AI in orthopaedics

Date: 6—7 November 2023
Venue: Day 1: The Medical Society of London
      Day 2: The Royal Society of Medicine
CPD: 11 CPD hours

#Alinortho
**Workshop programme**  
**Day 1: Monday 6 November**  
**Venue: The Medical Society of London**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>14:30</td>
<td>Registration, refreshments and meet the faculty</td>
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</table>
| 15:00 | Welcome and introduction                                                  | Mr Vipin Asopa, Consultant Orthopaedic Surgeon (Academic Surgical Unit), South West London Elective Orthopaedic Centre  
Mr Keith Tucker, Trustee, Orthopaedic Research UK |

**SESSION 1: BACKGROUND**  
**Chairs: Ms Antonella Maia Perini and Professor Mike Reed**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>15:05</td>
<td>Introduction and history of AI</td>
<td>Mr Vipin Asopa, Consultant Orthopaedic Surgeon (Academic Surgical Unit), South West London Elective Orthopaedic Centre</td>
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<tr>
<td>15:10</td>
<td>What happens inside the black box?</td>
<td>Mr Peter Harris, Research Science Manager, NielsenIQ</td>
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<td>15:15</td>
<td>Worked examples of AI in the clinical environment</td>
<td>Dr Christopher Spence, Clinical Fellow in Orthopaedics, Cleveland Clinic London</td>
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<tr>
<td>15:20</td>
<td>Generative AI for MSK</td>
<td>Mr Mustafa Amaib, Orthopaedic Surgeon, Maidstone and Tunbridge Wells NHS Trust</td>
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<tr>
<td>15:25</td>
<td>Different types of AI: From linear regression to deep learning</td>
<td>Professor Kia Nazarpour, Professor of Digital Health, The University of Edinburgh</td>
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<tr>
<td>15:32</td>
<td>Optimisation and machine learning</td>
<td>Professor Ferrante Neri, Professor of Machine Learning and Artificial Intelligence, University of Surrey</td>
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<tr>
<td>15:40</td>
<td>Computer vision: past, present and future</td>
<td>Professor Yi-Zhe Song, Professor of Computer Vision and Machine Learning, University of Surrey</td>
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<tr>
<td>15:52</td>
<td>Natural language processing</td>
<td>Dr Diptesh Kanojia, Lecturer in Artificial Intelligence for Natural Language Processing, University of Surrey</td>
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<tr>
<td>16:00</td>
<td>Q&amp;A</td>
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**SESSION 2: PRINCIPLES**  
**Chairs: Professor Deiary Kader & Dr Catherine Kelly**

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>16:12</td>
<td>Data collection and preparation</td>
<td>Dr Justin Green, Orthopaedic Registrar, Northumbria Healthcare NHS Foundation Trust and ORUK / BHS Research Fellow</td>
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<tr>
<td>16:17</td>
<td>PROBAST and CHARMS</td>
<td>Dr Justin Green, Orthopaedic Registrar, Northumbria Healthcare NHS Foundation Trust and ORUK / BHS Research Fellow</td>
</tr>
<tr>
<td>16:22</td>
<td>Model selection and evaluation</td>
<td>Dr Diptesh Kanojia, Lecturer in Artificial Intelligence for Natural Language Processing, University of Surrey</td>
</tr>
<tr>
<td>16:29</td>
<td>Introduction to deep learning</td>
<td>Mr Peter Harris, Research Science Manager, NielsenIQ</td>
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<tr>
<td>16:37</td>
<td>Deployment and Monitoring</td>
<td>Dr Justin Green, Orthopaedic Registrar, Northumbria Healthcare NHS Foundation Trust and ORUK / BHS Research Fellow</td>
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<tr>
<td>16:45</td>
<td>Q&amp;A</td>
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<tr>
<td>16:55</td>
<td>Refreshments</td>
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**SESSION 3: PRACTICAL CONSIDERATIONS FOR SETTING UP AI IN AN NHS HOSPITAL**  
**Chairs: Professor Deiary Kader & Dr Catherine Kelly**

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<tbody>
<tr>
<td>17:05</td>
<td>How to set up AI in an NHS hospital</td>
<td>Mr Vipin Asopa, Consultant Orthopaedic Surgeon (Academic Surgical Unit), South West London Elective Orthopaedic Centre</td>
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<tr>
<td>17:13</td>
<td>Appropriate hardware</td>
<td>Professor Philip Breedon, Professor of Smart Technologies, Nottingham Trent University, School of Science and Technology</td>
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<td>17:21</td>
<td>Virtualisation or on-premises?</td>
<td>Mr Vipin Asopa, Consultant Orthopaedic Surgeon (Academic Surgical Unit), South West London Elective Orthopaedic Centre</td>
</tr>
<tr>
<td>17:28</td>
<td>Data security and federated technology</td>
<td>Ms Irrum Afzal, Research and Outcomes Manager – Clinical Researcher, South West London Elective Orthopaedic Centre (SWLEOC)</td>
</tr>
<tr>
<td>17:35</td>
<td>Digital technology deployment – one size does not fit all</td>
<td>Professor Philip Breedon, Professor of Smart Technologies, Nottingham Trent University, School of Science and Technology</td>
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<tr>
<td>17:40</td>
<td>Q&amp;A</td>
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**All participants must bring along a fully charged laptop**
### SESSION 4: CODING
Chairs: Professor Richie Gill & Mr Richard Hewitt

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<th>Speaker(s)</th>
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<tbody>
<tr>
<td>17:52</td>
<td>What is meant by coding?</td>
<td>Mr Peter Harris, Research Science Manager, NielsenIQ</td>
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<tr>
<td>18:02</td>
<td>Basic principles of python coding for AI</td>
<td>Mr Peter Harris, Research Science Manager, NielsenIQ</td>
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<tr>
<td>18:10</td>
<td>Q&amp;A</td>
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### SESSION 5: PRACTICAL
Leaders: Mr Vipin Asopa, Mr Peter Harris & Mr Daniel Jones

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<tr>
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<tbody>
<tr>
<td>18:20</td>
<td>Setting up the environment for AI</td>
<td>Dr Suparna De, Lecturer in Computer Science, University of Surrey</td>
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</tbody>
</table>
| 18:28 | Worked examples of image analysis using deep learning | Mr Peter Harris, Research Science Manager, NielsenIQ  
|       |                                                  | Mr Vipin Asopa, Consultant Orthopaedic Surgeon (Academic Surgical Unit), South West London Elective Orthopaedic Centre |
| 19:28 | How to interpret the results?                     | Mr Peter Harris, Research Science Manager, NielsenIQ                       
|       |                                                  | Professor Kia Nazarpour, Professor of Digital Health, The University of Edinburgh |

### SESSION 6: ROUND UP
Chairs: Professor Deiary Kader & Professor Kia Nazarpour

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<tr>
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<tbody>
<tr>
<td>19:35</td>
<td>Round up...Best practices for the implementation of an AI programme</td>
<td>Professor Philip Breedon, Professor of Smart Technologies, Nottingham Trent University, School of Science and Technology</td>
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<tr>
<td>19:45</td>
<td>Discussion</td>
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<tr>
<td>20:00</td>
<td>Refreshments and opportunity to chat with faculty</td>
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<tr>
<td>20:20</td>
<td>Close of workshop</td>
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Conference programme, Day 2: Tuesday 7 November
Venue: The Royal Society of Medicine, London

09:00 Registration and refreshments

09:30 Welcome and introduction
Mr Keith Tucker, Trustee, Orthopaedic Research UK

SYMPOSIUM 1: AI AND HOW IT WORKED FOR ME (OR DID NOT WORK!)
Chairs: Professor Kia Nazarpour & Professor Mike Reed

09:35 Zero to one in medical AI
Dr Will Briggs, CEO, Naitive Technologies

09:43 Clinical evaluation of an AI-based 2D-to-3D knee bone reconstruction for patient-specific plan in total knee arthroplasty
Dr Hassan Nemati, Head of Technical Research, Ortoma AB

09:51 Deep learning in the osteoarthritis arthroplasty clinical pathway: a systematic review and meta-analysis evaluating performance in image interpretation
Ms Amal Ahmed, Medical Student, MSk Lab, Imperial College London

09:59 You’ve built the device, so what next? Insights from an AI technology on the journey to US clinical adoption
Dr Catherine Kelly, Chief Operating Officer, Naitive Technologies

10:07 Use of artificial intelligence and saliency mapping to identify novel radiographic markers in failing total hip arthroplasties
Mr Sai Pendyala, Junior Orthopaedic Clinical Research Fellow, South West London Elective Orthopaedic Centre (SWLEOC)

10:15 Panel discussion

SYMPOSIUM 2: WHERE WE ARE WITH OUR GOVERNMENT AND THE NHS
Chairs: Professor John Skinner & Mr Keith Tucker

10:30 Communication from the Minister of State for Science, Innovation and Technology
Mr George Freeman, MP

10:45 Developing an operational AI product
Mr Achut Manandhar, Senior Data Scientist, NHS England

10:55 Update from the NHS AI Lab
Mr Dominic Cushman, Director of AI, Imaging and Deployment, NHS Transformation Directorate

11:03 Panel discussion

11:15 Refreshments and exhibition

SYMPOSIUM 3: AI AND HOW IT WORKED FOR ME (OR DID NOT WORK!)
Chairs: Professor Richie Gill & Professor J Mark Wilkinson

11:30 Use of natural language processing techniques to predict patient selection for total hip arthroplasty: results from the Ai to Revolutionise the Patient Care pathway in Hip and Knee (ARCHERY) project
Mr Luke Farrow, Clinical Research Fellow, University of Aberdeen

11:38 A general-purpose natural language processing tool (ChatGPT) can make complex surgical decisions with confidence similar to experienced surgeons: a comparative analysis
Mr Kyriacos Pouris, Medical Student, MSk Lab, Imperial College London

11:46 Comparative analysis of generative artificial intelligence (AI) versus manual data analysis in orthopaedic patient data
Mr Mustafa Alnaib, Orthopaedic Surgeon, Maidstone and Tunbridge Wells NHS Trust

11:54 Guidelines Genius: A start-up in orthopaedic health education using generative pretrained transformer architecture
Dr Salah Hammouche, Senior Trauma and Orthopaedic Registrar ST8, Imperial College London and Founder & Director, Guidelines Genius

12:02 The application of large language models to orthopaedic practice
Dr Arwel Poacher, Academic Core Trainee (WCAT), University Hospital Wales

12:10 Panel discussion

SYMPOSIUM 4: EXPERIENCES FROM OTHER DISCIPLINES
Chairs: Professor Alan Fraser, Professor Rob Nelissen & Professor J Mark Wilkinson

12:20 CORE MD AI from a cardiologist
Professor Frank Rodemakers, Emeritus Professor of Cardiology, KU Leuven, Belgium

12:28 The path and the challenges in developing ML for retinal screening
Mr Richard Hewitt, Principal Consultant, Government, Health and Housing, NEC Software Solutions

12:35 The use of AI for survival modelling of hip and knee implants
Professor Visakan Kadirkamanathan, Professor of Signal and Information Processing, Department of Automatic Control and Systems Engineering, University of Sheffield

12:45 Panel discussion

13:00 Lunch and exhibition
**SYMPOSIUM 5: GOVERNANCE**  
*Chairs: Ms Christine Glover, Professor Caroline Hing & Professor John Skinner*

13:45 The important data protection and ethical issues before you implement AI  
Mr Taj Sallamuddin, Information Lawyer, Information Governance Services Limited

13:53 MHRA, the rules, the UKCA  
Ms Lucy Spain, Benefit Risk Evaluation Assessor, Musculoskeletal, Trauma and Cosmetic Team, MHRA

14:00 Health Research Authority / Research Ethics Service  
Ms Charlotte Allen, Quality and Performance Manager, Health Research Authority

14:08 Caldicott Guardians  
Mr Vipin Asopa, Consultant Orthopaedic Surgeon (Academic Surgical Unit), South West London Elective Orthopaedic Centre

14:15 Big data and building patient-powered platforms in orthopaedics  
Mr Manoj Ramachandran, Consultant Paediatric Orthopaedic and Trauma Surgeon/Professor and Director of Innovation, Barts Health NHS Trust

14:23 The rules which we need to observe  
Dr Justin Green, Orthopaedic Registrar, Northumbria Healthcare NHS Foundation Trust and ORUK / BHS Research Fellow

14:30 Panel discussion

**SYMPOSIUM 6: AI AND HOW IT WORKED FOR ME (OR DID NOT WORK!)**  
*Chairs: Professor Deiary Kader & Mr Daniel Jones*

14:50 Integration of gait function data into an orthopaedic AI algorithm  
Dr Matt Thornton, Technical Lead, Motor Learning Lab, Royal National Orthopaedic Hospital

14:58 Artificial intelligence in orthopaedics: Can chat generative pre-trained transformer (ChatGPT) pass section 1 of the fellowship of the Royal College of Surgeons (trauma & orthopaedics) examination?  
Mr Ekemini Ekpo, Trauma & Orthopaedic Registrar (ST4), Guy’s and St Thomas’ NHS Foundation Trust

15:06 Transfer learning with convolutional neural network ResNet150 model for radiographic prediction of one-year patient reported outcome post unicompartmental knee arthroplasty  
Dr Jack Tu, ORUK Early Career Research Fellow, Oxford Orthopaedic Engineering Centre

15:14 A transfer learning model with CNN ResNet50v2 for patella and femur detection from ultrasound images  
Mr Karthik Saravanan, Medical Student, University of Oxford

15:22 Operating theatre list scheduling of elective joint replacement surgery can be improved by machine learning: A systematic review  
Dr Christopher Spence, Clinical Fellow in Orthopaedics, Cleveland Clinic London

15:30 Panel discussion

**SYMPOSIUM 7: FUNDING**  
*Chairs: Professor Ferrante Neri & Ms Ines Reichert*

15:40 Obtaining data for M/LAI from PACS  
Mr Daniel Jones, Business Director UKI, Gleamer AI

15:48 Microsoft and data provision  
Dr Umang Patel, Chief Clinical Information Officer, Microsoft

15:56 Panel discussion

16:05 Refreshments and exhibition

16:25 ORUK investment in AI in MSK: what have we learnt so far?  
Dr Arash Angadji, CEO, Orthopaedic Research UK

16:30 NIHR-ORUK funding collaboration update  
Dr Helen Compton, Stakeholder Engagement Manager, Innovations, NIHR coordinating centre

16:38 Maximising the success of your innovation!  
Mr Tom Underwood, Delivery Manager, NHS Horizons

16:46 Building a successful funding application  
Mr Sasha Karakusevic, Project Director, NHS Horizons

16:54 Building and funding a global healthcare AI company from scratch  
Mr Manoj Ramachandran, Consultant Paediatric Orthopaedic and Trauma Surgeon/Professor and Director of Innovation, Barts Health NHS Trust

17:05 Panel discussion
### SYMPOSIUM 8: WRAP UP
Chairs: Mr Vipin Asopa & Mr Keith Tucker

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<tr>
<th>Time</th>
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| 17:10 | The importance of AI and ML in the future of orthopaedics             | Professor Fares Haddad, Professor of Orthopaedic and Sports Surgery and Consultant Orthopaedic Surgeon, University College Hospital  
Professor John Skinner, Past President, British Orthopaedic Association |
| 17:18 | Prizes (Vote on Slido for your favourite poster and proffered paper) |                                                                                                    |
| 17:21 | Presentation by the winner of the essay competition                   | Dr Nimra Akram, Junior Clinical Research Fellow, SWLEOC / Epsom and St Helier University Hospitals NHS Trust |
| 17:25 | Closing remarks                                                       | Dr Arash Angadjji, CEO, Orthopaedic Research UK  
Mr Keith Tucker, Trustee, Orthopaedic Research UK                                                   |
| 17:30 | The Furlong networking drinks reception and exhibition                |                                                                                                    |
| 19:00 | Close                                                                 |                                                                                                    |

Day 1 is an educational workshop for non-specialist AI users
- **Monday 6 November 2023, 14:30 – 20:00**
  - The Medical Society of London
  - Lettsom House, Chandos Street
  - London W1G 9EB
  - Attendees at the workshop will be limited to 40 in-person attendees (first come, first served)

Day 2 is the AI conference where all clinicians, scientists, engineers and industry experts are welcome to attend
- **Tuesday 7 November 2023, 09:00 - 19:00**
  - Royal Society of Medicine
  - 1 Wimpole Street
  - London, WIG 0AE

Day 1 & 2’s venue are around the corner from each other.

**Travelling by tube**
- Oxford Circus station (Victoria, Bakerloo, Central lines) & 4 minute walk
- Bond street (Central, Jubilee lines) & 5 minutes walk
- Great Portland Street (Hammersmith & City, Circle lines) & 15 minutes walk

**Travelling by train**
- London Victoria Station (Gatwick Express) & 2 stops on the Victoria line to Oxford Circus or 10 minutes by taxi
- London Charing Cross station & 2 stops on the Bakerloo line to Oxford Circus or 10 minutes by taxi
- London Euston Station & 2 stops on the Victoria line to Oxford Circus or 10 minutes by taxi
- London King’s Cross & St Pancras Station (Eurostar) & 3 stops on the Victoria line to Oxford Circus