REVIEW ARTICLE

Think Beyond Research Outcome and Publication! A Review of Various Parameters for Assessment of Medical Research

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ABSTRACT

Medical research has following phases- planning, performance, documentation, analysis, and publication. Evaluation of research can be summative (i.e. evaluations of research results) vs formative (i.e. evaluation used for improving scientific processes), quantitative vs qualitative and individual vs institute/departments. Understanding the usefulness and impact of science is important; Peer review mechanisms for objectively processing protocols should be there to produce quality research. Research committees should be established at the institute level to monitor the progress of research. Publication of research findings in high-quality international and peer-reviewed scientific journals should be emphasized apart from using the research for patient care, policy and programs. For improved decision-making in biomedical research, evaluation should be based on both bibliometric methods and peer review. For capacity building and skills development in research, researchers involved in the biomedical field require rigorous and methodological training to appraise the quality of evidence available critically and not trust all published literature. This narrative review aims to synthesize parameters for assessing medical research quality beyond outcomes and publications, focusing on LMICs like India. This review is narrative and non-systematic, subjective in nature and potentially subject to selection bias.

Keywords: Assessment, Bibliometrics, Data sharing, Equator network, Impact factor, LMIC research, Peer review, Research Quality

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INTRODUCTION

Science, research, and evidence are allied. Research is essential to carry science forward, and health research is responsible for improving healthcare. Research evaluation is an assessment of the performance and practices of researchers, programs, institutions and nations by various stakeholders. Evaluating medical research is an essential basis for the progress of academic departments, research focal points, medical faculties, and the individual careers of academicians and scientists.[1] However, there is incoherence between the goals of research and its assessment with ill-defined methods or guidelines. An analysis of biomedical research reported that due to inappropriate research questions, fault in study designs, poor reporting, inappropriate study endpoints and non-publication, 85% of research funding is fruitless.[2] Altman stated in a 1994 report that we need less research, better research, and research done for the right reasons.[3] A recent bibliometric analysis (2025) mentioned about 10- fold increase in the papers on research waste in last two decades which underscores major concern regarding quality research.[4]

Medical research has following phases- planning, performance, documentation, analysis, and publication.[5] Evaluation of research can be summative (i.e. evaluations of research results) vs formative (i.e. evaluation used for improving scientific processes), quantitative vs qualitative and individual vs institute/departments (Figure 1).[1] Customarily, research evaluation is largely dependent on peer review, but quantitative indicators have gained importance due to the rapid advance of science over the last century, development and increased accessibility of databases and scientometric techniques. In developing countries including India, where the culture of poor research environment, low quality, and faulty ways to use information exists, both the metrics and peer review are subject to flaws. The top-level institutions responsible for education and medical education in India (University Grants Commission, Indian Council of Medical Research and National Medical Commission) have exaggerated the importance of the number of publications in indexed journals as a criterion for the selection and promotion of faculty while overlooking the accountability for quality research.[6] The diffusion of research findings through publication is crucial for building evidence.[5] Recently, during the pandemic, underpowered, duplicated, and poor-quality publications about therapeutic trials involving thousands of patients were reported in a matter of months, which usually take years to complete. These factors resulted in a complicated "Infodemic" of low-quality medical information, accelerated by social media.[7,8]

Nonetheless, there exist discrepancies in the publication and assessment of research in different fields and settings. Evaluation of research in the context of only the number of papers and journal impact factors is not admissible.[6] It is a recognized fact that our science journals do not meet international standards, and the functioning of medical journals is a major concern in India.[9,10] Medical research conducted with better quality results in improved patient care, enhanced medical education, lower budgetary expenditure, and overall benefits for society at large. Recent NMC developments in 2025(NMC's Draft Framework for Accreditation and Ranking of Medical Colleges) introduce new accreditation parameters that could enhance research evaluation in India.[11] The characteristics of the Indian population in terms of diverse demography and disease patterns solidify the need for quality research to cover the population.[12] Hence, we need a robust system and adequate information for the assessment of research to produce quality evidence in healthcare from LMIC, including our country.

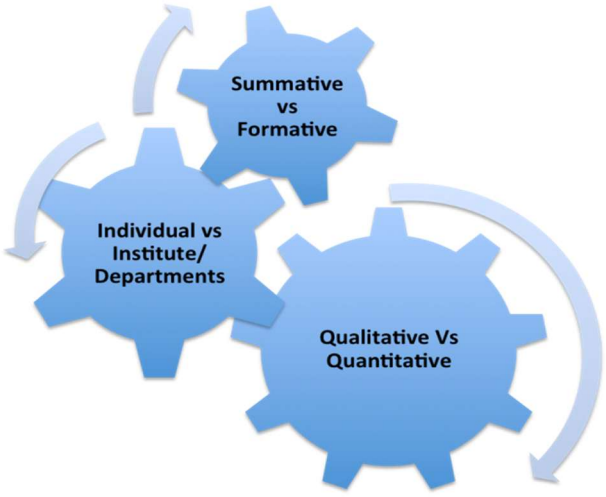

Figure 1: Assessment of Research (Types)- A Venn diagram or flowchart of research assessment types: summative vs. formative, quantitative vs. qualitative, individual vs. institutional.

For the purpose of this study, a comprehensive literature search was conducted with the keywords "Assessment" OR "Evaluation" AND "Medical Research" OR "Health Research" AND "Quantity" OR/AND "Quality" AND/OR "LMIC" OR "India" utilizing various search engines and databases including PubMed and Google Scholar. All the publication results from 1990- 2025, like original research studies, review articles, Editorials, Commentaries, and Press releases obtained from the literature search, were reviewed. Both full text and abstracts were included in the study. Cross-referencing was also conducted to expand the search from all articles. An in-depth review of the listed articles and abstracts was done after downloading. Various domains were extracted from the finalized articles and further presented as quantity and quality parameters. As a narrative review, this analysis synthesizes selected literature without systematic protocols, focusing on key parameters identified through expert curation and subject to selection bias. The following parameters should be considered

during the assessment of research and are narrated in this review paper.

RESEARCH PROTOCOLS

Assessment or review of research protocols is the initial step for the improvement of the quality of biomedical research. Well-designed and planned protocols are prerequisites for sound research and pave the way to high-quality journals.[13] Primary research should be reasoned by well-designed systematic reviews about existing literature and funders' stress for such protocols.[3]

The review of protocols is done in the purview of the Scientific Research Committee and Institutional Ethical Committee (IEC). The institutional ethics committee acts as the heart of regulation for maintaining the ethical integrity of the research.[14] Every medical institute should have functional scientific research and an institutional ethical committee to monitor the progress of the research.[15]

The 'New Drugs and Clinical Trials Rules, 2019' (as notified in the Gazette of India vide, G.S.R.227 (E), dated '19/03/2019', Chapter IV) mandated all biomedical and health research ethics committees that research involving human participants must register with designated authority by Central Government in the Department of Health Research (DHR), Ministry of Health and Family Welfare.[16] Registration of various types of research and protocols is a significant step in overcoming duplication, reducing reporting biases, and improving transparency in research. In recent times, journals have adopted guidelines for mandatory registration of clinical trials (CTRI no.), randomized trials, and results of trials, similarly for systematic reviews as a precondition for publication.

The EQUATOR (Enhancing the Quality and transparency of health research) network recent update and executive statement (August 2024) on data sharing stated that all protocols and reports of completed biomedical research should include data management and sharing plans. All the reporting guidelines' checklist should always include data sharing and management plans details (analytical code, materials for study purpose, study registration with number & details of study protocol). All such guidelines should be promoted to enhance transparency across different types and phases of research. There is absence of discussion on AI-assisted protocol design in this position statement of EQUATOR.[17] Recent NIH guidelines highlighted to Incorporate AI tools for protocol optimization and ethical consideration in AI in research is imperative.[18]

Research Misconduct

Research Misconduct- is described as fabrication, falsification, or plagiarism in protocol writing, performance of research, review of the research findings, or reporting of results of study. ***Fabrication*** in research misconduct is referred as making, cooking up the data and analysis or reporting such fabricated data. ***Falsification*** is biasing the research methods, materials or altering or obligating or neglecting data or findings such that research is not signified correctly in research record*;* ***Plagiarism*** is the annexation of another person's ideas, processes, results, or words without giving proper acknowledgements. Plagiarism is a well-known issue in the medical field, and many journals do not have appropriate mechanisms to deal with misconduct.[19]

Most non-indexed journals have plagiarized matter. The Committee on Publication Ethics (COPE) has developed guidelines for plagiarism (The COPE report, 2000).[20] As integrity is one of the most important aspects of research, editors of journals should follow a stringent review process for submitted papers. A mandatory and exclusive signed declaration of the originality of the submitted paper (contributor ship/copyright statement) should be in the submission guidelines. Recently, the University Grants Commission (UGC) issued a new regulation in 2018 to address the issue of plagiarism.[21]

Assessment of research for plagiarism is based on reports generated from anti-plagiarism software. Some of these tools (Grammarly's plagiarism checker or Crossref Similarity Check) are available to check manuscripts or any research work freely online, but these are not accurate, and data sharing is also not safe. Although paid tools (Turnitin, iThenticate) are good, they are very costly and not in the purview of every institute. NMC has given guidelines for paper publications (TEQ 2022,2025), should also emphasize on plagiarism and research misconduct.[22,23]

Large language models (LLMs) are deep learning models, when LLM fabricates information instead of trusting on valid evidence it is known as model "hallucinations". In medical field, it can fabricate case information and disease details. Google Gemini and openAIs GPT can generate up to 25-50% of fabricated references and error in patient related details. LLMs are very prone to false fabricated facts (hallucination attacks) which impose serious challenges in medical care.[24,25]

Research in Predatory Journals (Pseudo journals)

Jeffrey Beall invented the term ***'Predatory Journal'*** to explain the publishers in the process of scholarly publications who collect article processing charges (APC) and offer fast publication of papers without the process of proper peer-review.[26] Open access (OA) journals are now a choice for many organizations over print journals, but OA publications foster predatory journals/ predatory publishers.[27,28] Nevertheless, many studies concluded that India contributes a major share in poor quality predatory journal publications.[29] The major factors responsible for publishing articles in poor-quality predatory open-

access journals from India include publication pressure among researchers, poor knowledge about predatory journals and poor lack monitoring of the research work. The 'publish-or-perish' culture, poor understanding of predatory journals and lack of monitoring of the research cultivate the culture of predatory publications.

Constant and adaptable efforts must be made to counter predatory publications.[13] Beall has enlisted criteria regarding whether the publisher and individual journal are predatory or peer-reviewed.[26,29,30] "Predatory journals and publishers are entities that prioritize self-interest at the expense of scholarship and are characterized by false or misleading information, deviation from best editorial and publication practices, a lack of transparency, and/or the use of aggressive and indiscriminate solicitation practices" (best practices published by DOAJ, OASPA, COPE and WAME).[13,31,32]

An author can employ several methods and techniques to avoid predatory journals and publishers. These include looking through the journal's annals for articles not related to the topic, ensuring that the APCs (article processing charges), editorial and peer review guidelines are mentioned explicitly on the website of the journal , or close scrutiny for grammatical and spelling errors in solicitation e-mails and by checking whether the journal is indexed in the databases such as 'MEDLINE' and 'PUBMED' for biomedical journals and by checking that the journal is member of the COPE, OASPA or listed in DOAJ.[33,34]

Major disadvantage of AI tools is that its sometimeswarning signs predatory journals are missed and AI tool may misguide pseudo journal as legitimate journal. Teams of predatory journals often replicate reputed journals style and guidelines The rise in predatory journals poses a worrisome picture in all fields of medical science and in particular threat in respiratory medicine. The reasons being high load of upcoming research in chronic obstructive pulmonary disease, asthma, interstitial lung diseases, emerging communicable diseases, COVID-19 or lower respiratory tract infections.[35,36]

Editorials and Peer Review

A more direct measure for the assessment of research is by peers, which is defined as an evaluation of a research paper by one or more persons of similar competence to the authors of the research paper.[10,37] Peer review is typically a qualitative assessment of research performance. Editors and reviewers have decisive links to maintain a journal's quality. The editorial board should comprise recognized experts from their respective fields and competent researchers.[31] Editors and reviewers should be porters for quality research following methodological and ethical guidelines religiously. Publication in journals that are not peer-reviewed is not creditable.

Widely prevalent peer review is shadowed by several disadvantages. Review by peers is considered a very traditional method of assessment of research, limited by lack of novelty, influenced by subjectivity, conflicts of interests, and inexperience of quality of research. Together, all these issues restrict breakthrough research in science. A Cochrane review (2007) suggests that there exists little evidence in support of the effectiveness of scientific peer review. Likewise, certain surveys on reviewers following standard reporting guidelines reflected that only 16% referred to the guidelines while reviewing.[3,6,38,39]

Journal organizations, such as the International Committee of Medical Journal Editors (ICMJE) and the World Association of Medical Editors (WAME), should promote and recommend the use of reporting guidelines by peer reviewers and authors.[38] Post-publication peer review also provides insights regarding study quality and reproducibility, but few data exist for the effectiveness of this approach.[40] Evaluation should be based on both bibliometric methods and peer review for improved and high-quality decision-making in biomedical research.

The Web of Science Masters Journal List, describes journals on 24 measures of quality, including effective peer review and adherence to ethical publishing practices, and periodically checks that listed journals meet the standards.[41] Although the pace of publishing is slowed down by peer review, it is still rendered as an important step in producing high-quality data. However, uncontrolled published studies on effectiveness and role of hydroxychloroquine and azithromycin proved that peer review solely cannot eliminate the poor- quality research.[42]

The simplified framework of peer review from NIH describes five criteria; significance, investigators, innovation, approach, environment which decides overall impact score of review. This scoring system minimizes bias and promotes impact of research. F1000 research recuperates scientific reproducibility through its Open Science platform and includes details of complete methods, access to complete data and post-publication open peer review for enhanced transparency and reliable research.[43-45]

Standard database (Indexing)

Indexation is defined as the inclusion of research in select databases. Global indexing and abstracting services are internationally accepted parameters for quality assessment of research. Indexed journals, as compared to non-indexed journals, are considered more authentic in their scientific content. All this started in 1879 when Index Medicus started indexing medical journal articles to maintain their quality. Subsequently, over the years, many more indexation services have emerged, some of them being very popular, such as PubMed Central, SCOPUS, EBSCO, EMBASE, Science Citation Index and others. Indexation or inclusion in select databases is an imperfect

surrogate/proxy parameter for the quality of research output.[10,46]

Indexed journals are quality journals, and indexing agencies register these journals based on the following qualifying criteria: digitalization mechanisms, indexing in the databases, regularity of publications, international availability of published materials, quality of publishing, presence of peer review process, editorial work capacity and most importantly frequency of citations.[47] The National Medical Commission (NMC) in India mentions indexing in Medline, PubMed Central, Citation Index, Science Citation Index, Embase, Scopus and Directory of Open Access Journals (DOAJ) in publication guidelines in TEQ 2022. In most recent TEQ 2025 research publication" means only original papers, meta-analysis, systematic reviews, and case series that are published in journals indexed in Medline, PubMed Central, Science Citation Index, Citation Index, Expanded Embase, Scopus or Directory of Open Access Journals and other such journals as may be specified by the Commission from time to time". (part III SECTION 4 POINT 2(j)).[23]

NMC has recently removed Index Copernicus as an indexing site (Beall's blog says "Index Copernicus has no value"), which led to the flourishing of publication in predatory journals.[22,48,49]

Uniform Requirements for Manuscripts (URM) guidelines

The guidelines of Uniform Requirements for Manuscripts are the most well-rounded and extensive document in the field of science and technology. This document encompasses all issues for authors and editors regarding publication ethics, contributor ship, authorship, editorship, copyrights, electronic publishing, advertising as well as registration of clinical trials. URM also outlines detailed instructions regarding the reporting standards specific to study designs including the interventional observational studies, qualitative research, and reports regarding comparative studies for the accuracy of diagnostic tests.

URM is known as ICMJE Recommendation and new updates regarding detailed statement on AI includes that authors have to submit disclosure statement in context of use of various AI tools. (ChatGPT, LLMs) and other important updates include about data collection & measurements, conflict of interest, sponsorships, climate change due to paper publications and others.[50]

Standard guidelines for research

There are different checklists available for the evaluation of quality standards of study designs. Such as CONSORT guidelines for clinical trials, STROBE for observational study designs, STARD guidelines for evaluating the diagnostic accuracy studies, PRISMA for systematic reviews and meta-analysis, SPIRIT for recommendations for interventional trials and many more.[5,40,51]

Adoption and implementation of the CONSORT statement and checklist by international journals have resulted in improving the quality of randomized controlled trials reporting over time in comparison to the journals that did not adopt as per the systematic surveys.[52]

Reporting guidelines were developed to fulfil the need to establish common, minimum standards of quality in recent years. An international initiative, The Equator Network (Enhancing the Quality and Transparency of Health Research) (http://www.equator-network.org/) aims to improve health research reporting in terms of accuracy, reliability and transparency by providing the latest resources to empower the research community. The collated resources on this website are both educative and informative for the pupils involved in research.

Clinical practice guidelines underline evidence-based medicine, but methodological discrepancies and variations require strong quality assessment. The AGREE II (Advancing Guideline Development, Reporting and Evaluation in Health Care II) exists as the most extensively accepted framework for guideline assessment.[53,54]

EQUATOR network for better growth of science and research has collaborated with Centre for open science (COS). Both partners work together for development, designing and implementation of guidelines for transparency and benefit of society.[55]

Statistical methodology and analysis

Appropriate statistical methodology and analysis is the cornerstone of good-quality medical research. Statistical significance (classically stated through P-values calculated from null hypothesis testing) is almost ubiquitous in the biomedical literature, and the interpretation of P-values in data analysis is indefinable. National England Journal of Medicine (NEJM) recently, along with other journals, highlighted the flaws in overdependence on P values as ''significant'' and ''nonsignificant''. *Journal* editors and statistical experts have become increasingly concerned about the medical literature's overuse and misinterpretation of significance testing and P values.[56,57]

It is a matter of concern as problems with statistical testing in unstructured research settings (like health and medical fields) offset the benefits. Therefore, while evaluating statistical analysis, there are following guidelines for researchers, editors, and reviewers: effect size estimates, confidence limits and precise P values need to be examined for accurate analysis of statistical tests. It is not true to assert that statistically non-significant values support a test hypothesis. Interval estimates help in evaluating the data capability to discriminate among various hypotheses about effect sizes; whereas confidence in-

tervals are best- case measures for ambiguity or uncertainty left by the data as they are the result of the uncertain statistical model. For evidence-building, the results of statistical methods should not be the only criteria for conclusions.

Statistical significance is not essential or adequate to measure the practical significance of observations from research. All statistical methods (frequency or Bayesian models, various tests, or for inference or decision), including data generation, data analysis and presentation of results, also consider assumptions regarding the event sequence. Thus, during the assessment for all types of research, a detailed review of the study's rationale, study design, the analysis plan as mentioned in the protocol, inclusion and exclusion criteria, and systematic analysis of data analysis should also be considered. (Statistical medicine).[58]

The Bayesian models are current alternatives or even replacement option for classical inferential statistical procedures (such as t-tests and analysis of variance), But to decide which Bayesian methods is fit in particular research is also a problem. Detailed analytic understanding of advantages and disadvantages of these models is requisite. As P-values can mislead the findings and indicate poor decision-making, inclusion of metrics like minimum clinically important difference (MCID) effect sizes and Bayesian methods is required.[59,60] With evolving Artificial intelligence and clinical trials in medical science, standards for safety, efficacy, effectiveness and monitoring should be well framed. Dynamic deployments models which adapt with new data along with real time monitoring and validation.[61]

Bibliometric assessment of research

Bibliometric assessment is defined as statistical analysis of written publications; it is an attempt to quantitatively assess the academic quality of journals or authors by parameters like impact factor and other citation rates. Some other bibliometric features for quality include the international composition of the editorial board and authorship, variety of published papers, online e-archives availability and other features which enhance the value of the journal for readers and authors.[62] Various indicators like total citations received, highest citations, mean citation rate (C/P), G-Index, H-Index and I-10 Index are used to assess the ranking of the journals as per the total production of the research and the quality of journals by using the above indicators.[6,63-65]

Total citations are the citations of articles written by researchers;

Highest citations- for quality assessments, top-cited articles give insight into research, but citations and quality are not perfectly synced.

G-Index is the square root number of the highest number of citations received by an author for one of his papers out of his total publications. This means if an author has received the highest 400 citations for one of his papers, then his G-Index is 20 (20x20= 400).

H-index (Hirsch index)- is the matrix for authors based on the total number of published papers by an individual author and the number of times that they are cited. For example, the H index of an author is 10 if at least 10 of his research publications have received at least 10 citations each irrespective of the total publications done by the author. It does not account for the actual number of citations received by each paper and thus, can be misleading. The h-index favors senior researchers; using relative citation ratio (RCR) for fairer individual assessment is alternative. The Relative Citation Ratio is article level matrix; it provides an alternative to the invalid practice of using journal impact factors to identify influential papers. It is a better method to quantify the influence of a research article by including its co-citation network.[66]

I-10 Index: The number of publications which receive at least ten or more citations out of the total publications of an author is his/her I-10 -index.

The availability of the Science Citation Index (SCI), Journal Citation Reports (JCR), and Web of Science has initiated an entirely new area of bibliometrics/scientometrics.[10] A journal's impact factor is defined by two factors: the numerator, which is the number of citations in the current year to any items published in a journal in the previous two years, and the denominator, which is the number of substantive articles/ (source items) published in the same 2 years. The accumulated and average impact factors (IFs) were generated according to the Journal Citation Reports (JCR) 2014, which includes number of times each year that a journal is cited and the name of the citing journal.

Advancement of scientific medicine is an objective of research; this means the impact factor cannot be a suitable tool for evaluation inherited with many drawbacks. The impact factor of a journal does not correspond to every article published in that particular journal, as the citations of every paper are different and have a lot of variation. This misjudgement makes impact factor, a journal-based metric, an imperfect assessment tool for the academic performance of individuals or institutions.[1,67]

Citation-based statistics can play a role in the assessment of research, provided they are used properly, interpreted with caution, and form only part of the process. Peer review and metrics are the basis of the selection and promotion of faculty worldwide. Although, internationally bibliometrics and simple indicators are being used as well. However, there is a tendency among authors to prefer quantity over quality of research publications due to the weightage it is given.[52,68] The development of indica-

tors to assess the quality of clinical research is an unmet and urgent need in the present scenario.[69]

Nevertheless, experience has also shown that in each speciality, the best journals are those in which it is most difficult to have an article accepted, and these are the journals that have a high impact factor. Moreover, these journals existed long before the impact factor was devised. Impact Factor is not a perfect tool to measure the quality of articles, but there is nothing better. It has the advantage of already being in existence and is, therefore, a good technique for scientific evaluation.[70-72]

The IQVIA Global Trends in R&D 2025 report highlighted inclusion of altmetrics and PlumX in research evaluation for broader understanding of output and impact of research through digital backdrop. must go beyond traditional citation metrics by including for a broader, more nuanced assessment. This approach provides a comprehensive view of a research output's impact by tracking engagement across the digital landscape.[73,74] The MoRE (Modernizing Research and Evidence) consensus definitions on metric reforms are proposed to improve clinical research and transparency around innovative clinical study designs and trails.[75]

Conflict of interest (COI) in research

Conflict of interest (COI) comprises those conflicts, which may not be fully apparent and may influence the judgment of authors, reviewers, and editors. They may be personal, commercial, political, academic, or financial (COPE guidelines). In the time of the blooming industry of clinical trials, with pharmaceutical companies involved in funding trials, conflict of interest (COI) is a growing issue, which is now discussed and given due attention by editors during consideration of research, especially involving clinical trials. The National Medical Commission (NMC) has recently come out with guidelines for medical doctors on COI. The ICMJE recently introduced a new disclosure form on COI, which is adopted by the ICMJE member journals. Likewise, there is a need to mention conflicts with sponsors in cost-effectiveness analyses, meta-analyses and guidelines.[40]

The 'intellectual conflicts of interest' is defined as when a researcher is interested in particular point of view based on previous experience, academic and personal profile. Financial issues in academic research can create 'institutional conflicts of interest' (COIs) because the financial interests of the institution or institutional officials may inappropriately influence decision-making. Measures include formation of IEC (institutional ethics committee) and developing policies at institute level to manage such conflicts.[76-78]

Authorship in publications

The International Committee of Medical Journal Editors (ICMJE) mentions the following criteria for authorship: substantial contribution to the conception or study design, or the acquisition, analysis, or interpretation of data, or drafting the work, or revising it critically for important intellectual content, or final approval of the version to be published and agreement to be accountable for all aspects of the research work. However, abuse of authorship exists in the academic and non-academic systems in the form of ghost/orphan, gift authorship/honorary, guest, anonymous, forged and theft authorships.[79]

The 'Contributor ship' form has been introduced for this malpractice, but such authors always find space with some justification in contribution. Scientists, clinicians and academicians in higher positions should be role models to discourage ghost and gift authorship. Some systems of 'Naming and Shaming' could perhaps stem this malpractice.[10] According to COPE guidelines, there is no universally agreed definition of authorship, although attempts have been made. At the minimum, authors should take responsibility for a particular section of the study.

Utility of research

The most significant parameter of evaluation is the importance of research for the advancement of science and improvements in healthcare. The utility of research includes the following key domains: having a real problem to fix, research question related to existing evidence, novelty in research, patient-centeredness, proper utilization of funds, feasibility, and transparency. Most studies published, even in the very best journals, meet only a minority of these domains, and the utility of research is often ignored during the assessment of medical research. Impact or quality of research is defined in terms of evidence-based medicine or public health, new or revised guidelines, disease prevention, patient care, undergraduate, postgraduate, and continued medical education.[1,2]

It is also necessary to account for the contribution to the development of treatment guidelines while assessing the quality of medical publications. Field specialists develop medical treatment guidelines, and they provide the latest evidence-based data on medical practices and procedures in the clinical setting. Areas covered ranged from disease pathophysiology to prevention, diagnosis, treatment, and rehabilitation, and guidelines in each of these areas contribute to improving quality standards of medical treatment. Medical treatment guidelines are important contributions to healthcare, and publications focusing them should be considered as high-quality, regardless of the journal's IF or citation index.[5]

Evidence of a medical products into health technology assessment (HTA), guidelines from WHO, inclusion in clinical guidelines, regulatory and real-world evidence accounts for metrics of utility and patient care. Real world evidence (RWE) is clinical evidence produced using real world data (RWD) on safety and efficacy of drugs. RWD is generated from electronic records, registries, hospital bills, patient case data

and mobile based applications recording data in real time. It is type of post- marketing surveillance and utilized for pharmacovigilance of medical products.[80,81]

Translating research into clinical evidence and public health policy is imperative for better health care delivery and services. There are important barriers for translational research in LMICs which includes poor understanding of local research, limited funding, poor collaboration between different stakeholders and lack of knowledge of evidence-based medicine.[82,83]

Replicability (Reproducibility) of research

Replicability is a benchmark of scientific quality. Reproducibility of research means repeating analyses with raw data or independent replication using a changed methodology (different study participants or study designs) than the original study by authors or giving instructions for replication for other researchers. A Nature survey (2016) reported that more than two-thirds of scientists considered that there is a replicability concern in research field. The 'publish or perish' culture breeds several publications instead of producing quality, and this outcomes in the publishing of several papers from a single research project (*Salami Slicing*). Researchers should refrain from the temptation to sensationalize their results and confine to the findings of the research. The evaluation of research should focus on the quality and reproducibility of the work produced, the validity of findings, future replication, and the conversion of basic research into translational research in health care (translational research).[2,3]

Reproducibility in clinical trials and AI systems now involve dynamic deployment models with real time monitoring and validation. These models have more reliable, generalizable and ethical.[61,84] COS platforms recommend preregistration on OSF and data sharing mandates to enhance reproducibility.[55]

Collaboration for research

The researchers should be more inclusive to collaborate for research problems. Projects with collaboration from multiple disciplines and large teams have more chances to be published in high-quality journals. Evidence shows that research from India with international organizations produces results of better quality. The adoption of large-scale collaborative research with a strong replication culture has been successful in several biomedical fields. Multicenter study (study including multiple institutions or sites) has more external validity in comparison to (generalization) research conducted from one place. The gains of a multicenter study are that a larger sample size within a short time can be achieved.

Modern biomedical research is complex and requires a cross section of experts collaborating using multi-, inter-, or transdisciplinary approaches to address scientific questions. Known as team science, such approaches have become so critical it has given rise to a new field - the science of team science. In biomedical research, data scientists often play a critical role in team-based collaborations. Integration of data scientists into research teams has multiple advantages to the clinical and translational investigator as well as to the data scientist. Clinical and translational investigators benefit from having an invested dedicated collaborator who can assume principal responsibility for essential data-related activities, while the data scientist can build a career developing tools that are relevant and data-driven. Fostering team science on campuses by putting supportive systems in place will benefit not only clinical and translational investigators as well as data scientists, but also the larger academic institution.

Large- scale collaborative research including data scientists and replicative culture is need of an hour in all field, found to be successful in genetic and molecular epidemiology.[74,85]

Conclusion

Understanding the usefulness and impact of science is paramount. Mechanisms to objectively review protocols through peer review processes should be there to produce high-quality research. At the institutional level, a competent research committee should be established to monitor the progress of research. Every research organization requires its own research, audit, and administrative system processes to follow up on research activities. Publication of research findings in high-quality international and peer-reviewed scientific journals should be emphasized apart from using the research for patient care, policy and programs. For capacity building and skills development in research, researchers, the medical fraternity, and postgraduate and undergraduate students involved in the biomedical field require rigorous and methodological training to appraise the quality of evidence available critically and not trust all published literature. NMC's Draft Framework for Accreditation and Ranking of Medical Colleges 2025 should establish standards and benchmarks for quality evaluation of national research. This narrative review has summarized literature on research parameters with recent updates in field, some emerging topics like AI in ethics and use of AI is various metrics of research assessment may be not covered in detail; hence a systematic review is warranted for future research perspectives.

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manuscript preparation. The manuscript was finally reviewed and approved by **GS**.

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APPENDIX

AGREE II	Advancing Guideline Development, Reporting and Evaluation in Health Care II
COPE	Committee on Publication Ethics
COS	Center for Open Science
OASPA	Open Access Scholarly Publishers Association
DORA	Declaration on Research Assessment
EQUATOR	Enhancing the Quality and Transparency of Health Research
ICMJE	International Committee of Medical Journals Editors
JCR	Journal Citation Reports
IEC	Institutional Ethics Committee
NMC	National Medical Commission
RCR	Relative citation ratio
SCI	Science Citation Index
UGC	University Grants Commission
WAME	World Association of Medical Editors
CONSORT	Consolidated Standards of Reporting Trials
STROBE	Strengthening of Reporting of Observational Studies in Epidemiology
STARD	Standards for the reporting of Diagnostic Accuracy Studies
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta- Analyses
SPIRIT	Standard Protocol Items: Recommendations for Interventional Trials

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