Title: The STAR format journal club: An equation for evidence-based education and empowerment of allied health professionals

Name(s) of the author(s): Fadi Choucair^{1,2*}; Nagham Younis^{1,3}

¹Middle East Fertility Society Embryology Specialty Interest Group

²Sidra Medicine, Qatar. Email: fchoucair@sidra.org; embryology@mefs.org

³ University of Pittsburgh, USA. Email: younisn@mwri.magee.edu

1 **Abstract**

2 A journal club is an effective way to promote the evaluation of scientific literature and the
3 adoption of evidence-based practices. We developed a STAR format journal club (JC) for allied
4 health professionals. This format is based on inviting a “star” author to present his group's article.
5 Participants will evaluate the paper using the STAR (*Study design validity, Tackling the*
6 *methodology, Analysis of the results, Reflecting the results into practice*) concise critical appraisal
7 checklist. The STAR format JC will help participants develop an efficient and consistent means to
8 appraise evidence, stay abreast of the latest clinical research, network directly with researchers,
9 and be empowered to stimulate change. Alternatively, the participation of authors in an
10 educational activity may broaden the impact of their research, increase the level of engagement
11 for participants, and influence practice decisions.

12 **Keywords:** journal club; literature evaluation; critical appraisal

13

14

15

16 **Introduction**

17 In today's healthcare landscape, health and allied health professionals have acquired new
18 competencies that are integrated into their roles. The basic tenet of evidence-based practice is
19 the application of the most current and valid scientific evidence to patient care. Clinical practice
20 in the modern era demands all health and allied health professionals to stay abreast of clinical
21 research and critically appraise medical literature to improve patient care (1). Traditionally,
22 journal clubs have served these functions in medical education (1, 2). The traditional format of
23 journal clubs consists of selecting and presenting an article followed by a discussion. Fast-
24 forwarding to this era, the discussion has currently transitioned from the classroom to the laptop
25 through the Twitter platform (3). For allied healthcare practitioners, JCs are therefore a great
26 opportunity for empowering and enhancing clinical decisions. Nevertheless, the promotion of
27 evidence-based teaching is undervalued in clinical education and training of numerous health
28 and allied health specialties.

29 Because journal clubs can be perceived as dry and unstimulating, the first challenge was to
30 develop a format that would entice health practitioners to attend. Most educational activity
31 formats are delivered as an oral presentation by the presenter, while the remainder of the
32 participants has little motivation to prepare beforehand or engage in the discussion. More so,
33 most JC formats lack or struggle to implement critical appraisal guidance due to a lack of
34 resources.

35 In the ever-changing landscape of education and to address these needs, the authors on behalf
36 of the Middle East Fertility Society (MEFS) embryology specialty interest group have developed
37 a new journal club curriculum, the STAR format JC for clinical embryologists working in fertility

clinics. We previously identified seven key competencies that define the modern successful embryologist's roles including the scholar and the researcher roles which JCs fulfill (4). The STAR format can be used for a variety of health care specialties.

The curriculum consists of two major parts: (1) A pre-guide toolkit sent before the journal club which includes the journal article to be discussed scaffolded with the STAR (*Study design validity, Tackling the methodology, Analysis of the results, Reflecting the results into practice*) concise critical appraisal checklist. (2) A presenting "star" author presents his group's article. The involvement of authors in the JC session will increase the engagement of participants, boost the impact of the research, and influence practice decisions. The lack of harmonized, structured, and simplified JCs necessitates guidance to help standardize the process. This article aims to provide a framework for the streamlined journal club format focusing on the domains S, T, A, and R.

Main text

Process and format

Identification of a burning question and selection criteria of the journal article

Journal articles are chosen from the basic science and medical literature for their relevance to clinical practice. The technical journal club program coordinators will select journal articles according to how well they address the following questions:

- New accomplishments that have been made? Novel experimental design, good research design, originality of the paper.
- How does this work differ from previous work?

- 59 - What is the clinical significance of the results? Papers should be stating unambiguously
60 findings that can be translated to clinical practice.

61 Using the following empirical and pre-defined criteria, the journal club coordinators select
62 the most relevant original articles:

- 63 ▪ Original articles
- 64 ▪ Peer-reviewed
- 65 ▪ Recently published (within the last five years)
- 66 ▪ In English
- 67 ▪ About humans
- 68 ▪ Basic and clinical science journal articles in subject categories related to the specialty will be
69 considered (for example: embryology, andrology, cryopreservation of gametes/embryos,
70 reproductive genetics, and reproductive epigenetics).

71 It is noteworthy that research does not exclude non-native speakers, so it is evident that
72 international cooperation is critical for research advancement. Therefore, non-native English
73 speakers will be strongly supported to participate in the journal club sessions.

74 Additionally, a subjective and gestalt approach will be used to further select journal articles,
75 thereby prioritizing:

- 76 - Studies with clear objectives.
- 77 - Studies that use the proper research methods for the scientific question.
- 78 - Studies with validated outcomes and properly managed potential confounders, if applicable.
- 79 - Studies that use statistics properly with a clear understanding of the possibility of statistical
80 errors.

- Large multicenter studies over small single-center studies.
- Topics of significant importance or innovations.
- Papers that demonstrate proficient writing and attention to detail.

The technical journal club coordinators will collaborate with the corresponding author of the journal article. A presenting author will be selected by his peers. Upon receiving the authors' approval, the date of the journal club will be determined and flyers drafted.

Emailing JC flyer, research article, and the STAR critical appraisal checklist

Invitations are sent via email and social media and include a challenging clinical situation or question. A pre-guide toolkit will be sent to the registered participants including the journal article to be discussed as well as the STAR critical appraisal checklist.

An acronym was designed to structure the critical appraisal checklist and help readers critically evaluate the clinical relevance of research articles. This journal club template focuses on four major “STAR” sections to structure the critical appraisal. The STAR sections are: **S**tudy design validity, **T**ackling the methodology, **A**nalysis of the results, and **R**eflecting the results into practice.

This template can be used by both novice and skilled experts. The purpose is to help readers navigate an article without missing important details and foster critical thinking for a pertinent discussion of the article's strengths and weaknesses. It is also intended to emphasize key elements of study design, methodology, and statistical analysis that may be relevant to clinical practice. For an in-depth explanation, several critical appraisal checklists designed for different study types are available in the literature (5). A summary of the pertinent information to address in each respective section is provided in **Table 1**.

Table 1: Explanation of the STAR critical appraisal checklist headings

Heading	Explanation
Study design validity	▪ Consider whether the articles can be extrapolated to your population or practice. Ensure that the sample selected is representative of the population.
Tackling the methodology	▪ Ensure that the design minimizes study bias.
Analysis of the results	▪ Ensure the reliability of the results using appropriate statistics. The choice of statistics depends on three primary factors: the study design, the type of data, and the number of groups compared.
Reflecting the results into practice	▪ Briefly summarize the authors' conclusion and then offer specific clinical recommendations based on their findings.

The STAR concise critical appraisal checklist was developed from the Critical Appraisal Skills Program (CASP) checklists to assess the quality of research studies in terms of validity, reliability, and generalizability (**Fig. 1**) (5). In addition, the checklist includes a guide for using statistical tests (6).

STAR format critical appraisal checklist

Paper citation: _____

Presenter name: _____

1. Study design validity

i. Did the study address a clearly focused research question?

HINT: A question focused in terms of:

Clear Null hypothesis: _____

Population studied: _____

Intervention given/Risk factors studied: _____

Comparison performed: _____

Outcomes measured: _____

Key inclusion/exclusion criteria: _____

☐ Yes

☐ No

☐ Can't tell

ii. Were the participants recruited in an acceptable way?

HINT: Look for selection bias that might compromise the validity of the findings.

Cases representative of a defined population.

Use of a reliable system for selection (inclusion/exclusion criteria).

Selection of a sufficient number of cases (power calculation if performed).

If Randomized Controlled Trial (RCT), proper randomization of participants (e.g., concealed allocation...).

☐ Yes

☐ No

☐ Can't tell

2. Tackling the methodology

iii. Was the classification/allocation of participants accurate?

HINT: Look for classification bias between groups.

Baseline characteristics similar or matched (e.g., age, sex, ...) between groups.

Minimal differences between the studied groups that could affect the outcome/s.

If RCT, participants and investigators are "blind".

If cohort or case-control studies, groups are similarly exposed, or similar interventions are performed.

☐ Yes

☐ No

☐ Can't tell

iv. Were the outcomes accurately measured?

HINT: Look for measurement bias of outcomes.

Matched and accurate measurement methods between groups.

If RCT, investigators assessing/analyzing outcome/s are "blind".

If cohort or case-control studies, identification of potential confounding factors in the design and/or in the analysis (e.g., regression, stratification...).

☐ Yes

☐ No

☐ Can't tell

3. Analysis of the results

v. What are the results?

HINT: Look for the statistical validity of the results.

Were the results reported comprehensively? The appropriate statistical test was used, p-values reported, and adjusted results for confounders.

How precise are the results? Confidence Intervals were reported.

	Categorical data*	Non-normal data	Normal data*
One group compared with a hypothetical group	Chi-squared test	Sign test Wilcoxon's signed-rank test	One-sample t-test
Two groups comparison	Chi-squared test (unpaired ¹) McNemar's test (paired ²)	Mann-Whitney U test (unpaired) Wilcoxon's matched pairs test (paired)	t-test
More than two groups comparison	Chi-squared test (unpaired) McNemar's test (paired)	Kruskal-Wallis test (unpaired) Friedman's test (paired)	One-way ANOVA (unpaired) Repeated-measures ANOVA (paired)

*Categorical data are non-numerical data (e.g., male, female, ...).

*Normal distribution is a Gaussian distribution of data representative of a normal population demonstrated by a visual bell-shaped distribution or using statistical tests such as the Shapiro-Wilk test, Kolmogorov-Smirnov test...

¹Unpaired data refer to data collected from different individuals.

²Paired data refer to data collected from the same individuals.

☐ Yes

☐ No

☐ Can't tell

4. Reflecting the results into practice

vi. Can the results be applied to your local population/in your context?

☐ Yes

☐ No

☐ Can't tell

APPRAISAL SUMMARY

Record key points from your critical appraisal below. What is your conclusion about the paper? Would you use it to change your practice?

Figure 1. The STAR format journal club critical appraisal checklist

Journal club presentation

The journal club coordinators will open the session. The coordinators will designate a journal club facilitator to facilitate discussion. Certificates and evaluation forms will be sent to participants, and, if necessary, blog discussion. **Figure 2** summarizes the journal club process algorithm.

Figure 2. The STAR format journal club algorithm

Conclusion

As a method for systematically analyzing journal articles, the STAR format journal club was developed to communicate accurate and concise information from clinical research articles. This JC format enables readers to identify key aspects of the study and its validity before applying the findings to clinical practice. The ultimate goal of this manuscript is to provide a template-based format, easy-to-use and flexible process for conducting journal clubs, which will suit a diverse range of specialties. It is necessary to evaluate the journal club's educational and experience components in the future.

List of abbreviations

CASP: Critical Appraisal Skills Program

JC: Journal Club

MEFS: Middle East Fertility Society

Acknowledgments

Not applicable.

Authors' contributions

FC designed and wrote the manuscript. NY revised the article. All authors have read and approved the manuscript.

Declaration of interest

The authors declare no conflicts of interest

References

1. Zaccagnini M, Bussires A, West A, Boruff J, Thomas A. Features of scholarly practice in health care professionals: a scoping review protocol. Canadian journal of respiratory therapy: CJRT= Revue canadienne de la therapie respiratoire: RCTR. 2020;56:38.
2. Linzer M. The journal club and medical education: over one hundred years of unrecorded history. Postgraduate medical journal. 1987;63(740):475-8.
3. Topf JM, Sparks MA, Phelan PJ, Shah N, Lerma EV, Graham-Brown MP, et al. The evolution of the journal club: from Osler to Twitter. American Journal of Kidney Diseases. 2017;69(6):827-36.
4. Choucair F, Younis N, Hourani A. The value of the modern embryologist to a successful IVF system: revisiting an age-old question. Middle East Fertility Society Journal. 2021;26(1):1-6.
5. Programme CAS. casp-uk.net/casp-tools-checklists.
6. Byrne DW. Publishing your medical research paper: what they don't teach you in medical school: Williams & Wilkins; 1998.