Virtual Patient Simulation is Highly Effective at Improving Guideline-Based Management of Hyperlipidemia
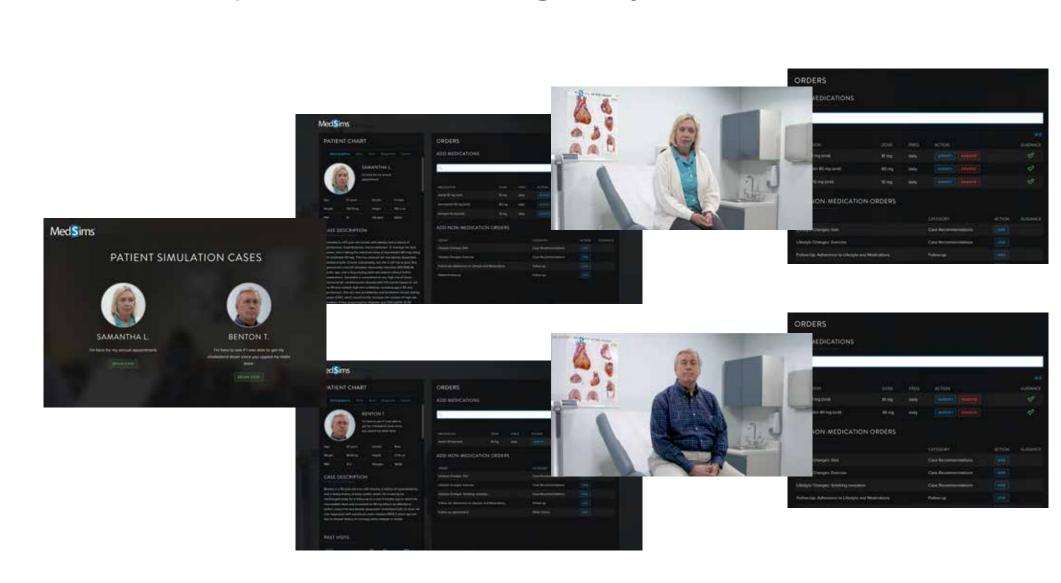
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PURPOSE

We sought to determine if an online, virtual patient simulation (VPS)-based continuing medical education (CME) intervention could improve performance of cardiologists and primary care physicians (PCPs) related to guideline-based management of patients with hyperlipidemia.

METHODS

- The intervention comprised 2 patients presenting in a VPS platform that allows learners to order lab tests, make diagnoses, and prescribe treatments supported by an extensive database of diagnostic and treatment possibilities matching the scope and depth of actual practice

- Learner clinical decisions, entered using open field entries, were analyzed using a sophisticated decision engine
  - Tailored clinical guidance (CG), based on current evidence and expert recommendation, was provided following each decision
  - Learners were given the opportunity to modify their decisions after receiving CG

- Each user's decisions were collected post-CG and compared with that user's pre-CG data using a 2-tailed, paired t-test

- Data are reflective of learners who participated in the VPS from April 29, 2019, through July 25, 2019
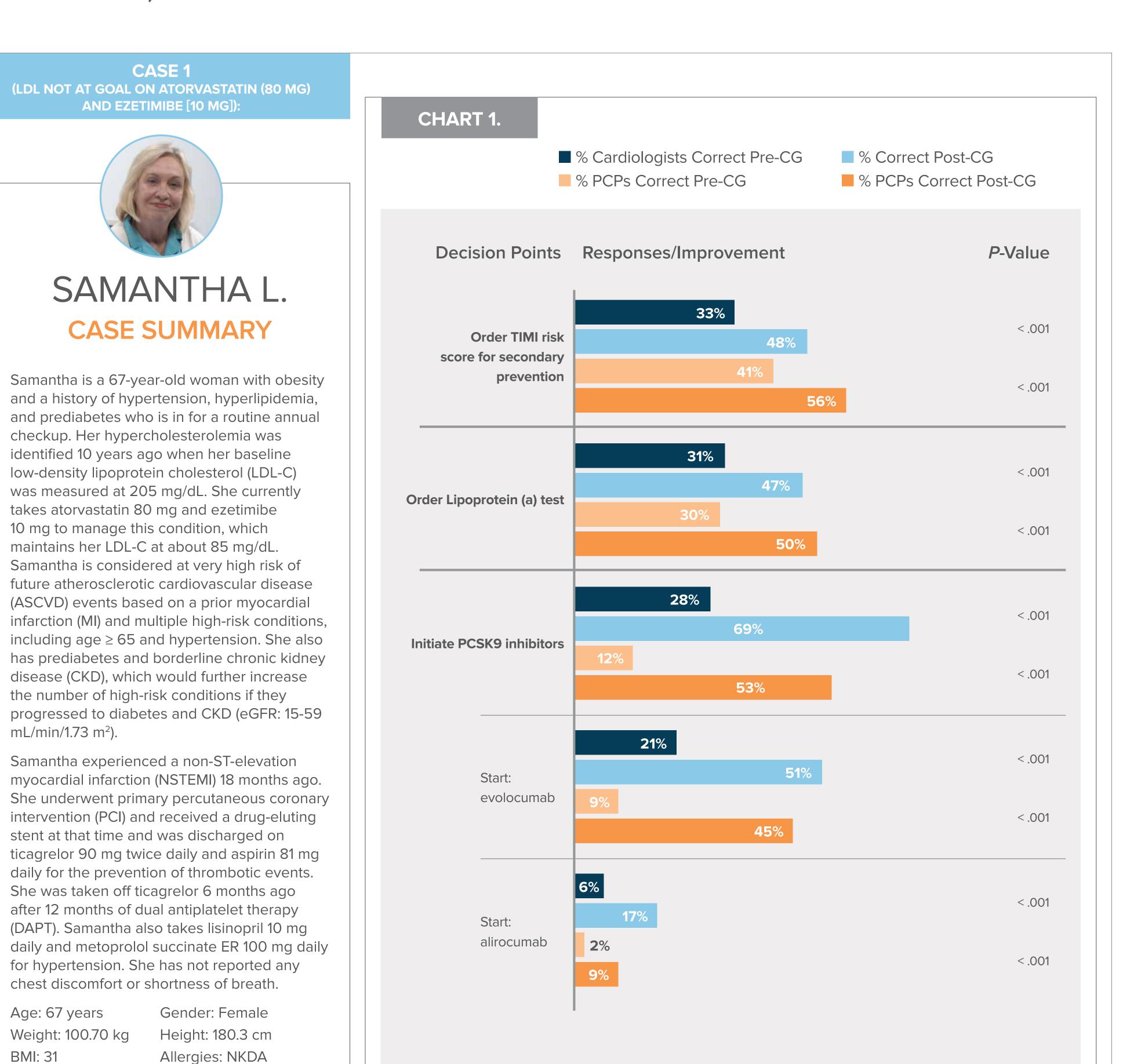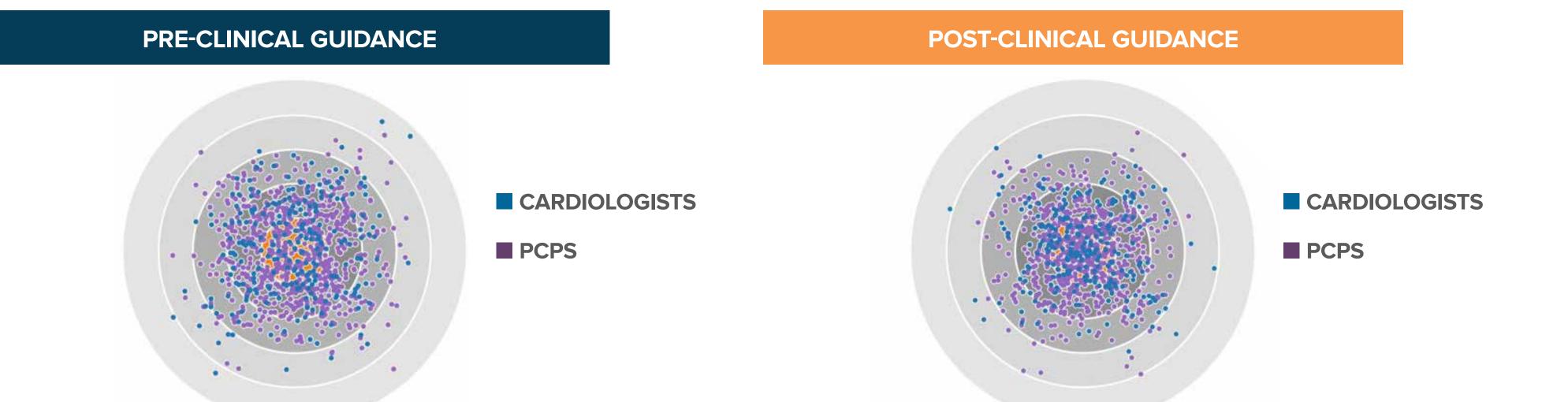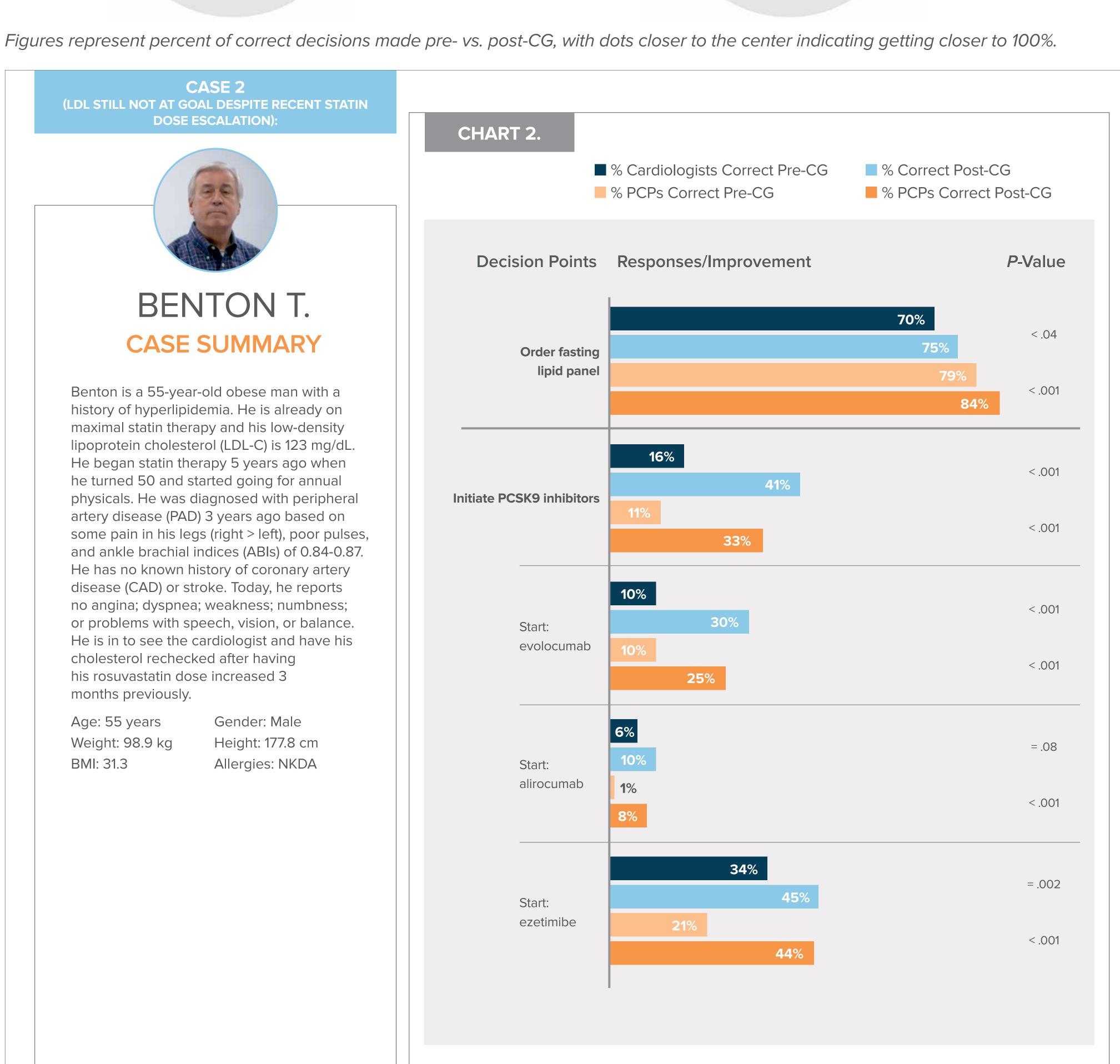
RESULTS

Patient Simulation Cases

Overall, significant improvements were demonstrated by both cardiologists and PCPs related to comprehensive management of patients with hyperlipidemia.

In total, 105 cardiologists and 375 PCPs were included. Significant improvements (reported as absolute differences) were observed after CG.

PRE-CLINICAL GUIDANCE — CARDIOLOGISTS, PCPS

POST-CLINICAL GUIDANCE — CARDIOLOGISTS, PCPS

Figures represent percent of correct decisions made pre- vs. post-CG, with dots closer to the center indicating getting closer to 100%.

CASE 1 (LDL NOT AT GOAL ON ATORVASTATIN (80 MG) AND EZETIMIBE [10 MG]):

SAMANTHA L.
CASE SUMMARY

Samantha is a 67-year-old woman with obesity and a history of hypertension, hyperlipidemia, and prediabetes who is in for a routine annual checkup. Her hypercholesterolemia was identified 10 years ago when her baseline low-density lipoprotein cholesterol (LDL-C) was measured at 205 mg/dL. She currently takes atorvastatin 80 mg and ezetimibe 10 mg to manage this condition, which maintains her LDL-C at about 85 mg/dL. Samantha is considered at very high risk of future atherosclerotic cardiovascular disease (ASCVD) events based on a prior myocardial infarction (MI) and multiple high-risk conditions, including age ≥ 65 and hypertension. She also has prediabetes and borderline chronic kidney disease (CKD), which would further increase the number of high-risk conditions if they progressed to diabetes and CKD (eGFR: 15-59 mL/min/1.73 m²).

Samantha experienced a non-ST-elevation myocardial infarction (NSTEMI) 18 months ago. She underwent primary percutaneous coronary intervention (PCI) and received a drug-eluting stent at that time and was discharged on ticagrelor 90 mg twice daily and aspirin 81 mg daily for the prevention of thrombotic events. She was taken off ticagrelor 6 months ago after 12 months of dual antiplatelet therapy (DAPT). Samantha also takes lisinopril 10 mg daily and metoprolol succinate ER 100 mg daily for hypertension. She has not reported any chest discomfort or shortness of breath.

Age: 67 years
Weight: 100.70 kg
BMI: 31
Gender: Female
Height: 180.3 cm
Allergies: NKDA

CHART 1.

Legend: % Cardiologists Correct Pre-CG; % Correct Post-CG; % PCPs Correct Pre-CG; % PCPs Correct Post-CG

Decision Points	Responses/Improvement	P-Value
Order TIMI risk score for secondary prevention	33% / 48%	<.001
	41% / 56%	<.001
Order Lipoprotein (a) test	31% / 47%	<.001
	30% / 50%	<.001
Initiate PCSK9 inhibitors	28% / 69%	<.001
	12% / 53%	<.001
Start: evolocumab	21% / 51%	<.001
	9% / 45%	<.001
Start: alirocumab	6% / 17%	<.001
	2% / 9%	<.001

CASE 2 (LDL STILL NOT AT GOAL DESPITE RECENT STATIN DOSE ESCALATION):

BENTON T.
CASE SUMMARY

Benton is a 55-year-old obese man with a history of hyperlipidemia. He is already on maximal statin therapy and his low-density lipoprotein cholesterol (LDL-C) is 123 mg/dL. He began statin therapy 5 years ago when he turned 50 and started going for annual physicals. He was diagnosed with peripheral artery disease (PAD) 3 years ago based on some pain in his legs (right > left), poor pulses, and ankle brachial indices (ABIs) of 0.84-0.87. He has no known history of coronary artery disease (CAD) or stroke. Today, he reports no angina; dyspnea; weakness; numbness; or problems with speech, vision, or balance. He is in to see the cardiologist and have his cholesterol rechecked after having his rosuvastatin dose increased 3 months previously.

Age: 55 years
Weight: 98.9 kg
BMI: 31.3
Gender: Male
Height: 177.8 cm
Allergies: NKDA

CHART 2.

Legend: % Cardiologists Correct Pre-CG; % Correct Post-CG; % PCPs Correct Pre-CG; % PCPs Correct Post-CG

Decision Points	Responses/Improvement	P-Value
Order fasting lipid panel	70% / 75%	<.04
	79% / 84%	<.001
Initiate PCSK9 inhibitors	16% / 41%	<.001
	11% / 33%	<.001
Start: evolocumab	10% / 30%	<.001
	10% / 25%	<.001
Start: alirocumab	6% / 10%	=.08
	1% / 8%	<.001
Start: ezetimibe	34% / 45%	=.002
	21% / 44%	<.001

CONCLUSIONS

- VPS that immerses and engages specialists in an authentic and practical learning experience can improve evidence-based clinical decisions related to guideline-based management of hyperlipidemia

- Persistent educational gaps were uncovered related to:
  - Order TIMI risk score for secondary prevention
  - Order Lipoprotein (a) test
  - Initiate a PCSK9 inhibitors or other nonstatin therapy when appropriate

DISCLOSURE

The author has nothing to disclose.

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