

## Contents

<b>Supplemental Digital Appendix 1: Implementation of the Virtual Interactive Patient (VIP) in an Integrated First-Year Medical Curriculum.....</b>	<b>1</b>
<b>Supplemental Digital Appendix 2: The Method Used to Design and Implement Each Virtual Interactive Patient (VIP) Encounter.....</b>	<b>2</b>
<b>Supplemental Digital Appendix 3: Exemplar Responses to VIP Documentation Tasks.....</b>	<b>3</b>
<b>Supplemental Digital Appendix 4: Student Evaluations of Each VIP Encounter Using a 5-Level Scale and Free Response.....</b>	<b>8</b>
<b>Supplemental Digital Appendix 5: VIP Engagement Metrics.....</b>	<b>18</b>

**Supplemental Digital Appendix 1: Implementation of the Virtual Interactive Patient (VIP) in an Integrated First-Year Medical Curriculum.** The figure below shows how the existing curriculum informs the VIP in a two-week block. In the example below, the VIP was designed to intentionally integrate the biomedical science content using a patient encounter.

### Content From a Two-Week Block in Foundations of Patient Care (FPC):

Gross Anatomy Topics: Hypaxial muscle, Epaxial muscle, Laminectomy, Ventral Body Wall.

Histology Topics: Epithelium, Connective Tissue, Blood, Cartilage and Bone, Bone Growth and Repair.

Biochemistry/Cell Biology: Cells and organelles, Cytoskeleton, Nucleic Acids, DNA replication, Amino Acids.

Clinical Skills Foundations: Communication skills, Opening Patient Encounters, Dimensions of a Symptom, Musculoskeletal Physical Exam.

### 1<sup>st</sup> Event: Beginning of the Two-Week Block

**Springboard to Patient Care:  
“The Patient with Back Pain”**  
Large Group Lecture

#### Learning Objectives:

1. Name the prevalence of back pain and impact on patient quality of life
2. Define non-specific low back pain
3. Identify both mechanical and non-mechanical causes of back pain using broad categories using a diagnostic framework
4. Name elements of the history and physical exam used to diagnose common causes of back pain

### 2<sup>nd</sup> Event: VIP Assigned in the Second Week



#### VIP: “58-Year-old with Low Back Pain”

- Woman with worsening lower back pain
- History of early menopause
- Working two jobs
- Son incarcerated for opioid disorder
- Caring for two grandchildren
- Significant financial strain
- Ongoing tobacco use
- Food Scarcity, cutting back meals
- Found to have focal L4 spinal tenderness, normal straight leg raise test and no signs of nerve impingement.

#### Interactive Pauses using Playposit®

- ✓ Interviewing about a symptom using the OLD CARTS mnemonic
- ✓ Student identifies the best diagnostic questions for the patient with back pain (with immediate feedback on correct responses)
- ✓ List of options for the patient with food insecurity
- ✓ Impact of psychosocial stress on the patient with back pain
- ✓ Video demonstration of back and spine physical exam
- ✓ Inspection of the spine with abnormal findings explained
- ✓ Causes of spinous process and paraspinal muscle tenderness
- ✓ Definition of sciatica, causes of sciatica, and demonstration of the straight leg raise test
- ✓ Student identifies the most likely cause of back pain using broad categories (with immediate feedback on correct response)
- ✓ Instruction on writing a Problem Representation statement with faculty exemplar provided
- ✓ Student asked to formulate the patient’s care plan and address the social determinants of health

### 3<sup>rd</sup> Event: End of the Two-Week Block

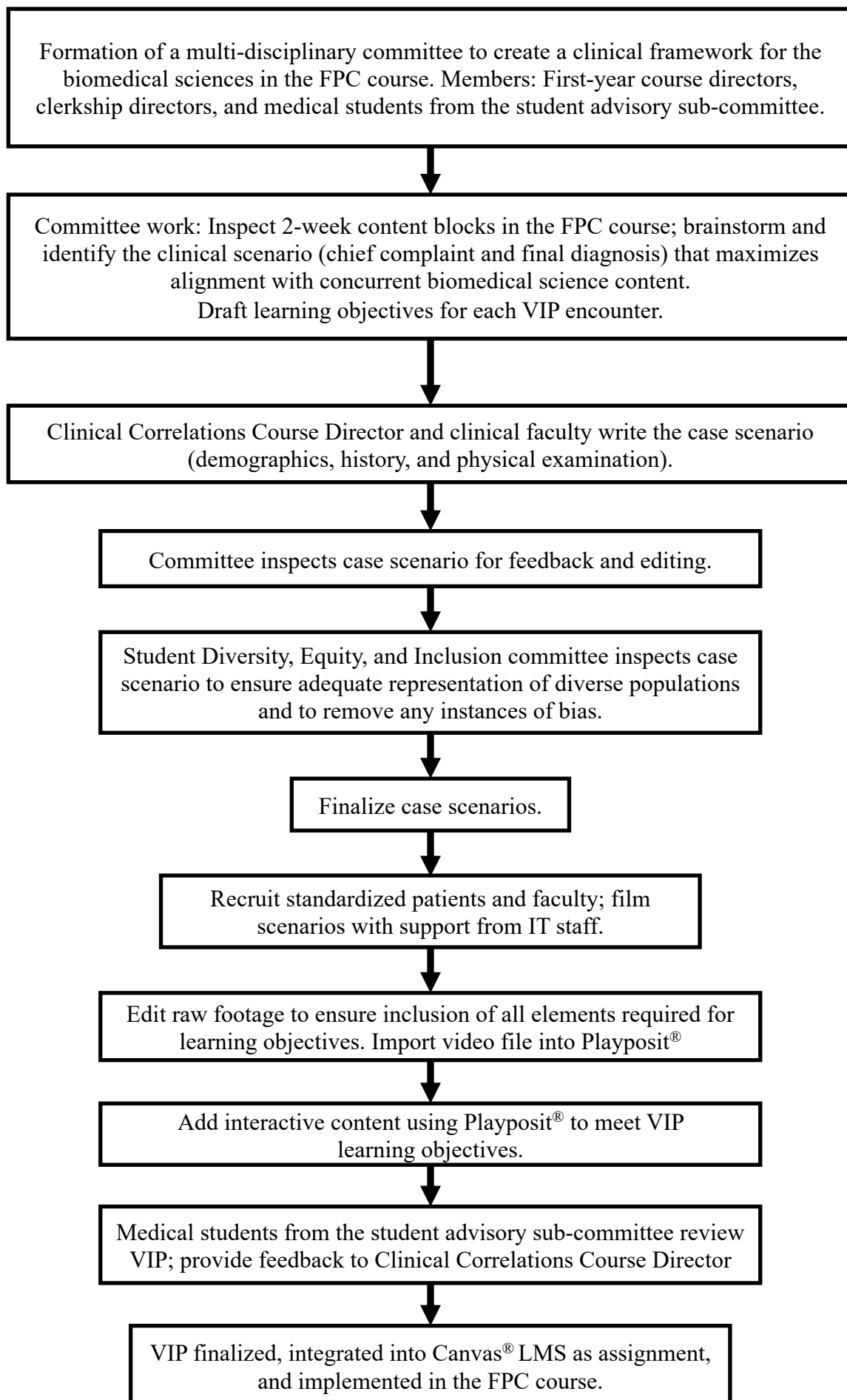
**Patient Care Discussion: Vertebral Compression Fracture and Osteoporosis**  
Large group lecture and interprofessional case discussion (Spine Surgeon and Physical Therapist)

#### Learning Objectives:

1. Name clinical manifestations of osteoporosis
2. Name the indications for diagnostic imaging for a patient with back pain
3. Define osteoporosis and name the common risk factors
4. Identify the major cells involved in bone remodeling
5. Discuss the role of physical therapy in the evaluation and management of a patient with back pain
6. Discuss the role of diagnostic imaging and surgery in the evaluation and management of a patient with back pain



**Supplemental Digital Appendix 2: The method used to design and implement each Virtual Interactive Patient encounter.** This chart shows the sequence of events used to design and implement each VIP.



## **Supplemental Digital Appendix 3**

### **Exemplar Responses to VIP Documentation Tasks**

#### **VIP: 58-year-old with lower back pain (Vertebral Compression Fracture)**

##### **Documentation Task: Write Patient Care Plan and address Social Determinants of Health**

**#Low Back Pain:** Differential includes but is not limited to spinous process fracture, lumbar compression fracture, and perhaps non-specific lower back pain which less likely here. Because she has focal lumbar spinous process tenderness with no neurologic deficits or "red flag" symptoms, I will start with a Lumbar XR. This will at least rule in or rule out a fracture like spinous process fracture or a lumbar compression fracture. This is a rapid, cheap imaging option and I will get the result back quickly. An MRI of the lumbar spine would be a great test as well, but this imaging test can have a high co-pay (this is the money the patient pays up front at the time of service) and I will go with the less expensive and rapid option first. I would offer pain medication as she seems to be in a great deal of debilitating pain. I would counsel her on the safe dosing limit for acetaminophen (4 grams/day) and give a prescription for high dose non-steroidal anti-inflammatory drugs (NSAIDs). In case this does not help, I would ask about her interest in a short course of oral opioid therapy. However, I will be mindful that she may be concerned about opioids considering her son's history. I would counsel her about safe opioid use, and I would work with her to find a way to control her pain safely regardless. I would refer her to physical therapy right now. Based on the imaging results, I may need to end up referring her to a spine surgeon/specialist for further evaluation.

I would encourage her to obtain over the counter Vitamin D and calcium supplements. I would counsel the patient on inexpensive foods that would provide necessary calcium and vitamin D and talk through with her which foods they like and could afford. I would refer her to a clinical nutritionist as well. I would explain the link between tobacco use and osteoporosis and how that might be contributing to her pain (after confirming with the imaging). I would write her a work excuse to protect her back and so she can get to her appointments and not aggravate her back pain further.

In terms of social support, I would encourage her to apply for SNAP if eligible, get connected with food banks in the area or Root Causes to supplement her food at home and their nutrition. I will get our clinic social worker to help facilitate these referrals. Finally, I will encourage the patient to seek emotional support if she feels comfortable, it sounds like she is under a lot of stress working two jobs and providing for her grandkids when her son just became incarcerated. I would validate that stress and offer referrals for counseling/therapy perhaps with mindfulness-based stress reduction. I will remind her about the Family and Medical Leave Act (FMLA) and offer to complete this paperwork, which can provide her with up to 12 weeks of unpaid, job-protected leave so she can complete her physical therapy appointments, rest, and not lose her job.

#### **VIP: 49-year-old with hand pain and weakness (Carpal Tunnel Syndrome)**

##### **Documentation Task: Write Assessment and Plan with Justification of Diagnosis (Clinical Reasoning)**

**Assessment:** Ms. Green is a 49 YO with a history of hypothyroidism and presenting with chronic, progressive right wrist pain and now numbness/tingling and weakness in her hand. The differential diagnosis includes carpal tunnel syndrome, wrist arthritis, or perhaps cervical radiculopathy (compression of cervical nerve roots from arthritis/bone spur). I think she likely has carpal tunnel syndrome due to the gradual onset of symptoms and slow progression to focal weakness (specifically in thumb abduction and opposition) and numbness that mapped onto areas innervated by branches of the median nerve beyond the wrist. Her job at the factory which requires repetitive hand movements as well as her hobby of knitting places her at a higher risk for this. A positive Phalen's test further solidified the diagnosis. Wrist arthritis can cause pain in the hand and wrist, but it would not be associated with any neurologic deficits, and it would be associated with inflammation at the wrist or restricted range of movement (and she had neither). Although she had some neck pain, cervical radiculopathy is unlikely because her symptoms are isolated to the hand and neurologic function was normal in the rest of the arm. Finally, moving her neck in did not exacerbate symptoms or cause a "shooting" like sensation of pain down the arm, which would be more typical of cervical radiculopathy.

**Plan:**

**#Carpal Tunnel Syndrome**

- Have her use a wrist splint: can use nocturnally or continuously during day.
- Avoid NSAIDs: oral anti-inflammatory pain medications have been found to be ineffective in treating CTS pain.
- Trial of glucocorticoid injection
- Referral to Occupational Therapy
- Referral for Nerve Conduction Study
- Offer referral to Orthopedics/Hand Surgeon to consider carpal tunnel decompression surgery.
- Offer work excuse or short-term disability coverage until symptoms improve.

**VIP: 53-year-old with vomiting and fatigue (Lactic Acidosis)**

**Documentation Task: Write the Assessment and Plan**

This is a 53-year-old man with Hypertension and Type 2 Diabetes on Metformin who presents with 3 days of generalized weakness and nausea/vomiting, found to have hypotension, tachycardia, acute kidney injury, and a high anion gap metabolic acidosis. His differential includes Lactic acidosis (from either global hypoperfusion from sepsis, or metformin toxicity), diabetic ketoacidosis (from hyperglycemic stunning of pancreatic beta cells), or simply related to his acute kidney failure. I don't think he had a toxic ingestion from anything other than metformin.

I am particularly worried about metformin induced lactic acidosis. He is on chronic metformin therapy and doubled his dose on his own (taking twice the recommended daily limit). In addition, he has acute kidney injury which directly leads to metformin accumulation. This would make a lot of sense here; however I will rule out DKA by checking serum beta-hydroxybutyrate.

Regarding the cause of his acute kidney failure, he has a few things going on. He has hypotension and tachycardia, which suggest volume depletion, and of course this can cause acute kidney failure. Importantly, it sounds like he has benign prostate hyperplasia and obstructive urinary symptoms, so there is a really good chance he was suffering from bladder outlet obstruction, which can cause kidney failure as well.

**Plan:**

**#Anion Gap Metabolic Acidosis**

check serum lactate, Beta-hydroxybutyrate, urinalysis for ketones, and metformin level.

**#Nausea/Vomiting and Hypotension**

I suspect the vomiting led to volume depletion and hypotension.

give IV fluid for volume expansion.

give anti-nausea medications.

He could be in septic shock but will administer IV fluid anyway and see how he responds.

Reasonable to check for infection with blood and urine cultures while awaiting more data.

**#Bladder outlet obstruction/BPH and Acute Kidney Failure**

Suspect this was going on for several months.

place bladder catheter to relieve obstruction.

start alpha-blocker therapy.

**#Hyperglycemia and Type 2 DM**

If he ends up having DKA then he gets IV insulin infusion

correcting volume depletion and AKI will help his hyperglycemia.

can use sub-cutaneous insulin in the meantime to help control sugars while hospitalized.

Will need to find/arrange outpatient PCP prior to discharge.

**VIP: 60-year-old with a skin lesion (SCC-in-situ)**

**Documentation Task: What do you tell the patient? How you do you counsel him? Do you make any referrals? Write your plan in the space below.**

I would tell him about the diagnosis of squamous cell carcinoma in situ. I would tell him the seborrheic keratoses on his back are benign. I would tell him the actinic keratoses on his hands are pre-cancerous and could turn into cancer later. I would tell him the mole on his shoulder is benign. I would counsel him on strategies to reduce his sun exposure. Since he works outside for his living, this may be challenging, but I would work with him to find ways to reduce direct sun exposure: use of high SPF sunscreen, broad brimmed hat, long sleeved, breathable shirt with UV protection. I would refer him to a dermatologist for treatment of the SCC in-situ and regular screening and follow-up afterwards.

**VIP: 4-week-old with jaundice (Lactation Failure Jaundice and Pyloric Stenosis)**

**Documentation Task: Write Problem Representation Statement**

Hannah is a 4-week and 2 day old otherwise healthy, breastfed infant who presents with less than a week of jaundice and projectile-like non-bilious vomiting after each feed, found to have scleral icterus, full-body jaundice (including palms and soles), and a palpable firm mass near the right upper quadrant.

### **VIP: 49-year-old feeling weak all over (Hyperkalemia)**

#### **Documentation Task: Write the Assessment and Plan**

Mr. Sims is a 49-year-old with HTN, DM, CHF w/ reduced EF, gout and recent NSAID usage who is here with weakness and found to have bradycardia, hypotension, hypoxemia, elevated JVP, pulmonary rales, and 2+ bilateral pitting edema on exam. Differential includes, but is not limited to, acute decompensated heart failure, acute MI, acute kidney injury from NSAID use, and symptomatic hyperkalemia. Clinical picture looks more like cardiogenic shock given evidence of fluid overload and the abnormal vitals. Absence of fever or signs/symptoms of any infection make sepsis/septic shock less likely. Absence of jaundice, ascites, known liver disease make liver failure less likely.

He has a set up for AKI and hyperkalemia given his chronic ARB use, K supplement, recent initiation of the Mineralocorticoid antagonist, and recent NSAID use for the gout flare. I wonder if his cardiologist knew about the potassium supplement when they started the Mineralocorticoid antagonist. I wonder if the Urgent Care provider knew about his ARB and Mineralocorticoid antagonist, and lower GFR when recommending the NSAID? I suspect he has unrecognized chronic kidney disease as Serum Cr two years ago was 1.4 mg/dl, above normal, and using a newer eGFR calculator without the race variable, estimated GFR is close to 60 ml/min, which is diagnostic of Stage II CKD. The addition of an NSAID here could have led to a significant decline in GFR. However, given his known systolic heart failure, he could have had a primary decompensation in pump function from some other yet discovered cause. Given his history of diabetes and HTN, an acute MI is a possibility too, but it seems less likely. We will still need to rule this out, I think.

#### **#Hypotension, fluid overload, systolic heart failure.**

I suspect pump failure from some cause. To work this up, I will order EKG stat, CV POCUS, BMP to check kidney function and electrolytes including potassium, Hepatic Function Panel, Arterial Blood Gas, Serum Lactate, serum cardiac biomarkers (Troponin I, CK, CK-MB). I will hold his ARB, Mineralocorticoid antagonist medications.

#### **#hypoxemia, dyspnea, pulmonary edema.**

Suspect pulmonary edema/parenchymal problem. Start supplemental oxygen. Chest XR stat, Lung POCUS, serum BNP, will consider high dose IV loop diuretic.

### **#Type 2 DM**

The BMP will give us the current glucose.

Hold glipizide for now until this is all sorted out.

### **VIP: 58-year-old with a neck mass (Squamous cell carcinoma)**

#### **Documentation Task: Write Problem Representation Statement**

Mr. Locklear is a 58-year-old with a 30-pack year tobacco smoking history who presents with a 3-month history of a left-sided neck mass, sore throat, odynophagia (pain with swallowing) and 15-lb unintentional weight loss. He was found to have a left sided soft tissue mass in his oropharynx, as well as a non-tender sub-mandibular mass on the left side of his neck.



## Supplemental Digital Appendix 4

### Student Evaluations of Each VIP Encounter Using a 5-Level Scale and Free Response

#### 4a: VIP Student Evaluation Survey

Feedback poll - what did you think of this bulb?

- 5 Super Engaging
- 4 Very Informative
- 3 Understandable
- 2 Confusing
- 1 Lost Interest

Why did you choose your response?

**4b: Student Evaluation of Each VIP Encounter Using a 5-level Scale (1 = Lost Interest, 2 = Confusing, 3 = Understandable, 4 = Very Informative, and 5 = Super Engaging)**

Columns show the percent of students responding for each level.

VIP Encounter	Percent Responding by Category (%)				
	Level 1: Lost Interest	Level 2: Confusing	Level 3: Understandable	Level 4: Very Informative	Level 5: Super Engaging
58-year-old with lower back pain (Vertebral Compression Fracture)	0.8	0.8	25.8	50.8	22.5
49-year-old with hand pain and weakness (Carpal Tunnel Syndrome)	0.8	1.7	16.7	45.8	31.7
53-year-old with vomiting and fatigue (Lactic Acidosis)	1.7	9.2	17.5	35	31.7
60-year-old with a skin lesion (Squamous Cell Carcinoma-in-situ)	1.7	5.8	21.7	42.5	27.5

4-week-old with jaundice (Lactation Failure Jaundice and Pyloric Stenosis)	0.8	3.3	18.3	48.3	32.5
49-year-old feeling weak all over (Hyperkalemia)	1.7	13.3	24.2	30.8	23.3
58-year-old with a neck mass (Squamous Cell Carcinoma of Head and Neck)	0	1.7	20.8	50.8	30

#### 4c: Examples of Narrative Comments Associated With the Rating at the End of the VIP Encounters

58-year-old with Lower Back Pain (Vertebral Compression Fracture)	
VIP Rating	Narrative Feedback
Very informative	I was focused and engaged; did not lose interest and saw reasoning behind answers
Understandable	Introduced to many new terms- enjoyed how answers were explained in depth. A bit confused on how/what imaging might help lead to a diagnosis and who is included in potential referrals.
Very informative	It was a pretty good way to get a full view of the patient while being online. I feel prepared for tomorrow.
Very informative	I really enjoyed the interactive pop ups that provided additional information on sources of back pain.
Understandable	Understandable but not super engaging, not really much new information. Would be interesting to see where the patient and illness progress from here
Super engaging	It was great to not have to worry about being scored, but to just absorb the information and interact with the videos. Low stress and very important to our future work. Also, a great review of concepts we began to learn in our Clinical Immersion Course .
Understandable	I actually thought it was interesting to put the knowledge we learned in class into practice with this scenario. Even though it was fake, it gave me an idea of what creating a differential feels like and how it truly is a process of elimination. Likewise, because this was our first exercise I do not have anything to compare it to. Now that I have seen what the patient scenarios are like, I look forward to hopefully being more prepared for the next one.
Understandable	I learned a lot from the interactive portions of the exam but still lack the understanding and medical knowledge to completely follow the differential diagnoses.

Very informative	I really enjoyed observing the provider conduct the spinal exam on the patient.
Super engaging	I enjoyed having the patient case because it showed a case that I could very much come across. The questions integrated throughout also made the case more interactive and helped me remember the concepts more effectively.
Super engaging	Stopping for integrated anatomy and scientific lessons during the 'patient encounter' helped organize my thinking in a way that hasn't been done so much in the course so far.
Very informative	I believe I was able to learn in a low stakes environment which allowed me to be more calm and take in the information presented.
Understandable	The bulb was of an appropriate length and complexity. The information was presented in a straightforward way that built upon our existing knowledge.
Very informative	The interactive video was very informative and helped me to get a brief introduction of the physical exam and what to rule out when reaching a differential diagnosis
Very informative	I thought the pop-ups were spaced nicely throughout and the overall story was coherent and practical
Super engaging	I really enjoyed the pop-up questions and especially the feedback that was offered for missed/incorrect answers in the check-box questions.
Very informative	I liked all the pop-ups that contained relevant information to the specific portions of the visit. The video of the physical exam helped to visualize some of the techniques we have heard about in class before.
Super engaging	I love how interactive this was.
Super engaging	I really enjoyed all of the facets of their social context and loved the exercise of trying to address each of those as it relates to their back pain.
Super engaging	I really enjoyed this activity. The pop-up boxes were informative and engaging. It was useful to watch the video on the spinal exam. It was also great to practice developing a differential diagnosis and read the explanations for these.

49-year-old with Hand Pain and Weakness (Carpal Tunnel Syndrome)	
VIP Rating	Narrative Feedback
Very informative	Felt engaged and appreciated the consistency with core material we are learning currently
Very informative	Enjoyed how each test was explained and how positive results indicate specific injuries to specific nerves
Very informative	Learned a lot, made me realize I had to do a little bit more anatomy review.
Super engaging	This was really relevant to what we have been learning. I also liked how we got to write an assessment and plan
Super engaging	I really liked all the pop-ups and intermittent knowledge checks. It helped to immediately reinforce the material learned.

Very informative	It was very helpful to review for the exam
Super engaging	I found all the nuances to her case very interesting and the differential diagnosis was challenging when we already knew that it was carpal tunnel. It was interesting to think through what the next likely diagnoses would be and why.
Super engaging	I found this bulb to be very engaging and informative, connecting concepts from anatomy to patient care in a very direct and clear way! I will note, though, that it took me considerably longer than I anticipated (closer to 1 hr than 20-30 minutes), which may have been because I was trying to review material as we covered it in anatomy as I worked through the case.
Very informative	Low stress. Once I understand where in my notes to look for the information in this module, I was able to translate what we learned in class to real clinical situations. This helped me to understand medial, radial, and ulnar nerve innervations better in a clinical setting and to understand carpal tunnel structure and syndrome manifestation.
Super engaging	Loved this module! I was able to apply my knowledge of forearm, hand, and wrist anatomy (muscles, nerves, and bones) to diagnose a patient and come up with treatments. It really helps me contextualize what we learn in class and focus on the real goal: patient care and wellness. These patient of the week sessions are rejuvenating and are main motivators to keep me going!
Understandable	It was easy to understand.
Super engaging	Just like the last video module, very engaging, perfect level of detail. Seeing this clinical application made me more motivated to study forearm anatomy.
Understandable	It would be useful to be able to see a summary of the information during the assessment and plan section. Also, there were several technical issues that made completion difficult like the slides not appearing on Google Chrome and difficulty with videos loading.
Super engaging	Was great to get to apply some of the things we learned in class and learn some clinical tests associated. Also really helpful to practice some of the nerve connections we learned in anatomy.
Very informative	We learned about the cause of carpal tunnel before this, so I actually felt like I could do something (the last one I felt like I did not know enough)
Very informative	I liked the supplemental Youtube videos and the fill-in-the-blank questions which were very relevant to current course material
Very informative	I enjoyed learning more about the tests for carpal tunnel and the exact nerves being evaluated.
Super engaging	I was having difficulty understanding carpal tunnel syndrome, to be completely honest. The anatomy was overwhelming to me, but having the patient example helped solidify my understanding.
Very informative	Helped solidify my knowledge about carpal tunnel syndrome
Very informative	This module used a variety of resources that made it informative and engaging.

<b>53-year-old with Vomiting and Fatigue (Lactic Acidosis)</b>	
<b>VIP Rating</b>	<b>Narrative Feedback</b>
Very informative	It tied in well with the biochem that we have been learning!
Understandable	This exercise was easy to follow but difficult seeing as my knowledge is so limited in the subject area. Creating a plan is by far the most difficult part.
Very informative	It was very useful to walk through all of the possible items on the differential and learn about the biology behind the possible diagnosis.
Super engaging	It was very informative and fun!
Confusing	I was definitely a bit overwhelmed not by the bulb (so maybe I shouldn't have picked 'confusing' as my review of the bulb) but by the content. I definitely missed a lot of things in my assessment and plan.
Super engaging	These videos are great
Very informative	It was informative, but I will be unlikely to use the info other than for personal situations (knowing when to recommend a loved one go to the doctor and to help then advocate for their care -- which is not completely worthless). PA student.
Super engaging	This bulb had a lot of helpful context for each bit of information we were presented with. It was a complicated case, and I could never have come up with an Assessment and Plan as thorough as the one Dr. Roberts shared at the end, but reading it, I understood it, which feels great! A step towards being able to eventually write one like that myself. Really enjoyed this!
Super engaging	This one was really fun and interesting! Plus it felt very applicable and tied in directly with the material we were doing. The questions were good and it was a good balance of being able to get some things correct while still having some additional points I hadn't thought of brought in!
Understandable	I liked the way the video went over all aspects of the blood panel
Lost interest	I think this mostly has to do with my interest in the topic and less with how the material was actually presented, which I actually think was organized very well and clearly.
Very informative	Very interesting information, but it went very fast at times and I was a little lost while reading the reading the provided plan and assessment
Very informative	Lots of information! Reading all the information about the metabolic panel was informative but slightly overwhelming. But I appreciate getting to engage with this type of content via this platform!
Super engaging	Really enjoyed this one because T2D runs in my family and I've witnessed this happen a lot in the pediatric ED. Super interesting to finally understand the science behind this condition and gain insight into the plan of care that's required.
Understandable	I understood in general what happened but still feel like I lack clinical knowledge to grasp everything and feel comfortable
Super engaging	The information presented here helped solidify the material presented last week and apply it to a case that does not seem as common as the typical

	diagnoses associated with acidosis. Because of this, I had to apply the material to a new situation which helped me learn it.
Super engaging	I found the blurbs helpful, especially in describing how the lab values are determined and why his may be abnormal
Super engaging	Video was excellently made
Understandable	I found this is a little more confusing than typical, but still engaging.
Super engaging	Seeing an example of a well-written Assessment and Plan showed me how I can begin phrasing and structuring my own A&P

<b>60-year-old with a Skin Lesion (Squamous Cell Carcinoma-in-situ)</b>	
<b>VIP Rating</b>	<b>Narrative Feedback</b>
Very informative	I liked this one, very applicable to what we are being taught!
Very informative	Engaging
Very informative	Good mix of ECG and skin!
Very informative	I thought this bulb really helped with EKG interpretation, but was a little overwhelming in terms of skin lesion information. However, I enjoyed how last week's material was tested in a concise manner here. Also, I find that I generally can't finish these bulbs in the recommended amount of time (20-25), and must take at least 45 upwards to an hour to really work through them thoroughly.
Very informative	I appreciated all of the descriptions of the different types of skin lesions. Also the ECG practice was unexpected but helpful.
Super engaging	very helpful and integrated both our cardiology and skin topics nicely
Confusing	Some more detail about ECG presentations of specific conditions would be helpful. Also, the amount of information given about different skin conditions without many examples of normal vs. diseased skin was overwhelming
Understandable	I definitely feel like we did not get enough practice with the ECGs to be able to interpret these as accurately as we need to! I also found it hard to swap from the ECGs to the skin situation and back (I feel like I had just lost my train of thought a little). But I liked all the info that was included in this bulb! The skin stuff was very interesting!
Very informative	I worked as an MA in a dermatology clinic for the past year and thought the video accurately captured many of the conversations I and others would have with patients throughout the day.
Very informative	I really appreciated how much EKG practice was available in this module.
Understandable	Paired well with the histology skin lab and EKG sessions
Super engaging	As always, I love these videos and was excited to learn about dermatology.

Understandable	It was good. This playposit took way longer than the '20 minutes' suggested though. It took me closer to an hour and a half.
Super engaging	I truly love these modules and they are the main thing that make me feel that I am really at doctor school. Please know that the work you put into these and the lectures is greatly appreciated and worth the cost of tuition!
Very informative	It brought in a lot of different things we have learned in lecture and put it into a clinical context which was well done.
Understandable	Like most of these modules, it asks alot of us regarding things we haven't really learned yet
Understandable	EKG seemed a bit outside our understanding
Very informative	I appreciated the skin histology review and the chance to interpret ECGs! I think I was a bit stressed because the level of detail in the ECG analysis is much more than I was providing.
Very informative	It brought in a lot of different things we have learned in lecture and put it into a clinical context which was well done.
Super engaging	Awesome integration of material

49-year-old Feeling Weak All Over (Hyperkalemia)	
VIP Rating	Narrative Feedback
Super engaging	Really interesting case that was complicated and pushed us to think a lot about multiple organ systems.
Very informative	This was a helpful review of a lot of complicated concepts in renal physiology as well as reviewing some concepts from the cardio and respiratory units. It was a challenge to synthesize all of the new information we have learned this week (especially about different types of drugs and their effects on the kidney) but I think this helped me to start reviewing some of that material.
Lost interest	Became confused
Super engaging	This was a really interesting case that encompassed so much of what we've learned from the past 3 month (not just the last week). I like having to think through the necessary tests and DDx. I would like a template for A/P on the last page (just so i can start to practice putting it in the right format)
Super engaging	It is great to learn about clinical correlations! I know we have started going over lab results, but I still feel a bit overwhelmed to have to interpret and make a differential diagnosis
Confusing	I am still struggling to understand kidney physiology right now so it was difficult to apply this developing knowledge at this point
Very informative	The explanations of the diagnostic tests were very helpful
Very informative	Helped tie in what we are learning in lecture
Confusing	I was definitely overwhelmed by all the different stuff going on with him but I know this is how real patients will be on the wards next year so I can't complain about that!

Super engaging	Another great one! Learned a lot. Love how complex this one was - many important issues (GFR calculations, healthcare reform, fragmented care) woven into the medical thinking/clinical decision making component.
Super engaging	Really intellectually stimulating, made me integrate things we have learned throughout the physiology unit. Was a really great case.
Understandable	Challenging but enjoyable
Very informative	I learned a great deal, especially regarding non-medical factors that impact health, such as multiple providers. Additionally, it was tricky to write the A/P, which was good practice for difficult cases in the future.
Super engaging	Allowed us to blend together what we're learning now with aspects from the cardiology/pulmonary unit!
Very informative	It was interesting and engaging
Confusing	I had difficulty following the case and I felt like there was a lot of background knowledge required for this bulb that I do not have.
Very informative	Great to see how doctors think and to get a chance to try myself without repercussions.
Very informative	It was challenging and I don't quite see how all the pieces fit right now but I look forward to unpacking the case as a team.
Understandable	It was good!
Confusing	I thought it was a little confusing to switch between kidney and heart problems, and I wished this module explained more what happens with each medication and how these systems were interacting with the medications and current illness presentation.

<b>4-week-old with Jaundice (Lactation Failure Jaundice and Pyloric Stenosis)</b>	
<b>VIP Rating</b>	<b>Narrative Feedback</b>
Understandable	I loved reading about the importance of breast feeding and how it is completely different than formula. Glad to see that in here!
Super engaging	The explanations were great and I enjoyed getting to see the reasons for/against placing certain orders
Very informative	I thought this was engaging and well-rounded, though it contained quite a bit of material we haven't touched on in class
Super engaging	This was very helpful in terms of tying in concepts we have learned.
Very informative	I learned so much! I had never known anything about breast feeding and I feel like that's super important to know as a future healthcare provider! I'm glad this case was a pediatric case too, everything is very different in a peds case.
Super engaging	As always, I really enjoyed this. It may have been too much to learn about babies AND jaundice at the same time.



Very informative	Lots of new info that we have not covered in lecture! We often focus on embryological and adult pathology so it was nice to have a pediatric case.
Very informative	I enjoyed learning about hyperbilirubinemia, and taking notes during the video helped me to keep the information organized in my head.
Super engaging	Relevant to course material. Appreciated the multiple explanatory vignettes of the underlying etiology of jaundice.
Very informative	This was an informative direct clinical correlation to what we have learned in lecture this past week.
Super engaging	I thoroughly enjoyed the video as it aligns well with what we are learning in class, as well as my career interests.
Very informative	I learned a lot and thought this elaborated well on our classroom learning.
Confusing	I understand the GI parts but was found the pediatric elements and information daunting and unfamiliar as well as learning about bilirubin, birthweights, and feeding patterns. the information was still interesting, it was just very new information even after completing lectures
Understandable	I enjoyed it and thought it gave good application to learning about the physiology of the GI tract
Super engaging	Physiology concepts were thoroughly and well explained!
Super engaging	I enjoyed the images of what we'd see on physical exam
Very informative	I really enjoyed learning about this topic and I feel like the information aligned well with what we are learning in class and expanded upon it in an approachable manner
Very informative	This was interesting case and I liked that it focused on bilirubin because that was a more challenging part of the lecture material in my opinion.
Super engaging	I LOOOVE these! I really enjoy the tangents of information and how much you can learn in 45 minutes
Super engaging	I really enjoyed that this was a pediatric case! It was new and exciting. I also loved that it centered two moms and talked about some of the challenges parents face around breastfeeding. I had no idea how breast milk changes post-partum or most of the info in that section.

<b>58-year-old with a Neck Mass (Squamous Cell Carcinoma of Head and Neck)</b>	
<b>VIP Rating</b>	<b>Narrative Feedback</b>
Super engaging	I thought the video was very engaging.
Super engaging	I think this patient of the week was accessible, digestible, informative, and engaging! I felt confident in my assessment & plan one-liner, and appreciated the format being provided, so that I could practice writing a 'correct' A&P! Thank you for the practice!
Very informative	I appreciated a lot of the clinical application of physical exam in this module.

Very informative	This was one of the easier videos to follow, so I never felt lost and thought all of the information presented made sense. This helped me to remain engaged!
Very informative	I really like only being responsible for writing the one liner as it allows us to consolidate all of the information we have received and practice picking out the most relevant information.
Understandable	Easy to follow - appropriate level of detail for our current state
Very informative	I liked visualizing the images of the nasopharynx and oral cavity.
Very informative	This helped make sense of some of the information we are learning in class.
Super engaging	It was engaging because it really made me want to know what he had!
Very informative	The case was easy to follow and relevant to the information we are learning now, while still bringing in an appropriate amount of info from CSF.
Very informative	I liked how this bulb was laid out, with possible causes of pharyngitis at the beginning giving us some of the context needed to approach this patient case. At this point, I do still feel like I don't have a strong grasp on which tests, labs, and imaging studies to order and when to order them.
Very informative	I thought this module fit nicely with our current content in anatomy
Very informative	This felt very applicable and more manageable than the last one!
Very informative	Easy to follow, learned a lot, great to see doctor's thought process and to have notes for how to write a 'one-liner' that I can save for future use.
Understandable	I felt the material was presented at an appropriate knowledge level.
Very informative	Information was presented in an understandable, manageable way.
Super engaging	Including the diagrams that labelled the anatomy seen on a typical physical exam for HEENT was really helpful in understanding the module.
Super engaging	This material appropriately applied the concepts we've been learning over the last two weeks in a relevant and engaging way!
Very informative	I am still having trouble sorting through when certain tests are and are not indicated, but I am continuing to learn a lot in these activities.
Super engaging	I always enjoy these! This time, I feel like it could have been a bit more involved or asked more questions.

## Supplemental Digital Appendix 5

### VIP Engagement Metrics

The table below shows engagement metrics (completion rates, completion times, and evaluation response rates) for each VIP encounter.

VIP Case Title	No. of Students Completing VIP	Completion Rate (%)	Mean Completion Time (hr:min:s)	No. of Students Giving Narrative Feedback
58-year-old with lower back pain (Vertebral Compression Fracture)	122	98%	37:57	112
49-year-old with hand pain and weakness (Carpal Tunnel Syndrome)	118	94%	50:23	109
53-year-old with vomiting and fatigue (Lactic Acidosis)	125	100%	57:13	106
60-year-old with a skin lesion (Squamous Cell Carcinoma-in-situ)	125	100%	1:03:42	110
4-week-old with jaundice (Lactation Failure Jaundice and Pyloric Stenosis)	125	100%	41:27	114
49-year-old feeling weak all over (Hyperkalemia)	125	100%	1:00:06	109
58-year-old with a neck mass (Squamous Cell Carcinoma of Head and Neck)	125	100%	35:05	112