AI in orthopaedics – current status, barriers and facilitators

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Artificial Intelligence (AI) aims to develop systems and processes capable of executing tasks traditionally involving human |intelligence. It has evolved from a basic understanding of neurones in the 1940's, to basic algorithms and subsequently, complex artificial neural networks. Advances have been accelerated by improvements in processor technology, enhancing the speed and efficiency of complex algorithms and real-time analysis and innovations in cloud computing, which provide scalable computational resources.[2,3]

AI has significant potential to improve patient care in the field of orthopaedics through one of three principle methodologies. These are, predictive analytics (utilising machine learning to forecast patient outcomes and optimise treatment plans), computer vision (enhancing diagnostics and surgical planning through advanced image analysis) and Natural Language Processing (NLP) to streamlining documentation and extracting meaningful insights from clinical texts. Predictive analytics examples include in-hospital numerical / tabular data and external, registry data from repositories such as the National Joint Registry and the American Joint Replacement Registry. Computer vision examples include radiographs, MRI, and CT scans. Natural language processing information sources can include in-hospital clinical information (letters and reports) and external information such as the medical literature.

The integration of AI into clinical practice is not without its challenges. These include legal, ethical, consent and technical considerations. Furthermore, the process of developing a system requires training and testing of an algorithm on suitable, often large datasets.

The purpose of this presentation is to discuss the current status, barriers and facilitators to developing and using AI in orthopaedics. The implications of utilising extensive data sets, regulatory and technical challenges, and the need for improving connectivity between data systems will be explored in this presentation.