NHS Endowment call 2020 – successful applications

Investigating socioeconomic disparities as a cause and consequence of deteriorating kidney health among people admitted to hospital with an acute illness

Training non-specialist nurses to triage digital skin images and use the ASICA intervention to support melanoma survivors

Optimising Remote Consulting and Home Assessment of medically vulnerable Rural patients During unscheduled and planned primary care – Assessing feasibility of the ORCHARD Intervention

Health seeking behaviour in women diagnosed with gynaecological cancer: can it be modified to improve patient outcomes?

Establishment of a human eye organoid system for investigating the functional importance of disease-associated genes in human eye development.

Using wearable technology to optimise timing of concomitant metformin and exercise prescription.

Developing a novel translational cell therapy for central nervous system repair

Exploring experiences, information and support needs of women with endometriosis during the COVID pandemic.

Digital pathology as a predictive tool of the response to first line treatment in oral lichen planus

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What outcomes do patients with localised kidney cancer think are important? And has COVID-19 impacted on their outcomes of importance or supportive care needs? A qualitative interview study to inform the development of a core outcomes sets for kidney cancer

The experience and impact of remote service provision during COVID-19 to inform sustainable high-quality Allied Health Professions (AHP) service delivery in NHS Grampian.

Defining the COVID-19 related immunothrombotic complications in patients with co-morbidities

Microfluidic tools for personalized medicine

Aspirin resistance in patients undergoing primary hip and knee arthroplasty: a case-control study

Remote and rural healthcare: Pilot study to investigate experiences, differences and changes to medical care for people living in remote and rural areas of Scotland

The changing pattern of stroke and acute brain disease during the COVID-19 pandemic

Is there evidence for microplastics in the human fetus in the first or second trimester of pregnancy?

PI	Project Title and Summary
Dr Simon Sawhney	**Investigating socioeconomic disparities as a cause and consequence of deteriorating kidney health among people admitted to hospital with an acute illness**
	Summary This project will link together our world-leading kidney health data research platform with census data to establish the role of social disparities in acute illness; with a focus on kidney health. Acute kidney injury (AKI) is a serious sudden worsening of kidney function that is central to the care of 1 in 7 people admitted to hospital. AKI has lasting serious consequences even after people leave hospital. The House of Lords Science and Technology Select Committee heard last month that the frequent occurrence of AKI with Covid could lead to an epidemic of kidney failure developing after AKI. Our input into a 2019 Kidney Research UK report on health inequalities highlights the need for more research on how social deprivation affects the health and care of people after AKI. Existing research is limited because most measures of social deprivation are based on groups of people living within certain postcode areas, and do not reflect the circumstances of individual people. We will address this clinical problem by using national census data. Census data has never previously been used in kidney research and will provide new insight into how social disparities affect the care people receive when leaving hospital.
Professor Peter Murchie	**Training non-specialist nurses to triage digital skin images and use the ASICA intervention to support melanoma survivors**
	Summary Melanoma survivors risk their disease coming back and need careful monitoring. Especially for rural-dwellers this can mean long journeys to hospital. In the postCOVID NHS there will be more digital healthcare and we have developed the ASICA (Achieving-Self-directed-Integrated-Cancer-Aftercare) app to help melanoma survivors to examine their own skin and send photos by the internet of any concerns. We recently tested ASICA with 240 melanoma survivors for one-year. Approximately 84% of all concerns raised were resolved remotely by a specialist dermatology nurse, only 14 patients needing face-to-face appointments. App testing revealed the range of concerns that melanoma survivors raise about their skin and how these can be resolved. We believe the ASICA app will be most effective and efficient if we can train GP practice nurses to make initial assessments of the photos submitted by patients. We believe we can train GP practice nurses to resolve and reassure patients in about 60% of cases, meaning quicker reassurance for patients and allowing specialists to focus on the most worrying cases. To do this, we need to design a high-quality proven online course that trains primary care nurses to use ASICA to make assessments quickly, consistently and safely
Professor Peter Murchie	**Optimising Remote Consulting and Home Assessment of medically vulnerable Rural patients During unscheduled and planned primary care – Assessing feasibility of the ORCHARD Intervention**
	Summary This project assesses feasibility of providing medically vulnerable rural patients with Medical-Self-Assessment-Boxes containing equipment to use at home during telephone and video consultations (telemedicine) with GPs and other healthcare professionals. COVID-19 has caused an upsurge in primary care telemedicine which we believe can be sustained and optimized to make things better for medically vulnerable rural patients beyond the pandemic. We will achieve this by equipping them to self-measure and report key clinical measurements (e.g. blood pressure, temperature, oxygen levels) during telemedicine consultations. Before conducting a major evaluation of the Medical-Self-Assessment-Box for medically vulnerable rural patients we must establish three things: First, we need to show GP practices can issue a Medical-Self-Assessment-Box to medically vulnerable rural patients and enable them to use it properly. Second, we need to determine that patients can use the Medical-Self-Assessment-Box effectively during telemedicine consultations. Third, we need to show that we can measure how well the Medical-Self-AssessmentBox is working by counting how often the

	boxes are being used and whether use is appropriate and helpful. The knowledge we gain will provide us with the information we need to develop a funding proposal to evaluate Medical-Self-Assessment-Boxes for medically vulnerable rural patients in the whole of the UK.
Dr Pauline Williams	**Health seeking behaviour in women diagnosed with gynaecological cancer: can it be modified to improve patient outcomes?**
	Summary This study will focus on speaking to women who have been diagnosed with one of the five main gynaecological cancers: ovarian, endometrial (womb), cervical, vulval and vaginal. Too many women are dying from gynaecological cancer in NHS Grampian and Scotland. There are many reasons for this, but we think that embarrassment might be one of the reasons. It can be embarrassing to talk about gynaecological cancers or the symptoms that they cause. This might lead some women to delay going to their doctor when they have symptoms. This study will speak with women who have been diagnosed with a gynaecological cancer to ask them what they did before they were diagnosed; when did they realise something was wrong; what made them go to their doctor; did having gynaecological symptoms make them think differently about going to the doctor? This information will be used to find ways of making it as easy as possible for women to go to their doctors as early as possible. This will hopefully see fewer women dying from these cancers.
Professor Lynda Erskine	**Establishment of a human eye organoid system for investigating the functional importance of disease-associated genes in human eye development.**
	Summary Visual impairment has a severe negative impact on the quality of life of individuals, costs NHS Scotland over £330 million a year and accounts for 10% of hospital outpatient appointments. Currently there are over 210, 000 people in Scotland living with sight loss and this is predicted to rise to over 266, 000 by 2050. To aid in the development of new preventative, diagnostic and therapeutic strategies it is critical we gain a better understanding of the factors underlying the cause and progression of eye disorders. Events in early eye development can have a profound influence on visual function and are important contributors to later risk of common eye conditions such as glaucoma. However, much of our understanding of the mechanisms regulating eye development has come from animal models and may not be translatable to human eye development and disease. The aim of this project is to develop robust systems for establishing the role of disease-associated genes in human eye development, particularly the development of anterior eye structures relevant to glaucoma. The results will form the foundation for future larger scale studies of the relationship between early eye development and late-onset adult disease
Dr Brendan Gabriel	**Using wearable technology to optimise timing of concomitant metformin and exercise prescription.**
	Summary Metformin is one of the primary front-line treatments of Type 2 Diabetes. Additionally, exercise is a crucial preventative and therapeutic lifestyle intervention in the management of Type 2 Diabetes. However, recent scientific evidence suggests that these 2 treatments (metformin and exercise) may interfere with each other in terms of the beneficial outcomes obtained from each treatment. Our previous research suggests that the time-of-day that people with Type 2 Diabetes perform exercise may change their blood sugar (an important component of Type 2 Diabetes treatment). In the aforementioned trial, morning exercise increased blood sugar compared with the participant's normal blood sugar, while evening exercise reduced blood sugar compared with normal. Most of the subjects in this trial were taking metformin and it may be possible that this is partly behind the effect we observed. Given these findings, we think it may be possible to further improve the beneficial outcomes of exercise and metformin treatment in people with Type 2 Diabetes by optimising the timing of exercise. We aim to test this by using cutting-edge wearable technology to remotely monitor subjects in real-time who are taking metformin and who we will instruct to exercise at different times of the day.

Dr Catriona Cunningham	**Developing a novel translational cell therapy for central nervous system repair**
	Summary Novel therapies are urgently needed to promote nerve cell regrowth in life-changing neurological conditions in the UK. This includes 50,000 spinal cord injury patients experiencing permanent loss of movement and sensation below the injury level and the 5,000 motor neuron disease patients facing progressive muscle wasting and respiratory paralysis due to the retraction of motor nerve connections. Astrocytes, cells within the brain and spinal cord that support normal nerve cell functions but also underlie the pathology in spinal injury and motor neuron disease, might provide such a therapy to address these unmet clinical needs. Here, we will investigate if human stem cell-derived astrocytes, when their functions are enhanced by a novel drug called Epac2 agonist, can promote the regrowth of spinal nerve cells across the injury gap using our recently established and published "spinal injury in a dish" model. We will also assess the ability of such a therapy to enhance the survival and regrowth of nerve cells derived from stem cells of motor neuron disease donors in our sophisticated "lab-on-a-chip" microfluidics system allowing nerve cell-astrocyte interactions. Our approach is the first of its kind and will lay the groundwork for future studies to translate this therapy to the clinic.
Dr Lucky Saraswat	**Exploring experiences, information and support needs of women with endometriosis during the COVID pandemic.**
	Summary Endometriosis is a long-term condition affecting 10% of women. It can be debilitating, and causes pelvic pain, painful periods or sex, infertility and poor quality of life with a negative impact on relationships, education and employment. A need for laparoscopy (key-hole surgery) to confirm the diagnosis, lack of awareness, huge variation in symptoms, and social and cultural taboos around menstrual pain have led to delayed diagnosis (average 8 years in the UK), inequalities in care, repeated visits to healthcare professionals, and lack of provision of long-term support and care - issues which were also highlighted in a recent parliamentary report. During the pandemic, with resources diverted to COVID care, women with endometriosis saw their treatments stopped, cancelled or changed with very little warning, little information available and extremely limited access to clinicians (in primary or secondary care). A key issue in optimal management of endometriosis is the lack of awareness and tailored information and support. We propose a study to explore the experiences and information and support needs of a diverse group of women with endometriosis during the pandemic. Findings will be used to develop an information and support package for women with endometriosis (a key research recommendation).
Dr Rasha Abu-Eid	**Digital pathology as a predictive tool of the response to first line treatment in oral lichen planus**
	Summary Lichen planus is a disease that affects the skin and the lining of the mouth and genitals. Lesions associated with this disease are painful and have a significant impact on patients' quality of life. Furthermore, oral lichen planus has been linked to an increased risk of oral cancer, a devastating disease with poor outcome. Therefore, treatment for lichen planus is essential to relieve pain, reverse the adverse effect on the quality of life and reduce the risk of cancer development. Treatment of oral lichen planus is through steroids applied directly to the affected areas. Unfortunately, this treatment does not work in all patients, especially those with more severe disease. Due to the lack of evidence, there are no guidelines for the management of patients who do not respond to topical steroids. Our aim is to identify microscopic, molecular and immunological factors that could be linked to lesions that do not heal with steroid treatment. We will use innovative image analysis technologies called digital pathology. We hope that findings of this project will enhance existing treatment guidelines and help identify patients who should not be given steroids. Studying different factors can potentially identify new targets for effective treatment and inform the development of novel therapies.

Ms Emma Ingram	**Enhancing Lives Through Technology: An Occupational Therapy early intervention programme, using voice controlled intelligent assistants for older adults with mild cognitive impairment, early dementia, anxiety and depression – a feasibility study**
	Summary We propose a study to test the feasibility and acceptability of "Enhancing Lives Through Technology" (ELTT). ELTT is an Occupational Therapy (OT) early intervention programme, developed in NHS Grampian, for older adults with mild cognitive impairment, early dementia, anxiety, and/or depression. It is a 10-week programme consisting of an OT assessment followed by weekly sessions, with older adults using a voice-controlled intelligent assistant (e.g. Amazon Alexa) to help them with strategies and routines to help them to live independently despite changes in memory or mood. Older adults who are referred to OT and fulfil the criteria for ELTT will be invited to take part. They will provide informed consent and complete questionnaires on their health status and wellbeing. They will then receive the ELTT programme. At the end of the 10-week programme they will complete the same questionnaires, and will be invited to take part in a 1-1 interview exploring their experiences of ELTT and using the intelligent assistant. Finally, 3-months after completing ELTT, they will be invited to complete the health and wellbeing questionnaires once more. OTs who deliver the ELTT programme will be invited to take part in a focus group to explore their experiences of delivering the intervention. Following COVID-19 guidelines, there are aspects of the intervention and evaluation that requires face to face contact however, we are able to conduct some of the study remotely.
Dr Alf Martinez-Felipe	**Novel nanoparticle-embedded membranes for long-term bioactive SARS-CoV-2 prevention**
	Summary Face masks are a key factor in preventing the spread of SARS-CoV-2, the virus responsible for the coronavirus disease 2019 (Covid-19), which first exhibited human-to-human transmission in December 2019 and has now infected millions of people within months across 213 different countries (November 2020). In this project we will prepare new materials to increase the efficiency of face masks turning them into active barriers for SARS-CoV-2. To do that, at the University of Aberdeen we will prepare new silver nanoparticles embedded in microfibres, which will retain the aerosols containing SARS-CoV-2, and we will also measure the therapeutic potential of the materials by using the antiviral potential of Ag ions. We will develop an innovative and versatile microfluidic device to test new materials and treatments to fight Covid-19 and other viral and bacterial outbreaks, and we will optimise the performance of the membranes using experimental and computational models. We expect that our findings will open new research lines and will attract larger projects to implement the new materials on commercial FN95 masks, and will alleviate the impacts of the Covid-19 pandemics on economies, communities and NHS workers and resources.
Dr Steven MacLennan	**What outcomes do patients with localised kidney cancer think are important? And has COVID-19 impacted on their outcomes of importance or supportive care needs? A qualitative interview study to inform the development of a core outcomes sets for kidney cancer.**
	Summary When treatments are compared in kidney cancer research, outcome reporting heterogeneity is problematic. Examples of kidney cancer research outcomes are 'cancer-specific survival', 'renal function', and 'quality of life'. Outcome reporting heterogeneity refers to the situation where different trials report on different outcomes or report the same outcomes but measure and define them differently. This creates difficulties to say which treatment is optimal. A solution is a core outcome set which is an agreed minimum set of outcomes to be reported in all trials in a clinical area. In developing core outcome sets, the opinions of patients must be included. Therefore, we would like to interview people who have been treated for kidney cancer to help us achieve our aim to develop core outcome sets for kidney cancer. This will be an important step forward in the standardisation of outcome reporting and definitions, making critical synthesis of the evidence base easier and more reliable, and facilitating decision-making for healthcare payers, policymakers, doctors and patients.

	Furthermore, little is known about the additional supportive needs for kidney cancer patients in the COVID-19 era. Therefore, we will probe this directly in our interview study and feed this information back to the local UCAN charity and NHSG urology team.
Dr Lyndsay Alexander	**The experience and impact of remote service provision during COVID-19 to inform sustainable high-quality Allied Health Professions (AHP) service delivery in NHS Grampian.**
	Summary Allied Health Professionals (AHPs: e.g. dieticians, physiotherapists, podiatrists) provide vital diagnostic, rehabilitative and preventive interventions to the population. AHPs in NHS Grampian embraced new ways of working in response to COVID-19, which included the rapid deployment of remote AHP service provision via telephone and online consultations. We want to understand more about the way in which AHP services in NHS Grampian changed due to COVID-19, particularly in relation to digital solutions and how service users have responded to these, to learn about the strengths and limitations of these changes, and to inform future AHP service provision in the post COVID-19 era. To do this, we will initially conduct surveys of NHS Grampian AHPs and service users to ask their views on this. Then, we will hold virtual stakeholder workshops with service users and AHPs to discuss the survey findings and confirm what to explore in more depth. In the next phase, we will speak to service users, AHPs and AHP managers to explore in detail their views and experiences of remote AHP service provision. Finally, we will share the findings with all stakeholders and agree how the recommendations for practice will be implemented across NHS Grampian.
Dr Nicola J Mutch	**Defining the COVID-19 related immunothrombotic complications in patients with co-morbidities**
	Summary Coronavirus disease 2019 (COVID-19) has resulted in more than 1 million deaths worldwide and more than 50,000 in the UK. Disease severity varies considerably with some people being asymptomatic whilst others have severe breathing complications that may require ventilation. It is now apparent that age, ethnicity and individuals with comorbidities such as high blood pressure, diabetes, increased BMI and prior cardiovascular event are more prone to develop severe COVID-19. Many of these patients experience abnormal blood clot formation leading to heart attacks, strokes, deep vein thrombosis and clots in the lungs. Patients are given 'anticlotting drugs' but around 30-50% still develop clots. Inflammatory markers are dramatically elevated in COVID-19 leading to an imbalance in the lining of the blood vessels. We hypothesise that this inflammatory state provokes blood clot formation. We aim to measure the levels of certain markers of blood clot formation and breakdown in plasma, termed 'biomarkers', at various stages of COVID-19 disease and how these contribute to blood clot formation. Understanding the changes that occur in the 'clotting' ability of blood of patients with COVID-19 will facilitate earlier, more efficient treatment for high risk groups and improve long-term care by identifying those in need of 'anticlotting drugs' following discharge from hospital.
Vasile Claudiu Giuraniuc	**Microfluidic tools for personalized medicine**
	Summary Personalised medicine approaches to major diseases require detailed study of how the patient's own cells and organs undergo the disease process and react to potential therapeutics. Ethics and practicalities mean this is usually impossible to do inside the human body. We are developing a powerful approach to this accessibility problem by generating cutting edge, microengineered cell culture observation chambers, using templates designed to mimic the relevant context of the body. In these chambers, potential treatments will be tested in parallel to select the most efficient one to be administered to the patient. For Motor Neurone Disease (MND), we have developed chips with nerve stem cells from single patients growing contacts onto muscles in separate chambers and will apply potential therapeutic compounds from a pharmaceutical company (Takeda, Japan) to different cell locations. We are also collaborating with a specialized manufacturer of culture chambers

	(Ibidi, Germany) to develop new designs for commercial production that are both high precision and user friendly, for the study of bacterial infection, myocardial infarction and cancer. Thus, this project aims to open the door to a wealth of novel research, including steps towards personalised medicine and delivery of devices for diagnostic and research usable by clinicians.
John McLoughlin	**Aspirin resistance in patients undergoing primary hip and knee arthroplasty: a case-control study**
	Summary Approximately every 1 in 1500 people undergoing hip and knee replacement surgery will die of a blood clot on the lungs following surgery. Medications are usually given to try prevent these clots from happening, with Aspirin one of the most common drugs used for this purpose. Aspirin has shown to be widely effective in preventing blood clots, but it has previously been recognised that the drug might not work properly for certain individuals. This is known as aspirin 'resistance'. We set out to establish whether patients who underwent joint surgery in Aberdeen from 2017-2020 and went on to develop clots can be classed as aspirin resistant using a blood test. The rate of resistance in this group will then be compared to a larger group of patients without a history of blood clots who are attending a pre-assessment clinic for joint replacement surgery. The data obtained from the study could highlight an important link between aspirin resistance and the likelihood of going on to develop a clot post-surgery. The information gathered in the study could help inform clinicians as to the most efficacious method of preventing clots for each individual, allowing for more targeted approach to clot prevention.
Dr Andrew S Maclaren	**Remote and rural healthcare: Pilot study to investigate experiences, differences and changes to medical care for people living in remote and rural areas of Scotland**
	Summary Providing healthcare for people in rural areas is a priority for Scotland. Provision is challenging due to ongoing issues with recruitment and retention of medical practitioners, and the cost of delivering a high quality service across widely dispersed and small populations: when a local GP retires, or a small hospital cannot attract enough doctors, this can affect community sustainability. Communities' experiences of care in rural areas thus can be varied, but little evidence exists about how the rural public experience this variation and use of service. The COVID-19 pandemic has created further disruption to the already varied delivery of healthcare in rural areas. This project aims to explore the public's perspectives on accessing/receiving healthcare in rural areas across Scotland and how recent changes brought about by the COVID-19 pandemic are changing the experience of rural healthcare. Considering areas such as eHealth technologies, access to face-toface appointments and ongoing care, this research will use focus groups and interviews to better understand the experiences, differences and changes to medical care for people living in rural areas of Scotland.
Mary Joan Macleod	**The changing pattern of stroke and acute brain disease during the COVID-19 pandemic**
	Summary Coronavirus disease 2019 (COVID-19) has resulted in over 50,000 deaths in the UK so far. While many are attributed to breathing difficulties, we know that other body systems are involved, including the brain. COVID-19 can cause a stroke but it can also affect the brain in different ways, which may affect recovery. The COVID-19 pandemic has also caused many people to avoid hospitals, resulting in a change in pattern of acute stroke seen. A greater understanding of the relationship between COVID-19 and the brain is important to anticipate, avoid and mitigate brain complications linked to this outbreak of COVID-19, and any future outbreaks. Our aim is to quantify the impact of COVID-19 on the brain. Using NHS Grampian data, we will identify people with abnormal brain scans during the COVID-19 period and determine which were COVID-19 positive or negative. Enriched by stroke audit data, we will compare stroke

	patterns during the COVID-19 pandemic with previous years. We will then use the data and methods developed to underpin a larger study across Scotland. We will also use these results to develop new ways of predicting outcomes based on brain changes seen in COVID-19 positive and negative patients.
Prof Paul Fowler	**Is there evidence for microplastics in the human fetus in the first or second trimester of pregnancy?**
	Summary Before the coronavirus pandemic hit, there was increasing anxiety about the sheer level of microplastics in our environment. Picking just one example, the Guardian reported *"Revealed: microplastic pollution is raining down on city dwellers"*, concluding *"London has highest level yet recorded but health impacts of breathing particles are unknown"*. It is estimated that over 14 million tonnes of plastic entered the oceans in 2018 alone and most ends up as microplastics. Microplastics also carry medicines and pollutants that can damage human health. A small study of 6 placentas collected at birth found that microplastics were on the fetal side of the 4 of the 6 placentas. This means that microplastics probably can cross the placenta from mother to fetus, making it much more likely that this might be a danger to the fetus. While ringing alarm bells, the study did not look in early pregnancy when the developing fetus in the womb is particularly vulnerable. We will look for microplastics in 10 pregnancies (5 males, 5 females), using placentas and fetal livers. These have already been collected from second trimester fetuses from normal pregnancies terminated for social, not health, reasons. This is a "proof of concept" study between the University of Aberdeen and the Vrije Universiteit Amsterdam. If we find microplastics in both the placenta and liver we will know that the fetus is, indeed, directly at risk from this pollution. We would be the first to quantify plastic polymers in the fetus. We will then be able to apply for funds for a much larger project to study the health effects of the level of microplastic pollution in the first and second trimester human fetus. In that study we would be asking the question "Does microplastic pollution programme the next generation to ill health even before they are born?".