

## Introduction

- Physical exam (PE) teaching has declined and deficiencies in PE performance directly contribute to diagnostic error.
- Barriers to PE education have included a lack of a systematic, longitudinal curriculum.
- Hypothesis-driven physical exam (HDPE) is an alternative method of teaching the PE with focusing on selecting PE maneuvers that alter the post-test probability of disease.

## Goals and Objectives

### Goals

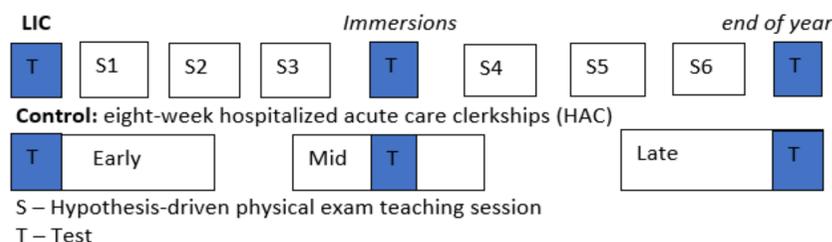
Utilize HDPE sessions to integrate students' physical exam into clinical reasoning so students learn to perform the PE in a hypothesis-driven manner.

### Objectives

- Apply a hypothesis-driven approach to the physical exam allowing students to improve their ability to tailor their exam to a chief complaint.
- Interpret physical exam findings and revise the post-test probabilities of competing diagnoses

## Program Description

Third year medical students in the Denver Health Longitudinal Integrated Clerkship attended six HDPE sessions.



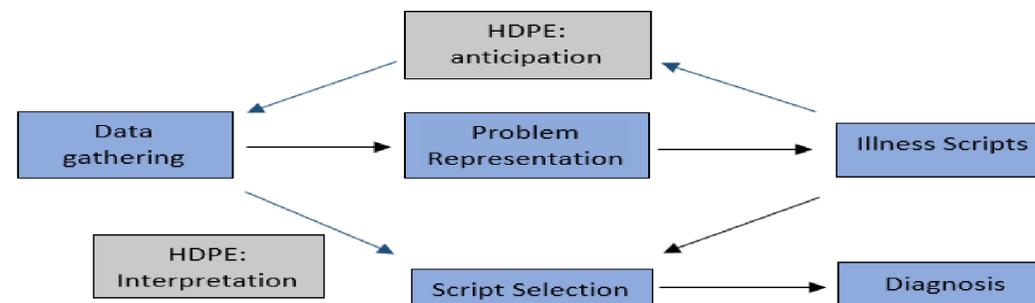
## HDPE Sessions

**Anticipation-** Facilitator presents a chief complaint and brief history. Students form a differential diagnosis and discuss physical exam maneuvers to perform. *Assess the learner's pre-existing knowledge*

**Elicit findings-** Perform exam maneuvers and provide feedback on student technique. *Assess the learner's PE skills.*

**Interpretation-** Teach evidence-based physical diagnosis to help students utilize exam findings to justify a working diagnosis.

**Debriefing-** Discuss case and impact of PE on diagnosis and treatment.



\*Dhaliwal G. Developing teachers of clinical reasoning. Clin Teach. 2013 Oct;10(5):313-7. doi: 10.1111/tct.12082.

Case 1: A 76-year-old male with a PMHx of Hypertension, and hyperlipidemia presented with several months of shortness of breath on exertion. He also reports near syncope on exertion. He is a former tobacco user.

Exam maneuver performed	Anticipated findings form			
	Diagnosis 1 Coronary artery disease	Diagnosis 2 Aortic stenosis	Diagnosis 3 CHF	Diagnosis 4 COPD
JVD	⊖	⊕	⊕	⊖
S3	⊖	⊖	⊕	⊖
displaced PMI	⊖	⊕	⊖	⊖
Systolic murmur	⊖	⊕	⊖	⊖
edema	⊖	⊖/⊕	⊕	⊖
crackles	⊖	⊖/⊕	⊕	⊖
wheezes	⊖	⊖	⊖	⊕
↑ JVP	⊖/⊕	⊖	⊖	⊖
Carotid bruits	⊖	⊕	⊖	⊖

Interpretation	
Exam	Differential Diagnosis
Pulse 120	COPD exacerbation
Temperature 39.0	CAP
RR 24 breaths per min	Viral URI
General: fatigued, NAD	Pleural effusion
HEENT: no pharyngeal erythema or exudates	
Neck: no tracheal deviation	
Inspection: no use of accessory muscles	
Pulm: auscultation-decreased left lower lobe breath sounds	X
Crackles Left lower lobe	
Dullness on percussion to left lower lobe	X
Increased tactile fremitus- Left lower lobe	X
Egophony present left lower lobe	X
CV – tachycardia, normal S1, S2 no m/r/g	
Normal JVP	
Final diagnosis: CAP	

## Program Assessment

Table 1: Preliminary anticipation results LIC

Diagnosis	Pretest	Midpoint	p-value	Cohen's d
CHF (5)	2	3.7	.024	1.56
CAP (5)	2.5	3.4	.018	0.85
COPD (4)	0.7	2.1	.013	1.44
Valve disease (5)	1	2.33	.007	1.42
Pleural effusion (4)	1.3	2.8	.02	1.31

Scoring rubric CHF

CHF scoring (5)
S3
Displaced PMI
Elevated JVP
Pulmonary crackles
Edema

Table 2: Anticipation Midpoint comparison

Diagnosis	LIC	HAC	p-value
CHF (5)	3.7	2.2	.012
CAP (5)	3.4	1.8	.009
COPD (4)	2.1	1.2	.11
Valve disease (5)	2.33	2.4	0.85
Pleural effusion (5)	2.8	1.4	.027

Table 3: LIC preliminary interpretation results

Diagnosis	Pretest correct (%)	Pretest High yield	Midpoint correct (%)
CHF (4)	90	2.4	
CAP (5)	90	2.2	
COPD (4)	90	1.7	100
AS (4)	80	2.3	

## Discussion

- Clerkships provide opportunities for students to practice PE skills, but often without direct observation or dedicated teaching.
- HDPE sessions improved students' ability to anticipate PE findings associated with common inpatient diagnoses
- Students' ability to interpret abnormal findings exceeds their ability to independently anticipate expected findings.
- Facilitators observed improved skill in PE maneuvers and selection of a tailored PE approach as sessions progressed
- HDPE sessions improved student knowledge of the diagnostic utility of the PE, and aim to coach students in improving PE technical skill and incorporation of the PE into their clinical reasoning.
- Next Steps:**
  - Collect and analyze end of year data
  - Expand HDPE sessions and assessment to CUSOM sites beyond the DHLIC