

AI System Achieves >90% Accuracy in Colonoscopy Surveillance

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Determining the correct colonoscopy surveillance interval following polypectomy is critical for preventing colorectal cancer while avoiding unnecessary procedures and associated risks.¹ Current guidelines, such as those from the American Society for Gastrointestinal Endoscopy (ASGE) and the European Society of Gastrointestinal Endoscopy (ESGE), rely on complex pathological assessments of resected polyps. An artificial intelligence (AI) system has shown the ability to select appropriate surveillance intervals with high accuracy, potentially streamlining this process.

KEY TAKEAWAYS

- **The Pivot:** An AI system can accurately determine colonoscopy surveillance intervals, traditionally a complex task relying on pathologist interpretation.
- **The Data:** The AI system achieved an accuracy of >90% in selecting appropriate surveillance intervals.
- **The Action:** Clinicians should monitor further validation studies of AI systems for integration into colonoscopy surveillance protocols.

The management of patients after polypectomy involves assigning a surveillance interval for subsequent colonoscopies. This decision is based on the number, size, and histological characteristics of resected polyps, with guidelines aiming to balance the detection of advanced adenomas and early-stage colorectal cancer against the risks and costs of over-surveillance. Misclassification can lead to either delayed detection of neoplasia or an undue burden on healthcare resources and patients. Colorectal cancer (CRC) remains a significant public health concern globally, and effective screening and surveillance strategies are crucial for reducing its incidence and mortality. Post-polypectomy surveillance is a cornerstone of CRC prevention, as it allows for the timely removal of new or recurrent adenomas before they progress to malignancy. However, the complexity of current guidelines, which often involve multiple variables and nuanced interpretations, can contribute to variability in clinical practice and potential errors in surveillance interval assignment.

What the study did

A study evaluated an AI system designed to recommend colonoscopy surveillance intervals. The system was trained on a dataset of colonoscopy reports and corresponding pathology findings, learning to interpret the various features that inform guideline-based recommendations. The primary objective was to assess the AI system's accuracy in assigning surveillance intervals compared to established clinical guidelines. The system processed data typically available to clinicians, including patient demographics, polyp characteristics (e.g., size, location), and histopathological diagnoses (e.g., adenoma type, presence of high-grade dysplasia). The AI system employed a machine learning architecture, likely

a deep learning model, to identify patterns and correlations within the extensive dataset. This allowed the system to learn the intricate decision-making logic embedded in clinical guidelines, effectively mimicking the cognitive process of an experienced clinician. The training dataset comprised a diverse range of patient cases, encompassing various polyp types, sizes, and grades of dysplasia, ensuring the system's exposure to a broad spectrum of clinical scenarios. The AI system's performance was measured against a consensus decision made by a panel of gastroenterologists and pathologists, who applied current guidelines to the same patient cases. The system's output was categorised as either 'appropriate' (matching the guideline-based recommendation) or 'inappropriate' (deviating from the recommendation). The study focused on the system's ability to correctly identify patients requiring shorter surveillance intervals due to higher risk features, as well as those who could safely undergo longer intervals. The panel of experts independently reviewed each case, and their collective decision served as the gold standard for evaluating the AI system's accuracy. This rigorous validation process aimed to ensure that the AI's recommendations aligned with the highest standard of clinical practice based on established guidelines.

Key Findings

The AI system demonstrated an accuracy of over 90% in selecting the appropriate colonoscopy surveillance interval. This high level of agreement with guideline-based recommendations indicates the system's capacity to interpret complex clinical and pathological data effectively. Specifically, the AI system showed a high sensitivity for identifying patients requiring intensified surveillance (e.g., 3-year intervals) and a high specificity for identifying patients eligible for extended surveillance (e.g., 5-10 year intervals). The system's performance was consistent across different types of polyps, including tubular adenomas, tubulovillous adenomas, and sessile serrated lesions, which often present nuanced diagnostic challenges for surveillance interval assignment. The ability to accurately classify these diverse polyp types is crucial, as each carries a different risk of malignant transformation and thus dictates a specific surveillance strategy. The system's robust performance across these categories suggests its potential utility in real-world clinical settings, where such distinctions are paramount for optimal patient management.

The study also evaluated the system's ability to reduce inter-observer variability, a known challenge in manual surveillance interval assignment. While specific quantitative data on variability reduction was not provided, the consistent output of the AI system suggests a potential for standardising surveillance recommendations. The system's processing speed was noted to be significantly faster than manual review, indicating potential for efficiency gains in clinical practice. This efficiency could translate into reduced administrative burden and faster turnaround times for surveillance recommendations, allowing clinicians to focus more on direct patient care.

Limitations & Next Steps

The study's limitations included its retrospective nature and the use of a single dataset for training and validation, which may limit generalisability. Further prospective, multi-centre validation studies are required to confirm these findings in diverse patient populations and clinical settings. The integration of such AI systems into existing electronic health record (EHR) systems and clinical workflows also presents practical challenges that need to be addressed. Future research should explore the system's performance in real-world scenarios, including its impact on patient outcomes and healthcare costs, and investigate user acceptance among clinicians. The retrospective design, while valuable for initial evaluation, does not fully capture the dynamic nature of clinical decision-making or the potential for new

information to emerge over time. A single dataset, even if diverse, may not fully represent the variability in patient demographics, healthcare practices, and guideline interpretations across different geographical regions and healthcare systems. Therefore, validating the system in prospective studies across multiple institutions and diverse patient cohorts is essential to establish its robustness and generalisability. Additionally, evaluating the system's performance in populations with specific comorbidities or genetic predispositions to CRC would provide further insights into its applicability.

CLINICAL IMPLICATIONS

The prospect of an AI system accurately determining colonoscopy surveillance intervals with over 90% accuracy is compelling. For gastroenterologists, this could mean a significant reduction in the cognitive load associated with interpreting complex pathology reports and applying intricate guideline algorithms. The current process is prone to inter-observer variability and can be time-consuming, diverting specialist attention from direct patient care. An AI assistant, if validated in large prospective trials, could standardise recommendations, potentially reducing both under-surveillance (missing high-risk lesions) and over-surveillance (unnecessary procedures and patient anxiety).

From an industry perspective, the development of such AI tools represents a growing market for clinical decision support systems. Companies investing in these technologies will need to demonstrate not only accuracy but also seamless integration with existing electronic health records and a clear pathway for regulatory approval. The challenge will be to move beyond impressive retrospective data to robust, real-world evidence that proves clinical utility and cost-effectiveness. Payers, including national health services and private insurers, will be keen to see if these systems can reduce the overall burden of colonoscopy procedures without compromising patient safety, thereby offering a tangible return on investment.

For patients, the implications are substantial. More accurate and consistent surveillance recommendations could mean fewer unnecessary colonoscopies, reducing procedural risks, preparation burden, and time away from work. Conversely, patients at higher risk would be more reliably identified for timely follow-up, potentially leading to earlier detection of advanced adenomas or colorectal cancer. The transparency and explainability of such AI systems will be paramount to foster trust among both clinicians and patients, ensuring that the 'black box' nature of some AI is mitigated by clear, evidence-based reasoning for each recommendation.

EDITORIAL & AI STANDARDS

AI tools are used solely to structure and summarise evidence from peer-reviewed primary sources. No AI-generated conclusions appear in The Life Science Feed without editor verification against the primary source.

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