PULSUS
WWW.PULSUSCONFERENCE.COM
35 YEARS IN ASSESING THE IMPACT OF HEALTHCARE RESEARCH
9th World Congress on
Spine and Spinal Disorders
Dubai, UAE | February 1-2, 2023

Title: Improving Outcomes after Spine Surgery Using Human Digital Twin Technology

Mohamed Rehman, M.D., FAAP
Johns Hopkins School of Medicine, USA

Abstract (300 word limit)

This study presents a novel approach to monitoring and guiding the recovery process of adolescent patients undergoing spine surgery. Sixty patients were closely observed using Fitbit wearable devices, capturing critical physiological data such as heart rate, oxygen saturation, sleep patterns, and recovery scores. These data were then integrated with electronic medical records to create personalized "Human Digital Twins" for each patient. The primary objective was to evaluate the recovery trajectory of these individualized digital twins, explicitly comparing their progress to baseline levels and exploring the possibility of surpassing baseline performance after surgery.

The methodology involved collecting and merging data from wearables and electronic medical records across the preoperative, intraoperative, and postoperative phases. By doing so, the research aimed to provide a comprehensive understanding of the recovery process and establish recovery patterns.

The findings of this study revealed three distinct recovery patterns among the patients: early, regular, and late. The "early" group demonstrated a remarkable return to their physiological baseline within just two weeks following surgery, while the "late" group took considerably longer, requiring 8-10 weeks to reach baseline levels. To further enhance our understanding of these recovery patterns, the study introduced the concept of "synthetic twins." These synthetic twins are designed to replicate patients' psychological and physiological profiles based on their recovery patterns, offering valuable insights into potential interventions and individualized care strategies.

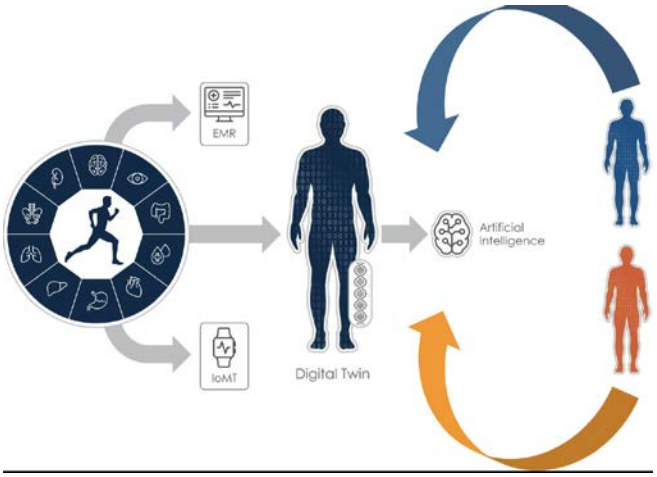
In conclusion, this research has introduced a groundbreaking "Digital Twins" methodology, offering a promising avenue for guiding individualized recovery patterns in spine surgery patients. By leveraging this innovative approach, healthcare practitioners can transition from a one-size-fits-all approach ("herd medicine") to precision medicine, tailoring treatment plans to each patient's unique needs. This shift has the potential to enhance postoperative care, improve patient outcomes, and revolutionize the field of spinal surgery.

Keywords: Digital Twins, Precision Medicine, Adolescent Spine Surgery, Wearable Devices, Recovery Patterns, Individualized Care, Healthcare Innovation.

1. Recent Publications (minimum 5)

1. Lonsdale H, Gray GM, Ahumada LM, Yates HM, Varughese A, **Rehman Mohamed**. **The Perioperative Human Digital Twin**. Anesth Analg. 2022 Apr 1;134(4):885-892. doi: 10.1213/ANE.0000000000005916. PMID: 35299215.
2. Cucchiaro G, Ahumada L, Gray G, Fierstein J, Yates H, Householder K, Frye W, **Rehman** Mohamed. Feasibility of Conducting Long-term Health and Behaviors Follow-up in Adolescents: Longitudinal Observational Study. JMIR Form Res. 2022 Aug 15;6(8):e37054. doi: 10.2196/37054. PMID: 35969442; PMCID: PMC9425168.
3. Jalali A, Lonsdale H, Do N, Peck J, Gupta M, Kutty S, Ghazarian SR, Jacobs JP, **Rehman Mohamed**, Ahumada LM. **Deep Learning for Improved Risk Prediction in Surgical Outcomes**. Sci Rep. 2020 Jun 9;10(1):9289. doi: 10.1038/s41598-020-62971-3. PMID: 32518246; PMCID: PMC7283236.
4. Ashfaq A, Gray GM, Carapelluci J, Amankwah EK,**Rehman Mohamed**, Puchalski M, Smith A, Quintessenza JA, Laks J, Ahumada LM, Asante-Korang A. Survival analysis for pediatric heart transplant patients using a novel **machine learning algorithm:** A UNOS analysis. J Heart Lung Transplant. 2023 Oct;42(10):1341-1348. doi: 10.1016/j.healun.2023.06.006. Epub 2023 Jun 15. PMID: 37327979.
5. Gray GM, Ahumada LM, **Rehman Mohamed**, Varughese A, Fernandez AM, Fackler J, Yates HM, Habre W, Disma N, Lonsdale H. A **machine-learning approach for decision support and risk stratification** of pediatric perioperative patients based on the APRICOT dataset. Paediatr Anaesth. 2023 Sep;33(9):710-719. doi: 10.1111/pan.14694. Epub 2023 May 21. PMID: 37211981.

Image





Photograph

Biography (150 word limit)

Dr. Mohamed Rehman is a world-renowned physician in Health Informatics, holding multiple board certifications in pediatrics, anesthesiology, pediatric anesthesiology, and critical care medicine. He holds an endowed chair in Health Informatics at The Johns Hopkins School of Medicine. At the same institution, he is a tenured professor in pediatrics, anesthesiology, and critical care medicine. Dr. Rehman leads a dynamic interdisciplinary team comprising data scientists, epidemiologists, statisticians, and healthcare professionals. This dedicated team is at the forefront of **the "Human Digital Team" Project at Johns Hopkins**, aiming to revolutionize healthcare. Their mission is to shift healthcare from a one-size-fits-all approach to precision medicine by pioneering the development of "synthetic twins," ultimately enhancing patient outcomes through innovative data-driven strategies.

Email: rehman@jhu.edu

Mobile no/Whatsapp no: +1-610-715-2662

Additional Details: Attendees can use this technology in their practice when returning home. This will help improve the outcomes of their patients.

Recent Keynote Speaker at : Great Ormand Street, London August 2023. Wearble Technogies and AI, Bangkok September 2023. HIMSS 2023 Jakarta September 2023.

Abstract Category: Emerging Technologies and Digital Health Solutions in Spine Care:

https://anesthesiology.hopkinsmedicine.org/faculty/mohamed-rehman/

Link to interview:
https://himsstv.brightcovegallery.com/detail/videos/apac/video/6333334049112/pursuing-preventive-health-using-digital-twin-technology?autoStart=true

https://www.linkedin.com/in/mohamedrehman/