SPECIAL COMMUNICATION

Bypassing clinical research for secondary evidence synthesis: Are systematic reviews replacing clinical research for medical students and residents in Pakistan?

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Abstract

In recent years, there has been a significant increase in the number of systematic reviews and meta-analyses authored by medical students, residents and novice researchers in Pakistan. Although developing skills in evidence synthesis is valuable, this trend has an unforeseen consequence: many of these reviews are conducted without the necessary clinical experience or subject matter expertise. These publications often are on diseases, diagnostic methods and treatments that are rarely encountered in Pakistani burden of disease context. This raises concerns about the purpose, relevance and educational value of such work. A balanced approach is recommended between conducting clinical research and relevant systematic reviews and meta-analyses. While the importance of systematic reviews and meta-analyses is duly recognised, students and residents must be encouraged to also engage in studies directly relevant to local clinical issues. Such a point of view is not a critique, but an effort to reshape the current research culture that is driven by the "publish or perish" mentality. Research should be multi-dimensional, diverse, with an aim to encourage deeper learning, and a meaningful contribution to local healthcare needs. This cannot be achieved by bypassing foundational clinical research experience.

Keywords: Systematic reviews, Research training, Pakistan, Evidence-based medicine, Clinical research, Research ethics, Medical students.

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Introduction

The academic and publishing landscape in Pakistan has evolved in the last two decades. There is an increasing awareness, leading to a trend towards conducting and publishing research at undergraduate, postgraduate and faculty levels.[1] Due to improved access to internet and increased availability of online learning and the use of Artificial Intelligence, medical students and residents are increasingly participating in research and publication activities.[2]

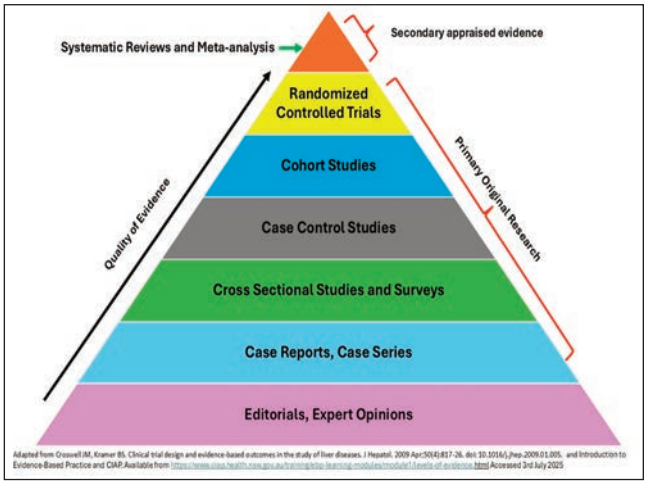

Figure: Levels of evidence in clinical research and publications: from primary original research to secondary appraised evidence.

Systematic reviews (SRs) and meta-analyses (MAs) are placed at the top of research study design pyramids, requiring a unique combination of clinical and analytical at the heart of the pyramid to synthesize meaningful evidence to synthesise meaningful evidence (Figure).

These skills are ideally acquired through a progressive journey of gaining clinical experience and expertise in research, which traditionally begins with relatively simpler forms of study designs, such as case series and clinical studies, leading to more complex ones like clinical trials, before progressing to SRs and MAs. In recent years, there has been a noticeable increase in the number of SRs authored by medical students, residents and novice researchers in Pakistan. This trend is a part of a broader global pattern, as the study conducted by Hoffman et al. noted that approximately 80 systematic reviews were published daily in 2019, showing a significant rise from previous decades.[3]

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While this increase reflects a growing interest in evidence-based medicine and scholarly activity among students and residents, it also raises some concerns that the current opinion piece aims at highlighting. The ease of conducting SRs and MAs without the need for patient interaction, ethical approvals or resource-intensive clinical data-collection makes them an attractive option for students and residents aiming at quickly enhancing their academic profiles. This convenience, however, may inadvertently encourage a form of desktop-based secondary research that frequently lacks depth and clinical relevance to local patient/population needs.

The availability of often free or low-cost online training programmes and virtual research workshops (often managed and led by undergraduate medical students and residents) has made it easier for young researchers to learn the technical aspects of conducting SRs and MAs without developing a basic understanding of theoretical underpinning and rationale for research. The current opinion acknowledges that these programmes provide valuable skills, but they may also contribute to a culture where the primary goal becomes increasing the number of publications rather than meaningfully contributing to medical knowledge, improving patient care or addressing local population's health needs. This is evident from the fact that, a single SR and MA from Pakistan can have more than 10 authors with 7-9 different institutional affiliations.[4,5]

The current opinion-based paper was planned to explore the implications of this trend, questioning whether exclusive reliance on desk-based evidence synthesis is undermining traditional clinical research, and what this shift means for the future of medical research in Pakistan.

The appeal of systematic reviews

The increasing popularity of SRs and MAs among medical students, residents and novice researchers in Pakistan can be attributed to several factors. First, SRs and MAs follow a well-defined structured methodology for synthesising existing literature.[6] This allows these young researchers to conduct high-value secondary research without getting into the resource and time constraints and the hassle of technical and logistic complexities associated with primary data collection required for original clinical research. This is particularly appealing in resource-constrained settings like Pakistan where access to research funding, patient population, and institutional support may be limited for students and residents. In a survey of 687 medical students from two public-sector universities in Pakistan, the main barriers to research participation included insufficient knowledge (90.7%), limited time (88.8%) and lack of mentorship (85.7%).[7]

Online training programmes, ranging from Coursera[8] to Cochrane Interactive Learning,[9] provide comprehensive self-paced modules on conducting SRs and MAs, making them suitable for students and residents who have to balance academic responsibilities with learning about SRs and MAs.

Additionally, the current academic culture of "publish or perish" aphorism emphasises the number of publications as a metric of success.[10] This encourages medical students to pursue this form of research and publication avenue that is perceived as easily attainable. Since SRs and MAs are conducted on a laptop, without direct patient interaction or ethical approval, they offer a practical option for students aiming at improving their curricula vitae (CV) and enhance the prospects of residency, particularly for the United States. However, this trend raises concerns about the depth of understanding and clinical relevance of the research to population needs. Without appropriate direct clinical experience, students and novice researchers may lack the contextual knowledge necessary to critically appraise studies, identify pertinent research questions, or interpret findings in a manner that informs local clinical practice.[11] This disconnect between relevant clinical exposure and practice-based research suggests the need for a more integrated approach to research training that balances competence in research methodology with clinical insight.

Experts have noticed that being the first author on papers in famous journals can boost residency applications for medical students aiming for highly sought-after residency matches in the US.[12] Graduate programme selection criteria during admissions rely on the number rather than the quality of publication. This is also a driving factor for preference to publish as many SRs and MAs as quickly as possible.

The hidden cost of convenience: Clinical disengagement

While the current paper acknowledges the convenience and accessibility of conducting SRs and MAs, their widespread adoption, especially as a first or the only kind of research publication, may promote a culture of disengagement with practical clinical research.

Medical research should not be considered merely an intellectual exercise or a process to increase the number of publications. Good medical research is built on real-world clinical questions that one formulates after gaining sufficient clinical experience. Without appropriate clinical background, SRs and MAs become only an abstract academic exercise based on specific statistical skills but totally disconnected from the healthcare needs of the local

community. Experts have emphasised that clinically relevant research starts from direct patient care, where nuances of disease presentation, patient context, and therapeutic decision-making can inform more meaningful research questions.[13]

Students and residents who bypass clinical research in favour of purely desk-based quick research publications may miss out on learning essential clinical research skills. A study by Burgoyne et al. suggested that early involvement in clinical research contributes significantly to the development of professional identity and critical thinking in medical trainees.[14] In Pakistan's context, this trend becomes even more problematic. SAs and MAs based on interventions or diagnostics with little or no local relevance are being published and they do little to guide local health practices. Pakistani students are synthesising and publishing data from trials conducted in other countries on technologies and medicines not available in their own hospitals. While this approach may appear resource-efficient and a quick way to earn a publication, it often results in a superficial understanding and a lack of practical insight that cannot be learned only from literature search and reading PDF articles on a laptop. This substantially reduces the relevance and impact of their research in Pakistani context.[15]

While SRs and MAs are a valid form of high-quality academic publishing, overreliance on them without any clinical exposure and research may risk developing researchers whose competence primarily lies in secondary evidence synthesis and who lack practical experience and contextual insights required for doing impactful clinical research useful for the country. Such reviews authored without contextual understanding are less likely to influence local health policy or practice.[16]

Skipping the ladder: from novice researcher to meta-analysis expert

Traditionally, novice researchers began their journey with simpler, more hands-on forms of research and publication, like case reports, case series, cross-sectional surveys, and other observational studies (Figure). These formats served as a learning ground, providing essential exposure to the research process that include brainstorming ideas relevant to the local population, identifying research gaps, forming clinical research questions, creating questionnaires, getting approval from the appropriate institutional review board or ethics committee, interacting with patients, obtaining informed consent, collecting patient data, assessing patient outcomes, navigating institutional review processes, and understanding ethical concerns that are important in primary research. This progression from relatively simple to complex research design prepares them for more complex research endeavours, such as randomised controlled trials (RCTs).

Due to these reasons, a growing number of students and residents in Pakistan are bypassing these foundational steps and begin their research journey at the level of SRs and MAs. While it is technically feasible, this shortcut can potentially compromise both the quality of their learning and the clinical relevance of research to their own work. The skills required for taking informed consent, patient data collection, clinical observation, and following ethical principles are best developed through direct involvement in practical clinical research.

A study on medical students' engagement in research emphasised that experiential learning, particularly through patient interaction, is essential for developing both competence and confidence in clinical research.[17] Furthermore, conducting early-stage research, even on a small scale, develops a deeper understanding of disease processes, health systems and patient contexts.[18]

While technical competence in evidence synthesis can be learned online, three essential functions requiring clinical judgment are compromised when researchers lack clinical experience.

1. **Critical appraisal and risk of bias:** Evaluating the risk of potential biases (e.g., selection, performance, or attrition bias) requires understanding of the real-world clinical practices and procedural differences that are not evident from statistical data alone.
2. **Clinical homogeneity assessment:** Accurately determining if the patient populations, interventions and outcome measurements across pooled studies are clinically similar enough to justify a meta-analysis requires subject-matter expertise.
3. **Translating findings:** Interpreting the statistical results into actionable, patient-centred recommendations requires an understanding of clinical relevance and local feasibility.

As highlighted by Glasziou et al., even evidence-based practice relies on the intersection of research evidence, clinical expertise and patient values,[19] none of which can be developed in isolation from practical clinical work.

The disconnect from local context and healthcare realities

One of the concerns regarding the current trend of student-led and resident-led SRs and MAs is their frequent disconnection from the healthcare realities of the populations they serve. Many of these reviews focus on diseases, diagnostic modalities or therapeutic interventions

that are uncommon, unavailable or impractical within the local healthcare context.[5,20-23] As a result, the output, while technically sound and publishable, lacks relevance or any value to local clinicians, patients or policymakers.

Many SRs and MAs authored by students and residents in Pakistan are based almost entirely on data derived from the countries with better resources for research. These studies are often conducted in specialised settings with better resources, technologies and patient profiles that are lacking in countries like Pakistan.

This makes direct translation of findings into local clinical practice challenging, if not impossible.[24] For instance, reviewing robotic surgical interventions[15] or biological therapies[5] in a context where such interventions are either prohibitively expensive or entirely unavailable adds little to the practical knowledge base of clinicians working in countries like Pakistan.

In most cases, SRs or MAs are written by the students only because of technical knowledge, and in some cases the listed authors are not even affiliated with the department relevant to the research topic. An SR conducted on intraoperative ketamine and pain after video-assisted thoracoscopic surgery is an interesting example.[25] All the listed authors were from the departments of medicine from different medical colleges in Pakistan, and none is affiliated with the departments of thoracic surgery or anaesthesia where this procedure is conducted and the results would be applicable.

This problem is further complicated by the fact that many student researchers and residents have limited or no direct clinical experience with the diseases they are reviewing. Many residents write SRs and MAs outside their primary specialties just because they have acquired writing and statistical skills, and would like to improve their CVs by adding more publications. For example, a student who has never encountered a case of pancreatic cancer in a clinical setting may find it difficult to meaningfully critique the methodologies or outcomes reported in multinational RCTs and would not be able to contextualise the findings for their own health system.

The research must be responsive to the local health needs and gaps. There is a growing emphasis on strengthening national research ecosystems by creating contextually relevant research agendas.[26] An analysis by McKee et al. argued that public health research conducted should be closely aligned with the country's disease burden and health priorities to improve both utility and uptake.[27] Medical research should be tailored to local contexts, including disease burden and health priorities, to be effective and impactful. SRs and MAs based on data mainly from the Global North do not address the local contextual healthcare needs of Pakistan.

The missed educational value of clinical research training

Conducting and publishing clinical research in the form of case reports, observational studies or interventional trials offers a range of educational benefits that go far beyond publication. These include developing diagnostic reasoning, clinical judgment, patient communication, teamwork and a deeper understanding of disease processes in real-world settings. Students and novice researchers who mainly rely on conducting and publishing SRs and MAs may miss out on this essential training.

Clinical research activities typically involve patient interaction, physical examination, diagnostic interpretation, outcome measurement and considering the ethical aspects of research.[28] Through this process, students learn to ask clinically relevant questions, design a feasible research protocol, obtain ethical approvals, collect data in real-time, and manage challenges unique to the clinical environment. These experiences are fundamental in creating in a seasoned clinical researcher.

Burgoyne et al. explored the impact of student participation in clinical research and found that such involvement significantly improved students' understanding of clinical workflows, enhanced their critical thinking, and motivated them to pursue academic medicine.[29] Another study reported that medical students involved in patient-centred research had better retention of clinical knowledge and developed greater confidence in interacting with patients.[30]

A call for balanced and contextual research training

It is encouraging to see young medical students and residents from Pakistan learning, conducting and publishing SRs and MAs in international journals. Conducting SRs and MAs by medical students and residents with limited clinical and practical research experience is not inherently problematic. Fabiano et al. suggested that training in meta-research (SRs and MAs) is essential for early career researchers, as it equips them with the skills to critically assess scientific literature, understand the intricacies of the research process, and design rigorous, high-quality studies across any academic field.[31]

However, relying exclusively on such desk-based research publications risks creating a generation of clinically disengaged researchers who may lack exposure to real-world clinical challenges, practical research constraints, and the nuances of patient-centred care. These researchers rely

exclusively on the original research conducted by often experienced 'hands-on' researchers in the complex clinical ecosystem.

Clinical research relevant to the local healthcare needs must not be neglected for the ease of laptop-based secondary evidence synthesis.

Holistic research training must emphasise stepwise progression through the research hierarchy, starting from clinical observations and case studies, moving to audits and surveys, and leading to more advanced work, such as trials and evidence synthesis (Figure). Faculty and institutions should support students in conducting clinical research. Institutions can facilitate clinical exposure during research, and ensure that topics for evidence synthesis are selected with clinical utility and feasibility in mind. When SRs and MAs complement patient-oriented research, they develop skilled, thoughtful and context-aware clinician-researchers. Institutions can also implement training and mentorship programmes that include both primary research design skills, as well as secondary synthesis techniques. Funding allocation policies could aim at supporting both innovative primary studies and high-quality secondary research.[32]

The monitoring and evaluation units in institutions should track research output metrics to avoid emphasis on quantity over quality. When institutions prioritise quantity over quality, the number of publications can promote the production of low-quality research. Lozada-Martinez et al. suggested that meta-research within universities and research institutes could be used as a tool to monitor scientific rigour, and promote responsible practices in medical research.[33] This is important as a large portion of evidence in the medical and health sciences literature has been found to be redundant, misleading or inconsistent.[34]

Conclusion

Research training for medical students in Pakistan and other similar countries should strike a balance between conducting evidence synthesis, like SRs and MAs, and gaining hands-on clinical research experience. Real-world clinical exposure builds social and organisational abilities that can be nurtured only at the workplace (in hospitals, clinics and wards) while doing clinical research and interacting with the patients. They cannot be learned through desk-based research alone. Faculty and institutions should create opportunities for students to participate in both primary and secondary research. Support groups, research electives and focused mentorship can help nurture a strong research culture, ensuring that future clinicians are both skilled and context-aware researchers.

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FAR: Concept, design, literature review, wrote the first draft, final approval and agreement to be accountable for all aspects of the work.
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