Integrity meets innovation: A first principles approach to the ethics of AI utilization in medical research writing

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Abstract

The integration of artificial intelligence (AI), particularly large language models (LLM), into medical research writing is reshaping the landscape of academic authorship, productivity, and scholarly merit. It has been demonstrated that LLM are capable of greatly expediting the process of researching, drafting, and publishing manuscripts, despite current limitations currently necessitating intensive human oversight to ensure veracity and mitigate the phenomenon of "hallucination." With these limitations being addressed by AI developers and perhaps on their way to irrelevance, a different question emerges as the most, and perhaps only, important one.

This paper adopts a first-principles ethical approach to examine the core moral question: independent of technological feasibility, to what extent is it ethically permissible to use AI in the drafting of medical research? We argue that the ethical imperative to accelerate scientific discovery, especially in Medicine, outweighs traditional concerns about the mechanics of authorship and merit attribution. Drawing on Aristotelian teleological reasoning, we contend that the primary value of research lies not in the process of its composition but in its capacity to alleviate suffering and advance human knowledge. Further, we understand authorship as inherently human, as only humans possess the moral agency required to accept responsibility for their work, which is something AI, by its nature, lacks. The paper concludes with a set of normative recommendations to guide the responsible and transparent integration of LLM in research.

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Introduction

Large language models (LLM) like GPT-4 represent a turning point in the history of academic communication. Their ability to streamline the production of scientific prose has raised both hope and alarm. Advocates view LLM as tools to enhance accessibility, reduce administrative burden, and democratize authorship [1, 2]. Critics fear a dilution of academic merit, the erosion of intellectual responsibility, and the risk of misinformation through AI "hallucinations" [3, 4].

An exhaustive discussion of the current technological capabilities of the LLM to effectively assist in the production of good scientific work is beyond the scope of this paper. Furthermore, the half-life of such information is likely to be brief given the incredible pace at which this technology is being improved and integrated into so many facets of academic life.

Thus, the paper's intention is to discuss the questions surrounding how the AI ought to be used, independent of its current abilities. We believe that the best way to answer this question is through ethical reasoning rooted in first principles.

What if a LLM were to reach a level of capability comparable to that of a human research assistant-competently aiding in literature review, drafting, and revising manuscripts? What if, in time, its performance came to rival that of a seasoned senior author in terms of clarity, structure, and even insight generation? Would we be justified in using such a tool to that extent? And more importantly, would we be ethically obligated to do so?

At the heart of our inquiry lies not a question of feasibility, a scientific discussion of what LLM can do, but rather a philosophical one, contemplating our moral responsibility: How ought we use them? We hold that if these models can accelerate the production of research that alleviates suffering and advances human health, then the ethical imperative may shift from permissibility to necessity. The real issue is not whether AI is capable of assisting in the research process, but whether failing to use such a tool-when it could substantially improve outcomes-constitutes a moral failing in itself.

Materials and Methods

This paper employs a philosophical and normative methodology centered on first-principles reasoning. Rather than performing an empirical or policy-based evaluation, we begin with ethical fundamentals-specifically, the goals of medical research and the responsibilities associated with scientific communication. We reviewed over 100 PubMed-indexed articles relating to the utilization of AI in Medicine and research writing, incorporating core positions and consensus frameworks into our analysis and cited those which were relevant to this paper [5, 6]. Human authors generated the ideas articulated in this manuscript, and used GPT-4 as well as Sci Space and Grok under structured editorial oversight to draft and refine it, serving as a reflective case study in ethical LLM use. Most importantly, we critically analyze whether and how AI integration in writing aligns with the telos-the end or purpose-of medical science.

An introduction to first principles reasoning

First principles reasoning is a method of inquiry that seeks clarity not through tradition, analogy, or inherited wisdom, but by stripping a question down to its most elemental truths. It demands that we begin from the ground up, discarding surface-level conventions and asking instead: what is fundamentally true? What is inherently valuable, irrespective of precedent?

Unlike reasoning by analogy-which compares current dilemmas to historical cases-or reasoning by convention-which accepts the status quo as a reliable compass-first principles reasoning refuses to inherit assumptions. It treats each problem as if it were being considered for the first time. This is not only intellectually rigorous-it is morally necessary when the topic at hand has implications for life, health, and human suffering.

When applied to the ethics of LLM use in medical research writing, this framework compels us to set aside our professional habits and institutional norms. We are not interested in what has historically been permitted, prohibited, or politically palatable. We are interested in what is right.

To begin from first principles is to pose the real questions-not the derivative ones. Specifically:

- What is the essential purpose of research?
- What is the purpose of Medicine?
- What moral obligations follow from each?
- And if those purposes are taken seriously, what follows for the integration of LLM into the research process?

These are not abstract philosophical indulgences. They are the only questions that matter if we care about aligning our actions with the stated goals of our profession. The premise of this paper is that if we answer them clearly and honestly, the ethical path forward becomes not only visible but unavoidable.

On the purpose of research

Research, at its core, is the disciplined pursuit of understanding. What one might alternatively call a "studious inquiry into the nature of things". But in the context of science, research is not done for its own sake. It is done to produce knowledge that can, eventually, do something. Whether that something is therapeutic, technological, or explanatory does not matter; the point is that research is purposive. Even if its utility is not immediately apparent, its ultimate justification lies in its capacity to generate tools-intellectual or material-that allow us to act more effectively in the world.

This view aligns with both Pragmatist epistemology and Aristotelian teleology. From the Pragmatist angle, truth is not a mirror of nature but a function of usefulness: a claim is true insofar as it works. From the Aristotelian perspective, the goodness of a thing is defined by its fulfillment of its function. A knife is good insofar as it cuts. A piece of research is good insofar as it leads us closer to solving real problems-whether those problems are clinical, conceptual, or civilizational.

But even if one rejects the Pragmatist's emphasis on utility, the ethical case for using AI in research remains intact. From a Rationalist perspective, where knowledge is rooted in logic and reason, the ability of large language models to rapidly generate, structure, and refine arguments offers a powerful complement to human cognition. These systems can sift through contradictions, formalize claims, and produce internally coherent frameworks that might otherwise take human researchers weeks or months. From the Empiricist point of view, which privileges observation and data as the foundation of knowledge, AI again strengthens the process-allowing for pattern recognition, data synthesis, and staistical modeling at scales no human could process alone. So even if one believes that truth stems from pure reason or from accumulated evidence, the tools we now have are not obstacles to that process-they are accelerants. To ignore them, simply because they challenge traditional notions of authorship, is to confuse historical procedure with epistemic integrity.

It is also important to recognize that utility in research is not always immediate. The timeline between discovery and application can span years or even decades-yet this delay does not diminish the research's value. On the contrary, it often highlights its depth. The true impact of scientific inquiry frequently becomes apparent only in hindsight, once downstream technologies or societal needs catch up to the initial insight. Consider the following historical examples:

- The Haber-Bosch process, developed by Fritz Haber, enabled the industrial production of fertilizer and dramatically increased global food supply. Yet it also facilitated the creation of high-yield explosives, which redefined modern warfare.
- Early theoretical physics, including Einstein's mass-energy equivalence and Fermi's chain reactions, laid the foundation for both nuclear medicine and nuclear weapons-tools that have shaped both clinical practice and geopolitical reality.

These cases demonstrate a crucial point: the value of research is not found in its purity or elegance but in its potential. Research matters because it changes what is possible for people to do.

There is, of course, an alternative, although perhaps, tacit view-one that treats research not as a means of generating

solutions but as a means of evaluating people. In this framing, research becomes a proxy for ambition, diligence, curiosity, and resilience. It is a sorting mechanism. Who can tolerate long hours? Who can navigate complexity? Who can persist through failure?

This second model is especially prevalent in academic medicine, where publications often serve less as contributions to human knowledge and more as signals to potential superiors [8]. And to be fair, there is a logic to this. Research productivity, in the absence of better metrics, may indeed correlate with desirable professional traits.

But now we have reached a turning point. Perhaps it is arguably true that until recently, the coupling of the production of knowledge with the allocation of academic merit may have operated in rough harmony. But AI has great potential to split them apart. A tool that can expedite knowledge production without effort may serve the first purpose while completely bypassing the second. And if the two are truly in tension, then we must ask: which one actually deserves primacy?

There is a thought experiment here which could be instrumental. Imagine being in the position of a patient suffering from some condition. Perhaps also a member of one of those groups that raises money for research. These people seem to tend to hope the fundraising will lead to better treatments. Site slogans like "race for a cure". These people are desperately hoping for better treatments, and it is from their efforts that medical research is funded. What is it that they want from us?

If we imagine being in the position of a patient suffering from a condition and hoping that new knowledge will allow for their doctor could better care for them, could we imagine telling this individual that we are refusing to make ourselves as efficient as we can be so that the paper we write about their condition will be maximally effective as padding for our corricula vitae?

Because if the core purpose of research is to empower human flourishing, then everything else, including our rituals of prestige, must bend to that goal.

On the purpose of Medicine

The purpose of Medicine, whether understood as a profession, a scientific discipline, or a system of care, is to forestall premature death, preserve physiological function, and alleviate human suffering. Although these aims are sometimes obscured by bureaucratic complexity or institutional inertia, they remain the ethical foundation upon which the field rests.

This moral orientation helps explain the extraordinary degree of public trust and investment Medicine receives. Across developed nations, it commands substantial financial resources, regulatory attention, and academic competitiveness. The field consistently attracts highly capable individuals not only because of material incentives, but also because it offers a rare opportunity to engage in work with unambiguous ethical value. Its objectives-protecting life, restoring health, and easing distress-are not only technically demanding but morally compelling.

Precisely because these goals are so broadly accepted, there is a risk that they may be treated as background assumptions rather than active moral imperatives. However, their ethical centrality requires that they remain the principal standard by which Medicine's ancillary functions, including education, policy, and research, are assessed. Any practice undertaken in the name of Medicine must ultimately serve these ends; otherwise, it risks drifting away from its foundational purpose.

On the purpose of Medical research

If the purpose of research is to generate knowledge that enables the realization of goals, and the purpose of Medicine is to alleviate suffering and preserve life, then the purpose of medical research follows directly: to produce knowledge that advances the aims of Medicine. It is a means to a deeply consequential end. The ethical implications of this framing are substantial.

Consider the following thought experiment. Imagine a patient with a debilitating or life-limiting condition-someone who has exhausted existing treatments and looks to the future of medical science for hope. Alternatively, imagine a family member who fundraises for biomedical research, motivated by the prospect that such efforts may contribute to improved therapies. Organizations devoted to fundraising often speak in terms that reflect urgency and optimism. Slogans such as "Cancer doesn't wait. Neither can we" or Susan G. Komen's "Race for a Cure" articulate a clear expectation: that research is ultimately meant to deliver clinical benefit.

Now ask: What do such individuals reasonably expect of the researchers whose work their lives depend upon? Surely, they do not hope merely for the production of polished academic prose or for the enhancement of an investigator's curriculum vitae. They hope for progress-efficient, rigorous, and unimpeded by arbitrary convention. Against this backdrop, withholding the use of tools that could accelerate the research process, such as large language models, risks appearing not just inefficient but ethically indefensible. If an investigator could produce higher-quality work in less time by responsibly integrating such tools, then a refusal to do so in the name of tradition or prestige undermines the very purpose for which medical research is funded and conducted.

This brings us back to the tension between two competing conceptions of medical research. One frames research as a means of generating actionable knowledge that benefits human health. The other treats it as a proxy for evaluating attributes such as diligence, creativity, or scholarly independence. Historically, these two purposes may have largely aligned-those who produced meaningful work also demonstrated the same traits that academic institutions sought to reward. The advent of AI, however, disrupts this alignment. It introduces the possibility that valuable intellectual output can be generated with less human labor, someday perhaps even none of it. This has the potential to sever the link between effort and merit that has long characterized the research enterprise.

This disruption has prompted discomfort and, in some quarters, resistance. But if we accept that the principal aim of medical research is to advance human health, then our allegiance must lie with efficacy rather than tradition. To preserve outdated rituals of merit attribution at the expense of scientific progress is to subordinate ethical priorities to pro-

fessional vanity.

Stated plainly: medical research is not, and must never become, a mechanism for stratifying individuals within an academic hierarchy. To suggest that the billions of dollars invested in biomedical science exist primarily to distinguish between levels of industriousness would be a profound misreading of the field's societal mandate. The primary metric of research should be its contribution to knowledge that serves public health, not the degree to which it reflects unaided individual effort.

There are, of course, more efficient and ethically neutral ways to assess qualities such as perseverance or cognitive ability, should institutions wish to do so. But medical research is a resource-intensive enterprise, often supported by public funding and driven by the expectations of patients and advocates. To allow it to be constrained by conventions that delay progress is to betray those expectations. The goals of Medicine are too important to be subordinated to legacy systems of academic self-evaluation.

Having established this ethical hierarchy, we are now in a position to address the final question: if large language models can accelerate medical discovery without compromising scientific integrity, do we not have a moral obligation to use them?

On the ethical necessity of AI in Medical research

Here the ethical imperative is clear. People are suffering, and they will continue to suffer. We cannot afford delay in the generation of knowledge that may alleviate that suffering. Researchers are entrusted with resources and positions precisely because society expects them to act in ways that maximize benefit to patients, both present and future. It is therefore impermissible to move more slowly than we are capable of moving when tools exist to augment human intelligence.

This does not mean that standards should be abandoned. Deception remains unethical, and transparency is essential. The literature already offers practical frameworks: disclosure of AI use in methods or acknowledgments sections [11, 12], standardized guidelines across journals [6], and the strict prohibition of AI as a listed author [13]. These measures preserve both academic accountability and public trust.

With such safeguards in place, the integration of large language models is not only permissible but ethically necessary. To refuse their use when they demonstrably increase the speed and quality of medical research is to fail in our obligation to those whose lives depend upon the knowledge we are tasked with producing.

In conclusion, LLM when ethically integrated, represent a powerful tool for accelerating medical discovery. Their proper use aligns with the central ethical aim of research: to improve human health. We must shift our valuation of academic contribution from procedural rigor to intellectual vision. To do otherwise is to confuse the method for the mission. Let the future of scientific authorship be human in its responsibility but bolder in its use of tools that advance knowledge.

Epilogue: What is authorship? A Philosophical clarification

Authorship is not merely the act of writing; it is a moral and intellectual commitment to an idea. It implies responsibility, accountability, and authority over the truth claims presented. AI, by definition, lacks the capacity for responsibility-it cannot face consequences, express intent, or defend its reasoning. Thus, AI can never be an author [4]. It may be a tool in the writing process, but it is always subordinate to the human who must stand by the work.

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