


# Chapter 6

## Assessment of AI's Impact on Precision Medicine and Personalized Healthcare in Clinical Environments

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### **ABSTRACT**

*Personalized medicine (PM) is transforming healthcare by adapting treatments that considers individual genetic, environmental, and lifestyle factors. Children present distinct physiological and developmental differences that require careful consideration in diagnosis, treatment, and prevention. Paediatric PM focuses on early detection of diseases, individualized drug therapy, and targeted interventions based on genetic and molecular profiles. Personalized medicine, is important for several reasons like children's genetic profiles can affect how they respond to medications*

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*and treatments, making personalized approaches crucial. The combination of AI and personalized medicine in pediatrics enables precision in drug dosing, early disease detection, and more effective treatment strategies. By integrating AI, the future of pediatric medicine will be more individualized, predictive, and patient-centric. This paradigm shift will ultimately enhance the quality of life for children, providing them with safer, more effective treatments tailored to their unique genetic and physiological needs.*

## **INTRODUCTION**

Personalized medicine, an alternate name for precision medicine, characterizes a profound transformation away from the general setup in healthcare. Personalized medicine abandons the “one-size-fits-all” approach and tries to deliver medical care according to the individual features of each patient. Hence, the consideration factors can be numerous: genetics, environmental exposure, lifestyle, and even the microbiome—from disease prediction and intervention to treatment, and treatment-related all.

The evolution of genomics, an offspring of the Human Genome Project, has been immensely instrumental in the realization of the concept of personalized medicine. NGS, GWAS, and pharmacogenomics have realized the linking of individual genetic variations with susceptibility to diseases and the acting of efficacious drugs. This, in fact, bears implications for the diagnosis and treatment of complex diseases such as cancer, cardiovascular diseases, and immune disorders.

Undergoing tumour profiling for specified mutations in oncology, personalized medicine ensure that targeted therapeutics can be assigned for dramatic improvement in long-term survival rates. Individualized drug regimens, however, can minimize untoward drug reactions and maximize therapeutic benefits in pharmacotherapy. Hence, personalized medicine is not just a scientific endeavour but also a philosophical rethinking of healthcare—with the individual patient being the centre around which all clinical decisions revolve.

Implementing personalized medicine is an issue of its own and comes with several difficulties. Costing huge bucks, it limits itself even in various parts of the world, privacy, disparities in participation in genetic research, especially by minorities—in all of these obstacles restrict it. Ethical dilemmas bring in issues on genetic discrimination and consent for genomic data use. At the same time, because of the possibilities of ameliorating health outcomes, this area is now on the sphere of continued research and development.

Pediatrics, the branch of medicine that deals with the development, care, and diseases of children, provides a unique and critical function in the realm of per-

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