

Can AI improve the Quality of Care?

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THE QUEEN'S MEDICAL CENTER
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I have no disclosures


What is Artificial Intelligence (AI) in Healthcare?


Artificial Intelligence (AI) refers to the use of advanced algorithms and machine learning models to simulate human intelligence in healthcare tasks. AI systems are designed to analyze complex medical data, identify patterns, and support clinical decision-making.


Key Functions of AI in Healthcare

 **Data Analysis:** AI processes vast amounts of medical data — from imaging scans to electronic health records — to uncover insights.

 **Pattern Recognition:** AI detects subtle abnormalities or trends that may be missed by the human eye, enhancing diagnostic accuracy.

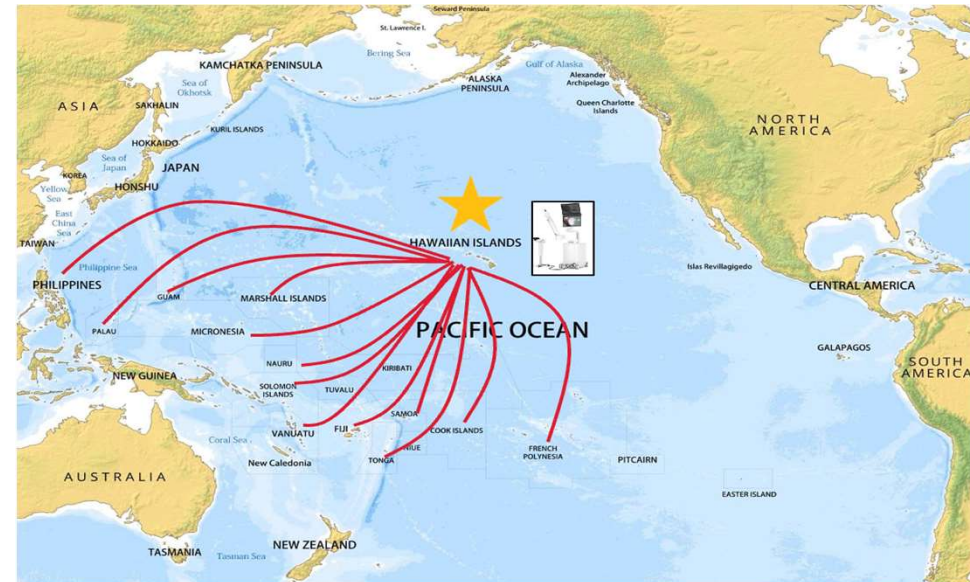
 **Automation:** AI streamlines routine tasks like data entry, appointment scheduling, and even predictive analytics.

 **Clinical Decision Support:** AI assists healthcare providers by recommending treatments, predicting outcomes, and personalizing care plans.

 **Early Detection and Prevention:** AI identifies high-risk patients earlier, enabling timely intervention and improved outcomes.

Why AI in the HI

- **Lung cancer in Hawaii**
 - 6th highest incidence of lung cancer in the country
 - Rank last in the country for early detection of lung cancer
- **Many patients at risk aren't eligible for screening:**
 - 60% of **women** with lung cancer are non-smokers and don't qualify for screening.
 - **Native Hawaiians** often develop lung cancer 10 years before screening guidelines begin
 - AI helps to identify these patients
- **Unique island geography limits access to timely lung cancer care**
 - Tertiary care center for the Pacific
 - To decrease treatment delays we have implemented a single anesthetic approach to diagnose, stage and treat in one setting
 - AI helps to select patients for this pathway that have a high likelihood of malignancy



AI-Powered Pulmonary Nodule Detection

Step 1: Patient Discovery AI

Automatically identify patients with reported measured lung nodules from CT radiology reports



AI-Powered Pulmonary Nodule Detection

Step 2: Patient Enrollment in the Virtual Nodule Clinic

Optellum

Virtual Nodule Clinic

Enrolled

Patient Discovery

Search

TOP

Analytics

Dr Ryan Hennen

About

Help

Log out

Enrollment: Patient Discovery

Suggested patients (10)

Dismissed patients

These are patients that have had nodules reported on their chest CTs but have not been referred to the Nodule Clinic.
Patients reports displayed contain configurable regular expressions / keywords. ⓘ

Patient Discovery completed.

0 out of 0 patient(s) with new reports suggested for enrollment on Apr 5, 2024. 0 patients were discarded due to the exclude list. Patients will be captured on the next Patient Discovery on Apr 6, 2024 (in 16 hours).

Filter patients

Patient name

MRN

Reset filters

Name	MRN	Date of birth	Found on
LOWE, Ned	558333	Oct 30, 1950	Jun 28, 2023
EIGHT, Mary	118777	May 5, 1952	Jun 28, 2023
SECOND, Charles	118111	Sep 24, 1953	Jun 28, 2023
NINE, Emily	118888	Dec 8, 1946	Jun 28, 2023
BROWN, Erwan	448555	May 14, 1963	Jun 28, 2023
SIX, Isabelle	118555	Nov 21, 1934	Jun 28, 2023
THIRD, Oliver	118222	Apr 26, 1930	Jun 28, 2023
UBELL, Ales	448222	Feb 16, 1952	Jun 28, 2023
TRAINING, 11	TR0011	Apr 1, 1946	Nov 17, 2023
DOE, Jane	DE00001	Jul 1, 1947	Nov 20, 2023

DOE, Jane

MRN
DE00001

DOB
Jul 1, 1947

Dismiss

Details

Draft

Latest Version

Radiology report by attending, attending.

Dated Nov 20, 2023

Accession number DE0000101

Emergency, ED

CT CHEST W0 CONTRAST

Indication: trauma \ fall from ladder \ w19.xxxx fall, initial encounter patient fell from ladder feet. rib cage pain

Comparison: none.

Findings:

Chest:

. thoracic inlet/axilla: within normal limits.

. central airways: within normal limits.

. mediastinum/hila: within normal limits.

. heart/vessel: normal heart size. no pericardial effusion. aorta normal in caliber and appearance.

. lungs: 14 mm left lower lobe pulmonary nodule (series 2 image 187) worrying for malignancy.

. pleura: within normal limits.

AI-Powered Pulmonary Nodule Detection

Step 3: Evaluate the Nodule

Optellum | Virtual Nodule Clinic | Enrolled | Patient Discovery | Search | TOP | Analytics

WILLIAMS, Claire
MRN: SE002 Sex: Female DOB: Jan 1, 1949 (75) **Awaiting clinical review**

Smoking: **Non-smoker**
Cancer history at enrollment: **No history of cancer**
Managing clinician: **Dr Ryan Hennen**

Feb 26 R/CT RLL_1
May 18 R/CT RLL_1
Aug 21 R/CT RLL_1

2 Q1 Q2 Q3 Q4 2023 Q1 Q2 Q3 Q4 2024 Q1

Report with CT Compare with previous CT

Thorax* Chest_Plain (Adult) Series 4: Thorax 2.0 17013

2 nodules in study 8 RLL_1 3 RLL_2

Nodule tracking Add Edit Delete

WM/RL Reset viewer Hide objects Non-Contrast

WILLIAMS, Claire, Female Age: 75
MRN: SE002
Accession number: SE00203
Thorax* Chest_Plain (Adult), Aug 21, 2022
Thorax 2.0 17013

RLL_1 (Solid)
Score: 8

Pending Signature Latest Version
Radiology report by attending, attending.
Dated Aug 21, 2023
Accession number SE00203

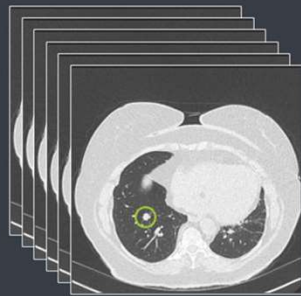
[Study Description] Thorax Chest Plain
[Clinical information] cardiomyopathy.RLL lesion
[Comparison study CT] Comparison is made with the previous study dated Jan 18th 2020.
[Findings]
[Nodules]
3 nodules have been identified:
1) The right lower lobe nodule (lm: 186/287) now measures 12mm previously 11.7mm. This is stable.
2) A further 3 mm nodule posteriorly within the right lower lobe base, (lm: 232) is also stable.
3) A new triangular 5 mm nodule adjacent to a vein in the left upper lobe, (lm: 104/287) is presumed benign.
[Other]
Atelectasis in the left lower lobe. There is mild cylindrical bronchiectasis in both lower lobes. Cardiomegaly. Unremarkable visualised upper abdominal appearances. No focal bone lesion.
Note

AI-Powered Pulmonary Nodule Detection

Step 4: Lung Cancer Prediction Score

World's first AI-powered decision support for early lung cancer diagnosis

- ✓ Imaging AI (radiomics) digital biomarker – computed from CT images only, harnessing all pixels in 3D
- ✓ Produces a malignancy score between 1 (benign) and 10 (malignant) for a nodule of interest



User triggers the Optellum LCP score in a single click



3D ROI around the nodule is automatically extracted ...

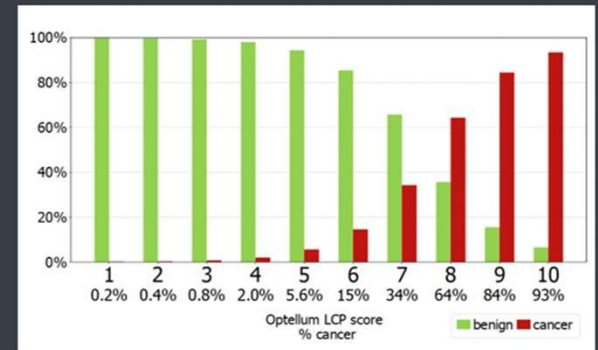


... and automatically sent to the Optellum LCP engine



LCP Score:
9

Optellum LCP score is returned **within seconds** for clinician interpretation



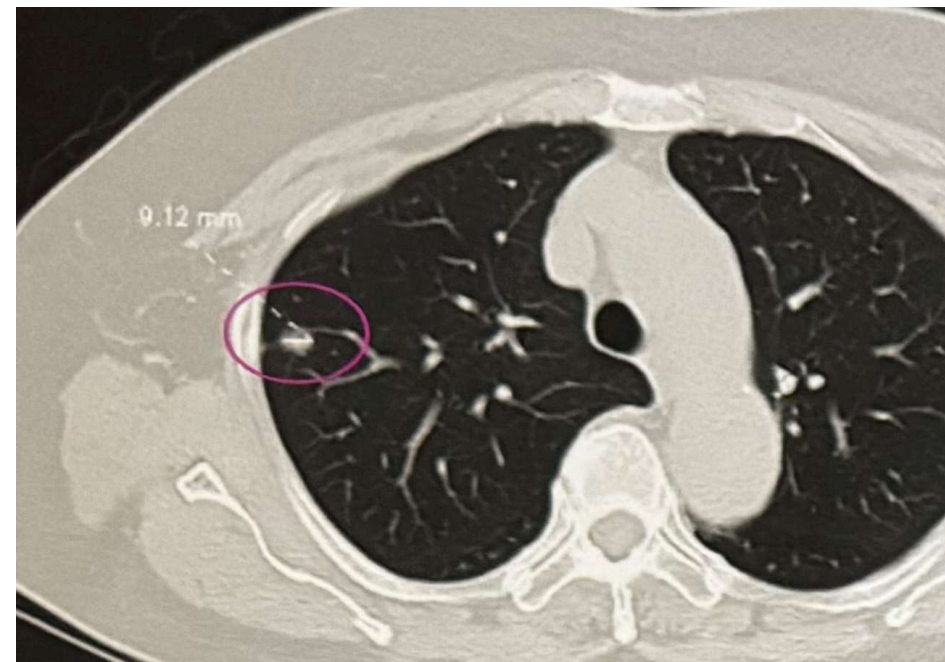
Impact of AI: Real World Application

69yo woman, never smoker and no family history of lung cancer, presents to the ER with abdominal pain

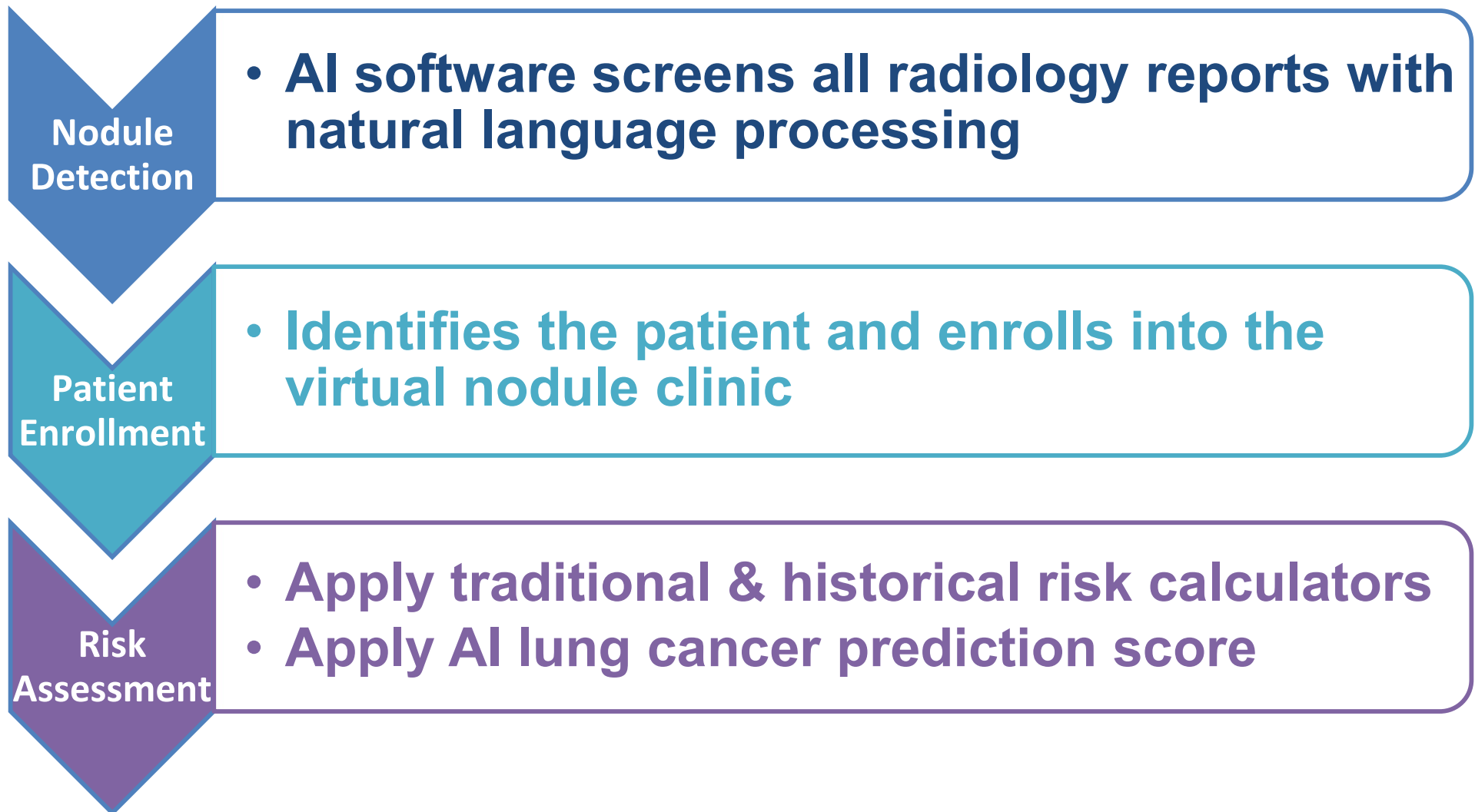
- Diagnosed with appendicitis by CT scan
- Incidental finding of a 0.9cm right pulmonary nodule

Is this malignant?

**Low Risk vs. High Risk
Surveillance vs. Biopsy**

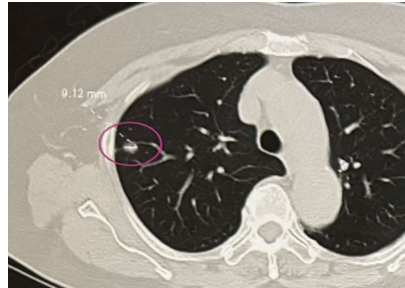


Impact of AI: Real World Application



Impact of AI: Real World Application

69yo woman, never smoker and no family history of lung cancer



PET/CT scan

- SUV 1.5

Fleischner Recommendation (part solid >8mm)

- CT in 3 to 6 months to confirm persistence. If unchanged and solid component below 6mm, CT annually for 5 years

Quantitative Risk Calculator

- 1.2% risk of malignancy

AI Lung Cancer Prediction Score

- Score 8 (64% risk of malignancy)**

Age	69	years
Nodule diameter	9	mm
Current or former smoker	No 0	Yes +1
Extrathoracic cancer diagnosis ≥5 years prior	No 0	Yes +1
Upper lobe location of tumor	No 0	Yes +1
Nodule spiculation	No 0	Yes +1
FDG-PET Optional, if performed	PET not performed No uptake Faint uptake Moderate uptake Intense uptake	

1.2 %

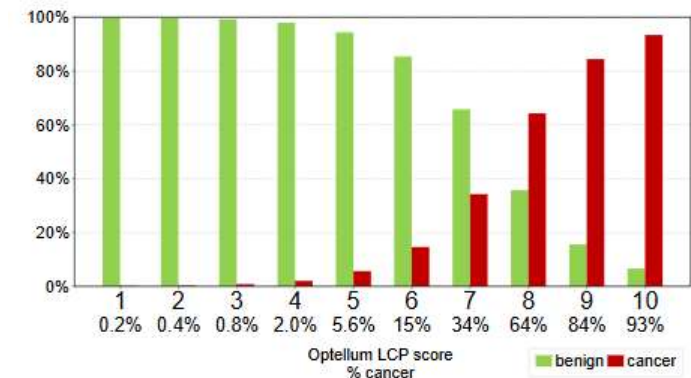
Probability of malignancy

One study suggests watchful waiting only at very low post-test probabilities (<2%), biopsy at "lower" post-test probabilities (2% to 20%), and surgery at higher post-test probabilities (>70%). See Next Steps.

Copy Results

Next Steps >>>

Optellum LCP Score



Impact of AI: Real World Application

OR for diagnosis, staging and treatment

1

Ion Biopsy of RUL
nodule:

NSCLC



Home 2 days after
surgery



negative

3

Robotic RUL
Segmentectomy
Stage I NSCLC



Our Experience

Launched: October 2024

- **Daily Impact:** AI identifies **40-50 patients** with lung nodules detected on CT scans from the previous day.
- **Nurse Navigator Review:** Patients already known to the nodule clinic or undergoing scans for known cancers or nodules are filtered out.
- **New Patients Identified:** This process results in **15-20 new patients** with newly detected pulmonary nodules being enrolled in the nodule clinic each day.
- **Monthly Enrollment:** Approximately **350-400 new nodule patients** are added to the clinic each month.
- **Biopsy Rate:** Around **20%** of these patients proceed to biopsy for further evaluation.



Our Workflow

AI powered detection of lung nodule and enrollment into virtual nodule clinic

Nurse navigator reviews the patients and filters out known nodules or cancers and identifies new nodule patients

Contact PCPs and ordering provider to inform them of their patient's detected lung nodule and offer management and monitoring through our nodule clinic

AI -powered lung cancer prediction score and review in multidisciplinary nodule conference

Nodule
Surveillance

Nodule Biopsy

Single Anesthetic
Diagnosis to
Resection

Key Pointers for Implementing AI in Healthcare:

- **Identify Clear Use Cases:** Focus on areas where AI can provide the most impact, such as diagnostics, predictive analytics, workflow optimization, or patient care personalization.
- **Data Quality and Integration:** Integration with existing electronic health records (EHR) systems is crucial for seamless implementation.
- **Regulatory Compliance:** Adhere to healthcare regulations such as HIPAA, GDPR, and FDA guidelines to ensure patient data privacy and model safety.
- **Clinician Involvement:** Engage healthcare providers throughout development to ensure AI tools align with clinical needs to enhance and not replace decision-making or the workforce.
- **Scalability and Sustainability:** Design AI solutions that are adaptable to new data, evolving clinical practices, and expanding healthcare environments.
- **Continuous Monitoring and Improvement:** Regularly evaluate AI performance, ensuring it maintains accuracy, reliability, and value in real-world clinical settings.

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Thank you

