Implementation of Artificial Intelligence (AI) solutions has increased rapidly in recent years and across multiple sectors, fuelled by advanced in big data, computing performance, and algorithm efficiency (Kneusel, 2023).

In healthcare, AI may help increase productivity and care quality, tackle higher demand, facilitate access, and improve experience of staff and patients (UK Government, 2021). AI may be particularly advantageous in this setting due to its complexity, scale, and the pace at which medical science expands (IBM Education, 2023).

Similar advantages may be seen in medical research, namely in drug development, as suggested by Paul. AI can facilitate drug discovery and development by identifying novel drug targets (Richardson et al., 2020), designing new drugs (Lou and Wu, 2020), predicting drug efficacy and toxicity (Gayvert, Madhukar and Elemento, 2016). It may also help identify suitable participants to clinical trials, analysing health records to identify events of interest, and extracting actionable insights from medical scans and wearable sensors (Harrer, Shah, Antony and Hu, 2019). Furthermore, the combination of large-language models and data analytics platforms opens the possibility of autonomous research agents, capable of both extracting meaning from medical records and write code to analyse those data (Kneusel, 2023).

These applications embody the philosophy of Industry 4.0 of smart work through big data, digitisation, interconnectivity, and real-time analytics (Peres et al., 2020). Perhaps more importantly, they pave the way towards Industry (or Healthcare) 5.0 (Kraaijenbrink, 2022). By better harnessing existing data, AI may help release healthcare professionals from avoidable burden, so they can deliver care in a more humane way that fosters both their wellbeing and that of their patients, while reducing overall costs, thus contributing to improved societal outcomes.

However, applying AI within healthcare entails considerable barriers, namely adherence to strict ethical and regulatory standards, ensuring data privacy and security, establishing interoperability with existing infrastructure, and committing adequate computing power to handle data volume, complexity, and speed (Leslie, 2019; Muller, Mayrhofer, Van Veen and Holzinger, 2021; Food and Drug Agency, 2023).

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References:

Food and Drug Agency (2023) ‘Proposed Regulatory Framework for Modifications to Artificial Intelligence/Machine Learning (AI/ML)-Based Software as a Medical Device (SaMD) - Discussion Paper and Request for Feedback’. Available from: https://www.fda.gov/files/medical%20devices/published/US-FDA-Artificial-Intelligence-and-Machine-Learning-Discussion-Paper.pdf (Accessed: 23 April 2024).

Gayvert, K.M., Madhukar, N.S. and Elemento, O. (2016) ‘A Data-Driven Approach to Predicting Successes and Failures of Clinical Trials’, *Cell Chemical Biology*, 23(10), pp. 1294–1301. Available from: https://doi.org/10.1016/j.chembiol.2016.07.023.

Harrer, S., Shah, P., Antony, B. and Hu, J. (2019) ‘Artificial Intelligence for Clinical Trial Design’, *Trends in Pharmacological Sciences*, 40(8), pp. 577–591. Available from: https://doi.org/10.1016/j.tips.2019.05.005.

IBM Education (2023) ‘https://www.ibm.com/blog/the-benefits-of-ai-in-healthcare/’, 11 July. Available from: https://www.ibm.com/blog/the-benefits-of-ai-in-healthcare/ (Accessed: 8 May 2024).

Kneusel, R.T. (2023) *How AI Works: From Sorcery to Science*. United Kingdom: No Starch Press.

Kraaijenbrink, J. (2022) ‘What Is Industry 5.0 And How It Will Radically Change Your Business Strategy?’, *Forbes*, 24 May. Available from: https://www.forbes.com/sites/jeroenkraaijenbrink/2022/05/24/what-is-industry-50-and-how-it-will-radically-change-your-business-strategy/?sh=5455994320bd (Accessed: 7 May 2024).

Leslie, D. (2019) *Understanding artificial intelligence ethics and safety: A guide for the responsible design and implementation of AI systems in the public sector*. [object Object]. Available from: https://doi.org/10.5281/ZENODO.3240528.

Lou, B. and Wu, L. (2020) ‘Artificial Intelligence and Drug Innovation: A Large Scale Examination of the Pharmaceutical Industry’, *SSRN Electronic Journal* [Preprint]. Available from: https://doi.org/10.2139/ssrn.3524985.

Muller, H., Mayrhofer, M.T., Van Veen, E.-B. and Holzinger, A. (2021) ‘The Ten Commandments of Ethical Medical AI’, *Computer*, 54(7), pp. 119–123. Available from: https://doi.org/10.1109/MC.2021.3074263.

Peres, R.S. et al. (2020) ‘Industrial Artificial Intelligence in Industry 4.0 - Systematic Review, Challenges and Outlook’, *IEEE Access*, 8, pp. 220121–220139. Available from: https://doi.org/10.1109/ACCESS.2020.3042874.

Richardson, P. et al. (2020) ‘Baricitinib as potential treatment for 2019-nCoV acute respiratory disease’, *The Lancet*, 395(10223), pp. e30–e31. Available from: https://doi.org/10.1016/S0140-6736(20)30304-4.

UK Government (2021) *National AI Strategy*. Available from: https://assets.publishing.service.gov.uk/media/614db4d1e90e077a2cbdf3c4/National\_AI\_Strategy\_-\_PDF\_version.pdf (Accessed: 8 May 2024).