the rate of 30-day post-operative pulmonary complications. A total of 224 patients (50 men [22.3 %] and 174 women [77.7 %]; mean [SD] age of 45.6
[11.8] years) were enrolled, and 112 were randomized for each group. Baseline characteristics of the groups were similar. No significant differences in frequency of post-operative hypoxemia between the control and test groups were found at 6 (11.9 % versus 10.4 %; p = 0.72), 12 (5.4 % versus 8.2 %; p = 0.40), or 24 (3.7 % versus 4.6 %; p = 0.73) post-operative hours. No significant differences were observed in mean (SD) Sao2 level between the control and test groups at 6 (94.9 % [3.2 %] versus 94.9 % [2.9 %]; p = 0.99), 12 (95.4 % [2.2 %] versus 95.1 % [2.5 %]; p = 0.40), or 24 (95.7 % [2.4 %] versus 95.6 % [2.4 %]; p = 0.69) post-operative hours. Rates of 30-day post-operative pulmonary complications did not differ between groups (8 patients [7.1 %] in the control group versus 4 [3.6 %] in the test group; p = 0.24). The authors concluded that post-operative IS did not demonstrate any effect on post-operative hypoxemia, Sao2 level, or post-operative pulmonary complications. They stated that based on these findings, the routine use of IS should not be recommended after bariatric surgery in its current implementation.

**Incentive Spirometers for Prevention of Atelectasis Following Neurosurgery:**

Sah and colleagues (2017) noted that volume controlled ventilation with low PEEP is used in neuro-anesthesia to provide constant PaCO2 levels and prevent raised intra-cranial pressure. Thus, neurosurgery patients are prone to atelectasis formation, however, these investigators could not find any study that evaluated prevention of post-operative pulmonary complications in neurosurgery. In a prospective RCT, these researchers examined the efficacy of CPAP and IS on respiratory functions during the post-operative period following supratentorial craniotomy. A total of 79 ASAI-II patients aged between 18 and 70 years scheduled for elective supratentorial craniotomy were included in the study. Patients were randomized into 3 groups after surgery. The Group IS (n = 20) was treated with IS 5 times in 1 min and 5 min per hour, the Group CPAP (n = 20) with continuous positive airway pressure 10 cm H2O pressure and 0.4 FiO2 via an oro-nasal mask 5 min per hour, and the Group Control (n = 20) 4L·min-1O2 via mask; all during the 1st 6 hours post-operatively. Respiratory functions tests and arterial blood gases analysis were performed before the induction of anesthesia (baseline), 30 minutes, 6 hours, 24 hours post-operatively. The IS and CPAP applications had similar effects with respect to FVC values. The post-operative 30-min FEV1 values were statistically significantly reduced compared to the baseline in all groups (p < 0.0001). FEV1 values were statistically significantly increased at the post-operative 24 hours compared to the post-operative 30-min in the Groups IS and CPAP (p < 0.0001). This increase, however, was not observed in the Group Control, and the
post-operative 24-hour FEV1 values were statistically significantly lower in the Group Control compared to the Group IS (p = 0.015). The authors concluded that although this study was under-powered to detect differences in FEV1 values, the post-operative 24-hour FEV1 values were significantly higher in the IS group than the Control group and this difference was not observed between the CPAP and Control groups. They stated that there might be a favorable effect of IS in neurosurgery patients; however, larger studies are needed to make a certain conclusion.

CPT Codes / HCPCS Codes / ICD-10 Codes

Information in the [brackets] below has been added for clarification purposes. Codes requiring a 7th character are represented by "*":

<table>
<thead>
<tr>
<th>Code</th>
<th>Code Description</th>
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<tbody>
<tr>
<td></td>
<td>CPT codes covered if selection criteria are met:</td>
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<tr>
<td>94640</td>
<td>Pressurized or nonpressurized inhalation treatment for acute airway obstruction for therapeutic purposes and/or for diagnostic purposes such as sputum induction with an aerosol generator, nebulizer, metered dose inhaler or intermittent positive pressure breathing (IPPB) device</td>
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<td>Other CPT codes related to the CPB:</td>
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<tr>
<td>43631 - 43635</td>
<td>Gastrectomy and Vagotomy [preoperative use of incentive spirometer prior to bariatric surgery to prevent postoperative decrease in lung function]</td>
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<tr>
<td>43644 - 43645</td>
<td>Laparoscopy, surgical, gastric restrictive procedure [preoperative use of incentive spirometer prior to bariatric surgery to prevent postoperative decrease in lung function]</td>
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<tr>
<td>43770 - 43775</td>
<td>Laparoscopy, surgical, gastric restrictive procedure [preoperative use of incentive spirometer prior to bariatric surgery to prevent postoperative decrease in lung function]</td>
</tr>
<tr>
<td>43842 - 43848</td>
<td>Gastric restrictive procedure [preoperative use of incentive spirometer prior to bariatric surgery to prevent postoperative decrease in lung function]</td>
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<tr>
<td>61000 - 64999</td>
<td>Surgery/nervous system</td>
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<tr>
<td>94010 - 94621, 94642 - 94799</td>
<td>Pulmonary medicine</td>
</tr>
<tr>
<td>Code</td>
<td>Code Description</td>
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<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>E0500</td>
<td>IPPB machine, all types, with built-in nebulization; manual or automatic valves; internal or external power source</td>
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HCPCS codes not covered for indications listed in the CPB:

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<th>Code</th>
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<td>E0605</td>
<td>Vaporizer, room type</td>
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Other HCPCS codes related to the CPB:

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<th>Code</th>
<th>Code Description</th>
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<tr>
<td>A9284</td>
<td>Spirometer, nonelectric, includes all accessories</td>
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<tr>
<td>E0550 - E0585</td>
<td>Humidifiers/compressors/nebulizers for use with oxygen IPPB equipment</td>
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</table>

S8096 | Portable peak flowmeter |

ICD-10 codes covered if selection criteria are met:

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<th>Code</th>
<th>Code Description</th>
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<tr>
<td>J00 - J99</td>
<td>Diseases of the respiratory system</td>
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ICD-10 codes not covered for indications listed in the CPB (not all inclusive):

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<th>Code</th>
<th>Code Description</th>
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<tr>
<td>J05.0</td>
<td>Acute obstructive laryngitis [croup]</td>
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<th>Code</th>
<th>Code Description</th>
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<td>S12.000+ -</td>
<td>Fracture of vertebral column with spinal cord injury</td>
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<td>S12.691+</td>
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AETNA BETTER HEALTH® OF PENNSYLVANIA

Amendment to
Aetna Clinical Policy Bulletin Number: 0479 Respiratory Devices: Incentive Spirometers, Vaporizers and Intermittent Positive Pressure Breathing Machines

There are no amendments for Medicaid.