

Poor Reporting and Methodological Quality of Network Meta-Analyses in Gastroenterology: Protocol for a Meta-Epidemiological Study

Daniel Arruda Navarro Albuquerque, MD, MSc ^a

Vassiliki Sinopoulou, MSc ^a

Shiyao Liu, BDS, PhD ^a,

Charlotte Haines, PhD ^a,

Aderonke Ajiboye, BDS, MPH ^a

Morris Gordon, MD, PhD ^a✉

¹School of Medicine, University of Lancashire, Preston, UK.

✉ Corresponding author

ABSTRACT

Background

Network meta-analysis (NMA) has become increasingly influential in evidence synthesis and clinical guideline development. The number of published NMAs has grown rapidly in recent years, including within gastroenterology and hepatology. To date, no comprehensive evaluation has specifically assessed the methodological and reporting quality of NMAs in gastroenterology. This study aims to evaluate key methodological characteristics and reporting practices of recently published NMAs in this field.

Methods

We will conduct a cross-sectional meta-epidemiological study of NMAs published in gastroenterology and hepatology. Electronic searches will be performed in MEDLINE, Embase, and the Cochrane Database of Systematic Reviews to identify eligible studies published between January and October 2025. Two independent reviewers will screen studies and extract data using a predefined form. Included studies will be NMAs evaluating any pharmacological, screening, preventive, behavioural, or technological interventions in gastroenterology or hepatology populations. Studies focusing exclusively on cancer, transplantation, or purely surgical interventions will be excluded. Extracted data will include general study characteristics, methodological approaches, reporting standards, protocol availability, risk of bias assessment tools, and certainty of evidence frameworks such as GRADE or CINeMA. Additional data will be collected on how NMAs report direct, indirect, and network estimates, as well as the use of ranking statistics and summary of findings tables. Results will be summarised using

descriptive statistics, including absolute frequencies, percentages, medians, and ranges. McNemar's test will be used to compare planned methodological approaches with reported analyses.

KEYWORDS

network meta-analysis, quality assessment, gastroenterology, methodology, grade, risk of bias, prisma, protocol

1. Background

Network meta-analysis (NMA) has become an increasingly popular method for synthesising evidence when multiple interventions are available for a certain condition. Unlike traditional pairwise meta-analysis, which compares only two treatments at a time, NMA enables the simultaneous comparison of several interventions using both direct and indirect evidence¹. This approach allows researchers to estimate the relative effectiveness of treatments and even rank them, providing valuable insights when head-to-head trials are unavailable.

Over the past two decades, the number of published NMAs has increased exponentially and has been increasingly incorporated into evidence generation for clinical decision-making. After the year of 2010, the number of publications grew sharply, achieving figures of 200 publications in 2014, 500 in 2016 and 600 in 2017². In gastroenterology, for instance, recent NMAs have provided insights for both diagnostic³ and therapeutic⁴⁻⁷ evidences, with findings incorporated into clinical guidelines⁸, therefore playing a significant role on clinical practice.

However, despite the increasing use of NMAs, there are growing concerns about their methodological quality and adherence to established standards⁹. Many authors do not fully comply with reporting guidelines, often omit assessments of risk of bias for individual studies, fail to register a prospective protocol, and overlook the assessment of certainty using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) framework. A meta-research study by Gianola et al.¹⁰ highlighted significant gaps in reporting and methodological quality across 139 NMAs published in January 2023 across various fields. Around half of the authors did not adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses for NMAs (PRISMA-NMA), only 61% had registered a study protocol, and just 33% reported an assessment of the certainty of evidence.

Preliminary observations from our research group indicate that many published NMAs in gastroenterology may not meet high methodological standards. In some cases, journals reject publishing

rigorously conducted NMAs because they have already accepted studies on similar topics with weaker methodologies. This situation raises concerns about the reliability of existing evidence syntheses and the risk of clinical recommendations being influenced by flawed analyses.

Previous studies in other medical specialties have highlighted considerable limitations in the quality of NMAs and adherence to reporting guidelines¹⁰⁻¹⁴. However, no comprehensive evaluation has been carried out specifically in the field of gastroenterology. Thus, assessing the current state of NMA methodology in these areas is crucial to identify gaps, encourage best practices, and ultimately enhance the quality of evidence available to clinicians, patients, and policymakers.

2. Methods

2.1. Study design

We will conduct a cross-sectional meta-epidemiological study to evaluate key aspects of reporting and methodological quality in recently published NMAs within gastroenterology. Our approach will adapt the methodology previously outlined by Moher et al.¹⁵ and Gianola et al.¹⁰ to extract relevant epidemiological data from eligible NMAs. This prospective protocol will be made publicly available in an open repository at <https://knowledge.lancashire.ac.uk/>.

2.2. Search strategy

Electronic searches will be conducted in Ovid MEDLINE, Embase, and the Cochrane Database of Systematic Reviews on 23rd October 2025, from January to October 2025. Studies published in languages other than English will be excluded. The search will be performed using the following strategy:

1 network meta-analysis/

2 ((network or mixed or multi* or indirect) adj5 (meta-analy* or metaanaly*)).ti,ab,kw,kf.

3 NMA.ti,ab,kw,kf.

4 or/1-3 [NMA]

5 exp Digestive System Diseases/

6 exp Nutrition Disorders/ or exp nutritional disorder/

7 exp Digestive System/

8 (esophag* or oesophag* or stomach or gastro* or gastric or duodenum or duodenal or jejunum or Jejunal or ileum or ileal or Ileocecal or intestin* or diverticu* or cecum or cecal or colon* or rectal

or rectum or bowel or colitis or abdomen or abdominal or liver or hepat* or intrahepatic or sigmoid or bile or biliary or gallbladder or Choledochal or pancrea* or upper GI or lower GI or gut or anus or anal or Peritoneal or Mesenteric).ti. [GI location]

9 (Budd-Chiari Syndrome or cirrhosis or cirrhostic or Crohn* or colitis or Celiac or Coeliac or Cholestasis or Cholelithiasis or Cholecystolithiasis or Choledocholithiasis or cholangiopancreato* or Caroli Disease or Cystic Fibrosis or Congenital Hyperinsulinism or digestive or dyspep* or constipation diarrhea or diarrhoea or Gallstone* or helicobacter or Peritonitis or Pneumoperitoneum or pylori or peptic ulcer* or proctitis or Portal hypertension or reflux disease* or Rumination Syndrome or steatohepatitis or Zellweger Syndrome).ti. [other GI diseases]

10 (nutrition* or malabsorption or Malnutrition or vitamin* or Hypervitaminosis or Deficiency Disease* or nutrients or overnutrition or overweight or obese or obesity or Refeeding Syndrome or Starvation or undernutrition or Wasting Syndrome).ti.

11 (IBD or IBS or GERD or MASH or MELD or MASLD or NASH or NAFLD or UGIB or LGIB or GIB or ERCP or endoscop* or colonoscop*).ti.

12 or/5-11

13 4 and 12

14 (conference abstract or conference review).pt.

15 13 not 14

16 limit 15 to english language [Limit not valid in CDSR; records were retained]

17 limit 16 to yr="2025 -Current"

18 remove duplicates from 17

2.3. *Study selection*

Two independent reviewers will independently screen title and abstracts followed by full-text screening using the Covidence online tool. Disagreements between reviewers will be resolved by a third senior researcher.

2.4. *Inclusion criteria*

- **Design:** articles that mentioned the study design as NMA in the title, abstract or main text. We will use the definition of NMA according to the Cochrane Handbook¹. Studies that performed NMAs as a part of another broader research will also be included. NMAs conducted using randomised and observational studies will be considered. Both frequentist and Bayesian approaches will be included.

- **Population:** adults and children at any age or sex with any medical or surgical condition within gastroenterology or hepatology, encompassing but not limited to the following:
 - Inflammatory bowel disease
 - Irritable bowel syndrome / functional abdominal pain / abdominal Migraine
 - Gastroesophageal reflux disease, peptic ulcer disease, gastritis, oesophagitis
 - Diverticular disease
 - Gastrointestinal bleeding (upper or lower)
 - Dysphagia (achalasia, eosinophilic oesophagitis)
 - Hepatitis (infectious, alcoholic, auto immune and metabolic aetiologies)
 - Acute and chronic pancreatitis (alcoholic and biliary aetiologies)
 - Appendicitis
 - Liver cirrhosis of any cause and their complications (ascites, hepatic encephalopathy, hepato-renal syndrome, spontaneous bacterial peritonitis)
 - Biliary diseases (infectious, inflammatory, obstructive)
 - Functional constipation or constipation caused by organic disease
 - Infantile colic
 - Coeliac disease
 - Cow's milk protein allergy, lactose intolerance, other food intolerances
 - Necrotising enterocolitis
 - Hirschsprung's disease
 - Any form of congenital intestinal malformation
 - Neonatal jaundice, biliary atresia

- **Interventions:** NMAs approaching any of the following intervention types conducted in any health care setting will be considered:
 - Pharmacological (or pharmacological analysed together with surgical interventions)
 - Endoscopic interventions

- Diagnostic screening
- Behavioural or procedural
- Preventive
- Public health policy
- Technological or digital
- **Outcomes:** any efficacy or safety outcome will be considered.

2.5. *Exclusion criteria*

- Studies that evaluate cancer (oesophagus, stomach, colon, rectum, liver, gallbladder, biliary tract, pancreas)
- Studies that evaluate only surgical intervention
- Studies that evaluate transplantation
- Traditional pairwise meta-analyses
- Diagnostic test accuracy meta-analyses
- Prognostic meta-analysis
- Prevalence/incidence meta-analysis
- Individual participant data meta-analyses
- Animal or pre-clinical studies
- Cost utility
- Conference abstracts, pre-prints, protocols, letters, corrigendum, erratum, editorials and commentaries.

2.6. *Data extraction*

Two independent researchers will extract general data from the included NMAs using a predefined extraction form containing key information relevant to the study objectives. Any disagreements will be resolved through consensus with a third researcher. The extraction form will include the following:

Authorship details:

- Title
- Year of publication

- First author name
- Country, institution and e-mail of the corresponding author
- International collaboration (yes/no)
- Journal name
- Journal Impact Factor (JIF) (calculated by Clarivate's Web of Science Journal Citation Reports¹⁶ as follow: average number of citations received in a particular year by articles published in the previous two years) and year it was assessed
- Cochrane review (yes/no)

PICO details

- Population age (adults/paediatric/both)
- Disease/condition in question
- Type of intervention (pharmacological/non-pharmacological/multiple categories of interventions)
- Safety outcomes included (yes/no)

Methodological details

- Number of included studies
- Only RCTs included (yes/no)
- Only observational studies included (yes/no)
- NMA statistical approach (frequentist/Bayesian)
- Risk of bias tools (Cochrane RoB 1 / Cochrane RoB 2 / ROBINS-I / ROBINS-E / Newcastle–Ottawa Scale / Joanna Briggs Institute (JBI)/Jadad Scale/none)
- Reporting checklist tool (PRISMA/PRISMA-NMA/MOOSE/none/not reported)
- Any accessible protocol (protocol link or citation/protocol or citation not reported/ protocol or citation reported but not accessible)
- Type of certainty assessment (GRADE¹⁷/CINeMA¹⁸/NETGRADE/ad hoc/none) – find out how studies do the certainty assessment

Data reporting

- Direct data estimates reported (yes/no)
 - Statement on where direct data was reported in the manuscript
- Indirect data estimates reported (yes/no)
 - Statement on where indirect data was reported in the manuscript
- Network data estimates reported (yes/no)

- Statement on where network data was reported in the manuscript
- Ranking statistics (SUCRA/P-score/no/other)
- NMA summary of findings table reported (yes/no)

Details on GRADE/Certainty Assessment

- Certainty assessed level (outcome x intervention/ intervention only (unclear what outcomes is)/ outcome (unclear what intervention is)/ study level)
- Statements on risk of bias to assess certainty (methods vs. results/discussion/appendix)
- Statements on inconsistency/heterogeneity (I^2) to assess certainty (methods vs. results/discussion/appendix)
- Statements on indirectness to assess certainty (methods vs. results/discussion/appendix)
- Statements on imprecision to assess certainty (methods vs. results/discussion/appendix)
- Statements on publication bias to assess certainty (methods vs. results/discussion/appendix)
- Statements on incoherence to assess certainty (methods vs. results/discussion/appendix)
- Statements on magnitude of effects to assess certainty (methods vs. results/discussion/appendix).

2.7. Data analysis

We will descriptively summarise our results as absolute numbers (percentages), and as medians (ranges). McNemar's test for related samples will be used to compare the planned methods to the completed (reported) results.

REFERENCES

1. Chaimani A, Caldwell DM, Li T, Higgins JPT, Salanti G. Chapter 11: Undertaking network meta-analyses [last updated October 2019]. In: Higgins JPT, Thomas J, Chandler J, et al, eds. *Cochrane Handbook for Systematic Reviews of Interventions version 65*. Cochrane; 2024.
2. Shi J, Gao Y, Ming L, et al. A bibliometric analysis of global research output on network meta-analysis. *BMC Medical Informatics and Decision Making* 2021 21:1. 2021–05–03;21(1)doi:10.1186/s12911-021-01470-5
3. Sinopoulou V, Nigam GB, Gordon M, et al. Comparative Efficacy and Safety of Endoscopic Modalities for Colorectal Cancer Screening in Inflammatory Bowel Disease: A Systematic Review and Network Meta-analysis. *Clin Gastroenterol Hepatol*. Dec 13 2024;doi:10.1016/j.cgh.2024.11.008
4. Sinopoulou V, Gordon M, Liu S, et al. Immunomodulators and Advanced Therapies for Induction of Remission in Crohn's Disease: A Systematic Review and Network Meta-Analysis. *Inflammatory Bowel Diseases*. 2025;doi:10.1093/ibd/izaf191
5. Shehab M, Alrashed F, Alsayegh A, et al. Comparative Efficacy of Biologics and Small Molecule in Ulcerative Colitis: A Systematic Review and Network Meta-analysis. *Clin Gastroenterol Hepatol*. Feb 2025;23(2):250–262. doi:10.1016/j.cgh.2024.07.033
6. Sinopoulou V, Groen J, Gordon M, et al. Efficacy of interventions for the treatment of irritable bowel syndrome, functional abdominal pain-not otherwise specified, and abdominal migraine in children: a systematic review and network meta-analysis. *Lancet Child Adolesc Health*. May 2025;9(5):315–324. doi:10.1016/S2352-4642(25)00058-6
7. Gordon M, Liu S, Sinopoulou V, Albuquerque DAN, Moran G. Interventions for maintenance of surgically induced remission in Crohn's disease: a systematic review and network meta-analysis. *BMJ Open Gastroenterol*. Dec 21 2025;12(1)doi:10.1136/bmjgast-2025-002086
8. East JE, Gordon M, Nigam GB, et al. British Society of Gastroenterology guidelines on colorectal surveillance in inflammatory bowel disease. *Gut*. Apr 30 2025;doi:10.1136/gutjnl-2025-335023
9. Gordon M. Network meta-analyses in IBD: pitfalls and promise for clinicians. *Therap Adv Gastroenterol*. 2026;19:17562848251408758. doi:10.1177/17562848251408758
10. Gianola S, Guida S, Ravot G, Lunny C, Barger S, Castellini G. Gaps in completeness of reporting and methodological quality: a metaresearch study of 139 network meta-analyses published in January 2023 using PRISMA-NMA and AMSTAR-2. *Journal of Clinical Epidemiology*. 2025/07/01;183doi:10.1016/j.jclinepi.2025.111783
11. V N, S N, CM F, et al. Reporting quality of systematic reviews with network meta-analyses in Endodontics - PubMed. *Clinical oral investigations*. 2023 Jul;27(7)doi:10.1007/s00784-023-04948-w

12. Sehmbi H, Retter S, Shah UJ, Nguyen D, Martin J, Uppal V. Epidemiological, methodological, and statistical characteristics of network meta-analysis in anaesthesia: a systematic review. *British Journal of Anaesthesia*. 2023/03/01;130(3)doi:10.1016/j.bja.2022.08.042
13. F Y, H W, J Z, et al. Assessing the methodological and reporting quality of network meta-analyses in Chinese medicine - PubMed. *Medicine*. 2018 Nov;97(47)doi:10.1097/MD.00000000000013052
14. Tonin FS, Borba HH, Leonart LP, et al. Methodological quality assessment of network meta-analysis of drug interventions: implications from a systematic review. *International Journal of Epidemiology*. 2019/04/01;48(2)doi:10.1093/ije/dyy197
15. Moher D, Tetzlaff J, Tricco AC, Sampson M, Altman DG. Epidemiology and Reporting Characteristics of Systematic Reviews. *PLOS Medicine*. 27 Mar 2007;4(3)doi:10.1371/journal.pmed.0040078
16. Clarivate. The Clarivate Impact Factor. 2025;
17. Guyatt GH, Oxman AD, Vist GE, et al. GRADE: an emerging consensus on rating quality of evidence and strength of recommendations. *BMJ*. 2008;336(7650):924–926. doi:10.1136/bmj.39489.470347.ad
18. Nikolakopoulou A, Higgins JPT, Papakonstantinou T, et al. CINeMA: An approach for assessing confidence in the results of a network meta-analysis. *PLOS Medicine*. 2020;17(4):e1003082. doi:10.1371/journal.pmed.1003082