

# The **Surg-e-Screener HF** Tool: *Improving Heart Failure Recognition in Electronic Health Records*

## e-Learning Module

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**MICHIGAN MEDICINE**  
UNIVERSITY OF MICHIGAN



# The Problem



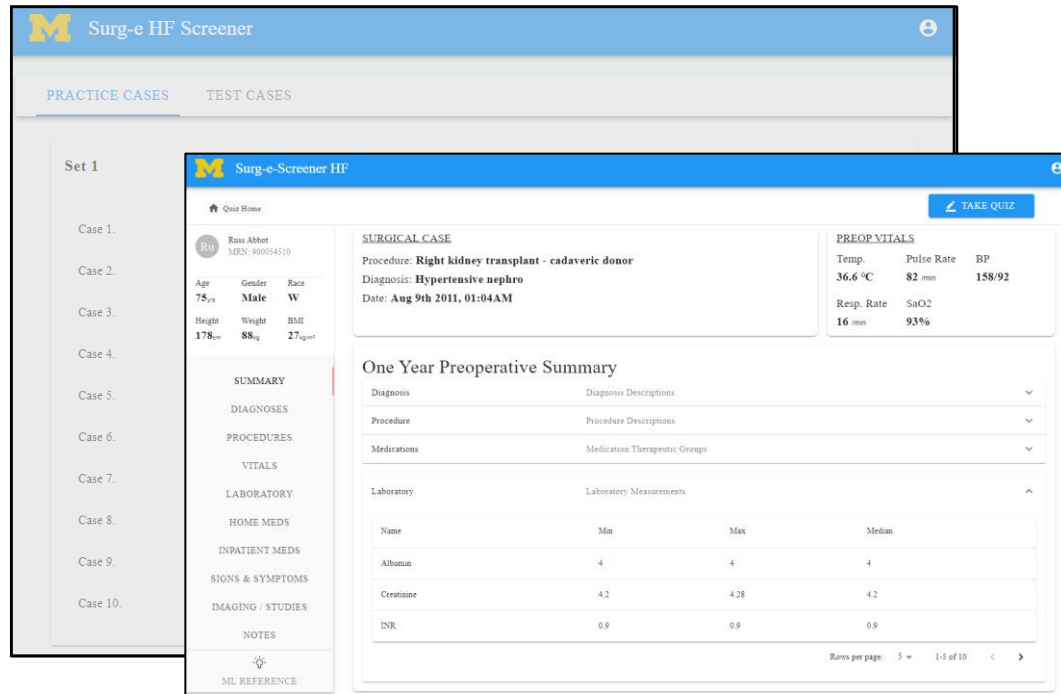
Treatments for **heart failure** (HF) proven to extend & improve quality of life are limited by clinicians' ability to diagnose the disease in **early stages**.

# The Problem



***Unrecognized or untreated*** heart failure is the single greatest risk factor for cardiovascular complications and mortality after **major surgery**.

# The Solution: Surg-e-Screener HF



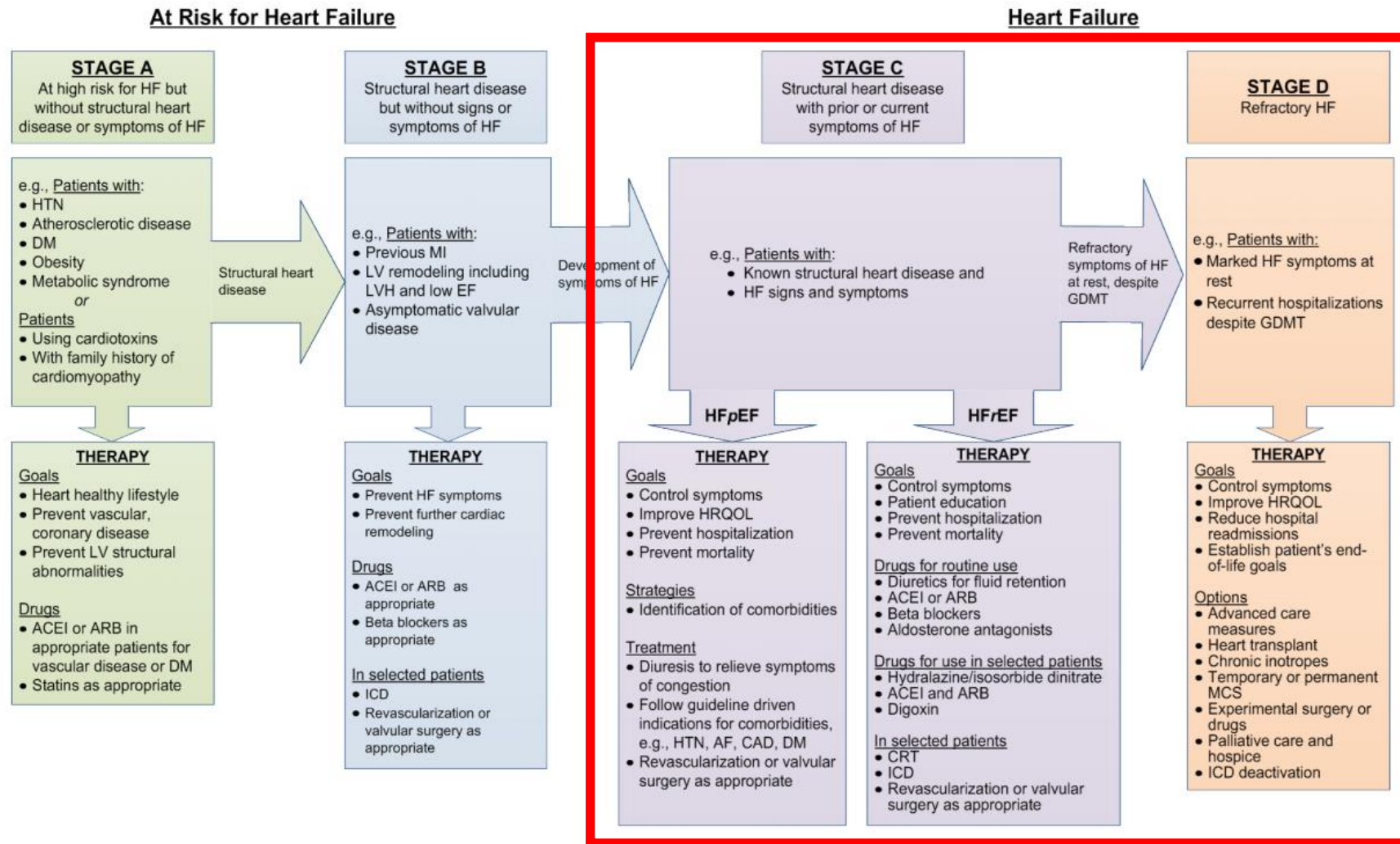
**Surg-e-Screener HF:**  
*Automated screening &  
educational tool*

## Education & Training –

- It is a quiz-based webapp to **improve HF recognition** with surgical cases in EHR
- It provides a report after completing quizzes to **compare** your clinical judgment to **a pane of HF experts**
- It is designed to **augment clinicians' ability** using evidence-based (EB) references



# Chronic Heart Failure Definition for this Tool



For purposes of this tool,  
**Chronic HF** defined as:

- **Chronic:** Signs +/- symptoms or underlying pathophysiology persistent for  $\geq 3$  months (with onset defined as the *start* of this  $\geq 3$  month period)
- **HF:** ACCF/AHA Stage C or D (*prior* or current symptoms + structural heart disease)

Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology*. 2013;62(16):e147-239.



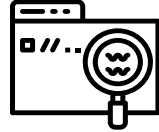
# Purpose of this pilot study

To understand how EHR-based heart failure (HF) recognition can be improved as aided by the **Surg-e-Screener HF** tool.



# Case Review Process

## 1. Case Reviews



Assume you are a *preop physician* reviewing the patient's medical history prior to surgery in order to identify factors pertaining to presence/absence of HF

- Previous HF diagnoses (simplest way to detect, but occasionally inaccurate)
- Signs & symptoms, labs, studies/imaging, medications, clinical notes.

## 2. Pre-test: HF Recognition Quiz



For the first 10 cases, you use EHR data to decide if a patient had HF (chronic ACC/AHA Stage C or D) before the start of the surgery.

## 3. EB Reference



After completing the quiz, you have access to the ***Evidence-Based (EB) reference***, a list of HF risk factors determined by HF guidelines.

## 4. Post-test: HF Recognition Quiz



For the next 10 new cases, you use EHR data **AND** the EB reference to decide if the patient had HF (chronic ACC/AHA Stage C or D) before the start of the surgery.

## 5. Expert Review Comparison



After completing 20 surgical cases, you can access a result report, comparing your HF decision to pre-determined answers and a short case summary by HF experts.



# How to use the tool:

## Step-by-step Guide





# Step 1. Case Reviews

Click "PRE-TEST"

Surge-Screener HF

PRE-TEST POST-TEST

Set 1 3/10 Completed Click "Set 1"

Case 1.	6 Questions Answered	Updated Date: January 13, 2022, 9:31 AM	VIEW
Case 2.	3 Questions Answered	Updated Date: January 13, 2022, 1:15 PM	RESUME
Case 3.	6 Questions Answered	Updated Date: January 14, 2022, 11:30 AM	VIEW
Case 4.	Not Started	Updated Date: -	START
Case 5.	Not Started	Updated Date: -	START
Case 6.	Not Started	Updated Date: -	START
Case 7.	6 Questions Answered	Updated Date: January 13, 2022, 11:50 AM	VIEW
Case 8.	Not Started	Updated Date: -	START
Case 9.	Not Started	Updated Date: -	START
Case 10.	Not Started	Updated Date: -	START

## Check your assigned cases


- 10 surgical cases are assigned to **Pre-Test** and 10 surgical cases are in **Post-Test**.
- Click **Pre-Test** to review 10 surgical cases.
- Click the **Start** button to begin your case review. The button indicates your status.

### Status of your progress:

<b>START</b>	No questions completed.
<b>RESUME</b>	Partially answered questions, not yet completed.
<b>VIEW</b>	Completed questions. You can <i>only</i> view the case.



# Step 1. Case Reviews: Dashboard

 Surg-e-Screener HF 8

[Quiz Home](#) [TAKE QUIZ](#)

1

Pa

Paul Bevoir

MRN: 900001038

Age

Gender

Race

87 yrs

Female

W

Height

Weight

BMI

173 cm

56 kg

18 kg/m<sup>2</sup>

2

SURGICAL CASE

Procedure: Left thrombectomy - specify body sit left above knee amputation

Diagnosis: Lle embolus, acute limb ischemia

Date: Jan 23rd 2010, 07:30PM

3

PREOP VITALS

Temp.

Pulse Rate

BP

36.8 °C

96 /min

145/99

Resp. Rate

SaO2

18 /min

94%

4

SUMMARY

DIAGNOSES

PROCEDURES

VITALS

LABORATORY

HOME MEDS

INPATIENT MEDS

SIGNS & SYMPTOMS

IMAGING / STUDIES

NOTES

5

Date Range Filters

January 24

July

February

September

April

November

June

January

August

March

October

May

December

July

February

September

April

November

2000

2001

2002

2003

2004

2005

2006

2007

2008

2009

☐ Expand All Groups

Select a date range before surgery:

☐ 1 mo.

☐ 3 mo.

☐ 6 mo.

☐ 1 yr.

☐ 3 yr.

☐ 5 yr.

☐ 10 yr.

☒ All

Elixhauser ↑▼

Diagnosis ↑▼

Search...

Diagnosis Source

Type

Code

Lexicon

Date

Present On Admission

▼ CardiacArrhythmias

► Fibrillation, atrial (count: 2)

► Paroxysmal atrial fibrillation (count: 1)

► Persistent atrial fibrillation (count: 1)

► Unspecified atrial fibrillation (count: 3)

▼ ChronicPulmonaryDisease

► Bronchitis, obstr chrn w/exacrb (count: 1)

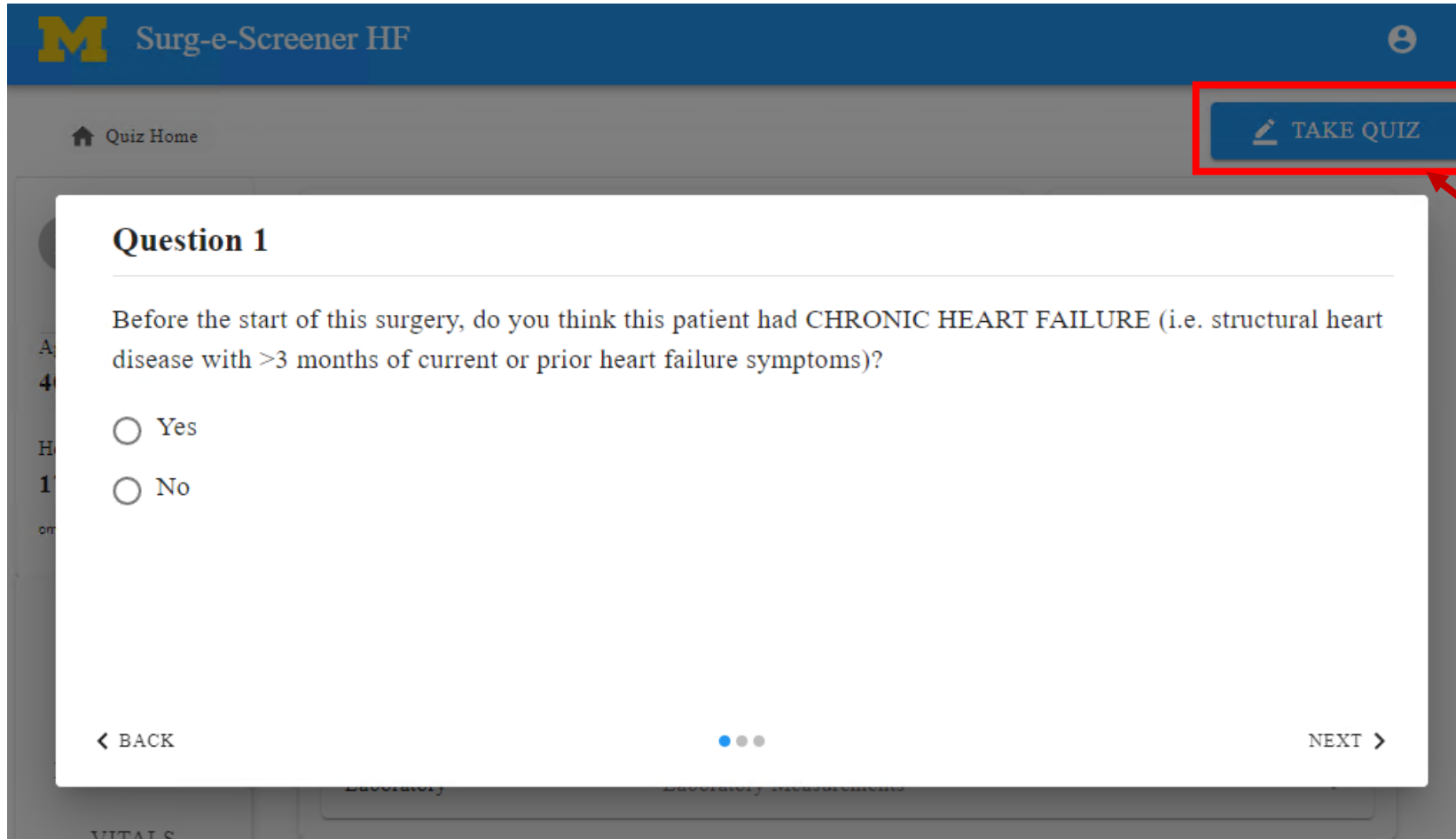
► Chronic obstructive pulmonary disease, unspecified (count: 1)

6

EB REFERENCE

- ## Key components
1. Demographics
  2. Surgical Case
  3. Preoperative Vitals
  4. Subject Domains
  5. Date Filter & EHR data
  6. EB reference

# Step 2. *Pre-test*: HF Recognition Quiz



**M** Surg-e-Screener HF

Quiz Home

**TAKE QUIZ**

**Question 1**

Before the start of this surgery, do you think this patient had CHRONIC HEART FAILURE (i.e. structural heart disease with >3 months of current or prior heart failure symptoms)?

☐ Yes

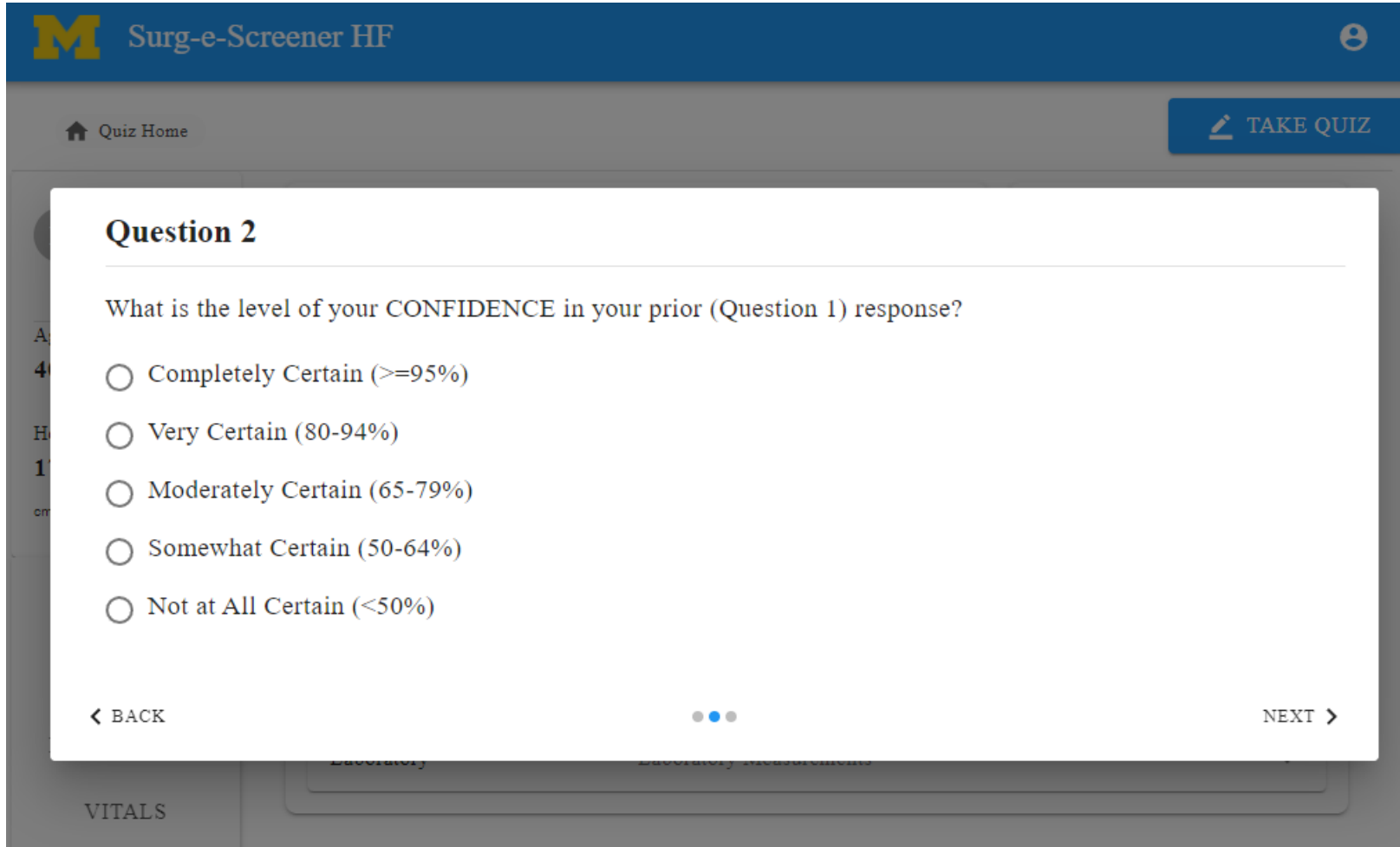
☐ No

[< BACK](#)

[NEXT >](#)

Click "Take Quiz" to answer your decision

# Step 2. *Pre-test*: HF Recognition Quiz



The screenshot displays the 'Surg-e-Screener HF' web application. At the top, there is a blue header with a yellow 'M' logo and the text 'Surg-e-Screener HF'. Below the header, a grey navigation bar contains a 'Quiz Home' link with a house icon and a 'TAKE QUIZ' button with a pencil icon. The main content area is a white modal window titled 'Question 2'. The question text is 'What is the level of your CONFIDENCE in your prior (Question 1) response?'. There are five radio button options: 'Completely Certain (>=95%)', 'Very Certain (80-94%)', 'Moderately Certain (65-79%)', 'Somewhat Certain (50-64%)', and 'Not at All Certain (<50%)'. At the bottom of the modal, there are navigation controls: a '< BACK' button, three dots (the middle one is blue), and a 'NEXT >' button. The background of the application shows a sidebar with 'VITALS' and 'Laboratory' sections.

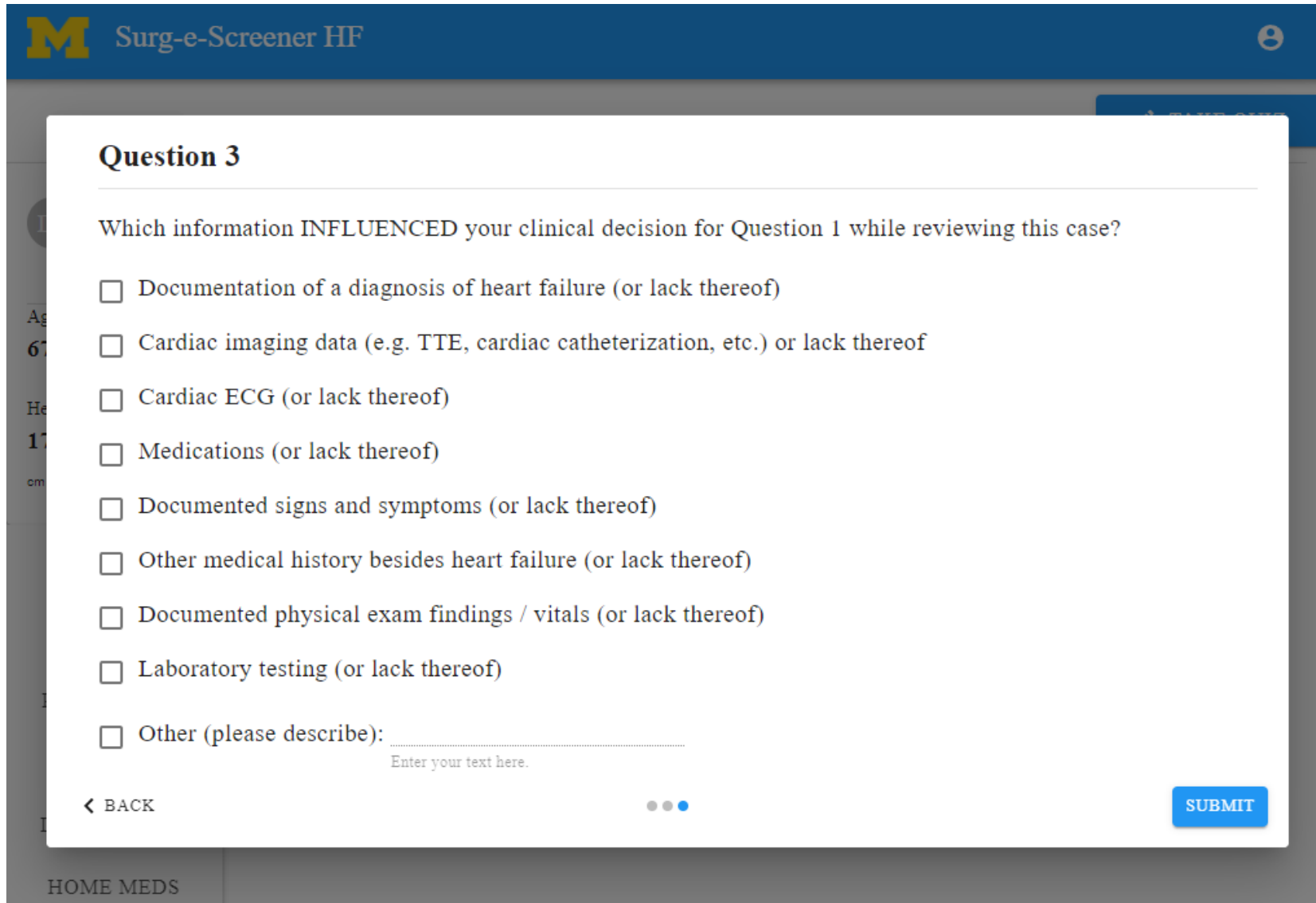
**Question 2**

What is the level of your CONFIDENCE in your prior (Question 1) response?

- ☐ Completely Certain ( $\geq 95\%$ )
- ☐ Very Certain (80-94%)
- ☐ Moderately Certain (65-79%)
- ☐ Somewhat Certain (50-64%)
- ☐ Not at All Certain ( $< 50\%$ )

< BACK      . . .      NEXT >

# Step 2. *Pre-test*: HF Recognition Quiz



The screenshot shows a web-based quiz interface titled "Surg-e-Screener HF". The main content area displays "Question 3" with the prompt: "Which information INFLUENCED your clinical decision for Question 1 while reviewing this case?". Below the prompt is a list of nine options, each preceded by an unchecked checkbox. The options are: "Documentation of a diagnosis of heart failure (or lack thereof)", "Cardiac imaging data (e.g. TTE, cardiac catheterization, etc.) or lack thereof", "Cardiac ECG (or lack thereof)", "Medications (or lack thereof)", "Documented signs and symptoms (or lack thereof)", "Other medical history besides heart failure (or lack thereof)", "Documented physical exam findings / vitals (or lack thereof)", "Laboratory testing (or lack thereof)", and "Other (please describe):". Below the "Other" option is a text input field with the placeholder "Enter your text here.". At the bottom left of the question card is a "< BACK" button, and at the bottom right is a blue "SUBMIT" button. The background of the interface shows a sidebar with a large yellow "M" logo and a list of items including "HOME MEDS".

**Question 3**

Which information INFLUENCED your clinical decision for Question 1 while reviewing this case?



- ☐ Documentation of a diagnosis of heart failure (or lack thereof)
- ☐ Cardiac imaging data (e.g. TTE, cardiac catheterization, etc.) or lack thereof
- ☐ Cardiac ECG (or lack thereof)
- ☐ Medications (or lack thereof)
- ☐ Documented signs and symptoms (or lack thereof)
- ☐ Other medical history besides heart failure (or lack thereof)
- ☐ Documented physical exam findings / vitals (or lack thereof)
- ☐ Laboratory testing (or lack thereof)
- ☐ Other (please describe):



Enter your text here.

< BACK SUBMIT



# Step 3. Evidence-Based (EB) Reference

 Surg-e-Screener HF 

 Quiz Home 

St

Steve Cassidy  
MRN: 900078715

Age	Gender	Race
46 <sub>yrs</sub>	Female	W
Height	Weight	BMI
163 <sub>cm</sub>	67 <sub>kg</sub>	25 <sub>kg/m²</sub>

SUMMARY

DIAGNOSES

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IMAGING / STUDIES

NOTES

 EB REFERENCE

1

**EB Reference:** A collection of risk factors synthesized from HF guidelines  

The EB Reference contains a list of risk factors addressed in HF guidelines. When reviewing this case, a panel of HF experts is asked to note whether these risk factors were documented, were not documented, or could not be determined explicitly in the EHR (MiChart). You can use this EB reference as reviewing this surgical case to determine the presence of HF.

> The key information to understand the EB reference.

2

Section	Risk Factors
1. Signs and Symptoms	Dyspnea on Exertion
	Nocturnal Cough
	Paroxysmal Nocturnal Dyspnea or Orthopnea
2. Past Medical History	History of CAD, MI, or Coronary Revascularization
	Hypertension
3. Medications	Exposure to cardiotoxic drugs/radiation
	Diuretics
4. Physical Exam	Ankle Edema
	Laterally Displaced/Broadened apical beat
	Heart Murmur
	Hepatojugular Reflux
	Hepatomegaly
	Neck Vein Distension
	Pulmonary Rales
	Tachycardia (HR>120)
	Third Heart Sound (S3 Gallop)
	Weight loss >4.5kg in 5 days
6. Test - Image	Acute Pulmonary Edema

3

HF Expert A		HF Expert B	
EHR Documentation	Expert Impression	EHR Documentation	Expert Impression
Absent	Maybe Absent	Absent	Probably Absent
Unknown	Probably Absent	Absent	Probably Absent
Unknown	Probably Absent	Unknown	Probably Absent
Absent	Probably Absent	Absent	Probably Absent
Present	Probably Present	Present	Definitely Present
Unknown	Probably Absent	Unknown	Probably Absent
Absent	Definitely Absent	Unknown	Probably Absent
Present	Definitely Absent	Absent	Probably Absent
Unknown	Maybe Present	Unknown	Probably Absent
Absent	Definitely Present	Absent	Probably Absent
Unknown	Maybe Absent	Unknown	Probably Absent
Absent	Probably Absent	Unknown	Probably Absent
Present	Definitely Present	Present	Probably Present
Absent	Definitely Absent	Absent	Probably Absent
Present	Definitely Present	Present	Definitely Present
Unknown	Probably Absent	Unknown	Probably Absent
Absent	Definitely Absent	Unknown	Probably Absent
Absent	Probably Absent	Unknown	Probably Absent

## Key components

1. The EB reference description
2. Key risk factors from the HF guidelines
3. Two HF expert pre-determined reviews
  - EHR Documentation – Present / Absent / Unknown of risk factors
  - Expert Impression – clinical impression of whether the risk factor present or not.



# Factors Contributing to Heart Failure

## Framingham Criteria

Major	Minor
Acute pulmonary edema	Ankle edema
Cardiomegaly	Dyspnea on exertion
Hepatojugular reflux	Hepatomegaly
Neck vein distention	Nocturnal cough
Paroxysmal nocturnal dyspnea/orthopnea	Pleural effusion
Pulmonary rales	Tachycardia (HR >120)
Third heart sound (S3 gallop)	
Weight loss >4.5 kg in 5 days in response to treatment	

McKee PA, Castelli WP, McNamara PM, Kannel WB: The natural history of congestive heart failure: the Framingham study. N Engl J Med 1971; 285: 1441-6



# Factors Contributing to Heart Failure

## European Society of Cardiology Guidelines

Assessment of HF Probability	
Clinical History	History of CAD (MI or revascularization)
	History of arterial hypertension
	Exposure to cardiotoxic drugs/radiation
	Use of diuretics
	Orthopnea / paroxysmal nocturnal dyspnea
Physical Examination	Rales
	Bilateral ankle edema
	Heart Murmur
	Jugular venous distention
	Laterally displaced / broadened apical beat
ECG	Any abnormality

Natriuretic Peptides (HF unlikely if negative)	
NT-proBNP	≥ 125 pg/mL
BNP	≥ 35 pg/mL

Echocardiography
Cardiologist assessment

2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. Eur Heart J. 2016;37(27):2129-2200. doi:10.1093/eurheartj/ehw128





# Factors Contributing to Heart Failure

## ACCF/AHA Guidelines

Clinical History
Family history of cardiomyopathy
Severity & triggers of dyspnea/fatigue, chest pain, exercise capacity, physical activity, sexual activity
Anorexia, early satiety, weight loss
Rapid weight gain
Palpitations, (pre)syncope episodes, ICD shocks
Symptoms suggesting transient ischemic attack/thromboembolism
Disordered breathing at night, sleep problems
Diet

Physical Exam
Vital signs, heart rhythm, orthostatic changes
Jugular venous distention / hepatojugular reflux
Peripheral edema / cool lower extremities
Hepatomegaly / ascites
Extra heart sounds, murmurs, enlarged/displaced maximal impulse, RV heave
Rales, pleural effusion
EHR Features
Hospitalizations for HF
Medications for HF

Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Journal of the American College of Cardiology*. 2013;62(16):e147-239.



# Using the Evidence-Based (EB) HF Reference

- For each patient, a HF expert panel reviewed the EHR, and documented whether or not **factors contributing to heart failure** were:
  - Present
  - Absent
  - Unable to explicitly determine (Unknown)
- Additionally, the expert panel noted quantitative and qualitative findings describing the **lowest left ventricular ejection fraction** within the EHR prior to surgery

# Example Data from HF Expert Panel Review

Based on **relevant** clinical records within 365 days of surgery, what specific Major Framingham Criteria for heart failure did the patient exhibit *prior* to surgery?

	Explicitly Determined from Clinical Documentation?		
	Documented as Present	Documented as Absent	Unable to explicitly determine
Acute Pulmonary Edema	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hepatojugular Reflux	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Neck Vein Distension	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Paroxysmal Nocturnal Dyspnea/Orthopnea	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Pulmonary Rales	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Third Heart Sound (S3 Gallop)	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>

Based on **relevant** clinical records within 365 days of surgery, what specific risk factors for heart failure did the patient exhibit on *prior* to surgery?

	Explicitly Determined from Clinical Documentation?		
	Documented as Present	Documented as Absent	Unable to explicitly determine
History of CAD, MI, or Coronary Revascularization	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
History of Hypertension	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Exposure to cardiotoxic drugs/radiation	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Use of diuretics	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Heart Murmur	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Laterally Displaced/Broadened apical beat	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>



# Example Data from HF Expert Panel Review

What was the lowest left ventricular ejection fraction (%), or if no ejection fraction available, lowest qualitative report of left ventricular systolic function performed within this time period?

☒ Specific EF Reported:

32%

☐ No EF Reported, but Hyperdynamic ( $\geq 70\%$ ) or equivalent qualitative report

☐ No EF Reported, but Normal (50–69%) or equivalent qualitative report

☐ No EF Reported, but Mild Dysfunction (40–49%) or equivalent qualitative report

☐ No EF Reported, but Moderate Dysfunction (30–39%) or equivalent qualitative report

☐ No EF Reported, but Severe Dysfunction ( $< 30\%$ ) or equivalent qualitative report



# Step 3. Evidence-Based (EB) Reference

St

Steve Cassidy

MRN: 900078715

Age

46<sub>yrs</sub>

Gender

Female

Race

W

Height

163<sub>cm</sub>

Weight

67<sub>kg</sub>

BMI

25<sub>kg/m²</sub>

SUMMARY

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EB REFERENCE

EB Reference: A collection of risk factors synthesized from HF guidelines

The EB Reference contains a list of risk factors addressed in HF guidelines. When reviewing this case, a panel of HF experts is asked to note whether these risk factors were documented, were not documented, or could not be determined explicitly in the EHR (MiChart). You can use this EB reference as reviewing this surgical case to determine the presence of HF.

▼ The key information to understand the EB reference.

The "EHR Documentation" column includes HF experts' verification of risk factors documented in EHR.

- Present:** The risk factor was **documented** in EHR.
- Absent:** The risk factor was documented as **not present** in EHR.
- Unknown:** The presence of the risk factor was **unable to be explicitly determined** from the EHR.

The "Expert Impression" column includes HF experts' clinical impression of whether the risk factor was present (based upon their expert judgment and trustworthiness of the EHR documentation).

- Definitely Present:** The HF expert was over **95%** certain that the risk factor was present.
- Probably Present:** The HF expert was between **80-94%** certain that the risk factor was present.
- Maybe Present:** The HF expert was between **50-79%** certain that the risk factor was present.
- Maybe Absent:** The HF expert was between **21-49%** certain that the risk factor was present.
- Probably Absent:** The HF expert was between **5-20%** certain that the risk factor was present.
- Definitely Absent:** The HF expert was less than **5%** certain that the risk factor was present.

Search...

Section	Risk Factors	HF Expert A		HF Expert B	
		EHR Documentation	Expert Impression	EHR Documentation	Expert Impression
1. Signs and Symptoms	Dyspnea on Exertion	Absent	Maybe Absent	Absent	Probably Absent
	Nocturnal Cough	Unknown	Probably Absent	Absent	Probably Absent
	Paroxysmal Nocturnal Dyspnea or Orthopnea	Unknown	Probably Absent	Unknown	Probably Absent
2. Past Medical History	History of CAD, MI, or Coronary Revascularization	Absent	Probably Absent	Absent	Probably Absent
	Hypertension	Present	Probably Present	Present	Definitely Present
3. Medications	Exposure to cardiotoxic drugs/radiation	Unknown	Probably Absent	Unknown	Probably Absent
	Diuretics	Absent	Definitely Absent	Unknown	Probably Absent
4. Physical Exam	Ankle Edema	Present	Definitely Absent	Absent	Probably Absent

# Step 4. *Post-test*: HF Recognition Quiz

**M** Surg-e-Screener HF

Quiz Home

**TAKE QUIZ**

**Question 1**

Before the start of this surgery, do you think this patient had CHRONIC HEART FAILURE (i.e. structural heart disease with >3 months of current or prior heart failure symptoms)?

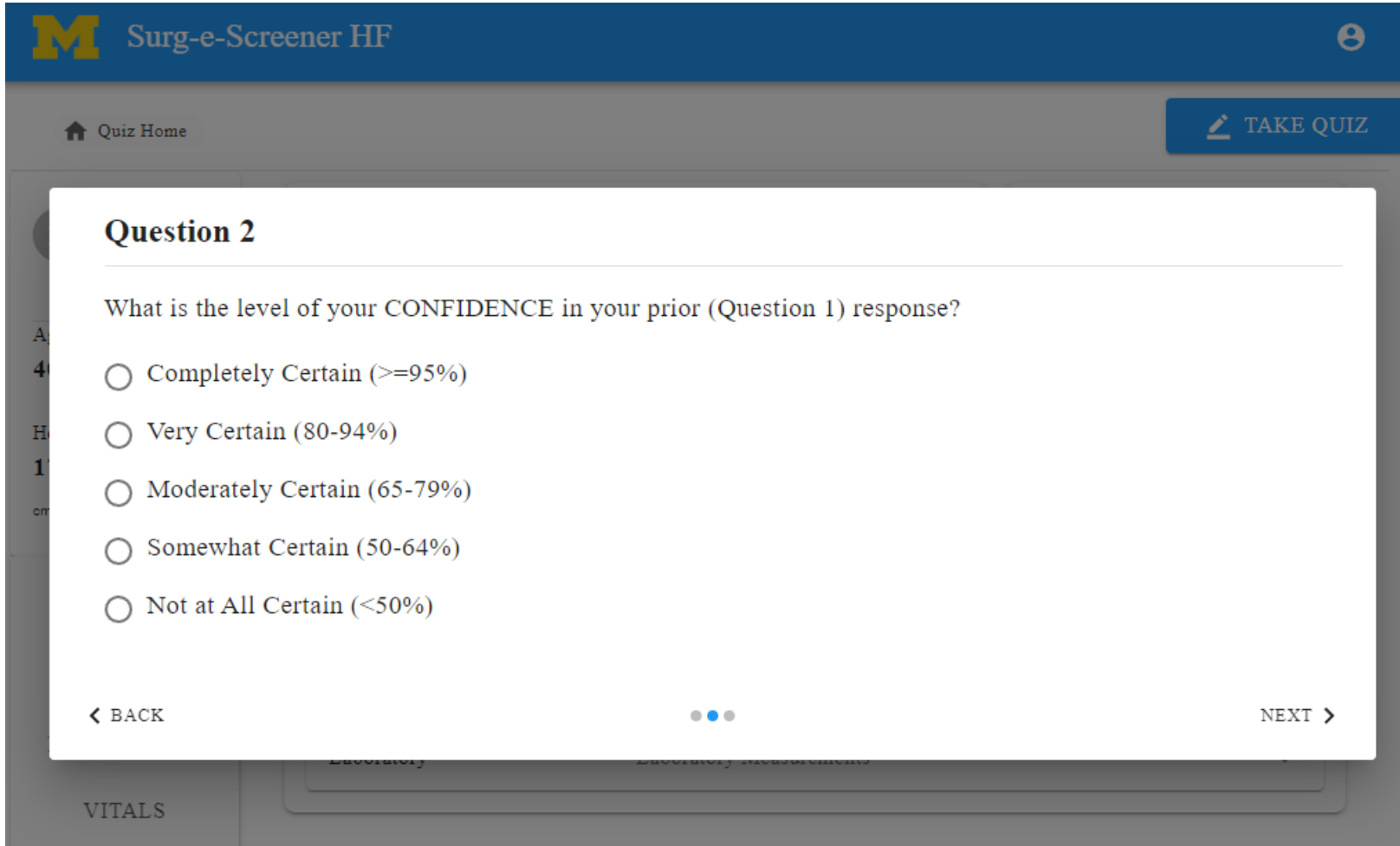
☐ Yes

☐ No

< BACK      ...      NEXT >

Click "Take Quiz" to answer your decision

# Step 4. *Post-test*: HF Recognition Quiz



The screenshot shows a web-based quiz interface for 'Surg-e-Screener HF'. The header is dark blue with a yellow 'M' logo and the text 'Surg-e-Screener HF'. Below the header, there's a navigation bar with 'Quiz Home' and a 'TAKE QUIZ' button. The main content area displays 'Question 2' with the text 'What is the level of your CONFIDENCE in your prior (Question 1) response?'. There are five radio button options: 'Completely Certain (>=95%)', 'Very Certain (80-94%)', 'Moderately Certain (65-79%)', 'Somewhat Certain (50-64%)', and 'Not at All Certain (<50%)'. At the bottom of the question card, there are 'BACK' and 'NEXT' buttons with a progress indicator in the center.

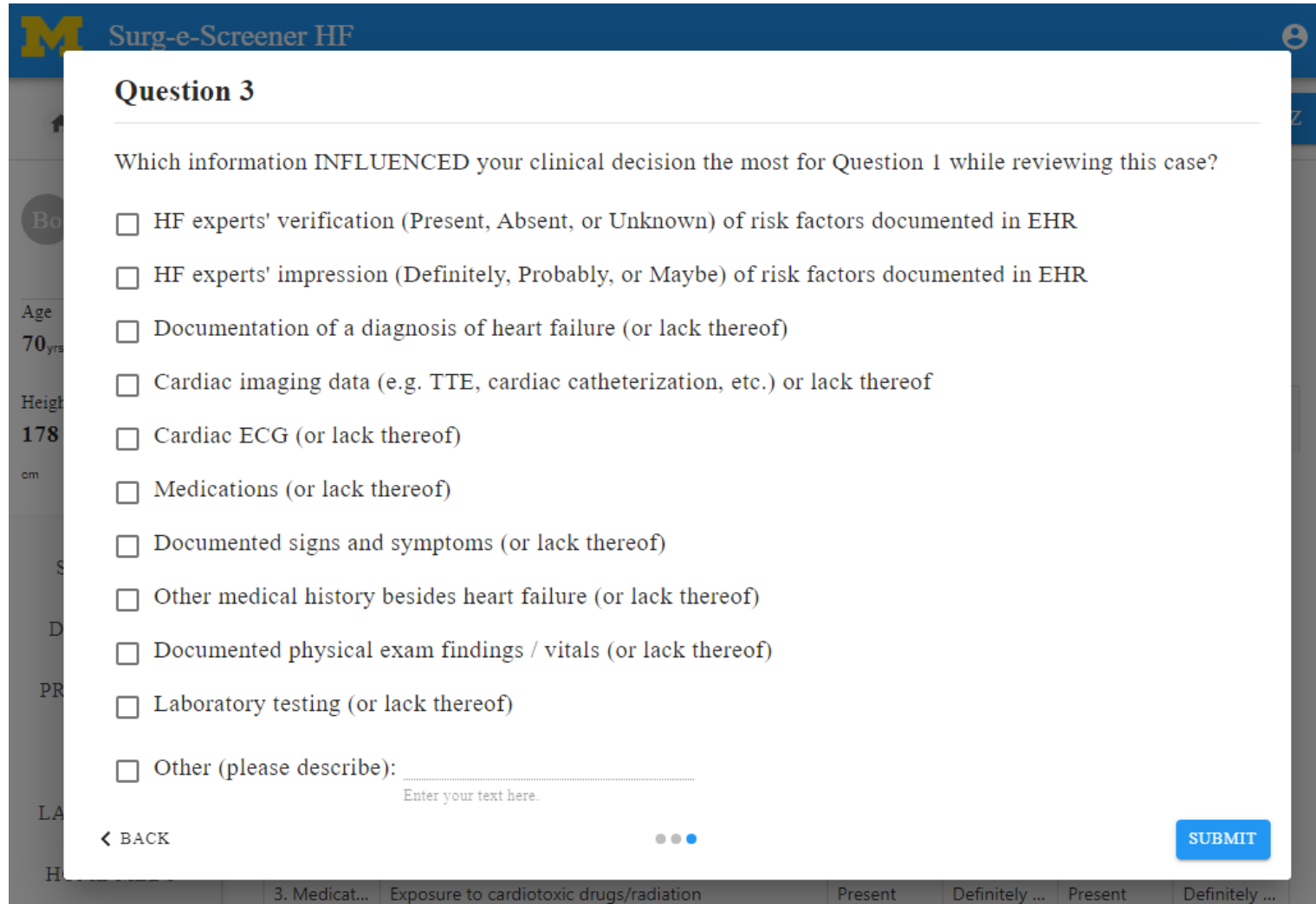
**Question 2**

What is the level of your CONFIDENCE in your prior (Question 1) response?

- ☐ Completely Certain ( $\geq 95\%$ )
- ☐ Very Certain (80-94%)
- ☐ Moderately Certain (65-79%)
- ☐ Somewhat Certain (50-64%)
- ☐ Not at All Certain ( $< 50\%$ )

[< BACK](#) [NEXT >](#)

# Step 4. Post-test: HF Recognition Quiz



The screenshot shows a web-based quiz interface titled "Surg-e-Screener HF". The main content area displays "Question 3" with the text: "Which information INFLUENCED your clinical decision the most for Question 1 while reviewing this case?". Below this text is a list of ten options, each preceded by an unchecked checkbox. The options are: "HF experts' verification (Present, Absent, or Unknown) of risk factors documented in EHR", "HF experts' impression (Definitely, Probably, or Maybe) of risk factors documented in EHR", "Documentation of a diagnosis of heart failure (or lack thereof)", "Cardiac imaging data (e.g. TTE, cardiac catheterization, etc.) or lack thereof", "Cardiac ECG (or lack thereof)", "Medications (or lack thereof)", "Documented signs and symptoms (or lack thereof)", "Other medical history besides heart failure (or lack thereof)", "Documented physical exam findings / vitals (or lack thereof)", and "Laboratory testing (or lack thereof)". The final option is "Other (please describe):" followed by a text input field with the placeholder "Enter your text here.". At the bottom left of the question card is a "< BACK" button, and at the bottom right is a blue "SUBMIT" button. Below the question card, a progress bar shows three dots, with the third dot being filled. At the very bottom of the screen, a table displays the quiz progress for various categories.

**Question 3**

Which information INFLUENCED your clinical decision the most for Question 1 while reviewing this case?

- ☐ HF experts' verification (Present, Absent, or Unknown) of risk factors documented in EHR
- ☐ HF experts' impression (Definitely, Probably, or Maybe) of risk factors documented in EHR
- ☐ Documentation of a diagnosis of heart failure (or lack thereof)
- ☐ Cardiac imaging data (e.g. TTE, cardiac catheterization, etc.) or lack thereof
- ☐ Cardiac ECG (or lack thereof)
- ☐ Medications (or lack thereof)
- ☐ Documented signs and symptoms (or lack thereof)
- ☐ Other medical history besides heart failure (or lack thereof)
- ☐ Documented physical exam findings / vitals (or lack thereof)
- ☐ Laboratory testing (or lack thereof)
- ☐ Other (please describe):

Enter your text here.

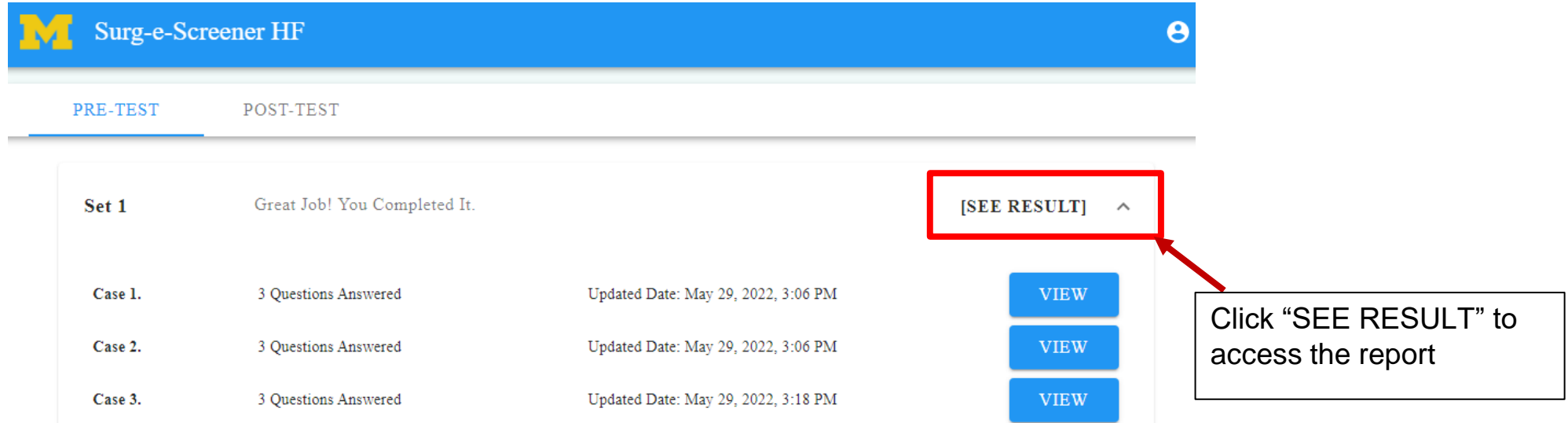
< BACK SUBMIT

3. Medicat...	Exposure to cardiotoxic drugs/radiation	Present	Definitely ...	Present	Definitely ...
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# Step 5. Result Report Access



**M** Surg-e-Screener HF

PRE-TEST POST-TEST

Set 1	Great Job! You Completed It.	[SEE RESULT] ^
Case 1.	3 Questions Answered	Updated Date: May 29, 2022, 3:06 PM
Case 2.	3 Questions Answered	Updated Date: May 29, 2022, 3:06 PM
Case 3.	3 Questions Answered	Updated Date: May 29, 2022, 3:18 PM

VIEW  
VIEW  
VIEW

Click "SEE RESULT" to access the report

## Key components

- SEE RESULT will be available after reviewing 20 surgical cases, 10 case review results in PRE-TEST and 10 case review results in POST-TEST.



# Step 5. Expert Review Comparison

	Your Response	Expert Review	HF Expert Case Summary
Case 1	Yes	Yes	REVIEW
Case 2	Yes (Incorrect)	No	REVIEW
Case 3	Yes	Yes	REVIEW

**Summary 1:**  
87 F PMH chronic afib with pulmonary HTN ... who had a significant reduction in EF ... that had not recovered 1 month later.

**Summary 2:**  
87-year-old female admitted 6-months before surgery .... Following that, she most likely developed .... she underwent ... for LLE Ischemia.

Your Score:	60%	-
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BACKHOME

## Review your result report

- Compare your HF recognition with the pre-determined answers by HF experts in each case.
- **Re-examine cases** when you are misaligned with the answers.
- Review **a short description** of the surgical cases summarized by the HF experts.

# Summary of e-Learning Module

After watching this e-Learning module, you should be able to:

1. Understand the **process and activities required** to complete the HF recognition study
2. Identify **risk factors contributing to HF** from Framingham Criteria, European Society of Cardiology, and American Heart Association guidelines
3. Describe what combination of **major and minor risk factors** determines HF using the Framingham Criteria.

The short quiz will ask you mainly about Point 2 and Point 3.



# Demo

# Final Step

- No further actions after completing the test cases. We appreciate your participation.
- Reimbursement:
  - **Follow-up** if any case reviews remain **incomplete**
  - Pending follow-up / completion of all cases, you will receive reimbursement of **\$50 as a check** delivered to your mailing address
- Email Hyeon Joo ([thejoo@med.umich.edu](mailto:thejoo@med.umich.edu)) if any questions

