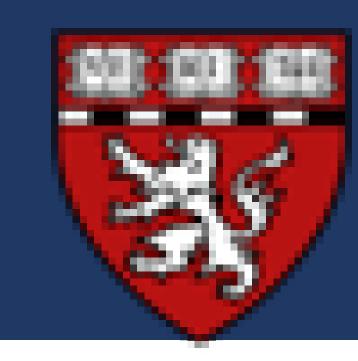
Detection of Ultra-High Risk Pancreatic Cancer Diagnoses Using a Custom NLP Pipeline Incorporating a Large Language Model: A Pilot Safety Net for Missed Diagnoses

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PURPOSE / OBJECTIVES

- Identify a care gap: Radiologic findings suggestive of malignancy are sometimes missed or lack timely follow-up, leading to delayed care.
- •Use AI to detect risk: A custom NLP pipeline leveraging a Large Language Model (LLM) was developed to flag reports indicative of new or progressive pancreatic cancer for manual review to investigate care gaps.
- •Aim: To evaluate whether an LLM-based NLP system can identify patients at risk for missed or delayed follow-up and lay the groundwork for Al-driven safety nets that support proactive clinical intervention.

Methods

Figure 1. Al-enabled workflow for identifying patients at risk for delayed recognition of worsening or suspected pancreatic cancer.

Radiology Reports

Al Analysis

Potential High-Risk Cases









Review Clinical Course

and Timeliness of Care

We used NLP to create a custom pipeline using 589,513 radiology reports from a large health system. The model flagged 2,897 reports related to pancreatic cancer; 43 were identified as suspicious for new, unexpected, or particularly worrisome findings. We then conducted a detailed manual review of 9 consecutively flagged cases to assess follow-up, diagnostic closure, and timeliness of response.

Results

Figure 2A. NLP-Flagged Cases Categorized by Diagnostic Novelty.



 History of pancreatic cancer, no evidence of



- New findings suggestive of potential pancreatic cancer x 2
- New findings of metastatic spread in patient with known pancreatic cancer x 3



- New diagnosis of likely pancreatic cancer x 2
 - Progression from known cysts to likely cancer





Presentation to emergency department for abdominal pain and weight loss. CT scan shows "...mass in the pancreatic tail, highly suspicious for primary malignant pancreatic neoplasm..."

Provider documents "I shared this information with the patient. I have paged the on-call oncologist...however the patient wishes to leave prior to this."



Female with Malaise,

Presentation to emergency department for malaise, nausea.

CT scan shows "...3.7 Provider documents "Recommended urgent cm pancreatic body mass ... concerning follow-up ... to schedule outpatient biopsy of the adenocarcinoma..." pancreatic mass."

Lab encounter 8 months later under "General Practice" but no clear confirmation of biopsy follow-up in system

Figure 2C. Summary of Care Gaps Identified.

Risk Category	Care Gaps Identified
Stable / Known Disease	 Appropriate surveillance maintained
Progressive / Indeterminate Findings	 Missed biopsy or follow-up imaging Communication or coordination lapses
Probable / New Pancreatic Cancer	 Emergent presentation without outpatient coordination No interim evaluation or contingency plan

Conclusions: Our LLM-powered NLP uncovered ultra-rare (<1 in 10,000) but high-impact diagnostic gaps—exemplifying a potential use of Al as an innovative safety net tool to ensure proper follow-up for high-risk imaging findings related to Pancreatic Cancer.