UCD School of Medicine

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Abstracts

SSRA 2020 Research Abstracts

1. DISEASE-GENE NETWORKS AND THREE-DIMENSIONAL STRUCTURAL MODELLING OF MELANIN BIOSYNTHESIS PATHWAY ENZYMES

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Melanin, derived from the oxidation and polymerization of tyrosine is a light and free radical absorbing pigment. Melanin is synthesized in melanosomes an organelle subset within melanocyte's and have a complex biosynthesis reaction, induced by exposure to UV stimulation and catalyzed by various enzymes, proteins/genes that results in either eumelanin or pheomelanin[1].

This project started by extensively researching for an array of hypo, hyper and mixed hyper/hypo pigmentation disorders and their various associated genes/proteins using the OpenTarget database. These 174 genes/protein associations were represented using the cytoscape software to create a 'diseasome' (174 genes and 104 pigmentation disorders). Diseasomes provide a comprehensive approach into network medicine to understand how complex a specific gene is, and how a gene can build a relationship with other genes or phenotypes[2]. In a second diseasome, we analyzed to which other non-pigmentary diseases the 174 genes are associated too. Indeed, we found several phenotypes/diseases (neurological, genetic and coronary etc..) involved in pigmentation disorders, showing us these genes are distributed all throughout the human body.

Next, we generated a high-confidence map of the known pigmentation pathways and all their own associated genes, enzymes and proteins. We then complemented these known interactions with binary interactions using the Bioplex database (48 novel interactions, and 45 proteins/genes), of which 69% of the genes are associated to pigmentation disorders, validating their potential impact within the pigmentation pathway. Among those, HPS6, HPS5, BLOC1S6 and DTNBP1 were the top three scoring interaction proteins.

Currently, we are analyzing the impact of mutations on protein function, and hope to obtain further insights into to molecular mechanism underlying pigmentation disorders.

References:

1. Yamaguchi Y, Hearing V, et al Melanocytes and Their Diseases. Cold Spring Harbor Laboratory Press. 2014, vol. 1 1-15

2. Barabasi A, Gulbache N, Loscalzo J, et al Network Medicine: A Network-based approach to Human Disease. Nat Rev Genet. 2011, vol 12 (56-68)

Presenting Author: Olivia Bass

Supervisor: Dr Christina Kiel

3. IS PATIENT OR PHYSICIAN GLOBAL ASSESSMENT A BETTER PREDICTOR OF DISEASE ACTIVITY IN PSORIATIC ARTHRITIS: A META-ANALYSIS

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Physician global assessments (PhysGA) and patient global assessments (PtGA) in psoriatic arthritis (PsA) are inconsistent and lack agreement. They are both used in composite scores to assess disease progression and activity in PsA (1). This meta-analysis explores differences in evaluation of PhysGA and PtGA. It also correlates these assessments with clinical outcomes in PsA to see which is more predictive of disease activity.

A systematic review was performed using Pubmed, EMBASE, Cochrane, and Web of Science from their inceptions until June 18, 2020. Studies that reported both PtGA and PhysGA in the context of a PsA cohort were included. Pooled mean differences were calculated to compare the assessments of activity using Revman5.3. SPSS 26 was used for linear regression to correlate each global assessment to outcome measures in PsA.

2663 citations were identified and 19 included. PtGA was consistently and significantly rated higher than PhysGA with a pooled mean difference of 1.16 [95% CI: 0.72-1.60] (P, 1.0x10-5). PtGA significantly correlated with PhysGA (p=0.01), SJC66 (p=0.023), DAS28 (p=0.016), and PASI (p=0.023). PhysGA significantly correlated with PtGA (p=0.01), SJC66 (p=0.003), and DAS28 (p=0.026). When compared together against significant outcome measures, increases in PtGA were better correlated to increases in DAS28 (p=0.024), and increases in PhysGA were better correlated to increases in SJC66 (p=0.005).

PtGA is uniformly higher than PhysGA in the evaluation of PsA. However, they correlate differently when compared to disease outcome measures.

Table 1. Combined linear regression for clinical metrics significant in both PtGA and PhysGA.

Disease activity metric	R^2	p	Beta [95%CI] for ptGA	Beta [95%CI] for physGA
SJC66	0.929	0.005	2.25 [-0.95-5.49]	3.70 [0.97-6.44]
DAS28	0.917	0.024	0.30 [-0.09-0.69]	0.27 [-0.15-0.70]

Reference:

1. Chaudhry SR, Thavaneswaran A, Chandran V, Gladman DD. Physician scores vs patient self-report of joint and skin manifestations in psoriatic arthritis. Rheumatology. 2013; 52(4):705–1.

Presenting Author: Matthew A Turk

Supervisor: Dr Janet E Pope

5. HETAIROS-SEARCH: A COMMAND-LINE TOOL TO FACILITATE THE ANALYSIS OF FUNCTIONALLY RELATED AND CLUSTERED PROTEIN DOMAINS IN BACTERIA AND ARCHAEA

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A bacterial or archaeal cell may have over 8000 protein-coding genes distributed along its chromosome. Protein domains act as functional units of genes and gene clusters. Clusters can consist of multidomain genes or clustered domains, like operons. Functionally related domains may move and cluster together during evolution. Previous work analysing genomes produced our inhouse Hetairos database of clustering probabilities for millions of pairs of protein domains, making it difficult to analyse. We aim to simplify the analysis of clustering domains presented in Hetairos using biological function.

We developed a software which interacts with the Hetairos database using Python 3.8 and modern python libraries. We used gene ontology (GO), a widely used and curated annotation of known biological functions to group domain pairs.

We developed Hetairos-Search, a command-line tool to analyse protein domain clusters. The researcher enters GO terms and receives a related dataset of paired protein domains, pairing probabilities and information about phylogeny. To facilitate downstream analysis, the search result is produced in the form of a Comma Separated Values (CSV) file which can be widely interpreted by many analysis software. Here I present, Hetairos-Search using protein domains involved in bacterial antibiotic response.

Hetairos-Search is a research tool which facilitates the finding and annotation of functionally related protein domains of unknown function in new, biologically relevant clusters.

References:

1. Cotroneo C. Identification of chromosomal clusters of protein domain coding regions in Bacteria and Archaea [Ph.D]. Hetairos. University College Dublin; 2020.

2. Mitchell A, Attwood T, Babbitt P, Blum M, Bork P, Bridge A et al. InterPro in 2019: improving coverage, classification and access to protein sequence annotations. Nucleic Acids Research. 2018;47(D1):D351-D360.

Presenting Author: Arisha Ali

Supervisor: Prof Denis Shields

7. AN INVESTIGATION INTO SELF-REPORTED QUALITY OF LIFE IN PATIENTS LIVING WITH HEPATITIS C; DATA FROM THE TRACER COHORT

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Patients living with hepatitis C virus (HCV) report decreased quality of life (QOL) in self-reported questionnaires. Health related QOL data can be used to assess the impact of a chronic disease on patient health and wellbeing. The aim of this research was to (a) describe the QOL of patients living with HCV and (b) to investigate associations of QOL components with liver stiffness measurements.

Patients commencing HCV therapy were recruited to the TRACER Cohort prior to commencing HCV treatment and completed a standardized QOL Questionnaire (HQLQv2™). Liver stiffness measurements were acquired using FibroScan®. HQLQv2™ results were analyzed and means values of each QOL domain were compared across liver stiffness groups using an ANOVA test.

88 patients were recruited; median age was 44 (IQR 39, 50), 27.3% were female (n=24) and 72.7% were male (n=64). 96.6% of patients (n=85) were Caucasian and 3.4% (n=3) were of another ethnicity. All patients reported lower than the normalized population scores for all aspects of health except for their general health (GH). When quality of life indicators were stratified by liver stiffness scores, the summary physical component summary measure (PCS) showed that as liver disease severity increased, the physical health of the patient decreased (see table 1.0).

The results demonstrate the overall mental health of the cohort was below normalized level, there was a strong association between physical health and severity of liver disease. Further analysis is required to determine if HCV treatment will improve the quality of life in these patients.

Table 1.0

Physical-health component summary and mental-health component summary by liver stiffness score (as measured by FibroScan®)

QoL indicator	All	F0-F1	F2/F3	F4	p-value
Total	88	34	20	29	
Physical-health component summary	49.1 (10.6)	52.8 (8.9)	51.3 (10.1)	44.2 (10.8)	0.003
Mental-health component summary	43.5 (12.7)	44.4 (14.2)	43.5 (11.7)	42.0 (11.5)	0.75

Presenting Author: Clíodhna Whittle

Supervisor: Assoc Prof Aoife Cotter

Co-Supervisor: Ms Thérèse Herlihy

14. UTILISING THE DOG-OWNER RELATIONSHIP TO IMPROVE THE HEALTH OF BOTH HUMANS AND CANINES.

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Estimates from the National Cancer Registry of Ireland indicate that 6,238 cancer cases (out of a total of 21,315) in Ireland in 2016 were caused by modifiable risk factors and were therefore potentially preventable[1]. Like humans, modifiable risk factors including passive smoking, obesity and lack of physical activity are also harmful to dogs. Owners form protective emotional attachment bonds to their dogs[2]. The objective of the project was to investigate whether these bonds could be used to evoke positive behavioural change.

We conducted an online questionnaire distributed *via* social media and veterinary clinics. Participants were dog owners. We sought information relating to the owner's and pet's health. We explored owner understanding of how their behaviours e.g. smoking and exercise could impact their own and their pet's health and whether they would modify their behaviour to improve their pet's health.

639 pet owners completed the survey, over 90% (n=637) were women, and 60% (n=637) were under 46 years. Over half of participants were overweight/obese and 30% (n=637) were current/ex-smokers. Almost 20% (n=635) did not know that smoking impacts pet health. Among smokers, 56% (n=140) agreed that knowing the negative effects of passive smoking on their pet would make them more likely to quit. Most smokers (70%, n= 143) agreed that this would be more motivational than concern for their own health alone.

We identified an understudied opportunity to promote healthier behaviours in dog owners. Most owners are willing to modify their behaviour to help their pet. Formal studies of interventions to positively exploit this relationship are needed.

References:

1. National Cancer Registry Ireland, *Lifestyle risk factors and cancer risk in Ireland.* 2020. [URL: http://ncri.ie/].
2. Payne, E., P.C. Bennett, and P.D. McGreevy, *Current perspectives on attachment and bonding in the dog-human dyad.* Psychol Res Behav Manag, 2015. 8: p. 71-9.

Presenting Author: Alex McMullin
Supervisor: Dr Catherine Kelly
Co-Supervisor: Dr Pamela Kelly

16. DO HEALTHIER OWNERS HAVE HEALTHIER DOGS? A CROSS-SECTIONAL STUDY OF MODIFIABLE RISK FACTORS IN DOG-OWNERS AND THEIR PETS

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The beneficial health effects of owning a dog have been well documented. No data has examined whether an association exists between the health of a dog and the health of its owner. In other words, could a dog benefit or be disadvantaged depending on whether its owner is healthy or unhealthy respectively? Obesity, lack of exercise and passive smoking have detrimental effects on a dog's health, quality of life and life expectancy [1]. Obesity puts dogs more at risk for metabolic, endocrine, orthopaedic, cardiac, respiratory, and functional disease as well as certain cancers e.g. mammary tumours and bladder cancer [2].

We conducted an anonymous online questionnaire and extracted data on; (1) Dog-owner health (BMI, smoking status, physical activity, co-morbidities) and (2) their dogs' health (Body condition score (BCS), physical activity, co-morbidities). This was distributed online and, via veterinary clinics and charities.

639 people responded, 92.9% female (n=593), 6.9% male (n=44). Over 80% were under 55 years. One-third of dog owners were current or ex-smokers. Half of owners (50.6% n=638) and 40.6% (n=630) of dogs were overweight/obese. We identified significant discordance between owner perception and assigned BCS. Dogs with owners who were ex/current smokers had an increased incidence of co-morbidities, (chi square test (1, N= 633) = 160.624, p=0.003), specifically aural, respiratory, and pancreatic disease and, increased incidence of allergies.

Our study found that owner health and lifestyle choices can impact on pet dog's health. Further research is needed to develop strategies to educate owners about this relationship.

References:

1. German, A., Holden, S., Wiseman-Orr, M., Reid, J., Nolan, A., Biourge, V., et al. (2012). Quality of life is reduced in obese dogs but improves after successful weight loss [Abstract]. *The Veterinary Journal, 192*(3), 428-434.
2. German, A. J. (2006). The Growing Problem of Obesity in Dogs and Cats. *The Journal of Nutrition, 136*(7), 1940-1946.

Presenting Author: Sarah Barry
Supervisor: Dr Pamela Kelly
Co-Supervisor: Dr Catherine Kelly

17. CAN THE COLLAPSE OF THE SCALP HAIR FOLLICLE PIGMENTARY UNIT WITH AGE (CANITIES) PROVIDE INSIGHTS INTO HOW MELANOCYTE DEATH COULD BE INDUCED IN MELANOMA?

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Melanoma, a potentially deadly skin cancer is increasing incidence worldwide. It develops from melanocytes located preferentially in the pigmented epidermis rather than the pigmented hair follicle(HF) epithelium.[1] In greying HFs the aging follicular melanin unit has been associated with increased melanocyte death by apoptosis perhaps triggered by uncontrolled oxidative stress(OS). Ataxia Telangiectasia Mutated(ATM) is a protein kinase that can sense DNA damage and OS, however its activation mechanisms in skin are little understood.[2] We aimed to investigate the relationship of melanocyte death (in greying HFs) and ATM sensing of OS.

Human haired scalp tissue(n=7,all male[25-73yrs,mean=46,4>40yrs]) was ethically obtained from The Charles Institute via Hair Restoration Blackrock. Tissue sections(5-10μm) were cut and a double immunohistochemistry assay was performed using a melanocyte lineage marker(Nkibeteb) and antibodies to ATM and phospho-ATM. Images were prepared using CellSense and ImageJ.

Melanocyte number decreased in greying HFs as pigmentation decreased. Nuclear ATM was expressed in the HF bulbar melanocytes and in some fibroblast cells of the dermal papilla of the HF bulb, but not in melanocytes of the more superficial and UV exposed epidermis. By contrast, phospho-ATM was expressed cytoplasmically in the keratinocytes of the epidermis and of the upper HF.

Results confirmed melanocyte depletion in human canities-affected HF and also suggested a protective role of ATM to OS in HF bulbs that retained pigmented melanocytes even at significant age. A potential melanoma intervention strategy may be to modulate ATM kinase expression in melanoma cells to make these cells more susceptible to a canities-like deletion.[1, 2]

References:

1. Bedogni B, Paus R. Hair(y) Matters in Melanoma Biology. Trends in Molecular Medicine. 2020;26(5):441-449.
2. Kozlov S, Graham M, Jakob B, Tobias F, Kijas A, Tanuji M et al. Autophosphorylation and ATM Activation. Journal of Biological Chemistry. 2010;286(11):9107-9119.

Presenting Author: Halin Buruno

Supervisor: Prof Desmond Tobin

Co-Supervisor: Dr Daniel Johnston

20. THE WATERSPORTS INCLUSION GAMES – WHAT ARE THE BENEFITS FOR VOLUNTEERS?

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The Watersports Inclusion Games is an annual event organised by Irish Sailing with partners which invites individuals of all abilities from the physical, sensory, intellectual and learning spectrums and those experiencing barriers to mainstream sport to participate in watersports activities. [1] 79 of the 2019 volunteers completed a pilot survey assessing the role of and benefits for volunteers at the event. This project aims to assess this data in the context of current knowledge of volunteers in inclusive sport.

A literature review was conducted, followed by analysis of the survey data. Literature review used the Population, Exposures and Outcomes framework in medical and psychological databases, as well as grey literature. Data was collected and initially analysed using SurveyMonkey, then exported to Excel to identify trends and explore themes, and to SPSS to compare groups.

Literature review revealed a significant gap in the literature on the benefits for volunteers in watersports inclusion in Ireland. Data analysis showed the role played by volunteers at the event, volunteers' opinions of the event, and the types and level of benefit they gained by attending the Watersports Inclusion Games.

This project demonstrates that the Watersports Inclusion Games is a positive experience for volunteers and that they derive benefit from their participation. Our data asserts that volunteerism in inclusive watersports is valuable not only because it is integral to the delivery of these events, but it is also beneficial to the volunteers themselves.

Reference:

1. Murphy J. Irish Sailing Report on Watersports Inclusion Games 2019. Irish Sailing, Sport Ireland; 2019.

Presenting Author: Aela O'Flynn

Supervisor: Dr Elizabeth Barrett

Co-Supervisor: Ms Johanne Murphy

21. TRAUMATIC BRAIN INJURY IN A RODENT MODEL INDUCES ACUTE CHANGES IN BRAIN METABOLITE LEVELS

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Non-invasive imaging, including magnetic resonance spectroscopy (MRS), is not clinically feasible immediately following mild traumatic brain injury (mTBI). Alternatively, animal models can be utilized to study the most acute brain changes following mTBI to explore the mechanisms and relevance of specific metabolite changes. The purpose of this study was to define the immediate changes in brain metabolite levels measured by MRS in a rodent model of mTBI. Twenty-seven adult male Wistar rats (control: n = 6, injury: n=21) were randomly assigned to control or injury group and scanned prior to injury (Baseline), and immediately following mTBI. MRS was acquired at 9.4 Tesla from an $8\times3\times4$ mm^3 voxel encompassing both hippocampi. Metabolites measured by MRS included N-acetyl aspartate (NAA), γ-aminobutyric acid, aspartate, choline, creatine (Cr), glutamate (Glu), glutamine, glutathione, glycine, myo-inositol, and taurine. Metabolite ratios relative to Cr were calculated and a two-way repeated measures mixed-effect model was used to analyze results between groups across time.

NAA/Cr was found to be significantly different between Control and Injury groups immediately following injury ($p = 0.021$). Additionally, a significant Time x Group interaction was found with Glu/Cr ($p = 0.0073$). Sidak's multiple comparisons test revealed increasing Glu/Cr in the controls between scans, and reduced Glu/Cr in the injury group following TBI ($p = 0.004$).Immediate changes in brain metabolite levels following mTBI may indicate altered neurotransmission (1) or neuronal integrity (2). Future studies should further probe whether detection of alterations in specific metabolic pathways could improve diagnosis and could help to develop mTBI therapeutics.

References:

1. Bittsansky M, Vybohova D, Dobrota D. Proton magnetic resonance spectroscopy and its diagnostically important metabolites in the brain. Gen Physiol Biophys. 2012;31:101–12.

2. Giza CC, Hovda DA. The New Neurometabolic Cascade of Concussion. Neurosurgery. 2014 ;75:S24–33.

Presenting Author: Amy Lynn Schranz

Supervisor: Dr Robert Bartha

23. NONALCOHOLIC STEATOHEPATITIS IN OBESITY: UPDATE ON EPIDEMIOLOGY, PATHOPHYSIOLOGY, AND PHARMACOTHERAPY

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Driven by the global rise in obesity, an estimated 25% of the worldwide population has hepatic steatosis consistent with nonalcoholic fatty liver disease (NAFLD). Of this, 20-30% will develop nonalcoholic steatohepatitis (NASH), a progressive form of NAFLD characterized by steatosis, lobular inflammation, and hepatocyte ballooning. Patients with NASH are at risk of developing cirrhosis, end-stage liver disease, and hepatocellular carcinoma. Within this review we discuss the epidemiology, pathophysiology, and phase 3 clinical trials targeting NASH.

The pathogenesis of NASH is multifactorial and complex with inter-patient heterogeneity. Central to its development is abnormal intrahepatic steatosis and toxic metabolite production, followed by oxidative stress, hepatic inflammation, and cell death. Insulin resistance, adipocyte dysfunction, and inflammasome activation contribute to disease progression and fibrogenesis.

Numerous therapeutic targets have been investigated for NASH, however there are currently no approved pharmacologic treatment options. This rapid review revealed that few large-scale phase 3 clinical trials have demonstrated long-term efficacy in NASH. Current clinical trials of obeticholic acid, resmetirom, aramchol, and cenicriviroc look promising and may be effective treatment options for NASH in the future.

This review provides an update on the epidemiology, pathophysiology, and pharmacotherapy of NASH. It has summarized the current state of knowledge and identified directions for future research.

Presenting Author: Andrew Meehan

Supervisor: Dr Fiona McGillicuddy

24. INVESTIGATING THE ATHEROPROTECTIVE ROLE OF LIPOXIN MIMETICS IN MODELS OF DIABETES: miRNA NETWORK ANALYSIS

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Increasing evidence supports the role of deficiencies in the resolution of inflammation in predisposing individuals to developing chronic inflammatory diseases, including diabetic complications such as accelerated atherosclerosis. Inflammation resolution is dynamically regulated by the production of endogenous modulators including lipoxin A4 (LXA4). To exploit the therapeutic potential of LXA4 we developed synthetic lipoxin mimetics (LXs). We have previously reported that miRNA networks are dysregulated in atherosclerosis, and LXs can modulate target gene expression by regulating miRNA networks. This study aims to discover and analyse the specific miRNA networks involved in atherosclerosis development, and in response to LXs.

We performed a meta-analysis of published human atherosclerotic transcriptome datasets and extracted statistically significant differentially expressed genes (False-discovery rate $p < 0.05$). LX-stimulated diabetic ApoE-/- mouse aorta and human carotid plaque gene expression datasets were previously generated at UCD in collaboration with St. Vincent's University Hospital [1]. miRNA network enrichment analysis was performed using MirNET 2.0 software (https://www.mirnet.ca/miRNet/home.xhtml). To translate our findings, we propose to use a human carotid plaque tissue ex vivo assay to determine the effects of candidate miRNA on gene expression in clinical samples.

miRNA network enrichment analysis of human atherosclerosis transcriptome datasets predicts an important role for multiple miRNAs in disease (e.g. let-7b, miR-27 and miR124). Analysis of miRNA networks enriched by LXs identified modulation of multiple miRNAs, including let-7 family members.

Characterising miRNA networks involved in atherosclerosis enables new medical advances, including miRNA biomarkers for atherosclerosis, miRNA's as therapeutic targets and delivering miRNA's modified by molecular techniques as standalone therapeutics.

Reference:

1. Brennan EP, Mohan M, McClelland A, et al. Lipoxins Protect Against Inflammation in Diabetes-Associated Atherosclerosis. *Diabetes*. 2018;67(12):2657-2667.

Presenting Author: Gavin McDaid

Supervisors: Prof Catherine Godson

Co-Supervisor: Dr Eoin Brennan

25. PAIN DETECTIVES: OPTIMIZING THE MANAGEMENT OF PAIN AND IRRITABILITY IN CHILDREN WITH SEVERE NEUROLOGICAL IMPAIRMENT

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Children with severe neurological impairment (SNI) are amongst the most vulnerable patients seen by clinicians. Children with SNI are typically non-verbal, non-mobile and cognitively impaired[1]. Many of these children experience pain or demonstrate irritability on a daily basis[2]. The source of this discomfort is difficult to identify when these children are unable to communicate. We describe this as Pain and Irritability of Unknown Origin (PIUO).

Lack of a standardized approach to investigating and managing PIUO may lead to persistent pain and suffering in this population. To address this, our team developed a systematic approach termed the PIUO Pathway that incorporates structured history-taking, physical examination, screening investigations for known and occult sources of pain, and pharmacological interventions. The goal is to efficiently assess treatable causes of nociceptive-inflammatory pain.

We used a waitlist-controlled randomized trial to test the efficacy of the PIUO Pathway. Participants were randomized to PIUO Pathway or waitlist (standard care) arms. The Pathway was deemed a success if pain was identified or if a participant was pain-free/had low pain on two consecutive visits.

Preliminary results are promising. 20 children have completed the PIUO Pathway. Four participants have had their source of pain identified. Seven have had their PIUO resolved. Recruiting will continue until 120 participants have completed the Pathway. Children in whom a source of pain remains unidentified or who continue to have pain will be eligible for our next trial, which is a prospective N-of-1 trial investigating the efficacy of gabapentin in treating PIUO in children with SNI.

References:

1. Siden HB, Carleton BC, Oberlander TF. Physician variability in treating pain and irritability of unknown origin in children with severe neurological impairment. Pain Res Manag J Can Pain Soc J Société Can Pour Trait Douleur. 2013;18(5):243-248.

2. Ståhle-Öberg L, Fjellman-Wiklund A. Parents' experience of pain in children with cerebral palsy and multiple disabilities – An interview study. Adv Physiother. 2009;11(3):137-144. doi: 10.1080/14038190902906318.

Presenting Author: Katherine Ketchum

Supervisor: Dr Hal Siden

27. TRANSFORMING THE ASSESSMENT OF CARDIAC FIBROSIS IN PATIENTS WITH ATRIAL FIBRILLATION

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Atrial fibrillation (AF) is the most common heart rhythm disturbance in clinical practice and will affect approximately 17.9 million people in Europe by 2060 (1). Cardiac fibrosis (scar) is critical for the initiation and propagation of AF and may be a therapeutic target for patients undergoing treatment with catheter ablation.

During this procedure, the gold standard for detecting scar involves evaluating the size and distribution of electrical signals (bipolar mapping). However, the direction of electrical conduction varies with each heart beat (2) while other imaging modalities (cardiac magnetic resonance imaging and computed tomography) are unable to accurately detect scar in the atria. We have developed a novel technique, termed omnipolar (OM) mapping, which overcomes existing limitations by standardizing electrical recordings irrespective of the direction of conduction.

All patients (N=29) undergoing catheter ablation for AF underwent high-definition cardiac mapping of the left atrium (LA) pre- and post-procedure. Clinical maps were generated using bipolar and OM mapping techniques and subsequently compared using the Precision research application software. Overall, the mean age was 64±8.6 years (60% female) and the most prevalent comorbidity at baseline was hypertension (38%). OM mapping significantly improved the detection of fibrous tissue by recording a greater number of electrical points (0.7; 95% CI, 0.66 to 0.77; p<0.0001) and a higher amplitude of signals. (1.21; 95% CI, 1.01-1.41; p<0.0001) when compared to bipolar mapping.

This technique will contribute to our understanding of the mechanisms underlying AF and may substantially improve the overall success of this treatment strategy.

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2. Haldar SK, Magtibay K, Porta-Sanchez A, Massé S, Mitsakakis N, Lai PFH, et al. Resolving Bipolar Electrogram Voltages During Atrial Fibrillation Using Omnipolar Mapping. Circ Arrhythm Electrophysiol. 2017 Sep;10(9).

Presenting Author: Kathryn L Hong

Supervisor: Dr Benedict M Glover

28. CHARACTERIZATION OF A RECOMBINANT ACID PHOSPHATASE FROM *ACINETOBACTER BAUMANNI*

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Genomic sequence analysis of *Acinetobacter baumannii* revealed the presence of a putative Acid Phosphatase (EC 3.1.3.2)[14,15]. Using recombinant protein, the goal of this work was to establish properties of this enzyme. PAGE analysis under reducing and denaturing conditions revealed the presence of near homogeneous band migrating as a species of approximately 35 kDa. Proteomic analysis of the 35 kDa band supports the Acid Phosphatase of *A. baumannii* as being a nonspecific/bacterial Acid Phosphatase, and member of the -DDDD Super Family. Zymogram-PAGE analysis run under native conditions revealed the presence of a single band of enzyme activity migrating as a species of approximately 80 kDa suggesting the catalytic active form of the enzyme is that of a dimer. Optimal hydrogen ion concentration for hydrolysis of paranitrophenyl phosphate (PNPP) was observed at pH 6.0. No sensitivity to Cysteamine S-phosphate, a classical inhibitor of Alkaline Phosphatase was observed supporting the assignment as an Acid Phosphatase. Kinetic analysis revealed high affinity for PNPP (K_m = 135 μM) with V_{max} and k_2 values of 24,800 nmoles/min/mg protein and 7500 min^{-1}, respectively. Sensitivity to a variety of reagents, *i.e.*, detergents, reducing, and chelating agents as well as classic acid phosphatase inhibitors was examined in addition to assessment of hydrolysis of phosphorylated compounds. Although the enzyme hydrolyzes to some extent a variety of phosphorylated compounds inclusive of peptides, the physiological function remains to be elucidated.

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Presenting Author: Douglas Smith

Supervisor: Dr James Chambers

29. THE DOMINO EFFECT WITHIN IRISH OBSTETRICS AND GYNAECOLOGY: WAS THERE AN EFFECT AFTER CERVICAL CHECK

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Clinical adverse events (CAEs) trigger a domino that can affect multiple groups. This study explored the impact of CAEs on Obstetricians and Gynaecologists working in the Republic of Ireland. We examined the effect of CAEs on clinicians involved in patient care following the Cervical Check Audit. The quality of support resources was investigated, along with clinicians' attitudes towards reporting CAEs.

A cross-sectional study was conducted using the Domino Effect survey, which consisted of the Reporting of Clinical Adverse Events Scale (RoCAES) and the Second Victim Experience Support Tool (SVEST). The data were analysed using descriptive statistics.

The survey was completed by 30 Obstetricians and Gynaecologists. Following a CAE, 80.6% of participants experienced psychological distress, over half (59.2%) experienced physical distress, 58.4% reported a reduction in professional self-efficacy, while 66.4% reported increased resilience. These results are significantly higher than in similar international studies. Clinicians involved in patient care following the Cervical Check Audit reported similar levels of distress to those who were not involved, however they were less satisfied with the organisational support received. Peer support was the most desired form of support in the aftermath of a CAE, followed by supervisor support. Of the 28 participants who had reported a CAE, 26 were likely to report future CAEs. Associated blame and lack of clarity in reporting procedures negatively influenced clinicians' likelihood to report CAEs.

CAEs significantly affect Obstetricians and Gynaecologists. Involvement in care following the Cervical Check Audit did not exacerbate these effects, however reported distress is still concerningly high.

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1. Burlison JD, Scott SD, Browne EK, Thompson SG, Hoffman JM. The Second Victim Experience and Support Tool: Validation of an Organizational Resource for Assessing Second Victim Effects and the Quality of Support Resources. J Patient Saf. 2017;13(2):93-102.

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Presenting Author: Aisling McEnteggart

Supervisor: Dr Mary Higgins

Co-Supervisor: Dr Brendan Dempsey

30. A PHYSIOLOGICAL STUDY ON BITTER SENSATION TO THE DISTAL SMALL INTESTINE

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Glucagon-like peptide 1 (GLP-1) is a critical incretin and satiety hormone released in the distal small intestine (DSI). GLP-1 is therefore an important target in the treatment of diseases such as diabetes and obesity. Evidence has shown that the DSI can detect its intraluminal contents much like in the oral cavity.(1) Specifically, preclinical models support a functional link between bitter taste receptors (BTRs) in the DSI and the release of GLP-1.(2)

The aim of this research was to investigate if encapsulation of cannabidiol (CBD), an intensely bitter compound, allows for it to reach the distal small intestine undigested.

Healthy participants visited the site on two separate occasions. During one visit, each participant received 10g of microcapsule powder containing CBD oil with 300ml of water and 30ml of *mi wadi* orange concentrate, and the microcapsule powder without the oil on another visit. A baseline blood sample was drawn from each subject prior to consumption of the drink. Blood was then collected every 30 minutes for 4 hours.

6 participants, aged 28.2±9.5 years were studied. CBD plasma concentrations (0.3424 as per AOAC SMPR® 2017.001) only appeared at 120 minutes, with higher concentrations seen 180 minutes.

Microencapsulation of CBD oil delays its absorption into the bloodstream. This suggests that the CBD oil reaches the DSI intact and therefore the intensely bitter sensation it holds is available to BTRs in the lumen of the DSI. Further analysis is required to determine if GLP-1 is released in correlation with CBD oil presence in the DSI.

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2. Kim KS, Egan JM, Jang HJ. Denatonium induces secretion of glucagon-like peptide-1 through activation of bitter taste receptor pathways. Diabetologia. 2014;57(10):2117-25.

Presenting Author: Nicholas Stratford

Supervisor: Prof Carel le Roux

Co-Supervisors: Mr Camilo Menezes-Mendes, Dr Babak Dehestani

31. OUTBREAKS OF INFECTIOUS DISEASE IN DESIGNATED CENTRES FOR OLDER PERSONS AND PEOPLE WITH DISABILITIES; A MIXED METHODS STUDY USING IRISH DATA COLLECTED BY THE HEALTH INFORMATION AND QUALITY AUTHORITY (HIQA)

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Residential care facilities (RCFs) for older persons and people with disabilities in Ireland are required to report outbreaks of infectious diseases, to HIQA. Review of these notifications can identify determinants of infectious disease outbreaks and inform good practice within services, policy, and practice to help limit spread of infectious disease in RCFs in Ireland.

Using 2014-2019 data, we undertook a mixed method study [1], to extract data from notifications of infectious disease outbreaks in RCFs in Ireland. We examined the differences in number of notifications by centre type, location, calendar month and pathogen. We undertook a thematic analysis of notifications to extract good practice undertaken by services when dealing with an outbreak.

The proportion of notifications of outbreaks from centres for people with disabilities and older people was 69.52% and 30.48% respectively. More than a third of notifications were from Dublin (20.52%) and Cork (14.96%). More notifications were reported in November through April in comparison with the other months. The majority (79.40%) of notifications concerned norovirus (36.21%), influenza (33.89%) and clostridioides difficile (9.30%). Good practice identified included: cohorting staff, exclusion of confirmed/suspected staff cases, use of PPE in interacting with residents in affected areas, close monitoring of affected residents for nutrition, hydration, new symptoms and medications, cancellation of social activities and visits (except palliative care scenarios), sending suspected case samples for laboratory confirmation, informing next-of-kin, providing signage on hygiene measures and staff training, vaccinating staff for influenza.

These findings can inform management of outbreaks of infectious disease in RCFs.

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1. Shorten A, Smith, J. Mixed methods research: expanding the evidence base. Evidence-based nursing. 2017,vol.20(3):74–75.

Presenting Author: Manaswee Dwivedi
Supervisor: Dr Laura O'Connor
Co-Supervisor: Ms Stephanie O'Regan

32. WEIGHT CHANGES FOLLOWING SWITCH TO DOLUTEGRAVIR-BASED REGIMENS IN IDU AND NON-IDU PATIENTS WITHIN THE UCD ID COHORT

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Though modern anti-retroviral therapies (ART) are effective, durable, and tolerable, recent studies have shown a trend of weight gain in people with HIV (PWH) using second-generation Integrase Strand Transfer Inhibitors (INSTI), such as dolutegravir (DTG) [1]. This trend is not well-studied in IV drug users (IDU), who represent a large subgroup of PWH populations, who are underrepresented in clinical trials and observational studies, and who have lower average body weights compared to non-IDU PWH [2].

The aim of this study was to compare weight changes between IDU and non-IDU HIV patients within the UCD ID cohort following a switch to dolutegravir-based regimens. Understanding differences in weight changes between these subpopulations could help identify patients at risk for clinically significant weight gain and its associated complications, including cardiovascular and metabolic diseases.

Retrospective analysis of 71 patients (41 IDU, 30 non-IDU) showed a 3.28kg (5%) average weight gain for non-IDU and a 3.56kg (6%) average weight gain for IDU over 48 weeks following a switch to DTG. Mann-Whitney U testing showed no significant difference in mean absolute weight changes (p=0.7755) or percentage weight changes (p=0.843) between the two groups over 48 weeks.

These results indicate that IV drug use is not a significant factor associated with weight change in PWH switching to dolutegravir-based ART regimens. However, the limited sample size and data availability could support the pursuit of future prospective studies.

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Presenting Author: Cole Hendrickson
Supervisor: Dr Stefano Savinelli
Co-Supervisor: Prof Patrick Mallon

33. DIFFERENTIAL (PHOSPHO-) PROTEOMICS TO STUDY THE MECHANISM-OF-ACTION OF DIPHENYLENEIODONIUM CHLORIDE (DPI) IN MYCN-AMPLIFIED NEUROBLASTOMA

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Neuroblastoma (NB) is responsible for 15% of paediatric cancer deaths and is the most common extracranial solid tumour in children under five.1,2 MYCN-amplification is found in ~25% of cases and is associated with poor prognosis.2 Diphenyleneiodonium chloride (DPI) has been shown to downregulate expression of MYCN in NB cells, induce apoptosis and reduce tumour size in vivo.1 This study aimed to investigate the mechanism of action of DPI in a MYCN-amplified NB cell line.

Label-free quantitative proteomics and phosphoproteomics (LC-MS/MS) experiments were performed on DPI-treated (0, 1h or 24h) BE(2)-C human neuroblastoma cells. Following MaxQuant analysis, Perseus software was used to identify differentially expressed and phosphorylated proteins. Further bioinformatic enrichments were performed using Cytoscape and STRING for network visualization, Reactome for pathway analysis and Enrichr for gene enrichment.

647 proteins were upregulated, and 2277 proteins were down-regulated following DPI treatment. Analysis of differentially phosphorylated proteins highlighted pathways activated in DPI-treated cells. Combined analysis of the total and phosphoproteomics data showed that differentiation is among the most altered biological processes. Four of the Eight upregulated proteins showing the highest degree of dephosphorylation regulate differentiation. These proteins include the neurofilament medium polypeptide (NEFM) and chromobox protein homolog 3 (CBX3) but also more ubiquitous proteins such as stathmin 1 (STMN1) and tumor protein D54 (TPD52L2). Retinoic acid, a therapy for high-risk NB, also activates NEFM.

These finding may explain how DPI induces differentiation of MYCN-amplified NB cells. Further studies are required before integrating DPI into the therapeutic regimen for high-risk MYCN-amplified NB.

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diphenyleneiodonium chloride (DPI) in aggressive neuroblastoma is regulated by MYCN. ESMO Open. 2018;3(Suppl 2) A203.

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Presenting: Author: Michael Regan

Supervisor: Dr Melinda Halasz

34. ANALYSIS OF STROMAL FEATURES PREDICTIVE OF IMMUNOTHERAPY RESPONSE IN HEAD AND NECK TUMOUR PATIENTS: SETTING UP A FRAMEWORK FOR AUTOMATIC ANALYSIS OF DIGITALIZED HES-STAINED TUMOURS

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Head and Neck Squamous cell carcinomas (HNSCCs) collectively represent a particularly aggressive and genetically complex group of cancers with an immunosuppressive phenotype. Certain components of the Extracellular Matrix (ECM) upregulated in HNSCC, including "oncofetal" Fibronectin and Tenascin-C, exert an immunomodulatory function that contributes to disease progression and likely to the high rate of resistance to immunotherapy (80%) seen in patients. The host team is involved in a clinical trial-associated translational research project in which one task is aimed at developing machine learning-based tools to identify features of the stromal ECM in Hematoxylin-Eosin-Saffron (HES)-stained sections of HNSCC that help predict response to immunotherapy.

The specific goal of the SSRA project was to perform a literature search and critically analyse studies in which machine learning methodologies have been applied to digitalized whole slide images (WSI) of histologically-stained tumour sections.

A broad literature review was performed on immunotherapy in HNSCC, the neoplastic ECM and Digital Pathology. Thereafter, a more focused search for recent publications describing Digital Pathology workflows to analyse stromal features in WSI of human tumour tissue was carried out. This search showed that only few studies have developed AI-based methods for stromal analysis. Results from critical reviews of these articles were presented in the form of a written report. Information relevant to the automated analyses was laid out in the form of a table.

This study has helped to optimise the pipeline for automatic analysis of ECM-related features of head and neck tumours that may be predictive of treatment response.

Presenting Author: Michael Boland

Supervisor: Dr Ellen Van Obberghen-Schilling

38. PROMOTING GENERAL PRACTICE & FAMILY MEDICINE CAREER INTENTIONS: A SCOPING REVIEW

Geszczak G[1], McCombe G[1], Carberry C[1], Donnelly S[1], Harkin P[1], O'Neill D[1,2], Cullen W[1]

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During a time when health systems need to increase the number of students choosing a career in general practice, the specialty often remains an unpopular choice. To promote the general practice specialty medical schools have begun various interventions. This scoping review hopes to examine the current interventions and experiences which may successfully increase the number of family physicians graduating from medical school.

Online databases were searched using pre-determined search terms. The six-stage scoping review framework by Arksey and O'Malley was utilized.(1)

Thirty-one studies were ultimately included in the review. The methodology most commonly used was cross-sectional studies. Curriculum initiatives that were reported included: providing higher quality and longer clinical placements, implementation of changes to the pre-clinical curriculum (e.g.: electives, tutorials and care courses), extra-curricular activities (e.g.: student run clinics and family medicine interest groups) and positive experiences with preceptors in both university teaching and during clinical placements. The negative effects of the 'hidden curriculum' on students' preferences to pursue a career in the specialty were commonly identified.

While our findings suggest that there are several initiatives medical schools can employ to encourage students to choose general practice as their career choice, there remains little evidence on the effectiveness and further studies, especially longitudinal surveys, are needed.

Reference:

1. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. International journal of social research methodology. 2005;8(1):19-32.

Presenting Author: Marta Geszczak

Supervisor: Dr Geoff McCombe

Co-Supervisor: Prof Walter Cullen

39. PRIORITIES IN INTEGRATED CARE: A SCOPING REVIEW

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Fragmentation is a feature of many healthcare systems and can lead to adverse effects on the quality of care and health outcomes. Further, as evidenced during the COVID-19 pandemic, these issues are amplified when populations and their healthcare demands increase. It is commonly believed that an integrated care approach may solve many of the problems associated with fragmented healthcare systems. However, despite integrated care's growing popularity, it's priorities are unclear.

A scoping review was conducted using Arksey and O'Malley's 2005 six-stage framework to examine the literature and to determine priority areas when developing and implementing integrated care models. Twenty-one papers were selected for review. The studies spanned numerous geographical locations, encompassing several study designs, and a range of populations and sample sizes. Integrated care priorities were identified qualitatively using a thematic analysis approach.

Overall, the findings show that while no one integrated care model fits all health systems, four priority areas should be considered when designing and implementing policy and care models. These areas are (i) communication, (ii) coordination, collaboration, and cooperation, (iii) responsibility and accountability, and (iv) a population approach. Multiple

elements were also identified within these themes, all of which are required to ensure successful and sustained integration. These elements included education, efficiency, patient centredness, safety, trust, and time.

The identified priority areas should guide policy makers when planning and implementing future integrated care models. Meanwhile, future research should evaluate the implementation of these priorities in integrated healthcare settings.

Presenting Author: Corey Burke

Supervisor: Prof Walter Cullen

Co-Supervisor: Mr John Broughan

40. INTEGRATED CARE-BASED INTERVENTIONS TO ENHANCE TREATMENT OF ACUTE KIDNEY INJURY: A SCOPING REVIEW

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The growing burden of Acute Kidney Injury (AKI) and its consequences has increased the need to improve the quality of care for patients with occurrences of AKI. Generally, it considered that patients with AKI are the charge of nephrologists in secondary care settings. However, general practitioners represent the front line in understanding the implication of the early stages of the condition in primary care[1]. This scoping review aimed to examine whether specific interventions have improved outcomes for patients with AKI that are currently managed across the primary and secondary care interface.

The scoping review framework comprised a six-stage process developed by Arksey and O'Malley[2]. The search process was guided by the 'Preferred Reporting Items for Systematic Reviews and Meta-Analyses' (PRISMA).

Twenty-six studies included in the review. The population targeted in the studies included the community-acquired (i.e. AKI arising in primary care) or hospital-acquired (i.e. AKI occurring in secondary care). Results indicated that AKI and CKD are not being managed effectively in primary care. Although interventions involving e-alerts,'sick day guidance' cards, AKI-care bundle and education have shown some efficacy, their use as standalone interventions in both primary and secondary care are insufficient. There is evidence that primary care-based interventions for the detection, management and treatment of AKI have the potential to improve outcomes.

The findings of this review showed that although there have been positive changes in the detection, management and treatment of AKI in recent years, most of the likely changes have been in the secondary healthcare system. Our findings demonstrate the necessity of implementing transformations in the management of AKI both in primary and secondary care settings and across the interface of both.

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2. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. International Journal of Social Research Methodology. 2005;8(1):19-32.

Presenting Author: Amirah Alzaki

Supervisor: Dr Geoff McCombe

Co-Supervisor: Prof Walter Cullen

41. INTEGRATING GENOMICS INTO PRIMARY CARE: A SCOPING REVIEW ON THE ROLE OF EDUCATIONAL INTERVENTIONS

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The rapidly evolving field of genomics and the increased availability of genomic testing has increased the expectations of general practitioners' ability to address genomic testing, implications of results and disease management with patients. Most general practitioner's genetic knowledge is limited to the outdated education from medical school and thus lack of genetic education acts as a significant barrier for integration. This scoping review seeks to address the role of educational interventions in supporting the integration of genomics into primary care by identifying the current educational interventions and how they have been evaluated.

The aim of this scoping review was to examine "the role of education interventions in integrating genomics into primary care".

Three electronic databases were searched using the six-stage scoping review framework developed by Arksey and O'Malley[1].

Seven studies were included in the review, mainly randomized controlled trials. The studies reported changes in general practitioner's level of genetic knowledge, confidence and clinical practice behaviour. An emphasis on easily accessible and continuous genetic resources was recognized as a key factor in the implementation of genomics into primary care setting[2].

Our findings show that for the genomics to be more frequently integrated into primary care, general practitioners need to be provided with adequate easily accessible knowledge and supportive resources. Current literature shows promising benefits from the educational interventions; however, more evidence is needed to identify the most effective, beneficial mode of educational intervention that would guarantee smooth and long-term integration of genomics into primary care.

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Presenting Author: Lemia Ismael

Supervisor: Dr Geoff McCombe

Co-supervisor: Prof Walter Cullen

42. EDUCATIONAL INTERVENTIONS PROMOTING PATIENT SAFETY IN TRANSITIONAL CARE: A SCOPING REVIEW

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Care transitions between healthcare settings have been consistently identified as having poor implications for patient safety and quality of care. In recent years, there have been increasing numbers of attempts to reconcile these issues through the development of different interventions. Recently, our eyes have turned towards education as the resources available for practitioners has grown.

This review aims to map key concepts that underpin the current research into educational interventions in improving care transitions and to inform future research in the area. It focuses on interventions directed at transitions between healthcare settings, as opposed to in-patient to in-patient 'handoffs'. A scoping review methodology was chosen. Databases were searched based on the terms 'transitional care', 'education' and 'doctor'. Two reviewers independently reviewed the literature and extracted articles relevant to the inclusion criteria.

21 articles were selected for the purpose of the review, the majority originating in the USA. Interventions employed were diverse in nature, using a combination of classroom-based, online, and task-based elements to teach learners. No interventions were designed for GPs and hospital consultants. Numerous limitations permeated each study, with most being designed with the aim of minimising use of resources. Most notably, many of the results lacked significance, usually due to low participation and response rates.

This review found that educational interventions have a positive impact on transitions of care processes. There is a need for a better theoretical framework to guide the innovation of a transitional care curriculum in the future.

Presenting Author: Thomas Deane

Supervisor: Prof Walter Cullen

Co-supervisor: Dr John Broughan

44. DUX4C OVEREXPRESSION INDUCES AN FSHD PHENOTYPE IN MOUSE MUSCLE THROUGH UPREGULATION OF APOPTOTIC PATHWAYS

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Facioscapulohumeral muscular dystrophy (FSHD) is a genetic neuromuscular disease caused by loss of repression of the *D4Z4* repeat array at 4q35. Each D4Z4 repeat contains an open reading frame encoding DUX4[1], a transcription factor with two n-terminal homeodomains and a c-terminal transcriptional activation domain. *DUX4C* is a truncated and inverted D4Z4 element located proximal to the *D4Z4* repeat array encoding a protein that is identical to DUX4 but lacks the c-terminal 82 amino acids. When expressed, DUX4C inhibits myoblast differentiation and downregulates myogenic regulators *MyoD* and *Myf5*, suggesting a role in FSHD[2]. We aim to identify the potential role of DUX4C in FSHD using bioinformatics analysis of muscle from mice with a muscle-specific doxycycline-inducible *DUX4C* gene.

RNA-seq data was obtained from mouse muscle after two weeks of doxycycline (controls lacked either the muscle-specific rtTA or the *iDUX4C* transgene). A list of differentially expressed genes (DEGs) was compiled and analyzed in R using the Bioconductor suite. Analyses included heatmapping, KEGG analysis, Venn Diagram comparison with DUX4 DEGs, and direct comparison of expression between groups for known DUX4 target genes.

Overexpression of DUX4C significantly dysregulates numerous genes involved in metabolism, cell cycle regulation, apoptosis, and myogenic differentiation. When compared with DUX4 overexpression, there were 661 DEGs shared, and 2,678 genes uniquely affected by DUX4C. These genes contribute to several pathways involving disruptions in Ca^{2+} homeostasis, oxidative stress, and apoptosis.

DUX4C may induce pathology through unique pathways when overexpressed in muscle. These results indicate a potential independent role for DUX4C in FSHD pathology.

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Presenting Author: Carter Bagley

Supervisor: Dr Michael Kyba

45. ENHANCING ANTI-TUMOR IMMUNOTHERAPY BY TARGETING THE AMINO ACID TRANSPORTERS SLC1A5 AND SLC3A2/SLC7A5

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Cancer cells excel in nutrients uptake and release immunosuppressive metabolites creating a nutrient-depleted tumor microenvironment (TME) hostile to cytotoxic immune cells. Since robust immune cell metabolism is required for optimal anti-tumor effector function, the TME results in defects in immune invasion and destruction of tumors. The amino acid transporters, SLC1A5, SLC3A2, and SLC7A5, are required for efficient uptake of essential amino acids and immune cell metabolism. In addition, the transporters can activate mTORC1, a metabolic regulator that promotes cell metabolism, and the expression of c-Myc, essential for cell proliferation. Over the course of the project, I reviewed the regulatory pathways of these amino acid transporters.

After a comprehensive literature review, where I analyzed existing prominent studies and recent discoveries, I proposed potential strategies to enhance the metabolic fitness of immune cells through the upregulation of nutrient transporters and thereby strengthen anti-tumor immunotherapy.

One potential strategy is to stimulate the cells to upregulate transporters using cytokines, specifically IL-15, IL-12 or IL-18, or to genetically engineer NK/T cells to overexpress these transporters. Another strategy is to overexpress specific proteins that increase the expression of SLCs and knockdown genes that decrease the expression of SLCs.

Our identified strategies on enhancing metabolism in immune cells could lead to developments in the field. In particular, the promising CAR-T/NK cells therapies, which enhance tumor recognition is often metabolically disadvantaged in the TME. Upregulation of SLC transporters in

CAR-T/NK cells using the proposed tactics could increase their effectiveness leading to better prognoses in patients.

Presenting Author: Marianna Nachef

Supervisor: Dr Seung-Hwan Lee

46. NETWORK ANALYSIS OF SIMVASTATIN TARGETS ON VASCULAR SMOOTH MUSCLE CELLS AND MYELOID CELLS

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Simvastatin, a widely used lipid-lowering prodrug, confers beneficial effects on the cardiovascular system by multiple pharmacological mechanisms.[1] Recently, patrolling CX3CR1+ myeloid cells in blood vessels are reported to influence vascular smooth muscle cells (VSMC) physiology.[2] However, simvastatin influences on VSMC in the presence of myeloid cells (MC) remain unknown. By using in-silico and pharmacoinformatic approach, this project aimed to a) identify and study simvastatin targets expressed on both VSMC and MC and b) validate the targets similarities between the two cellular lines in order to predict the potential phenotypic effects of simvastatin.

Five protocols were followed:

1. Simvastatin targets on VSMC and MC were identified by literature review.
2. The targets were profiled based on their tissue-specific distribution/localisation.
3. The expression profile of the targets on VSMC and MC was quantitated.
4. A homology modelling of each target was performed.
5. Network proteins of the targets and their functions were identified.

The results confirm the diversity of molecules influenced by simvastatin, which can be targeted pharmaceutically. The data analysis outcomes validate the close resemblance of targets found on both VSMC and MC - mainly functionally. Furthermore, all the shared targets downregulated by simvastatin are of pro-inflammatory nature. Hence, this might indicate the possible inhibitory effects of simvastatin on the inflamed vascular microenvironment, which in turn is augmented by reversing the pro-inflammatory myeloid cells phenotype.

Nevertheless, this research had been limited to the computational approaches due to the lab-access restriction under COVID-19 circumstances. Thereby, further functional analysis of simvastatin targets is required.

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Presenting Author: AL-Shaima Abdullah Masoud Ali AL-Kabi

Supervisor: Dr Arun Kumar

48. HOW TO STREAMLINE DELIVERY OF PLASTIC SURGERY TRAUMA SERVICES: A QUALITY IMPROVEMENT INITIATIVE

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In Feb 2018, the Trauma Steering Committee published 'A Trauma System For Ireland' report, which highlighted for the first time the need for structured, timely trauma-care in Ireland in line with international standards. Multiple studies have shown that a formal trauma system is associated with a reduction in death rates and disability, and the improvement patient outcomes. Evidence-based and informed by population needs, this report posits a streamlined trauma-care pathway. At St Vincent's University Hospital, there has been a 50% increase in hand trauma demand over the past 5 years with no increase in staffing or infrastructure to allow a streamlined delivery of care. The aim of this retrospective data collection and analysis was to determine (a) the total number of hand trauma patients seen by the clinic on a daily, weekly and monthly basis, and (b) the source of referrals for these patients, within the hospital group. The audit basis was to report and analyse the increase in total number of hand trauma patients attending the Hand Clinic, as well as the increase in referrals from regional hospitals. A formal quality improvement initiative was followed using the HSE 'Framework for Improving Quality' as a guide. This involved data collection from the ED Hand Clinic Appointment Book 2019, which was analysed using Microsoft Excel version-16.0. This data was incorporated into the HSE's measurement for quality run charts template to exhibit the total patient attendance, as well as source of referral.

Table 1.0: ED Hand Clinic Appointment Book 2019

	Wed	Thurs	Total
2019 Total Patients	226	522	748
2019 Average Monthly Patients	19	44	58

The data from this audit will allow the Plastics' department to restructure their services to meet patient's needs, increase staffing levels and improve patient management.

References:

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Orthopaedic Surgery. Available: https://www.hse.ie/eng/services/publications/clinical-strategy-and-programmes/national-model-of-care-for-trauma-and-orthopaedic-surgery-2015.pdf

Presenting Author: Elaine Joy

Supervisor: Ms Roisin Dolan

51. INTERVENTIONS TO OPTIMISE MENTAL HEALTH OUTCOMES DURING THE COVID-19 PANDEMIC: A SCOPING REVIEW

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With adverse mental health outcomes widely accepted as a major consequence of the COVID-19 pandemic, identifying interventions that best address this issue is a priority. In this scoping review, we aim to examine the current evidence for interventions to enhance mental health outcomes and wellbeing among populations affected by the Covid-19 pandemic.

Four electronic databases (MEDLINE, PsycINFO, Embase, and CINAHL) were searched using pre-determined search strategies in addition to hand-searching, following the six-staged scoping review process developed by Arskey and O'Malley.

Twenty studies were included in the review. The scoping review included any intervention that informed suggestions or treatment of mental health concerns during Covid-19. Interventions were broadly classified into a) those focused on prevention of poor mental health, b) therapeutic interventions (treatment), and c) other interventions including legislation and health system interventions. The majority of papers outlined key factors or strategies for prevention of poor mental health (n=16), while few others discussed potential approaches to treatment in individuals with poor mental health (n=7). Preventative strategies included: public health education, modified social media use (connecting with people, rather than obtaining health information), technology-based interventions, physical activity, policy adaptations, and therapeutic interventions. Treatment strategies included: adapting existing treatment and the creation new treatment programs and platforms.

Current interventions are promising; however, evidence is not yet strong enough to claim causal relationships between interventions and improved mental health outcomes. Future research should focus on novel effective interventions to address mental health issues during the pandemic.

Acknowledgment:

Presenting Author: Jacqueline Safieh

Supervisor: Dr Geoff McCombe

57. IN POPULATIONS WHO USE HYDROXYCHLOROQUINE AND CHLOROQUINE WHAT IS THE PREVALENCE AND RISK OF ADVERSE EFFECTS SUCH AS RETINOPATHIES. A SYSTEMATIC REVIEW

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Hydroxychloroquine (HQ) and Chloroquine (CQ), 4-aminoquinoline derivatives, are used to treat malaria and autoimmune disorders such as rheumatic arthritis, systemic lupus erythematosus and juvenile idiopathic arthritis. HQ and CQ have been reported to cause retinal adverse effects.

The purpose of this systematic review was to assess the prevalence of retinal adverse effects in those who take HQ or CQ. A systematic search was performed using databases Medline (Pubmed), Embase, Cochrane and ClinicalTrials.gov (June-July 2020). Searches were conducted to exclude Covid-19 and review articles. Covidence was used to screen results. 43 studies were finally selected for data extraction.

Of the 43 studies, 27 identified retinal toxicity caused by HQ or CQ. The results indicate that use of HCQ or CQ for a duration greater than five years increases the risk of developing retinal toxicity. Duration of use, cumulative dose and real body weight adjusted daily dose increase the risk of developing a HQ or CQ induced retinal adverse event (1). Ocular toxicity caused by short term HQ use has been detected by optical coherence tomography and mfERG, methods to evaluate retinal histology and retinal function, respectively. 16 of the 43 studies indicated that risk of retinal toxicity decreases when duration of treatment is less than 6 years no matter the daily dose or cumulative dose (2).

In conclusion, care, particularly around accurate dosing and treatment length, should be taken when prescribing HQ or CQ for long term use and routine screening should be encouraged.

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Presenting Author: Susan Obaseki

Supervisor: Dr Alison Reynolds

58. DO DOGS GET OSTEOPOROSIS? A STUDY OF CT IMAGES OF THE CANINE PELVIS

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Osteoporosis is a disorder of the skeleton characterized by bone loss and reduced bone density, which leads to an increased risk of fractures of the hip, vertebrae and limbs. It is a significant problem in older women where decreased levels of oestrogen are linked to bone loss and increased porosity of bone. Considerable research has been conducted on whether

animal models are suitable for research on the development and progress of osteoporosis.

CT images of dogs (n=14) were used to select suitable DICOM data for analysis by RadiAnt DICOM viewer (Medixant, Poland). With ImageJ (NIH) software, the depth of cortical bone, percentage of cortical bone and bone marrow area were measured in several regions (distal femur; proximal femur; sacrum) in addition to calculating the muscle mass around the hip joint. All data were statistically analysed.

Reference:

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Presenting Author: Han Zhang

Supervisor: Mr David Kilroy

Co-Supervisor: Dr Arun Kumar

59. UNDER-REPRESENTATION OF WOMEN IN LIPID MANAGEMENT CLINICAL TRIALS – IMPLICATION FOR CARDIOVASCULAR DISEASE MANAGEMENT

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Cardiovascular disease (CVD) is a well-documented co-morbidity of type 2 diabetes mellitus (T2DM). Risk factors for CVD include obesity and dyslipidemia. These are common in patients with T2DM. Amongst patients with T2DM, women display greater instance of co-morbid CVD.[1] We examined the literature, focusing on lipoprotein and lipid-modifying drugs, with a view to understanding this disparity.

Through undertaking a literature rapid review we explored relevant clinical trials for factors contributing to sexual dimorphism in the incidence of CVD in patients with T2DM. Given that lipid-modifying drugs are known to exert variable effects on lipoprotein profiles in men versus women[2], we performed a review of sex-based outcome variability in clinical trials investigating the effects of lipid modifying drugs on CVD risk and lipoprotein profiles.

Women with T2DM incur a 4-fold increased risk of CVD relative to non-diabetic controls. The protective effect of oestrogen is negated in women with T2DM. The underrepresentation of women in lipid-modifying trials hampers our understanding of CVD pathogenesis in women. Statin trials conducted between 1994 and 2017 predominantly recruited men. An average of 70% men were in each cohort, with one study comprised entirely of men. Recent CETP-inhibitor trials had similar bias toward men with an average of 79% of participants being men.

Our findings highlight the need to better understand CVD pathogenesis in women and balance gender composition in clinical trials. Greater understanding of sex hormones on lipoprotein particles in the setting of T2DM will be vital as this is likely an important biochemical difference.

References:

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Presenting Author: David Killilea

Supervisor: Dr Fiona McGillicuddy

60. TRENDS IN ANTIMICROBIAL SUSCEPTIBILITY IN EQUINE BACTERIAL ISOLATES IN A UNIVERSITY HOSPITAL

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Antimicrobial resistance (AMR), and the increasing prevalence thereof, is a critical area of research for both the medical and veterinary fields. Bacterial AMR can be inherent or acquired [1], and is of particular concern where it gives rise to multi-drug resistance (MDR). Despite the importance of this, the epidemiology of AMR is understudied in equine medicine [2].

The aim of this study was to (a) investigate the prevalence and trends of acquired AMR and MDR and (b) assess changes in the sample equine population seen at the University College Dublin Veterinary Hospital (UCDVH) over the 13-year study period.

To this end, case information was extracted from the UCDVH laboratory Vetscope database guided by inclusion/exclusion criteria and compiled into a spreadsheet which included relevant information such as patient age, site sampled, and test results. Included in the study were equine clinical samples from the UCDVH submitted to the UCDVH laboratory for culture and sensitivity testing within the first three days of hospitalization. From those, samples were excluded if they were repeated isolates for one case, repeat visits for the same problem within three months of the initial visit, or if the sensitivity results were unavailable.

Over the study period a total of 644 equine cases at the UCDVH submitted samples internally for culture and sensitivity testing that yielded a total of 1,152 isolates. Of those, 356 cases met the criteria resulting in an overall sample size of 641 isolates. Results of analysis regarding AMR and population trends will be presented at a later date.

References:

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Presenting Author: Morgan Flanders

Supervisor: Dr Vivienne Duggan

63. INFLAMMATORY RESPONSE AND HYPERCOAGULABILITY FOLLOWING HIP FRACTURE SURGERY

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Venous thromboembolism (VTE) is a major complication following hip fracture surgery (HFS)[1]. Thrombelastography (TEG) uses a whole-

blood sample to measure clot formation, and maximal amplitude (mA) values ≥65mm are predictive of in-hospital VTE[2]. The purpose of this study was to perform serial TEG analysis to determine hypercoagulability duration following HFS. Inflammatory marker analysis was also performed to investigate the association between inflammatory response and hypercoagulability following hip fracture.

TEG analysis was performed from admission until five days postoperatively, and at two-weeks, six-weeks, and three-months postoperatively. All patients received 28 days of chemoprophylaxis. Results were summarized using median with interquartile range (IQR).

Forty-eight patients underwent HFS. The median mA on admission was 63.2mm and surpassed the hypercoagulable threshold (mA >65mm) on post-operative day (POD) 2 (median mA = 65.5mm, p<0.001). A peak median mA of 70.4mm was reached two-weeks postoperatively. The median mA remained elevated before dropping below the hypercoagulable threshold at 3-months postoperatively (median mA=64.9mm, p=0.001). Median IL-6 and IL-10 levels peaked on POD 2 and POD 1, respectively. These values dropped below admission levels by POD 5 for IL-6 (median admission IL-6=19.8 (11.7-37.2) vs. POD 5=6.8 (4.2-16.4), p<0.001) and POD 4 for IL-10 (median admission IL-10=6.3 (3.6-17.0) vs. POD 4=2.8 (1.2-5.5), p<0.001).

This study shows that patients remain hypercoagulable beyond current thromboprophylaxis guidelines, with some individuals at significant VTE risk three months postoperatively. The inflammatory response observed following HFS with a subsequent hypercoagulable state suggests an association between inflammation and hypercoagulability.

Acknowledgements:

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Presenting Author: Benjamin Viner

Supervisor: Dr Prism Schneider

65. EXOTIC PET OWNERSHIP IN IRELAND AND ACCESS TO VETERINARY SERVICES

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The prevalence of exotic pet ownership has for years been widely accepted to be increasing in other countries such as the United Kingdom[1] and the United States[2], however no study looking at the prevalence of exotic pet ownership in the Republic of Ireland or their access to veterinary services has previously been conducted.

An online survey was designed in SurveyMonkey® to explore the prevalence of exotic pet ownership in the Republic of Ireland and to examine exotic pets' access to veterinary services which was distributed to University College Dublin employees.

93 pet owners completed the survey, of which 32 (34.4%) own exotic pets compared to 89.4% who own domestic pets. Of those 32 respondents, 11 of 22 reportedly sought veterinary services in

2019. Households whose highest level of educational attainment was less than NFQ level 7 were found to be more likely to own exotic pets overall (p = 0.01535) as well being more likely to own small exotic mammals specifically (p = 0.03589). Respondents whose dwelling included a garden were also found to be more likely to own domestic animals than those without a garden (p = 0.01597).

The results of this survey demonstrate that exotic pet ownership in the Republic of Ireland is demonstrably quite high, that use of veterinary services is low, and that additional surveys should be undertaken given the welfare implications for such a large population of pets going without routine veterinary care.

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Presenting Author: Lewis Goins

Supervisor: Assoc Prof Alison Hanlon

67. DIETARY HABITS AND IMPACT ON CARDIOVASCULAR DISEASE RISK IN HIV INFECTION

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People living with HIV (PLWH) have twice the risk of cardiovascular disease (CVD) compared to the general population [1]. The causes for this are likely multifactorial, with data surrounding dietary intake, a measure of socioeconomic status, and its impact on CVD-risk, limited in PLWH.

We aimed to (a) investigate differences in dietary intake, calculated by food frequency questionnaire (FFQ), between PLWH and CVD-risk matched controls in the UPBEAT CAD substudy, investigating CVD risk in PLWH, and (b) explore associations between HIV and subclinical CVD measured by CT coronary angiography, adjusting for these differences.

99 participants were enrolled in the substudy from the HIV UPBEAT Study, a prospective longitudinal cohort of PLWH and HIV negative controls. Propensity score matching was used to ensure similar CVD risk among participants. Median age was 49.87 years, 73.5% were male and 22.4% were current smokers.

Based on FFQ, PLWH had less daily intake of caffeine, protein and alcohol (see table). Presence of coronary plaque were similar between the two groups (PLWH; 33% versus uninfected controls; 40% p-value: 0.494). On univariate analysis there was no association between either food group intake or HIV status with subclinical CVD (OR 0.75 [95% CI 0.329, 1.711]).

Adjusting for difference in dietary intake between the two groups on multivariate testing, HIV status remained not associated with subclinical CVD (OR 0.874 [95% CI 0.351, 2.181]). These results, the first to examine dietary impact on CVD risk in PLWH, suggest differences in dietary intake may not impact CVD risk in PLWH.

Table 1.0: Dietary impact on CVD risk in PLWH

	HIV Positive (50%)	HIV Negative (50%)	P Value
N	47	47	
Kcal, median (IQR)	2233.73 (1821.26, 3139.02)	2370.9 (1738.48, 2942.37)	0.842
Carbohydrates (g), median (IQR)	245.75 (165.73, 353.1)	210.55 (158.84, 323.78)	0.456
Sugars (g), median (IQR)	111.18 (74.23, 170.62)	111.48 (70.58, 141.26)	0.369
Fibre (g), median (IQR)	27.54 (21.55, 38.94)	28.2 (17.53, 41.03)	0.848
Saturated Fats (g), median (IQR)	32.55 (21.67, 44.9)	29.7 (22.55, 34.45)	0.539
Polyunsaturated Fats (g), median (IQR)	12.06 (9.82, 19.23)	13.6 (8.73, 17.64)	0.684
Trans Fats (g), median (IQR)	1.43 (0.97, 1.91)	1.33 (1.08, 1.66)	0.628
Cholesterol (g), median (IQR)	304.03 (215.7, 420.92)	392.2 (205, 407.16)	0.607
Protein (g), median (IQR)	93.23 (83.77, 141.64)	127.21 (98.85, 181.37)	**0.043**
Alcohol (g), median (IQR)	4 (0.02, 13.48)	8.9 (2.86, 15.39)	**0.035**
Caffeine (mg), median (IQR)	382.76 (235, 1197.91)	3325.42 (123.04, 18633.05)	**0.049**

Reference:

1. Shah A, Stelzle D, Lee K, Beck E, Alam S, Clifford S et al. Global Burden of Atherosclerotic Cardiovascular Disease in People Living With HIV. Circulation. 2018;138(11):1100-1112.

Presenting Author: Róisín McGrath

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Co-Supervisor: Dr Willard Tinago

70. COVID AND CHILDREN'S MENTAL HEALTH STUDY

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The COVID-19 pandemic is thought to be associated with mental health difficulties. The impact that the pandemic and its restrictions have on children is unknown. This study's purpose was to examine the effect that the COVID-19 quarantine had on the mental health of primary school children by completing the 'My Feelings Form'(MFF)[4] during lockdown (2020 data), and comparing results with last year's validation study of the same school (2019 data), comparing the mental health of the two groups.

Data was collected via postal survey. Two hundred and forty envelopes were sent to households with a child in third - sixth class in a mixed urban primary school in Dublin 7. Sixty completed surveys were received back (twenty five percent response rate – expected response[5]). The data was recorded in Microsoft Excel and transferred to SPSS. The mean, standard deviation and range of each question and total score of the 2020 data were calculated and recorded, then compared to values calculated from the 2019 data. A two-step cluster analysis and standard t-test were carried out on both sets. Both data sets used the same school, and were completed at the same time of the academic year (last school week-late June).

The results showed great similarity between the two years, e.g. mean of total: 16.08 (2019) / 14.87 (2020), standard deviation of total: 5.97 (2019) / 5.73 (2020.

The study showed that there did not seem to be a worsening of the mental health of primary school children during the COVID-19 quarantine.

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Presenting Author: Colin Gilligan

Supervisor: Assoc Prof Aisling Mulligan

71. PROLONGED RESPONSE TO METASTATIC PANCREATIC CANCER TREATED WITH PEMBROLIZUMAB BASED ON MISMATCH REPAIR STATUS CHARACTERIZED FROM NEXT GENERATION SEQUENCING.

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Metastatic pancreatic cancer is associated with poor prognosis and 1-year survival with chemotherapy is 10% [1]. Patients with tumors that progress on standard treatment and are microsatellite instability-high (MSI-H) or mismatch repair-deficient (MMR-D) are potential candidates for pembrolizumab, a PD-1 immune checkpoint inhibitor. Only 2% of pancreatic adenocarcinomas are MSI-H/MMR-D [2]. MSI/MMR status has traditionally been determined using immunohistochemistry (IHC) or PCR testing. We present a case of a patient with metastatic pancreatic cancer identified as MSI-H/MMR-D using OncoPanel, a targeted next-generation sequencing (NGS) panel.

Patients at Dana-Farber Cancer Institute are approached for consent to OncoPanel tumor testing. Using a validated bioinformatics algorithm, MMR/MSI status can be inferred from OncoPanel data.

A 71-year-old female presented with abdominal and back pain, and a palpable left supraclavicular mass. PET imaging revealed a pancreatic mass and enlarged retroperitoneal and supraclavicular nodes. A supraclavicular node biopsy confirmed metastatic pancreatic adenocarcinoma. Genetic testing confirmed Lynch syndrome. The patient was treated with FOLFOX (progression after 5 months) and gemcitabine/nab-paclitaxel (progression after 2 months). OncoPanel testing showed MSI-H/MMR-D and confirmatory IHC on the pancreatic mass revealed absent MSH2 staining, consistent with MMR-D. The patient initiated pembrolizumab and has continued treatment for 16 months, with the most recent scan showing response.

This case illustrates prolonged clinical benefit from PD-1 inhibition in a patient with metastatic MSI-H/MMR-D pancreatic cancer refractory to standard chemotherapy. In cancer types with low frequency of MSI-H/MMR-D, institution-wide NGS platforms can be leveraged as a cost-effective method to identify MMR-D/MSI-H and potential candidates for immunotherapy.

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Presenting Author: Lan D Ngo

Supervisor: Dr Nancy U Lin

Co-Supervisors: Dr Ana C Garrido-Castro & Ms Melissa E Hughes

75. WHEN MEDICAL STUDENTS TAKE A STAND | STUDENT ATTITUDES TOWARDS CHALLENGING CONSENSUS

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This project aims to gain an understanding of medical students and their relationship with activism and militancy, and in doing so develop a tool to quantify it going forward. Despite the need for future leaders in healthcare, and the relationship between activism itself and advocating for one's patient, research in this area is scarce. How willing are medical students to challenge consensus or take a stand over a particular principle? Do their perceptions of ethical concerns and subsequent actions vary by cohort?

An online survey, consisting of six ethical dilemmas followed by a series of questions, was distributed to all medical students in in UCD School of Medicine. Data collected (n = 87) included age, gender, region, stage, and GEM/UEM status. Participants self-categorised their political beliefs, level of respect for authority, and in response to each scenario identified the primary ethical concern in a free text format. They subsequently rated the level of concern they had for each scenario, as well as the strength of each possible action. Responses consisted of 59% female/41% male and 48% GEM.

Results of the survey showed the six scenarios were discriminating and participants discerned a gradation of challenges and possible actions. The same cohorts provided different responses depending on the context of each scenario. Although different cohorts often perceived different concerns and proceeded differently for each scenario, some scenarios elicited responses that were universal across all cohorts.

We have developed a useful instrument to characterise different groups of students when faced with certain ethical dilemmas. Going forward, the survey can become a useful tool to quantify the effectiveness of targeted interventions in the areas of healthcare leadership and social awareness.

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Presenting Author: Laura Bruen

Supervisor: Mr Paul Harkin

Co-Supervisor: Assoc Prof Suzanne Donnelly

78. A FUNCTIONAL AND INTEGRATIVE GENOMICS ANALYSIS OF HOST RESPONSE TO DISEASE CAUSED BY INFECTION WITH *MYCOBACTERIUM TUBERCULOSIS* IN HUMANS AND *MYCOBACTERIUM BOVIS* IN CATTLE.

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Tuberculosis is an infectious disease of increasing importance in humans and cattle, causing significant mortality, morbidity, and economic loss worldwide. The rise of multidrug resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) is of particular concern. *Mycobacterium tuberculosis* (the primary cause of human TB) and *Mycobacterium bovis* (the primary cause of bovine TB) are remarkably similar at the genome sequence level. In the face of this, it is important to understand the molecular mechanisms underpinning host responses to infection with these pathogens. This will have implications for diagnosis, vaccinology, and treatment of human TB and for disease control and management of bovine TB.

In the present study, differentially expressed genes (DEGs) within active functional modules (subnetworks) were analysed [1]. These DEGs were identified using RNA sequencing (RNA-seq) of human and bovine alveolar macrophages (hAM and bAM) 24 hours post infection (hpi) with *M. tuberculosis* and *M. bovis*, respectively. Following this, Ingenuity® Pathway Analysis (IPA®) was used to systematically extract enriched molecular pathways involved in host responses to infection [2].

Table 1 shows an overview of some of the key findings in this study. The results were multifaceted and complex and encompassed many aspects of host-pathogen interactions, including pathogen recognition, cell signalling and downstream inflammatory processes. This study provides further evidence to help frame future research questions that will be vital to developing a complete understanding of host-pathogen interactions for pathogenic mycobacterial infections of humans and cattle.

Table 1: Top canonical pathways detected enriched for DEGs in bAM cells (infected with *M. bovis*) and hAM cells (infected with *M. tuberculosis*).

Bovine alveolar macrophage	*P*-value	Human alveolar macrophage	*P*-value
Neuroinflammation Signalling Pathway	3.66×10^{-30}	Neuroinflammation Signalling Pathway	7.36×10^{-29}
Systemic Lupus Erythematosus In B Cell Signalling Pathway	1.79×10^{-28}	T_H1 and T_H2 Activation Pathway	2.70×10^{-28}
Role of Macrophages, Fibroblasts and Endothelial Cells In Rheumatoid Arthritis	7.01×10^{-27}	Granulocyte Adhesion and Diapedesis	7.37×10^{-28}
Hepatic Fibrosis Signalling Pathway	5.98×10^{-25}	Glucocorticoid Receptor Signalling	3.26×10^{-24}
Type I Diabetes Mellitus Signalling	6.11×10^{-25}	Agranulocyte Adhesion and Diapedesis	4.01×10^{-24}

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2. Krämer A, Green J, Pollard Jr J, Tugendreich S. Causal analysis approaches in Ingenuity Pathway Analysis. Bioinformatics. 2014; 30(4):523-3.

Presenting Author: Michael Dover

Supervisor: Prof David MacHugh

80. PATHWAY ANALYSIS OF SPLICE VARIANTS SUGGEST A ROLE FOR INFLAMMATORY PROCESSES IN TYPE 1 MYOTONIC DYSTROPHY

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Type 1 myotonic dystrophy (DM1) is a multi-system disease caused by a CTG expansion of the *DMPK* gene resulting in toxic gain-of-function activity of RNA leading to a myriad of splice variants and aberrant proteins [1].

From published literature, experimentally validated and predicted splice variants in DM1 were analyzed using pathway analysis to determine if they contribute to common biological pathways. In total, 83 predicted and 55 experimentally validated splice variants in DM1 were examined using KEGG mapper and Reactome databases, with statistics computed using over-representation analysis.

Predicted misspliced genes revealed strong pathway interactions in responses of the innate and adaptive immune system in: antigen processing and presentation (p<1.12E-16), endosome and phagosome pathways (p<1.12E-16), and cytokine signalling (p<2.75E-14). Experimentally validated misspliced DM1 genes showed significant pathway interactions involving: MECP2 in gene transcription (p<1.8E-7), cardiac conduction (p<1.58E-4), RTK signaling (p<2.27E-3), platelet homeostasis (p<2.54E-3), and insulin receptor activation (p<0.0368). Both gene sets implicated pathways in muscle contraction (p<5.05E-4) and myogenesis (p<0.0341). Prominent genes in the pathway analyses include: *HLA-B, HLA-F, SIRPA, PML, TNL1, MEF2C, DMD, TNNT2, TTN3*. Analyses on an additional splice variant of a unique sub-type of DM1, congenital DM1, revealed significant pathway results in muscle contraction (p<1.54E-4), vesicle mediated transport (p<7.68E-4), and glycogenolysis (p<2.01E-3).

Pathway analysis of miRNA that regulate the splice variants was conducted and further corroborated the significance of the immune system, inflammatory responses, platelet activity and insulin signaling in DM1. Taken together, inflammatory and immune related pathways play a key role in the many manifestations of DM1.

Reference:

1. Udd B, Krahe R. The myotonic dystrophies: Molecular, clinical, and therapeutic challenges. Lancet Neurol. 2012; 11:891–905.

Presenting Author: Iulia Cornila

Supervisor: Dr Jeffrey Glennon

Co-Supervisor: Dr Simone Macri

81. DEVELOPMENT OF A SURVEY TO EXAMINE THE PREVALENCE, CHARACTERISTICS AND EXPERIENCE OF CHARLES BONNET SYNDROME IN THE IRISH VISUALLY IMPAIRED POPULATION FROM A PATIENT PERSPECTIVE

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Charles Bonnet Syndrome (CBS) is a side-effect of vision loss causing individuals to experience visual hallucinations. CBS is not routinely discussed between individuals with visual impairment and their physicians leading to a lack of awareness, and concern among patients that the hallucinations are indicative of neurodegenerative or psychiatric illness (1,2). The current study aims to perform a systematic review and develop a patient survey to

determine the prevalence, clinical presentation and patient experience of CBS.

PubMed, Embase, PscycINFO, CENTRAL, clinicaltrials.gov, the EU and WHO clinical trials registries were searched for English-language studies containing "vision loss" and "hallucinations" as MeSH/Emtree terms and keywords. Case reports/series, studies describing neurodegenerative/neuropsychiatric patients, and studies involving drug/alcohol use were excluded.

2962 abstracts were screened, 403 full-texts assessed for eligibility and 59 studies were included in the systematic review. Data extraction suggests that CBS is common and hallucination content/ patient experience is heterogeneous. Emerging themes informed the development of an online patient survey to collect demographics (age, gender, etiology/duration of vision loss), presence/characteristics of visual hallucinations, and the functional/emotional patient impact. Survey questions were reviewed by ophthalmologists and visually impaired patient representatives to ensure accessibility, question suitability and patient and public involvement (PPI).

Future directions are aimed at disseminating the survey to individuals living with visual impairment in Ireland. Increasing understanding of CBS among individuals with visual impairment and their health-care providers could potentially mitigate the fear/concern patients experience and motivate greater discussion of CBS during ophthalmic clinical appointments.

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Presenting Author: Claire McSweeny
Supervisor: Dr Alison Reynolds

82. PDAC MECHANOBIOLOGY; INFLUENCE ON DISEASE PROGRESSION AND MECHANOTHERAPEUTICS

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Pancreatic ductal adenocarcinoma (PDAC) carries a dismal prognosis, with limited effective treatment options, the need for investigation into new therapies is clear. PDAC exhibits biomechanical properties in contrast to many other cancers, manifesting an exceptionally dense, fibrous and hypovascular stroma. The purpose of this review is to highlight the contribution of the unique biomechanical properties of PDAC's desmoplastic stroma to the disease's progression and to identify potential biomechanical targets for its treatment.

The methods involved in writing this review included a literature search for papers relating to pancreatic cancer, pancreatic ductal adenocarcinoma, biomechanics, stroma, desmoplasia, stromal therapies, mechanobiology and mechaotherapeutics. Relevant papers were chosen, assimilated and summarised here.

The primary outcome of this project was the identification of a number of areas relating to the role of PDAC biomechanics on disease progression that require further research. The relationships between and roles of individual mechanobiological pathways that remodel the stroma in tumourigenesis were identified. Current trials into stromal therapies and mechanotherapeutics were summarised in a table, compiled from the international database available through www.clinicaltrials.gov.

The implications of this study are that PDAC is a disease about which there remains a vast amount of knowledge to uncover. It is understood from this research that there holds great promise for effective therapies targeting aspects of the stromal matrix and the unique biomechanical properties of PDAC. The information summarised in this review also supports the undertaking of further research into the use of biomechanical PDAC data for the diagnosis, staging and as a prognostic indicator for this disease.

Presenting Author: Ned Quirke
Supervisor: Dr Stephen Thorpe

83. ANALYSIS OF RETINOIC ACID RECEPTOR GENE REGULATION IN A METASTATIC PANCREATIC CANCER CELL LINE

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Pancreatic ductal adenocarcinoma (PDAC) is a highly aggressive cancer with a 5-year survival rate of 7% and a median survival of 6 months. Retinoic acid receptor beta (RAR-β) activation has been shown to downregulate myosin light chain 2 (MLC-2) associated contractility which controls the mechanosensory-driven activation of pancreatic stellate cells (PSCs)[1], and may play a role in cancer cell metastasis. This project aims to study genes and pathways regulated by RAR-β in a pancreatic cancer cell line (SUIT2) taken from a liver metastasis using chromatin immunoprecipitation sequencing (ChIP-seq).

Chromatin immunoprecipitation (ChIP) was performed on cells treated with RAR-β agonists and antagonists using with antibodies against RAR-β and histone H3. The ChIP-Seq analysis pipeline involved quality control with FastQC and Trim Galore!, genome alignment with bowtie2, peak calling and data visualisation with EaSeq (version 1.111)[2].

Peak calling identified 3244 enriched regions with 2148 distinct genes associated. Gene ontology (GO) analysis (STRING) was performed on genes associated with peaks above the log2fold ratio of 1.5. Functional enrichment showed involvement in biological processes associated with GO terms, 'plasma membrane bounded cell projection organisation' and 'lamellipodium organisation'. Reactome analysis highlighted MET as a promoter of cell motility and activator of PTK2 signalling in reactome pathways which account for 23.1 % and 20.5% of the gene set for these pathways, respectively.

Numerous genes were identified to be enriched upon RAR-β agonist activation and further work will explore RAR-β interactions which may be responsible for downregulation of MLC-2.

References:

1. Chronopoulos A, Robinson B, Sarper M, Cortes E, Auernheimer V, Lachowski D, et al. ATRA mechanically reprograms pancreatic stellate cells to suppress matrix remodelling and inhibit cancer cell invasion. Nat Commun. 2016; 7(12630)

2. Lerdrup M, Johansen J, Agrawal-Singh S, et al. An interactive environment for agile analysis and visualization of ChIP-sequencing data. Nat Struct Mol Biol. 2016; 23: 349-357

Presenting Author: Kai Ning Chiam

Supervisor: Dr Stephen Thorpe

84. CONSERVATION OF PREDICTED T-CELL EPITOPES ACROSS THE HUMAN CORONAVIRUSES

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As the COVID-19 pandemic continues to dominate the globe and causes significant mortality and morbidity, new research has put the spotlight on the T-cell response to SARS-cov-2. With particular scrutiny being placed on the suggested cross-reactivity of memory T-cells specific to common-cold coronaviruses having heterologous immunity to SARS-cov-2. A recent paper by Mateus et al[3] demonstrates this experimentally[3].
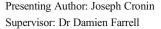
Using epitope prediction software, NetMHCIIpan, a list of the potential epitopes for CD4 T-cell 15-mer epitopes was predicted, for the 8 most common human HLA alleles. To simplify our analysis we concentrated on the SARS-cov-2 spike protein. Additionally, a sequence alignment of the spike protein genome for these viruses was performed to manually assess for conservation of each epitope we identified in the spike sequence and a literature review of relevant papers on T-cell cross-reactivity were performed.

Out of 92 SARS-cov-2 epitope predictions, 2 predicted peptides were conserved with >70% identity in all 6 coronaviruses and 8 epitopes had varying degrees of conservation with different combinations of the 6 coronaviruses.

These conserved epitopes across the human coronavirus family are significant in that they contribute to the growing body of evidence of human coronavirus memory T-cells displaying heterologous immunity to SARS-cov-2. The results underscore the need for further research, but also these results and how they fit in with the previous literature, informs the understanding of the immune response to COVID-19 and future therapeutic designs, and offers a possible explanation for the variability of COVID-19 symptoms[4].

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2. Sekine, Takuya, et al. 'Robust T Cell Immunity in Convalescent Individuals with Asymptomatic or Mild COVID-19'. *BioRxiv*, June 2020, p. 2020.06.29.174888. *www.biorxiv.org*, doi: 10.1101/2020.06.29.174888.

Presenting Author: Joseph Cronin

Supervisor: Dr Damien Farrell

85. THE ROLE OF TRIB1 IN THE DEVELOPMENT AND PROGRESSION OF ACUTE MYELOID LEUKAEMIA

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Trib1 has been identified as a myeloid oncogene which is overexpressed in murine acute myeloid leukaemia (AML). Trib1 functions by enhancing MEK1/ERK signaling and by degrading C/EBPα, an important tumour suppressor for AML [3]. Previously, a gain-of-function mutation, Trib1-R107L, was identified in a human case of Down syndrome-related acute megakaryocytic leukaemia [4]. AML development was accelerated with the R107L mutant with increased ERK phosphorylation and C/EBPα degradation. This study aims to confirm the transforming activity of the Trib1 and Trib1-R107L mutant for murine haematopoietic cells.

To assess the transforming activity of Trib1 we transfected murine bone marrow cells with retroviral vectors containing the Trib1 WT and Trib1-R107L gene. Retroviral transduced BM cells were then plated onto petri dishes in methylcellulose medium to form colonies. Western bot analysis was performed to confirm the expression of Trib1 and C/EBPα. Trib1 KO murine BM cells were used as a control. We then analysed morphologies of AML cells by Giemsa staining, expression of surface markers by FACS and tested self- renewal activities on the methylcellulose culture.

We were able to show that Trib1 expression down regulates differentiation of myeloid cells. In addition, the R107L mutant showed a tendency towards transforming into immature cells as we observed increased degradation of the P42 isoform of C/EBPα and increased expression of the CD34 marker. Further studies of Trib1 function will help to understand the importance of the Tribble psuedokinase in AML development and progression, and to discover novel therapeutic tools and important biomarkers.

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2. Yokoyama T, Toki T, Aoki Y, et al. Identification of TRIB1 R107L gain-of-function mutation in human acute megakaryocytic leukaemia. Blood, 119:2608-2611.2012

Presenting Author: Michelle Soye

Supervisor: Dr Takuro Nakamura

Co-Supervisor: Seiko Yoshino

86. SERUM BIOMARKER-BASED PREDICTION OF RENAL FUNCTIONAL DECLINE AND MORTALITY IN PEOPLE WITH CHRONIC KIDNEY DISEASE.

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In chronic kidney disease (CKD) the rate of decline in renal function is variable and unpredictable[1]. Serum biomarkers can potentially predict renal outcomes and mortality in CKD. We aimed to determine if a panel of biomarkers were associated with subsequent decline in renal function.

Patients with CKD (n=140) attending the Galway nephology outpatient clinic were enrolled between 2014-2016. Biomarkers EGF, FABP1, sTNFR1, sTNFR2 and NGAL were measured with a novel multi-analyte immunoanalyser BioChip (Randox®). Longitudinal clinical and laboratory data were collected over 4.09±1.55 years. A composite endpoint of renal replacement therapy, ≥40% decline in eGFR, doubling of serum creatinine, or death was selected. Statistical comparisons were made using t-test, one-way ANOVAS, and chi-squared tests, or nonparametric equivalents after normality testing.

Mean age of the cohort was 63.1±16.6 years and 62(44.3%) were female. Those who reached the composite endpoint had higher levels of all biomarkers at baseline, except EGF which was inversely associated with endpoint. Baseline creatinine also was higher in this group (p=<0.0001). When divided into quartiles of serum sTNFR1 concentration, there was a significant difference (p=<0.0001) in the frequency of the composite endpoint (q1:8.8%, q2:17.1%, q3:55.9%, q4:76.5%). Similar trends were observed with sTNFR2 and NGAL. Baseline creatinine was higher in the higher quartiles (p=<0.0001).

Serum levels of several biomarkers associated with inflammation were higher in those with renal functional decline overtime, but levels were also associated with baseline renal function. Further analyses to determine their utility when interpreted alongside routine clinical data are now being performed.

Reference:

1. Devarajan P. The use of targeted biomarkers for chronic kidney disease. Advances in Chronic Kidney Disease. 2010; 17(6):469-479. doi: 10.1053/j.ackd.2010.09.002.

Presenting Author: Chloe Conroy
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Co-Supervisor: Prof Matthew Griffin

99. EFFICACY OF BIOLOGICAL AGENTS FOR THE MANAGEMENT OF SYSTEMIC LUPUS ERYTHEMATOSUS: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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Systemic lupus erythematosus (SLE) is a multisystem disease with a myriad of symptoms. Biological agents may provide a more efficacious and better tolerated therapy for SLE then current standard of care [1]. Over the last two decades, the majority of randomized controlled trials (RCTs) did not meet their primary endpoint [2]. We aim to: (1) systematically review the literature investigating biologics for SLE; and (2) assess the methodological pitfalls that could have negatively altered the results of RCTs.

This systematic review and network meta-analysis (NMA) used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Comprehensive searches in three databases (Medline, Embase, Cochrane Central) were conducted to identify phase II and III RCTs in adults (≥16 years) with SLE, excluding lupus nephritis. Two reviewers independently screened references and full texts for inclusion on Covidence. Data was extracted using an excel form, and the Cochrane risk-of-bias tool was used to appraise the risk of bias of RCTs. The GRADE (Grading of Recommendations Assessment, Development and Evaluation) approach will be used to rate the quality of the evidence.

A total of 5804 references were identified, 144 were retained and reviewed in detail, and 24 RCTs were included for the final analysis. All included RCTs had a low risk of bias based on the Cochrane risk-of-bias tool.

Our study will identify efficacious biologics for the treatment of SLE by collating data together from several RCTs. The NMA will critically compare biologics that have not been directly compared in an RCT.

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2. Medina-Rosas J, Al-Rayes H, Moustafa AT, Touma Z. Recent advances in the biologic therapy of lupus: the 10 most important areas to look for common pitfalls in clinical trials. Expert Opin Biol Ther. 2016;16(10):1225-38.

Presenting Author: Sierra Mendelsohn
Supervisor: Prof Louise Rainford

100. A retrospective clinical audit on the quality of positioning standards in plain film radiography

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Clinical audit is designed to compare current practices to a proven standard, enabling healthcare providers to improve the quality of care for patients.[1] While there are established methods of quality assurance in radiography e.g. reject analysis, there is an absence of literature

pertaining to the quality of reported images and radiography/radiology concensus[2].

An institutional waiver from full ethics was confirmed. Radiology reported images were collated from 4 clinical sites governed by 2 healthcare providers (HCPs), with 51 radiography staff, 10+ radiologists. Each HCP provided access to 200 images for five different radiographic projections: Antero-posterior (AP) ankle, lateral knee, AP shoulder, lateral elbow and wrist. Images were prepared for review (n=2000) and 5 radiography observers with one common to both HCPs scored each image for radiographic positioning using a four-point scale: 0) Unacceptable, 1) Borderline Acceptable, 2) Definitely Acceptable, and 3) Very Good. Gold standard images indicating optimal radiographic positioning were provided to the observers.

Observer findings were analysed accumulatively for each radiographic projection and each HCP. Inter-observer and intra-observer differences were calculated. The results identified a substantial proportion of X-rays had suboptimal positioning, 36.3% recorded scores of 1 or below. Additionally, there were significant differences related to the perception of quality between the observers, demonstrating the subjectivity nature of image quality review.

Preliminary data has evidenced over one third of reported images are borderline acceptable at best. Further research is warranted into Radiography practice and how radiographers and radiologists judge diagnostic acceptability to inform future reject analysis developments and protocols.

Reference:

1. Burgess R. New Principles of Best Practice in Clinical Audit. 2nd edition. Oxford: Radcliffe Publishing; 2011.
2. Mount J. Reject analysis: A comparison of radiographer and radiologist perceptions of image quality. Radiography. 2016;22(2):e112-e117.

Presenting Author: Chelsea Nepomuceno
Supervisor: Prof Louise Rainford
Co-supervisor: Dr Marie-Louise Ryan

101. EVALUATION OF THE STUDENTS' EXPERIENCE USING AN ALTERNATIVE 2D IMPLEMENTATION OF THE VIRTUAL REALITY TRAINING FOR RADIOGRAPHY PRACTICE, COMPARED TO THE 3D VERSION

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Virtual reality (VR) simulation is increasingly recognised as an innovative, engaging tool for educating healthcare students (1). Student radiographers may particularly benefit from this tool as it removes the ethical barrier prohibiting exposure of humans to ionising radiation without justification (2). COVID-19 has impacted traditional clinical skills labs, thus remote VR is likely to play a greater role in simulation-based education.

This study evaluates the student experience using desktop VR software. Stage 1 students with Windows-10 were invited to participate as these students previously used the immersive 3D VR suite. After downloading the software, each volunteer was asked to acquire three specified radiographic images. Academic staff appraised these images using a rubric developed during this study. An online questionnaire was disseminated to gather user feedback.

Key comparative findings included: students required less time to familiarise themselves with the desktop version, with an average of 20 minutes required (3-45 minutes), however slightly more (55%) still preferred immersive 3D. Students noted that 'access at any time' and 'lab partner not needed' were advantages of the desktop version. All participants (n=9) reported finding the VR software beneficial to their learning, with key benefits noted in the following areas: patient positioning, dose tracking, radiation safety, anatomical knowledge and marker placement. Students felt VR was suitable for formative feedback but not summative assessments. A disadvantage identified was the 'limited viewing angles of patient with the desktop version'(n=2).

These findings demonstrate an overall positive user experience and support the implementation of desktop VR into the Radiography curriculum.

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2. Shanahan, M Student perspective on using virtual reality simulation. Radiography, 2016, vol. 22(3): 217-222.

Presenting Author: Aoife Harrington
Supervisor: Dr Michelle O'Connor
Co-Supervisor: Prof Louise Rainford

102. DEVELOPING ON-LINE CONTENT FOR RADIOGRAPHY VIRTUAL REALITY TRAINING & DISSEMINATION OF EDUCATIONAL OUTCOMES

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Due to the current COVID-19 pandemic there will be a reduced ability and capacity for radiography students to practice radiography laboratory based assignments, on campus, and during the spring 2020 national lockdown, these facilities were closed. The 3D VR (virtual reality) training suite to aid students in their studies which was introduced in 2019 and is also under similar constraints.

Skilitics, the New Zealand based company who created the 3D Virtual Reality VR programme for Radiography teaching have now created a 2D package which is to be implemented into the curriculum for Stage 2 students from September 2020. Use of this software will facilitate Radiography Practice sessions online, however the instructions for use differ from the 3D model and therefore a guide for students required development.

The aim of this research study was to develop online content which conforms to the UDL (Universal design for learning) guidelines to guide students in the use of the 2D on-line software. The research involved becoming familiar with the 2D user interface and to develop instructions using video with audio and provide a written transcript of the instructions. These scripts were then packaged using 'Storyline 3' so the script displays next to the video content. The student instructions developed also includes detail related to hygiene and adherence to social distancing

for return to campus learning, appropriate to COVID-19 restrictions and HSE guidelines.

The developed online content was trialed with incoming Stage 2 students, who were previously familiar with the 3D VR. The developed user content will be presented and Stage 2 student feedback will be discussed.

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Presenting Author: Ben O'Brien
Supervisor: Dr John Stowe
Co-Supervisor: Prof Louise Rainford

103. DEVELOPMENT OF A 3D PRINTABLE HOLDER FOR DIGITAL RADIOGRAPHY DETECTORS

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In digital radiography (DR), electronic detectors transform X-rays into digital images. These expensive detectors are highly vulnerable outside of their routine housing under the X-ray table. If damaged while in use, may require replacement at significant cost [1]. To overcome this problem, there is a need to develop a holder to stabilize and secure the detector in a range of adjustable positions within a clinical setting. This study aims to design a novel inexpensive 3D printable-based holder to fully support DR detectors when imaging using modified techniques either on the X-ray table or in wheelchairs.

The holder was mechanically designed, modeled, and assembled using Autodesk Inventor software. The Stress Analysis feature was employed to simulate the holder's performance with movement constraints and applied forces [2].

The designed holder consists of seven parts connected with joints allowing movements in different planes. The holder's free end includes a hook and latch creating a safe grasp for the detector. Using polylactic acid (PLA), the most readily available 3D printable material, the maximum Von Mises stress, displacement, and the safety factor on the holder were 0.551 MPa, 0.147 mm, and 15, respectively.

The yield stress of PLA is greater than maximum stress generated on the holder. Maximum displacement was minor, and safety factor was greater than one. Thus, the designed holder should be capable of fully supporting the detector without material failure, under the static loading conditions analyzed. These results provide a potential solution to reduce the risk of DR detector damage in practice.

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Presenting Author: Aliaa Karam
Supervisor: Assoc Prof Eoin O'Cearbhaill
Co-Supervisor: Prof Louise Rainford

105. DIFFERENTIATION LINEAGE ALTERS THE CYTOSKELETAL AND EPIGENETIC RESPONSE OF MESENCHYMAL STEM CELLS TO TENSILE STRAIN

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Mesenchymal stem cells (MSCs) are widely used for connective tissue regenerative therapies. The application of external mechanical forces to MSCs can initiate and drive fibro-chondrogenic differentiation and is associated with epigenetic histone modifications[1]. The aim of this work is to investigate the hypothesis that uniaxial tensile strain induced cytoskeletal and nuclear reorganisation is associated with histone 3, lysine 27 trimethylation (H3K27me3) in differentiating MSCs.

MSCs underwent uniaxial tensile strain of 3% at 1 Hz for 6 hours per day, repeated daily for 3 days in media to encourage osteogenic, adipogenic or fibro-chondrogenic differentiation. Fluorescently labelled images were processed using a custom MATLAB script to assess filamentous (f-)actin orientation and alignment variance, nuclear shape and orientation, and pixel intensities within the nucleus. Orientation detection methods based on inter-pixel gradients, binary object detection and Hough transform line detection[2] were implemented and compared. The Gradient Method was used to detect actin orientation and the Binary Object Method used for nuclei orientation and outline definition.

Dynamic loading caused fibre realignment perpendicular to the direction of strain associated with a decrease in alignment variance for cells in control, osteogenic and chondrogenic differentiation conditions. Differentiation led to reduced nuclear H3K27me3 immunostaining intensity, which was further reduced by tensile strain in chondrogenic cells where transforming growth factor-β (TGF-β) was omitted, resulting in a staining intensity similar to that obtained with TGF-β addition in the absence of strain.

Tensile strain applied in conditions permissive of chondrogenic differentiation may mimic the action of TGF-β3 on heterochromatin associated histone modification.

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Presenting Author: Chris Glynn

Supervisor: Dr Stephen Thorpe

110. IN VITRO IDENTIFICATION OF MARKERS OF HYPOXIC BRAIN INJURY

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Hypoxic brain injury (HBI), caused by insufficient oxygen supply or reduction in cerebral perfusion, carries significant mortality rates and can have a considerable impact on surviving patients' quality of life[3]. HBI in adults is commonly caused by either cardiac arrest or profound hypotension due to hypovolaemia, sepsis, drug overdose, pulmonary embolism, and others[3]. Whilst much progress has been made, there is still a significant deficit in our understanding of the pathogenic mechanism of HBI. In this study I have sought to establish an in vitro model of HBI with a view to identifying molecules that underpin the response to injury.

PC12 cells were grown in a complete cell culture medium. To induce differentiation to a neural phenotype, cells were grown in the presence of nerve-growth factor and differentiation confirmed microscopically. Differentiated cells were then exposed to hypoxia for 24 hours, with reoxygenation for 48 or 0 hours, respectively. Undifferentiated cells were exposed to hypoxia as above, as a non-neural control. Following hypoxia, cells are assessed for metabolic activity and viability, in addition to biochemical measures of membrane permeability and oxidative stress. Nucleic acid biomarkers will be identified through microRNA analysis.

The data generated in these studies will enable identification of both the cellular response and molecular mediators that underpin HBI.

This work has led to the successful establishment of an in vitro model of HBI, which will be utilised to determine the impact of injury and its modulators on cell survival, membrane integrity and biochemical pathways.

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Presenting Author: Kerri Rowen

Supervisor: Prof Peter Doran

111. WHAT IS THE PSYCHOLOGICAL IMPACT OF WORKING DURING VIRAL EPIDEMIC COVID-19 ON HEALTHCARE WORKERS? A SYSTEMATIC REVIEW OF QUALITATIVE STUDIES

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On March 11th 2020, the WHO declared Covid-19 a pandemic, consequently impacting citizens and health care workers(HCW) alike (1).

Covid-19 has put HCW in unprecedented situations which cause experiences of moral injury and mental health problems, such as psychological distress. In similar past pandemics, such as the SARS pandemic in 2003, HCW experienced psychological distress due to risk factors such as quarantine, fear of contagion, concerns for family wellbeing, work stress (2).

The aim of this research was to investigate psychological impact of working during viral epidemic Covid-19 on healthcare workers by synthesising evidence from qualitative studies thematically. A systematic review was carried out 6 papers were identified to be included in the review.

Thematic analysis of the papers revealed that HCW faced specific challenges when working during Covid-19. The psychological impact on HCWs emerged in the themes of: 1) Occupational Factors, 2) Interpersonal Factors, 3) Morally Injurious Factors. Examples of sub-themes within these broader themes included increased workload and professional responsibility, fear of infection, and limited resources for the three themes, respectively.

The results demonstrate that factors such as infection risk, increased workload, psychological distress, and quarantine all impacted negatively on the mental health of HCW on the frontline. Common concerns and factors were present across groups of HCW. However, spending more time with Covid-19 patients was a positive risk factor for psychological distress, particularly amongst nursing staff. Additionally, to minimize the psychological impact of future outbreaks of infectious diseases including Covid-19, protective practices such as Schwartz Rounds and interpersonal interactions should be prioritised to support the psychological welfare of HCW.

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Presenting Author: Megan Wilson

Supervisor: Prof John Hayden

112. THE PSYCHOLOGICAL IMPACT OF VIRAL EPIDEMICS ON MEDICAL STUDENTS: A SYSTEMATIC REVIEW

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The objective of the review was to qualitatively analyse the available evidence on the psychological impact of viral epidemics on medical students in terms of stress, anxiety, and risk factors that may expose them to psychological distress.

The review considered quantitative studies addressing psychological distress medical students' face during viral epidemics (SARS, MERS-CoV, EBV, 2019-nCoV). Papers of interest included measures assessing levels of stress, anxiety, and behavioural changes during the time of the epidemics.

The search strategy sought to find published papers in the English language in the following databases: Medline, PsycInfo,

Embase, PubMed, and were screened by two independent reviewers by examining title, abstract, and key terms.

Included papers were then assessed for methodological quality by using the Checklist for Analytical Cross Sectional Studies – a critical appraisal instrument developed by the Joanna Briggs Institute.

A total of 6 papers were included in the review. All papers used survey questionnaires to collect demographic data, assess anxiety levels, stress levels, and risk factors that may have an effect on these levels in medical students. Measures used were Generalised Anxiety Disorder scale, Perceived Stress Scale, and compared results between medical students of different stages and results between medical students, nurses, and non-healthcare students.

The results provide us a perception of the extent and risk factors of medical students' psychological distress during viral outbreaks. More studies are needed to address this issue as well as establishing support programmes and pandemic management courses to empower students during these trying times.

Presenting Author: Abdul Rahman Ammouni

Supervisor: Dr John Hayden

113. REPURPOSING PSYCHOLOGICAL INTERVENTIONS FOR HEALTHCARE WORKERS DURING COVID-19

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The COVID-19 pandemic has been shown to have a large negative impact on the mental health of healthcare workers. Evidence-based interventions that could be used to mitigate this are lacking in the literature. This systematic review aims to evaluate psychological interventions used for employees following disasters and assess the transferability of these interventions to a healthcare setting during the COVID-19 pandemic.

Electronic database Embase was searched from 2015 to 2020. Studies identified alongside studies received from a previous review (1) were assessed for transferability using a checklist based on the PIET-T process model (2).

An additional three studies were identified in the updated literature search. Eighteen studies were included for assessment of transferability. Interventions evaluated included psychological debriefing, meditation courses, cognitive behavioural therapy, mental health training courses/psychoeducation courses and Trauma Risk Management (TRiM).

TRiM could improve help seeking behaviour in healthcare workers. Meditation courses could alleviate stress in healthcare workers. Mental health training courses could build resilience in healthcare workers. Psychological debriefing has potential negative effects and is not recommended for transfer. More research needs to be undertaken in this area to assess the transferability of these interventions.

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Presenting Author: Sean Treacy

Supervisor: Prof Fiona McNicholas

114. THE NUMBER OF CITY-WIDE CHILD MENTAL HEALTH EMERGENCIES PRE AND POST COVID-19

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The aim of this study is to prospectively examine the impact of COVID-19 on paediatric liaison psychiatric cases assessed in terms of impact on social, financial, psychological and educational restrictions by way of analysing the profile of trauma presentations to paediatric emergency services during the COVID 19 pandemic.

The methods of this study included analyzing a completely anonymized existing database formed from routine assessment in the department to generate study data. All children presenting to Paediatric Liaison Psychiatry Services in CUH between January 2019-July 2020 were identified and time and profile of presentation collected from their case notes.

Preliminary results show a statistically significant increase in the number of Out of Hours presentations from Jan – July 2020 compared with the same period 2019, as well as an increase in the percent of patients admitted, the average number of bed days and the proportion of patients presenting with deliberate self-harm. These difference in the profile of patients presenting are also reflected between the 'pre-lockdown' months and 'post-lockdown' months of 2020. However, these results are preliminary as a more accurate analyses and comparison can be performed when the data from the months of July and August 2020 can be taken into account.

This data ultimately may be very clinically relevant, and help to inform the literature on mental health presentations in pandemics. The increase in the average length of stay and the number of admissions after COVID-19 suggests that the restrictive measures imposed by the government had a significant effect on the mental health of children. Sufficient resourcing of 'out of hours' CAMHS is vital to aid in allowing PCPLS to provide a specialist service to children with combined medical and mental health problems as is intended[1].

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Presenting Author: Saoirse Ní Mhaoilriada

Supervisor: Prof Fiona McNicholas

Co-Supervisor: Dr Kieran Moore

115. PREPARING CLINICAL TRIAL PATIENT INFORMATION LEAFLETS AND CONSENT FORMS: ESTABLISHING A SET

OF GUIDELINES FOR ACADEMIC INVESTIGATORS AND SPONSORS

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Patient Information Leaflets (PILs) and Informed Consent Forms (ICFs) are vital components of the informed consent process. However, a recent study of PILs and ICFs in Ireland and the UK showed that the PILs/ICFs provided to patients are too complex to understand[1]. The purpose of this research study was to produce an evidenced based set of guidelines to assist researchers in preparing PILs and ICFs that are accessible to the layperson.

A literature review was conducted to identify guidelines for any form of patient facing documents and from this a proposed set of guidelines was produced that would apply to clinical trial PILs/ICFs. An Expert Consensus Conference [2] was then conducted to reach consensus on the proposed guidelines. The Experts consisted of clinical researchers and representatives from an ethics committee, the Irish Platform for Patient Organisations, Science and Industry, and the National Adult Literacy Agency.

Five recommendations were proposed:

1. Layout: use of columns, text boxes etc;
2. Format: type size, font;
3. Syntax: use of bullet points, short sentences;
4. Content: use of active voice, no jargon;
5. Checks of Readability: readability assessment tools, recognised checklists.

Preparing accessible patient-facing documents is challenging. An evidence-based set of guidelines will assist researchers aiming to produce clinical research PIL/ICFs that clinical trial participants can understand. Ultimately, these guidelines will assist in ensuring that research participants fully understand all aspects of a trial, thus helping them to make an informed decision.

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Presenting Author: Eleanor Coleman

Supervisor: Prof Peter Doran

Co-Supervisor: Ms Lydia O'Sullivan

116. A SYSTEMATIC REVIEW OF MANAGEMENT OF

AVOIDANT/RESRICTIVE FOOD INTAKE DISORDER IN PEDIATRIC HOSPITALS

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According to the American Psychiatric Association Avoidant/ Restrictive Food Intake Disorder (ARFID) is a feeding or eating disturbance which manifests as a consistent failure to meet appropriate nutritional or energy needs, resulting in: significant weight loss (or failure to achieve expected weight gain); nutritional deficiency; dependence on enteral feeding or oral nutritional supplementation; or a marked interference with psychosocial function. The purpose of our review is to focus on current literature surrounding inpatient management of ARFID in pediatric hospital settings, such that we can make recommendations to clinicians regarding the inpatient care of their patients, with support from literature.

Three reviewers independently screened the title of each text for inclusion/exclusion. Once we were all in agreement, we repeated the step using abstracts. Two of the three reviewers screened each of the remaining full texts again independently, and the third reviewer was consulted should there be discrepancies in whether a paper should be included or not. We then reviewed the management methods used in the included literature.

While incomplete, our provisional results revealed that management often followed previous guidelines regarding anorexia nervosa. There is a clear desire in most cases to progress quickly from enteral feeding to a family-based treatment approach.

It is clear from our review that there is a vast amount of further research needed into how ARFID is managed. This is necessary in order to derive a clear protocol or guidelines for management, as the published literature in this area to date is sparse.

Presenting Author: Eamonn Byrne

Supervisor: Prof Fiona McNicholas

Co-Supervisor: Ms Niamh Doody and Dr Laura Ridgeway

117. CHILD MENTAL HEALTH EMERGENCIES PRE AND POST COVID-19 WITH A FOCUS ON LIAISON PSYCHIATRY

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We wish to examine the broad range of impact that COVID-19 has had on children and families. We want to document and describe the numbers and clinical profile of children presenting referred to the department of Paediatric Liaison Psychiatry for the duration of the COVID-19 pandemic.

This is a mixed methods study design that uses both qualitative and quantitative methods. The quantitative side involves a questionnaire called the COVID Impact Scale that measures the impact of COVID on the patients mental health. The qualitative side uses a completely anonymised existing database formed from routine assessment in the department to generate study data.

At the time of writing this I have not fully completed my study so the results section is sparse but it can be seen that the number of cases referred to Crumlin Hospital (Liaison Psychiatry) during the COVID Pandemic so far has reduced compared to normal months while out of hours admissions increased sharply.

It is difficult to make many firm conclusions before the study is complete but it is clear that the referral system in child psychiatry broke down during the pandemic and this put more pressure on the out of hours service and CAMHS in general.

Presenting Author: Niall McCaffrey

Supervisor: Prof Fiona McNicholas

Co-Supervisor: Dr Kieran Moore

118. PREVALENCE OF ANXIETY, DEPRESSION, POST-TRAUMATIC STRESS, AND BURNOUT IN HEALTHCARE WORKERS DURING THE COVID-19 PANDEMIC: A SYSTEMATIC REVIEW AND META-ANALYSIS

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While much of the focus of the COVID-19 attention has been on the physical sequelae, case numbers and mortality rates, there is growing attention on the longer-term psychological impact of the pandemic. Healthcare workers (HCWs) who face significant stressors are particularly at risk. We aimed to systematically review studies of anxiety, depression, post-traumatic stress, and burnout in HCWs during the pandemic to provide estimates of prevalence.

The databases PubMed, Psychinfo and Embase were searched before screening titles and abstracts followed by a full text review of included studies. This was followed by the extraction of data and an assessment of study quality. Pooling was performed where possible.

Anxiety prevalence was measured in 33 studies. Prevalence rates ranged from 7% to 61%. The Generalized Anxiety Disorder Scale (GAD-7) was the most common assessment tool used (13 studies). The pooled prevalence of those using this scale was 34% (95% CI 28% to 39%). Depression prevalence was measured in 33 studies. Prevalence rates ranged from 8.9% to 64.7%. The Patient Health Questionnaire 9 was the most common assessment tool used (15 Studies). The pooled prevalence of those using this was 33% (95% CI 23% to 43%). Post-Traumatic Stress was measured in five Studies. Prevalence rates ranged from 4.4% to 49.4%. Burnout was measured in five studies. Prevalence rates ranging from 12% to 76%.

One in three HCWs are experiencing anxiety and depression symptoms, with post-traumatic stress and burnout also common. This highlights the need for timely diagnosis, interventions, and adequate supports.

Presenting Author: Aidan Coombes

Supervisor: Dr John Hayden

Co-Supervisor: Prof Fiona McNicholas

119. THE USE OF TELEPSYCHIATRY IN IRELAND BEFORE AND DURING COVID-19: A SCOPING REVIEW

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The COVID-19 pandemic has precipitated the abrupt adoption of remote telemedicine services to compensate for the interruption of face-to-face psychiatric care. However, increased prevalence of this under-utilised tool has provided an opportunity to consider its potential in supplementing traditional in-person services. The purpose of this scoping review was to survey the extent, attitude and uptake regarding telepsychiatry in Ireland, before and during COVID-19, identify gaps in the literature and consider implications for future research.

This study addressed the gap in the literature using Arksey and O'Malley's six-stage methodological framework to conduct a scoping review examining telepsychiatry in Ireland, before and during COVID-19. Articles related to videoconferencing, teleconferencing and messaging were identified through searching six databases and data was synthesised narratively.

The author screened 718 articles, reviewed 26 full-text articles, and came to a consensus on 14 articles to include for data extraction. Face-to-face care was broadly replaced with telephone and videoconferencing services over the course of pandemic and was widely regarded as both feasible in implementation and satisfactory among psychiatrists and patients. Reported barriers to effective incorporation included matters of privacy, consent, safety, developing rapport and technological limitations while better access, flexibility, patient suitability, efficiency, convenience and facilitation of social distancing were cited as advantageous.

Rapid integration of telemedicine interventions has emphasised its importance and shown promise among stakeholders as a viable mode of delivery. However, future research is needed to address the barriers and investigate its scope for use in a blended approach to psychiatric care beyond COVID-19.

Presenting Author: Logan Arnold

Supervisor: Dr Blánaid Gavin

Co-Supervisor: Prof Fiona McNicholas

120. THE IMPACT OF COVID-19 ON MENTAL HEALTH PRESENTATIONS TO TEMPLE STREET CHILDREN'S UNIVERSITY HOSPITAL EMERGENCY DEPARTMENT

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On March 12th, 2020, the Irish government implemented disease containment measures due to the COVID-19 pandemic leading to widespread social isolation and absence of daily routine [1]. Evidence gathered after the SARS epidemic showed that 33.4% of quarantined children availed of mental health services due to anxiety and adjustment disorders, underscoring the impact of epidemics on paediatric mental health [2]. We carried out a prospective cohort study that aimed to highlight the impact of COVID-19 on paediatric mental health presentations to the Emergency Department (ED) at Temple Street Children's University Hospital (TSCUH).

ED mental health presentations from 2019 (n=79) and 2020 (n=60) were compared. Ten variables were prospectively gathered for presentations from March to April 2020 including – reason for ED presentation, preliminary diagnoses and prevalence of suicidal intent. We retrospectively reviewed presentations in the same time frame in 2019 and compared findings.

Results indicated a 24.1% decrease in ED mental health presentations in 2020. Deliberate self-harm presentations increased by 12.3% from

2019 to 2020. Amongst these, suicidal intent increased by 39.2%. Proportions of re-presentations to ED also increased by 38.9% in 2020. Furthermore, a 27.0% increase in ED presentations with two or more preliminary diagnoses was also seen in 2020.

These findings indicate higher numbers of complex presentations to this ED during the COVID-19 pandemic compared to the same timeframe in 2019. Further research is needed to explore the reasons for this, with a view to proactively manage these vulnerable cases, especially with the risk of further COVID-19 outbreaks.

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2. Sprang G. and Silman M. Posttraumatic stress disorder in parents and youth after health-related disasters. Disaster Medicine and Public Health Preparedness. 2013; 7(1): 105-110.

Presenting Author: Brigid Kemerer

Supervisor: Dr Ian McClelland

Co-Supervisor: Dr Sarah Casey

121. GIVING YOUNG PEOPLE A VOICE: THE IMPORTANCE OF FEEDBACK IN ADOLESCENT MENTAL HEALTHCARE

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There has been an exponential increase in adolescent mental health emergencies over recent years[1]. Research has shown that first impressions of mental health services have a profound impact on future help-seeking and recurrent self-harm[2]. Currently the HSE does not have a system to acquire feedback from adolescent patients about initial experiences of attending mental health services. This pilot study aimed to obtain feedback from mental healthcare specialists, adolescent patients, and carers about first contact with the St. Frances' Mental Health team in Temple St. paediatric hospital. An online survey was developed and distributed to the Mental Health team via SurveyMonkey. Paper surveys were developed and distributed to adolescent mental health patients and their carers. These surveys utilized Likert scales and open-ended questions. A literature review of relevant materials was also conducted. Out of 17 mental healthcare specialists, 94.12% responded that they strongly agreed it was important to get feedback from young people. A question about how much COVID-19 had impacted the ability to provide mental healthcare was opportunistically included, with 47.06% of staff responding "Very much". Out of 6 adolescent patients, 50% mentioned the importance of having conversations on topics besides their mental health. Other patient comments included initial feelings of nervousness, and the importance of inclusion in their treatment. Incorporating adolescent feedback into mental health treatment is crucial in order to optimize care. This could be especially important for directing future care, with the possible need to alter mental health practices due to restrictions relating to the COVID-19 pandemic.

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Presenting Author: Brenna McCormack

Supervisor: Dr Elizabeth Barrett

122. ANALYSING THE MERIT OF IRIS-PUPILLARY RATIO AS A NON-INVASIVE INDEX FOR STRESS IN WILD POPULATION OF TIGERS (*PANTHERA TIGRIS*)

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Tigers continuously face unprecedented existential threats such as poaching and habitat loss. Human disturbance, including tourism pressures, is a potential stressor leading to knockdown effects such as impaired reproductive performance.

To ensure the success of conservation projects; developing non-invasive techniques to assess animal welfare in wild tiger populations is essential. Assessing faecal glucocorticoid metabolite is a common non-invasive tool to measure stress. However, it is often difficult to trace back the sample to an individual animal. The pupillary diameter has shown success in captive populations as a marker of stress. Pupillary diameter is exclusively regulated by the autonomic nervous system. The assessment of pupil size (pupillometry) provides an indirect measure of sympathetic nervous system activity and thus an estimate of the degree of stress.

Digital photographs of wild tigers (n=72) were used to measure the iris-pupillary ratio (IPR) of both eyes using NIH Image-J software. Images were categorized into three groups, neonatal (NN), adults with normal physiology (ANP), and adult stress physiology (ASP). Oval selection tools were used to measure iris and pupil parameters of both eyes and the IPR were determined accordingly. The data were represented as Mean ± SD and compared by one-way ANOVA using the SSPS statistical analysis software. A statistically significant difference was found amongst ANP and ASP groups for both eyes.

The IPR index proves to be a useful non-invasive measure of stress in wild tigers. Therefore, it is a valuable tool to assess animal welfare which is essential for the success of conservation projects.

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Presenting Author: Fiona Sahyoun

Supervisor: Dr Arun Kumar

123. COMPARATIVE ANALYSIS OF RODENT AND PORCINE MODELS OF MYOCARDIAL INFARCTION

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Myocardial infarction (MI), commonly referred to as heart attack, occurs due to interruption of blood supply in the muscular wall of the heart called the myocardium. The cardiac muscle cells die if they do not receive an adequate supply of oxygen, which causes them to become infarct. [1]

Several animal models are commonly used to recreate the process of MI as it occurs in humans, which makes the synthesis of potentially usable information more difficult to interpret [2]. We aim to assess the implications and overall variability of infarct area measurement in animal models of MI. In this review, the infarct area values reported in murine and porcine studies of MI, were compared.

A PubMed search of publications from the last ten years identified 82 studies of MI that fit inclusion criteria for this study. The species groups of reported infarct values gave means of 37.60 ±11.96%, 41.20 ±13.55%, and 39.00 ±23.04%, respectively in the mice, rat, and swine groups. Analysis of the coefficient of variation for the group means and standard deviations, identified that the rodent groups show less distribution amongst infarct area values within each species dataset, compared with the porcine group.

The higher variability in the data of the porcine group versus the rodent groups, indicates that there are greater inconsistencies in the experimental designs and analyses in swine MI models. Comparison between animal models of MI revealed the universal need for more standardized methods of measuring infarct area in order to improve repeatability and production of translatable results.

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Presenting Author: Skylar LaManna

Supervisor: Dr Arun Kumar

Co-Supervisor: Mr David Kilroy

125. REFLECTION IN PRACTICE: WHAT DO PAEDIATRIC PHYSICIANS REPORT REGARDING PERCEIVED SKILLS, WELL-BEING AND BARRIERS IN ATTENDING PILOT REFLECTIVE PRACTICE GROUPS

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Reflective practice is a well-evidenced intervention to promote physician well-being. Doctors encounter challenging cases and professional interactions daily and may not discuss their emotional impact due to a lack of appropriate outlet. The 2017 report on the National Well-being of Doctors suggested a climate of ever-increasing burnout rates, and scarce action has since been taken to create relevant supports. This study aims to gather and interpret pooled baseline data of perceived skills, well-being and professional environment of trainees while participating in reflective practice groups.

Four successive cycles of reflective practice groups were offered to doctors in training in general paediatric hospitals in the Dublin region. Each cycle was composed of six one-hour monthly sessions, facilitated by two experienced co-leaders. An online study-specific questionnaire collected physicians' perceptions of the intervention using SurveyMonkey. Data was analysed with SPSS 24.0.

28 Non-Consultant Hospital Doctors responded to the questionnaire. Details were given regarding work environment, confidence in their skills and reflection perspectives. Most participants were women (68%, n=19), aged 31-35 years old (50%, 14). 67% have contact with patients most of the time. 40% never manage junior staff. 88% worked in mostly good teams. Post-cycle, 84% of doctors felt they could manage traumatic events most of the time, compared to only 50% pre-cycle.

This is the first study of reflective practice in children's hospitals in Ireland. Baseline data suggests the existence of systemic shortcomings and the need to implement such a support widely. Future directions may explore alternative methodologies to minimise barriers to attendance.

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Presenting Author: Teodora Bandut

Supervisor: Dr Elizabeth Barrett

Co-supervisor: Dr Claire Kehoe

126. A REVIEW OF PHYTOCHEMICALS FOUND IN VARIOUS PARTS OF CALOTROPIS GIGANTEA

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Calotropis gigantea is a shrubby plant used traditionally in many cultures for the treatment of a wide range of diseases affecting the nervous and digestive systems, and skin[1]. Considering this, its different parts must offer various phytochemicals which can be isolated and investigated further for the bioactivities and pharmacological properties they offer. The aim of this research was to (a) investigate phytochemicals present in different parts of the plant and (b) investigate if they offer any bioactivity in animals or cells.

A systematic literature search was performed using PubMed, GoogleScholar and PubChem with no set time limit restriction with the keyword 'Calotropis gigantea'. PubMed yield 452 articles of which 25, and GoogleScholar 8960 articles of which 16 were included in the review. Compounds found were segregated depending on whether they came from the leaves, stem, roots, flowers, fruits or other parts of the plant like its latex.

The majority of phytochemicals belong to the cardenolide, uscharin and calotropin families. They are dominant in the leaves, followed by fruits and other parts of the plant such as the latex. Many of them have enantiomers and/or stereoisomers which have been investigated for pharmaceutical properties. Main bioactivities exhibited are cytotoxicity, cell-cycle arrest and oxidative stress which are effective against pure cancer cell lines. Anhydrosophosphoradiol-3-acetate, frugoside and rutin are exclusively anti-cancer compounds[2] found in the latex, flowers and leaves.

The results demonstrate that C.Gigantea includes many bioactive phytochemicals which show potential to be further evaluated for medicinal use, such as development into anti-cancer agents.

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Presenting Author: Zahra Khosravi

Supervisor: Dr Arun Kumar

127. ASSESSMENT TOOLS FOR REFLECTIVE PRACTICE USED IN MEDICAL AND VETERINARY EDUCATION AND THE REFLECTIVE PROCESS OF RESEARCHING FOR WRITING A LITERATURE REVIEW

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Veterinary students who engage in reflective practice can enhance their learning process and thus make improved decisions as clinicians. Assessing reflective practice in veterinary education programs is important to provide feedback, and to aid in the development of clinical and personal skills. Reflection is also widely used in medicine and nursing programs, as it holds value for training future health care providers. Taking into consideration that reflective practice is used in veterinary, medical, and nursing education, assessment is essential. The aim of this project was three-fold: 1) to explore literature for validated assessment tools in veterinary medicine, moving to a broader review of medicine if none were found, 2) to learn the process of conducting a structured literature review framed to answer a specific research question, and 3) to learn about reflection and the process of learning.

The systematic review process was broadly followed by defining the research question. A search strategy was developed and entered into three databases, followed by the screening of titles and abstracts. The full text of each paper was retrieved and currently, the project is in the stage of assessing the quality of each paper.

Student reflection is customarily assessed by its quality and depth. However, there is limited evidence of validated assessment tools for reflective practice in veterinary and medical education, necessitating further research. The second aim of the project has been successful in that it allowed learning of the process to occur and in so doing, also naturally inspired reflective practice.

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2. Holder NAKA, Sim ZL, Foong CC, Pallath V. Developing a reflection guiding tool for underperforming medical students: An action research project. Tuning J High Educ. 2019;7(1):115–63.

Presenting Author: Lea Rice

Supervisor: Dr Emma O'Neill

Co-Supervisor: Dr Robin Farrell

128. THE AVAILIBILITY OF PRIMARY DATA IN PUBLISHED PAPERS DURING COVID-19

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Sharing of primary research data is critical in advancing knowledge, it provides a mechanism for review and verification of findings and enables meta-analyses. The need to share primary research findings is even more acute during the global covid-19 pandemic. The Research Data Alliance has called for the open sharing of research data, to better equip us in the fight against COVID-19. In this study I have sought to determine whether sharing of primary research data is occurring.

Methods: A structured review was conducted by searching the literature across COVID-19 Clinical Trials, Diagnostic and Observational Studies. Eligible articles were reviewed to determine 4 critical characteristics:

1) Primary Data Available.
2) Primary Data Available to download.
3) Data Sharing mentioned in article.
4) Summary tables included.

A PRISMA flow chart was constructed for each data set.

Of the 788 identified articles, 50 reported clinical trial primary data and only 8 had primary data available for download, whilst 26 mentioned data sharing. For diagnostic studies 383 articles were reviewed of which 73 reported primary data. It was noticeable that a relatively small proportion (11/73) had the data available for download. In the case of observational studies 23% of eligible publications had primary data sharing available.

The data shows that whilst significant publication output has been produced in the setting of covid-19, many authors are not making primary clinical data available for download. This may hinder progress and contribute to research waste, which we can ill afford in the pandemic setting.

Presenting Author: Sabir Khan

Supervisor: Prof Peter Doran

129. INADEQUATE ADHERENCE TO THE IRISH DEVELOPMENTAL DYSPLASIA OF THE HIP (DDH) SCREENING PROGRAM'S RECOMMENDATIONS REGARDING TIMING OF ULTRASOUND SCREENING AND REASONS FOR REFERRAL

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DDH comprises a spectrum of hip pathology affecting approximately 1-3% of babies to some degree. DDH can be detected up to 3 months of age. Undetected, uncorrected DDH can lead to avoidable disabling problems in adulthood [1,2]. In 2017, the national selective ultrasound screening programme was implemented in nineteen maternity units across Ireland. This retrospective clinical audit aimed to evaluate the accuracy and appropriateness of the programme regarding incidence of DDH, timing of ultrasound scan (recommended at 6 weeks of age) and reason for referral (recommended risk factors: first degree, family history, breech presentation, positive clinical examination).

5121 DDH referrals and reports of infants born in 2019 were collated from ten hospitals across Ireland (2464 from the four Global Diagnostics (GD) sites). Electronic neonatal and radiological databases and medical records on the National Integrated Medical Imaging System (NIMIS) were reviewed to collate data aligning with the key performance indicators (KPIs) of the DDH Screening Programme.

Analysis of the GD sites demonstrate that 8.79% of screening results are positive for DDH (type IIa or worse); this proportion is relatively low compared to the expected 20% catch-rate. 11.9% of newborns screened in 2019 did not have a recommended risk factor according to the national programme (underestimation of real value as abnormal clinical examination results other than dislocatable hips which do not warrant screening are excluded).

The results identify the need to further review imaging protocols and practice at the designated screening centres to reduce inappropriate referrals and delays in imaging.

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Presenting Author: Aisling Walsh
Supervisor: Dr Marie-Louise Ryan
Co-Supervisor: Mr Kevin Cronin

130. A COMPARISON OF COMPUTED TOMOGRAPHY (CT) JUSTIFICATION PRACTICES BETWEEN CORE HOURS AND ON-CALL HOURS IN IRISH CT CENTRES

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Radiation dose from CT scans are among the highest in diagnostic medical imaging. In Ireland, CT scans account for 5.7% of examinations but contribute to 55% of the collective dose (1). Legally, CT examinations have to be justified in order to avoid exposing patients to unnecessary and high radiation doses. In addition, resources in the HSE are stretched and appropriate use of CT is crucial to avoid unnecessary waiting lists and maximise efficiency.

The purpose of this study was to audit justification of the most common CT examinations in a sample of Irish CT departments, during standard working and on-call hours. CT referrals (of 6 different exam types) were randomly sampled from a three-month period in 2019 from five hospitals. Experienced radiographers assessed referrals for adequate completion and justification in accordance with UK iRefer guidelines (2). Each referral was further assessed by a consultant radiologist for justification in an on-call setting.

1158 CTs were reviewed, 488 of which were performed on-call. 11% of exams were not justified- 12% during working hours and 9% during on-call times. Justification per anatomical region varied widely- 28% of CT pulmonary angiogram scans were unjustified, compared to 3% of Kidney, Ureter and Bladder CTs. 37% of scans were deemed inappropriate for completion during on-call hours.

Notable differences exist in CT justification between working and on-call hours and among different examination types. Continued efforts in justification can save both resources and unnecessary radiation dosage. Further analysis is on-going and will be presented in the poster.

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Presenting Author: Anne Dowley
Supervisor: Dr Marie-Louise Ryan
Co-supervisor: Dr Shane Foley

131. DEFINING NON-PATHOGENIC NEAREST RELATED CONTROLS FOR A SERIES OF PATHOGENS TO BUILD A SOFTWARE FOR PATHOGEN DETECTION

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When researchers sample the environment (water, waste, etc.) and run metagenomic data through novel computer methods, the goal is to correctly identify the species present and known pathogens. To ensure software methods do not classify harmless related organisms as "dangerous", we are building simulated datasets of serious pathogens and their nearest relatives to blend with metagenomic data to test the novel methods. The specific purpose of this research was to identify control relatives for pathogens including *Bacillus anthracis, Clostridium botulinum,* and *Yersinia Pestis*.

Pathogens selected contain specific, diverse virulence factors that enable severe human disease. For example, LF, EF, PA, and a polyglutamyl capsule are necessary factors for *Bacillus anthracis* contained within plasmids pXO1 and pXO2[3], while *Clostridium botulinum* requires one neurotoxin encoded within a 150kDa polypeptide chain in its singular chromosome[4]. Evidence of strain mutation or horizontal gene transfer may reduce the potency of or silence pathogenic behavior, proving ideal candidates for control selection.

Identification of controls required use of literature search, genomic database search, and comparative genomic studies interpreting phylogenetic analyses. Control selection was complicated by: environmental availability (non-laboratory), completeness of genomic sequence, genetic distance to selected pathogens, availability of research specific to strains.

At least one control was identified for each pathogen. More than one was selected for pathogens (*Clostridium botulinum)* where permutations of the virulence factor enabled phylogenetic clade distinction and variable disease outcomes. Control organisms mostly remained within the same species/genus as that of the selected pathogen with >90% genomic similarity in most cases.

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Presenting Author: Farhana Nabi

Supervisor: Prof Denis Shields

Co-Supervisor: Ms Olateju Idowu

132. DESIGNING AN E-HEALTH PORTAL FOR THE PATIENT VOICE IN CANCER RESEARCH TO PROMOTE PUBLIC AND PATIENT INVOLVEMENT IN RESEARCH ACROSS ACADEMIC AND PATIENT COMMUNITIES

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The Patient Voice in Cancer Research (PVCR) grew from an "*unmet need"* to involve the voices of cancer patients and their families with the scientific research process. To bring the PVCR in line with Public Patient Involvement (PPI) initiatives internationally, a dedicated, engaging website was drafted as a vital communication tool.

A literature review of international PPI websites (Canada, Europe, UK) and attendance at the annual PPI Summer School (University of Limerick) were undertaken. A consent form and interview questions for PVCR Committee Members were designed and interviews conducted with cancer patients (6) and researchers (5) to develop 11 informative / reflective profiles. The National Adult Literacy Agency guidance was sought concerning requirements for obtaining a *Plain English Mark,* in line with international standards.

The profiles and transcripts have been reviewed, and permission granted for use in the PVCR website, social media and a manuscript for peer review entitled '*Could You Give Us An Idea On What We Are All Doing Here?*'. This paper documents the PVCR journey from initiation to involvement nationally. and is being prepared for the journal, *Research Involvement and Engagement.*

The PVCR are paving a new path in PPI in cancer research in Ireland. This research included assimilating **(i)** a reflective insight into the motivation and impact of PVCR membership since its initiation in 2016 and **(ii)** the vision of patients and researchers for PPI and its importance in advancing cancer research; crucial aspects for the PVCR website.

Acknowledgement:

Presenting Author: Aoife Gordon

Supervisor: Prof Amanda McCann

Co-Supervisor: Ms Elaine Quinn

133. EXTRACELLULAR VESICLES IDENTIFIED IN PATIENTS WITH TRIPLE NEGATIVE BREAST CANCER REVEAL POTENTIAL RECURRENCE RISK SURVIVAL SIGNATURES

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Triple negative breast cancer (TNBC), is a particularly aggressive subtype of breast cancer, accounting for ~10% of breast cancer presentations. Following the previous identification of the proteomic signature of extracellular vesicles/ exosomes harvested from the plasma of patients with metastatic TNBC, the objective of this study was interrogate these key proteins in publicly available survival data sets namely, BreastMark, Kaplan-Meier plotter and Breast Cancer Gene-Expression Miner.

The Oncomine platform was used to compare mRNA expression levels of our proteins of interest in TNBC with other biomolecular subtypes. Following this the proteins found in TNBC EVs were investigated for their role in survival using Kaplan-Meier survival curves & univariate Cox proportional hazard models using our three publicly available databases as detailed.

Comparative analysis found eleven proteins investigated, to have a fold change in mRNA of 1.5 and a p-value of < 0.05, indicating overexpression in TNBC vs other molecular biomarkers. Survival analysis identified several TNBC patient proteins that had an association with a shorter relapse free survival (RFS). Specifically, dermcidin (DCD), tenascin (TNC), Tubulin beta-2A chain (TUBB2A), keratin (type II cuticular) (KRT8) and junction plakoglobin (JUP) were associated with a shorter time to recurrence when present at increased mRNA expression levels. Higher expression of Desmoglein-1 (DSG-1) correlated with a reduced risk of distant metastasis.

Open access database may be useful in identifying functionally relevant proteomic signatures and further research is needed to investigate the potential role of proteomic EV signatures as prognostic biomarkers for mTNBC.

Presenting Author: Shane Evans

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Co-Supervisor: Ms Elaine Quinn

135. CONDUCTING A LITERATURE REVIEW TO EXPLORE THE USE OF VALIDATED ASSESSMENT TOOLS FOR EVALUATING AND ENCOURAGING REFLECTIVE PRACTICE IN MEDICAL AND VETERINARY EDUCATION

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Reflective practice in medical and veterinary education is not only critical for the development of clinical skills and medical knowledge, but it is integral to the development of professionalism. By providing students with the opportunity to think critically and hone the perception of their own learning, reflective practice can help them to become better prepared for the variety of challenges they are likely to face throughout their career [1].

The primary goal of this project was to conduct a literature review to establish the availability of validated tools for the assessment of reflective practice in medical or veterinary education. The secondary goal was to develop evidence-based practice skills by conducting a structured literature review by following and learning the systematic review process. This process entails the collection of evidence based on a research question and structured search strategy. Following this, critical appraisal of the available literature confirms its validity and relevance to the question, allowing the generation of data and creation of a summary document addressing the question.

Whilst this process identified an overall lack of validated assessment tools for use in medical or veterinary education, it has identified a clear research area for this work, proving valuable background knowledge.

In summary, there have been two distinct outcomes from this project; firstly, confirmation that there are currently no validated reflection tools utilized in veterinary curricula, and secondly, that this project has been a tremendous learning opportunity for me personally and an excellent starting point for future research.

Reference:

1. Holder NAKA, Sim ZL, Foong CC, Pallath V. Developing a reflection guiding tool for underperforming medical students: An action research project. Tuning J High Educ. 2019;7(1):115–63.

Presenting Author: Caroline Spangenberg
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136. BURNOUT AMONG NON CLINICAL STAFF WORKING IN CHILD AND ADOLESCENT MENTAL HEALTH SERVICES (CAMHS)

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Burnout (BO) has become a common workplace occurrence amongst medical practitioners. To date, no research has sought to study the effects of these environments on the non clinical staff who are exposed to many of the same stressors as clinical workers.

The aim of this study was to identify and quantify BO among non-clinical staff working in CAMHS.

A study specific questionnaire, which included the Copenhagen Burnout Inventory (CBI), was administered to clinical and non clinical staff in 5 CAMHS clinics. Fifty-nine respondents, including 13 non-clinical staff (administrative/support staff) completed the anonymous questionnaire.

Descriptive statistics were employed for results analysis. Low-moderate scores of personal burnout (PBO) (Non-clinical [n=13], CBI PBO = 46.18%, Clinical [n=27], CBI PBO = 47.53%) and work related burnout (WRBO) (Non-clinical [n=13], CBI WRBO=49.73%, Clinical [n=27], CBI WRBO=50.13%) were identified amongst staff.

Non-clinical staff working <5years in CAMHS scored higher for PBO than those working >5 years. 69.2% of non-clinical staff had no BO/Stress reduction training in their job and only 7.7% [n=1] would definitely choose to work in CAMHS again, compared to 25.9% [n= 7] of clinical staff.

The prevalence of personal and work related burnout among non-clinical staff was found to be in line with that identified amongst clinical staff working in the same services. These exploratory findings have serious implications for service provision as BO amongst clinicians has previously been linked with job dissatisfaction and negative attitudes towards service users.

Presenting Author: Laura Joyce
Supervisor: Prof Fiona McNicholas
Co-Supervisor: Ms Niamh Doody

137. BURNOUT IN CAMHS CLINICAL WORKERS PRIOR TO THE COVID-19 PANDEMIC

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Prior to COVID-19 mental health services were overstretched, with physician burnout being a well-documented phenomenon in psychiatry, linked to under resourcing, excessive workload, and recruitment & retention difficulties[1]. A surge in mental illness due to the pandemic is being documented in the Irish population risking increased burnout in psychiatric clinicians[2].

The aim of this study is to establish baseline burnout in CAMHS clinical workers prior to COVID-19, allowing for future post hoc comparison.

Hard copy data on 59 CAMHS employees (44% response rate) was collected over 3 months at the end of 2019 on burnout (CBI & MBI), career satisfaction, effort reward imbalance, and perceived social support. Descriptive statistical analysis and bivariate correlations were performed in SPSS on data pertaining to 27 self-indicated clinical workers.

Clinicians who have worked for more years tend to have higher mean CBI subscale scores. A similar trend exists for effort reward ratios shifting from rewards to an effort imbalance. A moderate correlation exists between effort reward ratio and years in CAMHS (r=0.497, n=27, p<0.001).

Limitations of this study include: 32% of respondents not indicating their area of work, preventing their inclusion in the analysis, a clerical error preventing the scoring of MBI and the low response rate, namely in respondents working less than 10 years in CAMHS impacting results statistical validity.

Clinical workers displayed burnout prior to COVID-19, notably individuals with over 10 years' experience were the most affected. Post hoc research is warranted on burnout levels during and after COVID-19 in Ireland.

References:

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Presenting Author: Imogen Fleischman
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138. THE IMPACT OF COVID-19 ON MEDICAL STUDENTS

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The COVID-19 pandemic has prompted unprecedented global disruption. For medical schools, this has manifested as examination and curricular restructuring as well as significant changes to clinical attachments. With the available evidence suggesting that medical students' mental health status is already poorer than that of the general population, with academic stress being a chief predictor, such changes are likely to have a significant effect on these students.[1] This study aimed to examine the effects of the COVID-19 pandemic on the mental wellbeing of medical students in Ireland.

An online, cross sectional survey was disseminated via email to 760 medical students at University College Dublin. The questionnaire is comprised of 42 questions. Quantitative and qualitative analyses were performed.

Respondents totalling 260 completed the survey (response rate: 26.3%). Of participants, only 9.1% reported experiencing no stress, with other students reporting some variation of stress (from mild to extreme). A significant difference ($p \leq 0.05$) was noted between reported stress and gender as well as nationality. The difference of stress scores was also not significant between the different years of study nor between undergraduate and graduate entry students. A significant association was also noted between reported stress and transition to online learning ($r = 0.161$) and assessment ($r = 0.169$).

This study highlights the effects of COVID-19 on the mental status of medical students. The relationship between stress and the transition to online learning highlights the importance of institutional planning in the incorporation of students' needs while transitioning to virtual space.

Reference:

1. Voltmer E, Kötter T, Spahn C. Perceived medical school stress and the development of behavior and experience patterns in German medical students. Med Teach [Internet]. 2012 Aug [cited 2020 Aug 6];34(10):840 - 847. Available from: https://pubmed.ncbi.nlm.nih.gov/22917267/

Presenting Author: Lim You Xin
Supervisor: Prof Fiona McNicholas
Co-supervisor: Dr Blánaid Gavin and Dr Lorcan O'Byrne

139. DO NOT ATTEMPT RESUSCITATION DECISIONS FOR OUT OF HOSPITAL CARDIAC ARREST: A SCOPING REVIEW

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Cardiopulmonary resuscitation (CPR) is frequently attempted when cardiac arrest occurs. In the right context it can reverse the dying process. However, CPR can also prolong suffering, inflict pain, and deprive an individual of a dignified death (1). A 'Do Not Attempt Resuscitation' (DNAR) directive signifies that CPR should not be carried out if cardiac arrest occurs. Such directives and their associated decision-making have previously been explored in hospital settings, but less so in the community (1). We undertook a scoping review to map the current literature considering DNAR decisions/directives for out-of-hospital cardiac arrest to inform a follow-on empiric research project.

We employed the six-stage scoping review framework developed by Arksey and O'Malley (2).

Our research questions were:

1. How are do-not-resuscitate directives/ decisions implemented in the community setting?
2. What are the barriers to and facilitators of implementation?
3. Are there any unintended consequences?

Our search of Pubmed (MEDLINE), CINAHL and the Cochrane Library in June 2020 identified twenty-eight studies that met our inclusion criteria. The included scientific literature was mapped around 6 themes: (i) DNAR/Advance directive formulation and application, (ii) Resuscitation decision making, (iii) Ethics, (iv) Policy and protocols, (v) Barriers and (vi) Consequences. We considered the above themes in the context of a temporal model where DNAR decisions may be formulated in advance of cardiac arrest occurring and/or applied when an event occurs. Barriers can arise at various stages and both formulation and application may involve complex decision making considering ethical principles, clinical circumstance, policy, protocols, and the law.

References:

1. Perkins GD, Griffiths F, Slowther A-M, George R, Fritz Z, Satherley P, et al. Do-not-attempt-cardiopulmonary-resuscitation decisions: an evidence synthesis. Health services and delivery research. 2016;4(11):1-154.
2. Arksey H & O'Malley L. Scoping studies: towards a methodological framework. International Journal of Social Research Methodology. 2005; vol 8(1);19-32.

Presenting Author: Mohammed Elfaki
Supervisor: Dr Tomas Barry
Co-Supervisor: Dr Geoff McCombe

140. TRANSITION FROM CHILD TO ADULT SERVICES FOR CHILDREN WITH 22Q11DS AND THEIR PARENTS: A SYSTEMATIC REVIEW

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22q11 Deletion Syndrome (22q11DS) is a rare genetic disorder affecting around 1 in 4000 people[4] and is caused by a chromosomal microdeletion leading to underdevelopment of several body systems. The strength of the association between this syndrome and multiple physical and psychiatric disorders is well recognised. However, it is only in more recent years that attention has been drawn to the question of adequacy of health services provided to patients that successfully meet their complex needs at a time of transition from childhood to adulthood. To date, patients have reported a lack of information transfer between general health services during this period, further exacerbated by the speech difficulties and intellectual disabilities many of them are affected by.[5]

The aim of this project is (a) to provide thorough review of the current literature in this field (b) to highlight areas that require improvement in the transfer of patients between paediatric and adult service and (c) to make recommendations for change.

A systematic search was conducted across electronic databases and grey literature using relevant MeSH search terms. Two reviewers independently applied inclusion criteria and screened 362 articles for eligibility. Data was selected and extracted from 9 studies and assessed using the Cochrane risk of bias tools. Narrative synthesis of findings was then undertaken as these studies were found to be too varied to allow for meta-analytic techniques.

Our findings demonstrate poor data-sharing and fragmented medical and educational services especially during transitional periods. There is need to improve education on 22q11DS and develop integrated services and care pathways.

References:

1. McDonald-McGinn DM, Sullivan KE. Chromosome 22q11.2 deletion syndrome (DiGeorge syndrome/velocardiofacial syndrome) Medicine (Baltimore) 2011;90(1):1–18.

2. Kerin L, Lynch D, McNicholas F. Participatory development of a patient–clinician communication tool to enhance healthcare transitions for young people with 22q11.2. Irish Journal of Medical Science (1971 -). 2019;189(3):761-769.

Presenting Author: Stephanie Greenan

Supervisor: Prof Fiona McNicholas

Co-Supervisor: Dr Daniel Leahy

141. RATES AND MANAGEMENT OF HYPERPROLACTINEMIA IN CHILDREN AND ADOLESCENTS ON ANTIPSYCHOTIC MEDICATION

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The prescription of antipsychotic medication is becoming increasingly common in child & adolescent psychiatry. Hyperprolactinemia is a potential side effect of treatment. Patients may present clinically with gynecomastia, decreased bone mineral density & menstrual disturbances. Through this review, we aimed to examine the rates of hyperprolactinemia in children treated with antipsychotics & evaluated management strategies used to treat hyperprolactinemia.

A systematic review of the literature was conducted using electronic databases PubMed, PsycINFO & EMBASE. Inclusion criteria: studies published between 1995-2000, patients < 18 & following a quantitative research design. 21 studies addressing incidence & management of hyperprolactinemia in children taking antipsychotic medication were identified & included in our review.

Included studies reported a high prevalence of antipsychotic-induced hyperprolactinemia. Risperidone was associated with the highest risk of hyperprolactinemia[1]. The risk of hyperprolactinemia appeared to be a dose-related phenomenon. In terms of management, clinicians should assess serum prolactin levels before and during treatment with antipsychotics. Adequate evidence suggests antipsychotic dose reduction and/or switching to a prolactin sparing agent such as Aripiprazole. The included studies also found that using a dopamine agonist such as Cabergoline could help to reduce the risk of hyperprolactinemia[2].

Antipsychotic use amongst children is associated with hyperprolactinemia & potential long-term consequences that can seriously affect quality of life. The treatment of antipsychotic-induced hyperprolactinemia should be personalized, with consideration given to antipsychotic dose reduction, use of dopamine receptor agonist and/or switching to a prolactin sparing agent. This review hopes to guide management strategies to be used in future clinical work.

Reference:

1. Masi G, Mucci M, Pari C. Children with Schizophrenia. CNS Drugs. 2006;20(10):841-866

2. Roke Y, van Harten P, Boot A, Buitelaar J. Antipsychotic Medication in Children and Adolescents: A Descriptive Review of the Effects on Prolactin Level and Associated Side Effects. Journal of Child and Adolescent Psychopharmacology. 2009;19(4):403-414.

Presenting Author: Cathal Darby

Supervisor: Prof Fiona McNicholas

Co Supervisor: Dr Kristen Maunder

142. THE DEVELOPMENT OF A NOVEL DEVICE TO SUPPORT THE USE OF DR DETECTORS IN RADIOGRAPHY PRACTICE

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Digital radiography (DR) detectors are removed from their normal X-ray housing when imaging patients who require modified examinations e.g. imaging patients in wheelchairs or trauma situations, with a subsequent increased risk of damage to the DR detector. A flexible supporting prototype was to be developed with the aim of stabilizing the DR detector outside of its routine housing for: antero-posterior (AP) chest x-ray, horizontal beam lateral and "skyline" knee projections.

Prototype components needed to remain outside the area of investigation and be fully supportive of the DR detector for use in portrait and landscape positions. The prototype needed to be lightweight, easy to transport and facilitate efficient positioning by the radiographer. The device was required to be chemically resistant to allow for repeated cleaning with Actichlor and Cliniwipes and facilitate cleaning between consecutive patients.

A prototype was developed, using an off-the-shelf monitor arm and a 3D printable hook component. The monitor arm could hold a maximum weight of 10kg: the Carestream detector (3.63kg) and the detector holder (3kg) had a combined weight of 6.63kg. A range of motion was possible at the 3 joints (180, 360 and 360 degrees), allowing for a sufficient degree of flexibility. The hook component was 3D printed and attached to the off-the-shelf monitor arm.

The device was tested and demonstrated particular potential for AP chest imaging for patients in wheelchairs. Further research is warranted to improve the prototype design for X-ray table use and radiographer feedback was collated to inform further development.

Presenting Author: Emily Conroy

Supervisor: Prof Louise Rainford

Co-Supervisor: Assoc Prof Eoin O'Cearbhaill

143. DELIBERATE SELF-HARM AND SUICIDE IN CHILDREN AND ADOLESCENTS IN IRELAND: A SYSTEMATIC REVIEW

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Deliberate Self-Harm (DSH) and Suicide in children and adolescents is a serious problem. Suicide is among the leading causes of death in adolescents and is often preceded by DSH. No published work has systematically examined all published material on the prevalence of DSH and suicide in Irish under 18-year-olds. This project aims to address that gap in the literature.

MEDLINE and PsycInfo databases were systematically searched for studies on DSH, Suicide, and attempted suicide in people under age 18, in the Republic of Ireland. Two authors independently conducted screening for eligibility and data extraction.

We found 15 papers specifically focusing on our question. The overall findings are concerning. A typical finding was that 4.4% of male children, and 13.4% of female children, had self-harmed in their life. Females self-harm 2-3 times more often, yet male children kill themselves at almost 5 times the rate that females do. Hanging is generally the preferred method of suicide for males, while overdose is the most common in females. The findings also indicate this problem is growing: Suicide rates rose from the mid-1990s to the mid-2000s; from 9.3 to 13.5 per 100,000 population for males under age 18, and from 2.4 to 5.1 per 100,000 population for females under age 18.

The findings indicate a significant portion of the <18 year old population of Ireland are at risk of attempting both SH and Suicide, and that the rates of occurrence are growing. This problem is clinically significant and requires both ongoing research and more clinical intervention. This review hopes to display the relatively wide prevalence of Self-Harm in Irish youth, as, the more accurate data that is available, the better service planning for youth who Self-Harm will be. This is particularly important as many children who die by suicide have prior Self-Harm in suicides. Consequently, this review hopes to encourage better and easier access to Self-Harm services with the ultimate aim of reducing suicide rates.

References:

1. Madge N, Hewitt A, Hawton K, Wilde E, Corcoran P, Fekete S et al. Deliberate self-harm within an international community sample of young people: comparative findings from the Child & Adolescent Self-harm in Europe (CASE) Study. 2020.

2. Kevin M M, Seamus M, Quinlivan L, Fiona M. Suicide in children over two decades: 1993-2008. Irish Medical Journal. 2012;105(7):231-3.

Presenting Author: Cormac O'Connell

Supervisor: Prof Fiona McNicholas

Co-Supervisor: Dr Daniel Leahy

145. CLINICAL GUIDELINES FOR TELEPSYCHIATRY IN CHILD AND ADOLESCENCE: A SCOPING REVIEW

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Telepsychiatry is the process of providing psychiatric care through digital media, often using videoconferencing. There has been a huge shift to telepsychiatry necessitated by COVID-19 and many psychiatrists have limited experience in the field of telepsychiatry. The approach to providing effective telepsychiatry care differs from psychiatric care, therefore, guidelines are required to ensure optimal practice. The aim of this research is to carry out a scoping review of clinical guidelines in telepsychiatry in child and adolescence and to produce evidence based clinical guidelines based on the findings.

The scoping review was carried out using the Arksey and O'Malley framework. An eligibility criterion was created. Studies were included if they covered the child and adolescent population and described either telepsychiatry, telepsychology or telemental. Studies were excluded if they explicitly covered telemedicine. Relevant articles were identified by searching the Pubmed and Psycinfo databases using the search strategy: (Child OR Adoles* OR Youth OR Toddler OR Infant) AND (Telepsychiatry OR Telepsychology OR Telemental).

The titles and abstracts were screened, followed by a full text screening and the data was charted. In total, 8 publications were charted.

The publications contained common essential clinical guidelines required for effective telepsychiatry practice. For example, knowledge of federal and state laws are essential to provide appropriate legal care to youth [1]. Stable connection is important to observe subtleties in child's speech, facial expression and movement and therapeutic alliance with the child or adolescent is important to keep them engaged and to establish trust [1].

Reference:

1. McGrath J. ADHD and Covid-19: Current roadblocks and future opportunities. Irish Journal of Psychological Medicine. 2020;1–22.

Presenting Author: Karan Dhand

Supervisor: Prof Fiona McNicholas

Co-supervisor: Dr Blánaid Gavin

147. LOW-COST PERIMORTEM CAESAREAN SECTION MODEL FOR SIMULATION BASED TRAINING IN EMERGENCY MEDICINE

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Each year approximately 1 in 30,000 pregnancies are complicated by maternal cardiac arrest [1]. The clinical consequences of this are potentially devastating and require a skilled clinical team. Globally, professional medical organizations recommend perimortem caesarean delivery (PMCD) in gravid women with a fundal height palpable at or above the umbilicus if there is no response to high-quality cardiopulmonary resuscitation (CPR) within four minutes of maternal collapse. PMCD may improve resuscitative efforts and may save the life of the mother and the foetus.

To determine best practices, recommendations from obstetric and emergency medicine (EM) professional societies on the provision of high-quality CPR during maternal cardiac arrest, including the use of PMCD, were reviewed. Existing PMCD simulation models in peer-reviewed, published literature were compared following a comprehensive search of PubMed, EMbase, Cochrane Library collection databases. Unpublished models shared on simulation based medical education (SBME) online discussion boards were also considered.

Nine reports on simulation based models were included. Acceptability by end-users, application as a teaching tool, cost and durability of materials were compared. The simulation model built was incorporated into the existing EM simulation curriculum after seeking expert feedback from obstetrics staff.

As the relative success of interventions is time-sensitive and cases often present with little warning for obstetric and emergency staff, simulation based learning utilising task trainers, case files, and high-fidelity models is an effective way to reduce knowledge deficits in learners. SBME improves technical and interpersonal skills to increase efficiency and effectiveness of the emergency response team [2].

References:

1. Campbell T, Sanson T. Cardiac arrest and pregnancy. Journal of Emergencies, Trauma, and Shock. 2009;2(1):34-42. doi: 10.4103/0974-2700.43586.
2. Preparing for clinical emergencies in obstetrics and gynecology. Committee Opinion No. 590. American College of Obstetricians and Gynecologists. Obstet Gynecol 2014;123:722–5.

Presenting Author: Fiona Byrne

Supervisor: Dr Andrew Musits

148. A SYSTEMATIC SCOPING REVIEW MAPPING THE CURRENT EVIDENCE OF DESIGN THINKING INTERVENTIONS FOR HOMELESS POPULATIONS.

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Homelessness is not only a housing issue, it is a complex public health issue resulting in poorer outcomes for health and wellbeing[1]. To date few solutions for homelessness include the input from key stakeholders (i.e. those who are homeless). Due to the multifaceted impact of homelessness, a systems lens is required to seek solutions. Design thinking or 'human-centred' approaches prioritize collaborative working and valuing user needs[2] and feedback. This review considered the current evidence base for the use of design thinking interventions to address homelessness.

A systematic scoping review of five databases (Pubmed, ASSIA, CINAHL, EMBASE, PsycInfo) and grey databases (Open Grey and Google Scholar) was completed. The titles and abstracts of 1874 articles were independently screened by two reviewers using Covidence software and full-text screening of 103 papers was achieved. In total we include 9 studies for data extraction and a narrative review of emergent evidence is reported.

Evidence from four countries: USA (5); Australia (2); Canada (1) and South Africa (1) was identified. Of the nine studies included, design thinking interventions were adopted for health, housing and employment solutions and included different population groups namely homeless families, youths and adults. Described interventions present evidence from early engagement of users to production of low fidelity prototyping with positive outcomes.

Design thinking processes offer inclusive and collaborative methods[2]. Preliminary evidence from this review confirms the importance of engaging the experience of users i.e. 'homeless populations' in seeking and developing solutions to empower and support their pathways out of homelessness.

References:

1. Local Government Association, 2018. The Impact Of Homelessness On Health A Guide For Local Authorities. UK, p.7-21.
2. Ku B., Lupton E. (2020) Health Design Thinking. Creating Products and services for better health. Cooper Hewitt: New York.

Presenting Author: Ella Lacey

Supervisor: Dr Kate Frazer

Co-Supervisor: Prof Thilo Kroll

149. CLINICAL COURSE AND PREDICTORS OF SEVERE CORONAVIRUS DISEASE 19 AMONG PATIENTS WITH RHEUMATIC DISEASES – PRELIMINARY SINGLE CENTRE RESULTS

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There is a major knowledge gap regarding the impact of COVID-19 in the outcome of rheumatic patients, mainly those with inflammatory

rheumatic and musculoskeletal diseases (RMDs) [1]. Therefore, we aimed to identify risk factors for poor prognosis in RMD patients with COVID-19.

We prospectively investigated patients from our department registered in the Rheumatic Diseases Portuguese Register, Reuma.pt., with suspected and/or confirmed COVID-19 infection, from March 2nd to July 31st. We collected demographic and disease-related data, and then compared patients and disease characteristics according to hospitalisation status to determine predictors of severe disease.

As of July 31st, there have been 26,389(5.2%) COVID-19 cases among the 504,718 Lisbon residents. Out of the 4848 rheumatic patients registered in Reuma.pt from our department, 24(0.5%) were infected with SARS-CoV-2, 9 of whom (38%) were hospitalised (Table 1). Hospitalised individuals were slightly older and had a higher comorbidity burden (p=0.59). Inflammatory RMD diagnosis and disease activity were not associated with hospitalisation, but patients on disease modifying anti-rheumatic drugs (DMARDs) were less frequently hospitalised (p<0.001). 7/9 of admitted patients suffered from complications; however, none required critical care (29% of total). 3/9 patients required supplemental oxygen due to bilateral pneumonia. None of the 24 patients died and all apart from 2 have recovered to date.

Table 1 – Classification of rheumatic patients infected with SARS-CoV-2 according to hospitalisation status based on clinical features

	N (%) n=24	Not hospitalised n=15	Hospitalised n=9	P value
Female	20 (83)	12 (80%)	8 (89%)	0.57
Age, median (IQR)	53 (42 – 59)	52 (30-59)	58 (48 – 68)	0.48
RMD diagnosis				
Inflammatory	20 (83)	12 (80%)	8 (89%)	0.57
Non-Inflammatory	4 (17)	3 (20%)	1 (11%)	
Comorbidities				0.59
Cancer	1 (4.2)	0	1 (11%)	
Cardiovascular disease	8 (33)	4 (27%)	4 (44%)	
Chronic Kidney Disease	1 (4.2)	0	1 (11%)	
Chronic Obstructive Pulmonary Disease	3 (12.5)	2 (13%)	1 (11%)	
Depression	3 (12.5)	1 (7%)	2 (22%)	
Obesity	1 (4.2)	0	1 (11%)	
Trigeminal Neuralgia	1 (4.2)	0	1 (11%)	
Disease Activity				0.13
Remission	13 (54.2)	9 (60%)	4 (44%)	
Moderate/severe	7 (29.2)	3 (20%)	4 (44%)	
Concomitant therapy				**<0.001**
DMARDs	17 (70.8)	11 (73%)	6 (66%)	

This preliminary analysis suggests COVID-19 incidence is not increased among RMD patients. Treatment with DMARDs was associated with reduced likelihood of hospitalisation, which did occur in a considerable proportion of patients. Most outcomes were, however, favourable and there were no fatal cases, suggesting that this population might have a good prognosis.

Reference:

1. Gianfrancesco M, Hyrich K, Al-Adely S, Carmona L, Danila M, Gossec L et al. Characteristics associated with hospitalisation for COVID-19 in people with rheumatic disease: data from the COVID-19 Global Rheumatology Alliance physician-reported registry. Annals of the Rheumatic Diseases. 2020;79(7):859-866. doi: 10.1136/annrheumdis-2020-217871.

Presenting Author: Ana Vaz

Supervisor: Dr Vasco C Romão

Co-Supervisor: Prof João E Fonseca

150. ANALYSIS OF TESTING AND FLOW OF PATIENTS PRESENTING WITH ACUTE PSYCHIATRIC CONDITIONS IN THE EMERGENCY DEPARTMENT

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A systematic review found that patients with "common mental health conditions" made up 4% of Emergency Department (ED) admissions[1]. However, there is currently minimal literature describing efficient assessment and treatment of psychiatric patients in the ED. We analysed patients with Acute Psychiatric Presentations (APP) to the ED in St. Vincent's University Hospital (SVUH) in order to better understand and improve the flow of such patients.

We collected retrospective data from the SVUH Maxims system from 156 patients over a 10-week period and analysed the frequency of tests performed, total duration of ED stay, 3-month reattendance rates and patient outcome. 119 patients (76.3%) had a test done including ECG,

X-rays, CT-brain, urine toxicology and urine dipstick. The mean ED stay duration was higher for patients who had such tests performed, and only a small percentage of them were abnormal.

We found that X-rays, CT-brain, and ECGs had a low percentage of abnormal test results - 12.5%, 7.69%, and 2.6% respectively. This led us to think that these three tests could possibly be used less commonly to improve patient flow. However, urine dipstick and toxicology tests are more diagnostically significant (46.5% and 66.7% respectively). There is no strong correlation between re-attendances or outcome when compared to ED duration, CT-Brain, and Urine toxicology.

This small pilot study shows the potential for unnecessary testing and inefficient patient flow in psychiatric ED admissions. However, no concrete changes can be made without a larger powered study with results compared to another cohort.

Reference:

1. Barratt H, Rojas-García A, Clarke K, et al. Epidemiology of Mental Health Attendances at Emergency Departments: Systematic Review and Meta-Analysis. *PLoS One*. 2016;11(4):e0154449. Published 2016 Apr 27. doi: 10.1371/journal.pone.0154449

Presenting Author: Fouad Helmy
Supervisor: Dr Nigel Salter

151. A REVIEW OF NEEDS OF HIV POSITIVE PATIENTS BEFORE THE UNIVERSAL INTRODUCTION ART AND IN RECENT YEARS WHEN ART HAVE BEEN WIDELY AVAILABLE

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In Africa, prior to 2003, antiretroviral therapy (ART) was prohibitively expensive and its use was limited. After the introduction of PEPFAR, President's Emergency Plan for AIDS Relief, ART became affordable and found widespread use among all social classes (1). ART has transformed the lives of people living with HIV/AIDS (PLWHA). There is little published work on the extent to which patient needs have changed from the pre-ART to post-ART eras.

In this study we documented, investigated and compared the needs of PLWHA in the pre-ART and post-ART era in a Hospice system in Uganda. We analyzed 19 pre-ART and 20 post-ART patient files from Hospice Africa Uganda in Kampala, Uganda. A total of 34 data points were collected from each patient and condensed into 7 categories to compare the patient cohorts.

Pre-ART patients were slightly younger, had more diverse pain, endured more opportunistic infections and malignancy, and suffered more total symptoms. On average, pre-ART patients reported 8.3 separate symptoms compared to 2.4 in the post-ART cohort. Among the total symptom burden, pre-ART patients suffered more GI (66 : 7), Respiratory (15 : 2) and Non-specific (36 : 4) symptoms, while reporting fewer pain-related symptoms (21 : 24) compared to the post-ART cohort.

The most important finding of this study is that pre-ART patients primarily suffered GI, Respiratory, and Non-specific symptoms compared to mainly Musculoskeletal pain in the post-ART cohort. This has not been previously reported. These findings require further study to analyze implications for patient care.

Reference:

• HIV.gov. (2019). PEPFAR. [online] Available at https://www.hiv.gov/federal-response/pepfar-global-aids/pepfar.

Presenting Author: Michael Daigle
Supervisor: Dr Eddie Mwebesa
Co-supervisor: Assoc Prof Patrick Felle

152. A REVIEW OF QUALITY OF CARE AT HOSPICE AFRICA UGANDA

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Hospice Africa Uganda (HAU) recently developed a set of 12 quality indicators (QI) to enhance and assess quality of care delivered to their patients. This project aims to assess the quality of care at HAU using these indicators and use this information to develop recommendations to ameliorate the service HAU provides.

A cross sectional study was conducted involving a review of 32 randomly selected patient case sheets. Data was collected from case sheets and the electronic database and inputted into a data abstraction tool. Sources were searched for documentation referring to QIs. The level of documentation of each QI was measured.

Six QIs were fully documented in all patients: one in the Structure and Process domain (Palliative Care Training), two in Physical Aspects (Treating Pain, Management Plan), one in Social (Vulnerability), one in Ethical (Next of Kin Documentation), and one in Completing the Circle of Care (Referral). The spiritual discussion indicator was the only indicator with incidences of no documentation. The comprehensive assessment indicator was least documented.

Partial documentations of QIs should be avoided. If a care provider believes a QI cannot be documented, reasons should be provided. Further research needs to be conducted with larger sample sizes. Patient feedback regarding their experience of care at HAU also needs to be evaluated. This is the first study to assess quality of care at HAU using the QIs. Results will be key during future studies at HAU, allowing quality of care to be benchmarked and re-evaluated in a prospective manner.

Presenting Author: Andrea Clarke

Supervisor: Assoc Prof Patrick Felle
Co-Supervisor: Dr Eddie Mwebesa

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