

Critical Writing

Why critical writing matters
PubMed advanced search & citation skills

Part 1

Why Critical Writing Matters



Overview

IN-SCOPE

Critical Writing Principles
(shifts you should see
+ value in the real world)
Citation/Search Skills
(and why they're essential)

OUT-OF-SCOPE

UWTSD login, Teams and email, enrolment, timetable, learning methods, Turnitin, finance forms, marking, feedback, Moodle, reading lists, time management, Mendeley (in detail)



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David



Wales Institute of Digital Information
Athrofa Wybodaeth Ddigidol Cymru

Shifts when you write critically

Descriptive → evaluative

- From description → explain and evaluate (weigh up the evidence)
- From reporting → apply reasoning / (“defensible” judgements)
- From summarising → synthesise causes, mechanisms, consequences
- From ‘what happened’ → ‘why it happened, how, and with what effect’
- From statements → Balance strengths and weaknesses
- From the boring → the creative/developing your own style

Moving to Analysis

Analysis - breaking things down to show *how it works* or *how it compares* to other cases.

Evaluation - go beyond explaining and analysing to make a defensible judgement: weighing up the evidence, *deciding* what is most important, and *showing why* it matters.

Examples of Critical Style

SEE HANDOUT 1

Handout 1 give examples of **tone and questioning style** (they are not an analysis)

The italics there are used for emphasis only

There are no references are included – its purely for style illustration

Read them as examples of **critical phrasing**



Critical Writing in Practice

Analyst Roles

SEE HANDOUT 2

An analyst is a professional who gathers, interprets, and analyses data or information to identify patterns, trends, and insights, ultimately providing recommendations or solutions to problems. They work in various industries, using their skills to improve efficiency, make informed decisions, and drive strategic planning.



An Example of an Analyst

Sir Michael Marmot

Turned data on social determinants of health into action.

What he did: Led the Marmot Reviews (2010, 2020), linking life expectancy to deprivation and policy.

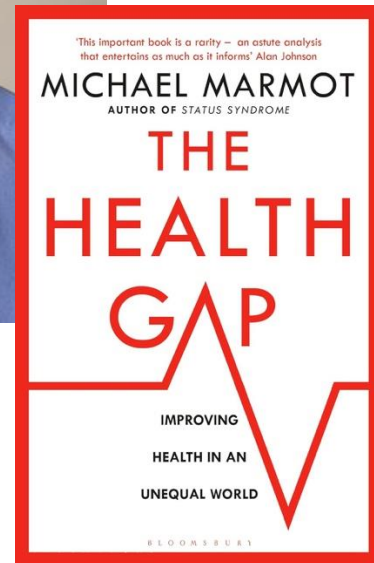
Why it matters: Showed health inequalities arise from housing, education, and work, not just medicine.

How he worked: Blended epidemiology, social science, and economics to reveal structural causes.

Impact: Shaped NHS and government policy, introducing the enduring “Marmot principles” for health equity.



Search
gFOc7zCHpRs
on YouTube

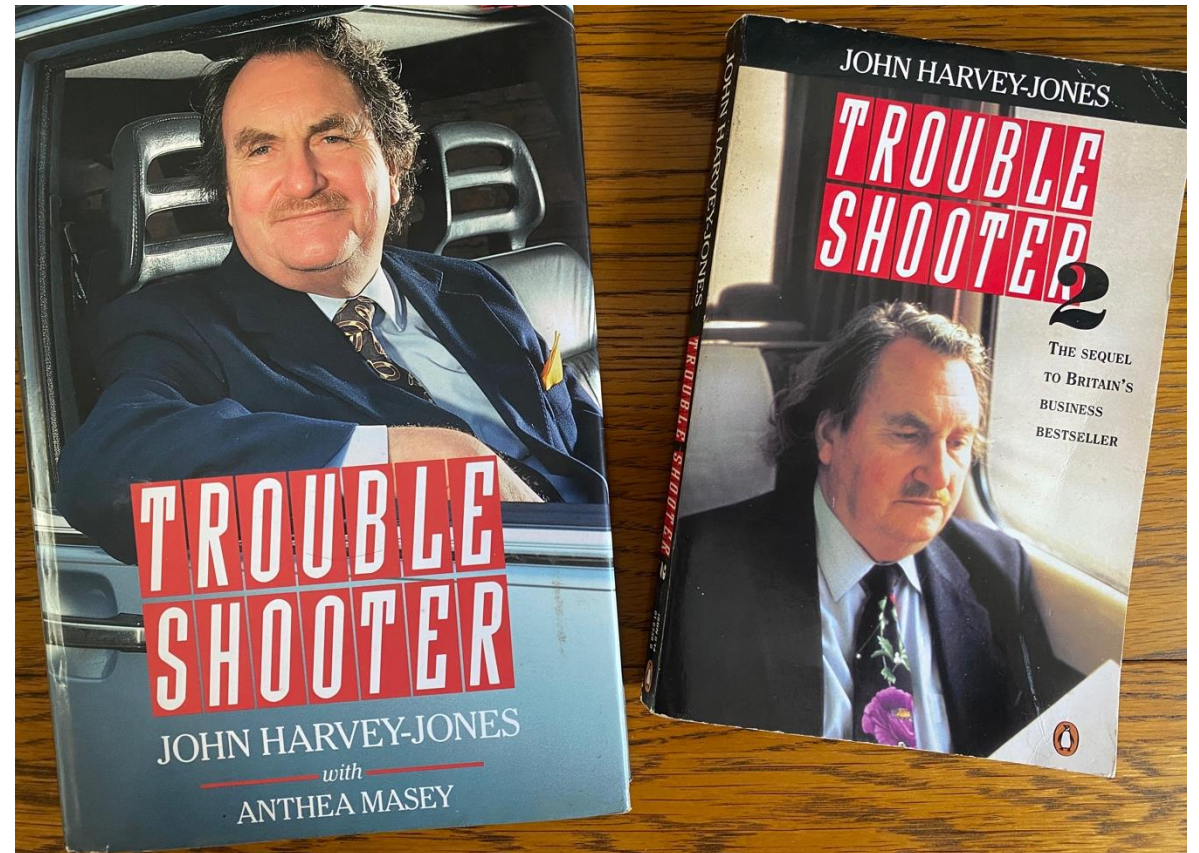


Critical Writing in Practice

Troubleshooter Roles

SEE HANDOUT 3

A troubleshooter is someone skilled at identifying and fixing problems, e.g. in mechanical equipment, computer software, or even diplomatic or political disputes. They are essentially problem solvers who can diagnose issues and implement solutions.



Sir John Harvey Jones (1924-2008)

Chair of ICI 1982 to 1987



Some Principles



Writing is About Trust

Not Just Structure

- Use rigorous, transparent data
- Separate evidence from interpretation
- Show how you reached conclusions
- **Example:** A falls-prevention report should not only show reduced admissions, but also explain how data were gathered, what was excluded, and why the figures are reliable.
- **Take-home:** Critical writing builds trust through transparent evidence and reasoning.





Context and Constraints

Clearly Define Your Contribution

Scope is as important as findings.

Boundaries show scholarly honesty and critical judgement.

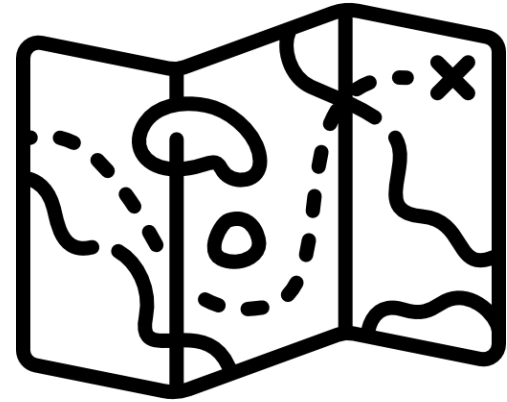
Context explains why it matters

Constraints define limits and add credibility

Contribution rests on what is included and excluded

Example (Health & Social Care): A digital inclusion project may focus only on older adults in one area. Stating this shows limits, avoids over-claiming, and invites further research.

Take-home: Credibility grows when boundaries are defined as clearly as achievements.



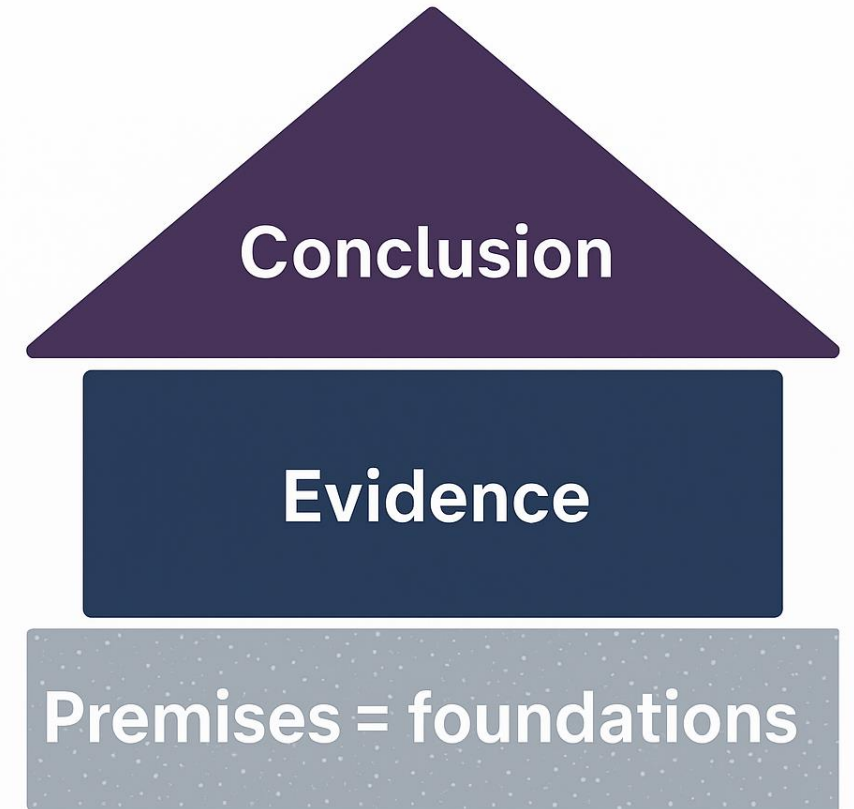


Argument as Architecture

**A strong argument is like a building:
conclusions must rest on clear premises and
credible evidence.**

Example (Health & Social Care): To argue for electronic prescribing, the conclusion (fewer errors) must rest on evidence (audits, studies, pilots) built on premises (risks of handwritten scripts).

Take-home: Foundations, walls, and roof must hold together.





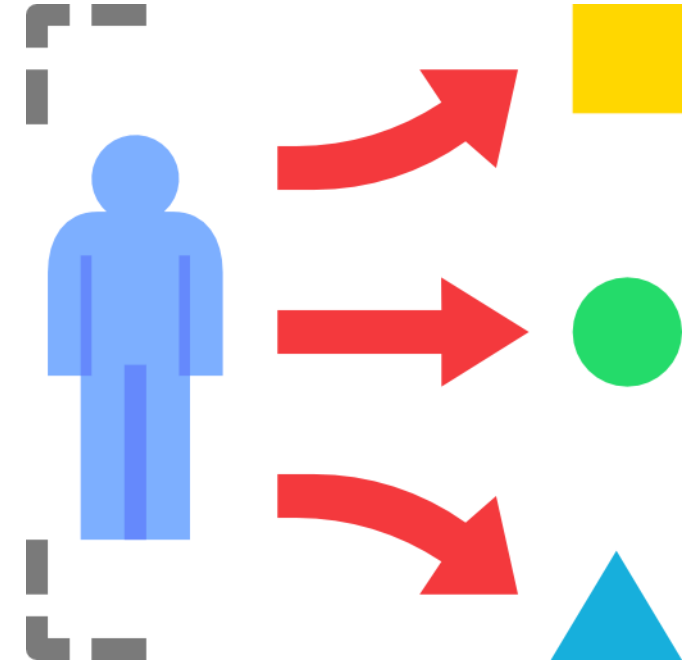
Balance and Objectivity

Advanced work weighs alternatives and justifies a position with balanced reasoning.

- Acknowledges limits and counter-evidence
- Shows why your view is stronger
- Authority comes from weighing, not ignoring

Example: On AI in radiology, note both efficiency gains and risks of bias, then explain why evidence supports careful adoption with safeguards.

Take-home: Authority comes from weighing alternatives.





Critical Writing = Actionable Writing

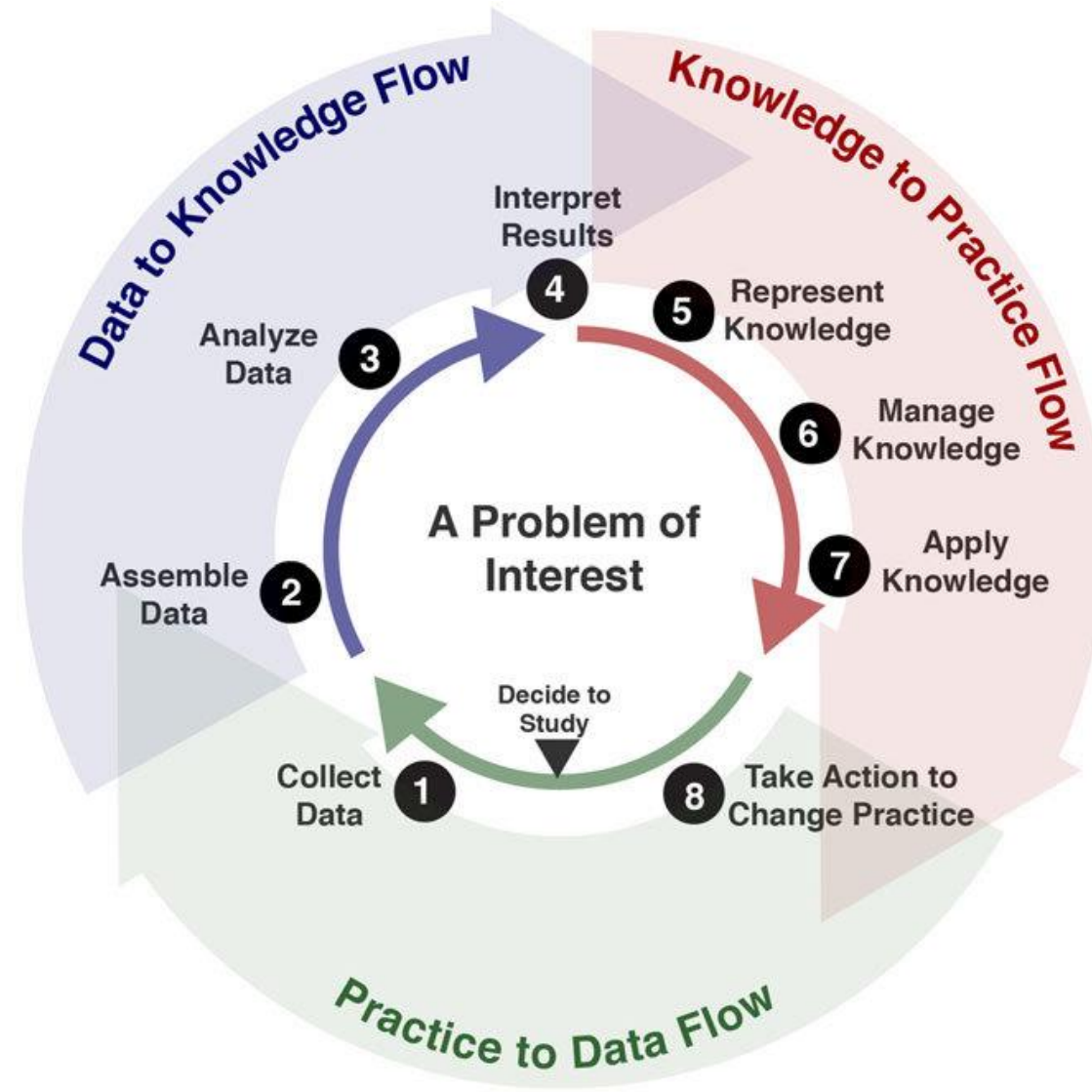
Critical writing is reader-centred:

it should enable others to use, act, test, or build on your work.

- Good structure makes for re-usability
- Recommendations flow from evidence
- Application limits must be clear

Example: A workforce report should give **actionable steps**, show how they were derived, and state limits — so managers can use it with confidence.

Take-home: Critical writing succeeds when readers can **act on it (implement it)**.





“Always Doubt Everything at Least Once”

Its that *hang on a minute...* moment

Rene Descartes’ methodical doubt:
question every claim at least once.

Test assumptions, evidence, and conclusions
Doubt is temporary; it strengthens what survives.

Readers trust claims that are stress-tested.

Example: “Telehealth reduces GP workload”
→ What does workload mean, who measured it, or did the original work shift to elsewhere?

Take-home: Every claim deserves at least one moment of doubt.



In the world of evidential claims

PubMed is your friend

but you need to master advanced search

The image is a screenshot of the PubMed homepage. At the top left is the NIH logo and the text "National Library of Medicine" and "National Center for Biotechnology Information". At the top right is a "Log in" button. The PubMed logo is prominently displayed in the center. Below the logo is a large white search bar. To the left of the search bar, the word "Advanced" is written in a smaller font and is circled in red. To the right of the search bar is a green "Search" button. Below the search bar, there is a paragraph of text: "PubMed® comprises more than 39 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full text content from PubMed Central and publisher web sites." The number "39" in the text is circled in red.

NIH National Library of Medicine
National Center for Biotechnology Information

Log in

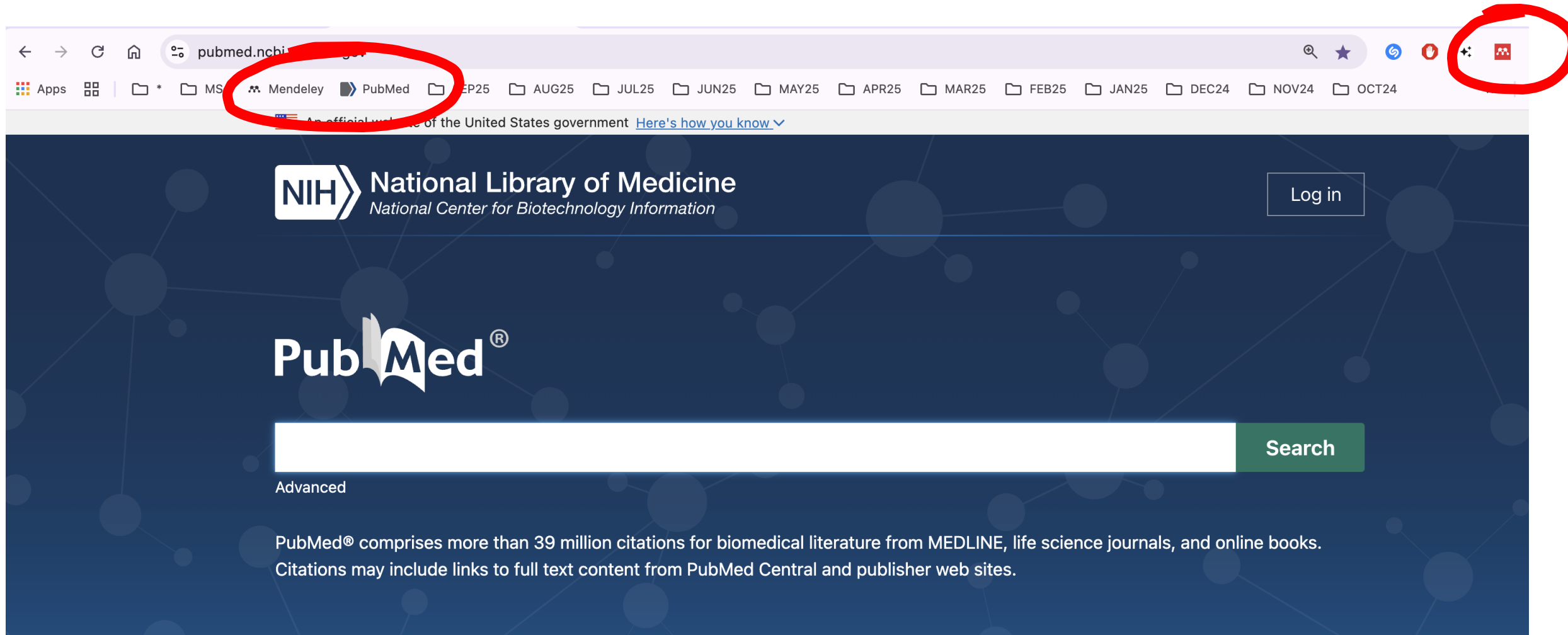
PubMed®

Advanced

Search

PubMed® comprises more than 39 million citations for biomedical literature from MEDLINE, life science journals, and online books. Citations may include links to full text content from PubMed Central and publisher web sites.

Keep the PubMed link and Mendeley Plug-in In your Menu Bar



PubMed Advanced Search Scenario

On Intubation and Surgical Recovery

SEE HANDOUT 4

Scenario Summary

You are working with a surgical recovery team facing challenges in predicting which patients will need extra support after extubation.

The consultant anaesthetist asks for up-to-date evidence on how AI and machine learning can be used to support decision-making in this area.

The team asks you to search PubMed for relevant research and providing useful references.



PubMed Advanced Search Strategy



National Library of Medicine
National Center for Biotechnology Information

Log in

PubMed Advanced Search Builder



Filters applied: 1 year, Abstract, Free full text, Full text, Review. [Clear all](#)

Add terms to the query box

All Fields



Option 1: Build step by step (the top "Add terms to the query box" section)



AND



Show Index

Query box

Option 2: Paste the full Boolean search directly (the big Query box)
Just copy your entire Boolean strategy:



Search



Link to PubMed [here](#).

PubMed Structured Search for Scenario

Link to PubMed [here](#).

Concept	Search	Link	Refs on run-through
#1 AI	("Artificial Intelligence"[mesh] OR "Machine Learning"[mesh] OR "machine learning"[tiab] OR "deep learning"[tiab])	AND	4827
#2 Extubation	("Intubation, Intratracheal"[mesh] OR "Extubation"[mesh] OR "Respiration, Artificial"[mesh] OR "respiratory recovery"[tiab] OR "weaning"[tiab])	AND	372
#3 Surgery	("surgical procedures, operative"[mesh] OR "postoperative period"[mesh] OR surgery[tiab] OR postoperative[tiab])	AND	1263

Retrieving Selected References

(Mendeley Reference Manager Plug-in)

If you don't know:

- Download Desktop App <https://www.mendeley.com/>
- Download Mendeley PubMed Plug-in
- Work in PubMed / Send selections to your Mendeley library

Critical Writing Checklist

SEE HANDOUT 5

Writing critically means:

- 1. Evaluate Evidence** – check credibility, quality, and relevance.
- 2. Challenge Assumptions** – question what is taken for granted.
- 3. Compare with Frameworks** – relate to models and best practice.
- 4. Develop Your Own Perspective** – synthesise, not just summarise.
- 5. Justify with Rigorous Argumentation** – defend your points with logic and evidence

Write for the educated layperson: clear, defensible, and professional.

HANDOUT 1

Simple Examples of Critical Style

Shown in italics for emphasis only

*These are style examples only without citations. They do **not reflect actual analysis** and are only intended to convey a questioning style to generally adopt.*

Electronic Patient Record in NHS Wales

NHS Wales is rolling out the Welsh Clinical Portal to bring results, orders, and documents into one place. The aim is to reduce fragmentation and support safer handover. The system is delivered nationally with common data standards and single sign-on. *The critical issue is that this only improves care if workflows change. Without evidence of fewer duplicate tests, faster clinical action, and safer prescribing, the project risks digitising inefficiency and creating a single point of failure.*

National Data Resource for Wales

The National Data Resource is designed to standardise health and care data so it can be analysed and shared. Its purpose is to support research and service planning. It is built on national data standards with central governance. *The critical question is who benefits. Unless there is transparency on secondary use, public consent, and evidence of service change driven by data, the programme may centralise power without delivering visible improvements to patients.*

Video Consultations in NHS Wales

The video consultation service was introduced at scale during the pandemic. It aimed to maintain access and reduce travel. The system was delivered through a single national platform integrated with appointment systems. *The critical appraisal is that while some patients gained easier access, others were excluded by digital poverty. Without monitoring completion rates by deprivation, and without providing alternatives, the service risks deepening health inequalities.*

Welsh Community Care Information System

WCCIS is a shared digital record for health and social care. The intention is to improve joint planning and reduce duplication. It relies on consistent templates, training, and secure governance. *The critical concern is variation between areas. If staff create workarounds because of slow performance or poor design, the system adds complexity rather than integration. Success should be measured by fewer duplicated assessments and faster joint visits.*

Welsh Immunisation System

A national scheduling system was used for mass vaccination. It coordinated invites, tracked uptake, and managed stock. It worked through a central database with automated call and recall. *The critical view is that strong throughput figures hide gaps in equity. Unless uptake is tracked by age, ethnicity and deprivation, and outreach funded for low-coverage groups, the system risks leaving the most vulnerable unprotected.*

HANDOUT 2

Critical Writing in Practice: Analyst Roles

Overview

Analysts operate across healthcare, government, finance, engineering, and many other fields. Their purpose is to turn complex information into knowledge that guides decisions. They do more than report what is happening. They question assumptions, connect evidence to context, and sometimes think in unorthodox ways in order to see causes and consequences that others miss. At Masters level this is the essence of critical writing.

Why Analysts Are Needed

Modern organisations face uncertainty, competing priorities, and information overload. Decisions cannot rest on raw data alone. Analysis is needed to identify what matters, explain why patterns occur, and set out realistic options with risks and trade offs made explicit. This work helps leaders avoid quick fixes that fail and instead adopt changes that are likely to endure.

Critical Writing and the Analyst

Critical writing mirrors the workflow of a good analyst. First state clearly what is happening. Then explain why it is happening. Next show how the system works in practice, including mechanisms, context, and comparisons. Finally judge what follows and with what effect, stating who benefits, who may be disadvantaged, and how success will be evidenced. This movement from description to evaluation is the hallmark of Masters level work.

Core Capabilities of Analysts

Strong analysts show clarity in explanation, sound handling of evidence, and contextual insight. They frame questions that matter, weigh alternative explanations, recognise uncertainty, and make defensible judgements. They write in plain English, identify ethical considerations, and translate findings into actions that others can implement.

Example: Sir Michael Marmot

Sir Michael Marmot is a widely recognised analyst of health inequalities. The Marmot Review in 2010 drew together epidemiology, economics, and social science to show how education, housing, and employment shape health. It moved beyond description by evaluating consequences for national policy and by proposing principles for fairer resource allocation. The work influenced NHS and government strategies, showing how analysis can change practice rather than simply comment on it.



Why This Matters For You

In digital transformation you are learning to think and write like an analyst. That means interrogating data, understanding systems and people, and making reasoned judgements about impact. Your assignments should show this movement from what to why to how to what follows, with clear criteria for success such as measurable outcomes and equity of access.

HANDOUT 3

Critical Writing in Practice: Troubleshooter Roles

Why Troubleshooters Are Needed

Troubleshooters are called in when organisations face complex or entrenched problems. Unlike analysts, who primarily interpret and explain, troubleshooters intervene, diagnose, and design solutions. They thrive on cutting through confusion and showing why quick fixes often fail. In critical writing terms, this means not only describing the problem but questioning its causes, assessing failed approaches, and judging which solutions are viable.

Critical Writing and the Troubleshooter

A troubleshooter demonstrates the same movement as critical writing:

- What: Identify and describe the core problem.
- Why: Explain why it has emerged and why it persists.
- How: Analyse failed attempts, organisational barriers, and underlying systems.
- What follows / With what effect: Evaluate which changes will make a lasting difference.

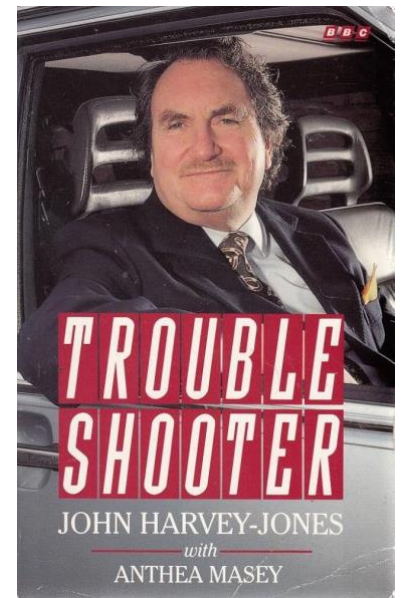
This approach mirrors the questioning style expected at Masters level: not stopping at description, but interrogating causes and outcomes while proposing reasoned solutions.

Example: Sir John Harvey-Jones

Sir John Harvey-Jones (1924–2008) is a famous British troubleshooter. After a naval career he became Chairman of ICI in the 1980s, where he restructured the company and improved competitiveness. He became a household name through the BBC series 'Troubleshooter', where he visited struggling firms, diagnosed their problems, and advised managers. His hallmark was clarity, honesty, and practical judgement. He often explained that problems were developmental in nature, showing why superficial fixes failed and why deeper restructuring was necessary. In critical writing terms, Harvey-Jones modelled how to go beyond describing a failing business to explaining causes, analysing failed solutions, and judging what changes were both realistic and effective.

Why This Matters for You

At Masters level in digital transformation, the troubleshooter role highlights the need to diagnose problems rigorously and explain clearly why they persist. Critical writing skills allow you to move from description to evaluation, to question why previous solutions failed, and to argue for better approaches. Learning to think like a troubleshooter prepares you not just to understand digital projects, but to rescue and reshape them when they falter.



HANDOUT 4

PubMed Search Scenario: Intubation and Surgical Recovery



Scenario

Imagine you are working with a surgical recovery team in a hospital. The team has been discussing how difficult it is to predict which patients will need extra support after intubation during surgery. Some patients recover quickly once the breathing tube is removed (extubation), while others struggle with complications, needing longer stays in intensive care.

At a team meeting, the consultant anaesthetist asks:

"Can we find the latest evidence on how artificial intelligence and machine learning are being used to support decision-making in patients who have been intubated during surgery, especially for predicting who might need more respiratory support afterwards?" The surgical registrar suggests looking up the research, and you are asked to run a PubMed search and share some useful references with the team.

The following shows the correct use of search annotations such as [MeSH Terms], [TiAb], and quotation marks (it will be demonstrated how to do include). MeSH Terms are controlled terminologies and much more powerful in retrieving topic-relevant results. **NOTE YOU CAN IGNORE CASE IN THE SEARCHES, i.e. USE mesh AND tiab**

The use of delimiters will ensure your PubMed search is both comprehensive and precise, capturing all relevant articles *regardless of the wording author's use*. Articles have been already mapped by PubMed to concept spaces - which you then search out.

Note it's fine on simple searches to ignore them BUT TRY NOT TO as it may omit important studies or retrieve large numbers of irrelevant results - weakening the quality of your evidence search.

Always Break your search space into distinct bite-sized concepts:

Concept #1: Artificial Intelligence, enter:

("Artificial Intelligence"[mesh]
OR "Machine Learning"[mesh]
OR "machine learning"[tiab]
OR "deep learning"[tiab])

Note - PubMed indexing may also use related concepts. For example:

- “Neural networks (computer)” is its own MeSH heading.
- “Natural Language Processing” is another MeSH heading.
- Terms like *algorithm*, *predictive modelling*, or *clinical decision support* may appear in titles/abstracts even if not tagged with AI-related MeSH.

This illustrates why **domain knowledge adds value**: knowing the field helps you identify synonyms, related concepts, and alternative indexing that make your search both more comprehensive and precise.

Concept #2: Intubation / Extubation / Respiratory Recovery enter:

("Intubation, Intratracheal"[mesh]
OR "Extubation"[mesh]
OR "Respiration, Artificial"[mesh]
OR "respiratory recovery"[tiab]
OR "weaning"[tiab])

note – again use your domain knowledge or find out what the standard MeSH term is.

Concept #3: Surgery / Postoperative enter:

("surgical procedures, operative"[mesh]
OR "postoperative period"[mesh]
OR surgery[tiab]
OR postoperative[tiab])

The Full PubMed Advanced Search String - “the Boolean” would be

((("Artificial Intelligence"[mesh] OR "Machine Learning"[mesh] OR "machine learning"[tiab]
OR "deep learning"[tiab]) **AND** ("Intubation, Intratracheal"[mesh] OR
"Extubation"[mesh] OR "Respiration, Artificial"[mesh] OR "respiratory recovery"[tiab] OR
"weaning"[tiab]) **AND** ("surgical procedures, operative"[mesh] OR "postoperative
period"[mesh] OR surgery[tiab] OR postoperative[tiab]))

How to Use It

1. Run the search in PubMed Advanced Search Builder (as demonstrated).
2. Apply filters for the last 5 years to keep evidence up to date.
3. Export promising results into Mendeley as shown

HANDOUT 5

A CRITICAL WRITING CHECKLIST

Writing **critically** in health informatics strategy requires evaluating evidence, questioning assumptions, and forming an independent analyst's perspective. The author's voice should be one of competence, aiming at "the educated layperson".

1. Evaluate the Evidence Behind Statements

- Scrutinise sources for **credibility** (peer-reviewed journals, official reports, recognised experts).
- Compare multiple sources to identify **consensus or conflicting** viewpoints.
- Assess **data quality**—how was it collected, and is it current?

2. Identify and Challenge Assumptions

- Examine whether arguments rely on untested assumptions or industry trends without strong backing. *"Always doubt everything at least once"*
- Consider biases in the data or methodologies used.
- Ask: "What is missing from this discussion?"

3. Compare with Established Frameworks & Best Practices

- Relate claims to established models (e.g., Donabedian's quality model, socio-technical approaches, interoperability frameworks).
- Highlight where the evidence supports or contradicts known strategies in health informatics.

4. Develop an Independent, Well-Reasoned Perspective

- Instead of summarising, **synthesise** insights from different sources to draw original conclusions.
- Weigh **benefits vs. risks** of an approach, considering practical implementation barriers.

5. Justify Recommendations with Rigorous Argumentation

- Use **logic-based argumentation** rather than opinion
- Support **recommendations** with well-documented evidence.
- Address potential **counterarguments** to demonstrate depth of analysis.
- Use clear, **precise language** to ensure your critique is professional and compelling.

Example: Applying a Critical Review to a Digital Health Strategy

AI-Driven Decision Support in Health Informatics Strategy

1. Evaluate the Evidence Behind Strategy Statements

“The strategy claims that AI-driven clinical decision support (CDS) will reduce diagnostic errors by 30%. However, the cited study (Smith et al., 2022) is based on a **small-scale trial in a controlled setting**, not a real-world hospital environment. Other studies (e.g., Brown et al., 2023) suggest that AI models struggle with generalisability due to **biased training data**. This raises concerns about the reliability of the 30% figure in routine clinical practice.

2. Identify and Challenge Assumptions

The strategy assumes that **clinicians will fully trust AI recommendations** and integrate them seamlessly into workflows. However, studies on **automation bias** (Carr, 2021) suggest that doctors either over-rely on AI or dismiss it entirely, depending on how the tool is designed. This assumption overlooks the **need for extensive training and change management**.

3. Compare with Established Frameworks & Best Practices

The document does not reference established models like the **Five Rights of CDS** (Right information, Right person, Right format, Right channel, Right time). Omitting this framework weakens the argument, as effective AI CDS must ensure **actionable, context-aware alerts**.

4. Develop an Independent, Well-Reasoned Perspective

While AI CDS has potential, its success **depends on implementation factors** such as:

- **Data interoperability** (ensuring AI can access diverse, real-time patient records).
- **Human-AI collaboration** (designing interfaces that support rather than replace clinician judgment).
- **Regulatory compliance** (addressing liability concerns if AI recommendations lead to harm).

5. Justify Recommendations with Rigorous Argumentation

To enhance adoption and effectiveness, the strategy should:

- Conduct **real-world trials** before scaling up.
- Implement **mandatory AI literacy training** for clinicians.
- Adopt a **risk-based regulatory framework** that aligns with UK Medical Device Regulations.

The above may allow a **conclusion or inference** such as “AI-driven CDS is not a universal solution but a tool requiring careful integration into existing clinical workflows” and/or “Without these steps, the AI-driven decision support strategy may become underutilised digital tool rather than a transformative force”.