

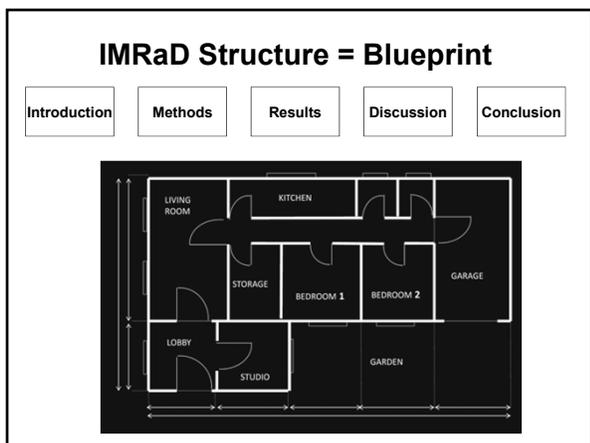
## Beyond IMRaD

*Meeting Readers' Expectations  
In Peer-Reviewed Articles*

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**Make your case:**

Provide readers (reviewers, journal editors) with lots of reasons to “rule in” (rather than “rule out”) your article



### Target Journal = Neighborhood (Location)

**Example reviewer ratings for “fit”**

• Suitable for publication in <u>this journal</u> ?	(yes/no)
• Who would be interested in reading this paper?	(fill in the blank)
• Rate the interest of the topic to <u>readers</u>	(very high, very low)
• Rate the appropriateness of topic for <u>this journal</u>	(highly relevant, fairly relevant, tangential, inappropriate)

### Choosing a Target Journal

- Consider journal features
  - Scope and Audience: Match with your article's focus and message?

**Example: *Ethnicity and Disease***

Focus: Causal relationships in the etiology of common illnesses through the study of ethnic patterns of disease

Multidisciplinary journal: Epidemiology, genetics, health services, social biology, anthropology

Subscribers: Physicians, medical researchers, other healthcare providers who treat patients and conduct research in the U.S. and abroad.

### Choosing a Target Journal

- Consider Journal features
  - Scope and Audience: Match with your article's message?
  - Impact factor
  - Acceptance rate
  - Circulation (# of subscriptions)
  - Abstracting/indexing
  - Frequency of publication (quarterly, monthly, weekly)
- Read the journal, identify "model" article
- Make a list (3-5 targets)
- Top-tier will triage, often rapid response
- If reviewed, but rejected – use comments to improve your article

**Example: *Pediatric Blood and Cancer***

- Basic and clinical investigations of blood disorders and malignant diseases of childhood, including diagnosis, treatment, epidemiology, etiology, biology, and molecular and clinical genetics of these diseases as they affect children, adolescents, and young adults
- Studies on treatment options such as hematopoietic stem cell transplantation, immunology, gene therapy

### Persuading the Skeptic, Section by Section

**1. Introduction**  
Did the authors ask an important research question?

**2. Methods**  
Was the study well-designed to answer to the question?  
Is there enough detail to discern quality? Replicate?

**3. Results**  
Was useful, credible information acquired to help discern an answer?

**4. Discussion and Conclusion**  
What answer do the results provide? Does the answer matter? To whom?

### Annals of Internal Medicine

Article Type (length)	Description
Original Research (1500 to 3200 words)	Reports of original research on prevalence, causes, mechanisms, diagnosis, course, treatment, and prevention of disease.
Research and Reporting Methods (2500 to 4000)	Papers about research methods or reporting standards.
Reviews: Narrative (3500 to 4000)	Descriptions of cutting-edge and evolving developments, and underlying theory.
Reviews: Systematic & Meta-Analyses (3500 to 4000)	Reviews that systematically find, select, critique, and synthesize evidence relevant to well-defined questions about diagnosis, prognosis, or therapy.
Letters: Clinical Observations (600)	Short research or case reports.
Clinical Guidelines including Synopses (4000)	Summaries of official or consensus positions on issues related to clinical practice, health care delivery or public policy.

### Use of IMRAD format ≠ well-written article

Introduction

Methods

Results

Discussion

Conclusion

“Scientific papers are not just baskets carrying unconnected facts like the telephone directory; they are instruments of persuasion.”

Scientific papers, even if they are based on sound research, must argue you into believing what they conclude; they must be built on the principles of critical argument” (p. 60).

Huth E.J. *Writing and Publishing in Medicine*. 3rd ed. Baltimore, MD: Williams & Watkins; 1999.

### Research paper as critical argument

Article Section	Element of Critical Argument
Introduction	Problem (question) – and its importance!
Results	Evidence (the data), initial answer
Materials and methods	Credibility of evidence
Discussion and Conclusion	Your valid evidence; supporting evidence from others; contradictory evidence; final assessment of all evidence. Answer!

Adapted from p. 65 of Huth E.J. *Writing and Publishing in Medicine*. 3rd ed. Baltimore, MD: Williams & Watkins; 1999.

**Introduction** 2. Be **specific** in arguing for your project's significance. LIKA ("little is known about") is **not** a sufficient justification!

**Example:**

To our knowledge, projects studying the use of rapid HIV testing in community outreach settings have not been reported.

This is an important area for research, because many outreach clients:

- Are at high risk for HIV
- Do not access HIV testing through standard venues (clinical settings)
- Are highly mobile, unlikely to return for test results after standard (non-rapid) testing.

*Postgrad Med* 2005;117(3):47-52.  
*AIDS* 2006;20:1655-1660

### Introduction and Methods = Foundation



### Try this at home:

1. Rapidly read the introduction to a published article
2. In 5 minutes or less, create a list of reasons (short bullet points) that the authors provide for why their work is important.

**Before you draft your own introduction, ask yourself:**

- What important health or educational challenge/opportunity does this work attempt to address? (There could be more than one!)
- What important unanswered question(s) or gap(s) in knowledge does this work attempt to answer?
- Who might be interested in the answer to this question?

### Readers (and reviewers) expect that you have...

**Introduction** Investigated an important (significant) question.

1. Don't assume readers will "get it." Instead, directly address need, value, importance of your work by answering questions such as these in the text:

**Research article:**

- What gap in knowledge does this project fill?
- How will filling this gap move the field forward?

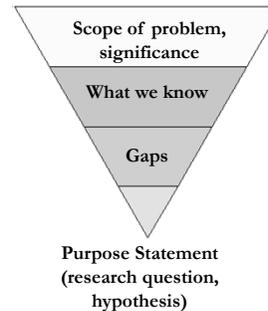
**Review article:**

- Why is a review needed on this topic? Why now?

**Education innovation:**

- What is novel about your approach? What educational need does it fill, what challenge does it overcome, or what opportunity does it leverage?

**Introduction** 3. Use "funnel" format to organize your significance argument.



**Introduction: Additional Writing Strategies**

1. Use "funnel" format to organize your significance argument.

**Scope of problem, significance** → Continuity in primary care settings is associated with lots of good outcomes, and ACGME requires a longitudinal continuity experience for IM residents

**What we know** → BUT, continuity is lower in resident continuity clinics, needs to improve.

**Gaps** → Some evidence that improvements are realized when clinic time is increased and continuity clinics are extended throughout residency

**Unknown:** Residents' perceptions of barriers to continuity and solutions to discontinuity. Missed opportunity to learn from them, apply

**Purpose Statement (research question, hypothesis)** → "We present a qualitative analysis of internal medicine residents' perspectives on factors contributing to discontinuity in ambulatory clinics and potential mechanisms to attenuate these factors."

Journal of Graduate Medical Education, 2013, 5(4):688-673

**Introduction** 4. Finish the introduction with a clear, strong purpose statement

- **Be detailed and precise:**
  - General (weak):**  
We compared the efficacy of two treatments for metastatic breast cancer.
  - Specific (strong):**  
We conducted a *randomized controlled trial* to compare the effect of two treatments – *standard therapy X or new therapy Y* – on *one-year survival rates in women with metastatic breast cancer and under the age of 50.*

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**Statin Use and Hospitalization for Sepsis in Patients With Chronic Kidney Disease** FREE

Rajesh Gupta, MD, Laura C. Flindings, Scott Nancy E. Fink, MPH, Michal L. Melamed, MD, MHS, Josef Coresh, MD, PhD, Caroline S. Fox, MD, MPH, Nathan W. Levin, MD, Neil R. Powe, MD, MPH, MBA

**Scope of problem, significance** → Sepsis is a major cause of morbidity and mortality in patients who have chronic kidney disease and are receiving dialysis. No preventive treatment has been identified.

**What we know** → Can statins help? Animal trials suggest "yes."

**Gaps** → Limited study in humans. Previous trials were small, observational; one larger, population-based cohort study.

**Purpose Statement (research question, hypothesis)** → "Therefore, our aim was to assess the effect of treatment with statin medications on the rates of sepsis in a prospective cohort study of patients who had chronic kidney disease and were receiving dialysis."

JAMA. 2007; 297(13): 1455-1464

**Example purpose statement for review article:**

"We aimed to review the literature on the outcomes of student participation in student-run free clinics using the four levels of learning outcomes as described in Kirkpatrick's hierarchy, namely: attitudes and motivation; skills and knowledge; behaviour, and patient and health care.

Schutte T, Tichelaar J, Dekker R, et al. Learning in student-run clinics: a systematic review. Medical Education. 2015;49: 249-263.

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**Introduction** 4. Finish the introduction with a clear, strong purpose statement

- **Explicitly signal the purpose, question, hypothesis:**
  - The purpose of this study was...
  - This report describes...
  - We tested the hypotheses that...
  - Therefore, our first objective in these studies was...
  - In this study, we sought to extend our initial observations and to specifically test...

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**Introduction** **Additional Writing Strategies**

1. Use "funnel" format to organize.
2. Conclude with strong purpose statement.
3. When describing previous literature,
  - Be selective (brief)
  - Focus on the findings
  - Identify flaws if your work is an improvement

*The initial studies of the effects of ART on gene expression in HIV-infected persons have been limited in size and duration, and none included longitudinal analyses in persons with AIDS.*
4. Draft, then revise after discussion is written.
5. Check for new literature before you submit.

**Readers (and reviewers) expect that you have...**

<b>Introduction</b>	1. Investigated an important (significant) question.
<b>Methods</b>	2. Approached the question or problem with an appropriate study design and methods.
<b>Results</b>	3. Reported <u>methods</u> and <u>findings</u> in sufficient detail to allow the research to be evaluated (for quality) and replicated.

**“Devil is in the details” – but which details are needed?**

Take advantage of:

- Reporting guidelines
- Model articles from excellent journals
- Instructions for authors



**Methods Additional Writing Strategies**

**1. When needed, give rationale for study design, methods**

**Example, exclusion criterion:**

*Because this test may give false positive results in the presence of active infection, we excluded patients who were febrile (>37.5 degrees C) or who had been treated with antibiotics during the previous 2 weeks.*

p. 33 of Browner WS. Publishing and Presenting Clinical Research, Baltimore MD: Williams & Wilkins; 1998.



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- <http://www.equator-network.org/>
- Reporting guidelines: what reviewers expect to see for certain article types or research designs
  - CONSORT – randomized controlled trials
  - STROBE – observational studies
  - PRISMA – systematic reviews, meta-analyses
  - SQUIRE – quality improvement in healthcare
  - CARE – case reports, data from point of care
  - ARRIVE – animal research, reporting in vivo experiments
- Review these before you start a study, and as you develop manuscript

**Methods Additional Writing Strategies**

**2. Include definitions when appropriate**

**Examples:**

- “From May 1 to October 31, 2006, all consecutive patients with a suspected TIA [transient ischemic attack] were prospectively evaluated.... TIA was defined on the basis of the World Health Organization standards.”
- “Relapse was defined as a *relapse from continuous abstinence (i.e., a single puff from a cigarette; Hughes et al., 2003).*”



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**Example: Systematic Review (PRISMA)**

- **Eligibility criteria for studies:** Study characteristics (e.g., length of follow-up) and report characteristics (e.g., language, years considered)
- **Information sources:** Databases with dates of coverage, date last searched.
- **Search protocol:** Full electronic search strategy for at least one database, including any limits used, such that it could be repeated

<http://www.equator-network.org/reporting-guidelines/prisma/>



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**Methods Additional Writing Strategies**

**3. Always provide details that emphasize data quality, (e.g., validated scales, controls)**

**Example, Rater agreement**

“The study neurologist and radiology report had to agree on each finding. If disagreement, consensus had to be reached by discussing discrepancies.”

Stroke. 2008;39:297-302



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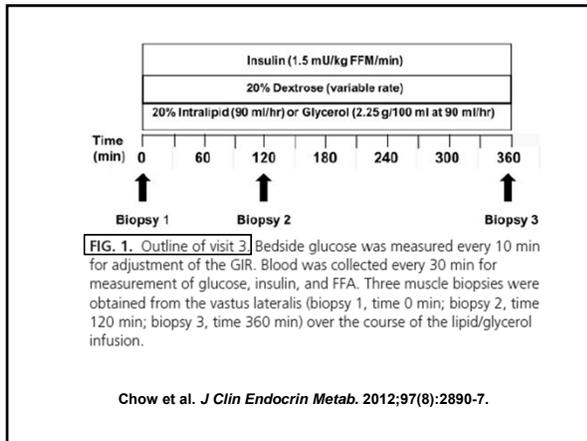
**Methods Additional Writing Strategies**

1. When needed, give rationale for study design, methods
2. Include definitions when appropriate
3. Always provide details that emphasize data quality
4. Be consistent, logical with terms, label
  - Study Groups:  
low-fat diet group, high-fat diet group  
Control (usual care), Treatment (intervention)
  - Variables: Aggression or aggressive behavior?
5. Provide a method for every result (and vice versa)
6. Use a logical organization (subheads) – not necessarily chronological
7. Consider using tables, figures for clarity and brevity

**Readers (and reviewers) expect that you have...**

**Results** Presented all relevant data, in accordance with best reporting practices for this type of study (or analysis), and in a transparent, unbiased manner

Article Section	Element of Critical Argument
Introduction	Problem (question) – and its importance!
Results	Evidence (the data), initial answer
Materials and methods	Credibility of evidence
Discussion and Conclusion	Your valid evidence; supporting evidence from others; contradictory evidence; final assessment of all evidence. Answer!



**Results: Presenting your findings**

**What readers want to know:**

- Data from the experiments conducted, assessments made, participants included, etc. – without judgments, opinions (Just the facts, ma'am).
- Good news: Reporting guidelines focus heavily on readers' expectations for results sections!

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**TABLE 2 IMPLEMENTATION OF FATIGUE COUNTERMEASURES TO THE NIGHT SHIFT ROTATION TO POTENTIALLY MINIMIZE THE INCIDENCE OF RESIDENT FATIGUE AND ERROR**

Fatigue Countermeasures	
1.	Taking a 30-min nap at 3:00 AM.
2.	Changing 24-h shift to two 12-h shifts.
3.	Sleeping in on day off.
4.	Prioritizing sleeping during darkness rather than day when post call.
5.	Improving sleep hygiene when sleeping during day (ie, dark environment, no caffeine/alcohol, minimize interruptions).
6.	Encouraging 1 h or more of sleep daily, from 6 to 7 h during the week.
7.	Taking a nap before first night shift.

McCormick et al. *Journal of Graduate Medical Education.* 2013;5(1):107-111.

**STROBE Statement—checklist of items that should be included in reports of observational studies**

<b>Descriptive data</b>	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Cohort study—Summarise follow-up time (eg, average and total amount)
<b>Outcome data</b>	Cohort study—Report numbers of outcome events or summary measures over time Case-control study—Report numbers in each exposure category, or summary measures of exposure Cross-sectional study—Report numbers of outcome events or summary measures
<b>Main results</b>	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period

**Results** **Additional Writing Strategies**

**1. Section organization**

- Typically most important to least important
  - Main question or outcome
  - Secondary aims or outcomes
- Sometimes chronological
- Follow order of methods
- Use descriptive subheads to guide reader (if allowed by journal)

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**Results** **Additional Writing Strategies**

**3. Redundancy in sentence structure and word choice is desirable**

**Example** American Journal of Medicine 2013; 126(4): 362-365

- When evaluating the 16-hour violations for interns, a statistically significant difference was detected with violations occurring in 1% of self-report data compared with 4% in parking card data (*P* .001). This difference amounts to 32 additional 16-hour violations detected over the 28-week period.
- When evaluating the 8-hour violations for all postgraduate year levels, a statistically significant difference of 1.0% violations in the self-report data compared with 3.0% in the parking card data was observed (*P* .001). This difference amounts to 49 additional 8-hour violations detected over the 28-week period.

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**Results** **Additional Writing Strategies**

**2. Paragraph Organization**

- Present general result in first sentence. Focus on the overall finding.
- Then provide explanatory details. Subordinate the specific data that support the finding.
- If necessary, add conclusion sentence to reinforce overall finding.

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**Introduction vs. Discussion**

Present a clear, compelling, concise, and well-supported argument for:

- 1. The importance of your research idea** (the need for, or value of, whatever you investigated, studied, tested)
- 2. The importance of your specific findings** (the value of the new knowledge that you generated).

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**Example** JAMA 2004;292(20):2482-2490

**The 2 weight loss diets differed ...in their effect on postprandial glycemia and insulinemia.** Incremental area under the curves for glucose (mean [SE], 2706 [394] vs 1070 [336] mg/dL per minute, *P*=.003) and insulin (5581 [859] vs 2044 [733] μIU/mL per minute, *P*=.003) were more than 2-fold greater for test meals from the low-fat vs low-glycemic load diet groups, respectively.

First sentence gives the core finding.

Rest of paragraph describes specific data for the core finding.

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**Research paper as critical argument**

Article Section	Element of Critical Argument
Introduction	Problem (question) – and its importance!
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Materials and methods	Credibility of evidence
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Adapted from p. 65 of Huth EJ. *Writing and Publishing in Medicine*. 3rd ed. Baltimore, MD: Williams & Watkins; 1999.

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**Readers (and reviewers) expect that you have...**

Discussion	Provided a thoughtful and balanced interpretation of your findings – what they mean, how they might be applied.
Conclusion	

**Complicating factors:**

**Answer is unexpected**



**Multiple interpretations are possible**



**Study limitations: What can you really conclude?**



**3. Take your ideas for a test drive.**

- Present your results and discussion ideas at suitable seminars, conferences.
- Circulate your main message(s) in writing to coauthors, other trusted colleagues for feedback.





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**Discussion**      **“Before you write” Strategies**

**1. Read (re-read) the literature as you analyze and interpret your results.**



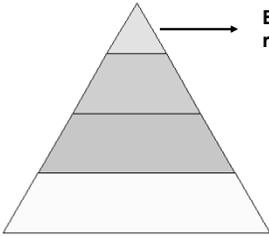
- Identify relevance to your work
- Note support for/disagreement with your results
- Note similarities/differences in design, endpoints, sampling, etc.
- Get ideas for points covered in discussion sections



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**Discussion**      **Additional writing strategies**

**1. Use “inverted funnel” or pyramid structure**



**Beginning: Answer to research question**

- Generalization from your results, not a repetition of your results

**2. Identify your main message(s).**

- What's the headline?
- Is your “story” verified by your sources” (quality of your data, existing literature)





<http://www.texasheart.org/AboutUs/Departments/sci/pubdocuments.cfm>

- What are the key messages to be conveyed?
  1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
- What is the significance/potential impact on practice or research?
  - Potential clinical benefits: \_\_\_\_\_
  - Significant additions to the knowledge base of a particular animal model or mechanistic concept: \_\_\_\_\_

**Summary (Generalization) of Results**

**Example**

“Our results suggest that SRFC participation at the level experienced by students in our study has a protective effect against the declining attitudes towards the underserved that can occur as training progresses.”



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### Structuring Your Discussion

**Middle:**

- Interpret your results
- Discuss key studies relevant to your work
- Compare your work to that of others – if discordant, discuss objectively
- Offer explanation(s) for unexpected findings
- Briefly describe limitations (and strengths!)

### Describe Limitations

**Example:**

Limitations of our study must be acknowledged.

- Survey response rates were low...
- Students were not randomly assigned to the SRFC experience...
- Results ...may not be generalizable to other SRFC experiences that differ substantially from our university's model – for example, those of shorter duration, with different criteria for participation (required vs. optional vs. selective application), and without an emphasis on interprofessional care delivery.

### Interpret your results

**Example:**

"Although we did not directly assess the impact of specific components of the SRFC student experience on attitudes toward the underserved, we can postulate that in addition to the extended contact with underserved populations that the clinic provides, the experience of working with service-oriented role models may have a positive influence on students."

### Structuring Your Discussion

**End:**

- Strong conclusion
- Signal the end
- Discuss implications
- Suggest future work

### Compare your work to that of others

**Example:**

"In prior work, Smith and colleagues (2014) documented a significant improvement in ..medical students' self-reported attitudes toward the underserved... Our research builds on this work and other valuable shorter-term research by following students for a full two years, and by including not just medical students but also trainees from nursing, pharmacy, physical therapy, public health, and social work programs."

**Discussion** **Additional writing strategies**

2. **If you recommend more research, don't be vague:**

*Additional research is needed.*

*Further studies to confirm these findings would be helpful.*

**Instead, make (a few) specific suggestions**

**Examples**

"Future research might test long-acting stimulant formulations for other substance-abusing ADHD adult populations, such as those with alcohol or cannabis use disorders."

"Further examination of the associations observed in this study might be improved by using a more comprehensive set of smoking intensity outcome measures."

### **Abstract = Curb Appeal**



- Too much background
  - No purpose statement
  - Missing important details (methods)
- 
- Results don't match text, tables, figures
  - No statement of main conclusion
  - Unfounded main conclusion
  - Importance of study not clear
  - Too many abbreviations