CLINICAL RESEARCH

TIME: 10.15 – 11.15

LOCATION: DOBSON ROOM

IS SEEING BELIEVING? AI IMAGE ANALYSIS TO ASSESS DONOR PANCREAS ORGAN QUALITY

Pierre Ezuma, Institute of Cellular Medicine, Newcastle University

Background: Pancreas transplantation is the only consistently curative treatment for selected patients with type 1 diabetes. Current donor pancreas quality assessment is a visual, subjective and qualitative process with multifactorial influences. Effective use of 'marginal' donors with suboptimal characteristics such as a fatty pancreas, or pancreatic steatosis (PS), is key to improve organ utilisation and outcomes. This study aims to harness machine-learning (ML) to develop an automated, quantitative image analysis tool to assess organ quality and additionally evaluate organ quality consensus between surgeons.
Methods: 6 pre-trained ML models were trained and tested on their ability to assess organ quality from 214 images of donor pancreata. Pancreata were labelled with transplant suitability and PS (binary and multiple classification) consensus scores from three surgeons. Inter-observer agreement was calculated with Fleiss' kappa (Fk) and intra-class correlation coefficient (ICC). Model performance was measured with accuracy.
Results: The highest performing models achieved 55-75% and 78.6% binary classification accuracy in training and testing respectively. Similarly, 48.7-53.8% and 71.4% accuracy for multiple classification was achieved. The increase in test performance demonstrates a desired generalisability to new pancreas images. Inter-observer agreement was 'fair' for transplant suitability and 'moderate' for PS (Fk=0.310 and ICC=0.716; $p<0.0001$). This illustrates suboptimal visual assessment consensus, potentially due to differing surgical expertise. The inherent lack of agreement may impact the robustness of ML model performance.
Conclusion: A ML image analysis method for donor pancreas organ quality assessment is feasible but further augmentation is needed to improve performance

MUSCLE TENSION DYSPHONIA IN PERFORMING ARTISTS: TOWARDS A THERAPEUTIC STRATEGY

Philippa Anderson, International Centre for Music Studies, Newcastle University

According to an informal vote taken by Speech Language Therapists at the 14th Newcastle Voice Conference 2018, Muscle Tension Dysphonia (MTD) was the main reason people with voice issues are seen in the Voice Clinic. The prevalence of the condition will affect the NHS considerably. Further to this, MTD has serious implications for professional voice users such as actors and singers. Dysfunction of the voice – potentially complete voice loss – is known to have financial consequences due to loss of work which may in turn impact the performer on an emotional level.
This research brings together for the first time the experience of a practising vocal coach and medical literature in order to provide a new evidence-based model termed, 'The Ten-Key Protocol'. The protocol outlines a systematic approach for the treatment of performers who have experienced stressful incidents preceding the onset of MTD including, the pressures of rehearsals, recording and forthcoming performances.
The protocol may have a positive affect for hundreds of artists. Benefits would include awareness of vocal hygiene, positive mind state and a tool to implement in everyday practice for longevity of career. Furthermore, due to the number of lost work days for voice issues being comparable with heart disease, asthma, and

depression, it is clear that voice issues are a public health concern. The protocol could potentially be an armamentarium for the treatment of MTD which could have implications for the general workforce, specifically other professional voice users such as teachers or call centre workers.

EVALUATING THE EFFECTIVENESS OF EHEALTH AND DIGITAL TECHNOLOGIES TO SUPPORT HEALTH BEHAVIOUR CHANGES IN SURGICAL PATIENTS

Anna Robinson, Institute of Health and Society, School of Pharmacy, Newcastle University

Background: There has been a shift towards using electronic healthcare (eHealth) technologies in the NHS, including smartphone applications (apps) and wearable trackers. eHealth technologies can promote patient empowerment and provide education to motivate lifestyle change. Elective surgical pathways may be amenable to these benefits to support pre- and post-operative health behaviour change in patients, with the focus of improved surgical outcomes.
Objective: To assess the effectiveness of eHealth technologies to support patient health behaviour change in bariatric, cancer, and orthopaedic elective surgeries.
Method: PROSPERO: CRD42019127972. This systematic review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. A literature search was conducted using Medline, Embase, CINAHL, PsycINFO, Web of Science and Scopus databases.
Results: 17 studies, published between 2011-2019, were included: USA (n=5), Netherlands (n=4), Canada (n=3), New Zealand (n=2), South Korea (n=1), Australia (n=1), and Spain (n=1).
The optimal time to initiate eHealth technologies remains unknown. 100% of interventions implemented pre- and post-operatively supported statistically significant ($p \leq 0.05$) behaviour change, in comparison to 40% of pre-operative and 62.5% of post-operative interventions. Internet-based 'e-platforms' demonstrated successful results with statistically significant behaviour change in 75% of studies, however, this delivery method may be superseded with increasing use of wearable technologies and apps.
Conclusions: eHealth is a rapidly evolving area within the NHS; the challenge we face is determining the optimal way to integrate these technologies into practice. Tailoring eHealth interventions to specialist surgical pathways is critical to ensure they best meet patient needs.

EVALUATION OF MEDICAL TEST IN THE ABSENCE OF A GOLD STANDARD

Chinyereugo Umemneku, Institute of Health and Society, Newcastle University

Objective: To review methods employed to evaluate the diagnostic accuracy of medical test when there is a missing or no gold standard.
Study design and settings: Articles that proposed or applied any methods to evaluate the diagnostic accuracy of medical test(s) in the absence of gold standard were reviewed.
Results: Identified methods were classified into four main groups: methods employed when there is a missing gold standard; correction methods (which make adjustment for an imperfect reference standard with known diagnostic accuracy measures); methods employed to evaluate a medical test using multiple imperfect reference standards; and other methods, like agreement studies, and a mixed group of alternative study designs. Flow-diagrams were developed to guide the selection of appropriate methods.
Conclusion: New medical devices are constantly develop to either replace ineffective medical devices, or serve as triage or add-on to existing medical devices in all aspect of medicine like cancer, genetics, ageing, amongst others. Between the tests' developers and the adoption of their new devices for clinical use; the diagnostic accuracy of the new devices are evaluated. Various methods have been developed to evaluate new device when there is no gold standard. However, the clinical application of the methods are limited. This may be due to the complexity of these methods and/or a disconnection between the fields

of expertise of those who develop (e.g. mathematicians) and those who employ the methods (e.g. clinical researchers). This review aims to help bridge this gap with our classification and guidance flow-diagrams.