

# The Development of Advanced Healthcare Scientific Practice in Intraoperative Neurophysiology:

## A MODEL FOR SERVICE TRANSFORMATION, CLINICAL LEADERSHIP & IMPROVED PATIENT SAFETY OUTCOMES

Clinical Neurophysiology in Edinburgh has evolved into a thriving Healthcare Scientist-led service, delivering autonomous highly specialised advanced practice that helps prevent devastating complications such as paralysis and brain injury and improves outcomes for patients undergoing complex neurological surgery across Scotland.

### THE STAKES



Intraoperative Neurophysiological Monitoring (IONM) uses advanced neurodiagnostic techniques during complex spinal, neurosurgical, and epilepsy procedures to assess the functional integrity of the brain, spinal cord, and peripheral nervous system in real time. By detecting emerging neural compromise, IONM enables immediate surgical intervention to prevent irreversible injury, reducing the risk of paralysis, permanent neurological disability, brain injury, and loss of function.

~300

Adults and children safeguarded every year

12

Healthcare Scientists providing IONM for 2 national and multi-regional surgical services

1

Award-winning example of safe advanced practice in Scotland

### THE JOURNEY



#### STEP 1 – DETECT (SPOT THE CHANGE)

#### STEP 2 – STRATIFY (ASSESS THE RISK)

#### STEP 3 – ESCALATE (RAISE IT FAST)

#### STEP 4 – COMMUNICATE (SPEAK CLEARLY - AS ONE)

#### STEP 5 – INTERVENE (ACT IN TIME TO PREVENT INJURY)

### THE INNOVATION — THE CORD-AT-RISK ALGORITHM

As surgical complexity increased, the team collaborated with Consultant Orthopaedic Spine Surgeon Mr Thanos Tsirikos MD, FRCS, PhD, an internationally recognised expert in spinal surgery, to develop a standardised framework for the early recognition of neurological compromise and coordinated management.

[Tsirikos AI, Duckworth AD, Henderson LE, Michaelson C. Multimodal Intraoperative Spinal Cord Monitoring during Spinal Deformity Surgery: Efficacy, Diagnostic Characteristics, and Algorithm Development. Med Princ Pract. 2020;29\(1\):6-17](#)

### THE IMPACT — SERVICE RENEWAL FRAMEWORK IN ACTION



#### PREVENTION

Deterioration is spotted before permanent injury occurs — preventing paralysis, disability and brain injury.



#### PEOPLE

Every patient receives a monitoring strategy tailored to their individual condition, procedure and risk profile.



#### DIGITAL

Advanced neurodiagnostic technology plus expert interpretation = actionable information throughout every operation.

### OUTCOMES & ACHIEVEMENTS



Outstanding **patient-safety outcomes** through shared decision-making & robust clinical governance



**Specialist training programme** built on human factors, patient safety & continuous improvement



A strong **research profile** with published research shaping national & international evidence and guidance



**Sustainable support** for Scotland's national spinal, epilepsy surgery & neurosurgical services



Creation of **innovative decision-support tools** - including published Cord-at-Risk Algorithm



Leadership roles in professional bodies - influencing **professional standards, education, governance and best practice** across the 4 nations



Translating the Scottish Government's Service Renewal Framework into demonstrable **service, workforce and patient-care outcomes**



Working collaboratively with Scottish Government and PSD Scotland to develop **national frameworks** & explore pathways to **professional registration and regulation** of Clinical Scientists

HEALTHCARE SCIENTISTS IN SCOTLAND ARE NO LONGER SIMPLY MONITORING SURGERY — THEY ARE ACTIVELY SHAPING IT.