

## Recognizing Pulmonary Arterial Hypertension in the Primary Care Setting - Outcomes Report

### Curriculum Activities Measured:

A Breath of Fresh Air: Improving Outcomes and Quality of Life in Patients with Pulmonary Arterial Hypertension  
Post-Curriculum Assessment

### Launch Date

Oct 7, 2011

Oct 27, 2011

**Date of Interim Outcomes Report: Oct 8, 2012**

### Learning Objectives

- **Learning Objective 1:** Explain the pathophysiology of PAH
- **Learning Objective 2:** Determine when and how to screen patients for PAH
- **Learning Objective 3:** Describe current therapies in the management of PAH
- **Learning Objective 4:** Appropriately monitor patients receiving treatment for PAH

**Background:** This curriculum consists of one online “virtual grand rounds” educational activity, *A Breath of Fresh Air: Improving Outcomes and Quality of Life in Patients with Pulmonary Arterial Hypertension*. The principal audience for this curriculum includes primary care providers (PCPs) and other healthcare professionals who manage patients with pulmonary arterial hypertension (PAH).

**Method:** To establish a baseline Performance score, curriculum participants were presented with the RealIndex at the beginning of the activity. The RealIndex includes a clinical vignette followed by a series of statements for learners to categorize as either consistent or non-consistent with their current clinical approach. Learners were also presented with this measure at the end of the activity and in the Post Curriculum Assessment (PCA), which was delivered to learners eight weeks after activity completion. In addition, the activity includes a unique matched set of Pre-Test and Post-Test questions assessing Knowledge, Competence, and Confidence domains, as well as learner practice patterns. Retention data was measured by the PCA, which includes the RealIndex in addition to the questions previously presented in the activity.

**Results:** Statistically significant learner improvement was measured across the activity over all learner-domains: Knowledge, Competence, Confidence, and Performance (as measured by the RealIndex and practice questions). Increases in the activity translated to significant improvement on all items mapped to the Learning Objectives and subject areas identified by the curriculum. The PCA showed net gains from Pre-Test in Knowledge, Competence, Confidence, and on the practice question, eight weeks after activity completion; a net gain from baseline was also demonstrated on the RealIndex.

**Conclusions:** The results support the effectiveness of this curriculum for improving and sustaining learner Knowledge, Competence, Confidence, and Performance. Learners who participated in the PCA demonstrated a significant net gain on the RealIndex from baseline through follow-up. Increases on the RealIndex correlate with learners’ self-reported changes in practice strategy at follow-up (PCA), and are indicative of the curriculum’s positive impact on the management of patients with pulmonary arterial hypertension.

### Performance Score: RealIndex<sup>®</sup>

The RealIndex is a composite score based on a multidimensional situation-based question that addresses the Learning Objectives of the curriculum. Participants in this curriculum were presented with a real-to-life clinical scenario, which was followed by a series of statements that they assessed as either consistent with, or inconsistent with, their current practice approach. This multidimensional question assesses learners' knowledge of the latest published data, assessment and diagnostic tools, pertinent clinical guidelines, and their ability to actively apply this knowledge to the scenario presented. It is administered prior to the first activity of the curriculum (baseline), following each activity of the curriculum, and then in a follow-up assessment (administered 6 to 8 weeks after curriculum completion). For each subsequent administration of the RealIndex question, learners were given the opportunity to refine their responses based on their progressive learning. The RealIndex Model is designed to align the progression of a learner's RealIndex from baseline through the multiple activities of a curriculum with the changes that the learner is making in their practice. Reliability analysis (Cronbach's alpha) was conducted on the RealIndex to assess the internal consistency of the items in the measure; results indicate a high level of reliability with alpha coefficients ranging from .715 to .838 (on a scale of 0 to 1.0).

### Learner-Domain Analysis

In addition, each activity contains a variety of question types that focus on specific learner-domains:

1. Knowledge questions
2. Competence (case-based) questions
3. Confidence questions
4. Practice questions

All questions presented to the learner in the Pre-Test section are paired with the identical question in the Post-Test and Evaluation sections. All questions in the Pre-Test and Post-Test sections are tagged in the RealMeasure platform by question type and for particular Learning Objectives and subject areas. All learner-domains are measured cumulatively, across the curriculum, and in every activity.

### Statistical Analysis

The data were analyzed using the *Statistical Package for Social Sciences* version 19.0 (SPSS 19; IBM Corporation, Somers NY). The data were first arrayed using frequencies. Questions were then reported and analyzed for Pre-Test and Post-Test comparisons employing a matched-pair methodology. Both dependent and independent samples t-tests were used to assess the differences between the mean evidence-based Pre-Test and Post-Test responses of the participants; differences were considered significant for  $p$ -values reaching .05 or less. Dependent t-test calculations were only conducted on matched-pairs of participant scores. Analyses of variance (ANOVAs) were carried out to assess differences between groups of learners (cohorts). Effect size was calculated using Cohen's  $d$  formula, and is expressed as a non-overlap percent or the percentage achieved by Post-Test compared to baseline performance. The Grubbs' test, also called the ESD (extreme studentized deviate) method, was used to determine the presence of statistically significant outliers or extreme scores to be considered for removal from the final data analysis.

## Curriculum Report: Level 1 - Participation

Intervention	Engagement					
	Participants Started	Completed Content		Completed Post-Test		Certs Issued
	N	N	%	N	%	N %
A Breath of Fresh Air	2316	961	41.5	912	39.4	773 33.4

### General Participation:

- In total, there were 2,316 activity starts in the curriculum, which was a “HarmonyRounds” activity that provided a grand rounds experience on pulmonary arterial hypertension.
- The activity was available on the Epocrates CME website and mobile application.
- An average of 42% of the participants completed the activity’s content, 39% finished the Post-Test, and 33% claimed certificates.
- 56% of the total learner population identified themselves as primary care providers, 9% indicated their specialty as emergency medicine, 8% as cardiology, 4% as pulmonology, 4% as anesthesiology, 3% as general surgery, 2% as geriatrics, 2% as pediatrics, 2% as psychiatry, and the remaining 8% of learners identified a variety of other specialties.
- 49% of the total learner population indicated their profession as medical doctor (MD), 16% as physician assistant (PA), 14% as nurse practitioner (NP), 10% as nurse, 7% as medical student, 3% as doctor of osteopathic medicine (DO), and 1% as pharmacist.

### Post Curriculum Assessment Participation:

- At the time of this report, 143 participants started the PCA and 104 completed it.
- On average, participants completed the PCA 70 days after completing the activity.

## Curriculum Report: Level 2 - Satisfaction

Participants indicated that they were satisfied with the activity and the overall educational experience.

Sample comments include:

- “Detailed, comprehensive, and useful for primary practice. Thank you!”
- “Excellent, informative, and current evidence-based discussion.”
- “Good case with a clear demonstration of the pathophysiology.”
- “Great description of evaluation and treatment.”
- “Helpful explanation of a very poorly understood disease.”
- “Important subject matter – good article.”
- “Good reminder of things I had forgotten.”
- “Valuable CME for differential diagnosis.”

The complete list of learner comments is available in the RealCME Reporting Tool.

Learners also indicated their satisfaction in the curriculum evaluation:

- On average, 88% of participants ( $N = 824$ ) reported that the activity was relevant to their practice, and 95% indicated a high level of interest in the content presented.

## Curriculum Report: Level 3 - Knowledge

### Curriculum Knowledge Questions

#### A Breath of Fresh Air

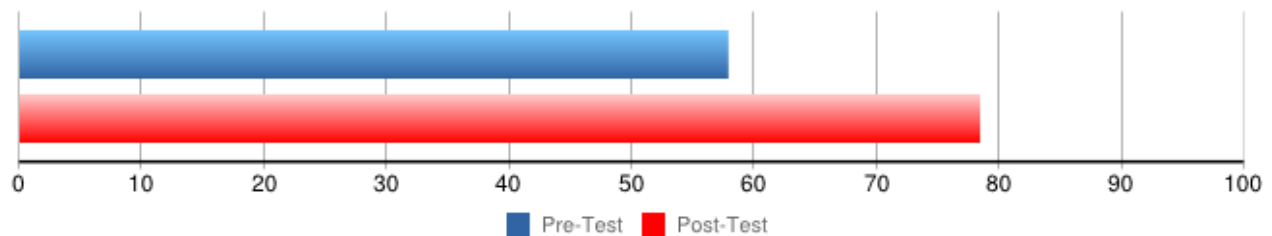
- Pathophysiologic mechanisms of pulmonary arterial hypertension include all of the following EXCEPT:
- Which of the following is a hallmark symptom of pulmonary arterial hypertension?
- Which of the following correctly identifies recommended follow-up for a patient with pulmonary arterial hypertension?

### Change in Knowledge

Measures the change between the average score on Pre-Test Knowledge questions and the average score on Post-Test Knowledge questions across the activity.

N	Pre-Test Average Score (SD)	Post-Test Average Score (SD)	% Change	P Value
912	57.86% (29.04)	78.40% (23.17)	35.50	< .0005

SD = Standard Deviation

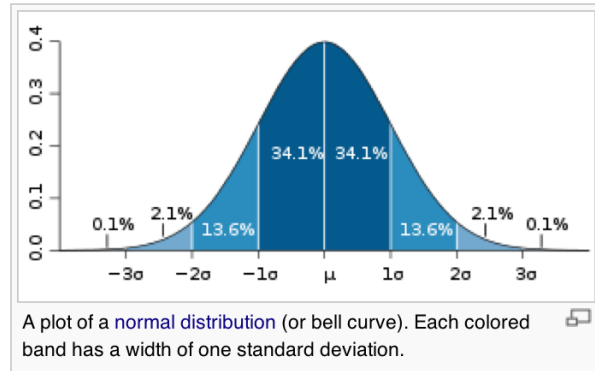


- When measured across the activity, from Pre-Test (58%) to Post-Test (78%), average scores on Knowledge questions ( $N = 912$ ) increased by 36%; the change met statistical significance ( $p < .0005$ ).
- Learner score dispersion, as indicated by the standard deviation statistics, improved from a high Pre-Test level (29) to a moderate level at Post-Test (23).

## Curriculum Report: Level 3 - Knowledge

### Statistical Note

Standard deviation is a widely used measure of variability or diversity in statistics and probability theory. It shows how much dispersion there is from the average (or mean). A low standard deviation indicates that the individual data points (scores) are very close to the mean, whereas a high standard deviation indicates that the data are spread out over a large range of values and suggests the presence of outliers or extreme scores. In a normal distribution, 68% of the scores fall within one standard deviation of the mean and 95% of the scores fall within 2 standard deviations. Often, educational measures are skewed with the majority of learners attaining lower scores at Pre-Test (a positive skew) and higher scores by Post-Test (a negative skew); thus, statistical methods standardize or normalize raw scores to assess significant differences between different distributions (e.g., Pre-Test vs. Post-Test).



In the case of the Knowledge domain, approximately 68% of learners' scores fell between 67% and 90% of the sum total score (100%) or within 23 points of the average Post-Test score (78%), which indicates a moderate level of individual score scatter around the reported mean (average score).

## Curriculum Report: Level 3 - Knowledge

### Learning Objective Report

Measures the success of the curriculum in achieving each of the Learning Objectives of the curriculum. For each Learning Objective, the change between the average score on all Pre-Test and Post-Test questions that address that Learning Objective is measured across the activity.

- **Learning Objective 1:** Explain the pathophysiology of PAH
- **Learning Objective 2:** Determine when and how to screen patients for PAH
- **Learning Objective 3:** Describe current therapies in the management of PAH
- **Learning Objective 4:** Appropriately monitor patients receiving treatment for PAH

Parameter	N	Pre-Test Average Score	Post-Test Average Score	% Change	P Value
Learning Objective 1	912	50.22% (50.03)	65.79% (47.47)	31.00	< .0005
Learning Objective 2	912	79.44% (30.67)	87.61% (22.83)	10.28	< .0005
Learning Objective 3	912	59.05% (29.22)	82.13% (26.27)	39.09	< .0005
Learning Objective 4	912	41.28% (34.48)	79.22% (29.05)	91.90	< .0005

- Pre-Test to Post-Test average score changes on items within the activity that were mapped to the Learning Objectives of the curriculum, which included Knowledge and Competence questions, showed gains ranging from 10% to 92% that met statistical significance at the  $p < .0005$  level.
- Learners demonstrated average Pre-Test scores across the Learning Objectives that ranged from 41% to 79%, and average Post-Test scores that ranged from 66% to 88%.
- Questions associated with Learning Objective 4 (*Appropriately monitor patients receiving treatment for PAH*) demonstrated the greatest gain (92%) over the curriculum ( $n = 912$ ), increasing from 41% at Pre-Test to 79% at Post-Test.
- Questions associated with Learning Objective 2 (*Determine when and how to screen patients for PAH*) demonstrated the least amount of gain (10%) over the curriculum and highest average scores at Pre-Test (79%) and Post-Test (88%).
- Standard deviations improved across the curriculum for all Learning Objectives, indicating a reduction in the amount of individual score scatter affecting the Post-Test average scores.

## Curriculum Report: Level 3 - Knowledge

### Subject Mastery Report

Measures the success of the curriculum in improving participant proficiency in a specific topic ("subject area") discussed in the activity. For each subject area, the change between the average score on all Pre-Test and Post-Test questions that address that subject area is measured across the activity.

- **Subject Area 1:** Chronic pulmonary heart disease
- **Subject Area 2:** Primary pulmonary hypertension
- **Subject Area 3:** Various diseases of pulmonary circulation

Parameter	N	Pre-Test Average Score	Post-Test Average Score	% Change	P Value
Subject Area 1	912	58.33% (22.03)	79.89% (17.54)	36.95	< .0005
Subject Area 2	912	58.33% (22.03)	79.89% (17.54)	36.95	< .0005
Subject Area 3	912	58.33% (22.03)	79.89% (17.54)	36.95	< .0005

- All Knowledge and Competence items were mapped to the curriculum's three subject areas, which demonstrated significant average gains ( $p < .0005$ ) that measured 37%.
- Learners demonstrated average Pre-Test scores that measured 58% and Post-Test averages that measured 80%.
- The standard deviations in the subject areas were moderate at Pre-Test and improved to a low level at Post-Test.

## Curriculum Report: Level 4 - Competence and Confidence

### Curriculum Competence Questions

#### A Breath of Fresh Air

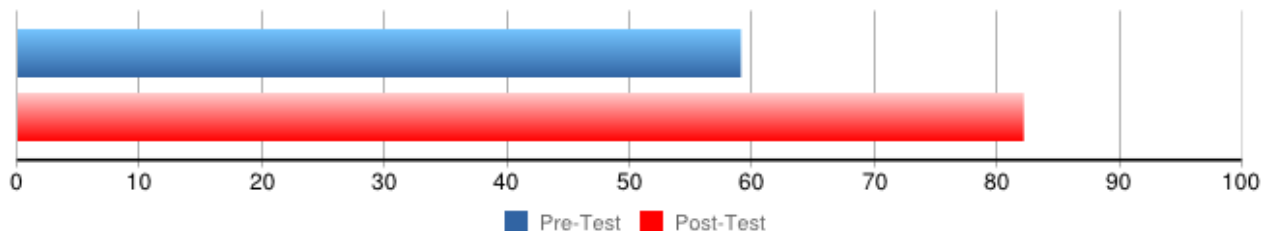
- A 57-year-old woman presents to your office complaining of dyspnea on exertion, fatigue, and swelling in her feet. She is obese (BMI 31 kg/m<sup>2</sup>) and has a history of hypertension, controlled with medication (hydrochlorothiazide 25 mg/d). On physical examination, blood pressure is 134/78 mmHg, chest is clear to auscultation, and heart sounds and rhythm are normal. Chest X-ray is clear and ECG and cardiac stress test are WNL. Pulmonary function tests identify slightly reduced total lung capacity and DLCO; other findings are WNL. What might be an appropriate next step in the management of this patient?
- The patient from the previous question (57-year-old woman with dyspnea on exertion, fatigue, and swelling in her feet) returns following referral for echocardiography and right heart catheterization. Echocardiogram suggested PAH and right heart catheterization findings included mean pulmonary artery pressure 28 mmHg, pulmonary capillary wedge pressure 12 mmHg, and negative vasodilator response. Based on results of these tests, a pulmonary hypertension specialist diagnoses her with PAH. Any of the following medications may be appropriate at this time EXCEPT:

### Change in Competence

Measures the change between the average score on Pre-Test Competence questions and the average score on Post-Test Competence questions across the activity.

N	Pre-Test Average Score (SD)	Post-Test Average Score (SD)	% Change	P Value
912	59.05% (29.22)	82.13% (26.27)	39.09	< .0005

SD = Standard Deviation



- The average score improvement on the case-based Competence items ( $N = 912$ ) across the activity was 39%; this increase was statistically significant at the  $p < .0005$  level.
- Learner scores improved over the activity from a Pre-Test average of 59% to a Post-Test average of 82%.
- Standard deviations improved but remained high across the activity due to individual score scatter.



## Curriculum Report: Level 4 - Competence and Confidence

### Curriculum Confidence Question

#### A Breath of Fresh Air

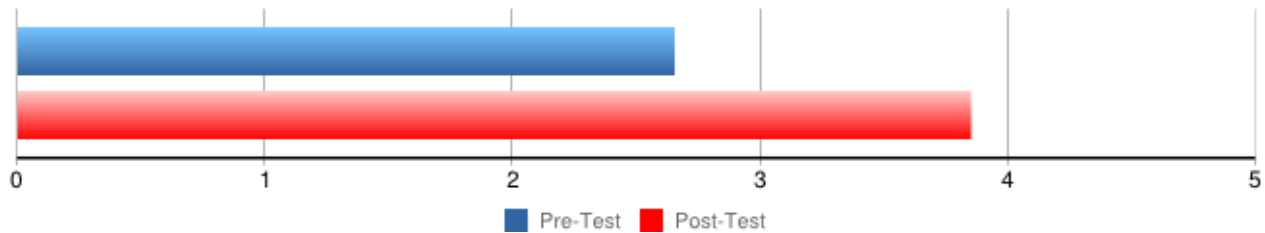
- Please rate your confidence in your ability to recognize features that suggest pulmonary arterial hypertension (based on a scale of 1 to 5, with 1= "Not at all confident" and 5= "Very confident"). - Confidence level

### Change in Confidence

Measures the change between the average score on the Pre-Test Confidence question and the average score on the Post-Test Confidence question across the activity.

N	Pre-Test Average Score (SD)	Post-Test Average Score (SD)	% Change	P Value
837	2.65 (1.05)	3.85 (0.87)	45.14	< .0005

SD = Standard Deviation



- The substantial 45% average increase on the learner-reported Confidence item ( $N = 837$ ) over the activity was statistically significant ( $p < .0005$ ).
- Learner ratings improved from a 2.7 Pre-Test average (on a Likert scale that ranges from 1 = *Not confident at all* to 5 = *Very confident*) to a Post-Test average of 3.9.
- Standard deviations improved from a moderate Pre-Test level to a low level at Post-Test.

## Curriculum Report: Level 5 - Performance

### Performance: RealIndex<sup>®</sup>

A 52-year-old Caucasian man presents to your office complaining of shortness of breath and dyspnea on exertion. On questioning, he also reports occasional syncope when exerting himself. His medical history is significant for hypertension, dyslipidemia, and previous smoking (12 pack-years, quit 10 years ago). His BMI is 29 kg/m<sup>2</sup> and blood pressure, 134/88 mmHg. Physical examination finds lungs clear to auscultation and normal heart sounds. Current medications include lisinopril 20 mg qd and simvastatin 20 mg qd.

Consistent	Not Consistent
Order chest X-ray	If PFTs suggest pulmonary arterial hypertension, then initiate empiric therapy with calcium channel blockers
Order ECG and exercise stress test	Order screening echocardiogram based on history and presenting symptoms
Perform pulmonary function tests	If echocardiogram suggests pulmonary arterial hypertension, then initiate empiric therapy with calcium channel blockers
If initial workup does not identify definitive etiology of symptoms, then order echocardiogram with pulmonary pressures	Initiate trial of a long-acting bronchodilator and inhaled corticosteroid
If echocardiogram suggests pulmonary arterial hypertension, then refer for right heart catheterization	

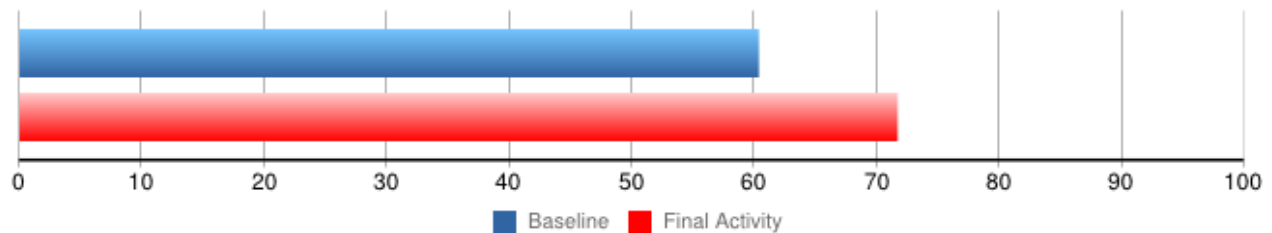
## Curriculum Report: Level 5 - Performance

### Performance Change

Measures the change and difference (effect size) between the average ReallIndex score of curriculum participants at baseline (before participating in the activity) and the average ReallIndex score of participants after the activity.

N	Intervention				Intervention Effect		
	Baseline Average Score (SD)	Final Activity Average Score (SD)	% Change	P Value	Average Effect Size	% Non-Overlap Baseline - Final Activity	Power
844	60.35% (22.86)	71.67% (22.32)	18.76	< .0005	0.501	33.59	1.000

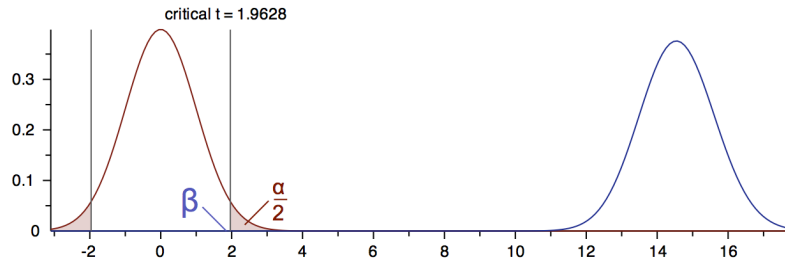
SD = Standard Deviation



- Participants' average Performance score, based on the ReallIndex, increased from 60% at baseline to 72% at the conclusion of the activity ( $N = 844$ ).
- The ReallIndex gain from baseline to the conclusion of the activity measured 19%; the improvement in Performance reached statistical significance ( $p < .0005$ ).
- A significant 22% net gain ( $p < .0005$ ) in Performance from baseline to the Post Curriculum Assessment (PCA) was also shown for learners ( $n = 101$ ) who participated in the follow-up, eight weeks after completing the activity.
- The curriculum had a medium effect ( $d = .501$ ) on learners' Performance, which equates to a 34% non-overlap between ReallIndex distributions measured at baseline and at the end of the activity. The difference (non-overlap) found between the two distributions of learners' Performance scores represents the relative amount of improvement that occurred on the ReallIndex over the activity.
- Standard deviations across the curriculum reflected a moderate level of individual score scatter.
- The learners that started but did *not* complete the activity ( $n = 736$ ) demonstrated a significantly lower average baseline score (49%) when compared to the learners who completed the activity ( $p < .0005$ ).

## Curriculum Report: Level 5 - Performance

### Statistical Note



ReallIndex Curriculum Effect Size & Power T-Value Graph

The graph above depicts a measure of distance between the two learner t-score distributions and incorporates information about the variability, sample size, power, and effect size of the curriculum.

The red bell-curve line in the graph represents the baseline ReallIndex distribution; the blue line represents the final ReallIndex distribution. The red shaded areas delineate the probability of a type I error (falsely rejecting the null hypothesis—represented by the  $p$ -value).

The critical t-values (at approximately -2 and 2) are based on the dependent t-test and represent the values at which the null hypothesis (representing no significant change) can be rejected; therefore, the larger the effect size and the larger the power, the less overlap between the two distributions and the greater the probability that the curriculum has to reject the null hypothesis when it is false.

In this case, the curriculum had a medium effect on learner Performance from baseline, and achieved a high level of power (1.000). Since the entire final ReallIndex distribution is positioned well to the right of the rejection region and statistical significance was met ( $p < .0005$ ), the alternative hypothesis can be accepted; the completion of the intervention resulted in positive changes in learner Performance.

## Curriculum Report: Level 5 - Performance

### Curriculum Practice Question

#### A Breath of Fresh Air

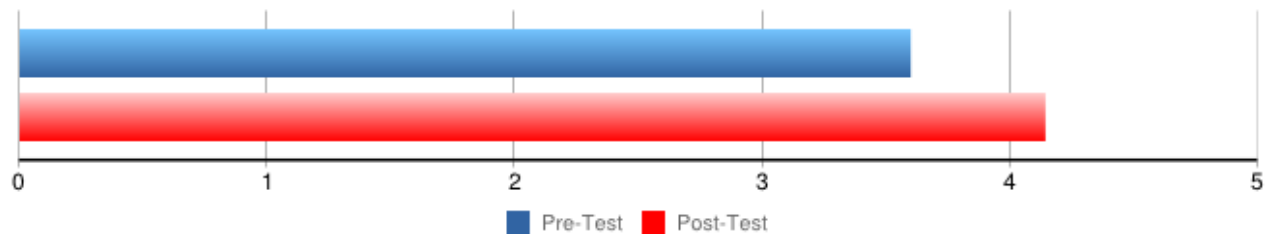
- How often do you request echocardiogram for workup of patients who have otherwise unexplained shortness of breath (based on a scale of 1 to 5, with 1= "Never" and 5= "Always")? - Frequency of use

### Change in Practice

Measures the change between the average score on the Pre-Test practice question and the average score on the Post-Test practice question across the activity.

N	Pre-Test Average Score (SD)	Post-Test Average Score (SD)	% Change	P Value
837	3.60 (1.20)	4.14 (1.01)	15.11	< .0005

SD = Standard Deviation



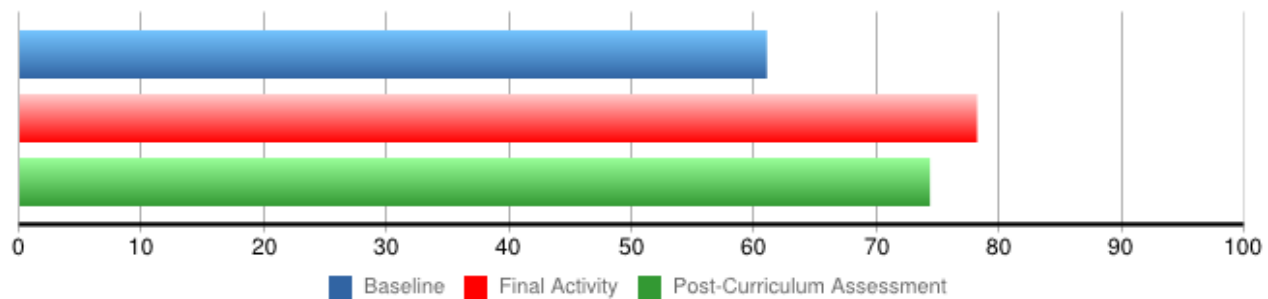
- A statistically significant ( $p < .0005$ ) 15% increase was measured on the self-reported practice item across the activity.
- Learner ratings improved from a Pre-Test average of 3.6 (on a Likert scale that ranges from 1 = *Never* to 5 = *Always*) to a Post-Test average of 4.1.
- Standard deviations were moderate and improved across the activity.

# Curriculum Retention Report

## Performance Change Retention

Measures the change and effect size between the average RealIndex net score of curriculum participants at baseline (before participating in the activity) and the average RealIndex score of participants engaging in the Post Curriculum Assessment (PCA) survey, typically delivered 60 to 90 days after completion of the curriculum. This report also measures the average RealIndex score change from baseline to the final RealIndex, and the change and effect size from the final average RealIndex score in the curriculum to the average RealIndex score at the PCA.

Parameter	N	Retention			Retention Effect		
		Average Score (SD)	% Change (P Value)	Net % Change (P Value)	Effect Size	% Non-Overlap	Net % Non-Overlap
Baseline RealIndex	101	61.00% (21.36)	-	-	-	-	-
Final RealIndex	101	78.16% (18.45)	28.13 (<.0005)	NA	.203	14.25%	-
PCA RealIndex	101	74.31% (19.34)	-4.93 (0.007)	21.81 (<.0005)	.652	-	40.34%



- Learners who participated in follow-up (measured by the PCA) eight weeks after the completion of the activity ( $n = 101$ ) showed a significant ( $p < .0005$ ) 22% net gain in the RealIndex from baseline (61%) to the PCA (74%).
- A 40% non-overlap was measured between baseline and PCA RealIndex score distributions, which indicated that the curriculum had a medium-to-large net effect ( $d = .652$ ) on learners' Performance.
- PCA participants' final RealIndex demonstrated a significant ( $p = .007$ ) 5% decrease from the conclusion of the activity (78%) to the PCA.
- The effect size ( $d = .203$ ) measured for the Performance change from the final RealIndex to the PCA indicated a 14% non-overlap in the learner Performance score distributions.
- Standard deviations for PCA participants were moderate over the curriculum to follow-up.

## Curriculum Retention Report

This report measures only the matched responses of participants who completed questions in the curriculum *and* in the Post Curriculum Assessment (PCA). The average Pre-Test scores are compared to the average PCA scores to calculate the net percent change for all learning domains. The change between average Pre-Test and Post-Test scores is also calculated across learner-domains, for PCA participants only.

Parameter	N	Retention			% Change	
		Pre-Test Average Score (SD)	Post-Test Average Score (SD)	PCA Average Score (SD)	Post-Test to PCA ( <i>p</i> -value)	Pre-Test to PCA ( <i>p</i> -value)
Knowledge	99	55.89% (27.70)	77.44% (23.73)	56.90% (30.95)	-26.52 ( <i>p</i> < .0005)	1.81 (0.769)
Competence	102	60.78% (30.37)	86.76% (22.17)	66.67% (30.94)	-23.16 ( <i>p</i> < .0005)	9.68 (0.103)
Confidence	95	2.62 (1.04)	3.83 (0.77)	3.52 (0.81)	-8.24 (0.002)	34.14 ( <i>p</i> < .0005)
Practice	95	3.56 (1.13)	4.20 (0.89)	3.78 (0.89)	-10.03 ( <i>p</i> < .0005)	6.21 (0.052)

### Knowledge

- PCA participants (*n* = 99) demonstrated a modest non-significant net gain (2%) in Knowledge from the average Pre-Test score (56%) to the PCA (57%).
- A significant 27% decrease (*p* < .0005) was observed from the average Post-Test score (77%) to the PCA.
- Standard deviations were elevated at Pre-Test and in the PCA, indicating a high level of individual score scatter affecting the average Knowledge scores.

### Competence

- Learners' (*n* = 102) average Competence Pre-Test score (61%) showed a non-significant 10% net gain from Pre-Test to the PCA (67%).
- A significant 23% decrease (*p* < .0005) was measured from the average Post-Test score (87%) to the PCA.
- Standard deviations indicated a high level of individual score scatter at Pre-Test and in the PCA.

### Confidence

- A significant 34% average net gain (*p* < .0005) was measured on the learner-rated Confidence question (*n* = 95) from Pre-Test (2.6 on a Likert scale) to the PCA (3.5).
- A significant 8% decline (*p* = .002) was observed from the average Post-Test rating (3.8) to the PCA.
- The moderate standard deviation at Pre-Test improved to a low level at Post-Test and in the PCA.

### Practice

- A significant average net gain of 6% (*p* = .05) was measured on the learner-reported practice question for PCA participants (*n* = 95) from the average Pre-Test rating (3.6 on a Likert scale) to the PCA (3.8).
- The change from the average Post-Test learner rating (4.2) to the PCA indicated a significant decrease of 10% (*p* < .0005).
- Standard deviations were moderate across the curriculum through follow-up.

## Curriculum Patient Reach

This report presents the estimated patient reach of the curriculum.

Participants (N)	961
<b>Patient Reach Range</b>	
Monthly	2,144 – 6,708
Yearly	18,010 – 56,345

- Learners ( $N = 102$ ) were asked to complete an item in the Post Curriculum Assessment requesting that they approximate the number of patients with symptoms of PAH that they see in their practice on a monthly basis by selecting a range. The resulting response distribution from this self-reported question was then applied to participants who completed the curriculum content ( $N = 961$ ). The results indicate that this curriculum has the potential to affect the care of:
  - 2,144 – 6,708 patients on a monthly basis
  - 18,010 – 56,345 unique patients on an annual basis, based on the assumption that 30% of patients will be seen more than once a year by their clinician



## Conclusions

**This curriculum is effective at demonstrating improvements at Moore's Levels 1-5.**

- **Level 1: Participation**
  - 2,316 learners participated in this curriculum
  - 42% of participants completed the activity's content and 39% finished the Post-Test
  - Based on participation levels, this curriculum has the potential to have an impact on the care of 18,010 – 56,345 unique patients with PAH annually
- **Level 2: Satisfaction**
  - Participants' comments and feedback indicate a high level of satisfaction with the activity and indicate that the curriculum was relevant to their practice
- **Level 3: Knowledge**
  - Participants show a statistically significant 36% increase in average Pre-Test to Post-Test Knowledge scores and a 2% net gain (non-significant) from Pre-Test to the Post Curriculum Assessment (PCA), eight weeks after curriculum completion
- **Level 4: Competence and Confidence**
  - Participants show a statistically significant 39% gain in average Pre-Test to Post-Test Competence scores and a 10% net gain (non-significant) from Pre-Test to the PCA
  - Participants demonstrate a statistically significant 45% improvement in average Pre-Test to Post-Test Confidence scores and a 34% net gain from Pre-Test to the PCA
- **Level 5: Performance**
  - ReallIndex Performance scores improved significantly across the curriculum (19%) and a significant 22% net gain was measured from baseline to the PCA
  - Participants demonstrate a statistically significant 15% improvement on the practice question from Pre-Test to Post-Test and a 6% net gain from Pre-Test to the PCA
  - Learners' reported improvement in practice strategy concerning the treatment of patients with PAH (measured across the curriculum to the PCA) correlates with Performance increases on the ReallIndex from baseline to the PCA.

## Conclusions

### Further Conclusions:

- Learners demonstrated an average gain of 43% from Pre-Test to Post-Test on all Knowledge and Competence questions that were mapped to the Learning Objectives identified in the curriculum, and an average gain of 37% across all items related to the curriculum's subject areas.
- An analysis of learner engagement patterns revealed that only 42% of learners who started the activity completed the content and that most learner attrition occurred during the activity Introduction and Pre-Test. Those learners who began the "Key Learning Points" and "Idea Exchange" components of the activity remained engaged for the duration of the activity, completed the Post-Test, and reported a high level of interest and relevance to their practice in the activity evaluation. The observation that the activity completion rate was substantially higher among primary care participants and lower among certain specialists (emergency medicine and general surgery), suggests that curriculum engagement may be related to learner specialty and the perceived relevance of the activity to participants' clinical practice.
- Significant gains were achieved across the curriculum in all learning domains, with a substantial increase (45%) observed in Confidence. The increase in learners' Confidence in their ability to recognize the features of PAH correlates with the improvement and high Post-Test score (92%) on one of the Knowledge questions (Question: *Which of the following is a hallmark symptom of pulmonary arterial hypertension?* Answer: *Exertional dyspnea*) which assessed learners' recognition of PAH symptoms. These observations highlight the success of the curriculum in improving the mastery and Confidence of learners in PAH recognition and are indicative of its impact on patient management.
- Results from the Curriculum Retention Report show that although some slippage occurred from the time learners completed the activity to the PCA, net gains from Pre-Test were measured in Knowledge, Competence, Confidence, and on the practice item. A significant net increase was also measured in the RealIndex from baseline to the PCA. These results show that the curriculum is producing sustainable gains that learners are retaining eight weeks after participating in the curriculum.

## Application To Future Education

### The results of this interim report suggest that future education should be considered in the following areas:

- Significant gains were shown on the Knowledge and Competence questions that were mapped to all of the Learning Objectives identified in the curriculum. However, learners' average Post-Test score in Learning Objective 1 (*Explain the pathophysiology of PAH*) remained low. An analysis of the question associated with this Learning Objective revealed that the topic of vasodilators and vasoconstrictors in the pathophysiology of PAH remains a particular challenge for this population of learners, who would likely benefit from additional education in this area.
- The Curriculum Retention Report shows that the substantial gains achieved in Knowledge, Competence, Confidence, and practice strategy during the activity were partially reduced by the time of the PCA, delivered eight weeks after learners' completion of the activity. Future efforts might focus on developing multiple-activity curricula to provide learners with serial learning experiences that can improve learning retention and the long-term impact of a curriculum on patient management (RealCME data, *ACEHP 2012 Annual Meeting*).