

SURG238: PRACTICAL INTRODUCTION TO CLINICAL RESEARCH

Welcome to Week 6!

Agenda

1. Writing: discussion
2. How to write efficiently?
3. Succinct writing

Discussion: like other sections, write systematically

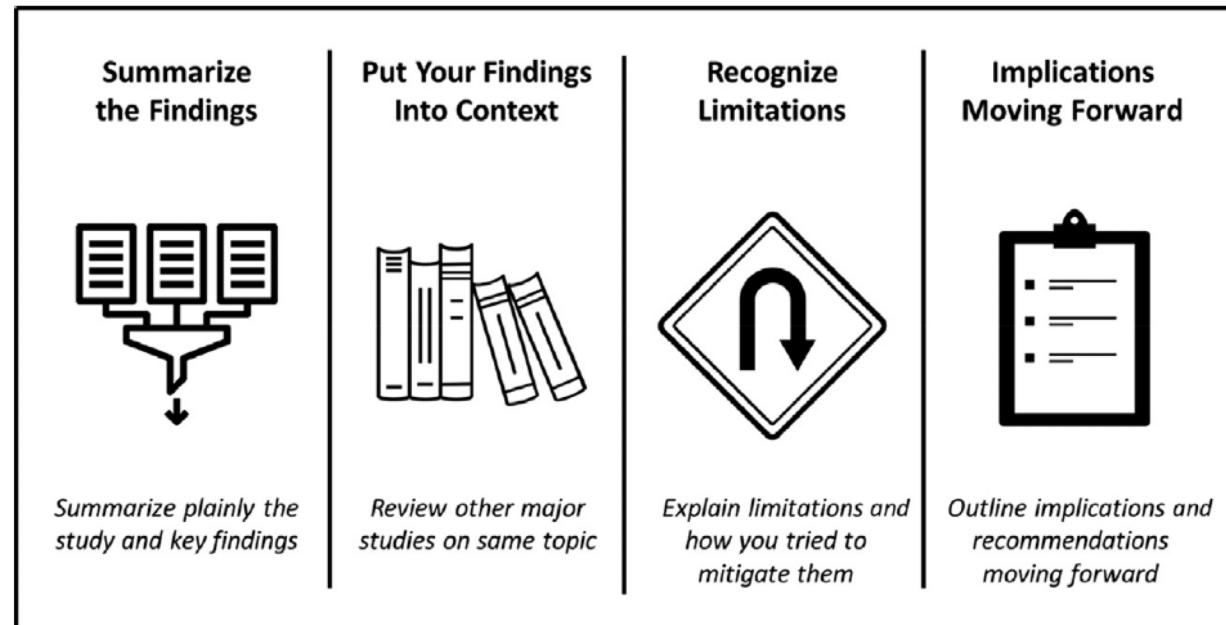


FIGURE 9.3 Four components of a compelling discussion.

Introduction

Elements to Include in the Discussion

- State the Major Findings of the Study
- Explain the Meaning of the Findings and Why the Findings Are Important
- Relate the Findings to Those of Similar Studies
- Consider Alternative Explanations of the Findings
- State the Clinical Relevance of the Findings
- Acknowledge the Study's Limitations
- Make Suggestions for Further Research
- Give the "Take-Home Message" in the Form of a Conclusion

Things to Avoid When Writing the Discussion

- Overinterpretation of the Results
- Unwarranted Speculation
- Inflating the Importance of the Findings
- Tangential Issues
- The "Bully Pulpit"
- Conclusions That Are Not Supported by the Data

Summary

How to Write an Effective Discussion. Hess DR

Ibrahim, A. and Dimick, J. *Writing for Impact*.

https://medicine.umich.edu/sites/default/files/content/downloads/WritingResearchPaper_Ibrahim_0.pdf

Keep two goals in mind: humility & “pre-emptive defense”

Be humble

- “This is the first study” → “To our knowledge...”
- “Our preliminary findings...”
- Do NOT use causal language unless well-designed RCT

Be your own worst critic

- Study design (granularity vs overview)
- Remember: database studies= hypothesis-generating research
- Unmeasured confounders
- Variable precision

But... offer why study is still valid (“pre-emptive defense”)

Limitations

Our study has several limitations. Estimates for the decision tree analysis were derived from a national database, not from a randomized controlled trial. However, we performed propensity score matching to balance clinically meaningful confounders and queried the largest US inpatient database. Many cost-effectiveness analyses use large population inputs from sources other than experimental studies.^{39,40} One confounder we could not adjust for was the operative candidacy of patients. It is possible that those who underwent SSRF had superior clinical outcomes because their baseline health was better (i.e. well enough to undergo an operation) compared to those who underwent non-operative management. It is also possible, that SSRF was only administered to some patients in an attempt to salvage. Our cost-effectiveness analysis was performed on matched patients with similar injury severities.

Confounders

Our analysis also does not account for time to SSRF. Emerging evidence suggests early SSRF may offer more favorable outcomes compared with late SSRF.^{41,42} Time to surgery was not available in NIS; comparative cost-effectiveness of SSRF may vary depending on time to surgery and requires future investigation. Center experience with SSRF is another confounder we could not adjust for. Similar to other operations, SSRF is likely associated with improved outcomes when performed in high-volume centers. Moreover, if hospital-level patient outcomes at centers that do and do not perform SSRF are different, our results may be confounded by hospital-level characteristics. Propensity score matching accounted for hospital type, but this is not a reliable proxy for either SSRF volume or overall patient outcomes.

Variable precision

Diagnosis of flail chest in a national database is nebulous: we cannot delineate radiographic (i.e. may not necessarily benefit from SSRF) vs “true” flail chest (i.e. paradoxical respiratory motion, benefits from SSRF). Potential for imprecise disease classification is a tradeoff when studying large populations from national databases. However, our analysis estimates reflect real-world clinical practice rather than experimental design.

Study design

Estimates for our Markov model were derived from literature and are limited to the quality of the studies. However, we derived all parameter estimates from the nationwide US population and performed multiple sensitivity analyses to assess how reasonable parameter variations may affect the cost effectiveness decision. Additionally, cost effective analysis was performed for those entering Markov model at ages 47 vs 74 years, the respective mean ages for our study population subgroups < vs ≥65 years. Sensitivity analyses delineating cost effectiveness by smaller-interval age subgroups (i.e. every 10-years) was not performed due to some subgroup-specific outcomes occurring in <10 encounters. NIS data use agreement precludes reporting any information on outcomes of <10 encounters. Future studies should include more detailed age-subgroup sensitivity analyses using a larger study population.

Our estimates are based on 2012-2014 data, yet there has been increasing interest and performance of SSRF since this time.^{43,44} We utilized the 2012-2014 NIS databases as this is the most recent multi-year series using the same data structure, which allows for combinatorial analysis. Increased familiarity with performing SSRF, advances leading to less costly implant material, and new techniques such as minimally invasive SSRF may lead to lower complications rates and costs for patients undergoing SSRF. As SSRF becomes more common and technology improves, the initial upfront cost of surgery may decrease which favor SSRF in our model across all age groups and fracture patterns. This cost-effectiveness analysis should be updated when newer multi-year series of NIS databases using comparable ICD coding become available. A more nuanced cost-effectiveness analysis will require assessing national databases with updated ICD-10 procedures codes specifying SSRF, or randomized controlled trials with granular data (i.e. time to surgery).

Writing efficiently: multiple sprints, not an ultra-marathon

Do NOT try to perfect every sentence, one sentence at a time

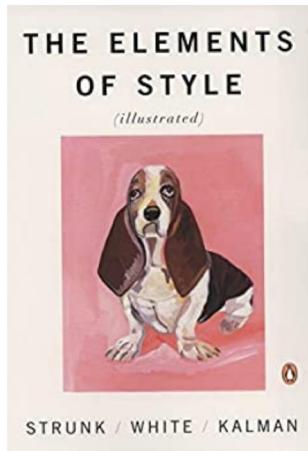
Consider this approach:

- Run 1: skeleton outline of objectives per paragraph
- Run 2: jot down key points (don't worry about grammar, complete sentences)
- Run 3: link appropriate citations to key points
- Run 4: write complete sentences
- Run 5: make sure sentences flow logically
- Run 6: refine: style, brevity
- Run 7 (after a few days): refine again

Live Demo

How to refine your writing

- 1) Read what you wrote, out loud
 - If it sounds “off,” re-write
 - If you have to pause for a breath mid-sentence, sentence is too long
- 2) Keep it Simple and Stupid
- 3) Get the message across in **as few words as possible**



Common questions

Citation superscripts follow “”/./, and precede : ;

e.g. Hip fracture are deadly injuries.¹⁻³

e.g. vs i.e.?

e.g. (exempli gratia)= for example, i.e. (id est)= in other words

Key concepts: stick to *one term* throughout manuscript

NOT elderly, older adults, elderly adults, the aged, those over 65 years

Formatting dates : 23 January 2013

Some tools to control the “flow of reading”

Parentheses ()

- To include necessary but minor details, and make sentence more readable
- *We identified x fall encounters among elderly adults (ground level falls: a%, mortality: b%).*

Colon:

- listing, amplification

Semicolon;

- Two grammatically complete clauses
- *With greater injury burden, baseline health likely has smaller role in dictating outcomes; RFF index is unlikely to change management of severely injured patients.*

Dash -

- “a dash is a mark of separation stronger than a comma, less formal than a colon, and more relaxed than a parenthesis”
- an abrupt break

Em dash — (Mac: option shift –)

- Emphasis, at the end of sentence

Eliminate clutter

Adverbs and adjectives

“As seen in figure/table” → ~ (figure/table)

“that”

- *In spite of the fact that* → *though*
- *It should be noted that*
- *It has been found that*

One of the most...

Every word must be essential

Ask: Is this paragraph essential? sentence essential? Can I combine two sentences → 1? Is this word essential?

Style

Sentence structure: start or end with important concepts

Active voice, NOT passive voice

Positive form

This is not the usual... → this is atypical

Common word choice errors

Among vs between

- Among if ≥ 2

And/or: don't

Compare to vs compare with

- to= similarity vs with= difference

Data: plural

“Due to” = attributable to

- probably mean, “because of”

Less vs fewer

- fewer= countable

Firstly, second, thirdly → First, second, third

Comprise vs constitute

- A zoo comprises different animal species.
Animals constitute a zoo

In-class exercise

Cut 400 words → 200

As trauma is the leading cause of death in Americans younger than 46 years of age, trauma presents a major burden to both the American healthcare system and society more broadly. Beyond the annual trauma-related death toll, which exceeds 150,000, the cost of care coupled with monetary losses from decreased work productivity result in yearly expenses upwards of \$600 billion. Instead of becoming more tractable, trauma deaths actually appear to be increasing at a rate that is outpacing concomitant population growth.

Although trauma injuries are common occurrences, access to trauma centers across the United States is highly variable. As of 2005 approximately 84% of Americans lived within 60 minutes of a Level I or II trauma center by either ground or helicopter transport, and ; residents without access were disproportionately from rural areas. This inequality in access to trauma services contributes to concrete disparities in health outcomes, as populations with less access experience greater rates of both trauma-related pre-hospital mortality and death. Given the public health ramifications of unequal access, the US government's Healthy People initiative identified increasing access to trauma centers as one of its core objectives.

While differences in access along the urban-rural divide have been relatively well-documented in the past, there are no recent investigations to our knowledge regarding the current status of trauma center access and how access has evolved since the mid-2000s. Furthermore, few studies have attempted to expand geographical analyses of access to include possible contributions by social attributes, such as race and socioeconomic status; those that have lack consistency not only in their basic definition of "access" but also in the scope of regions included for evaluation. Thus, an updated estimate of national access to trauma centers, both generally and by specific populations, remains an open question.

Given the current gaps in knowledge regarding trauma center access in the United States, this study sought to elucidate not only national access to trauma centers but also to understand how access is evolving based on openings, closures, and level designation changes. Trends from the early 2000s demonstrate that closures have disproportionately impacted African Americans as well as poor and rural communities, while overall access has not improved. Consequently, we analyzed trauma center data recorded in the Trauma Information Exchange Program (TIEP) between 2013-2020 and hypothesized that the evolution in national access has not improved access rates and continues to disadvantage rural communities.

Reminder of what to cover in the introduction (lecture 3)

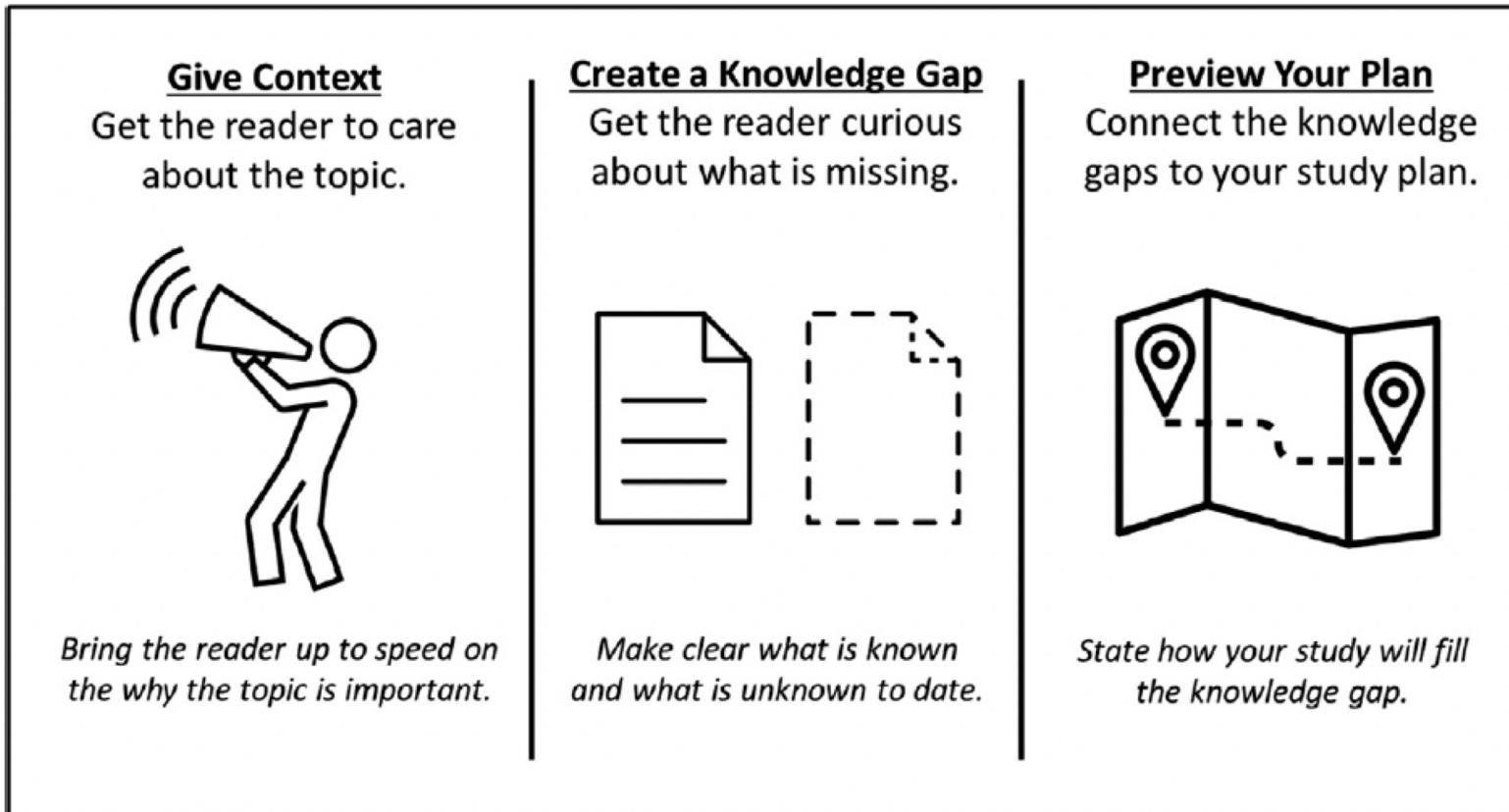


FIGURE 9.2 The three paragraphs of an effective introduction.

Table II

Themes noted in making recommendations to initially accept a manuscript

| Theme | n | Selected comments |
|-------------------------|---|---|
| Importance/relevance | 6 | High interest to the readership Answers a clinically relevant question Adds new knowledge Improves understanding of a disease process Improves patient outcomes Conclusions are useful and important |
| Data analysis | 5 | Conclusions are supported by the results Data analysis is appropriate Supports or challenges a hypothesis in a valid evidence-based manner |
| Study design | 3 | Study is well designed and appropriate Hypothesis-driven Mechanistically based |
| Manuscript construction | 3 | Well written and organized |

Abstract

Importance: Timely trauma center access is a critical component of the US healthcare infrastructure. With the availability of contemporary geocoding tools that can estimate realistic travel times based on road-specific driving conditions, access to US trauma centers in the recent decade requires re-evaluation.

Objective: Evaluate trends in nationwide access to American College of Surgeons Committee on Trauma (ACS-COT)-verified trauma centers between 2013 and 2019.

Design, Setting, and Participants: Cohort study using addresses and ACS-COT verification levels of all US trauma centers from 2013 to 2019. Ground ambulance transport times from each of 201,651 US census block groups' population centroids to the nearest trauma center was calculated using ArcGIS Open Streetmap Premium. Air ambulance transport time was calculated using air base locations and rotor-wing aircraft speeds from the Atlas & Database of Air Medical Services. National Historical Geographic Information System provided demographic data for each census block group. Sensitivity analysis evaluated the impact of ± 15 minute variations in pre-transport times on trauma center access.

Main Outcome and Measures: Proportion of US residents with 60-minute access to an ACS-COT-verified trauma center (levels I-IV) by ground or air ambulance transport. Access delineated by trauma center level (level I/II vs III/IV), state, urbanicity, and demographic group.

Results: Compared to 78% in 2019, 91% of US residents (sensitivity analysis: 78-98%) had 60-minute access to a trauma center in 2019. Compared with ground ambulance transport alone, air ambulance transport provided 60-minute trauma center access to an additional 23% of US residents. Ninety-four percent of urban residents had 60-minute trauma center access, compared with 78% of rural residents. Between 2013 and 2019, 60-minute trauma center access improved within 38 states, while access decreased within 4 states. Among racial/ethnic groups, Native Americans had the least improvement in ($\pm 8\%$) and lowest proportion (70% in 2019) with 60-minute trauma center access.

Conclusion and Relevance: US residents' access to ACS-COT-verified trauma centers has improved, yet access disparities remain for rural residents and Native Americans. A concerted, nationwide effort is needed to strategize how all US residents can access their right to timely, quality care of traumatic injuries.

How we did it

Traumatic injury remains the leading cause of mortality among Americans aged 1 to 44 years (third leading cause of mortality across all ages).¹ Timely trauma center access is a critical component of US healthcare infrastructure. In 2005² and 2010,³ approximately 16% and 10% of Americans lived over an hour from an American College of Surgeons Committee on Trauma (ACS-COT)-verified level I or II trauma center—hospitals with highest capacities to care for the injured.

The ACS-COT verifies new trauma centers and contemporary geocoding tools now facilitate estimating realistic travel times based on road-specific driving conditions. There is an urgent need to re-evaluate access to US trauma centers in the recent decade. Understanding access trends could inform appropriate resource allocation, elucidate systemic disparities, and guide health policy.

We aimed to evaluate trends in nationwide access to ACS-COT-verified trauma centers between 2013 and 2019. Using contemporary geocoding tools to account for realistic ground and air ambulance transport times, we evaluated access to ACS-COT level I-IV trauma centers from every US census block group (the smallest geographic census unit) and delineated access by urbanicity, state, and demographic groups. We hypothesized that trauma center access continues to improve but geographic and demographic disparities persist.

What if we had to cut Intro <100 words?

Timely trauma center access is a critical component of national healthcare infrastructure.

There is an urgent need to re-evaluate access to US trauma centers in the recent decade.

Understanding access trends could inform appropriate resource allocation, elucidate systemic disparities, and influence health policy.

We aimed to evaluate trends in nationwide access to American College of Surgeons Committee on Trauma (ACS-COT)-verified trauma centers between 2013 and 2019. We hypothesized trauma center access has improved but geographic and demographic disparities persist.