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PROFESSIONAL ISSUES

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The case for integrating genetic counselors into primary care: A paradigm shift for our profession

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Abstract

The integration of genetic counselors (GCs) into primary care represents an opportunity for a transformative shift in healthcare delivery, bridging the gap between the historical medical genetics delivery model and the increasing need for genetic services. This paradigm aligns the holistic ethos of primary care with the specialized expertise of genetic counseling and frontline access to preventive care, addressing critical barriers in genetic services. Current genetic service delivery models, concentrated in tertiary care settings, face limitations, including access disparities, fragmented care, and inefficiencies that disproportionately affect underserved populations. Embedding GCs within primary care leverages GCs' unique skills to enhance personalized healthcare delivery, improve risk assessment, and facilitate the implementation of precision medicine. GCs in primary care can streamline referrals, manage routine genetic concerns, and provide genetic continuity of care across the patient's lifespan. This integration ensures that genetic insights are contextualized within patients' day-to-day healthcare, fostering equitable and efficient access to genomic medicine. We explore the potential impact of primary care genetic counselors (PCGCs) on healthcare systems, emphasizing the alignment of their scope of practice with primary care principles such as accessibility, comprehensiveness, and continuity. By addressing evolving patient needs and collaborating with primary care teams, PCGCs can increase patient access, reduce system inefficiencies, alleviate pressures on specialty genetics services, and improve health equity. This paper advocates for a collaborative model where GCs are embedded within primary care, enabling proactive, prevention-focused interventions and enhancing patient outcomes. By integrating genetics into primary care settings, we reimagine genetic healthcare delivery to maximize the benefits of genomic medicine for all individuals. This paradigm shift underscores the urgency of addressing systemic barriers and advancing the role of GCs in healthcare to improve patient and clinician experiences, better population health, and achieve greater health equity.

KEYWORDS
genetic counseling, health equity, healthcare delivery, precision medicine, primary care, workforce

What is known about this topic

The integration and delivery of genetic services into healthcare has expanded significantly, yet these services remain largely concentrated in specialty settings, creating access barriers for many patients. Efforts to scale genetic services have highlighted the need for innovative delivery models to address disparities and inefficiencies in the current system. GCs play a critical role in bridging genetic science and patient care, but their roles in primary care have been limited, despite the potential to enhance accessibility, prevention, and patient-centered care.

What this paper adds to the topic

This paper advocates for embedding GCs into primary care as a transformative approach to addressing access disparities and enhancing the delivery of genomic medicine. It explores the scope of practice and ethos of primary care genetic counseling, demonstrating how GCs can align with the principles of accessibility, comprehensiveness, and continuity to provide equitable, integrated care. By presenting practical applications and a collaborative framework, this paper highlights how PCGCs can optimize healthcare delivery, improve patient outcomes, and advance health equity.

Positionality

As authors of this manuscript, we acknowledge the importance of transparency regarding our positions, perspectives, and potential biases that may influence our advocacy for integrating GCs into primary care. Our author group represents diverse backgrounds and experiences across multiple dimensions, including race/ethnicity, gender identity, religious affiliations, countries of origin, and professional roles. We include GCs and physicians working in clinical care, research, and operations across different healthcare settings in both the United States and Canada. Several authors currently work in primary care settings, which may contribute to our positive bias toward this model's potential success and impact. While our group brings together varied perspectives from different healthcare delivery models, professional backgrounds, and patient populations served, we recognize that we tend to be early adopters and change advocates within healthcare. This orientation may influence our optimistic view of practice evolution and innovative service delivery models. Many of us actively work to expand genetic counseling into new practice areas, which shapes our perspective on the profession's future direction. We acknowledge that despite our group's diversity, we cannot represent all viewpoints within the genetic counseling profession or healthcare more broadly. Some members of our profession may have valid concerns about this proposed paradigm shift that we haven't fully captured. Additionally, while we work with diverse patient populations across various settings (urban, rural, academic, community-based), our personal and professional experiences inevitably create blind spots in our understanding.

1 | INTRODUCTION

Propelled by the growing recognition of clinical and personal benefits derived from genetic testing and advances in genomic technologies, utilization of genomic medicine has expanded over the last decade (Abacan et al., 2019; Chou et al., 2021; Dragojlovic et al., 2021; Faucett et al., 2019; Harding et al., 2019; Ramos & Weissman, 2018; Swanson et al., 2018). Genetic services, including genetic counseling and genetic testing, provide numerous benefits to both patients and healthcare systems (Ginsburg et al., 2019; Grzymski et al., 2020; Halverson et al., 2016). However, studies indicate that barriers to accessing genetic services exist at every stage of care, including referrals, appointment scheduling, genetic testing, and management of genetic results (Chou et al., 2021; Kaye et al., 2019; Najafzadeh et al., 2013; Sharma et al., 2021). Patients often face challenges navigating complex healthcare systems, leading to fragmented care and suboptimal outcomes, especially in underserved populations (Delikurt et al., 2015; Gattas et al., 2001; Gene Hallford et al., 2020; Hawkins & Hayden, 2011). Addressing these barriers requires systemic changes, including enhanced integration of genetic services into primary care settings, targeted education for clinicians, and innovative service delivery models to ensure equitable access (Eichmeyer et al., 2014; Greenberg et al., 2020; Helm et al., 2018; Kentwell et al., 2017; Kubendran et al., 2017; Madlensky et al., 2017; Slomp et al., 2022; Tan et al., 2016; Wakefield et al., 2018). Genetic counselors (GCs) have the skills, expertise, and positioning to lead these systemic changes. By reimagining how genetic services are delivered, GCs can help mitigate disparities and promote a more inclusive approach to genomic medicine, ultimately improving outcomes for all patients.

1.1 | Increasing public awareness

The past decade has witnessed a remarkable transformation in public attitudes towards genetics, with increasing recognition of its role in shaping individual health and wellness. The growing popularity of direct-to-consumer genetic testing services and the widespread integration of genetics into various aspects of healthcare have heightened public awareness of the potential impact of genetics on individual health outcomes (Cohidon et al., 2021; Gollust et al., 2012). Additionally, the emergence of high-profile genomic initiatives, such as the All Of Us program, the 100,000 Genomes

Pilot, and Australian Genomics, has further fueled worldwide public interest in genetics by highlighting the potential of genomic data to inform personalized healthcare interventions and improve patient outcomes on a population scale (100000 Genomes Project Pilot Investigators et al., 2021; Kozlowski et al., 2024; Stark et al., 2023). This growing interest and public acceptance in genetics have profound implications for healthcare delivery, research, and policy. Thus, there is a need for continued education, dialogue, and engagement to ensure that genetic advancements are harnessed responsibly and equitably for the benefit of all individuals and communities. However, despite this growing public awareness, the majority of individuals with a genetic predisposition to disease remain unaware of their risk, highlighting the need for greater integration of genetic insights into clinical care to bridge this gap (Childers et al., 2017; Hellwig et al., 2024; Krakow et al., 2017).

1.2 | Innovations and challenges in scaling genetic services

With the rapid rise in the need for genetic services, there is an increasing need for more trained genetic clinicians. Although genetic counseling programs are growing in both size and number, many challenges remain in meeting this need, and a new paradigm is required to scale genomic medicine effectively and ensure its benefits reach everyone. Many have advocated for innovative service delivery models to improve the efficiency and accessibility of the existing genetic workforce (Hannig et al., 2014; Rashkin et al., 2019; Stoll et al., 2018). During the Coronavirus-19 pandemic, telehealth became more widely adopted, offering potential access to those facing geographic barriers, but the pandemic also highlighted other significant disparities in healthcare access (Mauer et al., 2021; Núñez et al., 2021; Shannon et al., 2021). Policy, billing, recognition, and reimbursement issues persist worldwide, with many clinical GCs unable to bill for their services (Abacan et al., 2019; National Society of Genetic Counselors, 2024a). The regulatory landscape further complicates matters, as varying regulatory requirements and scope-of-practice limitations can create additional challenges (College of Physicians and Surgeons of Ontario, 2021; Ministry of Health, 2024; National Society of Genetic Counselors, n.d.; National Society of Genetic Counselors, 2024b). Genetic services continue to be predominantly delivered within tertiary and specialty care settings, often characterized by individual, single-point interactions.

1.3 | Evolving healthcare practices

Rapid advancements in genetic research, genetic testing technologies, and our understanding of genetic conditions have catalyzed a shift towards personalized medicine, enabling treatments and interventions tailored to individual patients. Pharmacogenomic testing, for example, has emerged as a key component of personalized medicine (Rollinson et al., 2020). Beyond treatment, there is an increasing focus on prevention, using genetic insights to guide risk-reducing strategies, lifestyle modifications, and early interventions tailored to individuals' genetic profiles (Ginsburg & Phillips, 2018; Khoury et al., 2016). The integration of genomic medicine across healthcare has steadily grown, with non-genetics clinicians increasingly incorporating genetics into routine practice. Expanding genetic testing coverage policies have further enhanced the accessibility and utilization of genetic tests across various medical specialties, although coverage is still highly variable and incomplete (Graf et al., 2013; Mansur et al., 2022). In order to support pre-test and post-test counseling, many specialists are expanding their practice to include GCs, such as ophthalmology, nephrology, and neurology, reflecting the growing recognition of genetic and genomic contributions to these conditions (National Society of Genetic Counselors, 2024a). Given the in-depth knowledge of genomics, testing protocols, and the application of genetics to research and industry, GCs have also expanded beyond direct patient care to encompass a variety of roles in policy, laboratory, research, industry, and other fields, underscoring the versatility and growing influence of the profession (National Society of Genetic Counselors, 2024a). While there is expansion into these other specialty fields, there remain disparities in who is being seen by the specialists. Many individuals, particularly those in underserved and marginalized communities, continue to face barriers to accessing genetic testing and counseling, limiting the potential of these innovations to benefit all populations. Addressing these disparities is essential to ensuring that the progress in genomic medicine translates into improved health outcomes for everyone.

1.4 | Barriers to accessing genetic care

Access barriers to genetics care are multifaceted and pervasive, affecting individuals at various points along the healthcare continuum (Figure 1). Barriers to genetics care can be understood through the lens of a patient's journey (Bulto et al., 2024; Carayon et al., 2020). The journey often begins with recognizing a need for genetic services, where patients may face barriers such as limited access to information, cultural stigma, or distrust of healthcare providers (Borle et al., 2025; Delikurt et al., 2015). Even when a need is identified, referral and appointment scheduling can be hindered by provider knowledge gaps, lack of referrals, or logistical obstacles such as transportation, financial constraints, or time off work (Kne et al., 2017; Korte & Terry, 2023). These initial barriers can delay or entirely prevent access to care for underserved populations (Chou et al., 2021; Cragun et al., 2017). Once a patient reaches the stage of genetic testing, they may encounter issues such as understanding the purpose of testing, test availability, prohibitive costs, or the complexity of insurance coverage and reimbursement. Additionally, logistical hurdles like coordinating sample submission can add further delays. After testing, the interpretation and follow-up of results present another set of barriers (Burke et al., 2022; Farmer et al., 2021; Menke et al., 2021; Patel et al., 2016). Results may not be adequately communicated or integrated into patients' broader care plans due to non-genetic

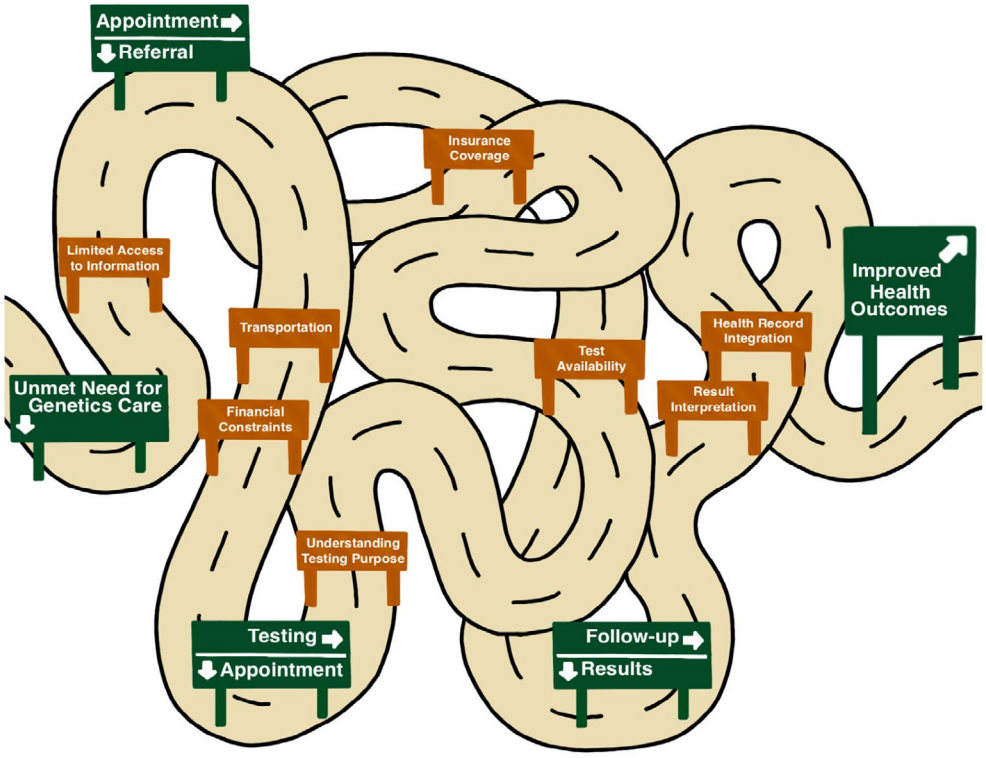

FIGURE 1 Pathway to genetics. The above considers the personal journey of a patient and the barriers they may face, notwithstanding additional overarching systematic barriers influencing accessing genetics care. There are multiple levels of barriers, such as personal, institutional, and societal factors which all interplay together creating a complex problem. Multiple solutions are required to truly address the systemic issues in terms of accessing genetics, but starting with adding primary care genetic counselors (PCGCs) is one step in the right direction. Adapted from Papautsky and Patterson (2021).

clinicians' limited genetic knowledge, and system-level inefficiencies, such as poor electronic medical record integration or the lack of clinical decision support tools (Kho et al., 2013; Ohno-Machado et al., 2018). Furthermore, patients may not receive timely updates on variant reclassification or access to additional testing, leaving important clinical information underutilized (Cherny et al., 2021; Donohue et al., 2021). Throughout this journey, marginalized populations often face compounding disparities, including geographic limitations, systemic biases, and insufficient resources to navigate these complexities. Understanding these barriers from the patient's perspective underscores the need for holistic, patient-centered interventions to improve the accessibility, efficiency, and equity of genetic care (Bulto et al., 2024; Carayon et al., 2020).

2 | THE CASE FOR GENETIC COUNSELING IN PRIMARY CARE

2.1 | What is primary care?

Primary care is defined as "the provision of integrated, accessible healthcare services by clinicians who are accountable for addressing a large majority of personal healthcare needs, developing a sustained partnership and practicing in the context of family and community" (Institute of Medicine (US) Committee on the Future of Primary Care et al., 1996). Primary care focuses on the comprehensive and interrelated aspects of physical, mental, and social health and well-being, providing whole-person care for health needs throughout the lifespan (World Health Organization, 2023). This is differentiated from specialty or tertiary care, which typically require referral, and focus narrowly on a specific clinical question, and often with limited integration of broader health concerns. At its core, primary care is the first point of contact for patients in the healthcare system; it also offers comprehensiveness, coordination, and continuity (Jimenez et al., 2021). Primary care serves as a cornerstone of healthcare delivery, serving all ages from pregnancy to death across a vast spectrum, including preventative care, acute care, and the management of chronic conditions. It encompasses the fields of family medicine, internal medicine, general pediatrics, and (depending on the healthcare system) obstetrics-gynecology, and is practiced by physicians, nurse practitioners, and physician assistants (American Academy of Family Physicians, 2019). Additionally, it can extend to larger multidisciplinary teams that may include dietitians, social workers, pharmacists, and increasingly, GCs (Ashcroft et al., 2024; Jortberg & Fleming, 2014; Leach et al., 2017). Primary care functions as a gateway to specialty care; in the context of genetics, this might involve identifying individuals at risk for genetic conditions, facilitating genetic testing, and coordinating appropriate care (Carroll et al., 2009; Harding et al., 2019; Martin & Wilikofsky, 2004).

2.2 | Mutual goals and complementary roles of primary care and genetic counseling

Primary care and genetic counseling share mutual goals of improving health outcomes, promoting preventive care, and empowering patients to make informed healthcare decisions (Figure 2). Primary care providers serve as the first point of contact for patients and are often responsible for identifying individuals at risk for genetic conditions through family history assessments, screening, or clinical presentations. GCs complement these efforts by providing specialized expertise in genetic risk assessment, interpretation of genetic test results, and psychosocial support tailored to the patient's needs. Together, these disciplines address not only the medical implications of genetic findings but also their emotional, ethical, and social dimensions. This integration creates practical benefits across multiple domains of care. For example, incorporating pharmacogenomics into primary care can improve medication management by guiding initial drug selection and dosing based on genetic variants affecting drug metabolism, potentially reducing adverse reactions and treatment failures. Similarly, preconception genetic counseling within primary care enables true family planning by identifying carrier status and genetic risks before pregnancy, allowing for informed reproductive decision-making. In cancer prevention, genetic risk assessment can transform age-based screening into precision prevention strategies that incorporate hereditary risk factors to determine optimal screening protocols and timelines (Figure 2). The integration of genetic counseling into primary care enhances the delivery of personalized medicine by uniting broad population-level preventive strategies with tailored individual genetic insights, creating a synergistic approach that amplifies the benefits of both. This collaboration enables earlier detection of genetic risks, targeted proactive and prevention strategies, and better coordination of care across specialties. By working together, primary care and genetic counseling maximize the accessibility, effectiveness, and equity of genetic services, advancing the shared goal of holistic, patient-centered care.

2.3 | Why should genetic counseling be integrated into primary care?

A significant gap exists in the provision of genetic services, and the functional requirement for primary care clinicians to refer patients to genetics creates additional barriers to accessing care. To bridge this gap effectively, we must meet patients where they are—within the primary care settings they may already trust and frequent rather than expecting patients to navigate their genetic health needs and stay updated on genetic services on their own—as is presumed by the current model of healthcare service. Patients have needs related to

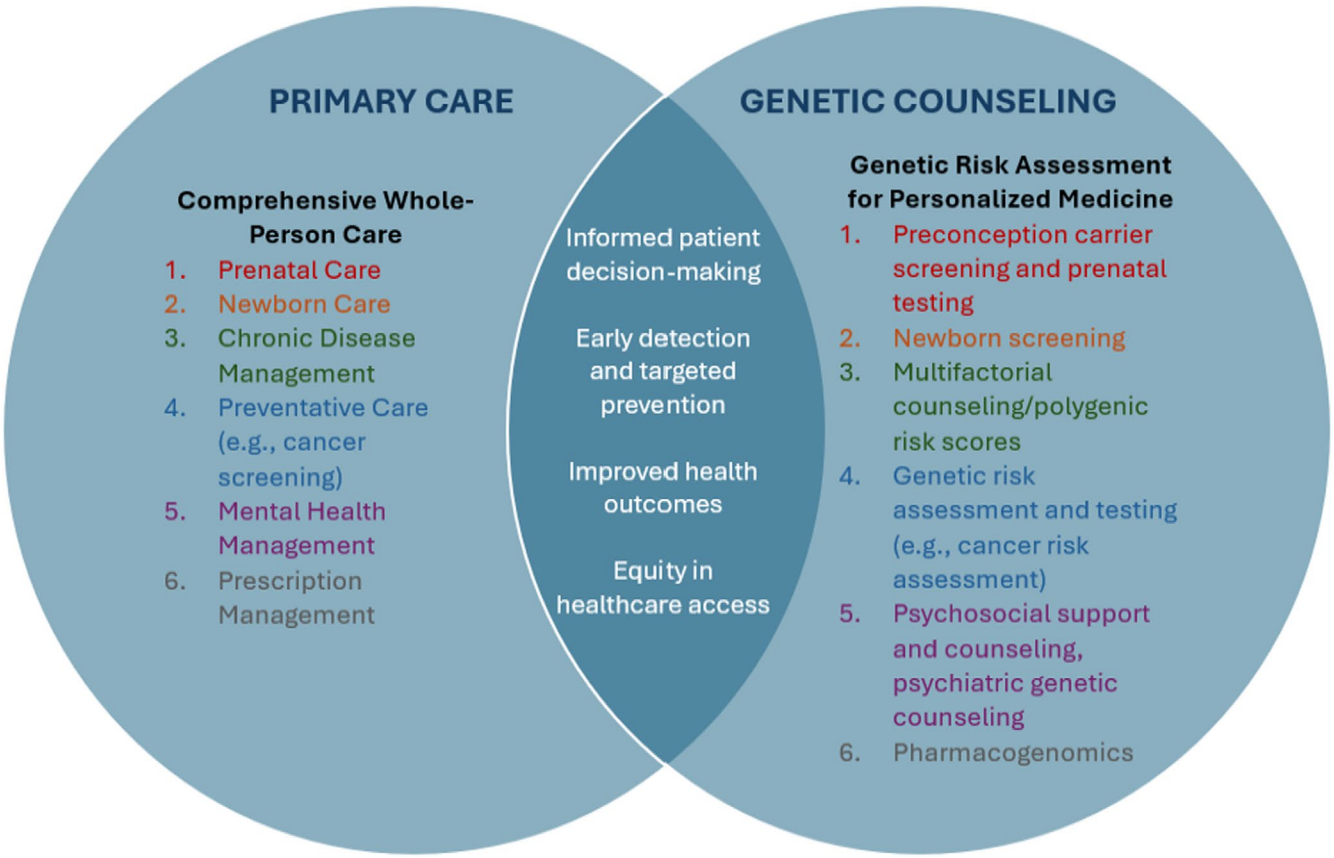

FIGURE 2 Mutual goals of genetic counseling and primary care. Genetic counseling aligns with primary care in several ways. Many of the areas where genetics is already deeply involved, such as perinatal care or cancer-related concerns, can be seen as routine primary care.

genetics that evolve over their lifespan, influenced by aging, changing life circumstances, and advancements in genetic technology. Translating specialized genetic knowledge into the context of patients' lives and values is precisely what GCs are trained to do. Integrating genetics into primary care practice not only brings genetic services closer to patients but also aligns with their real-world experiences and care pathways. Additionally, embedded genetic counselors can serve as crucial bridges between emerging genomic research and clinical implementation, facilitating the translation of new evidence into practice while providing valuable insights for population-based genetic testing initiatives. This integrated approach can help enhance personalized healthcare delivery, improve risk assessment and disease prevention efforts, and empower patients to make informed decisions about their health and well-being (Table 1). The overarching goals of primary care and genetic counseling align well (Figure 2).

3 | DEFINING GENETIC COUNSELING IN THE CONTEXT OF PRIMARY CARE

Genetic counseling has evolved since Sheldon Reed first coined the phrase in the late 1940s (Reed, 1974). In 2006, the Genetic Counseling Definition Task Force defined genetic counseling as "the process of helping people understand and adapt to the medical, psychological, and familial implications of genetic contributions to disease" (Resta et al., 2006). Since then, there has been growing recognition of the limitations of this definition. Austin (2024) offers an updated description: "Genetic counseling is a psychotherapeutic process of helping people to make meaning of genetic information, and helping them use that information in alignment with their values, needs, and wants, and—when appropriate—to manage their health in the context of uncertainty." They also differentiated between genetic counseling as an activity that any healthcare professional may engage in and as an intervention provided by those trained in the profession of genetic counseling and encouraged explicit articulation of the foundational assumptions, beliefs, and core values of the profession of genetic counseling. Building on these definitions, we examine the scope of practice and guiding principles of genetic counseling in the context of primary care below.

3.1 | Scope of practice for primary care genetic counselors

The scope of practice for GCs encompasses a range of responsibilities, including genetic risk assessment, test interpretation, and

TABLE 1 Benefits of integrating genetic counseling into primary care.

	Benefit	Example
For patients	Improved health outcomes	• Awareness of risk allows for discussion and integration of proactive and preventive medicine[1] • Receive interpretation/evaluation of genetic testing (or retesting, due to rapid changes in genomic medicine) results, within established medical home[2, 3, 4] • Build trust and increase satisfaction with the medical system
	Knowledge & empowerment	• Increased informed, shared decision-making about health behaviors consistent with individual needs, goals, and values[3] • Reduced anxiety and/or increased empowerment related to previously unaddressed genetic concerns[5]
For primary care clinicians	Education & training	• Increase in awareness of and knowledge about genetics care increases sense of confidence and ability to:[6, 7] ○ Provide appropriate and timely referrals for patients ○ Address common genetic concerns with patients
	Resources & support	• Increased, convenient access to genetics expert for timely and accurate answers to genetics questions and the opportunity for collaborative care[8, 9]
For genetic counselors	Top of scope	• Generalist GCs are able to apply the broad range of knowledge amassed in formal education • Specialist GCs conduct more in-depth genetic risk assessments, coordinate more specialized genetic testing, and provide specialized counseling tailored to the needs of patients
For institutions/ society	Decreased disparities	• Increased access to genomic medicine allows patients to be seen in the most appropriate clinics (e.g., their medical home in primary or the appropriate specialty clinic) and decreasing wait times • Ensures continuity of care within the medical home
	Downstream revenue & saved costs	• Preventative surveillance and/or surgeries increase revenue and/or decrease treatment costs[10, 11, 12] • Selection of the most appropriate genetic test by a GC saves time and costs[13, 14, 15, 16]

Note: 1. Helm et al. (2018); 2. Gollust et al. (2012); 3. Gordon et al. (2012); 4. Cohidon et al. (2021); 5. Madlensky et al. (2017); 6. Paneque et al. (2016); 7. Wilkes et al. (2017); 8. Carroll et al. (2019); 9. Carroll et al. (2021); 10. Mauer Hall et al. (2021); 11. Morris et al. (2022); 12. Mauer Hall et al. (2024); 13. Wakefield et al. (2018); 14. Montanez et al. (2020); 15. Neumann and Cohen (2009); 16. Ratushnyak et al. (2019).

psychosocial assessment and support. In the primary care context, this scope includes both Mendelian and multifactorial conditions across the lifespan, reflecting the diverse health needs of patients. Primary care genetic counselors (PCGCs) collaborate within multidisciplinary care teams, working closely with primary care clinicians to integrate genetic considerations into routine healthcare delivery. PCGCs play a critical role in conducting routine genetic risk assessments, triaging patients for specialty care when needed, and providing preventive and proactive care tailored to each patient's unique circumstances. Their work extends beyond one-time consultations, supporting patients over time as genetic concerns evolve with aging, life events, and advancements in genetic technology. By facilitating continuity of care, PCGCs ensure that genetic insights are integrated into broader health management, empowering patients to make informed decisions about their health. There is a small but growing number of GCs who work in the primary care setting and who identify as PCGCs (Bauer et al., 2023; Massart et al., 2022; Slomp et al., 2022). Although their scope is still being defined, real-world examples illustrate the value of PCGCs in primary care, such as hereditary cancer risk assessments, carrier screening, and pharmacogenomics consultations (Box 1). In these scenarios, PCGCs streamline referrals, reduce delays in care, and provide timely genetic expertise within the primary care setting. While specialty GCs cultivate deep knowledge in focused areas of genetics, PCGCs develop broad expertise across multiple conditions, complementing specialty care by ensuring patients receive comprehensive, coordinated genetic services.

3.2 | Ethos of primary care genetic counseling

The ethos of genetic counseling is rooted in core values such as patient-centered care, empathy and compassion, informed

BOX 1 An example of primary care genetic counseling: accessibility, comprehensiveness, and continuity in action

A 20-year-old cisgender female patient visited her primary care clinic for a routine appointment, disclosing that she had recently taken a direct-to-consumer (DTC) ancestry test, which included some health-related information, though the results were negative. The clinic's GCs performed a family history risk assessment and discovered concerning family medical histories: Her mother had early breast cancer and a variant of uncertain significance (VUS) in the BRCA1 gene, and her father had hypertrophic cardiomyopathy (HCM), with multiple early deaths in the family. The patient opted out of genetic testing at the time due to concerns over medical management and insurance implications but was recommended to start earlier breast cancer screenings at age 25.

Five years later, at 25, the patient returned for preconception genetic counseling. She provided updates to her family history, including her mother's passing due to a second primary breast cancer. The GC reviewed her family history, noting that the BRCA1 VUS was now classified as likely pathogenic, which could affect her cancer screening management. The patient chose to undergo BRCA1 analysis and carrier screening, confirming that she inherited the BRCA1 familial variant but was negative for carrier screening. Her partner was also screened for BRCA1 variants due to the recessive risk for Fanconi anemia; his result was negative.

During her pregnancy, the patient had not followed up on her high-risk breast clinic referral or screenings. She had been focused on her BRCA1 carrier status rather than the dominant cancer risk. After re-education by the GC, she began following the recommended cancer screenings.

After her pregnancy, the patient sought help for postpartum depression and anxiety. Due to concerns over medication side effects and breastfeeding, pharmacogenomic testing was discussed with her GC, pharmacy team, and primary care clinician. The patient was empowered to connect with a family psychiatrist and share her genetic results with her maternal family, reconnecting with relatives using a family letter provided by the GC.

In her 30s, the patient revisited the clinic for a wellness check. She had been monitoring her family's history of HCM (of unknown etiology) but had hesitated to undergo genetic testing. After her father's death, she decided to pursue testing for her own children's sake. The test was negative, and her family continued to be monitored based on the family history.

Reflection: This case demonstrates the unique value of PCGCs. By integrating genetic services into the medical home, the PCGC provided comprehensive care while avoiding the need for multiple specialty visits. The patient received individualized surveillance through her PCP, with appropriate specialty referrals when needed. The ongoing relationship in primary care proved crucial as the patient's needs evolved—from initially declining cardiomyopathy testing to reconsidering after having a child and later benefiting from the VUS reclassification update that might have been missed after her mother's death. The primary care genetic counseling model addresses care gaps, manages psychosocial needs, and ensures continuity of genetic care as family history and testing technologies evolve, all while reducing the burden on both patients and specialty genetic services. Mental health and well-being, as well as physical health, are both prioritized in this holistic approach to care delivered through the primary care genetic counseling model.

decision-making, clear communication, and justice, equity, and inclusion (Austin, 2024). In primary care, these core values adapt to prioritize accessibility, comprehensiveness, and continuity of care, aligning with the broader goals of primary care delivery.

- **Accessibility** involves meeting patients where they are, both physically in trusted primary care settings and contextually by considering literacy levels, cultural safety, and socioeconomic factors. Integrating genetic services into primary care reduces barriers, ensuring that more patients can benefit from these essential services.
- **Comprehensiveness** is another defining feature of primary care genetic counseling. PCGCs address a wide range of health concerns in a whole-person framework, providing genetic services that align with primary care's preventive and longitudinal approach. This involves considering not only specific genetic risks but also the broader health and life contexts that influence patient care.
- **Continuity** of care is essential to the primary care ethos, enabling sustained therapeutic relationships with patients over time. PCGCs revisit and update genetic insights as patients' needs and circumstances evolve, such as the reclassification of genetic variants or changes in personal and family history. This long-term engagement fosters trust and ensures that genetics care remains relevant and responsive.

By applying the core ethos of genetic counseling to the primary care setting, PCGCs enhance patient-centeredness, aligning services with individual values and life circumstances. This framework strengthens the relationship between patients, primary care providers, and GCs, creating a seamless and holistic healthcare experience (Figure 3).

3.3 | A practical and collaborative approach to integrating genetic counseling in primary care

Regardless of their work context, GCs rely on the same fundamental training, values and skills to deliver patient-centered education, counseling, and support. Rather than establishing a new "primary care specialty" within genetic counseling, this paradigm would emphasize integrating GCs into primary care settings and encouraging all GCs to consider primary care principles in their practice. For example, in the context of someone with both cancer and cardiovascular family history, if their point of entry is primary care, a PCGC can conduct a broad assessment and triage the patient to

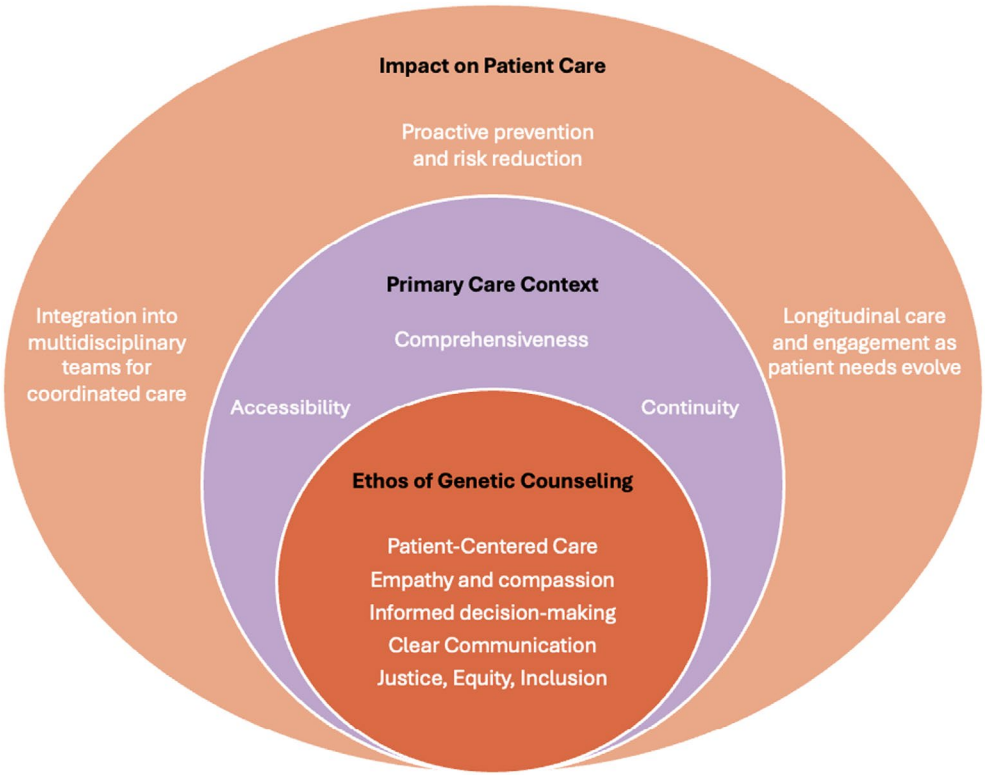

FIGURE 3 Ethos of Primary Care Genetic Counseling: A Framework Rooted in Core Genetic Counseling Principles. The core values of genetic counseling form the foundation for primary care genetic counseling, adapted to prioritize accessibility, comprehensiveness, and continuity. Accessibility reduces barriers, enabling timely identification of genetic risks and proactive prevention. Comprehensiveness addresses genetic and health concerns holistically, fostering coordinated, whole-person care. Continuity sustains long-term follow-up, adapting to patients' evolving needs and integrating genetic insights into care plans. Together, these elements create a framework for proactive, equitable, and integrated genetic counseling in primary care.

specialty care if needed (Box 1). Conversely, if the patient's first point of entry is in a cancer genetics clinic, cardiovascular family history may not be routinely collected or addressed in that setting right now, and even if they are, appropriate follow-up and triage may be disjointed. With the integration of a PCGC, the specialty care GC can send the patient back to primary care, trusting that the patient will have those concerns appropriately addressed by a genetics expert. Ultimately, building GCs into primary care is crucial for ensuring continuity of care, addressing patients' evolving genetic needs, and promoting equity within the healthcare system. Instead of expecting patients to navigate multiple genetic counseling referrals, PCGCs could conduct routine assessments and triage patients to specialty care as needed, promoting a more coordinated and comprehensive approach to genetic healthcare. Mirroring the collaborative care approach with pharmacists or dieticians to seek specialty expertise, primary care clinicians can develop a synergistic partnership with GCs for a patient's genetics care. This approach removes the burden from the patient and decreases barriers to care.

4 | THE INTERSECTION OF GROWTH AND CORE VALUES IN GENETIC COUNSELING

4.1 | Perception of a genetic counseling workforce shortage

A widespread perception that may serve as a barrier to integrating GCs into primary care is the belief that there are "not enough GCs"—an almost reflexive response that has become deeply embedded in discussions about the profession. However, current evidence presents a more complex picture. The US Bureau of Labor Statistics (2024) projects continued field growth of 15% over the next 10 years. In parallel, training programs have dramatically expanded their capacity, with student enrollment increasing by 53% from 716 students in 2018 to 1096 students in 2023 across 60 accredited programs (Accreditation Council of Genetic Counseling, 2023). Yet the current job market reveals additional complexity. Recent industry layoffs have left many GCs seeking employment, challenging the simplistic narrative of a workforce shortage. This situation highlights the limitations of traditional workforce planning models that often rely on non-evidence-based targets, such as the goal of one GC per 100000 population (Hoskovec et al., 2018). While there is evidence of service access challenges, including long wait times at tertiary genetics centers and high caseloads leading to restricted referral criteria (Dragojlovic et al., 2020; National Society of Genetic Counselors, 2024a), these issues may reflect inefficient service delivery models rather than an absolute shortage of professionals. The current system creates a paradox where many GCs seek employment while service access barriers persist (Dragojlovic et al., 2021). Integrating GCs into primary care could help resolve this paradox by creating new clinical roles in a service delivery model that enables GCs to work at the top of their scope. This approach supports a shift from a risk-based to a needs-based paradigm for referrals, potentially increasing the capacity of the existing GC workforce to meet patient needs without requiring substantial workforce expansion.

4.2 | Adapting to change in genetic counseling practice

The composition of the genetic counseling workforce is evolving, with a noticeable trend towards diversification in the settings where GCs practice (National Society of Genetic Counselors, 2024a). In fact, GCs have been emerging from "the big three" (cancer, pediatrics, and prenatal) specialties into other areas for some time, and with every first integration into a new specialty, initial apprehension and concern have arisen from both the genetics community and the respective specialty (Abacan et al., 2019; Chanouha et al., 2023). Yet, every time, GCs have successfully adapted and effectively addressed these challenges. Integration of GCs in primary care may raise questions about the dynamic between primary and specialty care GCs and between GCs and primary care clinicians. There is also the potential for tension between clinical medical geneticists, as efforts to integrate genetic counseling into new specialty areas or enable GCs to practice at the top of their scope have historically faced resistance (Ray, 2021). Successfully navigating these challenges will require clear communication, collaborative frameworks, and a shared commitment to leveraging the strengths of each professional role. By fostering mutual understanding—an area where GCs excel—and emphasizing the complementary nature of GCs and other healthcare professionals, the integration of GCs into primary care can enhance the delivery of comprehensive, patient-centered care while addressing systemic gaps in genetic services.

4.3 | Returning to the roots while embracing evolution in genetic counseling

In recent discussions within the genetic counseling community, there has been a call to return to the roots of genetic counseling (Bauer et al., 2023), emphasizing the importance of patient-centered care, psychotherapeutic support, and empowerment in decision-making. However, as genetics becomes more complex and as new technology and genetic understanding emerge, the role of the GC has also evolved. Balancing a cohesive identity, rooted in common values, with the diversity of perspectives within the profession is a challenge that requires thoughtful consideration. While our combination of skills shapes who we are as professionals, it is the shared values underpinning our practice that truly defines us. For example, there is a recognition that genetic counseling extends beyond the mere provision of genetic testing to encompass a holistic approach to addressing patients' informational, emotional, and decision-making needs in the context of genetic risk assessment and management (Austin, 2020; Semaka & Austin, 2019). Shifts in genetic counseling practice inevitably

shape our professional identity, raising questions about how we define ourselves and our role within the broader healthcare system (Stenberg et al., 2024). Addressing this is essential, as a strong and unified professional identity not only provides clarity for practitioners but also fosters trust and recognition among patients, collaborators, and stakeholders (Fitzgerald, 2020). By anchoring our practice in empathy, communication, and advocacy, we ensure that the essence of genetic counseling remains steadfast, even as technology continues to advance.

5 | IMPLEMENTATION CHALLENGES

Implementation of the PCGC model faces several practical barriers, with financial sustainability being perhaps the most significant challenge. Primary care practices often operate with tight margins, making it difficult to justify additional personnel costs without clear economic incentives. In the United States, current limitations in reimbursement for genetic counseling services create obstacles to financial viability. Similarly, in Canada, the lack of consistent regulation and limited coverage from extended health plans present funding challenges. The feasibility and implementation challenges vary substantially across international contexts—single-payer systems may face different hurdles than insurance-based models, while low- and middle-income countries contend with workforce shortages and competing healthcare priorities that uniquely shape genetic service integration. Hospital systems and health authorities may require compelling evidence of cost effectiveness, such as reduced inappropriate genetic testing, fewer specialist referrals, or improved health outcomes, before investing in embedded genetic counselors. Addressing these financial barriers will require multi-pronged approaches: advocacy for improved reimbursement models, demonstration projects showing return on investment, exploration of shared-resource models across practice groups, and potentially public health funding for prevention-focused genetic services. As the evidence base for genetic counseling's value in primary care grows and reimbursement structures evolve, these financial barriers may diminish, but they remain significant considerations for current implementation efforts.

The training requirements for effective integration differ significantly depending on the primary care context—family physicians may need different genetic competency training than OB/GYNs, pediatricians, or allied health professionals. While this model requires some collaboration with PCPs who possess baseline genetics knowledge, a key advantage of the PCGC approach is precisely to alleviate the training burden on primary care providers rather than intensify it. Many PCPs who actively seek genetic counselor collaboration often have some additional training or interest in genetics (through fellowships, additional coursework, or self-directed learning), which paradoxically makes them more aware of the limitations in their own scope of practice regarding clinical genetics applications. We recognize that medical education is increasingly incorporating genetics and genomics into standard curricula, establishing a minimum foundation that facilitates collaboration. This gradual improvement in baseline knowledge should be encouraged, but the PCGC model acknowledges that even with improved training, the depth of expertise required for complex genetic risk assessment and counseling exceeds what can reasonably be expected from primary care providers given their existing responsibilities and time constraints.

We acknowledge that implementation models and practical details of integrating GCs into primary care settings are important areas that warrant further exploration. This paper focuses specifically on establishing the foundational premise that GCs can and should be integral members of primary care teams. We plan to address the procedural aspects and implementation strategies in a subsequent paper. We also recognize that our discussion primarily centers on North American healthcare contexts. While we have attempted to consider diverse health systems, many of our references originate from the United States and Canada, which host a significant concentration of practicing genetic counselors. This geographical focus reflects current workforce distribution while acknowledging the need for broader international perspectives.

6 | CONCLUSION

The primary care genetic counseling model addresses the comprehensive needs of patients across the lifespan, contrasting sharply with the siloed, specialty-driven approach prevalent in North America (Cohen et al., 2016; Greenberg et al., 2020). By integrating genetic services directly into primary care workflows, PCGCs ensure accessibility, continuity, and comprehensiveness of care, solidifying genetic counseling as a vital component of modern healthcare delivery. This paradigm shift requires reimagining traditional service delivery models to align with the holistic, prevention-focused ethos of primary care while upholding the core values of patient-centered care, informed decision-making, and equity in genetic counseling. To achieve this, GCs are challenged to adapt their roles, expand beyond specialty settings, and collaborate with multidisciplinary teams in primary care environments. Addressing logistical, systemic, and educational barriers is critical, necessitating innovative solutions to seamlessly incorporate genetic services into primary care workflows and equip primary care clinicians with tools and knowledge to integrate genetics into routine practice. This approach redefines the scope of practice for GCs, emphasizing accessibility, continuity, and comprehensiveness to ensure genetic services are both equitable and sustainable for diverse populations.

Embedding genetic counseling within primary care holds transformative potential for improving access to genetic services and advancing health equity. By fostering collaboration between GCs and primary care clinicians, this model has the power to revolutionize healthcare delivery and enhance patient outcomes, aligning with the quintuple aims for healthcare improvement (Borle et al., 2023; Mitchell et al., 2019; Nundy et al., 2022): enhancing patient and provider experiences, promoting population health, reducing costs, and advancing equity. Ultimately, integrating genetic counseling into

primary care bridges critical gaps in access, paving the way for a more inclusive, sustainable, and patient-centered model of genomic medicine.

AUTHOR CONTRIBUTIONS

Conceptualization was conducted by all authors (VP, NB, SB, MB, KB, PC, MM, CM, and JA). VP, NB, and SB prepared the original draft of the manuscript. All authors participated in reviewing and editing the manuscript. VP and SB were responsible for data visualization. JA provided supervision for the project, while VP, NB, and SB handled project coordination.

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DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no datasets were generated or analyzed during the current study.

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