Publish, Perish, or Plagiarize - The Epidemic of Research Fraud

As the COVID-19 pandemic shifted attention to scientific research, researchers worldwide collaborated to understand the novel coronavirus and develop effective interventions. The rest of us found ourselves stuck at home, seeking solace in baking bread, binge-watching "Tiger King," downloading TikTok, and slowly but surely losing our minds. Meanwhile, one small US company managed to pull off a feat worthy of a Hollywood heist movie – except, in this case, the loot was fabricated data. Surgisphere, a company with aspirations as grand as its name, claimed to possess a database full of medical records from nearly 100,000 COVID-19 patients across 167 hospitals (1). It was a treasure trove of information that researchers salivated over – until they realized it was fool's gold.

Surgisphere's data made its star-studded debut in two of the world's most prestigious medical journals, the Lancet and the New England Journal of Medicine. The first act saw a study in The Lancet warning that Hydroxychloroquine, the infamous anti-malarial drug with a cult following led by a certain world leader, was more dangerous than a case of mistaken identity. Both articles directly citing Surgisphere's data erroneously suggested that the antimalarial drug Hydroxychloroquine and the anti-parasitic drug Ivermectin could potentially treat COVID. As a result, Peru and Bolivia enthusiastically added the drug to their COVID-19 treatment guidelines, blissfully unaware of the potential side effects – or the fact that some doctors were resorting to veterinary versions after the human supplies ran dry. Additionally, these recommendations diverted supplies from patients who genuinely needed them and potentially prolonged quarantines for COVID, even after the articles were retracted. Surgisphere's fraudulent research not only undermined the credibility of scientific inquiry but also eroded public trust in the scientific enterprise.

The repercussions of Surgisphere's misconduct are reminiscent of infamous cases like the discredited link between the MMR vaccine and autism. Despite retractions, their enduring influence reveals the insidious nature of research fraud and its far-reaching consequences. However, this particular scandal is just one instance of a pervasive culture of research misconduct threatening the integrity of scientific inquiry. Fraudulent research practices are more widespread than commonly acknowledged, with a significant proportion of scientists admitting to falsifying data or engaging in questionable research practices. Despite the vaunted role of peer review in safeguarding research quality, its limitations in detecting such malfeasance have been laid bare, highlighting systemic deficiencies in research oversight - which is no laughing matter. With patient safety and public trust hanging in the balance, it's of the utmost importance to ensure that the scientific enterprise doesn't become just another punchline in 2020.

Addressing the epidemic of research fraud requires a concerted effort from all stakeholders in the scientific community. The Surgisphere scandal exemplifies the dire consequences of research fraud, revealing a larger issue within academia - a culture that prioritizes vast quantities of published results, perpetuating unethical behavior in the pursuit of publication metrics and professional advancement. While research fraud undermines the integrity and credibility of scientific inquiry, its prevalence is fueled by systemic deficiencies such as ineffective peer review processes and insufficient oversight mechanisms. Addressing this epidemic necessitates institutional reform, cultural change, and regulatory intervention to promote integrity, accountability, and transparency in research practices. Upholding the principles of research integrity is essential in restoring public trust in the scientific enterprise and ensuring its role as a trusted source of knowledge and innovation for the betterment of society.

Fabrication, Falsification, and Plagiarism

Research fraud encompasses various deceptive practices, ranging from outright fabrication to subtle manipulation, all of which undermine the integrity of scientific inquiry. Fabrication involves inventing data or results, while falsification manipulates existing data to produce desired outcomes or suppress unfavorable results. Plagiarism, another form of fraud, entails appropriating someone else's work without proper attribution (2,3). Fraud itself is characterized by intentional deception for personal gain or to damage another, defined in court as "the knowing breach of the standard of good faith and fair dealing as understood in the community, involving deception or breach of trust, for money" (2).

Take the case of Harvard psychologist Marc Hauser, for example. Renowned for his groundbreaking work on the origins of cognition and morality, he must have forgotten to apply those very principles to his research methods (2). In 2012, the Office of Research Integrity of the Department of Health and Human Services found that Hauser had falsified and fabricated data in six federally funded studies. It turns out that while he was exploring the origins of morality, he was also exploring the limits of creative writing. Then there's Dipak Das from the University of Connecticut, whose enthusiasm for resveratrol – the supposed heart-health wonder compound found in red wine – led him to fabricate or falsify data 145 times (2). In his world, wine might have been the secret to a long life, but honesty certainly wasn't part of the recipe.

In addition to outright fraud, questionable research practices encompass a range of unethical behaviors that compromise research integrity. Dual submission involves submitting similar or identical manuscripts to multiple journals simultaneously, circumventing editorial scrutiny and potentially distorting the scientific record. Conflicts of interest, whether financial, professional, or personal, can bias research findings, leading to skewed outcomes and compromised objectivity. Fake reviewers and unethical authorship practices further undermine the credibility of scholarly publications. The manipulation of peer review through the use of fake reviewers or coerced endorsements distorts the evaluation process, allowing subpar research to masquerade as credible scholarship. Unethical authorship, such as adding or removing authors without their consent or inflating contributors' roles, distorts accountability and misrepresents the true extent of scholarly contributions (3). Fraudulent research not only compromises data validity but also impacts fundamental principles of good clinical practice, endangering the rights and well-being of research participants (4).

No discussion of scientific fraud would be complete without mentioning Andrew Wakefield. His infamous study linking the MMR vaccine to autism in patients he claimed were seeking him for "stomach issues" not only got him struck off the United Kingdom's medical register for professional misconduct but also managed to spark a global vaccine scare. His work is a stark reminder that fake news isn't just a modern phenomenon – sometimes, it's peer-reviewed.

While most research fraud is subtle, it is still a pervasive issue in academia, with numerous studies highlighting significant levels of unethical behavior among researchers. Surveys indicate that a substantial proportion of researchers are aware of misconduct but fail to report it. For instance, a 2005 study found that 17% of clinical drug trial authors knew of fabrication in research, and over 40% of surveyed researchers admitted knowing about misconduct without reporting it (5). Self-reported misconduct includes practices such as selective reporting and presenting unexpected findings as pre-planned, with between 25% and 50% of research psychologists admitting to such behaviors. A meta-analysis revealed that around 2% of researchers have fabricated or falsified data, and over 14% are aware of colleagues who have done so (5).

The financial implications of research fraud are also substantial. An analysis of article retractions from 1980 to 2011 found that 17% were due to data fabrication or falsification, and 22% due to plagiarism (5). Erroneous data can affect significant funding; for example, a single researcher's misconduct impacted projects worth $108 million between 2008 and 2014. The cost of investigating research misconduct is high, with estimates suggesting institutions spend approximately $110 million annually on investigations involving HHS-funded research (5). These findings underscore the extensive prevalence of research fraud and its profound impact on scientific integrity and financial resources.

The most expensive cases of research fraud are those where a prolific researcher has numerous papers retracted. Korean biochemist HyungIn Moon of Dong-A University managed to get 28 papers retracted in 2012. He had supplied journals with reviewer suggestions that just so happened to be his own email addresses. This move certainly redefined the concept of peer review – into a one-man show. Not to be outdone, Yoshitaka Fujii from Toho University of Medicine took data fabrication to new heights. The Japanese Society of Anesthesiologists reported in 2012 that Fujii had fabricated data in an astonishing 172 papers (5). “Go big or go home” certainly applied here.

The *Responsible Science Report* from the collective work of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine emphasizes the need for attention to be called to misconduct, as “every case” in science is “serious and requires attention” (5). These questionable research practices collectively corrode the very fabric of scientific research, sowing doubt about the authenticity of significant findings and eroding public confidence in the scientific enterprise. By perpetuating a culture of deceit and misconduct, these practices not only compromise the foundation of scholarly inquiry but also tarnish the credibility of academic publications.

“Publish or Perish”

Research fraud often arises from a complex intersection of institutional pressures, professional incentives, and systemic flaws within the academic research environment. The motivations behind fraud are multifaceted and go beyond mere laziness or ego, and understanding these underlying causes is crucial for developing effective strategies to curb its prevalence and uphold the integrity of scientific inquiry.

Central to the research fraud epidemic is the pervasive "publish or perish" culture endemic in academia. The relentless pressure to publish stems from the fact that career advancement and professional success often hinge on publication metrics. In a time where the pressure to publish “has never been greater,” researchers are driven to produce a steady stream of publications to bolster their academic standing and secure grants and promotions (3). The influence of bibliometric data, such as page views and citations, further exacerbates this pressure, as researchers strive to maximize their visibility and impact within the academic community.

Financial and professional incentives also play a crucial role in motivating research fraud. Grants, promotions, and reputation are coveted currencies in academia, driving researchers to pursue publication at all costs to enhance their standing and secure future funding opportunities. The competitive nature of academic research, characterized by fierce competition for limited funding and prestigious academic positions, exacerbates this pressure, creating fertile ground for unethical behavior to flourish.

Researchers are acutely aware of these pressures to produce high-quality research due to the significant amount of resources invested in them. With so much at stake, some inevitably

resort to data manipulation. This, however, precipitates another significant issue. Inconclusive or erroneous research is profoundly expensive both fiscally and professionally according to the National Academies of Science, which roughly breaks the costs down into reputational damage, direct financial costs, and broader social costs (5). Research misconduct and detrimental research practices (DRPs) incur numerous individual costs, including wasted efforts by researchers who relied on fabricated studies, harm to innocent collaborators such as graduate students and postdocs facing career upheaval due to a supervisor's or colleague's misconduct, and the time and energy expended by committee members and staff on misconduct inquiries and investigations (5). Additionally, editors and reviewers waste time, the perpetrators' careers are often damaged, and whistleblowers or informants acting in good faith may suffer retaliation or other negative consequences.

Another source of fraud stems from predatory practices ingrained in academia's culture. Publishers, conference organizers, scammers, and agencies exploit researchers for their research and funding (2). Open-access predatory journals, charging exorbitant fees for publication, pose a particular threat. Academic fraud occurs both internally, through researchers' misconduct, but also externally, with organizations that interface with academics supporting dubious practices and exploiting unwitting researchers (2).

Individuals undoubtedly bear responsibility for the actions they commit, including research fraud. However, it is imperative to acknowledge the significant influence of the culture within academia, which prioritizes publications above all else and creates an environment where unethical behavior can flourish. While researchers are acutely aware of the pressures to produce high-quality research, the competitive nature of academia and the emphasis on publication metrics often incentivize shortcuts and questionable practices. Therefore, while holding individuals accountable for their actions is essential, addressing the systemic flaws and cultural norms within academia is equally crucial in curbing research fraud and upholding the integrity of scientific research.

Mitigating Fraud

The proliferation of research fraud is facilitated by weak regulatory frameworks and inadequate oversight mechanisms within the academic research ecosystem. The absence of harmonized global guidelines for research conduct leaves significant gaps in accountability and enforcement, allowing fraudulent practices to go unchecked. Ineffective peer review processes, often marred by conflicts of interest and inadequate scrutiny, fail to detect and deter research fraud, perpetuating a cycle of misconduct and malpractice (2). Addressing these systemic deficiencies requires a multifaceted approach encompassing institutional reform, cultural change, and regulatory intervention to foster a culture of integrity, accountability, and ethical conduct in academia, thereby safeguarding the integrity of scientific inquiry and preserving public trust in the scientific enterprise (3).

Academic institutions are not immune to the effects of research fraud, exacerbated by systemic problems within academia. Insufficient reviews and poor management practices contribute to a culture of impunity where unethical behavior remains unaddressed, further undermining the integrity of scientific research and the credibility of its literature. In response to these challenges, proactive measures are necessary to mitigate the prevalence of fraudulent practices and uphold the integrity of scientific research. Enhancing the effectiveness of peer review by mandating thorough scrutiny of raw data and providing training programs for reviewers can empower them to detect signs of fraud and misconduct. Improving research practices through publicly sharing data sets and consulting with statistical and methodology experts can enhance the robustness and reproducibility of research findings (2). Additionally,

fostering a supportive research environment characterized by developmental reviewing and collaboration can incentivize researchers to prioritize the quality of their work and uphold ethical standards.

Furthermore, grant agencies play a critical role in perpetuating the problem. The competitive nature of securing research grants often incentivizes researchers to produce positive results that align with the interests of funding agencies, sometimes at the expense of research integrity. The emphasis on quantity over quality, combined with the high stakes involved in securing funding, fosters an environment where research fraud can thrive. Compounding these issues are predatory journals and fake peer-review processes. Predatory journals exploit the open-access publishing model, prioritizing profit over rigorous peer review, allowing substandard and fraudulent research to be published. This undermines the credibility of the scientific literature and contributes to the dissemination of unreliable findings.

In the battle against research fraud, the case of Matthew Schrag, a neuroscientist at Vanderbilt University, exemplifies how vigilant oversight can expose significant scientific misconduct. Initially contacted by an attorney representing neuroscientists and short sellers suspicious of fraudulent research on the Alzheimer's drug Simufilam, Schrag identified altered or duplicated images in related journal articles and reported these to the FDA and NIH. His scrutiny expanded to a seminal Alzheimer's study by Sylvain Lesné, published in Nature in 2006 (6). Independent experts supported Schrag's findings, noting possible image tampering. This raised concerns that significant NIH funding and subsequent research might have been misdirected based on flawed studies, highlighting the need for rigorous scrutiny and transparency in research.

Schrag's investigation reveals broader systemic issues, such as the failure of peer review processes and insufficient scrutiny of published data. Experts like Donna Wilcock and Thomas Südhof emphasized the potential damage, including wasted NIH funding and misdirected research efforts (6). Elisabeth Bik noted that experimental results might have been altered to fit a hypothesis, distorting scientific understanding. Schrag's efforts highlight the critical need for enhanced peer review, improved research practices, and a supportive research environment prioritizing ethical standards. By advocating for better oversight, Schrag contributes to safeguarding the integrity of scientific research and maintaining public trust in the scientific enterprise.

To mitigate research fraud and foster a culture of integrity in academia, a comprehensive approach involving education, training, and enforcement is crucial. Education and training play a pivotal role in instilling ethical principles and promoting responsible research practices. Integrating research integrity modules into academic curricula ensures that researchers, particularly early-career scientists, understand the importance of ethical conduct. Training programs should emphasize the value of honesty, transparency, and accountability in research, equipping researchers with the knowledge and skills to uphold these principles.

Going Forward

The revelations of research fraud during the COVID-19 pandemic, exemplified by the Surgisphere scandal, emphasize the urgent need to address systemic issues within academia and uphold the integrity of scientific research. The root causes of research fraud are multifaceted and deeply entrenched within the scientific community. The "publish or perish" culture, coupled with financial and professional incentives, drives researchers to prioritize getting a large volume of their work submitted, perpetuating a cycle of subpar research and unethical practices. Additionally, systemic deficiencies such as ineffective peer review processes and lack of global guidelines for research conduct exacerbate the problem.

Addressing these challenges requires a concerted effort from all stakeholders in the scientific community. Academic institutions must prioritize the development and enforcement of clear policies and standard operating procedures to govern research conduct, promoting a culture of openness, transparency, and ethical behavior. Peer review processes need to be strengthened, with journals mandating thorough scrutiny of raw data and providing training programs for reviewers to detect signs of fraud and misconduct. Upholding the principles of research integrity and embracing a higher quality of scientific publications ensures that scientific research remains a trusted source of knowledge and innovation for the betterment of society. The scientific enterprise is undergoing a transition from exponential growth to "something radically different," potentially threatening. Today, the interrelated problems of scientific quantity and quality are a frightening manifestation of what past scientists foresaw (7).

Reflecting on the COVID-19 pandemic, the Surgisphere scandal stands out as a glaring example of the harm caused by fraudulent data. This single case of research fraud had devastating consequences, from eroding public trust in medical science to diverting critical medications away from patients, and even prolonging lockdowns. While the world was occupied with baking sourdough bread, binge-watching "Tiger King," and downloading TikTok, humanity was also navigating the profound impacts of a global health crisis. Everyday tasks like grocery shopping became fraught with anxiety, schools and workplaces shifted to virtual settings, and stepping outside felt like a dangerous mission from a sci-fi movie due to the microscopic dangers lurking beyond our front doors.

The pandemic showcased how easily fraud can occur when researchers are desperate enough. Hopefully, any future pandemics will be met with research conducted with the utmost integrity from the start. While people sought distractions during challenging times, the integrity of scientific inquiry emerged as a paramount concern that demands continual vigilance and dedication. Upholding these principles ensures that science remains a trusted source of knowledge and innovation, capable of guiding society through crises. By learning from past mistakes and committing to ethical research practices, we can build a future where scientific integrity is the foundation of progress and public trust. Our collective experience during the COVID-19 pandemic must not be forgotten, but rather, they should drive us toward a more transparent, accountable, and reliable scientific community.