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Ridiculously good writing: How to write like a pro and publish like a boss

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1. Introduction

Learning to write well is not for the faint of heart. It requires knowledge, effort perseverance, grit and repetition to master; yet often the skills required to effectively convey scientific data are not stressed or taught in the modern postgraduate medical training. While the most crucial aspect of getting a manuscript published will always be the actual content, there are ways to optimize the chances of acceptance by presenting the reviewers and editors with a beautifully written and clear manuscript so that they don't have to interpret anything other than the merits of the science presented. The objectives of this publication are to 1) improve writing style, 2) outline common pitfalls, 3) review key components of most common types of manuscripts, 4) describe databases available in gynecologic oncology and 5) provide a compilation of resources for manuscript writing.

2. How to write like Hemingway – Less is more

Ernest Hemingway (1899–1961) was an American author, lauded for his writing style who received the Nobel Prize in Literature in 1954. Beginning when he wrote for the Kansas City Star after graduating high school, Hemingway's terse journalistic reports became the foundation for his subsequent style as an author of fiction. Hemingway believed that every word should have purpose and meaning, and that what is not written is equally important as that which is written. While the writing of fiction and writing for academic journals are clearly different, there are important lessons that we can learn from the economical style of Hemingway that will improve scientific writing and the probability of acceptance of a manuscript for publication in any journal. Hemingway condensed his style into four 'rules' that guided his writing throughout his career.

First, use short sentences. Developed from his journalistic background, this style persisted throughout his fiction. Hemingway's writing was not explicitly emotional, but emotion was effectively conveyed through sentence structure and his sparse and tight prose. Effective scientific writing can follow a similar structure to successfully communicate key information and allow the reader to experience the emotion of the findings.

Second, use short first paragraphs. Hemingway recognized that readers grazed rather than entirely digesting text. He believed that grabbing a reader's attention through powerfully introducing them to his work in the first three to five sentences would convert a browser to a reader. Parallels with scientific writing are clear. An author's ability to grab the attention of the reader early will prepare the audience for the important information to follow that supports the objective or hypothesis of the work.

Third, use vigorous English. Here, Hemingway believed that having a passion for one's subject and focusing language on the subject would successfully convey the facts that enhance the reader's understanding. Hemingway recognized that his work was more transformed through revision than in the completion of his first draft. In fact, he stated that in some of his works there was not a single wasted word. In scientific writing, too frequently authors submit a manuscript for publication with the appropriate description of the experiments without critically reviewing and revising the style of the writing that reports the results.

Lastly, the fourth rule is to be positive, not negative. Hemingway was thoughtful in the words that he used, writing about what it is rather than what it is not. Through this process, he was able to effectively portray positive emotion. While the facts of one's scientific writing may not allow this to occur, a positive style will generally be perceived more favorably.

Scientific writing is a remarkable combination of conveyance of fact in a style that effectively engages a reader and enhances their understanding. Every author can benefit from reflecting on their personal style and identifying opportunities for improvement. Hemingway's economical and direct literary style is but one of many. With word limits and an

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audience whose attention span may be limited, a 'less is more' approach to scientific writing is one that will likely be more successful than others.

3. Manuscript pearls organized by section

3.1. General tips

Evolving into an outstanding writer is a challenge. First and foremost, an author must understand the particular journal's audience and make sure that the research is relevant. Secondly, an author needs to ensure that they have made it easy for any reviewer or editor to understand and love their work. Lastly, an author simply cannot self-destruct with easily avoided mistakes that serve to raise questions in the reviewer's mind about an author's skill and knowledge as a scientist.

3.2. Planning your article type, journal selection, and instructions for authors

The type of article that will be produced from a research project is readily apparent even when the study objectives are being formulated and the grant or institutional review board (IRB) application is being crafted. A full research article will be a substantial and comprehensive piece of new research which could consist of original lab experiments, interventional studies (including early phase and large randomized controlled trials), observational studies (including database analyses) or a cost-effectiveness paper, among other study designs. Conversely, the foundational background research from a grant or IRB submission may readily be morphed into a review article that is a summary/distillation/analysis of recent developments on a specific topic. Lastly, an incredibly rare clinical event or outcome or treatment could be researched and subsequently written up and disseminated in the form of a case report. See Table 1 for types of articles and recommended checklists/resources.

Once the actual research project has been completed and the results/data amassed, the next step will be to choose the right journal for the intended audience and the manuscript will be constructed and formatted for that journal. A paper for a basic science journal should look and read very differently than an article geared for clinical practice. Shortlist a handful of journal options and investigate their aims, scope, types of articles accepted, readership and what they have published recently. It is important to solicit other suggestions from research mentors, colleagues or even websites that can help with journal decisions (The Biosemantics Group, 2007). While it is tempting to aim for a journal with a high impact factor, authors can only submit to a single journal at a time and each submission takes time and energy. If a paper is quickly desk-rejected (meaning an editor or publisher reviewed and rejected immediately without sending out for review), a few days at most would be lost but a review with a subsequent rejection will typically take at least 30 days and often over two months. Reviews of a rejected manuscript, however, can provide valuable insight and direction for subsequent revisions and more often now, journals may direct the manuscript immediately to a related journal within their publishing house. If the authors accept the offer for a direct transfer (e.g. *Gynecologic Oncology* might recommend transfer to *Gynecologic Oncology Reports),* all the files are directly transferred and no resubmission or reformatting is required.

Once the journal has been selected, the number one pitfall to avoid in manuscript preparation is to totally ignore the guide for authors from that journal—these can be found on every journal website and should be accessed and followed (Table 2). Ideally, this would be as the manuscript is written but certainly it should be accessed prior to submission.

3.3. Authorship and title

Authorship is a key and often overlooked part of the writing process and is ideally addressed well before the actual manuscript writing begins. Each author should meet the criteria for authorship as defined by the International Council of Medical Journal Editors (ICMJE, 2022) and ghost or gift authorship is always verboten (Elsevier, 2022). The first author should be the main author who did the majority of the project and writing. The last (sometimes termed the senior) author may often be a mentor to the first author and an expert in the field. In terms of academic promotion, the first, sometimes the second, and senior authors are generally considered separately and given more weight in terms of presumed contribution to the manuscript. If two or more authors contribute equally to the work, some journals allow sharing co-first or co-senior authorship. Finally, the corresponding author is generally the first or the last author and the one taking responsibility for submission and communication with the journal. Ensure that every author meets criteria, is willing to take responsibility for the entire manuscript and agrees with the author order. Authorship disputes are not as rare as one might imagine, and this is not something that the journals mediate following acceptance; disputes can result in an acceptance being withdrawn if not solved quickly. Many journals have moved to requiring authors to systematically report what part of the research project they were engaged with (idea, writing, data collection, analysis, funding, etc).

Title selection can also be fraught with challenges, as the title must attract the reader's attention yet be simultaneously informative and concise. The title should adequately and accurately describe the content of the article, use key words and subjects and avoid too much technical

Table 1
Guidelines and Checklists by Study type.

Study Type:	Guidelines and Hyperlinks
Cohort, case-control, and cross-sectional Survey Research	STROBE guidelines: https://www.strobe-statement.org/checklists/ STROBE for observational studies: https://www.strobe-statement.org/checklists/ CHERRIES guidelines for web-based surveys: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1550605/
Epidemiology Research	STROBE: https://www.strobe-statement.org/checklists/
Modeling and Simulation-Based Research (SBR)	TRIPOD statement (prediction model thesis): https://bmcmedicine.biomedcentral.com/articles/https://doi.org/10.1186/s12916-014-0241-z https://bmcmedicine.biomedcentral.com/articles/https://doi.org/10.1186/s12916-014-0241-z/tables/1 Simulation-Based Research (SBR): https://advancesinsimulation.biomedcentral.com/articles/https://doi.org/10.1186/s41077-016-0025-y
Qualitative Research	COREQ or SRQR guidelines: https://jamanetwork.com/journals/jamasurgery/article-abstract/2778475
Quality Improvement	SQUIRE guidelines: https://www.squire-statement.org/index.cfm?fuseaction=Page.ViewPage&PageID=471
Implementation Science	StaRI: ihttps://https://www.bmj.com/content/356/bmj.i6795
Systematic Review and Meta-Analyses	1) PRISMA: https://www.prisma-statement.org 2) MOOSE: https://www.elsevier.com/_data/promis_misc/ISSM_MOOSE_Checklist.pdf
Clinical Trials	CONSORT: https://www.consort-statement.org/consort-statement/checklist
Cost-effectiveness analysis	1) International Society for Pharmacoeconomics and Outcomes Research Consolidated Health Economic Evaluation Reporting Standards: https://www.bmj.com/content/346/bmj.f1049 2) WHO Guide to Cost-Effectiveness Analysis: https://apps.who.int/iris/bitstream/handle/10665/42699/9241546018.pdf?sequence=1&isAllowed=y 3) Second Panel on Cost-Effectiveness in Health and Medicine: https://jamanetwork.com/journals/jama/article-abstract/2552214

Table 2
Resources for authors.

Guidelines for Authors	
Journal	**Website with Guide for Authors**
Gynecologic Oncology	https://www.elsevier.com/journals/gynecologic-oncology/0090–8258/guide-for-authors
Gynecologic Oncology Reports	https://www.elsevier.com/journals/gynecologic-oncology-reports/2352–5789/guide-for-authors
Obstetrics and Gynecology	https://journals.lww.com/greenjournal/pages/instructionsforauthors.aspx
American Journal of Obstetrics and Gynecology	https://www.elsevier.com/journals/american-journal-of-obstetrics-and-gynecology/0002–9378/guide-for-authors
International Journal of Gynecological Cancer (IJGC)	https://ijgc.bmj.com/pages/authors/
Journal of Clinical Oncology	https://ascopubs.org/jco/authors/format-manuscript
Cancer	https://acsjournals.onlinelibrary.wiley.com/hub/journal/https://doi.org/10970142/homepage/forauthors.html
Journal of Gynecologic Oncology	https://ejgo.org/index.php?body=instructions
European Journal of Gynaecological Oncology	https://www.imrpress.com/journal/EJGO
Database Websites	
SEER	https://seer.cancer.gov/about/overview.html
SEER-Medicare	https://healthservices.cancer.gov/seermedicare/overview
Cancer Research Network	https://crn.cancer.gov/about/
NSQIP	https://www.facs.org/quality-programs/data-and-registries/acs-nsqip/participant-use-data-file/
National Inpatient Sample (NIS)	https://www.hcup-us.ahrq.gov/nisoverview.jsp
NCDB	https://www.facs.org/quality-programs/cancer-programs/national-cancer-database/puf/
MarketScan	https://marketscan.thomsonreuters.com/marketscanportal/
Other Helpful websites/references	
SGO Writing workshop-2022	https://connected.sgo.org/content/ridiculously-good-writing-how-write-pro-and-publish-boss
Criteria for Authorship	https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html
ABOG Subspecialty Thesis and Approved Abbreviations	https://www.abog.org/subspecialty-certification/thesis-guidelines
reVITALize Gynecology Data Definitions	Gynecologic data definitions https://www.acog.org/practice-management/health-it-and-clinical-informatics/revitalize-gynecology-data-definitionsEndorsed by ACOG, SGO, ASCCP, ASRM, AUGS, NAMS
Elsevier's e-learning platform: Research Academy	https://researcheracademy.elsevier.com/
Find the right journal tools	https://jane.biosemantics.org/
Manuscript check for plagiarizing	https://www.ithenticate.com/
NIH Rigor and Transparency	https://grants.nih.gov/faqs#/rigor-and-reproducibility.htm.

jargon or acronyms/abbreviations.

3.4. Abstract

The abstract is perhaps the most important part of the manuscript as it is the most widely read and disseminated and is the section that editors will read first to determine if the article will even go out to reviewers. It must be interesting and understandable but also accurate and specific. Simply stating that treatment A was better than treatment B without reporting actual data, statistics or measurable results that can be assessed by the reader is a sure recipe for rejection. Similarly, making sweeping conclusions unrelated to the data presented is both common and an important mistake to avoid.

3.5. Introduction

The introduction should be approximately three paragraphs in length and provide a brief context of the problem to the readers, outline the specific question(s) or hypotheses that the manuscript will address and then specifically list the study objectives. The author must write a unique introduction for every article (even if the authors has personally written a prior article on the identical subject); self-plagiarism is real and most journals use automated ways to assess for any form of plagiarism. Fortunately, there are tools available to authors to actually check their own article for inadvertent plagiarism (Ithenticate, 2021) if any concerns arise.

3.6. Methods

The methods section should be the easiest and most formulaic to devise and write. It should be detailed enough that someone else can independently replicate the project, including the statistical analysis section. If the work includes previously published procedures, they do not need to be reproduced in full, but the authors should cite the appropriate reference. This section should identify equipment, materials, and their sources; documentation of informed consent, IRB approvals, and Clinical Trials registrations should all be specified as well. If submitting to a journal that requires double blinding, make sure to remove institution names and provide study site descriptions instead (e.g. a tertiary care hospital, a community based practice etc.). Depending on the type of article, the authors should also list the use of any reporting guideline checklists such as STROBE, MOOSE, PRISMA or CONSORT (Table 1).

3.7. Results

The results section should report the facts and nothing but the facts in terms of objective data. It should include the findings of primary importance as well as any unexpected findings, be clear and easy to understand (use subheadings as needed) and provide statistical analysis. Figures and tables should be used to present organized data and should be able to stand alone from the text; likewise, do not repeat in text form all the data from a table or a figure but rather highlight the key finding (s). Table columns and row totals should sum up to the stated totals (or explanations of variations should be included) and the columns/rows should be visually line up and be easily deciphered. Particular pitfalls to be avoided include the following: 1) Always equating statistical significance to clinical significance and 2) Saying that X was larger than Y when they were not statistically significantly different.

3.8. Discussion and conclusion

In this part of the paper, interpretation of the data is presented and suppositions and hypotheses can be put forth (again, this should not occur in the results section). The discussion points should correspond to the results and complement them as well as serve to put the current data/work into context with prior published and related work. There is no need to restate what methods were used, no new results should be introduced, and it is again important to avoid conclusions and statements that are unrelated or unsupported by the data presented in the manuscript.

3.9. Other pitfalls to avoid

1. *Incorrect punctuation.* Commas seem to give some authors particular difficulties. For example, the famous example of the profound semantic difference between the panda that "eats, shoots, and leaves" versus "eats shoots and leaves".
2. *Use of innumerable and/or non-standard acronyms and abbreviations:* A common editorial complaint (e.g. EC, OC, CC, MOGCT, WTFIHNC).

Go ahead and splurge on the extra letters and use the whole word for endometrial cancer or cervical cancer. Also, if you devise an acronym for a cohort/data set, readers may not remember what it stands for and have to continually refer back to first usage in the manuscript. Best practice is to consider restricting acronym use to the ABOG-approved ones for the case lists

3. *DATA ARE PLURAL*. That is all.
4. *Failure to create viable paragraphs:* A paragraph is defined as a unit of writing within a larger body of work that expresses a particular topic or theme. Paragraphs ideally should begin with a topic sentence and be followed by supporting sentences and information and, in general, should be more than one sentence long.
5. *Make grandiose assertions and primacy claims:* Please avoid using phrases like "The largest study ever…", "The only study ever…", "The first, best, grandest, etc.". Often it is not true depending on how prior work is interpreted and it just makes reviewers want to disprove it. It is unnecessary: let the work speak for itself.
6. *Careful attention to the proper use of the word 'significant':* In scientific writing, the word 'significant' has specifically implies that there was a statistical difference in comparison(s). Resist the urge to use it to emphasize the interpretation of findings that are not statistically significantly different.

4. Cost-effectiveness manuscripts

An explanation of the methodology of cost-effectiveness analyses is beyond the scope of this guidance article. For those engaged in writing a cost-effectiveness analysis, the following tips should prove useful in guiding the manuscript development process along with input from their expert mentors.

4.1. Use of checklists

Checklists have become the rule rather than the exception in manuscript writing. The author should consider using an established cost-effectiveness analysis checklist and report its use in the Methods section. The purpose of the checklist is two-fold; it improves the quality of the manuscript and serves as reassurance that basic standards have been employed. The International Society for Pharmacoeconomics and Outcomes Research Consolidated Health Economic Evaluation Reporting Standards checklist is straightforward and easy to use (Husereau et al, 2022). Alternatively, the American Board of Obstetrics and Gynecology (ABOG) guidelines mandate the use of the World Health Organization (WHO) Guide to Cost-Effectiveness Analysis checklist for board-eligible thesis manuscripts (Tan-Torres Edejer et al., 2003; ABOG, 2022).

4.2. Perspective and model design

The perspective, or viewpoint, of the analysis and its basic design (e.g., simple decision tree, Markov model) should be specified early, usually in the first sentence of the Methods section. Commonly employed perspectives are societal and third-party payer. For ABOG thesis submissions, WHO guidelines state that the societal perspective must be assumed (Tan-Torres Edejer et al., 2003). A model design figure should be included. Costly interventions should be compared to a "do nothing" or status quo strategy.

4.3. Defining outcomes and terms

Most cost-effectiveness manuscripts on gynecologic cancer topics are submitted to clinical specialty journals, rather than to a health economics journal. As such, the readership may be unfamiliar with common cost-effectiveness terminology. It is therefore important to define common terms such as utility, quality-adjusted life year (QALY), incremental cost-effectiveness ratio (ICER), willingness-to-pay threshold, and dominant/dominated, usually in the Methods section. The primary outcome of a cost-effectiveness analysis may seem self-evident to the authors but should be defined in Methods. The burdens of an intervention can be expressed in monetary units or using another metric. Effectiveness is traditionally presented in QALYs but might also be measured in life-years, progression-free years, or using an alternative metric such as cases of an adverse event avoided. The authors should define and justify willingness-to-pay thresholds while providing references.

4.4. Model inputs

The simplest way to list the inputs for a cost-effectiveness model is in tabular form. To save space and table count, one table may be used to list all inputs, with separate sections devoted to costs, clinical estimates, and utilities. If a cost input requires an itemized calculation, this can be included in the same table or listed in supplemental materials with a written explanation of the calculation methods also provided in Methods. When inputs are modeled as distributions, the type of distribution should be specified. Ranges for sensitivity analysis and the source of each estimate should also be listed.

4.5. Unique features of results and discussion sections in cost-effectiveness analyses

Cost-effectiveness results such as the total cost and effectiveness of each strategy should be presented using means and ranges or 95% confidence intervals. The ICER is not a characteristic of a single strategy but rather of a comparison between two adjacent-cost strategies, and should be expressed as such: "Strategy X (more costly) had an ICER of $100,000/QALY compared to strategy Y (less costly)".

The validity of a cost-effectiveness analysis is based on the robustness of its findings over a range of clinical assumptions. Uncertainty concerning model inputs can most easily be tested using multiple one-way sensitivity analyses. A tornado diagram succinctly presents the effects of multiple one-way sensitivity analyses. When enough data are available, specific inputs may be modeled as distributions. When multiple inputs are modeled in this way, the primary cost-effectiveness results can be presented using a Monte Carlo probabilistic sensitivity analysis. Cost-effectiveness acceptability (CEA) curves can then be presented as effective 95% confidence intervals around the ICER. The results and conclusions of "expensive drug versus generic drug" CEAs are rarely novel in that newly marketed drugs are almost never cost-effective but may become so when generic or biosimilar versions become available. Sensitivity and alternative analyses that guide clinicians in their use of limited resources or highlight the need to rein in drug costs can be useful. For example, personalized strategies such as "biomarker test-and-treat positives" compared to "treat-all" strategies can enlighten the reader on possible approaches to good drug stewardship.

5. Case reports

For many healthcare professionals, writing a case report represents the first attempt at publishing in medical journals. Case reports aim to convey a clinical message and enhance the reader's knowledge of clinical manifestations, diagnostic approaches, or the therapeutic alternatives of a disease. A case report worthy of reading should contain both practical messages and educational purpose. Although case reports are considered lowest in the hierarchy of evidence in the medical literature, publishing case reports allows for anecdotal sharing of individual experiences and serves to generate hypotheses for further investigation. Case reports that are carefully prepared and interpreted with appropriate caution play a valuable role in the advancement of medical knowledge especially with rare diseases where they may be the best (only) evidence available about a treatment. Educational value, rather than extreme rarity, is the main quality of a case report worthy of

publication. This section discusses the essential components of a case report, with the aim of providing guidance and tips to authors to improve their writing skills.

Case reports are shorter than most types of articles. Case reports should incorporate five sections: an abstract, an introduction, a description of the clinical case, a discussion that includes a literature review, and a brief summary of the case with a conclusion. Tables, figures, and graphs should be used to enhance the case report's clarity. As the format for case reports varies among different journals, it is important for authors to carefully follow the target journal's instructions to authors.

The title should be informative and relevant to the subject while attracting the reader's attention without being too cumbersome. Redundant words such as "case reports" or "review of the literature" should be omitted, and ostentatious words such as "unique case" or "first report of" should be avoided. Like other types of articles, it is necessary to include an abstract that gives an overall idea about the content of the case report. The abstract is usually brief, and it typically has a word limit of 100 words or less. The abstract presents the clinical question and provide essential information which allows the reader to determine their level of interest in the report.

The introduction should be concise and immediately provide background information on why the case is worth publishing in light of the current literature available; a more detailed literature review belongs in the discussion. The focus of the case report is the case summary, and this is best presented in chronological order with enough detail for the readers to establish their own conclusions about the case. The current medical condition should be clearly described, typically comprising clinical history, family history, physical examination findings, imaging and laboratory results, differential diagnosis, management, and follow-up. The author's own interpretation should be avoided in the body of a case report. Tables and figures should be used to show important findings. In particular, figures need a brief but clear description. It is important that patient confidentiality is maintained and documentation of either patient consent or IRB approval should be provided.

The discussion is the most important section of the case report. The discussion serves to summarize and interpret the key findings, to contrast the case report with what is already reported in the literature, to present new knowledge and applicability to practice, and to draw clinically useful conclusions. The author should briefly summarize the published literature and show how the present case differs from or adds to those previously published. The discussion section is not designed to provide a comprehensive literature review and citation of all references. The value that the case adds to the current literature and the lessons that may be learned from the case should be highlighted. In the last paragraph, the author should provide the main conclusion of the case report based on the evidence reviewed. A statement of any lessons to be learned from the case should be stated with evidence-based recommendations. The references listed should be carefully chosen by their relevance. References should provide additional information for readers interested in more detail than can be found in the case report. Well-written and appropriately structured case reports will continue to contribute to the medical literature and can still enrich knowledge in today's evidence-based world.

6. Database

Observational studies are best used to evaluate the "real-world" applicability of evidence obtained from randomized clinical trials; to evaluate interventions or outcomes that cannot be studied in randomized trials due to ethical concerns, rare events, or budget constrains; to obtain pilot data to design an appropriate clinical trial or obtain grant funding; and to provide information that can be derived only through large studies or long-term follow-up (Dreyer et al, 2010).

The use of large databases is now integral to clinical gynecologic oncology research. These resources facilitate the study of real-world evidence of the effect of various exposures, interventions, treatments, and outcomes across a spectrum of cancers and health systems. However, most large publicly available databases were not designed for research purposes. Due to the unique idiosyncrasies in their original designs, they have substantial differences in data structure and available information. Therefore, researchers must gain in-depth knowledge of each database, have reliable processes of analyzing the data, and have a keen understanding of the unique limitations of each of these data sources to allow for appropriate interpretation of the results. Most importantly, the research question must be tailored to the right database. Herein we present a brief summary of some of the cancer-related databases that are publicly available and/or readily accessible.

6.1. Surveillance, Epidemiology, and End Results (SER)

The SEER Program of the National Cancer Institute (NCI) collects information on cancer incidence and survival in the United States. Specifically, the SEER Program collects and publishes cancer incidence and survival data from 17 population-based cancer registries covering about 28% of the U.S. population (SEER, 2022). Although the SEER database provides detailed information about cancer stage and treatment at the time of diagnosis, recurrence information, chemotherapy details, specific comorbidities, and detailed sociodemographic data are not available (Murphy M et al, 2013).

6.2. SEER-Medicare

In a collaborative effort, the NCI and the Centers for Medicare and Medicaid Services originally developed the linked SEER-Medicare database in 1993 (Potosky et al, 1993; NCI, 2022). SEER data, including cancer incidence, site, stage, initial treatment, and vital status, are linked with Medicare claims for hospital stays, physician and laboratory services, hospital outpatient claims, and home health/hospice bills. Census tract and zip code data are available and can be used to extrapolate patient socioeconomic data. In addition, patients can be tracked longitudinally as they progress through the various phases of health care. The files in this database contain everything for which a medical bill was generated, including inpatient, outpatient, and noninstitutional (physician) services. Because Medicare coverage is largely restricted to elderly people, the SEER-Medicare data cannot be used to evaluate risk factors that arise earlier in life.

6.3. National Cancer Data Base

The National Cancer Data Base is a national cancer registry that includes information on about 70% of all incident cancers diagnosed in the United States. This database is a joint project of the American College of Surgeons and the American Cancer Society and serves as a surveillance mechanism for more than 1,430 hospitals participating in the American College of Surgeons' Commission on Cancer. Data are collected by trained hospital cancer registrars and include demographic, clinical, histopathologic, primary treatment, and survival information (Raval et al, 2009). The main limitation is that cohorts are not population-based but rather identified in hospitals where they present for diagnosis and/or treatment, thereby limiting the generalizability of the patient population and management algorithms. Similar to SEER, recurrence information, chemotherapy details, specific comorbidities, and detailed sociodemographic data are not available.

6.4. Cancer Research network

The Cancer Research Network is an NCI-funded initiative that supports and facilitates cancer research based in nonprofit integrated health care delivery settings. The Cancer Research Network supports data management, analysis, and scientific infrastructure in eight U.S. health care systems. [Reliant Medical Group and Fallon Community Health

Plan; Group Health; Henry Ford Health System and Health Alliance Plan; Kaiser Permanente Colorado; Kaiser Permanente Hawaii; Kaiser Permanente Northwest; Kaiser Permanente Northern California; and Marshfield Clinic Health System and Security Health Plan. Three affiliate sites also provided data (HealthPartners; Harvard Pilgrim Health Care; Kaiser Permanente Southern California) (Chubak et al, 2016)]. These health care systems use similar electronic data capture systems and collect information on patient demographics, tumor characteristics, use of health care services, and survival.

6.5. Nationwide Inpatient Sample

The National Inpatient Sample (NIS) is a publicly available database maintained by the Agency for Healthcare Research and Quality (AHRQ, 2022; Health Care Cost and Utilization, 2022). Of all publicly available databases, the NIS is the largest all-payer inpatient database in the United States. The database does not record each individual discharge from a given institution but rather records a 20% stratified systemic random sample of all discharges. Information available in the NIS includes sociodemographic information, diagnosis/treatment codes, complications, cost, and hospital characteristics. The NIS database only records inpatient events and does not allow for longitudinal tracking of patients. Therefore, only inpatient complications may be assessed for a given procedure, which likely underestimates the true complication rate. A second major limitation is the database only contains predischarge information, making distinguishing comorbidities from complications difficult. Lastly, it does not contain operative variables such as anesthesia type, length of surgery, or blood loss, which can be important considerations in surgical research (Bekkers et al., 2014; Alluri et al, 2016).

6.6. National Surgical Quality Improvement Program (NSQIP)

The aim of NSQIP is to measure and improve the quality of surgical care across surgical specialties and this is an American College of Surgeons' administered database (American College of Surgeons, 1996–2022). NSQIP data are abstracted by trained surgical clinical reviewers at each participating institution; NSQIP provides risk-adjusted outcomes by collecting detailed clinical and demographic information on the surgeries performed. The NSQIP also assesses complications and mortality. Patient data are limited to 30 days after discharge; therefore, readmissions, complications, and deaths after this period are not available. Of note, not all patients at participating institutions are included in the NSQIP but rather a select sample of both patients and procedures.

6.7. Commercial databases

The implementation of electronic medical records has allowed private companies to extract data from insurance claims and hospital-level data sources and to compile these data for commercial purchase. The sources from which these companies obtain their data are highly variable with respect to payer, hospitals included, and health care documents analyzed. Some of the private national databases commonly used for research include MarketScan (Truven Health Analytics, Ann Arbor, MI, USA), Premier (Premier Inc., Charlotte, NC, USA), and PearlDiver (Pearl-Diver Technologies, Fort Wayne, IN, USA), (Thomas Reuters, 2022).

6.8. Challenges and biases inherent in database studies

Two of the major challenges in observational research are confounding and selection bias, which can lead to errors in estimates of the effects of an exposure (e.g., surgical intervention). In the absence of randomization, exposure groups may differ widely with respect to factors other than the intervention. Confounding occurs when some variables, in addition to being related to the exposure of interest, are related to the disease, and the observed effect of the exposure on disease risk may be mixed with effects of these other variables. Three criteria for identifying confounders have been suggested: 1) a confounder must be associated with the exposure under study in the source populations; 2) a confounder must be a risk factor for the outcome (i.e., it must predict who will experience disease), though it need not actually cause the outcome; and 3) a confounder must not be affected by the exposure or outcome. (Rothman KJ et al, 2008). Selection bias occurs when nonrandom variables influence the exposure. For example, a poor performance status can impact the surgeon's decision to proceed with neoadjuvant chemotherapy versus primary debulking surgery or the radicality of the surgery (e.g. bowel resection or lymph node dissection). Selection bias is particularly problematic in observational studies when patient characteristics, clinicians' decisions, or health care systems influence the choice of who will receive the intervention. Other types of bias that are important to consider include immortal time bias, a period during follow-up in which, by design, the study outcome cannot occur or is excluded from the analysis due to an incorrect definition of the start of follow-up. The authors should acknowledge the possibility of bias and expound on the potential impact in their limitation section of the discussion.

Multivariate analyses, stratification, matching, propensity score analyses, and instrumental variables are often used to adjust for information available in these data sets. Nevertheless, unmeasured confounders are likely to persist and can lead to biased effect estimates. Several sensitivity analysis and bias-modeling techniques have been developed to handle uncontrolled confounding. Including an assessment of unmeasured confounding is always a good research practice. The E-value is a simple measure of the potential for bias arising from unmeasured confounders in observational studies. The E-value is defined as the minimum strength of association on the risk ratio scale that an unmeasured confounder must have with both the treatment and outcome to fully explain a specific treatment-outcome association conditional on the measured covariates (VanderWeele and Ding, 2017). The E-value was introduced to make sensitivity analysis more easily available for researchers. To this end, an easy-to-use software and an online E-value calculator are available at no cost (Mathur MB et al, 2018).

7. Basic science and translational manuscripts

7.1. Experimental design, rigor and reproducibility

Good laboratory practices, including detailed reporting when writing peer-reviewed manuscripts, are essential for rigorous, scientific research. The National Institute of Health (NIH) describes scientific rigor as "the strict application of the scientific method to ensure robust and unbiased experimental design, methodology, analysis, interpretation and reporting of results (NIH, accessed 2022). This includes full transparency in reporting experimental details so that others may reproduce and extend the findings. Investigators should apply the elements of rigor that are appropriate for their science." This standard requires that investigators and authors transparently report and authenticate key biological and/or chemical resources. This ensures the correct regents and methods are available for repeating studies, as these are often integral to an experimental outcome. The Methods section should describe the selection of positive and negative controls, number of experimental replicates and provide comprehensive detail about experiments evaluating dose response studies and time point studies. When feasible, other members of the laboratory team should repeat experiments to test reproducibility. Ultimately, the entire data set should be represented (and/or made available) in the final publication (Begley and Ellis, 2012). Publication of results should include multiple, characterized cell lines that reflect the disease state to account for variability.

7.2. Animal models and three Rs

Inclusion of animal models into basic science research has contributed substantially to the advancement of medical research, including the development of new therapies for evaluation in clinical trials. However, translating research performed in animal models to patients can be unpredictable (Francia and Kerbel, 2010). To overcome these shortcomings careful attention must be given to methodology sections in peer-reviewed manuscripts. The three Rs guide the principles of animal research (replacement, reduction, and refinement) (Smith R. 2001). Replacement refers to avoiding and/or replacing animals in research when feasible. One example of this is relying on cell line work and *in vitro* experiments to answer a scientific question in lieu of experiments requiring animals. Reduction is the concept of using the fewest animals possible for an experiment and maximizing the data obtained from each animal. The manuscript must critically address how the number of animals used for research ensures adequate power and detail any analysis that was needed to address confounding variables. Refinement includes minimizing pain, distress and suffering of animals while ensuring welfare of the animals. Institutional Animal Care and Use Committees (IACUC) offer resources and training to investigators to ensure the highest standard of animal care is provided while performing essential research. The three Rs can also offer understanding with regard to (1) appropriateness of the animal model selected for the research, (2) translatability of the intervention induced in an animal, and (3) selection of endpoints or outcome measures. When selecting an outcome measure, a description of how this corresponds to a human condition further strengthens results. Authors must meticulously describe drug concentrations, dosing schedules, preparation and storage of compounds. These details allow other investigators to understand and replicate the studies accurately, as well as understand drug efficacy and toxicity of the study. Increasingly and to enhance rigor, journals require detailed descriptions about randomization of animals prior to treatment and blinding of investigators involved in the acquisition of data endpoints. This scrupulous attention to detail increases the likelihood that results provide sufficient evidence for translation, are reliable, and can be repeated.

7.3. Keep it simple and use a working model

Basic science and translational papers use the same structure as other peer-reviewed work. Despite the technical nature of the methodology, clear, concise writing and presentation communicates a compelling story. Clarity of message through a framework of data presentation and accompanying text, figure legends and tables should support logical conclusions. Inclusion of a working model or a simple schematic summary can illustrate to readers the concepts presented in a translational or basic science paper. These figures can help both readers with expertise outside of the specialty and referees understand rationale, mechanism and conclusions. Finally, the discussion should provide readers with evidence-based conclusions while avoiding excessive speculation and over-interpretation of findings. Engaging investigators outside of the lab or in other specialties to review your work for understanding and rationale can further strengthen the writing, revising, and editorial process before submission.

8. The review article

Review articles provide a collated summary of the current knowledge and published literature on a topic. *Gynecologic Oncology Reports* publishes review articles and encourages authors to address important clinical or basic science topics. While there are up to 14 different types of approaches to review articles described (Grant and Booth, 2009), reviews fall within two general methodologic approaches. These include 1) synthesis methodology and 2) narrative methodology. Synthesis methodology includes a rigorous protocolized approach to the process with systematic methods. The review addresses a focused question and includes a comprehensive search of the available literature. The ultimate goals are to collate studies' data, report organized combined results, and address the strengths and weaknesses within the combined findings. Narrative methodology is less structured and, while it provides a review of the literature, there is not an *a priori* protocol or methodologic approach to the literature search. The approach to selecting studies that are included is often variable and undefined. As such, bias is frequent and expected. A narrative review is usually a broad but relatively shallow overview that provides background on a topic and aids in hypothesis generation rather than answering a clinical question (Heyn et al, 2019).

Perhaps the most recognized review articles generated via synthesis methodology are the *meta*-analysis and systematic review. Both follow established, standardized methodology of a) an *a priori* protocol for the review process, b) a comprehensive, unbiased literature search, c) the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement (PRISMA, 2022) and d) an assessment of the evidence quality of the studies included. While the *meta*-analysis and systematic reviews both include similar robustness in the search of the published literature, the *meta*-analysis is designed to statistically combine data from the included studies and generate a strong recommendation for the field whereas findings in a systematic review are typically reported in tabular form without a statistical analysis of pooled data from included studies. Overall, a systematic review provides a presentation and appraisal of the current literature (Grant and Booth, 2009; Heyn, P.C et al, 2019). A requirement for both the *meta*-analysis and systematic review, the PRISMA Statement was first published in 2009 and was updated in 2020 with an approach that provides a 27-item checklist for investigators and authors as well as a flow diagram for identification, screening, and inclusion of studies in the review. The overarching goal of the PRISMA Statement is to guide transparent reporting of the researchers' rationale for the review and their approach and findings such that the process is reproducible (Page et al., 2021).

Other types of review articles include the scoping review, the rapid review, the umbrella review, and the mapping review. The scoping review also utilizes the synthesis methodology to perform a preliminary assessment of the scope and size of a topic using the available literature. This review is typically used to explore a research question and identify existing knowledge gaps. While the search strategy can be more flexible than a *meta*-analysis or systematic review, the scoping review still includes a comprehensive and unbiased literature search. The rapid review type also utilizes a systematic approach to address a particular practice issue, identify the weaknesses and/or gaps, and provides recommendations for future research. The rapid review follows the rigor outlined by the PRISMA Statement but the literature search is more flexible and a rapid review does not require an appraisal of the literature. An umbrella review, also called an overview review, is similar to a systematic review and follows the PRISMA flow diagram but only includes compiled evidence from other systematic reviews and/or *meta*-analyses. No primary original research studies are included in an umbrella review. Lastly, a mapping review provides a summary categorization of available literature such that gaps in research can be defined; however, the literature search is defined by the scope of the topic (Heyn et al, 2019)..

As noted above, narrative methodology in review articles is flexible in structure and the scope and included literature of the review are usually defined by the investigator (Grant and Booth, 2009; Heyn et al, 2019). Many of the reviews of the literature published in *Gynecologic Oncology Reports* will accompany a case report and fall into a narrative methodologic approach.

The type of review performed and review article selected by investigators should be determined by the primary goal of the review effort, the state of current published knowledge, whether the scope of the review is narrow versus broad, and the quality of available published evidence. In general, any review article should provide an up-to-date

guide through the current literature with a coherent distillation that digests the data for the audience. Typically, the first step in writing a review article is to identify the question worth understanding. Then, select the review methodology to best address the question, perform a thorough updated search of the literature as guided by the methodology, and complete the qualitative versus quantitative data analysis. Each review article approach can provide a high-quality review and synthesis of the contemporary literature on an important clinical, translational, or basic science topic.

9. Conclusions

"The only reason not to publish your manuscript is a lack of stamps" (verbal communication, Dr. William Droegemueller, University of North Carolina OB/GYN Chair, circa 1996). Assuming that your research is solid, the 2022 addendum to this statement would be a lack of internet connection. Writing and publishing a manuscript, while challenging, should be the fun culmination of your research endeavor and we hope that this manuscript can be of some assistance in getting started (or finished).

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The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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