

# Resident and Attending Perceptions on Artificial Intelligence in Radiology



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# Authors and Disclosures

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- No financial disclosures

# Purpose

- Artificial intelligence (AI) is an emerging technology in radiology. However, given that this is a relatively new technology, many radiologists may not be fully aware of it, how it works, or may have preconceived notions regarding it.
- This study seek to evaluate current perceptions on AI technologies by radiology residents and attending staff, provide an informational presentation of AI techniques and their potential uses in radiology, and then reassesses the participant's perception of these technologies after targeted education.

# Materials and Methods

- Precourse and postcourse surveys and an educational presentation were sent to all residents and attending staff in the Department of Radiology. The precourse survey collected demographic information, level of training, and questions related to the participant's perception of artificial intelligence technologies such as willingness to use the technology, fears related to AI, and desired levels of accuracy.

# Materials and Methods

- An informational course based on the academic literature of AI in radiology, AI techniques as taught in academic courses, and selected videos showing AI technologies in use was then provided to the participants and timed to take no more than 10 minutes to help ensure full completion.

# Materials and Methods

- After the course, participants were provided a postcourse survey asking similar questions to the precourse survey to see the impact on the participant's perceptions as well as their willingness to use AI technology. Results were then loaded into SPSS and Excel for analysis.

# Sample Slides From Educational Course

## BASICS OF ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

### Core Lessons

[Why Learn about Artificial Intelligence?](#)

[Examples of AI in Radiology](#)

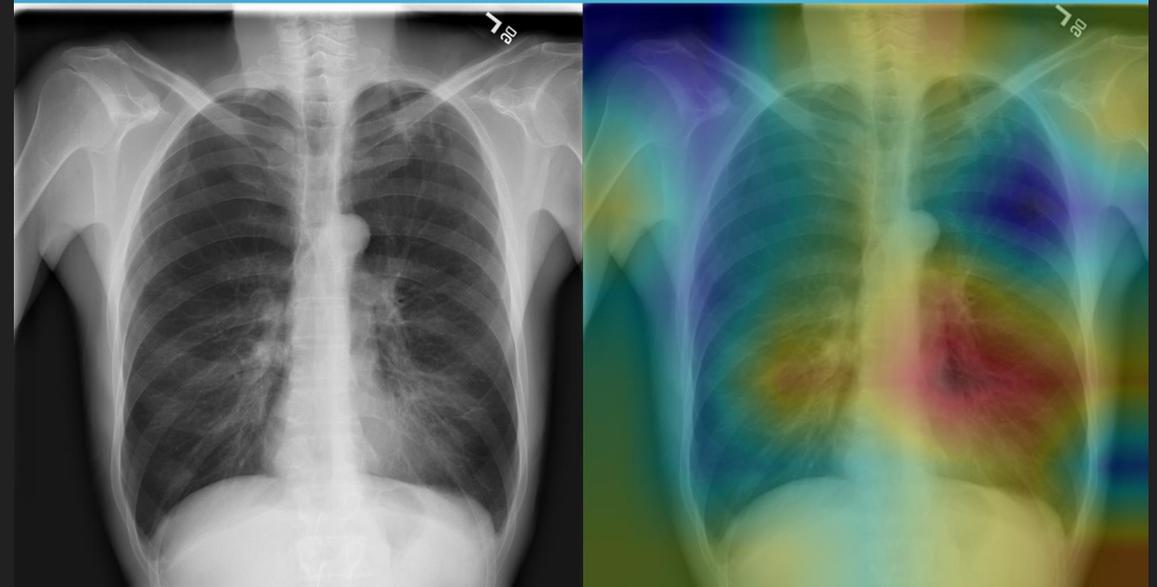
[Video – Examples of AI in Medical Imaging](#)

### Additional Learning

[Origins of Artificial Intelligence](#)

[Modern Techniques](#)

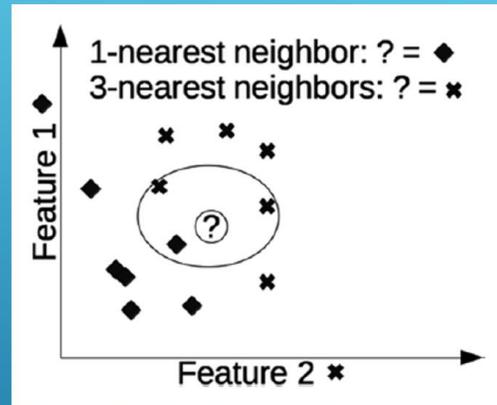
## CHEXNET: RADIOLOGIST-LEVEL PNEUMONIA DETECTION ON CHEST X-RAYS WITH DEEP LEARNING



# Sample Slides From Educational Course

## A FEW EXAMPLES OF LEARNING

- ▶ K-Nearest Neighbor
  - ▶ Classifies an input vector (collection of features for an unknown object) by assigning the object to the most similar class



## DEEP LEARNING

- ▶ Convolutional Neural Networks
  - ▶ Input layer produces a small image (kernel) which is moved across a larger image for subset detection with edges, arcs, etc.
  - ▶ Specialized layers help amplify important features
  - ▶ Pooling layers can find maximal values and rewarding (improving) convolution function to extract important features

# Precourse Results

- Results from the precourse survey showed 21 respondents out of 45 recipients.
- Most respondents were residents (57%), were somewhat familiar with AI (67%), would be willing to use it (48%), and strongly wanted to know more (43%).

# Postcourse Results

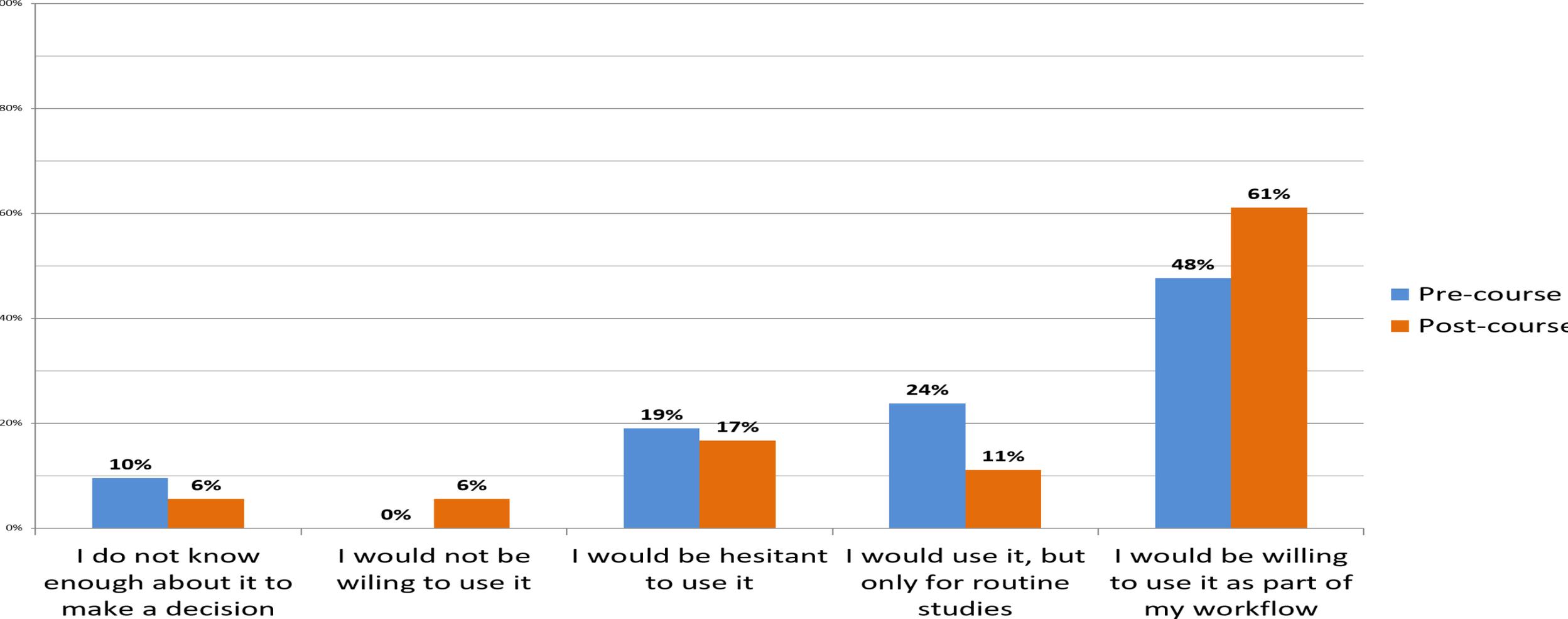
- Eighteen respondents completed the postcourse survey (86%).
- Of those, 88% found the course free of bias (6% no opinion, 6% disagree) and educational (100%).  
94% felt familiar with AI and wanted to know more.  
61% would be willing to use AI.

## Precourse and Postcourse Survey Results

Precourse and Postcourse Survey Results											
Q1. What is your age?					Q6. What are your biggest fears regarding artificial intelligence technologies in radiology?						
Answer Choices		Precourse		Postcourse		Answer Choices		Precourse		Postcourse	
18 to 24		0%	0	0%	0	Losing my job to a computer		52%	11	56%	10
25 to 34		67%	14	67%	12	Having to review review computer-generated findings		43%	9	61%	11
35 to 44		10%	2	6%	1	Having to document agreement or disagreement with a computer-generated finding		52%	11	61%	11
45 to 54		10%	2	11%	2	Increased costs related to imaging		24%	5	28%	5
55 to 64		10%	2	11%	2	Difficulty in using or need for training in using new software		29%	6	28%	5
65 to 74		5%	1	6%	1	Inaccuracy of AI-reported findings		57%	12	56%	10
75 or older		0%	0	0%	0	I have no fear. I think it will be an asset.		10%	2	17%	3
<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>	Other		10%	2	11%	2
Q2. What is your gender?					Q7. Using a hypothetical general purpose AI system, how accurate would it need to be in detecting any pathology, significant or non-significant, before presenting a report to be useful?						
Answer Choices		Precourse		Postcourse		Answer Choices		Precourse		Postcourse	
Female		33%	7	28%	5	0-20%		0%	0	0%	0
Male		67%	14	72%	13	20-40%		0%	0	0%	0
<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>	40-60%		10%	2	11%	2
						60-80%		19%	4	28%	5
						80-100%		71%	15	61%	11
						<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>
Q3. At what level of training are you?					Q8. Using a hypothetical system for automatically detecting a clinically significant finding, how accurate would it need to be before presenting a report to be to be useful?						
Answer Choices		Precourse		Postcourse		Answer Choices		Precourse		Postcourse	
1st year radiology resident		24%	5	28%	5	0-20%		0%	0	0%	0
2nd year radiology resident		10%	2	11%	2	20-40%		0%	0	0%	0
3rd year radiology resident		14%	3	11%	2	40-60%		10%	2	6%	1
4th year radiology resident		10%	2	6%	1	60-80%		19%	4	24%	4
Fellow		5%	1	6%	1	80-100%		71%	15	71%	12
Attending		38%	8	39%	7	<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>17</b>
<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>						
Q4. How would you rate your understanding of artificial intelligence technology?					Q9. Using a hypothetical system for automatically detecting a non-clinically significant finding, how accurate would it need to be before presenting a report to be useful?						
Answer Choices		Precourse		Postcourse		Answer Choices		Precourse		Postcourse	
I am not familiar		5%	1	0%	0	0-20%		0%	0	0%	0
I have heard of it, but only in passing		29%	6	6%	1	20-40%		0%	0	0%	0
I am somewhat familiar		62%	13	76%	13	40-60%		19%	4	17%	3
I am very familiar		5%	1	18%	3	60-80%		33%	7	33%	6
I would consider myself an expert		0%	0	0%	0	80-100%		48%	10	50%	9
<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>17</b>	<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>
Q5. How would you rate your willingness to use artificial intelligence software in					Q10. I am interested in learning more about artificial intelligence technologies in radiology.						
Answer Choices		Precourse		Postcourse		Answer Choices		Precourse		Postcourse	
I do not know enough about it to make a decision		10%	2	6%	1	Strongly disagree		0%	0	0%	0
I would not be willing to use it		0%	0	6%	1	Disagree		0%	0	0%	0
I would be hesitant to use it		19%	4	17%	3	Neutral		10%	2	6%	1
I would use it, but only for routine studies		24%	5	11%	2	Agree		48%	10	39%	7
I would be willing to use it as part of my workflow		48%	10	61%	11	Strongly agree		43%	9	56%	10
<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>	<b>Total</b>		<b>100%</b>	<b>21</b>	<b>100%</b>	<b>18</b>

# Willingness To Use Precourse v. Postcourse

How would you rate your willingness to use artificial intelligence software in interpreting images?



# Conclusion

- Artificial intelligence is an emerging and exciting field in radiology with great promise. Radiologists are willing to use the technology and enthusiastic to learn more, but have lingering fears regarding its use.