Supplement materials

1.Search strategy performed in the PubMed, Embase, Web of Science and Cochrane Library.

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| **Databases** | **Search** | **Search terms** |
| **Pubmed** | **#1** | "Colorectal Neoplasms"[MeSH Terms] |
| **#2** | (Neoplasm\*, Colorectal[Title/Abstract])) OR (Colorectal Tumor\*[Title/Abstract])) OR (Colorectal Cancer[Title/Abstract])) OR (Colorectal Carcinoma\*[Title/Abstract]) |
| **#3** | #1 OR #2 |
| **#4** | "Volatile Organic Compounds" [MeSH Terms] |
| **#5** | (Compound\*, Volatile Organic[Title/Abstract]) OR (Organic Compound\*, Volatile [Title/Abstract]) OR (Volatile Organic Compound [Title/Abstract]) OR (VOCs [Title/Abstract]) OR (VOC [Title/Abstract]) |
| **#6** | #4 OR #5 |
| **#7** | "Electronic Nose"[MeSH Terms] |
| **#8** | (Nose, Electronic[Title/Abstract]) OR (artificial nose [Title/Abstract]) OR (e-nose [Title/Abstract]) OR (eNose [Title/Abstract]) OR (Electronic Tongue\* [Title/Abstract]) OR (Aeonose [Title/Abstract]) OR (Cyranose 320 [Title/Abstract]) |
| **#9** | #7 OR #8 |
| **#10** | "Diagnosis"[MeSH Terms] OR "ROC curve"[MeSH Terms] |
| **#11** | (Diagnose\* [Title/Abstract]) OR(Diagnose\* and Examination\* [Title/Abstract]) (Postmortem Diagnosis [Title/Abstract]) OR (Diagnoses, Postmortem[Title/Abstract]) OR (Antemortem Diagnosis[Title/Abstract]) OR (Antemortem Diagnoses[Title/Abstract]) OR (ROC Curve\*[Title/Abstract]) OR (Analysis, ROC[Title/Abstract]) OR (Analyses, ROC[Title/Abstract]) OR (ROC Analyses [Title/Abstract]) OR (ROC Analysis[Title/Abstract]) OR ( Receiver Operating Characteristic\* [Title/Abstract]) OR  ( Characteristic\*, Receiver Operating [Title/Abstract]) OR (Sensitivity AND Specificity [Title/Abstract]) OR (Sensitivity [Title/Abstract]) OR (Specificity[Title/Abstract]) |
| **#12** | #10 OR #11 |
| **#13** | #3 AND #6 AND #9 AND #12 |
| **Embase** | **#1** | 'Colorectal Neoplasms':ab,ti |
| **#2** | 'Neoplasm, Colorectal':ab,ti OR 'Neoplasms, Colorectal':ab,ti OR 'Colorectal Tumors':ab,ti OR 'Colorectal Tumor':ab,ti OR 'Tumor, Colorectal':ab,ti OR 'Tumors, Colorectal':ab,ti OR 'Colorectal Cancer':ab,ti OR 'Cancer, Colorectal':ab,ti OR 'Cancers, Colorectal':ab,ti OR 'Colorectal Cancers':ab,ti OR 'Colorectal Carcinoma':ab,ti OR 'Carcinoma, Colorectal':ab,ti OR 'Carcinomas, Colorectal':ab,ti OR 'Colorectal Carcinomas':ab,ti |
| **#3** | #1 OR #2 |
| **#4** | 'Volatile Organic Compounds':ab,ti |
| **#5** | 'Compound\*, Volatile Organic':ab,ti OR 'Organic Compound\*, Volatile':ab,ti OR 'Volatile Organic Compound':ab,ti OR 'VOCs':ab,ti OR 'VOC':ab,ti |
| **#6** | #4 OR #5 |
| **#7** | 'Electronic Nose':ab,ti |
| **#8** | 'Nose, Electronic':ab,ti OR 'e-Nose':ab,ti OR 'e Nose':ab,ti OR 'Artificial Nose':ab,ti OR 'Nose, Artificial':ab,ti OR 'Electronic Tongue\*':ab,ti OR 'Tongue\*, Electronic':ab,ti OR 'Aeonose ':ab,ti OR 'Cyranose 320':ab,ti |
| **#9** | #7 OR #8 |
| **#10** | 'Diagnosis':ab,ti |
| **#11** | 'Diagnose\*':ab,ti OR 'Diagnoses and Examination\*':ab,ti OR 'Examination\* and Diagnose\*':ab,ti OR 'Postmortem Diagnosis':ab,ti OR 'Postmortem Diagnoses':ab,ti OR 'Antemortem Diagnosis':ab,ti OR 'Antemortem Diagnoses':ab,ti OR 'Sensitivity AND Specificity':ab,ti OR 'Sensitivity:ab,ti OR 'Specificity':ab,ti |
| **#12** | #10 OR #11 |
| **#13** | 'ROC Curve':ab,ti |
| **#14** | 'Curve\*, ROC':ab,ti OR 'ROC Curves':ab,ti OR 'Analysis, ROC':ab,ti OR 'Analyses, ROC':ab,ti OR 'ROC Analyses':ab,ti OR 'ROC Analysis':ab,ti OR 'Receiver Operating Characteristic\*':ab,ti OR 'Characteristic\*, Receiver Operating':ab,ti |
| **#15** | #13 OR #14 |
| **#16** | #3 AND #6 AND #9 AND #12 AND #15 |
| **Web of Science** | **#1** | ‘Colorectal Neoplasms’ OR ‘Neoplasm\*, ‘Colorectal’ OR ‘Colorectal Tumor\*’OR ‘Colorectal Cancer’  OR ‘Colorectal Carcinoma\*’ |
| **#2** | ‘Volatile Organic Compounds’ OR ‘Compound\*, Volatile Organic’ OR ‘Organic Compound\*, Volatile’ OR ‘Volatile Organic Compound’ OR ‘VOCs’ OR ‘VOC’ |
| **#3** | ‘Electronic Nose’ OR ‘artificial nose’ OR ‘e-nose’ OR ‘eNose’ OR ‘Electronic Tongue\*’OR ‘Aeonose’ OR ‘Cyranose 320’ |
| **#4** | ‘Diagnosis’ OR ‘Diagnose’ OR ‘Diagnose\* and Examination\* ’  ‘Postmortem Diagnosis’ OR ‘Antemortem Diagnosis’ OR ‘ROC Curve\*’ OR ‘ROC Analyses’ OR ‘ROC Analysis’ OR ‘Receiver Operating Characteristic\*’ OR ‘Sensitivity AND Specificity’ OR ‘Sensitivity’ OR ‘Specificity’ |
| **#5** | #1 AND #2 AND #3 AND #4 |
| **Cochrane**  **Library** | **#1** | 'Colorectal Neoplasms' |
| **#2** | 'Neoplasm, Colorectal':ab,ti,kw OR 'Neoplasms, Colorectal':ab,ti,kw OR 'Colorectal Tumors':ab,ti,kw OR 'Colorectal Tumor':ab,ti,kw OR 'Tumor, Colorectal':ab,ti,kw OR 'Tumors, Colorectal':ab,ti,kw OR 'Colorectal Cancer':ab,ti ,kw OR 'Cancer, Colorectal':ab,ti,kw OR 'Cancers, Colorectal':ab,ti,kw OR 'Colorectal Cancers':ab,ti ,kw OR 'Colorectal Carcinoma':ab,ti,kw OR 'Carcinoma, Colorectal':ab,ti,kw OR 'Carcinomas, Colorectal':ab,ti,kw OR 'Colorectal Carcinomas':ab,ti,kw |
| **#3** | #1 OR #2 |
| **#4** | 'Volatile Organic Compounds' |
| **#5** | 'Compound\*, Volatile Organic':ab,ti,kw OR 'Organic Compound\*, Volatile':ab,ti,kw OR 'Volatile Organic Compound':ab,ti,kw OR 'VOCs':ab,ti,kw OR 'VOC':ab,ti,kw |
| **#6** | #4 OR #5 |
| **#7** | 'Electronic Nose' |
| **#8** | 'Nose, Electronic':ab,ti,kw OR 'e-Nose':ab,ti,kw OR 'e Nose':ab,ti,kw OR 'Artificial Nose':ab,ti,kw OR 'Nose, Artificial':ab,ti,kw OR 'Electronic Tongue\*':ab,ti,kw OR 'Tongue\*, Electronic':ab,ti,kw OR 'Aeonose ':ab,ti,kw OR 'Cyranose 320':ab,ti,kw |
| **#9** | #7 OR #8 |
| **#10** | 'Diagnosis' |
| **#11** | 'Diagnose\*':ab,ti,kw OR 'Diagnoses and Examination\*':ab,ti,kw OR 'Examination\* and Diagnose\*':ab,ti,kw OR 'Postmortem Diagnosis':ab,ti,kw OR 'Postmortem Diagnoses':ab,ti,kw OR 'Antemortem Diagnosis':ab,ti,kw OR 'Antemorte Diagnoses' :ab,ti,kw OR 'Sensitivity AND Specificity':ab,ti,kw OR 'Sensitivity:ab,ti,kw OR 'Specificity':ab,ti,kw |
| **#12** | #10 OR #11 |
| **#13** | 'ROC Curve' |
| **#14** | 'Curve\*, ROC':ab,ti,kw OR 'ROC Curves':ab,ti,kw OR 'Analysis, ROC':ab,ti ,kwOR 'Analyses, ROC':ab,ti,kw OR 'ROC Analyses':ab,ti,kw OR 'ROC Analysis':ab,ti,kw OR 'Receiver Operating Characteristic\*':ab,ti,kw OR 'Characteristic\*, Receiver Operating':ab,ti,kw |
| **#15** | #13 OR #14 |
| **#16** | #3 AND #6 AND #9 AND #12 AND #15 |

2. Modified QUADAS-2 tool

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|  |  | QUADAS-2 (modified) |
| **Risk of Bias** | **Patient selection** | Were sampled patients representative of the intended population?  Did the study include patients as well as healthy controls?  Did the study avoid inappropriate exclusions?  **Could the selection of patients have introduced bias?** |
| **Index test** | Was the index test and interpretation of data performed in standardized and reproducible fashion?  If a threshold was used, was it prespecified?  Validation of results performed (internal or external)?  Did they validate their results on a blinded sample?  **Could the conduct or interpretation of the index test have introduced bias?** |
| **Reference standard** | Is the reference standard likely to correctly classify the target condition?  Were the reference standard results interpreted without knowledge of the results of the index test?  Is the reference standard likely to correctly classify the control group?  **Could the reference standard, its conduct, or its interpretation have introduced bias?** |
| **Flow and timing** | Was there an appropriate interval between index test and reference standard?  Did all patients receive a reference standard?  Were index test and reference standard performed prior to therapeutic intervention?  Did all patients receive the same reference standard?  Were all patients included in the analysis?  **Could the patient flow and application of the tests have introduced bias?** |
| **Applicability** | **Patient selection** | Are there concerns that the included patients and setting do not match the review question? |
| **Index test** | Are there concerns that the authors have not demonstrated suitable reproducibility and sensitivity of the chosen index test? |
| **Reference standard** | Are there concerns that the target condition as defined by the reference standard does not match the question? |