Supplemental Digital Appendix 1
Semistructured Interview Script

Introduction
- Thank you for agreeing to talk with us today. We are eager to hear your thoughts on artificial intelligence and clinician competencies.
- I am [Name/Role] and these are my research partners [Name/Role]. They will listen while we are talking and ask a few questions of their own at the end. [say hello, then other cameras/mics off]
- As we explained in the invitation letter, this is part of a collaborative project between IBM and Vanderbilt University Medical Center.
- Our goal with this project is to describe a set of competencies that are needed to use artificial intelligence effectively in clinical care. Specifically, we are interested in clarifying the scope of required knowledge, skills, and attitudes across health professions.
- We want to hear your perspective and experiences. Please feel free to ask questions or for clarification at any time. I'm hoping you will provide details and examples when possible and that, after this introduction, you will do most of the talking.
- This interview will be audio recorded for transcription. You will receive a short survey after this interview and a draft of the proposed competencies within a few months. After completion of the three study elements (interview, experience survey and feedback on competencies), you will receive an honorarium in appreciation for your time and expertise.
- Do you have any questions before we begin?

Definition
- When we say *artificial intelligence in healthcare*, we are referring to technologies intended to augment the clinical decisions, actions, and environments of health care workers and patients. These technologies are enabled by computational means such as predictive analytics, machine learning, and natural language processing. They could be implemented in electronic health records, in new technologies such as robots, or in personal tools. Examples might include risk scoring, chatbots, and image analysis.
- Do you have any feedback or adjustments to this definition?

Your Experience
- What are some of the most important ways artificial intelligence is currently integrated in health care delivery?
    o Why are they important?
- How do you imagine the impacts of artificial intelligence in healthcare over the next 5-7 years?
    o Describe the pace of change that you anticipate?

Competencies
- We want to know more about competencies needed for clinical practice in this new technological environment. Think broadly including all necessary knowledge, skills, and attitudes.
- Individual Competencies

- o What does a doctor / nurse / pharmacist need to know to work effectively with AI in healthcare?
  - o Specific technical or analytical skills?
  - o Attitudes related to AI in healthcare?
  - o Aspects of professionalism or ethics?
  - o What would you say is the top of list in importance?
- Interprofessional Teams
  - o How might this differ across health professions (physicians, nurses, pharmacists, other caregivers)?
  - o How will interprofessional teamwork be affected?

Education & Training
- What type of education or training programs do you think will be needed to prepare healthcare professionals to work effectively with AI?
- Do you know of best practices or exemplar training programs to prepare clinical professionals to work with AI?

Specific Use Cases
- Example #1: Algorithm
  - o A common use of AI is to improve information summarization and aid in decision-making.
  - o To use an AI system that provides algorithmic guidance for practice, what KSAs will clinicians need?
- Example #2: Patient-driven AI
  - o Patients are already using AI-enhanced tools in their personal lives and bringing information to clinic.
  - o What KSAs will clinicians need to navigate AI advances together with their patients?
- Example #3: Care-Bots
  - o How will smart robots impact healthcare delivery in the future? How do you think the roles of health professionals will change?
  - o What KSAs will clinicians need to navigate AI advances together with robotic intelligences?

Diversity & Bias
- Describe the key knowledge, skills and attitudes for frontline clinicians related to human diversity and equity//bias in these systems?
- Related to bias in datasets and cultural competency, what kind of understanding about human variation and complexity is necessary?
- How have/will AI-based approaches contribute to sciences of human diversity? What are the risks?

Closing & Questions
- Thank you for your time and ideas
- Are there questions we should have asked?
- Does my research partner have questions?

- Do you have questions or additional comments?
- Will follow-up with 1) Experience Survey and 2) Draft Competencies
- Suggestions about additional people to interview for this project?

Supplemental Digital Appendix 2
Competencies for the Use of Artificial Intelligence–Based Tools by Health Care Professionals: Expected Experience Levels and Relationship to ACGME Core Competency Domains

Recognizing that students may enter their education programs with more experience and knowledge than their faculty teachers, we have designated the sub-competencies as early (all), middle (mid), or advanced (adv) rather than recommend a specific phase of education for each.

The ACGME core competency domains are medical knowledge (MK), patient care (PC), professionalism (PRO), systems-based practice (SBP), practice-based learning and improvement (PBLI), and interpersonal and communication skills (IPCS).[1]

Competencies and subcompetencies	Experience level	ACGME core competency
Basic knowledge of AI: Explain what artificial intelligence is and describe its health care applications.		
a. Identify the range of health-related AI applications.	All	MK
b. Describe contributions from the disciplines of data science, computer science, and informatics to the development of health care AI tools.	All	MK
c. Summarize the factors that influence the quality of data and explain how they impact the outputs of AI applications.	Mid	MK
d. Explain how different approaches to data visualization can affect interpretation of the outputs of AI-based tools and the subsequent actions that might be taken.	Adv	MK
e. Describe the statistical properties of AI-based tools and explain how they should be used in interpreting outputs.	Mid	MK
Social and ethical implications of AI: Explain how social, economic, and political systems influence AI-based tools and how these relationships impact justice, equity, and ethics.		
a. Acknowledge personal responsibility for fairness and equity in the use of AI-based tools in health care.	All	PRO
b. Describe how system-level factors and regulatory structures influence the implementation of AI-based tools in health care.	Mid	SBP

c. Identify and evaluate how personal and structural biases can impact health data and the outputs of AI-based tools.	All	PRO, SBP
d. Recognize the potential for use of AI-based tools to reduce or exacerbate health disparities and participate in debiasing activities to mitigate negative impacts.	All	PRO, PBLI, SBP
e. Appraise the ethical issues for clinicians, patients, and populations raised by various design, implementation, and use scenarios involving AI.	Mid	PRO
AI-enhanced clinical encounters: Carry out AI-enhanced clinical encounters that integrate diverse sources of information in creating patient-centered care plans.		
a. Recognize that clinicians are responsible for all patient care decisions, including those that involve support from AI-based tools, and exercise judgment in applying AI-generated recommendations.	All	PRO, PC
b. Discern a patient's information needs, preferences, numeracy, and health literacy levels regarding the use of AI-based tools in their care.	Mid	PC, IPCS
c. Explain to patients the concepts of risk and uncertainty as they relate to the outputs of AI-based tools and describe practical implications for their care.	Mid	PC, IPCS
d. Integrate information derived from multiple AI and non-AI sources in patient-centered decision-making processes that result in personalized care plans.	Mid	PC
e. Demonstrate comfort and humility in caring for data-empowered patients and incorporate patient-reported data and outcomes in developing care plans.	All	PC, PRO, IPCS
f. Apply methods of data visualization to facilitate patient understanding of AI-derived data, with sensitivity to possible differential impacts related to race, ethnicity, sex, gender, and social determinants of health.	Adv	PC, IPCS
g. Describe how AI-based tools can be used to enhance access and quality of care in remote and underserved settings.	Mid	PC, SBP

1. **Evidence-based evaluation of AI-based tools:** Evaluate the quality, accuracy, safety, contextual appropriateness, and biases of AI-based tools and their underlying datasets in providing care to patients and populations.		
a. Access critical information about specific AI tools before applying them to patient care, including sources and representativeness of training data, algorithm performance for the question being asked, and how they were validated.	Mid	PC
b. Describe how the scope and quality of data sets used in development of AI tools influence their applicability to specific patients and populations.	All	MK, SBP
c. Identify potential biases in the design of an AI-based tool, and the implications of those biases for patient care and population health.	All	MK, SBP
d. Collaborate with patients, caregivers, informaticians, and others in the ongoing monitoring of AI applications, and communicate feedback through established organizational channels.	Mid - Adv	PC, IPCS, SBP
Workflow analysis for AI-based tools: Analyze and adapt to changes in teams, roles, responsibilities, and workflows resulting from implementation of AI-based tools.		
a. Participate collaboratively in team-based discussions that analyze changing roles, responsibilities and workflows associated with the adoption of novel AI-based tools and help implement necessary changes.	Mid	IPCS, SBP
b. Effectively use AI tools to facilitate critical communications between all members of health care teams.	Mid	IPCS
c. Recognize data and informatics professionals as valuable members of health care teams and collaborate with them in the design of AI tools that address clinical problems.	Mid	IPCS, PC
d. Contribute to micro- and macro- system decision-making processes regarding which AI-based tools should augment and which should replace parts of current health care practices.	Adv	IPCS, SBP
Practice-based learning and improvement regarding AI-based tools: Analyze and adapt to changes in teams, roles, responsibilities, and workflows resulting from implementation of AI-based tools.	All	PRO, PBLI

1. Accreditation Council for Graduate Medical Education. ACGME Common Program Requirements. https://www.acgme.org/Portals/0/PFAssets/ProgramRequirements/CPRResidency2020.pdf. Accessed August 16, 2022

Abbreviations: AI, artificial intelligence; ACGME, Accreditation Council for Graduate Medical Education.