INPLASY

Enteroscopy Versus Video Capsule Endoscopy for Automatic Diagnosis of Small Bowel Disorders. A Comparative Analysis of Artificial Intelligence Applications

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ADMINISTRATIVE INFORMATION

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Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 09 October 2023 and was last updated on 09 October 2023.

INTRODUCTION

*R*eview question / Objective The eligibility criteria were based on the PICOS framework to select the relevant literature.
• Population: Studies involving human subjects of all ages diagnosed with or suspected small bowel disorders have been included, whereas studies involving animal subjects or in vitro have been excluded.
• Intervention: Studies that utilize artificial intelligence (AI), machine learning, deep learning, convolutional neural networks, or computer-aided diagnosis in the processing of capsule endoscopy and/or enteroscopy images for diagnosis were added. Studies using capsule endoscopy or enteroscopy without any form of AI for diagnosis or other gastrointestinal diseases without focusing on small bowel disorders were removed.
• Comparator: The presence of a control group was not mandatory for the screening and selection process. If a control group was present, it had to be diagnosed through standard diagnostic methods without the use of AI.
• Outcome Measures: Studies should focus on diagnostic metrics such as sensitivity, specificity, predictive values, or other performance metrics of AI-based techniques and not patient satisfaction or cost-effectiveness, which offers no objective performance measurement.

Condition being studied Various small bowel diseases, such as inflammatory bowel disease, tumors, celiac disease, vascular and hemorrhagic lesions, erosions, ulcers, and functional disorders.

METHODS

Participant or population Patients with different small bowel diseases in various clinical settings.

Intervention Not applicable.

Comparator Not applicable.

Study designs to be included Observational studies.

Eligibility criteria Peer-reviewed original research articles, including randomized controlled trials, cohort studies, and case-control studies. Reviews, letters to the editor, commentaries, case reports, case series, and animal studies were excluded. Studies with incomplete data sets or lacking the necessary statistical analysis and duplicate publications, where multiple articles based on the same dataset were excluded, keeping only the most comprehensive one.

Information sources A comprehensive literature search was conducted from 2012 until 2023, using Pubmed, MEDLINE, Cochrane Library, Google Scholar, Embase, and ClinicalTri-als.gov databases. Keywords used in the search strategy included "Artificial Intelligence", "Machine Learning", "Deep Learning", "Convolutional Neural Network (CNN)", "Small Bowel Disorders", "Capsule Endoscopy", "Enteroscopy", "Diagnosis", "Imaging", "Image Analysis", "Computer-Aided Diagnosis", in various combinations, with the help of Boolean operators (AND, OR, NOT). Searches were also performed using Medical Subject Headings (MeSH) where applicable. Language restrictions to English, Romanian, and German were applied.

Main outcome(s) Main outcomes were represented by the sensitivity, specificity, predictive values, or other performance metrics of AI algorithms in video capsule endoscopy and enteroscopy.

Quality assessment / Risk of bias analysis The quality of the included studies was assessed using the QUADAS-2 tool, evaluating the risk of bias and applicability concerns in diagnostic accuracy studies. It primarily consists of four key domains: patient selection, index test, reference standard, and flow and timing, utilized in 4 phases with signaling tasks and questions for bias risk awareness. Two reviewers independently performed the assessment, and any disagreements were resolved through consensus or consultation with a third reviewer.

Strategy of data synthesis Due to the anticipated heterogeneity among the included studies, a meta-analysis was not deemed appropriate. Therefore, a narrative synthesis approach was used to summarize the findings, and relevant data were presented in tabular format.

Subgroup analysis Subgroup analysis was conducted in accordance with the available data from the extracted data from the included studies, such as additional diagnoses, symptomatology, and sex.

Sensitivity analysis No sensitivity analysis was conducted.

Country(ies) involved Romania and Italy.

Keywords small bowel; artificial intelligence; enteroscopy; video capsule endoscopy.

Contributions of each author
Author 1 - Stefan-Lucian Popa - Contributed to the conceptualization and validation of the study.
Author 2 - Bogdan Stancu - Contributed to the conceptualization and methodology of the study.
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