Interventional Pathology: Ethical Implications for Adapting with the Evolving Medical Landscape

A Thesis

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Nicholas Osborne

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Thesis Committee: Julie Aultman, Ph.D. (Advisor) Brian Harrell, M.A. (Advisor) Copyright Nicholas Osborne 2024

ABSTRACT

This thesis explores the transformative roles of pathologists within modern healthcare. As healthcare evolves with innovations in digital pathology, artificial intelligence (AI), and precision medicine, pathologists are poised to assume enhanced clinical roles that extend beyond traditional laboratory diagnostics to direct patient care and multidisciplinary team collaborations. Centered around W.D. Ross's prima facie ethical principles, it delves into the ethical challenges introduced by emerging technologies, underscoring the necessity for robust ethical frameworks to maintain patient trust and safeguard data integrity. The research advocates for significant educational reforms to equip pathologists with the skills needed for their expanded roles, emphasizing the integration of technological proficiency with ethical decision-making. It calls for continuous adaptation and strategic policymaking to enhance patient outcomes amidst rapid medical innovation. By synthesizing ethical practices with cutting-edge technological advancements, this thesis outlines a future where pathologists not only enhance healthcare delivery but also ensure that these innovations are applied judiciously and ethically, thereby positioning pathologists at the forefront of patient care and medical research in a rapidly evolving healthcare landscape.

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VITA

Education

Northeast Ohio Medical University	2018-2026(Anticipated)
Doctor of Medicine	
Northeast Ohio Medical University	2020-2025(Anticipated)
Doctor of Philosophy	
Northeast Ohio Medical University	2019-2024
Master of Arts	
Youngstown State University	2016-2018
Bachelor of Science	

Publications

Leahy, C., Osborne, N., Shirota, L., Rote, P., Lee, Y. K., Song, B. J., Yin, L., Zhang, Y., Garcia, V., & Hardwick, J. P. (2024). The fatty acid omega hydroxylase genes (CYP4 family) in the progression of metabolic dysfunction-associated steatotic liver disease (MASLD): An RNA sequence database analysis and review. Biochemical pharmacology, 116241. Advance online publication. https://doi.org/10.1016/j.bcp.2024.116241

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Chapter One:

Pathologists at the Forefront of Patient Care: Exploring the Ethical Framework for Expanding Their Role in Healthcare

Introduction

In the complex healthcare landscape, pathologists play a pivotal role in patient care, influencing 60-70% of clinical decisions (Bhagwat et al., 2020). Despite their significance, they often remain unfamiliar to the public and even their fellow physicians, sometimes met with even negative misconceptions and stereotypes or perception of low prestige (Hernandez et al., 2022; Hung & Jarvis, 2011; McCloskey et al., 2020). This thesis examines the evolving role of pathologists in patient-facing domains and its ethical implications, aiming to highlight its potential in addressing healthcare disparities, improving patient outcomes, and optimizing pathologists' contributions. An ethical framework of Scottish philosopher William David (W.D.) Ross's (1877–1971) prima facie duties will guide the exploration of the expanded role of pathologists in patient-facing, precision medicine, and inter-professional collaboration domains, providing a nuanced and flexible analysis. This approach allows for a comprehensive analysis of the diverse obligations faced by pathologists, ensuring that ethical considerations are central to the advancement and practice of this transformative role in healthcare.

The analysis adopts W.D. Ross' prima facie duties—fidelity, reparation, gratitude, justice, beneficence, non-maleficence, and self-improvement—as the ethical framework to evaluate the expanding role of pathologists into patient-facing domains, precision medicine, and inter-professional collaboration. At the organizational level, this approach emphasizes the commitment to compassionate, patient-centered care, the fair access and distribution of healthcare resources, and principled ethical decision-making. Individually, it highlights pathologists' obligation to act in the best interests of their patients, advocating for patient-centered care.

Additionally, the application of Ross' prima facie duties extends to nonpathologist physicians, emphasizing the importance of inter-professional ethical considerations and collaboration in enhancing patient care and decision-making processes within the healthcare setting. This exploration is critical for the healthcare community, aiming to merge technical proficiency with empathetic care and cultivate an ethical culture that champions patient welfare.

In this chapter, the exploration will cover the evolving roles of pathologists, current practice and status of the field, potential future developments, and the concept of interventional pathology. This study will outline the application of Ross' prima facie duties within healthcare settings, with a particular focusing on pathologists and their interactions with physician colleagues, and the anticipated outcomes.

Background

Pathology and Laboratory Medicine

Pathology, the comprehensive study of diseases within the human body, plays a vital role in healthcare. Expert pathologists meticulously analyze diverse human tissue and fluid samples, providing diagnoses that span across almost every field of medicine (College of American Pathologists, 2023; Cleveland Clinic, 2023; The Royal College of Pathologists, 2023). From the intricacies of molecular analysis to the macroscopic examination of organs, the breadth of this discipline is boundless. Research has shown that a significant percentage, approximately 60-70% (Bhagwat & Pai, 2020), of all clinical diagnoses trace back to the invaluable insights provided by pathologists' reports. Despite debates about the exact percentages (Hallworth, 2018), pathologists' contribution remains indisputable, making them essential contributors to the healthcare system.

Guided by their expertise and proficient use of diverse laboratory methodologies and cutting-edge technologies, pathologists offer diagnoses, recommend appropriate treatment options, monitor ongoing conditions like tumor progression and chronic viral

infections, and deliver crucial prognosis evaluations (Cleveland Clinic, 2023). While pathologists play a pivotal role in healthcare, they often work discreetly from the public eye. This discreet nature has led to many misconceptions, and some negative stereotypes, about who pathologists are and their significance in the medical field (Hernandez et al., 2022; Hung & Jarvis, 2011; McCloskey et al., 2020). However, they collaborate seamlessly with other stakeholders, including nursing, pharmacy, medicine, community public health, and more (CAP, 2023; RCP, 2023).

Pathology, traditionally divided into anatomical and clinical branches, is experiencing a transformative evolution due to rapid technological advancements (Louis, et al., 2011; Niazi, et al., 2019). While the concept of evolution is nothing new to pathology, dating back approximately 4000 years, early physicians have consistently pursued a deeper understanding of disease origins and mechanisms (van den Tweel & Taylor, 2010). During the 19th century, pathology was primarily academic, relying heavily on post-mortem studies. Pioneers like Rudolf Virchow, often referred to as the father of modern pathology, made groundbreaking contributions to cell theory and significantly influenced modern medicine (Race, et al., 2004). It was not until the early 20th century that pathology laboratories became integral to hospitals, solidifying the field's relevance in both academic and practical healthcare settings (van den Tweel & Taylor, 2010). From the earliest microscopes in the 18th century to their refined versions in the mid-19th century (van den Tweel & Taylor, 2010), these scientific breakthroughs consistently shape pathology's trajectory, positioning it as an ever-evolving discipline with substantial future potential. As scientific knowledge and technology continuously advance, pathology adapts and thrives.

Current Landscape of Pathology

Within pathology, a field pivotal to healthcare for its crucial role in diagnosis and guiding clinical decisions, the ever-changing environment of modern medicine is captured by transformative technological advancements and an expanding accessibility to services. This section will emphasize pathology as it embraces the digital renaissance of bioinformatics and computational biology, and artificial intelligence in the promising prospects of precision medicine—all propelling the field towards enhanced diagnostic precision and patient care. Amidst these advancements, the challenge of ensuring equitable access to these innovations exists along with the need to address the pressing concern of nurturing the next generation of pathologists. This exploration aims to guide a course for pathology that not only embraces technological innovations and broadens patient access but also addresses the vital issue of recruitment within the profession.

Technological Adaptation. When navigating the challenges faced by pathology, technological advancement emerges as a recurrent theme. The realm of bioinformatics, computational biology, artificial intelligence, and digitalization of pathology slides emerges as a catalyst of transformation (Louis et al., 2011; D'Abbronzo & Franco, 2021; Berbis, 2023; Hassell et al., 2022). This convergence of technology holds the promise of optimizing diagnoses and laboratory operations, requiring pathologists to navigate with shrewdness.

Within this digital renaissance, precision medicine stands as a central pillar. Precision medicine has revolutionized diagnosis by integrating patient-specific factors, notably genetics, into treatment approaches (Vranic & Gatalica, 2021). Immunohistochemical (IHC) stains underscore precision medicine's transformative influence, enhancing diagnosis accuracy through molecular subtyping (D'Abbronzo & Franco, 2021). Additionally, a change precision medicine is bringing to the forefront is blurring the division of anatomical pathology (AP) and clinical pathology (CP), with AP becoming increasingly concerned and rooted in molecular analysis; no longer concerned

with morphology alone (Vranic & Gatalica, 2021). This shift from "traditional diagnostics to therapeutic consultation" emphasizes the discipline's adaptability (Zhao, 2020).

Artificial intelligence (AI) and digitalization of pathology slides offers a horizon of radical transformation. AI, as indicated by the consensus among pathologists, is thought to constitute standard practice by 2030 (Berbis, 2023). AI's potential to bolster diagnostic accuracy holds considerable promise, albeit accompanied by ethical and legal considerations (Sorrell et al., 2022; Chauhan, 2021; Jackson et al., 2021). Careful implementation and consideration for patient safety must guide AI's integration into pathology. The digitalization of pathology slides introduces a realm of remote diagnostics and enhanced standardized examination (Hassell et al., 2022). This evolution, while advantageous, requires addressing pathologists' confidence with the technology (Coulter et al., 2022). Educational initiatives and training must evolve in tandem with digitalization, ensuring seamless integration into the field.

Alongside the rapid integration of these technologies, it is imperative to establish comprehensive ethical guidelines that address potential impacts on privacy, confidentiality, and consent (Chauhan, 2021). The introduction of tools such as digital pathology and Al-enhanced diagnostics not only transforms diagnostic capabilities but also introduces complex ethical and legal challenges. These include ensuring the protection of sensitive patient information as data becomes more accessible across digital platforms. Therefore, developing robust ethical frameworks and legal safeguards is crucial to navigate these challenges effectively. Institutions should implement strict data governance protocols and transparent patient consent processes that are adaptable to the evolving digital landscape. Furthermore, continuous ethical training for healthcare professionals on these issues will ensure that they are well-prepared to address potential ethical dilemmas and uphold the trust and integrity of patient care.

The integration of Whole Slide Imaging (WSI) and Liquid Biopsy (LB) epitomizes innovation in action, streamlining diagnostic processes and fostering non-invasive approaches to cancer detection. WSI enables pathologists to share and analyze highresolution digital slides remotely, enhancing diagnostic accuracy and facilitating collaborative consultations across vast distances (Oiknine, et al., 2023). Similarly, LBs represent a shift towards minimally invasive diagnostics, allowing for the early detection of cancers through the analysis of circulating tumor DNA in blood samples (Gupta et al., 2024). These methodologies not only promise improved patient outcomes but also underscore the potential for personalized treatment strategies.

Furthermore, the development of 3D pathology (Huo et al., 2024), Multiplex Immunohistochemistry/Immunofluorescence (mIHC/IF), and Next-Generation Sequencing (NGS) (Ferreira, et al., 2024) offers pathologists unprecedented tools for the comprehensive analysis of tumors and genetic profiles. 3D pathology provides deeper insights into tissue architecture and tumor environments, while mIHC/IF techniques enable the detailed characterization of multiple biomarkers on a single tissue section, crucial for understanding complex disease mechanisms and guiding immunotherapy decisions (Chen et al., 2024; Sun et al., 2024). Additionally, NGS technology facilitates the identification of genetic mutations, driving the selection of targeted therapies and complements a new era of customized patient care (Canino et al., 2024). These technological evolutions, coupled with the advent of machine learning and predictive analytics, not only augment the pathologist's toolkit but also pave the way for predictive diagnostics and treatment planning, reflecting a significant shift towards a more proactive and patient-centric approach in healthcare.

Uniformly incorporating these cutting-edge technologies—there exist discrepancies based on the healthcare organization and their policies, geographical location, and academic affiliation— into pathology practice represents a crucial step

towards addressing the field's current challenges, including the pressing need for accessible, equitable healthcare services and the imperative for continuous professional development among pathologists. As the discipline embraces these innovations, the vision of interventional pathology becomes increasingly tangible, promising a future where pathologists are central to the delivery of precision medicine, and patients benefit from timely, accurate, and personalized care. As technology continues to advance, it prompts the field to confront the need for adaptation, requiring a comprehensive approach to address these issues. Within this context, the idea of interventional pathology emerges as a potential source of transformative solutions in the context of evolving technology.

Access to Pathology Services. Another pressing challenge confronting the field of pathology is the need for accessible healthcare services, a challenge that reverberates across the entire medical landscape. The United States is grappling with a significant physician shortage, particularly in primary care (estimated to be 17,266) and mental health services (Health Resources and Services Administration, 2023). Projections from the American Association of Medical Colleges (AAMC) underscore an impending shortage of all specialist physicians by 2036, potentially ranging from 13,500 to 86,000 (GlobalData Plc., 2024). Also, a global concern, the disproportionate impact of inaccessibility falls upon low and lower-middle-income nations, a reality emphasized by the World Health Organization (2023).

One approach has been the reemergence of the Resident Physician Shortage Reduction Act of 2021, now 2023, a bipartisan bill introduced in Congress to increase the number of Medicare-funded residency training positions by 14,000 over seven years (118th Congress, 2023). This legislative proposal seeks to bolster the physician workforce by investing in residency training programs, a key determinant of future physician supply. Despite the bill's initial failure due to its connection to partisan issues,

its reintroduction in 2023 highlights the ongoing dialogue around enhancing physician workforce capacity.

Furthermore, state legislatures have initiated measures to address the shortage by expanding the scope of practice for nurse practitioners (NPs) and physician assistants (PAs), eliciting both support (Kurtzman & Barnow, 2017) and contention from stakeholders (AMA, 2023). This effort, while aiming to enhance access to care, has also sparked debates over safety concerns and healthcare expenditure (AMA, 2023; Chan & Chen, 2022). Advocates argue that increased autonomy for NPs and PAs could alleviate the physician shortage (Kurtzman & Barnow, 2017), while opponents raise issues regarding patient safety and the potential erosion of physician oversight (Chan & Chen, 2022). As the medical landscape navigates these policy deliberations, the imperative remains to bridge the access gap and ensure quality care for all individuals.

Within the discipline of pathology, authors Lilley and Mirza (2022; 2023) illuminate the profession's capacity to influence access to medicine. Pathologists hold a vantage point from which they can contribute significantly through policy involvement and education of their medical colleagues. Nonetheless, inequities persist due to factors such as cost, geography, and data-set biases (Lilley & Mirza, 2022). Addressing these disparities necessitates open dialogue, particularly towards racial and ethnic minorities who experience distrust towards healthcare systems (LaVeist et al., 2023). These conversations must form a cornerstone of any transformative efforts.

Recruitment Hurdles. One challenge confronting pathology revolves around the declining recruitment of US medical school graduates (Gaskil, 2021). The reasons behind this decline are multifold. Primarily, the absence of exposure to pathology within the medical school curriculum (Hernandez et al., 2022; Hung & Jarvis, 2011; McCloskey et al., 2020) seems to be the prevailing cause. A mere fraction of students engages with pathology through rotations or electives, as indicated by McCloskey et al. (2020).

Transformations in medical school curricula toward integrated systems in the preclinical years have inadvertently reduced the prominence of basic science material and, subsequently, pathology. Pathology's presence has been condensed into a handful of lecture points, neglecting to emphasize its career prospects. The limited exposure undoubtedly hampers students' inclination toward considering pathology as a potential career path (Hernandez et al., 2022; McCloskey et al., 2020).

The list of factors contributing to the recruitment crisis goes beyond curricular limitations. Negative misconceptions and stereotypes about pathology further erode its allure (Hernandez et al., 2022; Hung & Jarvis, 2011; McCloskey et al., 2020). Pervasive stereotypes, like the perception of pathologists as introverted or "anti-social," persist (Hung & Jarvis, 2011; McCloskey et al., 2020), further promoting the idea that pathology lacks direct patient interaction. These misconceptions contrast starkly with the dynamic reality of the field, characterized by diversity in practice and practitioner personalities (CAP, 2023). Moreover, specialized domains within pathology, such as cytopathology with fine needle aspirations (FNA) and blood banking and transfusion pathology with therapeutic apheresis, demonstrate avenues of patient interaction (CAP, 2023; Pagni & Di Bella, 2013). These stereotypes demand dispelling to present pathology as its authentic self.

Integrating pathologists more seamlessly into the patient care system not only addresses service gaps but also aligns closely with the ethical principles espoused by the Scottish philosopher, W.D. Ross (1930). By fostering a healthcare environment where pathologists are acknowledged beyond traditional stereotypes and valued for their critical contributions, the healthcare field adheres to Ross's prima facie duties such as beneficence and justice. Beneficence is served through the enhanced patient outcomes that result from pathologists' direct involvement, while justice is promoted by ensuring equitable access to their expertise across all levels of patient care. Furthermore,

organizational ethics demand that systems and policies facilitate rather than hinder such integrations (Paraizo & Begin, 2020). By dismantling barriers and fostering collaborative practices, healthcare organizations can create a system where ethical standards and patient care efficacy are inherently linked, ensuring that pathologists can fulfill their pivotal role without the constraints of outdated perceptions.

Addressing these recruitment challenges involves proactive efforts from both the pathology community and the larger medical education sphere. Notably, initiatives like PathElective aim to supplement medical school curricula and provide engaging learning modules in pathology, bridging the gap between students and this multifaceted field (Lilley et al., 2021a, 2021b). Leveraging social media platforms like X (formerly Twitter) has also enhanced the visibility of pathology to medical students, healthcare professionals, and the public (Gardner & Allen, 2019; Tushir et al., 2022; Schukow et al., 2023; Hamnvag et al., 2021). Furthermore, the potential for direct patient interaction within pathology is often underestimated. Pathologists engage in meaningful consultations with patients and colleagues, explaining diagnoses and treatment recommendations in a patient-centric manner (Irvine, 2019; Mitchell, 2022). These efforts, coupled with ongoing advocacy within the pathology community and partnerships with medical schools, promise to reshape the perception of pathology and overcome recruitment hurdles, emphasizing the integration of laboratory science knowledge into medical education (Mirza et al., 2021; Mirza & Weber, 2022).

The Future of Pathology, Interventional Pathology

What is Interventional Pathology? Although lacking a universal formal definition, interventional pathology typically describes the evolving role of pathologists in direct patient care and collaboration with other medical specialties (Asif, 2022; Grohs, 1988; Pagni & Di Bella, 2013). Historically, pathology has adopted patient-facing, or

interventional procedures, such as FNA in cytopathology (Grohs, 1988). Grohs argued for the integration of FNAs under the field's practice, citing expertise benefits of a "single operator-interpreter system" (p.352-353); pathologists hold the expertise to conduct the procedure, provide the diagnosis, all the while optimizing cost efficiency and speed of care. Other procedural-based responsibilities pathologists can perform in the U.S. are bone marrow biopsies (BMBx) by hematopathologists and therapeutic apheresis by blood banking and transfusion medicine pathologists (CAP, 2023; Cleveland Clinic, 2023), albeit with variation across institutions. The variation lies in who performs these tasks, policies set by healthcare institutions and by training programs.

Another break from tradition or the stereotypical role is pathologists becoming increasingly part of patient-management in the form of colleague-consultations like tumor boards, an interdisciplinary conference of medical specialist (Specchia et al., 2020), patient-consultations (Irvine, 2019; Mitchell, 2022), and mini-tumor boards (Charara et al., 2016). They are a way to review complex cancer cases through expert lenses to establish personalized treatment plans. This multidisciplinary holistic approach has been shown to meaningfully impact and improve patient outcomes (Specchia, 2020). Pathologists are a vital contributor to these teams with their expertise on the molecular and morphological presentations underpinning these diseases. Individual patients also receive consultations from pathologists. While not universally chosen or known amongst cancer patients, they can meet with pathologists and review their tumor slides and learn about their diagnosis (Charara, 2016). Patients who have chosen to have these consultations report a sense of empowerment and insight into fighting their disease (Irvine, 2019; Mitchel, 2022).

Some countries outside the United States have pathologists practicing in directpatient care and procedures. For example, in the U.K. and Australia, hematopathologists diagnose and treat blood disorders (RCP, 2023; Royal College of Pathologists of

Australasia, 2023). It is worth noting that the medical education process in these countries is different than in the U.S., requiring a period of general medicine training, like an extended intern year in American residency programs; intern years are not required for American pathology residency programs. Additionally, countries where pathologists do not have direct patient care, or as much as that of the U.K. and Australia, have or are making calls for further expansion of these types of roles. Some of these calls are here in the U.S. (Asif, 2022; Ehsan, 2023), Spain calling for the adaption of the field to embrace an interventional role in developing precision medicine (Nieto & Villar, 2022), and Italy calling for more formal training in imaging modalities like ultrasounds for tissue and cell procurement procedures (Pagni & Di Bella, 2013). Each of these three sets of authors share common arguments in why pathology should evolve in this way: decrease intrinsic error (one procurer and diagnostician), efficiency, and embracing new technologies.

The remarkable strides in precision medicine by bioinformatics and computational biology, epitomized by NGS and other molecular testing modalities' capability to meticulously scrutinize patients' transcriptome, proteome, metabolome, and more, are ushering in a new era of heightened diagnostic accuracy, comprehensive prognostication, and targeted therapeutic interventions (D'Abbronzo et al., 2021; Pinto et al., 2022; Nieto et al., 2022). This enhanced diagnostic judgment and insight provide pathologists with a pivotal role in consultative collaborations (i.e., tumor boards). Such remarkable advances are prompting calls from authors like Louis et al. (2011) and Vranic et al. (2021) to reevaluate pathology training, advocating for greater early specialization and an in-depth understanding of the clinical practices of their medical peer. Additionally, there is a call for physicians in general to become acquainted with the business realm of medicine, thus embedding them more profoundly within the administrative branch of the patient care consortium (DeCamp, 2021).

However, while the profession appears to be shifting toward a more unconventional sphere of practice, this transition is not devoid of trepidation and resistance among practicing pathologists (Nieto, 2022; Ehsan, 2023). Concerns exist regarding the potential encroachment upon clinical boundaries (Nieto, 2022), the uncertainty surrounding the adoption of sophisticated technologies (Coulter et al., 2022), worries about existing workload burdens, and a certain resistance to change fueled by personality dynamics (Ehsan, 2023). Despite these reservations, the potential gains inherent in this pivot toward interventional pathology are vast, promising improvements in patient care and the transformation of a crucial niche within healthcare systems, revolutionizing the operations of this specialized domain. As this paper explores the expansive role of interventional pathology, it becomes essential to examine the ethical underpinnings that guide these practices, ensuring that patient care aligns with the highest ethical standards.

An Ethical Framework for Expanding Pathology's Domain

Introduction

Advancements in healthcare delivery and technology warrant adaptation from practitioners. In pathology, this can be exemplified in the interventional pathologist, a role that transcends traditional laboratory boundaries to embrace patient-facing responsibilities, precision medicine, and collaborative healthcare delivery. This evolution necessitates a nuanced approach that addresses the unique ethical dilemmas and opportunities this new role presents. W.D. Ross' concept of prima facie (Latin for "at first glance") duties provides a profound ethical foundation for navigating these challenges, offering a nuanced approach that aligns with the diverse and evolving responsibilities of pathologists (Ross, 1930/2002). Drawing on Ross' prima facie duties, this framework aims to provide ethical guidance tailored to the multifaceted responsibilities of pathologists. By ensuring that integrity, innovation, and patient-centered care remain at

the forefront, this guidance also serves to mitigate stigmas associated with the profession, emphasizing that pathologists' work is rigorously upheld by ethical standards and oversight.

W.D. Ross, a Scottish philosopher, introduced a nuanced approach to ethical theory that diverges from the absolutist views of his predecessors. In his influential work, *The Right and the Good* (1930), Ross presents the concept of prima facie duties to navigate the complex terrain of moral decision-making. He argues that ethical dilemmas often arise not from the existence of multiple duties that cannot all be fulfilled, but from the competing tendencies of different types of actions. He illustrates this with the concept of prima facie duties, which are duties apparent in certain actions due to specific characteristics of those actions. However, these duties are not absolute and can be overridden by more compelling obligations in particular situations. Morreau (1996) proclaims this framework allows for nuanced moral deliberation, recognizing the complexity of ethical decision-making where actions can have different moral significances depending on the context.

Challenging Stigmas and Enhancing Ethical Standards

In expanding the role of pathologists within the healthcare system, it is crucial to address and challenge the existing stigmas associated with the profession. The comprehensive ethical framework based on prima facie duties not only guides pathologists through the complexities of modern medical ethics but also serves as a public testament to the rigorous ethical standards upheld within the profession. By emphasizing that pathologists are as rigorously bound by ethical oversight as other medical professionals, this approach not only ensures integrity and patient-centered care but also enhances the public and professional understanding of pathologists' critical contributions. This early integration of ethical considerations sets the foundation for applying these principles in practice, as explored in the subsequent chapters, and

underscores the profession's commitment to ethical excellence amid technological and clinical advancements.

Foundation of Ross's Ethical Theory

Ross' ethical theory, deeply rooted in the complexity of real-life ethical dilemmas, underscores the relevance of his pluralistic deontology in the context of modern healthcare and, more specifically, pathology (Ross, 1939). This theory is rooted in intuitionism, which posits that certain ethical truths are immediately known to us through moral intuition. Unlike utilitarianism, which evaluates actions based on their outcomes, or Kantian ethics, which emphasizes adherence to universal moral laws, Ross (1930/2002) proposes a pluralistic form of deontology (Jovanovic, 2019; Skelton, 2024). This framework acknowledges a set of inherent duties, each of which is compelling and selfevident but not absolute. The "prima facie" qualifier indicates that these duties are binding in their immediate appearance but may be overridden by stronger duties in specific circumstances. Ross's assertion that no single prima facie duty always takes precedence over others, highlights the need for careful deliberation in each unique situation (Ross, 1930/2002). In the context of pathology, Ross's concept of moral intuition can empower pathologists to trust their ethical instincts when faced with unprecedented dilemmas, ensuring their decisions are both morally grounded and responsive to the specificities of each case.

In his *The Right and the Good*, Ross identifies seven central prima facie duties (fidelity, reparation, gratitude, justice, beneficence, non-maleficence, and selfimprovement), which serve as guiding principles for moral conduct:

Fidelity is the duty to keep promises and be truthful (Ross, 1930). Fidelity involves an unwavering commitment to truthfulness and promise-keeping, which are essential for maintaining trust within clinical and professional relationships.

Reparation is the duty to compensate others for harm we have caused them. Reparation requires acknowledging and addressing harm caused by one's actions, making amends for those affected. Following the duty of fidelity, Ross asserts, "A promise creates a moral expectation; its breach creates not only disappointment of this expectation but resentment and imposes on me the duty of making reparation" (Ross, 1930).

Gratitude, the duty to be grateful for benefits received and to express that gratitude appropriately, involves recognizing and reciprocating the goodwill and benefits one has received from others. Ross explains, "we should recognize towards benefactors a duty of requiting their benefactions" (Ross, 1930).

Justice encompasses the duty to ensure fairness in distributing happiness or resources. Ross extends that this is a duty to recognize and reward merit, entailing the insurance of fairness and equity in the allocation of resources and opportunities; "justice requires that happiness or good should be apportioned to virtue or merit," (Ross, 1930)

Beneficence, the duty to contribute to the well-being of others, involves actions intended to benefit others, enhancing their well-being and conditions; "apart from any debt we may owe to others, we should treat them in a way that will promote their happiness" (Ross, 1930).

Non-Maleficence is the duty to avoid harming others. "The prime duties that are self-evident are constituted by the fact that acts of a certain kind would be generally harmful;" non-maleficence focuses on the imperative to avoid actions that could cause harm or injury to others. (Ross, 1930).

Self-Improvement refers to the duty to improve oneself in terms of virtue, intelligence, and capacity to appreciate and engage in morally good actions such that "We have a duty to improve ourselves in various respects: to cultivate our minds, to

develop our talents, to keep our bodies in good condition;" self-improvement involves efforts to enhance one's own moral, intellectual, and physical capacities (Ross, 1930). These duties, as described by Ross, form a comprehensive ethical guide for pathologists, especially in scenarios where ethical obligations towards patients, colleagues, and society converge and sometimes conflict (Ross, 1930/2002).

Furthermore, Ross's engagement with Kantian ethics in his commentary on the Grundlegung zur Metaphysik der Sitten, "Groundwork of the Metaphysic of Morals" (Ross, 1954; Kant 1785/1998) reveals a careful consideration of the role of duty within ethical decision-making. For instance, the balance between adherence to universal moral laws and the consideration of individual circumstances might guide a pathologist in handling sensitive genetic information, where Ross's nuanced approach enables a reconciliation between patient confidentiality and the broader implications of genetic knowledge. While Ross respects Kant's emphasis on the universality of moral laws, he also identifies areas where Kantian ethics may be too rigid to accommodate in multifactorial considerations inherent to complex realities, exemplified in what is seen in healthcare practice. Ross argues for a balance between Kant's categorical imperative and the practical necessity of addressing individual ethical dilemmas as they arise, highlighting the importance of flexibility within ethical frameworks (Ross, 1954). This balance is crucial for pathologists, who must navigate between the universal principles of medical ethics and the specific ethical challenges of their practice. Ross's integration of Kantian principles with his own concept of prima facie duties enriches the ethical landscape, providing pathologists with a nuanced approach that values both universal ethical standards and the particularities of each patient's case. By doing so, Ross offers a model for ethical decision-making in pathology that is both principled and adaptable, enabling pathologists to fulfill their ethical obligations with integrity and sensitivity to the unique circumstances of their work (Ross, 1954).

A key aspect of Ross's theory is the acknowledgment that these prima facie duties often come into conflict, necessitating a process of moral deliberation to determine which duty is most pressing in each situation (termed the "duty proper") (Postow, 2006). This process relies heavily on moral judgment and the particulars of the scenario, allowing for a nuanced and context-sensitive approach to ethics. Considering the "duty proper," this framework is particularly well-suited to fields like healthcare, where professionals frequently face complex ethical dilemmas involving conflicting obligations to patients, colleagues, and society at large (Skelton, 2024; Amadi & Okonkwo, 2023). Its flexibility and emphasis on moral intuition offer a robust method for navigating the intricacies of medical ethics, making it a valuable resource for addressing the ethical challenges encountered in practice.

In summary, W.D. Ross's theory of prima facie duties provides a comprehensive and adaptable ethical framework that emphasizes the inherent complexity of moral decision-making. By recognizing a spectrum of moral obligations and the necessity of balancing them against each other in real-world contexts, Ross's approach allows individuals to navigate ethical dilemmas with nuance and sensitivity to the particulars of each situation. His insight into moral intuition as the basis for recognizing prima facie duties highlights the intrinsic ethical compass guiding pathologists in their expanded role, suggesting a deeply rooted understanding of their obligations to patients, colleagues, and the broader community (Ross, 1930/2002).

Ethical Considerations for the "Interventional Pathologist"

In the evolving landscape of pathology, ethical considerations are paramount, guiding the path through direct patient care and collaborative treatment management. This section highlights and emphasizes the synergistic role of prima facie duties fidelity, justice, beneficence, and others—in driving this transformation (Star, 2024).

These concepts not only ensure the integrity of patient care but also advocate for equitable access to diagnostics and treatments, highlighting the importance of continuous learning, accountability, and interprofessional respect in the field of modern pathology (Meyers, 2011). The pluralism of values articulated by Ross challenges the notion of a single guiding ethical principle, reflecting the reality pathologists face where patient autonomy, beneficence, non-maleficence, and other often present competing values requiring careful balancing in every decision (Ross, 1930/2002). The application of these duties is as follows:

1. Fidelity to Professionalism and Patient Trust: The duty of fidelity, emphasized by Ross, becomes increasingly significant as pathologists navigate their expanded roles, underscoring the importance of maintaining trust through honesty and promise-keeping (Ross, 1930/2002). The expansion of pathologists' roles into direct patient care and collaborative treatment management heightens the importance of maintaining professional integrity and trust (Jonsson & Stefansdottir, 2019). Fidelity encompasses not only adherence to confidentiality and informed consent but also a commitment to transparent communication and empathy in patient interactions (Epsten & Street, 2011).

In their expanded roles, pathologists frequently interact directly with patients and other healthcare professionals, making the integrity of these interactions' paramount. For instance, a pathologist involved in patient consultations ensures that all diagnostic results are double-checked before delivery to maintain accuracy and trust. When a rare error occurs, the pathologist promptly informs the patient and the healthcare team, explaining the mistake and the corrected results transparently, thereby upholding the promises of honesty and reliability critical to medical practice. Maintaining fidelity also influences patient compliance, as trust directly impacts how patients openly

communicate their symptoms and adhere to prescribed treatment regimens (Birkhäuer et al., 2017).

2. Justice in Access and Treatment: Ross's emphasis on the duty of justice provides a foundational principle for both pathologists and healthcare organizations to ensure equitable access to diagnostics and treatment, echoing the ethical responsibilities of these stakeholders towards its patients and society (Ross, 1930/2002). As pathologists engage more directly with patient care, they must advocate for equitable access to diagnostic services, precision medicine, and innovative treatments (Lilley & Mirza, 2023). This duty involves addressing disparities in healthcare access and ensuring that all patients benefit from advancements in pathology. Pathologists are uniquely positioned to address social determinants of health by advocating for policies that ensure equitable treatment access, thus tackling health disparities head-on.

As advocates for equity, pathologists can play a pivotal role in minimizing healthcare disparities by facilitating access to advanced diagnostic tools and treatments. For example, a pathologist working in a community hospital notices a pattern of underutilization of genetic testing among minority populations. They could initiate a community outreach program that educates underrepresented groups about the benefits of precision medicine and advocates for policy changes that increase access to these services, thus addressing systemic inequities.

3. Beneficence through Precision Medicine: Ross's duty of beneficence resonates deeply with the pathologist's role in precision medicine, advocating for actions that enhance patient well-being through the precise and personalized application of medical knowledge (Ross, 1930/2002). The role of pathologists in precision medicine underscores the duty to contribute positively to patient outcomes (Jonsson & Stefansdottir, 2019). By leveraging their expertise in molecular diagnostics and

personalized medicine, pathologists can guide treatment decisions that optimize patient health and well-being. In a healthcare center specializing in personalized cancer therapy, a pathologist can utilize their expertise in molecular diagnostics to identify a genetic mutation in a patient's tumor that responds to a specific drug, which significantly extends the patient's life expectancy and improves quality of life, thus demonstrating direct patient benefit. While precision medicine offers tailored treatments, it also raises significant ethical issues, such as the potential for increasing healthcare disparities due to uneven access to advanced genomic testing (Smith, 2021).

4. Non-maleficence in Ethical Dilemmas: The proactive involvement of pathologists in treatment recommendations and patient management introduces complex ethical dilemmas, particularly concerning risk-benefit analyses of diagnostic and therapeutic interventions. A steadfast commitment to "do no harm" requires careful consideration of the implications of each clinical decision (Baron, 1992; Omonzejele, 2009). For example, the duty of non-maleficence might inform a pathologist's careful communication of a diagnosis, ensuring that the information is conveyed in a manner that minimizes harm and respects the patient's autonomy and psychological well-being.

Pathologists must employ patient-centered communication to mitigate the psychological impact of medical procedures, thereby fulfilling their duty to do no harm (McCabe, et. Al. 2017). This duty requires pathologists to avoid causing harm by carefully considering the potential impacts of diagnostic and treatment recommendations. This can be exampled by a pathologist consulting on a complex case, ensuring that the recommended diagnostic tests are necessary and beneficial for the patient, avoiding over-testing or the use of invasive techniques that may not influence the outcome.

5. **Self-improvement and Lifelong Learning**: The rapidly evolving nature of the field of pathology mandates a dedication to ongoing education and self-improvement

(Kass & Faden, 2018). Pathologists must remain at the cutting edge of technological and medical advancements to provide the best possible care (Siddiqui, 2003).

Constantly updating their knowledge and skills, pathologists can ensure they provide the most effective and current patient care. A pathologist participates in regular training sessions and subscribes to leading medical journals to stay alongside of the latest developments in pathology, especially in rapidly evolving fields like immunotherapy. The challenge of staying on top of rapid advancements can be mitigated through institutional support for continuous professional development, ensuring pathologists remain at the forefront of medical innovation (Bosman, 20000).

6. **Reparation and Accountability**: Ross discusses the duty of reparation, emphasizing the importance of rectifying harm we have caused, which is particularly relevant in clinical settings where outcomes may not always align with expectations (Ross, 1930/2002). In the context of patient-facing roles and treatment management, the potential for diagnostic errors or adverse outcomes necessitates a robust system of accountability. Pathologists must embrace a culture of continuous quality improvement and be prepared to make amends when necessary (Nakhleh, Coffin, & Coper, 2006).

Healthcare systems support the duty of reparation through mechanisms like morbidity and mortality conferences, which provide platforms for learning from errors and implementing systematic changes. Recognizing and addressing errors are critical components of ethical medical practice, especially in roles involving complex diagnostic processes. When a diagnostic error is identified, a pathologist can lead a review of the laboratory procedures, implement changes to prevent future errors, and directly communicate the situation to the affected patient, explaining the steps taken to rectify the issue.

7. **Gratitude and Interprofessional Respect**: The success of interventional pathology hinges on collaboration across disciplines (Ewashen, McInnis, & Murphy,

2013). Demonstrating gratitude for the contributions of all healthcare professionals and fostering a respectful, team-based approach to patient care are essential for achieving optimal outcomes.

Effective interventional pathology depends on mutual respect and appreciation across various healthcare disciplines. An example may be a pathologist organizes regular team meetings to learn from and acknowledge and appreciate the efforts of all staff involved in patient care, from technicians to nurses, which helps to build a supportive and collaborative work environment.

Ethical Imperatives for the Healthcare Organization

At the Organizational Level, the ethical compass guiding healthcare organizations, especially within pathology, can find a foundation in Ross' delineation of prima facie duties. These duties align closely with the aspirations of contemporary healthcare to deliver patient-centered care and equitable access to services. Ross' framework, with its critique of consequentialism, advocates for an ethical approach that values the multiplicity of ethical principles and the intrinsic worth of actions beyond their outcomes. This emphasizes the importance of an ethical framework that integrates a holistic approach, balancing outcomes with the inherent dignity of patient care and professional integrity (Ross, 1930/2002).

The administration level can echo this commitment, with leaders exemplifying Ross' virtues of moral responsibility, compassion, and a dedication to self-improvement. This leadership paradigm fosters an environment where patient stories are honored, and ethical decisions are guided by a blend of deontological principles and Ross' nuanced understanding of moral duties. For instance, a healthcare organization might implement a policy ensuring that all patients, regardless of socioeconomic status, have equal access to advanced diagnostic tools. This policy could be driven by Ross's duty of

justice and beneficence, aiming to eliminate disparities in healthcare access and improve outcomes across diverse populations.

Such an approach ensures that operational efficiencies, legal compliance, and stakeholder relations are not merely transactional but are imbued with ethical significance, reflecting the organization's core values and commitment to patient welfare. By integrating ethical considerations into every decision, from policy implementation to daily operations, healthcare organizations can create a culture that not only meets regulatory standards but also advances the moral dimensions of healthcare delivery.

The interplay between organizational ethics and Ross' prima facie duties illuminates the path for ethically evaluating the evolving role of the interventional pathologist. Within this dynamic, the duties of fidelity, justice, beneficence, and their counterparts intertwine with the organizational ethos, fostering an environment where ethical considerations are woven into the fabric of ethical leadership, culture of the organization, stakeholder engagement, quality improvement, priority of patient care, decision-making, and policy formulation (Paraizo & Begin, 2020; Nelson, Taylor, & Walsh, 2014). This integration ensures that the expansion of the pathologist's domain is navigated with a deep commitment to ethical principles, thereby enhancing the symbiotic relationship between individual ethical obligations and the overarching goals of healthcare organizations.

By adopting policies that resonate with Ross' duty of justice, organizations can implement practices that ensure equitable access to diagnostic services. Examples could include introducing sliding scale fees for low-income patients and prioritizing urgent cases, thereby manifesting Ross' ethical principles at an institutional level. Such policies not only demonstrate a commitment to justice and beneficence but also foster an organizational culture that places patient welfare and ethical integrity at the forefront of healthcare delivery.

In summary, the framework provided by W.D. Ross offers a comprehensive and adaptable ethical guide for healthcare organizations navigating the complexities of modern medical practice. By embracing Ross' principles, healthcare organizations, particularly those within the domain of pathology, can ensure that their evolution is rooted in ethical excellence, thereby guaranteeing a future where patient care, professional integrity, and innovation are harmoniously aligned.

Looking Ahead

This ethical application is not a one-time task but a continuous process, necessitating ongoing dialogue among pathologists, their interdisciplinary colleagues, and stakeholders to adapt and refine ethical practices in response to emerging challenges and technological advancements in pathology. As pathology evolves, more exploration of ethical scenarios and dilemmas will be essential. In the subsequent chapter, this ethical framework will be applied to case studies to critically evaluate the key implications and considerations of expanding the pathologist's role. Future research and discussion will deepen understanding of how these ethical principles apply in practice, ensuring that pathologists are equipped to fulfill their expanded roles in a manner that prioritizes patient welfare, advances medical science, and upholds the dignity of the profession.

By adhering to the adapted prima facie duties, pathologists, physician colleagues from other specialties, and their housing organization can navigate the ethical complexities of their evolving role, ensuring that their contributions to patient care, precision medicine, and collaborative healthcare are grounded in ethical principles. This ethical framework serves as a guide for pathologists as they navigate the challenges and opportunities of their expanded role, striving always to advance the field of pathology in alignment with the highest ethical standards.

Chapter Conclusion

This chapter has explored interventional pathology's transformative significance, rooted in the recognition of the wealth and significance of the field of pathology in nearly every medical specialty and evolving patient care paradigm. Illustrated examples emphasize the imperative to bridge existing gaps and revitalize the field. The construction of an ethical framework, consisting of W.D. Ross' prima facie duties to be applied to the pathologist, their physician colleagues, and organization, has been established to further the analysis of these issues. This synthesis of ethical perspectives addresses technological complexities and nurtures ethical leadership and responsible care.

The paper addresses the persistent challenges of physician shortages across specialties, initiatives to expand the scope of practice for nurse practitioners and physician assistants have emerged as contentious strategies. These legislative efforts highlight a broader opportunity for pathologists to assert their unique capabilities, particularly in areas experiencing acute shortages (e.g., dermatology). By leveraging their expertise to perform specialized procedures like biopsies, pathologists can significantly contribute to alleviating service gaps, thereby ensuring more comprehensive and timely patient care.

As healthcare evolves, this chapter guides towards a more ethically conscious and patient-centered future for pathology. The subsequent chapter will conduct a comprehensive ethical analysis, using the framework established here, to delve deeper into the ethical considerations arising from this transformative shift, exploring their intersection with the intricacies of interventional pathology.

Chapter Two:

Prima Facie Ethics in the Practice of Interventional Pathology

This chapter delves into a series of four case studies that exemplify the critical roles pathologists can play in patient care, underscored by an ethical analysis based on W.D. Ross' prima facie duties and organizational ethics. These cases are carefully chosen to illustrate the theoretical applications of ethical principles and to showcase the practical implications of pathologists' work in the healthcare landscape. Each case will be analyzed to reveal how pathologists navigate complex clinical scenarios, thereby contributing significantly to the medical field and improving patient outcomes. This exploration aims to highlight the indispensable value of pathologists beyond traditional laboratory roles, positioning them as integral stakeholders in the broader medical community. Through these discussions, we aim to enhance understanding of the dynamic interplay between ethical theory and clinical practice, ultimately arguing for a redefined perspective on the pathologist's role in modern medicine.

Integrating pathologists into patient-facing domains of healthcare organizations mirrors the profound ethical considerations that underscore the entire healthcare landscape. As illuminated by the research of Belde & Secours (2007), Bhagwat & Pai (2020), Castlen et al. (2017), and Chauhan et al. (2021), these broad considerations span the intricate dynamics of the physician-patient relationship, as delineated by Emanuel and Emanuel (1992) and Pellegrino and Thomasma (1993).

The principles of healthcare organizational ethics are embedded in every interaction, whether in the pathology laboratory, at the patient's bedside, or in the executive boardroom. As illustrated by Foglia et al. (2013) and Gunderman (2020), even the complex business practices and organizational dynamics within healthcare institutions must be guided by ethical values. This holds for the delicate balance

between commerce and calling, as discussed by Phelan (2020), where the principles of beneficence and patient advocacy must take precedence.

Moreover, ethical considerations extend beyond the confines of individual healthcare facilities to encompass societal resource allocation and justice, as outlined by Persad, Wertheimer, and Emanuel (2009). Their work on scarce medical interventions and Maddox's (1998) discussions on resource allocation highlight the need for ethical decision-making that balances fairness with maximizing benefits.

A patient-centered approach, advocated by Michele Mitchell (2022), brings patient-pathologist interactions to the forefront, aligning with the broader philosophy of patient engagement and empowerment emphasized by Jackson et al. (2021) and Sorell et al. (2022). These perspectives underscore the role of pathologists in advocating for equitable access to safe and quality diagnostic care, bridging gaps in trust and communication.

Overall, the amalgamation of ethical considerations from various dimensions paints a holistic portrait of healthcare organizational ethics, highlighting the intricate interplay between patient care, administrative practices, resource allocation, technological advancements, and patient empowerment (Lilley & Delille, 2022; Lilley & Mirza, 2023; Lynn et al., 2007; Maddox, 1998; Mitchell, 2022). As elucidated by Belde and Secours (2007), ethics in healthcare are transitioning towards a holistic organizational ethic that transcends the traditional boundaries of clinical contexts. Furthermore, as we navigate the ethical landscape shaped by Bhagwat and Pai (2020), it becomes apparent that the virtues essential to pathologists—compassion, discernment, trustworthiness, integrity, and conscientiousness—must be more than aspirational traits; they need actionable frameworks to be effectively realized in daily medical practice. In this context, integrating W.D. Ross's prima facie duties offers a robust mechanism for bringing these virtues to life. For instance, the duty of fidelity

(being truthful and keeping promises) enhances trustworthiness and integrity, while the duty of beneficence (acting in the best interest of others) and non-maleficence (avoiding harm) directly reflect compassion in patient care.

C. Meyers (2011) further explores the adaptability of Ross's prima facie duties to modern ethical challenges, proposing a naturalized approach that brings these theoretical concepts into direct application within the healthcare setting. Ross's emphasis on justice—ensuring fairness in the distribution of healthcare resources— supports the equitable treatment goals that are central to pathologist roles (Castlen et al., 2017). These scholars highlight the evolving healthcare dynamics where administrative presence is increasing, thus underscoring the need to balance physician autonomy with patient-centered care. By advocating for Ross's ethical duties as foundational pillars, pathologists can ensure that their clinical judgments and interactions not only uphold but champion these virtues, thereby fostering a more ethically coherent and person-centered healthcare environment.

Additionally, incorporating Ross's duties into the virtue ethics framework provides a structured approach to ethical decision-making, ensuring that the pathologist's role in advocating for equitable access to diagnostic care remains aligned with the broader goals of patient empowerment and engagement. As articulated by Lilley & Mirza (2023) and Lynn et al. (2007), advancing technologies and shifting patient expectations demand a responsive and principled approach to healthcare, one that seamlessly integrates ethical considerations with clinical expertise.

This holistic view of healthcare organizational ethics, enriched by the practical application of Ross's duties, paints a comprehensive portrait of how pathologists can navigate the complex tapestry of patient care, administrative practices, and technological advancements with ethical integrity and virtue-driven purpose. This chapter aims to demonstrate how these virtues and duties, essential to pathologists, come to life in

complex clinical scenarios, not only reinforcing the professional integrity of pathologists but also illustrating their pivotal role in a person-centered healthcare environment.

Case Study One: Revolutionizing Patient Care through Pathologist-Led Collaborations

This case study explores the significant role of pathologists in leading interdisciplinary team collaborations beyond the conventional laboratory setting. Using W.D. Ross's ethical framework, this analysis will delve into how a hematopathologist integrates cutting-edge research into clinical practice, enhancing patient care and fostering a culture of continuous learning and innovation within her healthcare team. By examining the application of Ross's prima facie duties such as fidelity, justice, beneficence, and self-improvement, this case underscores the evolving roles of pathologists in transforming healthcare delivery and patient outcomes.

Despite her extensive experience, Dr. Selena, a hematopathologist, remains committed to expanding her expertise in hematologic oncology, a field where diagnostic and treatment paradigms are rapidly evolving. She regularly sets aside time for selfeducation, engaging with the latest research, and participating in professional forums to discuss innovative practices in leukemia treatment. This dedication not only keeps her knowledge current but also enhances the care provided to patients like Mr. Greer.

Recently, Dr. Selena introduced a monthly tumor board series within the hematology-oncology care team, from laboratory technicians and pathology assistants to nurses and physicians, bringing in experts to discuss emerging trends and best practices in oncology. It was through this initiative that she learned about a new biomarker for leukemia, which she then applied in patient Mr. Greer's case, to identify an effective, targeted treatment option. Her proactive approach to learning and adaptation exemplifies
the positive ripple effect of self-improvement on patient outcomes and the collective expertise of the healthcare team.

Prima Facie Duties in Pathologist-Led Tumor Boards

Dr. Selena exemplifies the duty of **fidelity**, which Ross defines as the obligation to be truthful and keep promises. In the context of the tumor board, her commitment to fidelity manifests through her consistent and accurate communication with both colleagues and patients. This transparency is crucial, as it builds trust and reliability within the team, ensuring that all members, from laboratory technicians to physicians, are equally informed and aligned in their understanding of patient cases and treatment options (Ross, 1930). By maintaining high standards of honesty, Dr. Selena not only upholds her ethical responsibilities but also fosters a collaborative environment that is conducive to effective patient care.

Justice, according to Ross, involves the fair and equitable distribution of resources and opportunities, or happiness (Ross, 1930). Dr. Selena advocates for this principle by ensuring that all patients, including Mr. Greer, have access to the most effective treatment options available. This duty is particularly pertinent in the allocation of new medical technologies and treatments, such as the biomarker for leukemia, which can often be limited by factors such as cost and institutional priorities. By pushing for equitable treatment access, Dr. Selena addresses potential disparities in healthcare provision, thereby promoting fairness and equity within her clinical practice (Lilley & Mirza, 2022).

The duty of **beneficence** is central to Dr. Selena's role in the tumor board. Ross articulates this duty as the obligation to act in ways that benefit others, particularly in terms of improving patient outcomes (Ross, 1930). In applying her expertise to introduce new diagnostic and treatment modalities, Dr. Selena significantly enhances the quality of care for her patients by seeking to positively tip the benefits-to-risks ratio. This proactive

approach not only benefits individuals like Mr. Greer but also sets a standard for patient care within the team, demonstrating the powerful impact of beneficence in clinical settings, especially when challenging patient care situations emerge.

Self-improvement is a duty that Dr. Selena passionately embraces. Ross describes self-improvement as the obligation to enhance one's knowledge and skills (Ross, 1930). Dr. Selena's commitment to this duty is evident in her continuous learning and professional development and in her innovative efforts to improve healthcare delivery. For instance, she has established a tumor board series that serves as a platform for ongoing discussions and reviews of new medical approaches and technologies. This initiative allows her and her colleagues to explore cutting-edge developments in the field, ensuring that their practice remains at the forefront of medical science. By doing so, Dr. Selena not only enhances her capabilities but also significantly contributes to the collective expertise of her healthcare team. This commitment to self-improvement fosters a culture of continuous education and innovation within her team, encouraging her colleagues to pursue their own growth and thereby elevating the overall standard of care they provide.

In examining the **Organizational and Inter-Specialty Collaboration**, Ross's framework implicitly supports the duty of collaborative practice, though it is not explicitly named as one of the prima facie duties (Meyers, 2011). In the case of Dr. Selena, the integration of various medical specialties within the tumor board exemplifies this duty. The collaborative environment she fosters allows for a holistic approach to patient care, which integrates diverse medical insights and optimizes the use of resources (Paraico & Begin, 2020). This interdisciplinary effort is crucial for advancing medical innovation and improving patient outcomes, highlighting the importance of teamwork and cooperation in healthcare settings (Engel & Prentice, 2013).

The Benefits of Expanded Roles

Dr. Selena's leadership within the tumor board serves as a prime example of the significant benefits of expanded roles for pathologists in interdisciplinary settings. While tumor boards are common practice in much of American hospitals—especially academic and cancer treatment centers—they are not ubiquitous nor homogenous (Specchia et al., 2020). Building on this foundation of interdisciplinary collaboration, extending the role of pathologists to include participation in hospital rounds as 'rounding pathologists' can further magnify these benefits, enhancing the integration of clinical insights with laboratory precision. (CAP, 2024).

Integrating pathologists into collaborations like tumor boards, and hospital rounds, could significantly enhance patient care by bridging the gap between clinical observations and laboratory diagnostics. Studies underscore the multifaceted benefits of this practice, not only in improving patient outcomes but also in enriching the educational environment for medical staff and students. For instance, interprofessional collaboration during rounds can expedite diagnostic accuracy and treatment efficiency, thereby enhancing patient safety and care quality (McGowan, & Vaccarella, 2021). Moreover, the presence of pathologists in rounding teams facilitates real-time discussions and decision-making, which is critical for managing complex cases like Mr. Greer's, ensuring that all team members, including physicians and nurses, are aligned in their understanding and approach (McKenna, & Ashton, 2006). This collaborative practice not only embodies the ethical duty of beneficence by directly benefiting patients through improved care outcomes but also aligns with Ross's principle of justice by promoting equitable access to expert knowledge and resources. Additionally, such interdisciplinary engagement supports the duty of self-improvement among healthcare providers, fostering a learning environment that is reflective, adaptive, and inclusive of cutting-edge medical science (Smith & Jones, 2010).

The application of four prima facie duties—fidelity, justice, beneficence, and selfimprovement—and organizational ethics provides a valuable framework for understanding these benefits. These benefits include enhanced patient care, increased innovation, professional development, and increased visibility of pathologists.

Beneficence plays a crucial role in enhancing patient care. By actively integrating new research findings and treatment options into clinical practice, Dr. Selena acts for the benefit of her patients, ensuring they receive the most effective care (Sandman & Liliemark, 2017). The ethical duty to improve patient outcomes drives her to lead integrative discussions that include diverse medical perspectives, thereby creating more comprehensive treatment strategies (Ross, 1930). This integrated approach not only aligns with the ethical principle of beneficence but also exemplifies best practices in patient-centered care, which are fundamental to the ethos of medical ethics (Pellegrino & Thomasma, 1988).

Self-Improvement and Fidelity are critical to fostering a culture of innovation. Dr. Selena's commitment to self-improvement through continuous education and her adherence to fidelity by truthfully and accurately sharing information encourage a team environment where innovation thrives. Regular exposure to cutting-edge research and clinical practices allows the team to stay at the forefront of medical science, epitomized by precision medicine (Vranic & Gatalica, 2021), pushing the boundaries of what is possible in-patient care (Louis, Virgin, & Asa, 2011). This commitment to innovation not only enhances the team's capabilities but also ensures that they are utilizing the latest and most effective treatments available, a practice deeply rooted in the ethical responsibilities of medical professionals (Ross, 1930).

The Self-Improvement duty extends beyond personal growth to encompass the professional development of the entire care team. Dr. Selena's leadership in the tumor board promotes an educational environment where team members from various

disciplines share knowledge and experiences. This collaborative learning process enhances the professional skills and understanding of all team members, which is essential for maintaining high standards of care and adapting to the rapidly evolving field of medicine (Ross, 1930). The benefit of professional development is a direct outcome of the ethical commitment to self-improvement and beneficence, ensuring that the team not only grows together but also excels in delivering high-quality care (Wood et al., 2019).

The duties of Justice and Beneficence are pivotal in increasing the visibility of pathologists, which in turn benefits recruitment and corrects misconceptions about the profession (Hernandez et al., 2022; Hung & Jarvis, 2011; McCloskey et al., 2020). By taking a prominent role in tumor boards and demonstrating the critical impact of pathologists on patient care, Dr. Selena helps to elevate the profile of the profession. This increased visibility addresses recruitment challenges by attracting more candidates to the field and correcting the longstanding misconceptions about pathologists' roles as merely laboratory-bound professionals (Ross, 1930). Furthermore, her visible leadership enhances collaborations across specialties and builds patient engagement and trust, fostering a better understanding of the vital contributions pathologists make to healthcare.

Dr. Selena's involvement in leading tumor boards is a model of how ethical principles can guide the expansion of roles in healthcare, particularly for pathologists. By adhering to Ross's prima facie duties, she not only improves patient care but also fosters a dynamic environment of professional growth and innovation. These efforts address the immediate needs of her patients and the broader challenges facing the pathology profession. Her example underscores the potential of ethical leadership in transforming healthcare practices and highlights the profound impact of increased visibility and interdisciplinary collaboration in enhancing the healthcare landscape.

Conclusion

Dr. Selena's role in the tumor board as a hematopathologist highlights the practical application of Ross's prima facie duties in a modern healthcare setting. By demonstrating fidelity, justice, beneficence, and self-improvement, she not only enhances patient care but also advances the professional capabilities of her team. This case study underscores the importance of pathologists' leadership in interdisciplinary collaborations and provides a valuable model for other healthcare settings seeking to optimize patient outcomes and team performance.

Case Study Two: Pathologists at the Forefront of Personalized Medicine and Patient Engagement

This analysis highlights the expanding role of pathologists in personalized medicine, particularly through direct patient interactions. Dr. Harikrishnan, a cytopathologist, engages directly with patients to discuss complex diagnostic results, thereby enhancing the therapeutic relationship and patient autonomy. Through the ethical lenses of beneficence, non-maleficence, fidelity, and gratitude, this case examines the implications and benefits of pathologist-led patient consultations in crafting tailored treatment strategies.

In an innovative shift towards patient-centered care and promise of decrease cost expenditure, a leading hospital system is extending the role of pathologists to include direct interactions with patients, particularly in the context of personalized medicine for complex diseases like melanoma. Examples include therapeutic apheresis, bone marrow biopsy (BMBx), and fine needle aspirations (FNA); often but not uniformly performed by pathologists in the country, Dr. Harikrishnan, known for her expertise in cytopathology and molecular genetics, is pioneering a program that emphasizes direct patient consultations alongside her diagnostic responsibilities. She performs FNAs herself, not just for the technical precision it requires but also to minimize the distress

such procedures can cause, highlighting her dedication to the patient's comfort and wellbeing. This approach allows for rapid diagnostic insights, enabling timely and tailored treatment decisions.

In a notable case, Dr. Harikrishnan meets with Mrs. Lee, a patient undergoing melanoma treatment, to discuss the results of her FNA. She explains the significance of the detected genetic markers and how they influence the choice of therapy, making complex genomic information accessible and understandable. This conversation empowers Mrs. Lee to actively participate in her care, making informed decisions about her treatment options.

Prima Facie Duties in Pathologist-Patient Collaboration

Dr. Harikrishnan's approach to performing FNAs herself, emphasizing technical precision and minimizing patient discomfort and harm, exemplifies the duty of **non-maleficence** (Ross, 1930). This practice not only ensures high-quality medical procedures but also addresses the emotional and physical comfort of patients, a critical aspect of patient-centered care. In the context of personalized medicine, where treatments are increasingly complex and potentially invasive, such consideration is paramount to uphold the ethical principle of doing no harm (Mirnezami et al., 2012). The use of advanced sampling techniques that prevent cell degeneration and enhance sample quality directly contributes to non-maleficence by ensuring that diagnostic procedures are not only less invasive but also more accurate (Grohs, 1988; Niento, et al., 2022). This reduces the likelihood of misdiagnosis and unnecessary repeat procedures, which can be physically and emotionally taxing for patients.

Moreover, non-maleficence, while traditionally focused on avoiding physical harm to patients, can be extended to include avoiding financial harm, which is increasingly relevant in today's healthcare context (Pisu & Martin, 2022). By implementing costefficient diagnostic procedures, Dr. Harikrishnan not only minimizes the physical

discomfort associated with such tests but also reduces the financial burden on patients. This aspect is highlighted by the findings of Asif et al. (2022), which demonstrated substantial cost savings when hematopathologists conduct bone marrow biopsies—a similar procedure to FNAs—in physician offices compared to more expensive settings. These savings reflect a commitment to minimizing overall harm, thus fulfilling the ethical duty of non-maleficence in a broader sense.

In addition to the financial and physical considerations, non-maleficence should also encompass minimizing social burdens that often accompany medical treatments. Recognizing the holistic needs of patients includes understanding the emotional and logistical strains on family caregivers, which can be significant. By offering more personalized care, Dr. Harikrishnan not only addresses the direct needs of the patient but also indirectly supports their wider support network. This approach can enhance overall health outcomes by reducing the stress and disruption often associated with ongoing medical care, thus aligning with the ethical commitment to do no harm in a comprehensive and compassionate manner.

Fidelity involves the upholding of truthfulness and trust in professional relationships. In the context of Dr. Harikrishnan's practice, fidelity is demonstrated through her transparent communication with patients about the implications of their diagnostic results. By clearly and honestly explaining complex genomic data, she ensures that Mrs. Lee is well-informed and able to trust the information provided, which is crucial for building a strong patient-physician relationship and empowering patients to make informed decisions about their treatment options (Omonzejele, 2009). Integrating the potential economic and diagnostic benefits into this discussion highlights how fidelity is not only about accurate information sharing but also about ensuring that patients receive high-quality care without undue financial strain (Pisu, 2022; Asif 2022; Grohs, 1988).

Dr. Harikrishnan's commitment to providing cost-effective and precise diagnostic services upholds her moral obligation to fidelity by reinforcing trust through transparency about the benefits of direct pathologist involvement. This approach to precision medicine not only empowers patients like Mrs. Lee to make informed decisions about their healthcare, managing their treatment fully aware of the economic and medical implications, but also mitigates additional burdens such as prolonged hospital stays, the likelihood of medical errors, and extensive patient suffering (Grohs, 1988; Asf et al., 2022). By minimizing these risks, fidelity in communication helps reduce social and psychological burdens on patients and their families, thus avoiding the cascade of multiple interventions that can erode trust and increase emotional stress (Boothe et al., 2018).

Ross's duty of **gratitude** in medical practice extends beyond mere appreciation it deeply influences the therapeutic relationship between healthcare providers and patients (Ross, 1930 and Aparicio et al., 2018). In Dr. Harikrishnan's interactions with Mrs. Lee, gratitude is not just about acknowledging her patient's struggles and engagement; it is an ethical gesture that recognizes the patient's active role in their own healthcare journey. This recognition, consistent with Ross' recognition of the beneficiary, can significantly empower patients, making them feel valued and respected in their medical encounters (Booth, et al., 2018). Ethically, this gratitude does more than enhance interpersonal interactions; it reaffirms the patient's dignity and autonomy, critical elements in ethical patient care. Such an environment not only improves patient satisfaction but may also elevate adherence to treatment protocols, as patients feel more invested and involved in their healthcare decisions. The act of expressing gratitude, therefore, becomes a powerful tool for reinforcing mutual trust and loyalty, fostering a partnership rather than a traditional patient-provider hierarchy.

The ethical dimension of **organizational and inter-specialty collaboration** in healthcare transcends operational efficiency to embody the ethical principle of justice, demanding that healthcare systems provide equitable care through the integration of various specialties (Ferrari et al., 2018). Dr. Harikrishnan's initiative in pathologist-led patient consultations is a prime example of how multidisciplinary collaboration can effectively bridge gaps between different areas of expertise, ensuring comprehensive and cohesive patient care (Robichaux & Sauerland, 2012; Lee, 2020). This approach minimizes the risks of fragmented care and promotes an ethical culture within the organization by valuing each specialist's contribution, thereby enhancing morale, and encouraging a team-based approach to healthcare (Lee, 2020).

The economic and procedural efficiencies highlighted in BMBx research by Asif et al. (2022) and Ehsan (2023), and Grohs (1988) with FNA resonate with the benefits seen in Dr. Harikrishnan's model where pathologists' direct involvement in patient care leads to significant cost reductions and enhanced diagnostic precision. These efficiencies exemplify the benefits of integrating pathologists directly into patient care teams, ensuring high diagnostic accuracy and stronger patient-provider relationships, critical for personalized medicine. By adopting a similar model of streamlined diagnostic procedures led by specialized pathologists, the organization can achieve notable efficiencies in personalized medicine contexts, echoing Ehsan's (2023) advocacy for interventional pathology as a transformative approach in healthcare (Asif, et al., 2022). This collaborative model not only demonstrates the practical benefits of inter-specialty cooperation but also serves as a template for future healthcare innovations where pathologists play a central role in patient care.

The Benefits of Expanding Pathologist-Patient Collaboration

Dr. Harikrishnan's direct involvement in conducting FNAs and engaging with patients to discuss complex diagnostic results exemplifies her commitment to

personalized and informed patient care. This hands-on approach not only tailor's treatment plans to the specific genetic profiles of diseases like melanoma but also empowers patients to make well-informed decisions about their treatment options (Suleiman, 2015). By facilitating these in-depth consultations, she enhances patient understanding and participation, which are crucial for diseases requiring complex decision-making (Carlson et al., 2010). Pathologist-patient interactions have been shown to be empowering and enlightening for patients (Irvine, 2019 & Mitchell, 2022) Such transparency builds a robust foundation of trust and mutual respect, essential for patient satisfaction and compliance—key factors in successful treatment outcomes.

Additionally, Dr. Harikrishnan's model promotes interdisciplinary collaboration by integrating the expertise of various specialties such as cytopathology and oncology, enriching the treatment planning process and improving overall patient outcomes. This collaborative environment not only leverages collective medical expertise but also fosters a culture of innovation within the healthcare team (Suleiman, 2105). Furthermore, by increasing the accuracy and precision of diagnostics and treatments, this approach substantially reduces the likelihood of medical errors, thereby mitigating potential harm to patients. Such reductions are crucial in enhancing patient safety, a core component of healthcare quality (Asif et al., 2022).

While the primary focus remains on patient care and collaboration, the model also introduces significant economic and procedural efficiencies. Drawing on insights from similar diagnostic settings, such as those documented by Asif et al. (2022), this approach not only ensures medical efficacy but also enhances cost-effectiveness, crucial in today's resource-constrained healthcare environment. These combined benefits highlight how pathologists like Dr. Harikrishnan can redefine their roles, setting a sustainable model for integrating advanced diagnostic care within patient-centered treatment plans.

Conclusion

Dr. Harikrishnan's pioneering role in direct patient interactions within the realm of personalized medicine exemplifies the substantial benefits of expanding pathologist duties beyond traditional laboratory boundaries. By personally conducting FNAs and explaining complex diagnostic results, she enhances patient care through personalized treatment plans and improves patient autonomy and engagement. This approach also fosters interdisciplinary collaboration and economic efficiencies like those seen in other specialized procedures, significantly reducing healthcare costs (e.g., precise test selections, higher sample quality, fewer parties' involvement, improve diagnostic accuracy), while improving outcomes (Asif, 2022; Grohs, 1988). Dr. Harikrishnan's model potentially reduces litigation costs related to medical errors and the mismanagement of patient care, including issues arising from over-treatment and under-treatment (McCabe, 2017; Nakhleh et al., 2006). These financial and legal benefits further underscore the value of integrating pathologists more deeply into patient care teams. Dr. Harikrishnan's case robustly supports the broader inclusion of pathologists in direct patient care, highlighting how such a shift can transform healthcare delivery by leveraging pathologists' unique skills in enhancing both the quality and efficiency of medical treatment in the era of personalized medicine.

Case Study Three: Pathologists at End-of-Life Care Decisions

This hypothetical case study presents a pathologist's proactive role in end-of-life care decisions, illustrating the critical impact of pathologists in exploring experimental treatment avenues for patients with terminal illnesses. Employing W.D. Ross' four ethical duties of reparation, beneficence, non-maleficence, and fidelity, this analysis will explore how pathologists can extend beyond diagnostic duties to significantly influence patient care decisions, especially when standard treatments fall short. This pathologist's

involvement not only enhances patient care through innovative approaches but also addresses ethical considerations in providing equitable and compassionate treatment options.

Christine, a 68-year-old woman battling late-stage pancreatic cancer, has faced numerous challenges with her treatment. Despite the extensive efforts, the conventional treatment avenues have shown limited success. Her oncologist, Dr. Lee, suggests transitioning to palliative care, due to the unfavorable prognosis with current treatments and reluctance to advocate for experimental treatments with uncertain risks and benefits, but Christine's unwavering spirit yearns for more time with her grandchildren, prompting an exploration of potential experimental treatments.

Upon learning about Christine's situation, Dr. Muhammed, a molecular genetics pathologist specializing in cancer genomics, takes a proactive step. Reflecting on the journey of Christine's care, she recognizes that earlier stages might have benefitted from a more aggressive search for novel treatment avenues, given her specific cancer subtype's poor response to standard therapies. Motivated by a sense of responsibility and the desire to amend past treatment limitations, Dr. Muhammed conducts an exhaustive search for any newly discovered markers that might offer Christine a glimmer of hope.

Her efforts uncover a mutation in Christine's tumor that recent studies have linked to a positive response with an experimental drug. Dr. Muhammed presents this finding to Dr. Lee and, after a comprehensive discussion with Christine about the potential risks and benefits, acknowledging curative outcomes may not come to fruition, she consents to participate in the trial. Dr. Muhammed's initiative is not only about seeking new treatment options but also about addressing the oversight in not considering experimental pathways earlier in Christine's care.

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Reparation. In the context of healthcare, the principle of reparation is especially crucial when addressing cases like Christine's, where the initial treatment strategies might have fallen short. Dr. Muhammed's proactive search for experimental treatments reflects a commitment to rectifying these oversights and the necessity for adaptability, demonstrating a deep ethical responsibility to expand Christine's treatment possibilities (Ross, 1930 & Lantos, 2018). This pursuit not only aims to correct previous care limitations but also embodies a compassionate determination to explore every possible option that could extend Christine's time with her loved ones (Pellegrino & Thomasma, 1993).

This approach goes beyond mere correction; it advocates for a responsive and adaptable model of patient care that embraces continuous evaluation and application of emerging scientific data. Dr. Muhammed's efforts highlight the dynamic nature of ethical reparation, which involves an active commitment to applying new knowledge for the patient's benefit. However, this ideal is often challenged by the realities of healthcare provision. Counterarguments to this approach include the substantial time and financial resources required for ongoing professional development, which may not be feasible for all healthcare settings, particularly those with limited budgets or in rural areas (Sadat et al., 2013). Furthermore, the rapid pace of medical advancements can outstrip the ability of institutions to provide timely training, and there may be an institutional or cultural resistance to adopting new practices perceived as unproven or risky (Bauer et al., 2019). These factors can hinder the application of the latest research and technologies in patient care, suggesting a need for more supportive policies and infrastructure that facilitate continuous learning and ethical practice across all healthcare environments.

Such actions as Dr. Muhammed's set a precedent for future care, emphasizing that medical professionals should persistently seek to improve past decisions with new insights, thereby enhancing the overall quality of care and ethical standards in the

medical field. Motivated by her desire to spend time with her grandchildren, Christine's case aligns with Kuczewski (1999) discussions of ethical family-centered decision-making, where the evolving understanding of treatment options and patient needs must continuously inform the care process.

The principle of **beneficence** is clearly demonstrated by Dr. Muhammed's efforts (Beauchamp & Childress, 2019 and Pellegrino & Thomasma, 1993). By identifying a mutation that responds well to an experimental drug, she not only improves Christine's quality of life but also potentially extends her time with her family (Sulmasy, 2009). This pursuit of beneficial outcomes, even in the face of terminal illness, highlights the proactive and compassionate application of beneficence in clinical practice.

Dr. Muhammed's exploration of experimental treatments addresses multiple systemic barriers that often deter physicians from pursuing novel therapeutic avenues. These barriers include the high costs associated with new treatments, limited access to necessary technologies and training, and the significant time and effort required for providers to adapt to new approaches (Rojewski et al., 2018). Additionally, there is often a cultural inertia within the medical community, a reluctance rooted in fear of the unknown and potential complications, which can stifle innovation (Ashfold et al., 2018; Boonstra & Broekhuis, 2010). Such hesitancy may also reflect a conflict between the ethical duty of beneficence—pursuing actions that benefit the patient—and the practical challenges of implementing these actions. This scenario underscores the complex interplay between a physician's duty for self-improvement and the real-world constraints that might hinder this ethical obligation. By actively seeking to overcome these barriers, Dr. Muhammed not only advocates for more patient-centered care but also prompts a broader discussion about the need for healthcare systems to better support continuous learning and adaptation in medical practice.

In aligning with the principle of **non-maleficence**, Dr. Muhammed ensures that all interventions avoid causing harm. This is particularly pertinent when introducing patients to experimental treatments, which can carry significant risks (Beauchamp & Childress, 2019). Dr. Muhammed's thorough informed consent process, where Christine is fully briefed on the potential risks and realistic outcomes of the experimental therapy, ensures that Christine's participation is grounded in a clear understanding of the possible implications, thereby adhering to the principle of doing no harm (Josen, et al., 2015).

Dr. Muhammed embodies the duty of fidelity by transparently communicating with both Christine and Dr. Lee about the potential and limitations of the experimental treatment (Sokol, 2006). This openness respects Christine's autonomy, allowing her to make an informed decision based on a truthful assessment of her options (Ross, 1930 & Pellegrino & Thomasma, 1993). It reinforces the trust patients place in healthcare professionals, particularly in sensitive and potentially life-altering situations.

Benefits of Pathologists and End-of Life Decision Making

Dr. Muhammed's proactive approach in searching for experimental treatment options for Christine exemplifies the significant benefits of involving pathologists in endof-life care decisions. By utilizing her expertise in cancer genomics, Dr. Muhammed identifies a mutation that responds to experimental therapy, demonstrating the crucial role pathologists can play in extending viable treatment options when standard therapies fail (Smith, et al. 2021). This not only aligns with the ethical principle of beneficence aiming to do good by improving the patient's quality of life—but also illustrates the value of specialized knowledge in making informed, impactful medical decisions (Beauchamp & Childress, 2019).

Dr. Muhammed's proactive search highlights the significant role pathologists can play in bridging the gap between available and emerging treatments. By pursuing novel therapies, she not only advocates for patient-centered care but also challenges existing practice norms constrained by institutional policies and resource limitations. This case exemplifies how pathologists can be pivotal in pushing the boundaries of conventional treatment, advocating for ethical practices that integrate new scientific findings into clinical decision-making.

Incorporating pathologists like Dr. Muhammed in the decision-making process for cases like Christine's ensures that care strategies are comprehensive and ethically sound (Stevens, 2022). Her effort to rectify past treatment oversights by seeking new opportunities for care addresses the principle of reparation and shows a commitment to justice by striving to provide equitable care options (Ross, 1930 & Meyers, 2011). This role significantly enhances the ethical delivery of healthcare by ensuring that decisions are not only medically informed but also morally considered, supporting the overall integrity of patient care. While exploring these innovative treatments can enrich the standard of care, it also poses potential liability issues if the treatments do not align with comprehensive informed consent and are supported by emerging evidence, they may be protected under the framework of exploratory or compassionate use, thereby mitigating liability risks (Allen, 2014; Sidhom & Poulsen, 2006). It is essential that these decisions are made transparently, documented thoroughly, and involve multidisciplinary consultation to align with legal standards and ethical best practices.

Dr. Muhammed's active search for innovative treatments in Christine's case not only demonstrates a commitment to beneficence but also highlights the role of pathologists as advocates for patient-centric innovation in clinical settings. However, this pursuit must be carefully balanced to ensure that the motivation remains genuinely

patient-directed, not overshadowed by desires for research advancement, funding, or professional prestige. It is vital that such experimental therapies are pursued with a primary focus on enhancing patient well-being and adhering to the ethical duties of nonmaleficence and fidelity. These include obtaining thorough informed consent, ensuring transparency about the potential risks and benefits, and maintaining a clear separation between clinical care and research interests. By going beyond traditional treatment options and exploring cutting-edge experimental therapies, Dr. Muhammed acts as a catalyst for the integration of the latest scientific research into practical patient care (Patel & Lee, 2022). This proactive stance exemplifies how pathologists can influence the broader healthcare strategy, advocating for the adoption of novel therapies that may offer hope to patients with otherwise limited options. Her involvement thus extends the scope of pathologist roles from diagnostic support to active participants in shaping treatment paradigms, emphasizing their potential to drive clinical advancements (Allen, 2013 and Hamburg & Collins, 2010).

Furthermore, Dr. Muhammed's efforts to amend past treatment limitations through her initiative reflect a deep commitment to ethical leadership. By identifying a new experimental drug that could potentially benefit Christine, she not only provides an alternative path for care but also reinforces the ethical principles of respect for patient autonomy and informed consent. This leadership shows how pathologists, while ethically motivated, can play a significant role in empowering patients, enabling them to make knowledgeable decisions about their treatment (Trevino & Brown, 2004). Importantly, Dr. Muhammed also ensures that Christine understands the experimental nature of the treatment and the realistic chances of success, thus helping to balance hope with an informed awareness of the potential risks and limitations. This approach is critical to prevent therapeutic misconception, where patients might believe these treatments offer a certain cure rather than being a potentially beneficial option under trial (Ackerman &

DuBois, 2023). The act of seeking out and implementing new treatment options based on patient-specific genetic markers also illustrates the shift towards more personalized medicine, where treatments are tailored to individual patient profiles. This personalized approach not only maximizes therapeutic efficacy but also minimizes potential harm, aligning with the ethical principle of non-maleficence by ensuring that treatments are as safe and effective as possible for the patient (Ackerman & DuBois, 2023).

Conclusion

Dr. Muhammed's proactive involvement in Christine's care exemplifies the profound impact that pathologists can have in guiding end-of-life decisions through personalized, or precision, medicine. By leveraging her expertise in cancer genomics, Dr. Muhammed identifies a potentially life-extending experimental treatment, thus fulfilling her ethical obligations toward beneficence and non-maleficence. Her efforts to correct past care limitations through the discovery of new treatment options also highlight the role of pathologists in advocating for patient-centric care and embodying ethical leadership in clinical settings. Ultimately, Dr. Muhammed's engagement in Christine's case not only enhances the quality of care received at a critical juncture but also underscores the vital role pathologists can play in the broader narrative of patient care, particularly in navigating the complex dynamics of end-of-life treatment decisions. This case study affirms the need for an integrated approach in healthcare that transcends conventional boundaries and incorporates the specialized knowledge of pathologists to improve patient outcomes in ethically sensitive situations.

Case Study Four: Consulting Pathologists in Clinical Ethics Cases

Focusing on the unique contributions of pathologists in ethics consultations, this case study evaluates Dr. Rizkala's role in a sensitive case of suspected child abuse. As an ethics consultant with a forensic pathology background, Dr. Rizkala brings essential

expertise to complex ethical dilemmas, ensuring that clinical decisions are informed by meticulous and unbiased forensic evidence. The ethical challenges and benefits of involving pathologists in such multidisciplinary settings are examined through the duties of justice, non-maleficence, and fidelity, as well as organizational collaboration, highlighting the pathologist's role in safeguarding patient welfare and upholding justice.

A 4-year-old boy, Alex, is brought to the emergency department by his parents with multiple bruises and a fractured arm. The parents offer vague explanations that Alex is clumsy and fell down the stairs. Due to the suspicious nature of the injuries and inconsistent stories, the medical team suspects child abuse and contacts Child Protective Services (CPS) as per hospital protocol. The case is also referred to the clinical ethics team to help navigate the way forward, including Dr. Rizkala, a forensic pathologist with expertise in pediatric injuries, to assist the ethics consultation. The ethical dilemma arises when considering the child's best interest in the context of potential abuse. The medical team needs to address both legal requirements and ethical considerations by protecting Alex from further harm, respecting the family's rights, and ensuring that any actions taken are based on solid medical and forensic evidence.

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Dr. Rizkala's forensic analysis is pivotal in ensuring that Alex receives fair treatment under the law and within the healthcare system (Tarini & Goldenberg, 2012). **Justice** in this context involves providing an impartial and thorough investigation to accurately determine the cause of Alex's injuries (Ross, 1930 & Meyers, 2011). This is essential not only for administering appropriate medical care but also for ensuring that any legal actions taken are grounded in solid evidence. Dr. Rizkala's expertise helps bridge the gap between medical observations and judicial requirements, ensuring that the proceedings adhere to the principles of justice, thereby safeguarding Alex's rights and well-being (Jones, 2011).

The avoidance of harm, or non-maleficence, is what guides these medical professionals in their consultation with the ethics committee. Dr. Rizkala's involvement ensures that the investigation into the injuries is conducted with the utmost care to prevent further psychological and physical harm to Alex (Flaherty & MacMillan, 2013). By using his specialized skills to accurately diagnose the nature of the injuries, Dr. Rizkala helps the team avoid interventions that could exacerbate the child's trauma, thus adhering to the ethical mandate of do no harm (Christian & Committee on Child Abuse and Neglect, 2015).

In this sensitive case, Dr. Rizkala and the medical team's commitment to factual accuracy and transparency is crucial under the duty of **fidelity**. Their detailed and honest communication with CPS and within the hospital ensures that all parties are informed with the most reliable data available, which supports ethical decision-making processes and reinforces the trust placed in the healthcare system by the public (Bubowitz & Bennett, 2007; Leventhal & Gaither, 2012). This steadfast adherence to the principle of fidelity underscores the ethical imperative to maintain truthfulness and reliability in all professional interactions, particularly when handling cases of potential child abuse. Dr. Rizkala's role is integral in ensuring that all diagnostic findings are conveyed accurately and without bias—compounded by the emotional charge of such cases as child abuse— safeguarding the integrity of the medical response and upholding the ethical standard of fidelity. The commitment to transparent reporting protects the patient's rights and strengthens the ethical foundation of the healthcare institution by showing dedication to truth and justice.

The case also illustrates the importance of **organizational and inter-specialty collaboration**. The hospital's protocol for suspected child abuse involves multiple specialties, including pediatrics, forensic pathology, clinical ethics, and social services, highlighting the institution's commitment to a multidisciplinary approach (Gittelman &

Pomerantz, 2014). This collaboration not only enhances the quality of patient care but also ensures comprehensive consideration of the ethical, medical, and legal aspects of the case (Fins, 2016; Celei & Prager, 2016). Dr. Rizkala's forensic insights are invaluable, providing clarity and supporting the medical team in making informed decisions that align with the hospital's mission to deliver innovative and conscientious healthcare (Coulthard & Warburton, 2015). This aligns with the insights of Lilley and Mirza (2023) in that the specialized knowledge held by pathologists' bridges past the laboratory and into policy and collaborative ingenuity.

Benefits of Pathologist Involvement in Clinical Ethics Cases

Dr. Rizkala's involvement in the case of Alex, a young boy with suspicious injuries, underscores the benefit of having a pathologist with forensic expertise assist in ethically complex clinical cases (Huh, 2023). Her specialized knowledge in the anatomical and gross signs of pediatric injuries is crucial for accurately determining the nature of Alex's injuries, thereby facilitating informed ethical decision-making within a clinical ethics consultation committee; diversity of perspectives is key in such a setting (Fox, Meyers, & Pearlman, 2007). Forensic pathologists are well-equipped in their expertise to engage in such cases (Powell et al, 2012; Kepron et al, 2016; & Wecht et al., 1980). This ensures that justice is served, both in terms of medical treatment and legal proceedings, aligning with the ethical duty to provide fair and equitable care. By accurately identifying the cause of injuries, Dr. Rizkala helps the medical team make decisions grounded in solid medical evidence, thereby upholding the ethical principle of justice (Ross, 1930). In instances where the evidence is inconclusive, Dr. Rizkala's commitment to honesty and transparency is vital. She ensures that all involved parties are aware of the limitations of the forensic findings, which maintains the integrity of the

medical and legal process. This honesty not only preserves the trust placed in the medical profession but also safeguards against potential miscarriages of justice.

The forensic pathologist's role is pivotal in preventing further harm to Alex by providing definitive evidence of abuse, which supports the principle of non-maleficence (Ross, 1930). If such evidence can be achieved, pathologists have a significant opportunity to advance forensic methods. Innovations like advanced imaging techniques and digital pathology could enhance the precision of forensic analyses, leading to more reliable evidence. Such advancements not only improve case resolution but also uphold higher standards of medical and legal practice. By integrating new technologies and continually updating their skills, forensic pathologists can fulfill their ethical duty to contribute to medical science, thereby ensuring fair and equitable care (Ross, 1930). This involvement not only protects Alex from potential ongoing abuse but also guides the medical team in their duty to do no harm, ensuring that any interventions are justified and, in the patient's, best interest (Guttmann, 2019). Dr. Rizkala's contribution exemplifies how pathologists can play a direct role in safeguarding patient welfare, particularly in sensitive cases where the patient's voice may not be enough to protect their own safety.

Involving a forensic pathologist like Dr. Rizkala in cases of suspected child abuse brings critical medical insight and objective evidence to complex ethical dilemmas. Her specialized expertise in pediatric injuries enables the healthcare team to interpret physical signs with greater accuracy, ensuring that decisions about Alex's care are based on robust forensic analysis (Holloway & Noguchi, 1984). This objectivity is crucial in cases where the potential for abuse exists, as it helps to eliminate personal biases and ensures that clinical decisions are grounded in empirical evidence (Moreno, 2003). Dr. Rizkala's ability to provide definitive explanations for injuries not only supports the

medical team's diagnostic processes but also reinforces the credibility of the findings in the eyes of the law and child protective services.

Dr. Rizkala's participation exemplifies the importance of multidisciplinary approaches in handling cases of child abuse, where the integration of medical, legal, and social services is vital. Her assessments help coordinate the actions of different stakeholders, ensuring that all interventions are informed by a clear understanding of the injury mechanisms and potential causes. This coordinated response is essential for protecting vulnerable children, as it combines the expertise of healthcare providers with the protective measures offered by legal and social agencies. The pathologist's involvement thus not only aids in immediate medical decision-making but also plays a pivotal role in the broader context of child welfare and protection.

Moreover, Dr. Rizkala's forensic insights contribute to the development of hospital protocols for similar cases. By documenting and analyzing patterns of injury and correlating them with clinical outcomes, she helps healthcare institutions refine their screening processes for abuse and improve their preventive measures. This not only aids in the immediate care of patients like Alex but also enhances the hospital's overall capacity to respond to similar incidents in the future. Such contributions are invaluable in advancing hospital practices related to child safety and ensuring that these institutions serve as safe havens for at-risk youth.

Conclusion:

Dr. Rizkala's contribution to Alex's case as an ethics consultant with a background in forensic pathology highlights the critical importance of specialized knowledge in complex clinical ethics consultations. Her expertise provides the medical team with crucial insights necessary for making informed decisions that are both ethically sound and legally defensible. This approach not only protects Alex from potential further harm but also ensures that actions taken by healthcare professionals

are based on robust, objective evidence. The case underscores the value of multidisciplinary collaboration in handling sensitive situations, integrating medical, legal, and social perspectives to safeguard child welfare. Dr. Rizkala's role as an ethics consultant exemplifies the extended reach pathologists can have in clinical settings, influencing patient outcomes positively by applying their unique expertise to aid ethical deliberations and decision-making processes.

Limitations in Encouraging Pathologists' Extra-Lab Engagement

Expanding the role of pathologists into interdisciplinary and direct patient care settings presents several challenges, each reflecting the complex dynamics of healthcare settings: resource allocation and workload management; inter-profession dynamics and ethical conflicts; legal and organizational challenges; and specialtyspecific constraints.

Across all case studies, a significant limitation is the strain on resources, which manifests as increased workload and potential for pathologist burnout. The direct engagement of pathologists in patient care could lead to role overload, where balancing the increased demands of diagnostic responsibilities and patient interactions may heighten stress levels and elevate the risk of burnout (Booth, 2018 & Maung, 2016). This challenge is evident in scenarios involving tumor boards, direct patient engagement, and end-of-life care decisions where pathologists like Dr. Selena and Dr. Muhammed balance complex diagnostic work with new responsibilities (Garcia et al., 2020; Tawfik et al., 2018; Maung, 2016). Continuous funding and institutional support are critical to sustain these initiatives; however, these resources can be limited, presenting a substantial barrier to the implementation and growth of pathologist-led interdisciplinary collaborations (Emanuel, et. Al, 2020). The need for additional training to equip pathologists for these roles can further strain hospital budgets and personnel resources.

In reflecting on the treatment decisions in Christine's case, it becomes clear that what may appear as oversight often stems from deeper, systemic constraints. Providers like Dr. Lee face numerous challenges when considering novel treatments, including institutional policies that favor proven therapies over experimental options, budgetary constraints that limit the availability of new treatments, and a professional culture that may be risk averse (Bauer et al., 2019; Rojewski et al., 2018; Boonstra & Broekhuis, 2010)). Additionally, the personal and professional commitment required to stay abreast of rapidly advancing medical technologies can be daunting without adequate institutional support (Chauhan et al., 2021). This reality highlights the necessity for healthcare systems to provide continuous training and resources that enable providers to adopt innovative treatments confidently and ethically. By addressing these structural barriers, the medical community can better support healthcare providers in fulfilling their ethical obligations to pursue all possible avenues for patient care.

In the United States, the practice of pathology varies significantly between different types of healthcare facilities, reflecting the divergent roles and responsibilities that pathologists undertake depending on their working environment and training program (CAP, 2024, CC, 2024, & Wood, 2016). Large academic hospitals often feature teams that include pathologist assistants and specialized technicians, enabling pathologists to focus more on complex diagnostics and research activities (Wood, 2016 & Wiles, et al., 2018). This setup allows for deep specialization in areas like molecular genetics or forensic pathology, which are integrated with educational duties as these institutions are typically involved in training the next generation of pathologists. Conversely, in smaller community hospitals, the scope of a pathologist's duties may expand out of necessity. Without the same level of staffing or specialized support, pathologists in these settings might directly perform clinical procedures such as bone marrow biopsies, which in larger hospitals might be delegated to other healthcare

professionals (Ehsan, 2023). This necessity highlights a critical need for uniform training and certification processes that consider the diverse environments pathologists work in, ensuring all are equipped to provide high-quality care regardless of location (Pagni & DiBella, 2013).

The cases of Dr. Selena, Dr. Harikrishnan, and Dr. Muhammed each could highlight tensions that arise from expanded pathologist roles, especially when their medical conclusions or treatment recommendations differ from those of other healthcare professionals. Such differences can lead to ethical conflicts, particularly when dealing with experimental treatments and patient comfort versus aggressive treatment options (Oandasan & Conn, 2021; Raj, 2019). Navigating these conflicts requires sophisticated communication strategies and a deep understanding of both medical ethics and legal principles. It is essential to acknowledge that maintaining ethical standards demands continuous moral development and role-modeling of ethical behavior. Without ongoing education and reflection on complex ethical dilemmas, there can be significant limitations to patient care, potentially compromising the integrity of the healthcare provided.

The direct patient involvement seen in Dr. Harikrishnan's case introduces legal complexities related to the pathologist's role expansion, which could necessitate changes to regulatory frameworks. Similarly, Dr. Rizkala's forensic contributions in legal-sensitive situations such as suspected child abuse cases bring additional legal implications that need careful handling to avoid influencing the care provided adversely (Allen, 2008; Astho, 2021).

In clinical ethics cases like those involving Dr. Rizkala, the need for forensic pathology expertise highlights the limitation of access to specialized services, which not all institutions can support; not all hospitals have access to forensic pathologists, exacerbated by the fact there are around 700 forensic pathologists as of 2022 (Tatsumi

& Graham, 2022). The focused nature of forensic work can divert pathologists from broader healthcare services, impacting service delivery where their expertise is crucial (Astho, 2021). This scarcity not only limits the immediate availability of forensic specialists in clinical settings but also places a greater strain on existing pathologists to cover many responsibilities. As a result, the breadth of forensic pathology's impact is often constricted by resource allocation, with potential delays in case resolutions and a ripple effect on patient care across multiple departments. Moreover, the concentration of forensic pathologists in larger urban centers leaves rural and under-resourced areas particularly vulnerable, often leading to significant disparities in healthcare outcomes (Astho, 2021).

In considering these limitations, in the decision to expand pathologists' roles, Ross' prima facie principles become essential in offering ethical guidance (1930). The importance of navigating complex scenarios and competing duties is a hallmark of his theory (Ross, 1930, & Meyers, 2013). The balancing act this entails will have to be met with careful consideration and weighing of both the individual values of physicians and care stakeholders, patients, and healthcare organizations. Specific challenges include the potential for ethical conflicts when medical conclusions differ, as seen in Dr. Selena's case with tumor boards, the resource constraints and accessibility issues highlighted by Dr. Rizkala's forensic pathology expertise, and the ethical dilemmas of end-of-life care decisions in Dr. Muhammed's scenario. These reoccurring limitations illustrate the need for robust support systems, careful planning, and continuous evaluation to mitigate the potential drawbacks of expanding pathologist roles. Addressing these issues effectively is essential for leveraging the full potential of pathologists to advance healthcare quality and uphold ethical standards within the increasingly complex medical landscape.

Chapter Conclusion

Throughout this chapter, the paper has explored four detailed case studies that not only illustrate the diverse roles pathologists can assume beyond the laboratory but also provide a rich context for applying W.D. Ross's ethical framework to real-world clinical dilemmas. Each case vividly demonstrates the potential for pathologists to impact patient care profoundly, from enhancing diagnostic precision and treatment efficacy to navigating complex ethical and organizational landscapes.

In the first case, Dr. Selena's leadership in tumor boards epitomizes how pathologists can extend their influence across interdisciplinary teams, enhancing patient care through continuous education and collaborative practice. This not only elevates the standard of healthcare delivery but also exemplifies the ethical principles of beneficence and justice, ensuring equitable access to innovative treatments and fostering an environment of mutual learning and respect.

The second case with Dr. Harikrishnan highlights the transformative potential of direct patient engagement by pathologists, particularly in the realm of personalized medicine. By discussing complex genetic information with patients, Dr. Harikrishnan enhances understanding and empowers patients, aligning with the duties of fidelity and gratitude. This model not only improves patient outcomes but also challenges traditional perceptions of pathologists' roles, suggesting a shift towards more patient-facing responsibilities.

In the third case, Dr. Muhammed's initiative in exploring experimental treatments for end-of-life care reflects a profound application of the principles of reparation and beneficence. Her actions address past care limitations and introduce new possibilities for patient treatment, underscoring the pathologist's role in ethical decision-making and patient advocacy at critical care junctures.

The fourth case involves Dr. Rizkala in a consultative role, using her forensic expertise to ensure that clinical and ethical decisions regarding suspected child abuse

are informed by solid evidence. This not only safeguards the patient's welfare but also enhances the ethical handling of the case through meticulous and unbiased analysis, embodying the principles of justice and non-maleficence.

Together, these cases argue compellingly for the expanded integration of pathologists into roles that intersect directly with patient care, inter-professional collaboration, and ethical consultation. They reveal the unique position of pathologists to influence healthcare delivery positively, advocating for a model where pathologists are not only diagnosticians but also key players in the ethical fabric of healthcare.

However, this expanded involvement is not without challenges. The potential for role overload, resource constraints, and inter-professional conflicts highlights the need for careful planning, ongoing education, and clear communication. but also underlines the essential role of a robust moral compass. As pathologists navigate these challenges, the integrity of their ethical framework—further explored in Chapter Three—becomes crucial. This next chapter will delve into how Ehics education and continuous professional development can fortify pathologists' roles, ensuring that their expanded responsibilities enhance rather than complicate healthcare delivery. These factors are essential to successfully navigate the complexities introduced by such transformative roles.

Chapter Three will consider the broader implications of these expanded roles for pathologists. We will explore strategic approaches to integrate these roles sustainably into healthcare systems, ensuring that pathologists can continue to enhance patient care and ethical standards in medicine. The ongoing evolution of the "interventional pathologist" promises to redefine the profession's boundaries and enrich the overall quality of healthcare through a more collaborative, informed, and ethically engaged practice.

Chapter Three:

Advancing Interventional Pathology: Future Directions and Broader Implications Introduction

Chapters One and Two of this thesis explored the transformative role of pathologists within the modern healthcare landscape, anchored by an ethical framework based on W.D. Ross's prima facie duties. Chapter One introduced the concept of "interventional pathology," highlighting the expansion of pathologists' roles beyond traditional laboratory confines to include direct patient consultations, participation in multidisciplinary teams, and the application of advanced diagnostic technologies such as Next-Generation Sequencing (NGS), Artificial Intelligence (AI), and bioinformatics and computational biology. This evolution significantly enhances diagnostic accuracy and treatment efficacy, challenging and reshaping public and professional perceptions of pathologists from solely laboratory-based professionals to critical decision-makers in patient care.

Chapter Two shifts focus to the ethical considerations intrinsic to these expanded roles. Utilizing Ross's ethical principles, it examines how pathologists navigate complex ethical landscapes in settings such as tumor boards and clinical ethics consultations. It illustrates the crucial role of ethical principles—justice, beneficence, fidelity, non-maleficence, and more—in guiding pathologists to ensure equitable treatment decisions and minimize harm, thereby reinforcing the integration of ethical decision-making in clinical practice.

Together, these chapters depict pathologists as indispensable agents of medical innovation within the healthcare system. This thesis advocates for a nuanced understanding of pathology, where scientific expertise and ethical integrity converge to meet the demands of contemporary medicine. This sets the foundation for Chapter Three, which focuses on integrating advanced technologies, developing recruitment

strategies, and broadening the inclusion of pathologists in medical teams to enhance diagnostic accuracy, treatment efficacy, and compliance with ethical standards in healthcare. This chapter charts the course for embedding interventional pathology into mainstream medical practice, aiming to elevate the standard and efficacy of patient care.

The Ethical Framework in Interventional Pathology

To broaden the role of pathologists within the healthcare landscape, anchoring their expanded responsibilities in the ethical frameworks detailed in the second chapter is crucial. Utilizing prima facie duties provides a duty-based compass to navigate the complex ethical landscapes that arise as pathologists assume more interactive roles in patient care, research, and organizational ethics.

Application of Prima Facie Duties in Contemporary Practice

Chapter two demonstrated how pathologists face ethical decisions involving a balance of competing duties in clinical settings (Ross, 1930, and Meyers, 2011). As their roles expand, as advocated in this chapter, a re-evaluation of these duties in new clinical and organizational contexts becomes essential:

Fidelity. Pathologists' direct engagement with patients and clinical teams heightens the importance of maintaining trust through honest communication and stringent confidentiality, especially when handling sensitive genetic information or using AI in diagnostics.

Reparation. Pathologists must address and rectify diagnostic errors or technological failures, ensuring alignment with organizational ethics that prioritize patient safety.

Gratitude. As the scope of pathology expands, recognizing and valuing the contributions of all team members fosters a collaborative environment essential for integrating new technologies.

Justice. Pathologists must advocate for equitable access to advanced diagnostics and treatments, ensuring fair distribution of healthcare resources, which is crucial in precision medicine and personalized therapies.

Beneficence. Active contributions to tumor boards and ethics committees are vital, as pathologists' unique expertise can significantly enhance patient health outcomes. By promoting patient autonomy and shared decision-making, pathologists ensure that the availability of precision diagnostics and personalized treatment options truly benefit patients. This advocacy not only improves outcomes but also respects and amplifies patient agency, central to ethical healthcare delivery.

Non-Maleficence. Implementing new technologies like AI and digital pathology obligates pathologists to ensure that these innovations do not inadvertently cause harm. This requires adherence to stringent ethical standards and rigorous testing. It is equally important to recognize the limitations of these technologies and guard against potential abuses, such as violations of patient privacy with genetics information. Pathologists must be vigilant in monitoring these technologies to prevent misuse and ensure that their integration into healthcare respects and protects patient rights and data security.

Self-Improvement. Continuous education in ethical practices and emerging medical technologies is crucial to effectively adapt to evolving healthcare demands. This pursuit of knowledge also positions pathologists to contribute meaningfully to organizational goals and resource allocation, ensuring they are not constrained in environments that stifle innovation. By understanding and aligning with institutional goals, pathologists can influence healthcare systems to foster an innovative, supportive atmosphere that advances both medical practice and ethical standards.

Integrating Organizational Ethics

The integration of pathologists into direct patient care introduces new ethical and organizational challenges that require careful navigation using the ethical framework

established earlier, particularly the application of W.D. Ross's prima facie duties. These include fidelity, beneficence, and non-maleficence, which guide pathologists in their expanded roles (Ross, 1930; Meyers, 2011). As Karcher (2023) notes, it is crucial for pathologists to manage patient interactions with the same ethical rigor applied in traditional medical consultations. This includes upholding confidentiality, obtaining informed consent, and engaging in clear, compassionate communication about medical findings.

In addition to their clinical and diagnostic responsibilities, pathologists have a pivotal role in advocating for patients to improve access to healthcare and reduce disparities (Lilley & Mirza, 2022). This advocacy extends beyond individual patient interactions, encompassing efforts to transform institutional practices and policies related to the acknowledgment and billing of services. For instance, pathologists can champion changes in how services are documented and reimbursed within healthcare institutions and by systems such as Medicare. By doing so, they can help ensure that financial and systemic barriers do not impede patient access to necessary diagnostic and therapeutic services (Asif et al., 2022). Such efforts are crucial for promoting equity in healthcare, ensuring that all patients, regardless of socioeconomic status, receive the high-quality care they deserve.

The integration of these prima facie duties into organizational ethics provides a robust framework to address the implications of pathologists' expanded roles. As pathologists become integral to team-based care, their influence on organizational policies increases. This influence is pivotal for promoting ethical cultures within healthcare institutions, which sustains the integrity and trustworthiness of the pathology profession. For example, pathologists can champion patient-centric care models that prioritize ethical considerations over financial or administrative objectives. In a patient-centric care model, pathologists actively engage in direct consultations with patients to

ensure transparency and informed decision-making, while advocating for fair and equitable access to diagnostic services. This approach prioritizes ethical considerations, such as fidelity and justice, over financial or administrative constraints, thus enhancing the integrity and effectiveness of patient care. They can shape policies ensuring equitable patient access to medical advancements, upholding justice, and beneficence (Lilley & Mirza, 2022).

Expanding Roles in Clinical Ethics and Policy Advocacy

Incorporating pathologists into clinical ethics committees can significantly enhance the decision-making process, particularly in complex cases characterized by diagnostic uncertainty or high-risk treatment options. Their deep understanding of disease mechanisms provides a robust scientific foundation for ethical deliberations, ensuring that medical interventions are aligned with ethical standards to optimize patient outcomes (Fox, Meyers, & Pearlman, 2007).

Pathologists also play a crucial role in healthcare policy advocacy, influencing the standards that govern clinical practice (Lilley & Mirza, 2022, and Black et al., 2023). By actively participating in policy discussions, they contribute to shaping healthcare policies that reflect the latest scientific developments and societal values, exemplified in their expertise and implementation of genetics testing which Lilley notes Medicare is increasingly paying for (2022). This involvement not only enhances pathology practice but also ensures that the healthcare system remains adaptive to emerging challenges and opportunities.

Ethical, Legal, and Social Implications (ELSI) of New Technologies

As new technologies become integral to healthcare, pathologists face critical ethical considerations, such as ensuring informed patient consent, safeguarding data privacy, and addressing potential biases in AI algorithms (Sorrell et al., 2022). Legal aspects, particularly concerning the management of genetic data under regulations like

Health Information Portability and Accountability (HIPAA) are essential to maintain patient privacy while leveraging advanced diagnostic tools (Chauhan, 2021).

As pathologists become integral to the implementation of precision medicine, they face complex ethical challenges including genetic privacy, informed consent, and equitable access to genomic technologies. Developing robust frameworks to safeguard patient rights while optimizing the clinical benefits of genomic data is crucial. Comprehensive policies and guidelines are essential for navigating the ethical landscape of modern medicine effectively.

Pathologists must become increasingly involved in ethical and business practices within healthcare, navigating complex business practices while ensuring patient welfare (DeCamp et al., 2021). This aligns with the deliberative model of physician-patient relationships, which emphasizes narrative and care ethics (Emanuel & Emanuel, 1992). As AI's impact on healthcare grows, ensuring ethical integration of AI is paramount to guarantee equitable care for all patients (Gunderman, 2020). Pathologists' expanding roles into patient-facing activities are essential in bridging trust gaps and enhancing access to advanced diagnostic tools (Lilley & Mirza, 2023).

Summary of the Framework

As pathologists take on broader roles within healthcare, they are guided by ethical frameworks like W.D. Ross's prima facie duties, ensuring their expanded responsibilities align with rigorous ethical standards and enhance patient care. Their involvement in clinical ethics committees and policy advocacy sharpens healthcare practices, integrating ethical deliberations with scientific advancements to promote equitable access to diagnostics and treatments. This is crucial in maintaining the integrity and trust necessary in modern medicine, especially as pathologists navigate the complexities introduced by new technologies such as AI and digital pathology.
The ethical challenges brought by these technologies—such as managing informed consent, ensuring data privacy, and addressing AI's ethical implications—are met with rigorous application of pathologists' ethical training. As pathologists adopt more dynamic roles, their contributions are pivotal not only in improving patient outcomes but also in reinforcing the moral foundations of healthcare. The upcoming section continues this discussion by exploring how these ethical principles are crucial in guiding the adoption of digital pathology and AI, technologies set to transform medical diagnostics while testing the resilience of established ethical frameworks.

Transforming Diagnostic Medicine Through Digital Pathology and AI

Digital pathology and AI are poised to revolutionize diagnostic practices by enhancing the speed and accuracy of pathologists' assessments. This technological shift, however, brings challenges such as algorithmic bias and data security issues. It is critical to address these concerns to maintain trust in medical diagnostics and ensure ethical and professional standards in the implementation of AI in pathology (Berbis, 2023).

Innovations in Diagnostic Pathology

Artificial Intelligence (AI) and Whole Slide Imaging (WSI) are transforming pathology, with AI poised to standardize by 2030, drastically altering the diagnostic processes through advanced image analysis (Bera et al., 2019; Berbis, 2023). WSI enables the digitalization of pathology slides, facilitating remote diagnostics and fostering educational partnerships for collaborative global consultations (Hassell et al., 2022). Concurrently, the emergence of liquid biopsies offers a minimally invasive approach for early cancer detection by analyzing circulating tumor DNA, allowing for ongoing monitoring and dynamic treatment adjustments (Gupta et al., 2024). Additionally, innovations in 3D pathology and Multiplex IHC/IF are revolutionizing our understanding of tumor microenvironments and enhancing personalized immunotherapies, marking

them as essential in modern clinical settings (Chen et al., 2024; Sun et al., 2024). In response to these advancements, pathology curricula should be updated to include AI, WSI, and genomic sequencing, while also integrating virtual and augmented reality into training programs to adequately equip pathologists with necessary skills for these advanced technologies (Ferreira et al., 2024).

Addressing Ethical Challenges in Al and Digital Pathology

The integration of AI in pathology promises revolutionary changes to diagnostic processes but also introduces substantial ethical challenges. These include ensuring transparency, accountability, and ethical governance to prevent biases and guarantee equitable care (Chauhan et al., 2021; Berbis, 2023). Concerns about maintaining confidentiality and quality in digital pathology emphasize the need for stringent legal and ethical frameworks (Coulter et al., 2022).

As the paper addresses the ethical challenges presented by AI and digital pathology, ensuring transparency and equitable care, it becomes clear that the scope of pathology is evolving far beyond the microscope. This broader vision leads us directly into the realm of interventional pathology, where pathologists not only enhance diagnostic processes but also directly intervene in patient care through activities like bone marrow biopsies and therapeutic apheresis. Such advancements underscore the need for comprehensive training and support systems to fully realize the potential of pathologists in improving patient outcomes.

Interventional Pathology Manifestations

The concept of "interventional pathology" involves a broad range of activities extending beyond traditional or "stereotypical" diagnostic roles. This includes pathologists performing procedures like bone marrow biopsies, engaging in therapeutic apheresis, multidisciplinary collaboration, and participating in clinical ethics consult committees to address dilemmas such as X. Training programs and healthcare

institutions should support pathologists in acquiring the skills and knowledge needed to engage in these activities, recognizing their value in improving patient care and outcomes.

Integration of Pathologists in Precision Medicine

The integration of pathologists in precision medicine, particularly through the application of genomic technologies, raises substantial ethical questions concerning genetic privacy, consent, and access to genetic information. These issues demand careful ethical consideration and the establishment of strong policy frameworks to balance patient rights with the benefits of advanced technologies. Pathologists are pivotal in translating complex genomic data into actionable treatment strategies, which enhances patient outcomes by providing precise diagnostic and prognostic information that guides personalized treatment plans (Bhagwat & Pai, 2020).

The development of Pathology Explanation Clinics (PECs) represents a significant move towards demystifying pathology reports for patients, marking a shift from pathologists being seen solely as laboratory-bound to taking active roles in patient management (Bergholtz et al., 2023). These clinics and similar initiatives help pathologists engage directly with patients to discuss diagnostic outcomes and treatment options, which enhances patient understanding and involvement in their own healthcare decisions (Association for Molecular Pathology, 2024; Saikia et al., 2008). This provides a sense of empowerment and control for patients in their medical journey (Irvine, 2019).

Direct involvement of pathologists in patient care can streamline diagnostic processes, thereby reducing delays and improving treatment plans' accuracy. This transition is expected to significantly enhance healthcare efficiency, reducing the costs associated with prolonged diagnostic cycles and ineffective treatments (Asif et al., 2022; Bergholtz et al., 2023; Karcher, 2023).

Future Directions

As the healthcare landscape continues to evolve, the role of the pathologist will likely undergo further changes. Increasing reliance on genetic and molecular diagnostics will require a greater degree, or earlier, of specialization and possibly, a redefinition of training and certification processes for pathologists (Berbis, 2023). Furthermore, as patient engagement becomes more integrated into care practices, pathologists will need to develop skills not traditionally, or typically associated with their profession, such as patient communication and more involved interdisciplinary collaboration (Karcher, 2023).

The case studies in Chapter Two illustrated a pivotal shift towards a more interactive and visible role for pathologists in clinical decision-making. These scenarios provide a blueprint for expanding pathologists' influence beyond traditional laboratory roles, demonstrating the real-world application of theoretical ethical considerations.

The initiatives and broader application of interventional pathology practices provide a robust framework for the evolution of pathology into a more dynamic and integrative medical field. As healthcare continues to evolve, the intersection of pathologists with direct patient care will necessitate continuous adaptation and reassessment of traditional roles, significantly contributing to immediate and long-term improvements in healthcare efficiency, cost reduction, and patient satisfaction, positioning the specialty at the forefront of medical innovation and patient-centered care.

With the anticipated evolution in the healthcare landscape and the increasing integration of advanced technologies, the pathologist's role continues to expand beyond traditional boundaries. These developments necessitate a reevaluation of training, certification, and daily practices to embrace these new capabilities fully. With these changes at the forefront, we now turn our attention to comprehensive recommendations for stakeholders. These recommendations aim to ensure that pathologists are not only well-prepared to meet the challenges of modern medicine but are also key players in

shaping its future, leveraging their unique skills to improve patient care and clinical outcomes.

Recommendations for Maintaining Ethical Integrity in the Adoption of New Technologies and Clinical Roles

Recommendations for Pathologists

Pathologists are urged to actively pursue opportunities for direct patient engagement and multidisciplinary collaboration (Parwani & Amin, 2020). This involvement should extend beyond traditional roles, such as participating in tumor boards and clinical rounds, to include direct patient consultations wherever applicable. Embracing advancements in digital pathology, artificial intelligence (AI), and precision medicine is crucial for staying at the forefront of medical technology and enhancing patient care (Chauhan et al., 2021).

Pathologists should also advocate for their integral role within the healthcare team, highlighting how their specialized expertise contributes significantly to patient care and clinical decision-making (Lilley & Mirza, 2023). Engaging in the administrative aspects of healthcare allows pathologists to influence organizational decisions, ensuring that practices are aligned with the principles of patient-centered care and evidence-based medicine (Castlen, et al., 2017 and Lee, 2020). The recommendations for ethical development and engagement include:

Continuous Ethical Education: Pathologists should commit to ongoing education to adeptly navigate the ethical intricacies brought forth by advanced technologies, such as AI and novel genetic testing methods (McKay, et al., 2022). This continuous educational commitment should not only be periodic but integrated into the pathologist's regular professional development cycle, ideally occurring semi-annually. These sessions can be structured as workshops, seminars, or even part of annual conferences that focus specifically on emerging topics relevant to pathology. The

curriculum for these educational initiatives should be robust, addressing critical areas such as data privacy, informed consent, and the ethical use of AI in diagnostics (Chauhan, 2021; Sorell et al., 2022). For example, modules could include case studies on data breaches and best practices for securing patient information, discussions on the complexities of obtaining consent in an era where genetic information can predict patient health trajectories, and simulations that explore the decision-making process when using AI to identify potential diagnoses.

Additionally, training should cover the social and psychological implications of genetic testing, where pathologists could learn strategies to communicate sensitive genetic information to patients in an ethical and compassionate way. Training should also include the legal aspects of emerging technologies to ensure pathologists are aware of their obligations and liabilities. To facilitate this ongoing education, pathology departments could collaborate with bioethics centers at academic institutions or professional, which could provide resources and frameworks for developing these training programs. Such partnerships might also lead to the creation of standardized ethical guidelines that can be regularly updated and disseminated through these educational sessions. Ultimately, the goal of this continuous ethical education is to empower pathologists not only to perform their roles with technological proficiency but also with a heightened awareness of the ethical dimensions of their work, ensuring that they remain advocates for patient welfare in a landscape of rapid medical and technological evolution.

Ethical Auditing of New Technologies: Before new technologies are adopted, pathologists should conduct comprehensive ethical audits to evaluate potential biases, risks, and their implications for patient care. This precaution helps to ensure adherence to the principle of non-maleficence, preventing harm from new diagnostic tools. In

conducting these audits, pathologists should collaborate with data scientists to scrutinize the algorithms for biases, healthcare ethicists to assess ethical implications, and legal experts to ensure compliance with regulatory standards (Chauhan et al., 2021; Niazi et al., 2019). This multidisciplinary approach ensures a well-rounded evaluation of new technologies, fortifying the ethical integrity of their application in clinical settings.

To effectively conduct these audits, the team should employ a structured framework that includes bias assessment, risk evaluation, and regulatory compliance checks. Data scientists play a crucial role in analyzing the training datasets for AI technologies, ensuring they are representative and free of biases that could lead to skewed diagnostic outcomes. Ethicists and pathologists jointly explore potential ethical risks, such as impacts on patient privacy or autonomy. Legal experts ensure that the implementation of these technologies aligns with existing healthcare regulations and anticipate changes that could affect their use. This comprehensive documentation and reporting of the audit process serve as a critical reference for continual assessment and refinement of the technology, fostering transparency and trust among all stakeholders involved.

Transparent Patient Communications: Upholding the duty of fidelity involves maintaining open and transparent communication with patients about the capabilities, limitations, and risks of new diagnostic technologies (Meyers, 2011). All patient interactions must involve comprehensive informed consent processes and respect for patient autonomy, ensuring that patients are fully aware of and voluntarily agree to the procedures and treatments proposed.

Participation in Ethics Committees: Active participation or consultation with ethics committees is vital for navigating complex ethical cases. Pathologists bring a unique perspective to these committees, grounded in their deep understanding of

disease mechanisms and diagnostic complexities. For instance, as demonstrated in case 4 of Chapter Two, the forensic pathologist on the ethics committee played an essential role in interpreting medical data to assess the validity of abuse claims. This specialist's input ensured that the committee's decisions were informed by precise medical insights, aligning the ethical deliberations with factual evidence and patient welfare. Such involvement not only aids in safeguarding the interests of vulnerable populations but also underscores the indispensable role of pathologists in bridging clinical expertise with ethical decision-making. This collaborative approach enhances the integrity of the ethical review process, ensuring decisions are both medically informed and ethically sound (Chauhan et al., 2021).

By adopting these recommendations, pathologists can expand their ethical knowledge and enhance their contributions to healthcare, ensuring that their practices not only meet the highest standards of medical care but also adhere to rigorous ethical standards. This comprehensive approach supports the evolution of pathology as a field at the intersection of technology, ethics, and patient care.

Education and Integration of Non-Pathologist Physicians

Effective integration of pathologists into patient care and treatment management requires comprehensive education for non-pathologist healthcare providers. Training programs should be designed to illuminate the unique contributions of pathologists through interactive workshops, seminars, and engaging case studies that highlight evidence-based outcomes (Dintzis, 2016). Such initiatives can demonstrate how pathologists' insights into disease mechanisms significantly enhance diagnostic accuracy and treatment planning, thereby improving patient outcomes.

Non-pathologist physicians need to understand the expansive role of pathologists beyond traditional laboratory settings. Regular involvement in clinical decision-making, tumor boards, and inter-specialty reviews can enrich the multidisciplinary care approach,

enhancing collaborative medical practice (Sprecchia, 2020 and Sorace et al., 2012). Specifically, active participation in tumor boards and other interdisciplinary boards is crucial. These platforms facilitate in-depth discussions that combine diverse medical expertise, thereby fostering an integrated approach to patient care.

Continuing medical education programs should consistently include modules on the evolving scope of pathology practice, emphasizing practical examples of pathologists contributing to patient management and care team dynamics (Sadofsky et al., 2014). This educational approach will foster a greater appreciation and utilization of pathologists' expertise across healthcare settings, ultimately elevating the standard of care provided. Four recommendations for expanding opportunities for non-pathologist physician education are as follows:

Interactive Education Programs: Engage in training that includes interactive workshops and seminars, using engaging case studies and evidence-based outcomes to highlight the critical role of pathologists in enhancing diagnostic accuracy and treatment planning.

Role Expansion Awareness: Enhance understanding of the expansive role of pathologists beyond the lab. Encourage regular inclusion in clinical decision-making, tumor boards, and inter-specialty reviews to enrich the multidisciplinary care approach.

Board Participation: Advocate for non-pathologist physicians to serve on boards such as tumor boards, where interdisciplinary discussions vital to patient care take place. This participation helps integrate diverse medical insights, thereby improving decision-making and patient outcomes.

Continuing Medical Education: Ensure that continuing medical education programs regularly feature modules exploring the evolving scope of pathology practice, with an emphasis on practical examples of pathologists contributing to patient management and care team dynamics.

Enhancing Care Standards: Promote the integration of pathologists in various clinical roles to elevate the standard of care provided across healthcare settings. This includes utilizing pathologists' unique insights effectively in all facets of patient care. Strategic Initiatives for Healthcare Institutions in Integrating Interventional Pathology

In the integration of interventional pathology into healthcare practices, institutions must be guided by foundational ethical principles, taking note from Ross (1930) and Meyer (2011). Beneficence and non-maleficence require that healthcare organizations act in the best interests of their patients, which includes equipping pathologists and other providers with the necessary tools to make informed decisions that benefit patient care (Scheper, 2020). The principle of justice mandates equitable access to advanced diagnostic tools like digital pathology and AI, ensuring all patients receive fair treatment (Chauhan, 2021; Brewster, 2020). Autonomy is critical as it respects patients' rights to informed consent and involves them in decision-making processes, while also allowing healthcare professionals to exercise their judgment without undue interference. Transparency and accountability are essential for maintaining trust; institutions must be open about their decision-making processes and accountable for the outcomes, especially concerning patient safety and privacy (Tsan & Tsan, 2020). Fidelity to ethical standards and institutional policies ensures integrity within the organization. Respect for persons emphasizes treating everyone with dignity and ensuring policies reflect this respect. Upholding integrity means integrating ethical values consistently across all operations, promoting a culture of ethical behavior and continuous ethical training (Phelan, 2020). Compliance with regulations ensures that institutions not only maintain public trust but also adhere to legal standards protecting patient rights and safety. Finally, quality improvement and Innovation involve ongoing evaluation and refinement of practices to keep pace with technological advances and optimize patient outcomes,

underscoring the commitment to excellence and ethical responsibility in healthcare (Ferrari et al., 2018).

Healthcare institutions play a crucial role in fostering the growth and effective integration of interventional pathology. By developing policies that embed pathologists within clinical decision-making teams and supporting their active participation in clinical rounds, tumor boards, and direct patient care, these institutions can leverage the unique insights that pathologists provide. This strategic integration is vital for understanding the complex biological aspects of diseases discussed in tumor boards and ethics consultations and for applying innovative scientific methods alongside rigorous ethical standards in patient care (Asif, 2022; Specchia, 2020). The ethical deployment of mission statements in healthcare, as discussed by Schueler and Stulberg (2020), can guide organizations in aligning their operational practices, such as fostering pathology's growth with their ethical commitments to enhance both patient care and professional integrity.

To fully utilize the potential of modern technologies, institutions must invest in the necessary infrastructure for digital pathology, artificial intelligence (AI), and precision medicine. This investment equips pathologists with the tools they need to succeed and drive advancements in healthcare diagnostics and treatment planning (Bera et al., 2019 and Lai et al., 2023). Establishing multidisciplinary committees that include pathologists as key members ensures comprehensive patient care, enhances clinical outcomes, and streamlines workflow, thus improving the efficiency of healthcare processes.

Within this framework, the ethical considerations emphasized by Richard Gunderman (2020) become particularly relevant. Gunderman argues for a balance between commercial interests and the professional calling of healthcare providers. He highlights the risk of prioritizing financial gains over patient welfare, suggesting that healthcare organizations must ensure that their operational goals do not undermine

ethical standards or compromise patient care (Gunderman, 2020). By embedding ethical considerations deeply into their strategic planning, institutions can uphold their moral responsibilities and maintain public trust. Furthermore, to support ethical practices effectively, institutions should:

Develop Ethical Guidelines for Technology Use: Create comprehensive guidelines that address the ethical use of AI and digital tools in pathology (Lai et al, 2023 and McKay et al., 2022). These guidelines should cover critical issues such as data security, patient consent, and equitable access to technologies, thus reflecting the principles of justice and non-maleficence.

Allocate Resources for Ethical Training: Provide enough resources for technological advancements and the ethical training of staff. This helps uphold beneficence and fidelity within the institution by ensuring all team members are informed and aligned with ethical practices.

Conduct Regular Ethical Training Programs: Implement ongoing training sessions for all healthcare staff to address the ethical implications of pathology practices. Integrating ethical considerations into daily decision-making processes ensures that the institution's practices align with high ethical standards.

Create Interdisciplinary Teams Including Ethicists: Establish teams that incorporate ethicists to ensure that diverse perspectives are considered in clinical decisions. This approach enhances the ethical standard of care provided and supports comprehensive decision-making processes.

Undertaking Quality Improvement Research: Institutions should conduct research to evaluate the effectiveness of pathologist integration within multidisciplinary teams (Plotkin et al., 2019). This research will identify best practices for leveraging pathologists' expertise to enhance patient care outcomes and process efficiencies,

ensuring that the healthcare system remains adaptive and responsive to new challenges and opportunities in patient care and medical ethics.

By embedding these strategies into their operational frameworks, healthcare institutions can ensure that the integration of interventional pathology not only advances technological and clinical capabilities but also reinforces the ethical foundations critical to patient care and institutional integrity.

Enhancing Patient Involvement and Advocacy

Patients stand to gain significantly from the expanded involvement of pathologists in healthcare settings (Irvine, 2019 and Mitchell, 2022). As key players in the multidisciplinary healthcare team, pathologists provide critical insights that enhance diagnosis, treatment planning, and the implementation of precision medicine. To leverage these benefits fully, it is essential to foster robust patient engagement and education:

Educational Materials on New Technologies: It is crucial to provide patients with clear and accessible information about the new technologies used in their diagnosis and treatment. Educational materials should outline the benefits and potential risks associated with these technologies, ensuring patients are well-informed about the tools that may impact their health care (Dijk, Duijzer, & Wienold, 2020). This initiative supports the ethical duty of beneficence by promoting informed patient decisions.

Feedback Mechanisms: Establishing effective feedback mechanisms allows patients to share their experiences with new diagnostic tools and their participation in treatment decisions. This process not only reinforces the ethical principles of beneficence and fidelity but also enhances patient care by incorporating patient insights into healthcare practices (Allen, 2017 and Ross, 1930).

Advocacy for Inclusive Care: Encouraging patients to advocate for care models that include pathologists as integral members of the healthcare team can significantly

improve the quality of care (Wensing & Baker, 2003). Communicate to patients their rights and ability to consult with their pathologists to understand their disease processes. By ensuring that all relevant medical expertise, including that of pathologists, is utilized in treatment planning, patient outcomes can be optimized.

These measures aim to enhance the transparency and inclusivity of patient care, ensuring that patients are not only recipients of health services but active participants in their healthcare journeys. Through effective education and advocacy, patients can better understand and influence the complex dynamics of healthcare delivery, which now increasingly involves sophisticated diagnostics and personalized treatment strategies.

Evolving Education for Pathologists and Healthcare Providers

Education and training bodies play a critical role in equipping pathologists and other healthcare professionals with the knowledge and skills necessary to adapt to rapid technological advances in medicine such as Next-Generation Sequencing (NGS), Artificial Intelligence (AI), and bioinformatics (Roy et al., 2018; Yao et al., 2020). These technologies demand that educational curricula be continuously updated to include these tools and empower pathologists to lead their integration into clinical practice. This is essential for enhancing the role of pathologists in personalized medicine, allowing them to conduct precise diagnostic work and tailor treatments to individual genetic profiles, thereby increasing the efficacy and personalization of patient care (Louis et al., 2011; Vranic & Gatalica, 2021; Roy et al., 2018; Haspel et al., 2012).

Furthermore, training programs must focus on developing soft skills such as communication, leadership, and ethical decision-making, which are essential for direct patient engagement and effective participation in multidisciplinary teams (Majid et al., 2012). These types of skills are vital for improving patient care and are intrinsic to the skills of being a quality physician (Lafleuer et al., 2019). Standardizing procedural training and practices across diverse geographic and practice settings can ensure that

the pathologist workforce is well-prepared to meet varied clinical demands and contribute significantly to expanding medical access (Black-Schaffer et al., 2021).

It is equally crucial to enhance the education of non-pathologist healthcare providers about the critical roles that pathologists play within healthcare settings. Emphasizing collaboration and cooperative skills in training programs can foster more effective use of pathologists' expertise in patient care, enhancing the quality of healthcare delivery (Staden et al., 2006; McCloskey et al., 2020).

To address these educational needs, institutions should integrate ethics and technology into the curriculum, incorporating real-world case studies that apply Ross's prima facie duties to scenarios involving emerging technologies in pathology. Also, workshops and simulation experiences should be conducted to emphasize ethical decision-making in AI, digital pathology, and personalized medicine. These interactive experiences are designed to help students understand the practical impact of their decisions on patient care and medical outcomes.

Continuing professional development modules should be created to keep healthcare practitioners up to date on the latest technological advancements and their ethical implications, ensuring that they remain capable of navigating the challenges presented by new diagnostic tools and treatments. Furthermore, forming collaborations with technology developers and ethicists can provide a balanced view of the challenges and opportunities in interventional pathology, preparing future pathologists to address these issues thoughtfully and ethically (Black-Schaffer et al., 2021).

By implementing these educational strategies, training bodies can ensure that pathologists and other healthcare professionals are not only well-prepared technically but also ethically attuned to manage the complexities of modern medical practices effectively.

Recruitment and Public Perception

Addressing recruitment challenges is vital for the sustained growth of pathology. Enhancing the visibility of the field and correcting misconceptions about the role of pathologists are crucial steps in attracting new talent and fostering a more inclusive understanding of pathology's critical role in healthcare. As Hernandez et al. (2022) and McCloskey et al. (2020) have highlighted, strategic communication and education initiatives are essential to demystify pathology and highlight its indispensable contributions to patient care.

Pathologists play a dynamic and integral role in patient care, particularly in emerging fields such as molecular diagnostics and personalized medicine. Effective public relations campaigns and educational programs should not only elevate the profile of pathology but also emphasize the innovative aspects of the field, such as the use of AI and personalized medicine. By improving public and professional understanding of pathology's vital role, these efforts can enhance recruitment and foster better collaboration within healthcare teams. These initiatives can transform patient care by integrating innovative diagnostic and therapeutic roles that merge traditional pathology with the forefront of medical technology and ethics. This approach not only enhances diagnostic accuracy and treatment efficacy but also upholds ethical standards in patient care.

Continuing Research Efforts in Pathology

In the rapidly evolving field of pathology, targeted research is essential to validate the integration of interventional practices and advanced technologies. The focus should be on educational strategies and clinical outcomes to effectively expand the roles of pathologists. The needed areas of research and methodologies is as follows:

1. **Medical Student Perception Studies**: Investigate medical students' perceptions of pathology to understand the impact of increased exposure through dedicated

rotations, involvement in multidisciplinary teams, and direct patient care opportunities on their career choice interests. Surveys and focus groups will identify factors that attract or deter students, informing curriculum development and exposure strategies.

- 2. Outcomes of Pathologist Involvement in Diverse Clinical Settings: Conduct longitudinal studies to compare patient outcomes in settings with and without pathologist involvement, assessing the value added by their unique expertise in ethics committees, multidisciplinary teams, and patient consultations.
- Institutional Studies on Procedural Interventions: Examine the efficacy, costeffectiveness, and patient satisfaction of procedural interventions such as bone marrow biopsies and fine needle aspirations performed by pathologists compared to other specialists.
- 4. Technological Integration in Pathology: With advancements in AI, NGS, bioinformatics, and cell-based therapies, research should focus on how pathologists can best implement these tools. Studies will identify technologies that significantly enhance diagnostic accuracy and operational efficiency, including the challenges and educational needs associated with these technologies.
- 5. Impact of AI on Reducing Biases in Healthcare: Explore how AI algorithms in pathology diagnostics may mitigate or exacerbate biases in patient treatment outcomes. Statistical analysis will help identify existing biases and assess AI modifications aimed at reducing these biases effectively.
- Effectiveness of Multidisciplinary Teams in Managing Complex Ethical Cases: Assess how multidisciplinary teams, including pathologists, address complex disease cases and ethical dilemmas, particularly those arising from

emerging technologies. Analyze the influence of these teams on ethical decisionmaking and patient care outcomes.

7. **Patient Consent in the Era of Digital Pathology**: Study how consent processes are managed in digital pathology and investigate patients' perceptions of their consent, focusing on satisfaction and understanding.

To effectively navigate the challenges in modern healthcare and fully integrate the use of advanced technologies in pathology, a comprehensive suite of research methodologies is essential. Quantitative measures such as surveys, questionnaires, and statistical analysis will need to be employed to gather data and identify patterns of bias in AI diagnostics. Additionally, qualitative measures including in-depth case studies and focus groups will provide crucial insights into the ethical dilemmas faced and the processes surrounding patient consent. To capture a holistic view of the ongoing changes in technology and team dynamics, mixed-methods approaches should also be utilized. This should include longitudinal studies that monitor changes over time and ethnographic studies that observe daily practices and interactions within pathology departments, thus providing a comprehensive understanding of the practical challenges and successes in implementing ethical practices.

The proposed future research directions aim to fill the gaps in current knowledge about the ethical implications of advanced technologies and expanded roles in pathology. By employing a mix of quantitative and qualitative research methodologies, the field can develop a more comprehensive, evidence-based understanding of how best to navigate the ethical landscapes integral to modern medical practice.

For instance, consider the implementation of Artificial Intelligence (AI) systems in diagnostic pathology, a major technological advancement aimed at improving diagnostic accuracy and speed. To thoroughly assess both the efficacy and ethical implications of these systems, researchers adopt a multifaceted approach. Quantitative methods, such as statistical analyses, are used to evaluate the precision of AI diagnostics against traditional techniques, analyzing large datasets to identify accuracy rates and potential biases. Simultaneously, qualitative techniques like focus groups and interviews with pathologists and patients provide insights into personal experiences with AI, exploring concerns about reduced human oversight, the impact on the patient-pathologist relationship, and ethical issues related to AI errors. Furthermore, mixed-methods studies combine these approaches to monitor the long-term effects of AI integration, assessing both statistical outcomes and shifts in perceptions among healthcare stakeholders. This comprehensive research strategy not only ensures that AI advancements are scientifically robust but also ethically sound, fostering developments that are technologically effective and aligned with the core values of patient-centered care.

This comprehensive approach will not only address immediate ethical concerns but also lay the groundwork for sustainable, ethical practices as the field continues to evolve. The outlined research efforts are pivotal in addressing significant gaps within the current understanding of pathology's evolving landscape. They aim to systematically evaluate how new roles and technologies impact not only clinical outcomes but also ethical standards and patient engagement. Connecting innovations in pathology with rigorous empirical research can provide evidence-based recommendations that ensure these advances benefit all stakeholders, particularly in terms of enhancing diagnostic accuracy, patient safety, and ethical compliance.

These studies are not just about incremental improvements but are critical for establishing a new paradigm in pathology that aligns with the complex demands of modern healthcare. They provide the necessary data to inform policy, curriculum reforms, and technology deployment strategies that are grounded in robust ethical practices, thereby ensuring that the field remains responsive and responsible to the patients it serves. Understanding these dynamics through ongoing research addresses a

critical research gap, ensuring that the field of pathology does not merely evolve technologically but also grows in its capacity to deal with the ethical, legal, and social implications of these changes. This is crucial for bolstering patient-centric care for maintaining public trust and ensuring that pathology practices align with the broader goals of medical ethics and healthcare equity. The findings from these research efforts will guide the integration of pathologists into more clinically active roles, promote ethical decision-making in the use of AI and other technologies, and enhance the overall quality of healthcare delivery.

Chapter Conclusion and Closing Thoughts

This chapter explores the dynamic evolution of pathology within the modern healthcare environment, integrating ethical considerations, technological advancements, and educational reforms. By employing W.D. Ross's prima facie duties as a moral compass, we have redefined the pathologist's role not only to enhance patient care but also to uphold the highest ethical standards. This comprehensive approach ensures that pathologists remain central to patient-centered care, adapting to their broadened responsibilities with integrity and foresight.

The discussion on the transformative impact of AI, digital pathology, and precision medicine has highlighted their potential to revolutionize diagnostics while also presenting substantial ethical challenges. These technologies necessitate a balanced approach to their integration, emphasizing the importance of maintaining patient privacy, securing informed consent, and ensuring equitable access to healthcare innovations. As such, pathologists are called upon to navigate these advancements with a robust ethical framework, guiding the adoption of new technologies to enhance patient outcomes without compromising ethical values.

Furthermore, the chapter underscores the urgent need to revamp educational and training programs. It advocates for curricula that not only equip pathologists with cutting-edge technological skills but also imbue them with the ethical acumen necessary for their expanding roles. Addressing recruitment challenges and reshaping public perceptions are also crucial for sustaining the growth and relevance of the pathology field.

This narrative has laid a solid foundation for the necessity of targeted research. Such research should aim to empirically validate the integration of interventional practices and advanced technologies, optimizing educational strategies and clinical outcomes. This forward-thinking research agenda is essential for continuously refining the role of pathologists and ensuring that the field remains at the forefront of healthcare innovation.

Looking to the future, pathology stands at the cusp of a transformative era. By embracing expanded clinical roles, integrating state-of-the-art technologies within an ethical framework, and promoting an environment of relentless innovation and research, pathologists are poised to significantly improve healthcare delivery. This chapter sets the stage for a future where pathology is not only a fundamental component of medical practice but also a leader in ethical and technological advancements. As we continue to navigate this evolving landscape, the insights and frameworks developed here will guide pathologists to enhance their impact on patient care, ensuring their indispensable role in the evolving healthcare landscape.

By embracing these challenges and opportunities, pathology is poised to fulfill its full potential as a pivotal field in modern medicine, characterized by continuous adaptation and ethical integrity. Over the next decade, it is expected the advancing integration of artificial intelligence (AI), and omics-based approaches will radically enhance personalized patient diagnoses and care. As these technologies become

increasingly central to pathology, they will not only speed up diagnostic processes but also improve the precision of patient-specific therapeutic strategies. This transformation, however, necessitates a steadfast commitment to the prima facie duties— fidelity in maintaining truthful communication about diagnostic capabilities, reparation for addressing any harm caused by technological errors, gratitude towards collaborative healthcare teams, justice in ensuring equitable access to these innovations, beneficence in improving patient outcomes, non-maleficence in preventing harm from misdiagnosis or data breaches, and self-improvement through continuous learning about new technologies— will be crucial in guiding pathologists to use these advancements responsibly and ethically . Pathologists must remain vigilant ethical stewards, navigating the complexities introduced by precision medicine to maintain patient trust and uphold ethical standards. Through this dedication, pathologists will continue to be indispensable, shaping a future where medical practice not only advances technologically but also adheres to the highest standards of ethical integrity and patientcentered care.

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