AI in Gastroenterology (GI): A Window of Opportunity

As artificial intelligence (AI) grows, so does its importance within human health. In recent years we have seen rapid development in this area, giving rise to more opportunities to utilise AI in healthcare, particularly in the field of digestive health oncology, surgery, and endoscopy.

Through novelties like 3D imaging, enhanced organ access and increased movement, AI and robotic devices enable healthcare professionals (HCPs) to perform highly complex procedures with greater precision, flexibility and control. This opens the door to a wider pool of professionals, who can conduct these treatments.

AI-assisted procedures can also be less invasive, minimising pain as well as delivering earlier hospital discharge. Additionally, the use of AI presents an opportunity to gather and analyse big data to facilitate clinical practice as well as improve education and training through the novelty of virtual reality training models.

To maximise the life-changing opportunities offered by AI and robotics, we must overcome a variety of challenges. Here, UEG highlights the value AI can provide to the field of gastroenterology, identifies the challenges we face and sets out a 4-step pathway forward.

Harnessing the potential of big data in clinical trials

The introduction of AI-based analysis of electronic health records provides a significant window of opportunity for the development of diagnostic and therapeutic algorithms as well as improved clinical analysis and outcomes. Utilising mass data generated by treating and managing patients helps facilitate data-analysis using AI. As treatment for digestive diseases is highly personalised it makes big-data analysis and categorisation critical, as it provides a point of reference for informed clinical decision-making, while streamlining internal processes and encouraging multidisciplinary working. The role of apps and wearables is particularly important as they allow for ongoing and real-time data analysis. This helps to provide HCPs with early signals that the condition of a patient may be at risk of deteriorating.
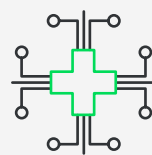
AI-assisted Gastrointestinal (GI) endoscopic imaging and surgery

AI-guided image interpretation has successfully facilitated endoscopic detection of early malignant lesions, improved risk stratification before and during therapy, and assisted during endoscopic surgery. This has led to endoscopic procedures being performed more accurately and a reduction in workload.

Approaches to precision medicine involving AI in GI oncology

AI has played an important role in enhancing systems developed for cancer screening and early detection. In addition to this, the impact of AI on approaches to precision medicine in GI oncology is continuing to grow. Robotic tool kits are now being used to remove GI cancers and provide diagnostic access to the GI tract. In addition, the integration of AI into molecular profiling of GI tumours at the genomic or transcriptomic level by next-generation sequencing tools offers an unprecedented opportunity to guide molecular tumour board recommendations towards personalised and targeted treatment strategies.

AI Challenges

While AI has the potential to be highly beneficial in the field of gastroenterology, there are significant challenges that need to be overcome:

1. A lack of testing for large-scale clinical applications of AI and external validation of AI through randomised trials

2. No standardised AI patient care guidelines nor classifications for AI-based systems are currently available

3. A lack of HCP AI training – clarity and understanding is critical to ensuring the HCP remains responsible and in control

4. Strengthening physician/surgeon-patient trust is essential when using AI

5. Patient concerns and informed consent are a priority – information provided needs to be sufficiently detailed and understandable for autonomous patient decision making

6. Ethical challenges – what data is shared between HCPs and AI system providers and the increasing levels of autonomy for surgical robots

7. The real-world performance of AI – while AI systems might demonstrate excellent performance when developed in the lab, this performance may not translate into real healthcare settings

8. Varying access and regulatory inconsistencies across Europe have caused vast inequalities and fragmentation in the uptake of AI

UEG 4-Step Plan-of-Action

To tackle these challenges and effectively cope with the fast developments of AI, UEG has set out a 4-step plan to maximise the benefits of AI:

1. Training, Education and Certification: HCP training to learn AI skills, understand its principles and where it can be beneficial, and sustaining professional development throughout an HCP's career to ensure their AI knowledge and skillset remain up-to-date

2. The HCP Voice: HCPs must be given a voice at every stage of the process to ensure appropriate design, validation and implementation of AI in healthcare. HCPs should be represented in relevant advisory bodies at EU and national level

3. Harmonisation and Standardisation:

a. Guidelines must be developed to standardise the applications of AI in medicine across Europe

b. A fully harmonised approach to data processing regulations in healthcare settings, administration or research across the EU, by providing sufficient guidance and legal clarity, to maximise the information and use AI can provide. The European Health Data Space should advance health data sharing in the EU.

c. Well-defined standards to specifically mitigate ethical and liability issues and protect Meaningful Human Control. This includes well-defined human responsibility for task supervision and informed decision-making procedures for professionals and patients

4. AI Research Funding: Allocate more funding for AI-related research projects. In gastroenterology, automation can significantly improve procedures such as endoscopy and surgery as well as simulation in training. It can also prevent errors in robotic surgery and polyp detection and removal