ISSN: 2091-2331 (Print) 2091-234X (Online)

Journal of Nobel Medical College

Volume 15, Number 01, Issue 28, January-June 2026, 1-2

Editorial

Precision Medicine: Where Do We Stand?

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DOI: https://doi.org/10.3126/jonmc.v15i1.96053

Background

When we treat a lady with peripartum cardiomyopathy, one gets fully recovered while another with the same problem and similar treatment gets symptomatically better but still left ventricular ejection fraction does not improve. At the same time another similar patient doesn't improve at all and succumbs to death. We know some high-risk factors associated with outcome but we exactly don't know who does well and who will not. Framingham observational study found out that hypertension, hypercholesteremia, smoking, diabetes mellitus, physical inactivity, increasing age, male sex is associated with coronary artery disease [1], but when a 32-year menstruating working lady with no history of smoking, diabetes, hypertension dyslipidemia suffers heart attack and asks her physician what is the cause of her disease, the physician becomes answerless.

Discussion

Medicine has so far been practiced on the assumption that similar diseases will be cured by similar treatment. This population-based, one- size- fit- all approach has undoubtedly transformed healthcare and contributed to remarkable improvements in disease outcomes. However, clinicians have long recognized an important reality: patients with seemingly identical diagnoses often respond differently to the same treatment and we always talk about the probability but not surety. Patients would prefer to know what would happen to him/her. They will definitely not be impressed by the data presented by the physician saying that out of hundred similar patients like your, ninety percent will improve and I don't know who ten will fail. So, here comes the need of intense search of precision medicine.

The strong foundation for precision medicine was laid by the Human Genome Project (HGP) [2] completed in 2003 by national human genome research institute, U.S, its major achievements of HGP were determination of complete sequence of approximately 3.2 billion base pairs of human genomes, identification of thousands of genes and genetic variants associated with various disease, development of genetic testing, molecular diagnostics and disease risk prediction technologies. It also laid the foundation for pharmacogenomics which studies how genetic variations influence drug response, for example, genetic basis of individual response to warfarin and clopidogrel [3, 4]. Simultaneously, developments in bioinformatics, artificial intelligence, molecular biology, and digital health technologies have accelerated the translation of genom-

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Citation
Nepal R, Precision Medicine: Where do we stand?, JoNMC. 15:1 (2026) 1-2. DOI: https://doi.org/10.3126/jonmc.v15i1.96053

ic discoveries into clinical practice [5]. Oncology has become a flagship specialty for precision medicine. One of the most successful examples of precision medicine is the management of HER2 positive breast cancer [6]. Identification of the gene guides us to the most effective therapy like trastuzumab and pertuzumab [7]. We can avoid these medicines to the classical HER2 negative patients who would not benefit and only suffer the side effects.

Definitely in future precise medicine will change the face of modern medicine and healthcare system where we will observe a clear shift of one-size- fit -all approach to one -size -fit-one treatment. But at present where we stand? It has just crosse its infancy and proceed towards its childhood. Now we have some achievements at hand like its application in oncology, pharmacogenomics and in some genetic disorders. Though precision medicine seems very promising in the coming days its faces several challenges. These include interpretation of complex genomic data, economic barriers, data privacy concerns, ethical issues, and underrepresentation of diverse populations in genomic research. For developing countries like Nepal, implementation presents even more challenges. Looking ahead, precision medicine is likely to expand beyond disease treatment toward disease prediction and prevention. By integrating genetic risk profiles, environmental exposures, lifestyle factors, and real-time physiological monitoring, healthcare systems may identify individuals at risk before disease manifests clinically.

Conclusion

Precision medicine represents one of the most significant advances in modern healthcare. By recognizing the biological uniqueness of each individual, it offers the possibility of delivering the right treatment to the right patient at the right time. At present, it has just crossed its infancy and leaping towards childhood.

References

[1] Tsao CW, Aday AW, Almarzooq ZI, Anderson CA, Arora P, Avery CL *et al.,* Heart disease and stroke statistics—2023 update: a report from the American Heart Association, Circulation. 147:8 (2023) e93. PMID: 36695182.

[2] International Human Genome Sequencing Consortium, Initial sequencing and analysis of the human genome, Nature. 409 (2001) 860–921. DOI: https://doi.org/10.1038/35057062.

[3] Johnson JA, Cavallari LH, Pharmacogenetics and cardiovascular disease—implications for personalized medicine, Pharmacol Rev. 65:3 (2013) 987-1009. DOI: https://doi.org/10.1124/pr.112.007252.

[4] Mega JL, Close SL, Wiviott SD, *et al.,* Cytochrome P-450 polymorphisms and response to clopidogrel, N Engl J Med. 360:4 (2009) 354-362. DOI: 10.1056/NEJMoa0809171.

[5] Collins FS, Varmus H, A New Initiative on Precision Medicine, N Engl J Med. 372:9 (2015) 793-795. DOI: 10.1056/NEJMp1500523.

[6] Slamon DJ, Leyland-Jones B, Shak S, *et al*., Use of chemotherapy plus a monoclonal antibody against HER2 for metastatic breast cancer, N Engl J Med. 344:11 (2001) 783-792. DOI: 10.1056/NEJM200103153441101.

[7] Swain SM, Baselga J, Kim SB, *et al*., Pertuzumab, trastuzumab, and docetaxel in HER2-positive metastatic breast cancer, N Engl J Med. 372:8 (2015) 724-734. DOI: 10.1056/NEJMoa1413513.