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Reconstructing General Medicine: Integrative Frameworks for Precision and Population Health

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Abstract

The convergence of precision medicine, population health, digital technologies, multi-omics, artificial intelligence (AI), and data-driven healthcare increasingly shapes general medicine. This review examines integrative frameworks that connect individualized clinical care with population-level prevention, surveillance, and health-system planning. The reviewed evidence highlights the expanding role of genomics, phenomics, multi-omics, predictive analytics, digital health, and AI in disease characterization, risk stratification, clinical decision-making, and personalized treatment. Population-health approaches complement these advances by incorporating environmental exposures, behavioral factors, social determinants, occupational health, community resilience, and public health preparedness. Big data and computational modeling further support the integration of heterogeneous clinical, molecular, environmental, and population datasets for predictive and preventive applications. The review also identifies challenges related to data interoperability, algorithmic bias, privacy, unequal digital infrastructure, limited external validation, and inconsistent implementation across healthcare settings. Emerging strategies such as explainable AI, digital twins, standardized data architectures, and multidisciplinary implementation models may improve clinical translation. This review reports that integrating precision-oriented approaches with population-health frameworks can support a more preventive, personalized, equitable, and resilient model of general medicine capable of addressing both individual biological variability and broader determinants of health.

Categories: Public Health, Internal Medicine, Healthcare Technology
Keywords: artificial intelligence, cancer detection, liquid biopsy, molecular biomarkers, multi-omics

Introduction And Background

General medicine is undergoing a substantial transformation as conventional disease-oriented models become increasingly integrated with precision medicine, population health, digital technologies, environmental science, and data-driven clinical decision-making; the healthcare value of these approaches is becoming more apparent [1]. Modern healthcare systems are required not only to handle individual diseases but also to address more complex relationships between genetic predispositions, environmental exposures, behaviors, social determinants, and access to healthcare services throughout the lifespan, all of which influence health outcomes [1]. This has been broadened by the concept of the human exposome, which highlights the cumulative effects of environmental and social exposures on biological processes, disease susceptibility, and population-level patterns [1]. One area of this shift that is garnering increasing attention is precision medicine, which leverages genomic, molecular, clinical, and phenotypic data to better predict, prevent, diagnose, and select treatments for disease [2]. More extensive biobanks and population genetic studies of genomes are also enhancing the ability to detect disease-associated variants, to study population-specific genetic architecture, and to translate genomic evidence into individual clinical interventions [2]. Precision public health extends this idea by using large-scale data and analytic technologies to better target preventive interventions, surveillance programs, and health resource allocations [3].

Effective integration of large-scale, highly diverse datasets from Electronic Health Records (EHRs), genomics, environmental monitoring, social determinants, wearable technology, and public health surveillance systems is a critical enabler of the convergence of precision medicine and population health [3]. There are still major methodological and infrastructural challenges, including data standardization, interoperability, computational scalability, privacy protection, algorithmic validity, and equitable representation of diverse populations [4]. Biomarker science also shows general medicine's trend toward a more personalized risk assessment [5]. In the field of cardiometabolic medicine, this is a new approach to disease prediction, using conventional clinical variables combined with molecular biomarkers and large datasets, and supporting more individualized approaches to disease prevention and therapeutic decision-

making [5]. Artificial intelligence (AI) further supports precision medicine by analyzing complex clinical datasets, identifying patterns, and assisting in individualized risk assessment and treatment decision-making [6]. The clinical implementation of AI-based systems requires reliable data, external validation, algorithmic transparency, and appropriate integration into healthcare workflows to ensure safe and effective decision-making [6]. Additionally, multi-omics technologies are expanding the reach of precision medicine, combining genomic, transcriptomic, proteomic, metabolomic, and other biological information to describe the mechanisms of disease at several different molecular levels [7]. Multi-omics data, in combination with AI, can enhance pathogen characterization, transmission analysis, outbreak detection, and population-level risk assessment in infectious disease surveillance [7]. Historical and ecological studies also show that long-term dynamics between biological susceptibility, environmental factors, social stress, and population characteristics influence infectious diseases [8]. Digital health technologies also connect individual care and the population level through remote monitoring, telemedicine, electronic health information exchange, mobile health interventions, and continuous data collection [9]. When they are used within appropriate regulatory and governance frameworks, these tools can increase access to healthcare and aid in longitudinal disease management, as well as improve the quality and safety of clinical care [9]. Digital data sources can also be useful for the assessment of populations by providing behavioral and social signals, although issues of representativeness, privacy, misinformation, and analytical reliability are relevant [10]. Similarly, machine-learning methods have been explored to predict complex public health problems like obesity, highlighting the increasing importance of population risk assessment and preventive medicine with computational models [11].

Communication, resilience, and health-system preparedness are also essential to general medicine, as population outcomes are heavily dependent on the capacity of healthcare institutions to respond effectively to crises and health emergencies [12-14]. Crisis and emergency risk communication is an integrative approach for providing timely, credible, and actionable information in times of uncertainty and rapid health events [12]. In conflict-affected and resource-limited environments, where infrastructure failure, medication stock-outs, health worker shortages, and the lack of preventive services can have detrimental impacts on the ability to treat individual patients as well as achieve population health objectives, resilient health systems are especially critical [13]. Effective communication frameworks also enhance preparedness by connecting risk assessment, institutional response, public trust, and community engagement in response to emergencies [14]. Thus, an integrative general medicine approach may facilitate the linkage of precision diagnostics and therapeutics, prevention, public health surveillance, digital health, environmental determinants, and resilient healthcare delivery. Although existing reviews have explored precision medicine, digital health, and population health individually, their integration into a unified framework for routine general medical practice remains insufficiently addressed [3,4,9]. In particular, limited attention has been given to connecting individualized clinical care with population-level prevention, health equity, and healthcare-system resilience. This review addresses this gap by synthesizing these interconnected approaches within a comprehensive framework, emphasizing their clinical relevance, implementation challenges, and potential to advance personalized and population-oriented healthcare.

Objectives of the review

This review examines how precision medicine and population health can be integrated within general medicine. It evaluates the contribution of genomics, AI, multi-omics, digital health, and public health strategies. It also identifies key challenges and future opportunities for developing more personalized, preventive, and equitable healthcare systems.

Methodology

This narrative review focused on the integration of precision medicine, population health, AI, multi-omics, digital health, and healthcare delivery. The literature search involved PubMed, Scopus, and Google Scholar up to September 9, 2026, using keywords such as “precision medicine,” “population health,” “precision public health,” “general medicine,” “artificial intelligence,” “multi-omics,” “digital health,” and “predictive analytics,” combined using Boolean operators (AND/OR). Eligible publications included original research, review articles, and conceptual studies addressing personalized care, population-level prevention, and healthcare-system integration. Irrelevant, duplicate, and retracted publications were considered ineligible. Literature selection was based on the relevance of titles, abstracts, and accessible article content. A total of 288 records were identified through the literature search. Of these, 241 records were excluded because of duplicate identification, lack of relevance to the review objectives, insufficient alignment with the intended clinical and population-health framework, or failure to meet the eligibility criteria. The remaining 47 publications were selected for the initial narrative synthesis. An additional 11 relevant publications were incorporated to provide more comprehensive coverage of emerging technologies, methodological challenges, healthcare governance, and adaptive intervention strategies, resulting in a total of 58 publications included in the revised narrative synthesis. Findings were synthesized thematically, focusing on clinical applications, technological advances, health equity, and implementation challenges. As the review employed a narrative synthesis approach, PRISMA guidelines were not applied.

Review

Precision medicine as an integrative framework for general medicine

Precision medicine is a framework that can be used to customize prevention, diagnosis, and treatment to the unique biological features, clinical phenotypes, and disease courses of each person, rather than relying on a one-size-fits-all approach to treatment [15]. The approach is gradually being extended to the fields of neurology and psychiatry, where molecular signatures are being added alongside genetic, imaging, and clinical data to enhance disease classification and therapeutic stratification [15]. Network medicine is relevant to understanding multimorbidity, shared molecular pathways, and interconnected disease mechanisms in complex diseases, which often result from interacting biological networks [16]. AI takes this a step further by facilitating the analysis of complex and diverse health information at scale for surveillance, prediction, and population-level decision-making [17].

Population health is no longer limited to genomics but extends to personalized phenomics, which encompasses observable phenotypic traits, behaviors, clinical characteristics, and environmental factors to enhance risk assessment in populations [18]. Multi-omics further strengthens precision medicine by integrating various molecular information, such as genomic, transcriptomic, proteomic, metabolomic, and related data [19]. These datasets can be integrated for better disease characterization, biomarker discovery, patient stratification, and the translation of molecular discoveries into clinically relevant strategies [19]. Table *1* summarizes the key elements of precision medicine and their use in general medicine.

Component	Main contribution	Relevance to general medicine	References
Precision medicine	Individualized disease classification and treatment selection	Supports patient-specific clinical decision-making	[15]
Network medicine	Analysis of interacting disease pathways	Improves understanding of complex and multimorbid conditions	[16]
AI	Large-scale prediction and surveillance	Supports clinical and population-level risk assessment	[17]
Phenomics	Integration of observable and environmental characteristics	Links individual variation with population health patterns	[18]
Multi-omics	Molecular-level integration across biological systems	Enhances biomarker discovery and patient stratification	[19]

TABLE 1: Components of precision medicine within integrative general medicine

Created by the authors based on sources [15-19].

AI: artificial intelligence.

Personalized and predictive models in general medicine

Complex diseases are increasingly classified into biologically meaningful subgroups, which can enhance risk prediction and therapeutic stratification, and precision medicine is supporting this classification. Within apparently identical clinical settings, molecular subgrouping may reveal intra-clinical heterogeneity, which may be used to guide the selection of treatment approaches more closely aligned with the underlying disease mechanisms [20]. The Predictive, Preventive, Personalized, and Participatory (P4) medicine model represents a precision medicine framework built on four interconnected pillars that emphasize disease risk prediction, early prevention, individualized treatment, and active patient participation [21].

Precision-based models can integrate clinical, biological, behavioral, and patient-specific information to inform periodontal prevention and management when applying P4 principles [21]. Generative AI can further enhance personalized medicine by interpreting complex health data and aiding in personalized treatment recommendations [22]. However, while AI-based tools could potentially be used to assist with clinical decision-making, they should be carefully validated and supervised for clinical use, as patient characteristics, disease patterns, and available therapeutic options must be considered [22]. Population health provides a complementary approach by considering health outcomes in specific populations, as opposed to the outcomes of specific patients [23]. Modern concepts of population health focus on the need to bring together clinical care, disease prevention, social determinants, and health-system organization to achieve better-than-expected outcomes at scale [23]. Figure *1* shows the personalized-to-population health pathway.

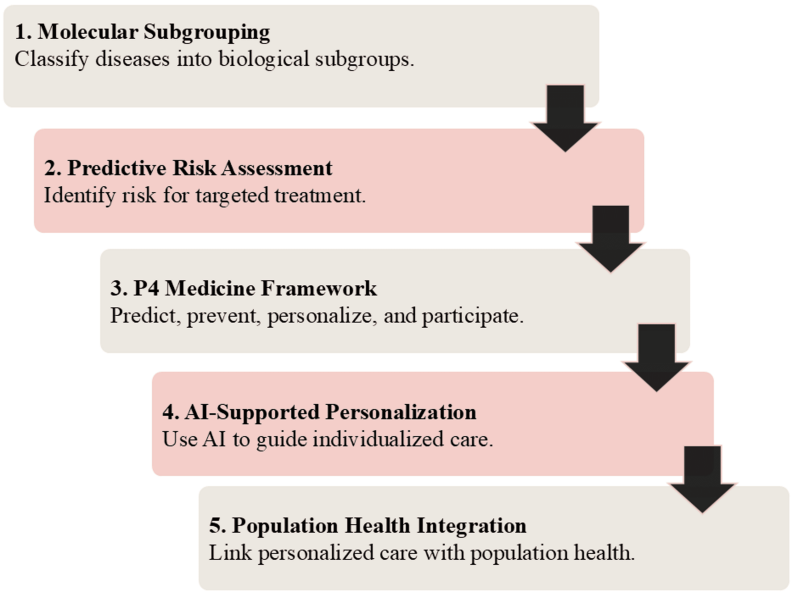


FIGURE 1: Personalized and predictive care pathway in general medicine

Created by the authors using Microsoft PowerPoint (Microsoft Corporation, Redmond, Washington), based on sources [20-23].

AI: artificial intelligence.

Digital technologies, workforce health, and community resilience

The Internet of Things sensor network, mobile technology, and machine learning algorithms are increasingly being used together to gather and analyze health data over time, making digital technology a pivotal component in chronic disease monitoring [24]. These technologies can be used to facilitate remote monitoring, early detection of disease deterioration, and more personalized disease management, provided that data quality, interoperability, and privacy are adequately addressed [24]. Workforce health is another essential component of integrated population medicine, as protecting workers requires coordinated approaches to occupational safety, physical and psychological well-being, and organizational support, particularly during public health emergencies [25]. The Total Worker Health framework shows how occupational risk reduction can be integrated with other approaches to physical, psychological, and organizational health during a large-scale public health emergency [25].

AI could also enhance occupational surveillance, as it can detect patterns linked to workplace hazards, stress, and burnout, especially when environmental factors such as climate change exacerbate occupational risks [26]. The principles of community resilience are not limited to healthcare facilities but are equally important in local preparedness, adaptive capacity, social cohesion, and coordinated response to natural hazards and public health threats [27]. Community-level resilience strategies can be effective in facilitating preparedness and recovery if they draw on local knowledge, public involvement, health services, and disaster planning [27]. Table *2* provides a summary of technology, workforce health, and community resilience approaches.

Approach	Primary application	Relevance to population health	References
IoT and machine learning	Chronic disease monitoring	Supports continuous surveillance and individualized management	[24]
Total worker health	Occupational health and safety	Integrates worker protection with health promotion	[25]
AI-driven occupational analysis	Hazard, stress, and burnout prediction	Supports workforce risk assessment	[26]
Community resilience	Disaster and public health preparedness	Strengthens local adaptive capacity and coordinated response	[27]

TABLE 2: Integrative approaches to technology, workforce health, and community resilience

Created by the authors based on sources [24-27].

AI: artificial intelligence.

Digital governance, risk assessment, and precision health systems

The digital transformation is changing the landscape of population health, not only by changing clinical technologies but also by changing systems of governance, public administration, and social coordination as well [28]. The digital economy can contribute to improving social governance by better information exchange, service integration, and data-informed decision-making between institutions [28]. The public sector also has an impact on the ability of health systems to embrace innovation and re-engineer service delivery [29]. Integrative business-model frameworks can help enable more adaptive public organizations through the alignment of value creation, organizational areas, stakeholder engagement, and digital transformation [29]. In healthcare settings, governance and business-model frameworks could strengthen service coordination, resource allocation, and equitable access to care, with their effectiveness evaluated through clinical outcomes, healthcare quality, service utilization, and healthcare expenditure [23,29]. Evaluating these outcomes across different population groups, while addressing data interoperability, representativeness, and potential bias, could help determine whether digital health initiatives contribute to improved population health and reduced healthcare disparities [4].

Computational methods can be used to estimate the carcinogenic risk of chemical exposure with AI-based models that analyze complex toxicological and genomic data; these models have the potential to support environmental and population-level health assessment [30]. These applications can be used in addition to traditional epidemiological methods and can enhance the analysis of multidimensional exposure and biological data [30]. Digital twins are a new precision-medicine approach involving dynamic computational models of a person or biological system that can simulate disease progression and the effects of intervention [31]. The development of a complex-systems viewpoint may lead to a way of integrating heterogeneous biological and clinical data for prediction, treatment optimization, and personalized decision-making [31]. Integrating data, validating models, scaling systems, interpreting the results, and making it useful in clinical practice are major challenges [31].

The integration of precision medicine and public health remains limited by infrastructure gaps, fragmented governance frameworks, inconsistent evidence, and differences in institutional priorities, which may hinder coordinated implementation [32]. Unsustainable funding and unequal resource allocation further restrict long-term investment in digital infrastructure, workforce development, and equitable healthcare delivery [33]. Blockchain-backed dynamic consent systems have been proposed to facilitate secure genomic data sharing across biobanks while allowing participants to manage their consent preferences, although interoperability, regulatory compliance, and scalability remain unresolved [34]. Evidence from Asian healthcare systems also highlights financing and institutional capacity gaps, emphasizing the need for sustainable investment and coordinated policies to support precision medicine across diverse healthcare settings [35].

Multi-omics, multimorbidity, and generative AI in integrated medicine

Multi-omics integration is emerging as a key aspect of precision medicine, where different omics datasets are combined to accurately describe disease and guide treatment selection [36]. For precision oncology, AI-driven multi-omics could enable the delivery of clinically relevant information from voluminous molecular data related to tumor classification, biomarker identification, prognosis, and therapeutic decisions [36]. Additionally, the rise of image-based and phenotype-driven diagnostic approaches also reinforces the need for consistent interpretation of images and ethical direction within the diagnostic process when images are included in the assessment [37]. Effective integration of multi-omics has been hindered by the lack of

reliable methods for integrating high-dimensional and heterogeneous biological data [38]. Recent methods include classical statistical methods as well as machine-learning and deep generative models, which have various benefits in terms of feature extraction, dimensionality reduction, and biological interpretation [38].

Careful validation, reproducibility, and preparation of computational infrastructure are required for clinical translation [38]. Omics overload, differences in data processing, and the limited interpretability of black-box models can compromise reproducibility and clinical decision-making [39]. Lengthy molecular analysis and computational processing may also delay clinically actionable results, highlighting the need for standardized analytical methods and shorter turnaround times [39]. Another significant problem in integrated general medicine is multimorbidity, especially in elderly people, in whom the disease patterns are shaped by demographic, behavioral, environmental, and healthcare factors [40]. A health-ecological view may help explain the emergence of multiple chronic conditions because of the interplay between individual characteristics and social and environmental contexts [40]. Integrated care could also benefit from the use of generative AI for aiding in the synthesis of clinical information, decision-making, documentation, and personalized recommendations [41]. It requires precision, transparency, bias mitigation, accountability, and professional supervision to be used clinically [41].

Integrated patient digital and biomimetic twins offer opportunities to combine biological observations with computational models for personalized therapeutic evaluation [42]. Experimental ex vivo human lung digital twins have demonstrated the potential of multimodal organ modeling for assessing therapeutic responses [43]. Further research is needed to develop highly scalable cellular digital twins that incorporate biological network interactions and predict patient-specific drug responses with sufficient accuracy and clinical validity [44]. A summary of the key data-driven approaches relevant to integrated precision medicine is given in Table *3*.

Approach	Main application	Relevance to general medicine	References
AI-driven multi-omics	Molecular data integration	Supports precision diagnosis and treatment selection	[36]
Standardized diagnostic frameworks	Clinical interpretation	Promotes consistent and ethically guided assessment	[37]
Multi-omics integration methods	High-dimensional data analysis	Improves biomarker and disease-pattern identification	[38]
Multimorbidity analysis	Chronic disease clustering	Supports integrated care in older adults	[40]
Generative AI	Clinical decision support	Assists information synthesis and personalized care	[41]

TABLE 3: Data-driven approaches in precision medicine

Created by the authors based on sources [36-38,40,41].

AI: artificial intelligence.

AI, epidemiological modeling, and implementation science

AI is a growing cornerstone of precision medicine as it can be used to synthesize complex clinical and biological information and to aid in prediction, diagnosis, and personalized treatment decision-making [45]. It is especially useful when dealing with the scale, dimensionality, and heterogeneity of data used in the modern healthcare environment, where traditional analytic techniques are inadequate [45]. The integration of AI into mechanistic epidemiological modeling can further enhance how disease transmission, intervention effects, and population-level dynamics are understood by combining the predictive power of AI with the principles of biology and epidemiology [46]. Digital-intelligent technologies also have a role beyond clinical prediction in population health promotion and behavioral monitoring [47]. In public health and physical education settings, digital platforms, intelligent sensing, and data analytics have been shown to be of benefit for personalized feedback, monitoring of participation, and health-aimed interventions [47]. Their general applicability lies in linking personal behavioral information with preventive and population-based health interventions [47].

The adoption of such innovations requires organizational design and stakeholder involvement [48]. Design thinking can be used to help improve healthcare systems and services by generating user needs, piloting solutions, and fine-tuning the implementation method to the healthcare context at hand [48]. This is significant because, while interventions are technically effective, their success will be constrained by clinical practices, institutional organization, or community priorities [48]. Real-world implementation also requires integration into existing clinical workflows, stakeholder engagement, workforce readiness, and adaptation

to local healthcare needs, particularly in resource-limited settings where financial and infrastructural constraints may affect sustainability [48]. Clinical, genomic, imaging, and behavioral data are highly different in their structure, quality, and completeness, making data integration a key methodological challenge for machine learning applications in precision medicine [49]. Interoperability, missingness, harmonization, bias, and computational complexity issues can directly impact model validity and clinical utility [49].

Differences in outcome definitions, data collection methods, and analytical assumptions between precision medicine and public health may generate contradictory findings and limit evidence integration [46,49]. Conflict-reduction frameworks involving standardized measures, transparent model comparisons, and multidisciplinary interpretation may help reconcile inconsistent evidence [49]. Contextual and longitudinal modeling can further account for changes in patient characteristics, behaviors, and environmental exposures over time [46,49].

External validation across independent healthcare settings and diverse patient populations is necessary to assess model generalizability, while representative datasets and subgroup performance assessments can help identify algorithmic bias and potential disparities in predictive accuracy [4,49]. Cost-effectiveness evaluations should consider implementation and maintenance costs alongside clinical outcomes, healthcare utilization, and service accessibility [23]. In resource-limited settings, sustainable implementation further depends on locally appropriate technologies, reliable data infrastructure, and their compatibility with existing healthcare services [4,48]. These limitations must be overcome if AI-driven systems are to be accurate, interpretable, scalable, and able to integrate with precision and population-health systems [45].

Sequential multiple assignment randomized trials (SMARTs) support the development of adaptive treatment strategies by evaluating interventions according to intermediate patient responses [50]. Adaptive randomization methods may improve the efficiency of multistage intervention research [51]. Just-in-time adaptive interventions (JITAIs) use changing contextual and behavioral information to deliver support when individuals are most likely to benefit [52]. These approaches may facilitate responsive precision population-health programs, although their effectiveness, feasibility, and equity require further evaluation [50-52]. Figure *2* summarizes key AI, epidemiological, digital health, and implementation components.

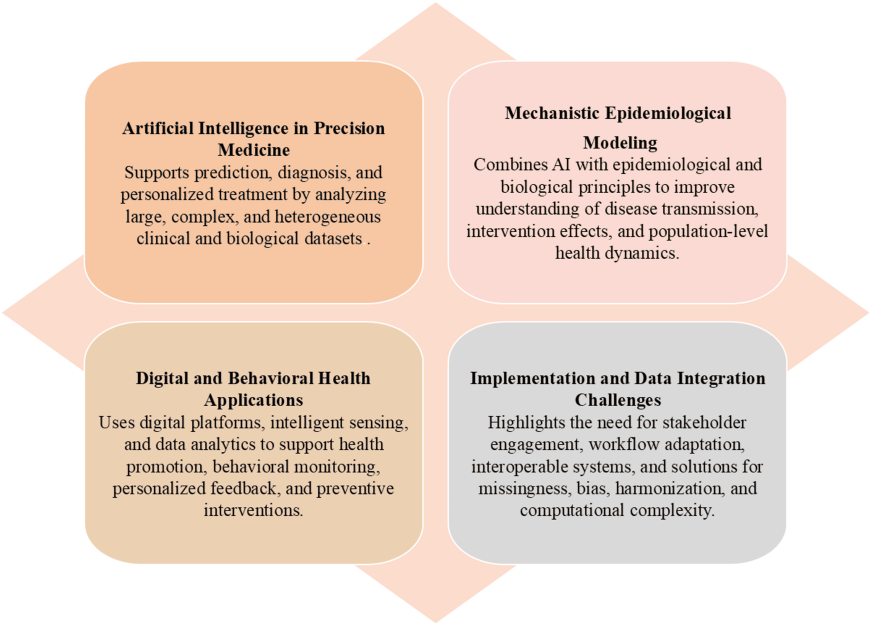


FIGURE 2: Key components of AI-enabled precision and population health

Created by the authors using Microsoft PowerPoint, based on sources [45-49].

AI: artificial intelligence.

Big data, predictive analytics, and precision disease management

The use of big data and computational modeling is broadening the impact of precision medicine, turning complex information from biology and clinical practice into personalized risk assessment and disease management strategies [4]. Connectome-based modeling can also be used to describe brain network changes

in neurodegenerative diseases and offer mechanistic insight that can help with earlier diagnosis, disease stratification, and personalized therapeutic strategies [53]. Another growing area of application for time-series analysis in population health is forecasting environmental exposures, such as particulate matter, which can inform public health planning and prevention [54]. Large-scale data technologies have been shown to be useful in the management of epidemics and other emergencies through real-time surveillance, information integration, resource coordination, and decision-making in local governments during infectious disease outbreak [55]. They are effective when data are collected in a timely manner and are interoperable, when analytical capability exists, and when there is appropriate institutional coordination [55]. Additionally, sophisticated computational methods that combine high-dimensional biological data to discover molecular relationships and disease mechanisms that are meaningful for precision medicine are advantageous for systems biology [56]. Multi-omics analyses of bulk and single cells may help identify biomarkers, characterize cells, and interpret disease processes in an individual context [56].

The increasing scale of genomic, clinical, and population-health datasets presents challenges involving computational capacity, data standardization, and integration across heterogeneous information systems [32,49]. Differences in data quality, completeness, and collection methods may introduce bias and reduce predictive accuracy across populations [49]. Fragmented digital infrastructure and limited financial resources further restrict the implementation of interoperable systems, particularly in resource-limited healthcare settings [35]. Addressing these challenges requires standardized data architectures, reproducible analytical methods, and sustainable institutional support [32,35].

Cardiovascular medicine is a particularly useful example of how big data can be integrated into EHRs, imaging, genomics, biomarkers, and longitudinal clinical data to realize the clinical potential of big data [57]. These datasets can be used to improve cardiovascular risk assessment, disease phenotyping, and the selection of individual preventive or therapeutic strategies [57]. AI additionally augments the power of predictive analytics by uncovering intricate patterns in huge clinical information and assisting with diagnostic and prognostic decision-making [58]. To be adopted in the clinic, algorithms must be carefully designed to avoid bias, be transparent, be validated, be respectful of privacy, and be ethically accountable, especially when they affect medical decisions [58].

Limitations and future directions

There are a few limitations to this review. The literature studies vary in design, population, data, and methodology, making direct comparisons between the two approaches to precision medicine and population health difficult. For several emerging technologies and applications, such as AI, multi-omics, and digital health, evidence is still in its nascent stage, and their long-term clinical effectiveness and cost-effectiveness have not been consistently proven [6,9,39]. Additionally, the narrative approach lacks a formal risk-of-bias assessment, while emerging technologies require further clinical validation and sustainable implementation.

Standardized data integration, external validation, interoperable digital systems, and evaluation across different populations should be studied in the future. Explainable AI, privacy and security, equity, and practical application remain areas of focus that require further attention [4,6,9]. When combined with other genetic, environmental, behavioral, and social factors, high-level risk assessment and personalized prevention strategies may be further improved. Longitudinal and multicenter studies can help elucidate the clinical relevance, extensibility, and feasibility of these interventions in the context of general medicine.

Conclusions

This review highlighted how precision medicine can complement population health to enhance general medicine through the integration of genomics, multi-omics, AI, digital health, predictive analytics, environmental assessment, and systems-based approaches. These strategies can enhance disease characterization, risk stratification, disease prevention, and individual therapeutic decision-making and can enable the delivery of clinical services beyond the individual disease level to address behavioral, environmental, and social determinants of health. Additionally, the review highlighted the importance of ensuring that data integration, data interoperability, transparent algorithms, ethical governance, and representative population datasets are in place for successful implementation. Improved engagement between clinicians, public health professionals, data scientists, policymakers, and communities is necessary to bring these frameworks into practice. Implementing precision clinical care alongside population-level prevention can help create healthcare systems that are more equitable, efficient, resilient, and responsive.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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