NIHR | Applied Research Collaboration South West Peninsula

Annual Report 1st April 2020 – 31st March 2021

1. Overview of activities

Strategy development in response to COVID-19

As with all NIHR and NHS linked organisations our last year has been dominated by the pandemic. We are immensely proud of the response of our staff, both in continuing wherever possible to adapt and maintain our existing programmes of work and in responding directly to the Covid 19-related needs of the services.

We benefited from NIHR permission to flex our research programmes, redeploying staff from paused studies and slowing progress on others to free them to directly address needs identified by partners. Although we have gradually moved back to reinstate these original research studies we continue to work with both our local partners and national initiatives including the "Beneficial Changes Network" to ensure that we are responsive to partner needs as services come out of the pandemic and address the backlog. After consultation with our Regional Medical Director and ICS colleagues, we have elected to work jointly with ARC West and the two partner AHSNs to address issues relating to the use of remote consultation. We have an agreed process to link with other ARCs nationally to ensure that this complements projects being conducted elsewhere. This overall aim is to produce evidence that enables providers/commissioners to decide in what circumstances and for whom remote consultation is most likely to be effective and where on the contrary it is likely to reduce patient satisfaction or exacerbate inequalities.

We successfully transferred many other aspects of our activities from in person to virtual. This includes our PPIE work where staff found ways to help public collaborators who had never previously used digital media to engage effectively and maintain our collaborative approach. This was particularly important in the delivery of our National Priority programme in Children's Health and Maternity which had substantial involvement from public collaborators in designing our approach and choosing which projects to adopt. Our public collaborators also overcame the challenges of remote work to help us re-conceptualise our draft PPIE strategy. Our capacity building activities too, including *Making Sense of Evidence* and *Health and Police Service Modelling Associates* have also completely transferred to remote delivery. Although we will seek to return to some in person modes of delivery when appropriate we will use learning from our experiences to produce blended programmes for the future, enabling greater access and spread of opportunities.

Progress on Short and Medium-term aims

Aim 1: Engage organisations commissioning and providing NHS services, clinicians, and members of the public in identifying and prioritising information needs and translate these into clearly delineated
questions amenable to research.

Aim 6: Ensure effective links across the landscape of health and social care providers and commissioners, including local authorities.

We have successfully established partnerships with the 28 organisations who form part of the ARC collaborative though inevitably these organisations were all facing challenges during the period which meant the engagement was sporadic. Nonetheless these organisational links have supplemented our continued joint working with individual groups of clinicians involved with PenARC projects. We are working increasingly closely with the SW AHSN and this relationship is of particular importance in ensuring effective links between organisations as we largely share members and have complementary aims.

The effectiveness of these links are evidenced by the COVID 19 related projects we undertook in direct response to identified needs. Examples include:

- Acute providers in the region urgently needed to be able to predict the rapidly evolving pandemic driven need for resources including beds, ICU beds, staff and oxygen. We were able to connect modellers with PenARC and the wider universities with the key players in the region. This close collaboration led to the design of an interactive app, based on daily integration of local NHS data into disease models, which allowed services to estimate the short and medium term needs for resources and to examine the effects of varying the model assumptions. https://arc-swp.nihr.ac.uk/research/projects/modelling-sw-demand-and-capacity/

- A recent graduate from our HSMA programme who had moved to a new post in the Wessex Dialysis Service requested help in dealing with the challenge presented by COVID in their population of 650 people requiring dialysis. These individuals are particularly vulnerable to adverse effects of the infection, require regular attendance at dialysis centres which puts them at high risk of cross-infection during transport and treatment, and account for 30% of the non-emergency ambulance transport in normal times. Our modelling team were able to work with the service providers to redesign an efficient system reducing both the risk of infection and use of transport. https://arc-swp.nihr.ac.uk/research/projects/dialysis-service-modelling-in-portsmouth/

- A current HSMA participant (a GP) developed a modelling tool which allowed the time and staffing allocations originally planned for their practice vaccination clinic to be optimised *ahead* of the launch, thereby avoiding queues and issues with social distancing. https://arc-swp.nihr.ac.uk/news/hsma-covid-vaccination-model/

- The pandemic placed particular strains on people with dementia and their carers, a problem highlighted by our charity partners. Working with partners including Alzheimer's Society, Manchester University, Bradford University, and Brunel University, we used evidence from our research to produce materials containing tips to help these groups cope with the challenges of lockdown. https://arc-swp.nihr.ac.uk/news/five-tips-from-project-to-support-people-with-dementia-and-carers-in-covid-19-lockdown/

Aim 2: Lead and contribute to programmes of work in areas of national priority

PenARC themes reflect many areas of national priority – Complex Care, Mental Health, Dementia and Public Health. Our strategy of linking closely with partners in the NHS/SC system ensures that the specific topics addressed reflect the most important issues facing the system within these areas.

The NIHR call for cross-ARC national priority areas has provided a further opportunity to develop these areas. The consortium of 9 ARCs we led has established a national collaboration to address Children's Health and Maternity (CH&M). As detailed elsewhere, we have conducted an extensive consultation with members of the public, clinicians and organisations to select a small number of projects which will be adopted by the collaboration with the aim of fostering widespread adoption on evidence-based solutions to important problems. PenARC plays a leading role (one of four core partners) in the successful bid to establish the Aging Frailty and Dementia Collaboration and has contributed to other national priority bids including Inequalities and Prevention where our staff sit on the programme management groups and have submitted potential programmes.

Aim 3: To undertake research and improvement work to address identified priorities, where appropriate gaining external funding.

The PenARC model depends on deploying NIHR funding to provide an infrastructure of skilled researchers and research support to enable us to identify key questions with partners and seek to address them. Smaller studies may be conducted with our own resources but many will require external funding.

During the first six months of PenARC, our staff attracted a further £7.5m in external grant funding as either PIs or Co-Is. These grants demonstrate the wide range of research areas, driven by key questions of importance to our stakeholders. Amongst these grants highlights include:

An NIHR funded realist evaluation of the use of Family Group Conferences in child protection proceedings (NIHR HS&DR £789k)

"Remote by default", a joint project with the University of Oxford prompted by the pandemic, examining effective use of remote consultation in primary care (UKRI COVID 19, £753,325)

EVADE, an RCT of the Valsalva Assist Device for the pre-hospital Emergency treatment of Supra-Ventricular Tachycardia (NIHR RfPB £349k)

An NIHR HS&DR funded linked evidence synthesis evaluating the impact of interventions to improve recovery of older adults following planned hospital admission (NIHR HS&DR £349k)

Jointly with University of Newcastle the OPTIMIST study (OPTimising IMplementation of Ischaemic Stroke Thrombectomy) seeks to ensure the efficient spread of this new technology across the country (NIHR PGfAR £1.98M)

Aim 4: With partners, including the AHSN, mobilise evidence to achieve service improvement and conduct research into effective methods for doing so.

Aim 7: Gain the maximum impact from pre-existing PenCLAHRC projects.

As demonstrated by our Added Value Examples, we continue to work with partners to exploit research evidence to improve services and health outcomes, including by exploiting programmes begun during the life of NIHR PenCLAHRC.

PenCHORD, the operational research modelling group within PenARC, has a particularly strong programme of work around service improvement, including the examples discussed above where we have been able to assist services in their response to COVID 19. A particularly effective part of this work has been the HSMA/PSMA programme, described in detail elsewhere, which combines capacity building and developing solutions to problems facing organisations. Alumni from previous courses have proved invaluable in facilitating joint working with partners using data-led approaches to service improvement.

A core activity within the CH&M Programme has been planning research on implementation crossing the adopted programmes and we are currently seeking to extend this to include a project led from within PenARC within the Ageing and Dementia programme.

Aim 5: Build receptivity in the health workforce to research and innovation.

We have developed long-term relationships with local organisations and staff, with the aim that over time the approach we offer in using evidence to facilitate service improvements is seen as having delivered benefits, engendering a virtuous circle. Similarly, we encourage health and social care staff to engage with research studies in order to encourage those with an interest and talent to become active in the generation as well as use of evidence.

This aim is supported by a wide range of opportunities for staff in partner organisations and members of our PPI network to develop their skills in the use and generation of evidence. These range from short courses such as "Making Sense of Evidence" (MSE) to "clinics" where they can discuss specific methodological issues.   The MSE programme is of particular importance as it serves not only to help participants develop skills, but also allows the identification of potentially important research questions which can be considered through our prioritisation system and of individuals who can be helped if they are interested in developing research careers.

In addition, we offer longer-term training on secondment such as the HSMA/PSMA programme. The alumni of these programmes form an important group spread through partner organisations with whom we can work on future projects. The importance of this group has been demonstrated by the events of the recent pandemic where alumni played a significant role in brokering opportunities for effectively utilising the skills we can offer as their organisations sought to redesign services.

National Programmes

PenARC leads the Children's Health and Maternity National priority area and participates in many of the other themes. The activities are fully described in section 12. All of our activities in these priority areas have been built around ensuring the meaningful involvement of our public collaborators and those who provide the services.

2. Progress Made in Each Research & Cross-cutting Theme

Although this section is presented in Themes it is important to acknowledge that, because the PenARC research strategy specifically aims to help service users and providers address problems, many projects need cross-theme involvement. This is something we actively encourage so the section within which projects are reported is somewhat arbitrary.

<u>Dementia theme</u>

Theme leadership

Theme lead Clare and the core team of contributors meet regularly with ARC Director Logan.

Progress against Strategy

We aim to better understand the needs of people affected by dementia so we can respond more effectively, and to achieve enhanced implementation and dissemination of existing evidence. The COVID-19 pandemic has presented challenges for conducting research and implementation activities but we have adapted our approaches and procedures rapidly to ensure we continue to make progress with these objectives.

The balance of our activity is now focusing more on people living with dementia than those at risk of developing dementia, and this year there has been a strong emphasis on addressing the impact of the COVID-19 pandemic.

Major grant awards

Grant awards this year include:
- ENLIVEN –Extending active life for older people with cognitive impairment through innovation in the visitor economy of the natural environment. ESRC/ISCF SBRD £1.6m
- INCLUDE – Identifying and mitigating the individual and dyadic impact of COVID-19 and life under physical distancing on people with dementia and carers. ESRC £600,000
- WHELD – Evidence-based supported digital intervention for improving well-being and health of people living in care homes (WHELD) during COVID-19. MRC £1.2m

Highlights of research activities

- The IDEAL programme, an Alzheimer's Society Centre of Excellence, successfully negotiated its mid-term review and had the final two years' funding confirmed. The programme adapted rapidly during the year to introduce online/telephone data collection and incorporate first the NIHR-funded IDEAL COVID-19 Dementia Initiative (IDEAL-CDI), a collaboration with the NIHR Older People and Frailty PRU, and second the ongoing INCLUDE COVID-19 rapid response study. IDEAL-CDI has provided evidence-based recommendations to colleagues at DHSC, NHS-E, NHS-I and PHE about the support

needs of people with dementia and family carers during the pandemic. Evidence from IDEAL has informed several Alzheimer's Society policy initiatives
- The D-PACT NIHR PGfAR project team have developed and pilot-tested an intervention, and developed a set of outcome measures and trial procedures, in preparation for a full RCT.

Highlights of implementation research activities

- GREAT into Practice although affected by COVID has demonstrated that the benefits to people living with dementia of the GREAT Cognitive Rehabilitation (CR) intervention implemented by staff in NHS community services following training are at least equivalent to those seen in the NIHR-funded GREAT RCT.
- The [EXCHANGE](#) collaboration co-created and conducted online capacity-building events bringing together care home providers, researchers and other stakeholders. Priorities for future research were identified and two collaborative studies focusing on emotional well-being of care home staff were initiated.
- The WHELD team has developed an online, COVID-adapted version of its evidence-based staff training and support programme for care homes and is testing its effectiveness and cost-effectiveness in an RCT involving over 1000 care homes.

Initiation of new activities

- We are part of the consortium led by Wessex for the National Priorities – Ageing, Dementia and Frailty programme. Theme lead Clare is a member of the Programme Management Group. PenARC leads on PPIEP overall, and we have contributed to a selection of projects for funding, one of which we are leading.

Mental Health Theme

Leadership of the theme:

Prof Dickens remains theme lead.

Progress of the strategy:

The short term aims were: to develop and evaluate interventions to reduce the risk of mental health problems and manage established conditions; maximise the impact of existing research by facilitating evidence-based service improvement; develop robust measures of patient experience and outcomes; and, build capacity of staff in mental health to generate and use research.

We are driven by the needs of our partner organisations in health and social care, though this year all individuals and partner organisations have been affected by the Covid-19 pandemic. As a result many ARC projects have been delayed or disrupted. Despite these problems, particular areas of activity have been the continuation of support for existing projects including: facilitating the implementation of psychological interventions amongst people being treated in acute care; developing and evaluating preventive interventions related to the mental health of children and young people and methods for intervening with the group of children exposed to domestic violence who are at high risk of adverse mental health outcomes (jointly with Complex Care theme); and working with marginalised groups such as people involved with the criminal justice system and those living in deprived communities. A new study will evaluate the contribution of functional disorders to the load of general outpatient referrals in child health with the aim of designing more effective pathways of care.

Major grant awards

Highlights in the period include:

- A study investigating the feasibility of implementation and delivery of mindfulness in adolescents and their carers, DHSC / NIHR funded £100,000
- A community transformation programme for mental health, NHSE £284,000
- A study tracking the impact of Covid-19 on the mental health of children, young people and families MRC £669,000

Highlights of research and implementation:

- PenARC is continuing to support the development and evaluation of an Integrated Psychological Medicine Service (IPMS) identifying psychological needs in patients across a number of medical specialties within a local acute Trust and steering them into appropriate treatment. This service is being evaluated by a PenARC PhD student, who successfully completed her PhD upgrade this year.
- The Reshape project aims to track the mental health and wellbeing of children and young people over the course of the Covid-19 pandemic and up to a year afterwards, to identify groups whose mental health may be most adversely affected, and to explore risk and protective factors. The methods include national probability surveys (partnering with NHS Digital, Office for National Statistics and NatCen) and qualitative interviews.
- The Attend study has now received ethical permission to start testing the feasibility of implementation and delivery of a combined mindfulness approach for adolescents who have not responded to first-line treatments for depression and their carers
- Our research related to the national Community Mental Health Framework transformation programme is progressing. Our researchers have conducted an evaluation of three of 12 pilot sites (Somerset, East London, Herts/Essex), aiming to investigate the models being put in place, the experience of service users and the process of implementation.

Public health

Leadership of the theme:

- Prof Stein remains theme lead with Prof Wyatt as deputy.

Progress of the strategy:

The short term aims of this theme were: to maximise the impact of existing research and work with local partners to appropriately contextualise interventions developed elsewhere; develop and evaluate public health interventions; and, increase engagement with local public health practitioners through development of the SW Public Health Research Action Group (PHRAG).

We have continued to work across a number of areas but, three major areas of work are highlighted here: social prescribing, identified by our local partners as a priority interest; health promotion/prevention interventions amongst high risk groups; and early diagnosis of cancer. In addition, jointly with our mental health theme, we have developed and are evaluating public health interventions related to mental health in children and young people and are awaiting the results of a substantial bid to UKPRP to test "place-based" public health approaches to child mental health in deprived communities.

Early moves to establish PHRAG are on hold due to the pandemic but close relationships with Public Health/local authority colleagues remain key to all projects.

Highlights of research and implementation activities:

- There is increasing evidence that social prescribing can be a powerful intervention to improve wellbeing for some people. The team, led by Husk, has attracted grant funding from multiple sources (NIHR, UKRI, MRC, and local NHS organisations) to develop the

evidence base both the use of this approach amongst people with mental health problems, with dementia, for children and for frequent users of the health service.

- Research aiming to understand depression in disadvantaged communities in the context of their lives and the implications for primary care (https://www.arc-swp.nihr.ac.uk/research/de-stress) has received widespread media coverage and forms the basis for a training package for Primary Care produced with the RCGP. We hope to take this forward under the auspices of the national ARC Inequalities programme.
- The C2 Connecting Communities organization (https://www.c2connectingcommunities.co.uk/), based on research conducted by Wyatt et al, aims to improve health by breaking barriers between disadvantaged communities and health and local government. The organization has hubs in multiple sites across England and is partnering the Cross ARC collaboration on Inequalities, supporting the prioritisation of projects as well as their delivery.
- Identifying groups at high risk of adverse outcomes can allow the development of health promotion interventions. Current studies include the development and evaluation of programmes for parent carers of children with major disabilities (NIHR); physical activity promotion amongst people with cystic fibrosis (NIHR); and an online parent package to prevent anxiety disorders in high risk children (Kavli Trust).
- Late diagnosis of cancer is a recognised issue in the UK. Funded by multiple sources, Hamilton's group are conducting a major programme of research to address this issue. Most recently a substantial philanthropic donation has led to the ERICA trial (https://www.theericatrial.co.uk/the-trial-team/) which is evaluating whether the use of risk assessment tools (based on previous work by the team) in primary care can reduce delayed diagnosis.

Complex Care Theme

Leadership of the theme:

Prof Byng remains theme lead.

Progress of the strategy:

Engagement with local priorities remains at the core of the work. Current projects responding directly to services include: care pathways for complex need for Torbay Hospital's Improvement Programme; a bid to Health Foundation bid for an innovation pipeline for systems of care (Cornwall Foundation Trust); evaluation of care for individuals living with frailty and homelessness (Plymouth CCG); evaluation of new mental health systems (Somerset CCG).

Developing practical theory: several projects (SHERPA, PARTNERS2 and Dementia-PACT) contribute to theoretical advances for core aspects of care for individuals and carers with complexity – e.g. relational practices to build trust and engagement, analytic clinical reasoning to make best decisions together.
Engagement with individuals with complex needs and carers is at the core of the work (section 6) with public collaborators as co-applicants on many projects.

Highlights of research and implementation activities:

- One effect of the pandemic has been the development of alternative approaches to service delivery. The "Remote by Default" study (ESRC) aimed to help GPs deliver care to patients during the pandemic. The team also supported the development of "Hot hubs" in primary care. We are now engaged in partnership with ARC West, SWAHSN and West of England AHSN in developing evidence-based tools to inform services on situations where remote consultation is most likely to provide effective care.

- Delivery of projects focused on complex emotional and social needs of young people: intervention development, feasibility of delivery and evaluation for a) Looked after Children Transition Hub addressing needs of those in or on edge of care (Youth Endowment Fund); b) 'Becoming a Man' - a social-emotional group based mentoring intervention to increase educational attainment and prevent engagement in crime (YEF); c) Family Group Conferences in child protection services (NIHR HS&DR).
- Frailty and older people: Working with older individuals and healthcare professionals to understand challenges and potential interventions for supporting people to get up after having a fall which led to an NIHR Evidence Alert; home-based rehabilitation for older adults (NIHR HTA); RCT of alternative surgical approaches to emergency hip replacement designed improve function and mobility (NIHR RfPB).
- Interface between the police and health services: evaluation of health and social care services for people in police custody who inject drugs; evaluation of the Serenity Integrated Mentoring pilots for people with mental health needs and high intensity users of emergency services.
- Targeted peer coaching for outpatients with long term conditions (Torbay Medical Fund)
- In April 2021 we launched a Future learn MOOC to teach physiotherapists effective approaches based on the results of the PDSAFE trial on falls prevention for people with Parkinson's. https://www.futurelearn.com/courses/pdsafe-falls-prevention-in-parkinsons-the-therapists-approach-
- The CASTLE study (NIHR PGfAR) is developing outcome sets for children with epilepsy and will design and evaluate a sleep intervention for this group of children.
- The SHERPA study has developed a structured approach for GPs to manage consultations with their patients who have multiple health conditions for which no single set of guidelines will cover.

Methods for Research and Improvement

Leadership of the theme:

Prof Logan remains theme lead.

Progress of the strategy:

The principal aims of this cross-cutting theme are: to provide the methodological underpinnings for ARC research and service improvement projects; and, contribute to building capacity in the health economy to generate and use evidence. Staff associated with the theme contributed to numerous grant applications, providing methodological input, including expertise in PPIE, from within and beyond our region. Researchers, particularly those from PenCHORD, the Operational Research modelling group within PenARC, and our "Researchers-in-residence" programme, also work directly with services on design projects. Our capacity building programme has largely moved online which has enabled us to open participation across the country.

Highlights of capacity building

- The Health Service Modelling Associates programme (https://arc-swp.nihr.ac.uk/training-type/hsma/) has been enormously successful. Last year the programme was extended to the police service in response to a request from the Devon and Cornwall Police. Taking advantage of adaptation to virtual teaching, the next course will offer around 100 places across the country and include a tutor training programme. The training not only teaches skills but offers participants the opportunity to work on problems facing their own organisations with expert supervision.
- The Making Sense of Evidence (MSE) programme offers training to health and social care staff and members of PPIE groups in how to find, appraise and apply evidence. In this period we ran 12 workshops and a "Masterclass" for 187 delegates.

Highlights of research and implementation activities:

- Our "Researchers-in-residence" within a local Trust (https://arc-swp.nihr.ac.uk/research/projects/researcher-in-residence/) are working with colleagues to evaluate and adapt two programmes: the "enhanced intermediate care service" to avoid hospital admission or bridge journeys home; and rolling out multi-disciplinary health and wellbeing teams including voluntary sector wellbeing coordinators aiming to prevent people becoming unwell. The approach is action-orientated and participatory, impacting development and implementation of service innovations in real time by working alongside front line teams and managers.
- The PenCHORD, team have multiple projects running (many referenced elsewhere in the report) including:
  - A major programme in the area of stroke care including with the National Stroke Audit system investigating optimal interventions to increase the appropriate thrombolysis.
  - Modelling need for end of life care
  - Modelling potential approaches to providing dialysis services in the light of Covid 19.
  - Work with the local Ambulance Trust to forecast need and decision making, including predicting calls requiring >1 ambulance.
  - Forecasting COVID 19-related service needs for local trusts.
- Better Care South-West Partnership is a collaboration of NHS commissioners, health care providers, local authorities, and academia which will address real-world health problems using the Bristol, North Somerset and South Gloucestershire (BNSSG) Systemwide health and social care dataset and aim to use linked routine care and administrative data to deliver a learning, Integrated Care System for the local population. https://www.hdruk.ac.uk/about-us/locations/health-data-research-uk-southwest/
- NIHR-funded DACHA project (led by Professor Goodman) aims to explore and enhance how resident quality of life and care data can be systematically shared between health and social care organisations working with care homes, for mutual benefit. https://www.nationalcareforum.org.uk/dacha-project/

3. Impact on Healthcare Provision and Public Health

Impact is referenced throughout the report and Added Value Examples. This section includes some examples illustrating the breadth of impact.

Supporting people with dementia and their carers

The pandemic has had a major impact on this group of people, both because they are at high risk of direct adverse consequences of infection causing substantial anxiety and because the lockdown reduced the assistance they received, the opportunities for respite care and their social interaction. Using the outputs of the IDEAL programme the team produced materials aimed at both the people with dementia and their carers offering practical advice. These materials were widely distributed through charity partners, ARCs and AHSNs across the country in physical and electronic formats. The leaflets were subsequently adapted and translated into 10 more languages by the Race Equality Foundation. The team briefed colleagues from DHSC, NHS-E, NHS-I, PHE and Alzheimer's Society on the materials and on practical adaptations for services such as respite care.

Adapting dialysis services to minimise impact of infection

PenARC provided rapid COVID-19 modelling and Operational Research expertise to the Wessex Kidney Centre, Portsmouth Hospitals NHS Trust. The modelling had immediate impact and was used by centre to reconfigure the service to continue to operate in the pandemic while ensuring the safety of over 650 dialysis patients. Steve Dudfield, General Renal Manager, Wessex Kidney

Centre said "*This is brilliant… it has been extremely helpful enabling us to plan for the demand implications of COVID-19 with a high degree of confidence.*"

Forecasting COVID 19-related demand on health services

A collaboration between PenARC, University of Exeter researchers and the NHS resulted in the development of a tool to ensure health trusts maintained sufficient levels of life-saving equipment and bed spaces during the COVID-19 pandemic. The interactive tool allows services to predict the demand for in-patient beds, intensive care, PPE, ventilators, oxygen and testing kits, with a facility to examine the effect of varying assumptions on outputs. https://arc-swp.nihr.ac.uk/research/projects/modelling-sw-demand-and-capacity/

Integrating Psychological medicine into clinical care

PenARC is supporting the development and evaluation of an Integrated Psychological Medicine Service (IPMS) identifying psychological needs in patients across a number of medical specialties within a local acute Trust and steering them into appropriate treatment. The evaluation will allow adaptation of the tool which the Trust aims to roll out across all inpatient services in the future.

Improving primary care management of depression in disadvantaged communities

Research aiming to understand depression in disadvantaged communities in the context of their lives and the implications for primary care (https://www.arc-swp.nihr.ac.uk/research/de-stress) has resulted in the development of a training package for Primary Care produced with the RCGP.

Improving falls prevention for people with Parkinson's Disease

Based on the results of the NIHR-funded PDSAFE trial on falls prevention for people with Parkinsons Disease which demonstrated the effectiveness of the approach we launched a Future learn MOOC for physiotherapists managing these patients to improve their skills. Since the launch in April 2021, 461 physiotherapists have completed the course and a future course is planned for the autumn. https://www.futurelearn.com/courses/pdsafe-falls-prevention-in-parkinsons-the-therapists-approach-

4. Public and Community Involvement, Engagement and Participation

The period covered by this report was defined by Covid-19 and in the first lock down the PenARC PPIE team checked in with all our public collaborators to establish if everyone was safe and sound. We then moved on to providing individual support to connect online. This process was less painful than anticipated and we have been able to continue work with most of our established groups.

PPIE administrator Tanya Hynd started a monthly newsletter called 'Connect'. The newsletter provides information to public collaborators about support available, and shares what the PPIE team members and public collaborators have been up to. It has also been a channel for sharing NIHR and PenARC news. This newsletter has helped keep our sense of 'community' during uncertain times.

Examples of how we work to the NIHR Involvement Standards 'Impact' and 'Working Together'

PenARC launched its new strategy for PCIEP in March 2021. The strategy was co-produced with public collaborators, PenARC researchers, the PenARC leadership team and the PPIE team. At meetings and workshops in the autumn of 2020, we developed initial ideas into aims that speak to the NIHR standards, and the activities that may underpin them. As part of this process we discussed the use of language for PPIE. Words are important, they have meaning and evoke connotations. Together, PenPEG members and the PPIE team reflected on the words used for public members

in research and decided on a term PenPEG members felt would best describe their role – public collaborator. A joint decision was also made to change the group's name from PenPIG to PenPEG, aware of the cultural associations the acronym 'PIG' suggests.

Our first draft was reviewed by researchers and public collaborators and their feedback was incorporated to produce the final document. The PPIE team valued the opportunity of shared reflection and learning during this process, leading to a strategy that celebrates our shared objectives.

Part of the new strategy is the strong desire to increase diversity within PenARC's PPIE activities and to broaden participation. This year we have welcomed eight new members to PenPEG, including a young person. PPIE staff have attended seminars on diversifying PPIE and inclusion of underrepresented groups, led by the NIHR School for Primary Care Research and ARC East Midlands. We have committed to further diversity training for the team and PenPEG members. The PPIE team is now starting to initiate the actions outlined in our strategy, working with PenPEG and PenARC researchers.

Examples of how we work to NIHR Standards 'Governance', 'Working Together' and 'Inclusive Opportunities'

PenARC is leading the public involvement for two national priority programmes, Children's Health and Maternity (CH&M) and Ageing, Dementia and Frailty. Our first priority has been to establish key networks across the collaborating ARCs to identify and invite public collaborators and groups nationwide to contribute to the programme on a strategic level, in an advisory capacity and in the prioritisation of proposals. Opportunities were disseminated with diversity in mind; connections were built to PPIE staff across the ARC network known to have led substantial work within community engagement and inclusion of underrepresented groups in research. We have had substantial engagement and involvement in all stages of the CH&M programme and led an open and inclusive prioritisation process with wide representation of different ethnic groups and generations of care givers and children in the programme management group, advisory board and prioritisation panels.

Examples of how we work to the NIHR Standard 'Support and Learning'

Our team offers advisory clinics, now online, to respond to PPIE related questions from researchers and research active health and social care staff in PenARC's geographical area. Since November 2020, we have organised bi-weekly PPI cafés, providing a space for mutual learning, where researchers can discuss their emerging research ideas with members of PenPEG. In addition, PenPEG members and the team have contributed to several funding applications including Covid Nurse http://blogs.exeter.ac.uk/covid-nurse/

We continue to offer training for public collaborators, with an emphasis on helping them identify what 'knowledge from experience' they bring to research. New PenPEG members and other public collaborators attended the training in December 2020 and January 2021, and we aspire to co-develop a similar training course for researchers.

A BMedSci student joined the team for a practical placement year and with Kate Boddy has been analysing the impact of PPIE on health research from in-detail transcripts from meetings between researchers and public collaborators. She initiated a SharePoint website for our PenPEG group to stay connected during the pandemic, review and comment on documents and celebrate achievements and trained PenPEG members and staff, building confidence and capacity to use this platform.

Significant challenges and barriers

Although online meetings and platforms were initially met with hesitation and anxiety by staff and public collaborators, many now appreciate the positives this provides (e.g. convenience, ability to engage people nationally, increase diversity) and celebrate the achievements. The COVID-NURSE

project specifically demonstrates the ability to build relationships, involve patient collaborators and co-produce a study protocol completely online.

Some public collaborators have commented that moving meetings online has been empowering, feeling they were on a more equal footing when they don't have to enter a "research space", highlighting the importance of a neutral, safe space for positive involvement.

While PenPEG has grown during lock down and we have met with many new public collaborators nationally, it has been a challenge to connect with new local communities. In the past we have enjoyed visiting community centres to meet people and the informal chat and sensitive approaches are difficult to achieve online with new people.

We have also experienced increased demand for PPIE support to researchers. It is very positive that more researchers want to engage with members of the public, but we are working beyond capacity to provide this and are looking for solutions to reduce workloads in the PPIE team while still supporting PPIE in line with the NIHR standards.

5. Academic Career Development

Research Capacity Building

The Making Sense of Evidence Programme continues to be a core activity contributing to both capacity building and the delineation of important unanswered questions of relevance to practitioners. In response to the pandemic this has been converted to an online course. In the reporting persied we have delivered 12 workshops and a masterclass to 187 delegates from a range of disciplines including GPs, nurses, therapists and healthcare assistants.

The Health and Police Service Modelling Associates programme (HSMA and PSMA) offers both an opportunity for particpants to develop skills in the use of modelling approaches and, for those continuing to the second phase, a chance to work with our team to test potential solutions to problems identified their own organisations. Overr 50 students for the Phase 1 training phase of our Health Service Modelling Associate (HSMA) Programme - this was made up of over 30 new HSMAs, 10 Police Service Modelling Associates (analytic roles with 4 regional forces) , and a number of HSMA alumni and PenARC academics. Currently mentoring 7 projects in phase 2 as part of the 3 round of the HSMA programme. Projects are exploring issues such as post-COVID recovery and building of new ways of delivering outpatient care, as well as advanced AI projects looking at predicting hospital admissions and identifying links between offenders and their victims. We're currently exploring a number of options to extend the HSMA programme nationally for the next iteration of the programme, with a possible emphasis on national issues around COVID recovery.

All our capacity building programmes have had to respond to the challenge of the pandemic and have successfully moved to primarily online delivery.

NIHR Academy Members

Each of our five themes has a linked PhD student, in addition to four studentships linked to the TriARC network. Of these latter, two are funded by PenARC and one each by Y&H and NT ARCs with joint supervision. All have now started their studies, with four having already completed the important milestone of upgrading from MPhil to PhD and pleasingly, a number of students have already published papers or presented at conferences.

In conjunction with ARC West and Health Education England we have established stronger processes and oversight of the HEE/NIHR ICA Internships and Bridging Fellowships. In 2020, we awarded 10 Fellowships (internships, pre-doctoral and post-doctoral) and we meet with the awardees quarterly to monitor progress and support next staps (PCAFs or CDRF applications). The 2021 round has been launched and we maned to successfully bid for additional funds circa £200k on top of the orignial £83k we were given to funds more Fellowships and also run additional

events. We link with the Nursing Incubator now meet quarterly with the AHP, bioscience and nursing leads along with the Dean for pharmacy from HEE to develop and monitor our strategy.

The pandemic has resulted in challenges for PhD students, almost all of whom have had to make changes to their projects, sometimes by moving to online delivery and sometimes by a complete re-working of the planned research. We are delighted that all are now on track.

Impact

Our ACD Lead (Vicki Goodwin) maintains regular contact with individual students and meets with them every 6 months as a group. In the past year the students have presented their research to 11 members of PenPEG (our PPI group) as part of an intereactive session; in addition they have discussed mentoring and as a result several students have successfully linked with a mentor.

Supporting Fellowship applications: Our ACD lead and ARC staff have supported the development of applications for NIHR Fellowships, including running mock fellowship interview panels for all candidates. We have supported fellowships across the NIHR Academy programme including internships, pre-doctoral, Development and Skills Enhancement (DSE), post-doctoral bridging and advanced fellowships. Successes include DSE (Masoli), Internship (Goldsmith) and post-doctoral bridging (Hall) with outcomes of other applications due later in 2021.

Collaborations

We run 3-monthly collaborative workshops with ARC West for the successful regional NIHR ICA Internship and bridging fellowship Academy Members, starting in December 2020. This provides mentoring and support to prepare for future fellowship applications as well as allowing the Academy Members to present their research.

For our PhD students we will encourage and support applications to the IVSA and SPARK awards. As part of the NIHR Academic Career Development Forum, our ACD Lead sits on the steering group representing ARCs. As part of this she plans to re-establish the regular ARC Leads meetings to share good practice and learning opportunities.

Sharing best practice

The aim of our training is both developing the researchers of the future and increasing the capacity within the health economy to use and generate evidence. We have well-supported PhD students and an active programme in the ARC and partner organisations to provide staff with research training and to help them achieve post-doctoral fellowships. Our trainees have the opportunity to work with others in the Tri-ARC collaboration and are encouraged to make the most of opportunities in the NIHR Academy. We offer a range of opportunities for staff and members of our PPIE groups to develop their skills from regular methodology "clinics", to short courses such as "Making Sense of Evidence" to longer secondments such as the HSMA/PSMA programme in OR modelling. These activities are both valuable in themselves but also provide the basis for long term relationships which help to support impact.

Expenditure on training

The salary and support costs for NIHR Academy Members during the period totalled £119,422. A further £15,200 was spent on wider academic career development.

A total of £300,676 was spent on networking/training/events, of which £298,321 (over 99%) was leveraged as co-funding from our Health Service and Police Service Modelling Associates (HSMA and PSMA) programmes.

6. Links with NIHR Infrastructure and the wider innovation landscape

PenARC has strong links across NIHR infrastructure. Cross-ARC activities include involvement in methodological development (PPI, OR, Modelling). We lead the Children's Health and Maternity national priority area and consortium members for Older Peoples Care and Dementia, Inequalities, Health Promotion and Prevention themes. PenARC are co-applicants or leading projects within the Multimorbidity, Inequalities, and Older Peoples Care and Dementia themes. Our association with Yorkshire and Humber and North Thames ARCs, the TriARC partnership, includes projects and PhD studentships in areas of modelling and child mental health and a programme around evaluation of the Community Mental Health Framework.

Our collaboration with the South West Academic Health Science Network (AHSN) remains a cornerstone of our regional network. We remain closely involved at Board level (Logan). The AHSN's work on spread and adoption links to our work on Improvement and Implementation in several key areas including innovation in care homes, remote working and health inequalities. We are working in close partnership with the local AHSN, AHSN West and ARC West in a pooled response to the "Beneficial Changes Network" evaluation programme with a regional focus on remote working and monitoring. We have also set up a joint system with SWAHSN in a Regional Programme for Adopting Innovation which builds on the system piloted by Greater Manchester ARC and AHSN. Alongside and co-ordinated with the latter, leaders from the ARC, AHSN and CRN have commenced a process of engagement and collaboration with each of our three emerging Integrated Care Systems (Somerset, Devon, Cornwall) to ensure a mutually beneficial approach to: research capacity building, adoption of large studies, evaluation of local innovation and evaluation of implementation of imported evidence based innovation.

The SWAHSN, PenARC and the Association of Healthcare Analysts continue to support the regional network of business intelligence analysis – the Regional Information Analysts Network. This links with the Health Service Modelling Associates programme part-funded by the AHSN and relaunched for the ARC.

We have ongoing strong links with other elements of NIHR infrastructure, including:

- **NIHR Research Design Service (RDS) South West.** PenARC and the RDS work closely together supporting applications through combining ARC stakeholder engagement and RDS's system of peer review and support. The RDS Director, Prof Gordon Taylor, works in close association with ARC staff in Exeter and Plymouth.

- **NIHR Clinical Research Network (CRN) South West Peninsula.** As well as supporting promotion of recruitment we work closely with the CRN leadership for example in promoting development of Investigators (e.g. allied health, public health, social care, primary care), and also in capacity development for specific areas. Our recent stage 2 bid for social care research across two local authorities has been successful, as was a 4 month NIHR research study examining the best means to promote public health research in Plymouth.

- **NIHR Exeter Clinical Research Facility.** We have developed shared standard operating procedures, joint training, and collaboration between methodologists

- **Peninsula Clinical Trials Unit (PenCTU) and Exeter Clinical Trials Unit.** We work closely with both local CTUs and share methodological expertise and standard operating procedures.

7. Links with industry

Progress against strategy

We have continued to make progress against targets identified in our application. Our partnership with the SWAHSN is key to this area. A major focus is the development with them and increasingly the new ICSs, and industry partners of capacity in real-time analytics. With the same partners and the CRN we aim to develop the capacity of practitioners to engage in research as local investigators including engaging in industry related research, especially clinical trials.

Our work with the AHSN to evaluate and promote adoption of new innovation has developed into an emerging set of partnerships with the new ICSs, starting with Devon, to shift from a responsive to proactive mode. Instead of receiving requests for evaluation or adoption, the CCG is setting up a process of review and of more proactive search for industry partners interested in tackling locally identified problems.

Strategic plans for increasing engagement with industry

We are currently seeking to develop an effective approach to providing PPIE input for industry partners who wish to conduct clinical trials and are looking at the potential to develop links with industry engaged in education and evaluation.

Key examples of working with Small and Medium Enterprises (SMEs)

Our key partnerships with SME relate to the care home sector. We have numerous projects related to research, implementation science, and capacity development and ongoing collaborative work with a number of organisations and key individuals including both small homes and larger providers. The [EXCHANGE](#) project was enhanced during the pandemic with a responsive co-production project involving care homes, the AHSN and NHSEI South West Integrated Personalised Care team. Our recent Social Care Research capacity building bid involved the wider care sector is under stage 2 review.

Strategic partnerships with industry

We have an ongoing partnership with Network Canvass as part of the C2: Connecting Communities project. Within the NIHR-funded Remote by Default project investigating digital and remote care in general practice we have developed a partnership with Design Service who are working with the team and Plymouth 'Deep End' practices to design material (such as practice website) to support access to the increasingly complex range of ways of accessing primary care with the aim of addressing inequalities and promoting a coherent experience. We are also working in the project with ICE Creates Ltd, a research design enterprise, to establish how to overcome digital inequalities for individuals who are homeless, in collaboration with Devon CCG.

Contract commercial studies, industry collaborative research studies, and other academic commercial research
We are not currently involved in formal studies.

Partnerships or studies with industry leading to further funding
We have no current industry studies which have led to further funding. Our ongoing partnership with McPin Foundation (specialist charity in user involvement in mental health research) has led to funding of a collaborative evaluation of the Community Mental Health Framework pilots.

Key examples of agreements signed with industry including Non-Disclosure Agreements and Model Trial Agreements
None

8. Co-funding

PenARC co-funding comes from multiple sources including NHS/SC organisations, AHSN, partner Universities, charities (including Alzheimer's Society, Stroke Association, All Saints Trust, Crohns and Colitis UK), and the private sector. This includes direct grants to address their questions and in kind contributions to joint projects with PenARC. Only a small sample of projects supported by co-funding can be reported. Our strategy is explicitly responsive to the needs of decision makers and projects often cross themes and include elements of both implementation and research.

We often work with organisations which are not partners within our collaboration either because of the nature of the organisation (e.g. the Police Service) or because they are based in other parts of

the country (e.g. Wessex Dialysis Service). Because of the reporting structure, we are not able to formally declare their contribution to our co-funding so that the amount declared in the financial report underestimates the actual extent of co-funding. We received co-funding totalling just under £2M in the reporting period, c. £1.26M from our NHS partners. Although there is considerable overlap, approximately 60% of this funding went to support implementation activities.

Some key activities and achievements supported by co-funding

- **AHSN Partnership**
  The AHSN is a key partner and includes contributions to a number of our projects. These include the following projects/programmes:
  - Developing the evidence base for social prescribing **(Complex Care, Mental Health and Public Health Themes)** Including https://arc-swp.nihr.ac.uk/research/projects/nature-on-prescription/
  - A programme of research developing and implementing best practice interventions for care homes. These include DACHA, CHIK-P and ExCHANGE (**Complex Care, Dementia Themes)**
  - Covid-19 and development of 'hot' Covid-19 hubs in primary care **(Complex Care)** https://arc-swp.nihr.ac.uk/research/projects/general-practice-hubs/

- **Researchers in Residence Programme** *(Complex Care Theme)*
  - co-funding from Torbay and South Devon FT enabled the delivery of multiple projects including an evidence-based business case leading to attracting £10m in funding for a new mental health facility, with the researchers now helping to design systems for its operation.

- **HSMA and PSMA Programme** *(Methods for Research and Improvement Theme)*
  This programme (see *AVE*), has been supported by funding from the AHSN and a substantial contribution from participating organisations. It builds on the programme begun in PenCLAHRC. Participants develop new skills, provide evidence-based solutions for problems defined by their employers and then join a growing alumnus group with whom we continue to work on service improvement.

- **Operational Research Modelling for Service Design** *(Methods for Research and Improvement Theme)*
  The PenCHORD modelling team work with service providers and commissioners to provide a basis to assist ratinal decision making in complex systems. Examples include:
  - Covid Vaccination Modelling
  - Covid End of Life Care
  - Covid Dialysis Service
  - Maximising the effectiveness of acute stroke care including:
    - https://arc-swp.nihr.ac.uk/research/projects/stroke-thrombectomy/
    - https://arc-swp.nihr.ac.uk/research/projects/samuel-stroke-audit-machine-learning/

9. Forward look

The pandemic required the effective use of evidence to underpin service redesign. Our ability to work constructively with services demonstrated the utility of our model of building long term relationships between academics, service users, providers and commissioners through responsiveness, delivery of joint projects with clear impact and capacity building activities. These relationships enabled us to deliver across a number of areas. Services are reeling under the knock-on effects of the lockdown but we will continue to build on our links, often with the SWAHSN, to help address these challenges. We do not underestimate the challenge, particularly as many staff are committed to delivery of projects paused during the pandemic but now re-starting.

We anticipate pursuing two major avenues of work to address service needs. Firstly, our OR modelling team will continue to respond to requests to help providers achieve efficiencies in

pathways of care, something fruitfully exploited in the past. To increase capacity, this is a particular focus for the next round of the HSMA programme and we have recruited a number of academics from outside the region who will receive training in these methods in exchange for supervising projects by modelling associates. Secondly, in response to the Beneficial Changes Network, we have established a partnership between the two ARCs and two AHSNs in the southwest to attempt to address the potential for using virtual approaches to outpatient care. We see this as offering considerable potential benefit but also posing dangers if used in the wrong circumstances with a potential to exacerbate the inverse care law. We will seek to develop evidence-based guidance to help providers choose the circumstances in which this is likely to produce overall benefit.

The pandemic forced us to consider how we deliver many activities and we are keen to use the learning. In particular we have moved most capacity building activities online with the effect of increasing access. Face to face interaction can offer deeper learning and we will return to this when permissible but will continue virtual delivery where this works well. Similarly, we plan to exploit lessons from using remote approaches to PPIE to expand the diversity of groups effectively engaged.

Research for Best health: the next chapter provides a useful benchmark to ensure that we continue to deliver in key areas for NIHR. We have demonstrated the significant strength of PenARC in almost all of the areas of strategic focus. We would specifically highlight the strong links with care home providers, residents and carers to improve evidence-based care and promote the conduct of relevant research relevant, an important and underserved community, work that we plan to develop further. Overall we have demonstrated an ability to engage poorly served groups as public collaborators, in research, and in capacity building – this will remain a key focus and an area where we will seek to build.

PenARC is built on explicit responsiveness to the needs of service users and providers, a strategy which will remain at the core of our activities in the future.

10. National Priority Areas

The Child Health and Maternity Programme is a consortium of 9 ARCs, with 4 ARCs at the core of the collaboration management and 2 (PenARC and Yorkshire and Humber) providing leadership. Since October 2020, we have worked with more than 170 stakeholders from 13 regions, and national bodies including NHS EI and national charities to develop our programme. We have used this engagement to prioritise 4 evidence-based interventions to take forward in 2021-23, including Multidiscipliary Teams in Maternal Mental Health Services (MMHS), Trauma-Focused Cognitive-Behavioural Therapy (TF-CBT) for young people in care with post-traumatic stress disorder, Supervised Toothbrushing for 3-5 year olds in deprived areas, and Independent Domestic Violence Advisors (IDVAs) for maternity patients. In the first phase (Oct-Dec), we invited all ARCs to consult with their constituencies to suggest interventions meeting the criteria. We received 32 suggestions, which were screened on evidence of efficacy, producing a shortlist of 14. In January 2021 we held four workshops - two each in maternal and child health - attended by service users, providers and academics representing our 9 partner ARCs - each chaired by a public contributor. Interventions were scored and ranked based on their feasibility, acceptability, and impact on equity. Nine interventions were particularly highly rated. Over a 6-week period (Feb-March 2021) the team undertook rapid but formal reviews of the evidence of effectiveness, cost-effectiveness, and side effects of these interventions and, using these reviews, we finalised our selection of the 4 interventions above. We sense-checked this against national priorities with our Progamme Advisory Board, which includes PPI representatives and national leaders in Child Health and Maternity.

As part of its role in leading the national ARC network in operational research (OR), the SW ARC has co-ordinated a series of network meetings across the UK. These commenced in April 2021 are held on-line and focussed on the use of OR for address key issues in the Covid-19 pandemic such as modelling demand and predicting on-going workforce and bed capacity.

Initially this network engaged with members of ARCs across England but it felt important to expand the network to include all of the UK so that all relevant work could be shared. The group was therefore named National Covid-19 Operational Research Network to include all relevant professional staff interested in this area. The group currently has around seventy members which shares resources using a MS-Team site. To date, a total of around twenty hour long on-line meetings have taken place with key presentations demonstrating the use of OR methods to directly address a wide range of current issues arising from the Covid-19 pandemic. Recent N-CORN presentations, for instance, have concentrated on the use of modelling to help organise the vaccine roll-out for the UK population.

Benefits from N-CORN include the sharing of expertise and initiatives enabled through the networking opportunities facilitated by the group. Full minutes and recordings of the presentations are made available following each on-line meeting. Prof. Martin Pitt who leads the N-CORN group is also helping to lead the health stream at the upcoming OR Society conference and will plan to develop the OR network amongst ARC participants in coming years.

11. Beneficial Change Network (BCN)

The Beneficial Changes Network produced a very large number of potential questions and there was initially some difficulty in prioritising the work and ensuring that NIHR ARCs could deliver useful answers with the resources available. We collectively established a jointly funded national system, led by Prof Nicky Cullum, to liaise with NHSE&I and coordinate our efforts. This produced a helpful map of existing ARC research relevant to these areas which has been widely shared.

It was then agreed that ARCs and partner AHSNs would work with regional providers and commissioners to choose a small number of key topics with the aim of producing useful resources to underpin service delivery. Working with ARC West, SW AHSN and West of England AHSN we consulted widely within region and have agreed that our primary focus will relate to the use of remote consultation. We hypothesise that remote consultation offers potential advantages to streamline and improve services but also risks exacerbating the inverse care law if used inappropriate circumstances. We aim to produce resources which will help services decide for whom and how this can best be deployed. The 4 organisations have pooled our resources and will deliver this work jointly.

12. Added Value Examples: outcome, actual impact, or potential impact

A simulation modelling toolkit for organising outpatient dialysis services during the COVID-19 pandemic

PenARC provided rapid COVID-19 modelling and Operational Research expertise to the Wessex Kidney Centre, Portsmouth Hospitals NHS Trust. The modelling had immediate impact and was used by centre to reconfigure the service to continue to operate in the pandemic while ensuring the safety of over 650 dialysis patients.

Due to the risks COVID-19 poses to dialysis patients and their need to regularly interact with the health service, NIHR PenARC delivered the new evidence within 2 weeks of request from our NHS partners.

The team - a collaboration between clinicians, NHS managers and NIHR PenARC researchers, used advanced computer simulation methods to model the dialysis network and transport of patients to units. By modelling a range of infection scenarios, the team investigated the impact of COVID-19 on outpatient, inpatient and patient transport services.

The study found that the most resilient approach was to centralise care of infected outpatients at the Queen Alexandra Hospital Portsmouth, with surge capacity at Basingstoke Hospital. Regional capacity plans for patient transport to dialysis were found to be insufficient. The study recommended that existing services could be reconfigured to reduce transport time by 50-60% and that this would need to be supported by a temporary accommodation for infected patients located closer to the

centralised unit.

Impact on local NHS services:

Steve Dudfield, General Renal Manager, Wessex Kidney Centre
- "*This is brilliant… it has been extremely helpful enabling us to plan for the demand implications of COVID-19 with a high degree of confidence.*

Jonas Willemsen, Renal Information and Systems Manager, Wessex Kidney Centre

- "*We're bowled over by how quickly [the team] turned this around… I think this is going to be (and indeed already is) transformative to our handling of the outbreak.*"

Amir Bhanji, Consultant Nephrologist, Portsmouth Hopsitals NHS Trust

- "*The modelling was very helpful in providing a basis on which we could change the way we work in preparedness the number of COVID cases. We relocated patients to more appropriate satellite dialysis units to free up space in our main unit to manage the number of patients. We negotiated the use of an extra inpatient ward with the trust in case we saw a large increase in the number of dialysis inpatients. We also paid patients who were able to make their own way into the units to free up the patient transport service. As a unit we felt we were well prepared for the worst case scenario thanks to the model.*"

For more information on the project please visit the [Project Page](#).

Forecasting Demand and Capacity for NHS Trusts in the South West during the Covid-19 Pandemic

A collaboration between PenARC, University of Exeter Researchers and the NHS resulted in the development of a new tool to ensure health trusts maintained sufficient levels of life-saving equipment and bed spaces during the COVID-19 pandemic.

The research team, led by Professor Gavin Shaddick, developed a data modelling tool to help forecast demand on crucial NHS resources in the region. The forecasts have been used to help predict the demand for in-patient beds, intensive care, PPE, ventilators, oxygen and testing kits.

The forecasting model integrates epidemiological modelling with statistical forecasting using both national and local data. The analysis works by comparing local patterns of the spread of COVID-19 with other areas nationally and abroad.

The researchers have been able to use daily 'live' data to adjust their forecasts as the spread of the disease evolved in local populations. The team were also able to vary the anticipated R number to review potential impacts as social distancing rules were relaxed and ahead of anticipated population increases in the South West over the Summer period.

The forecasting model was made available online to a group of senior clinicians including microbiologists, disease infection and prevention specialists and mangers as well as public health and commissioning experts. This reference group has been giving feedback to the team so the model can be iterated to best reflect the latest research and understanding in the field. The initial model, developed in partnership with [Northern Devon Healthcare NHS Trust](#) and the [Royal Devon and Exeter NHS Foundation Trust](#) evolved substantially following these suggestions. The tool has now also been rolled out to the [Royal Cornwall Hospitals NHS Trust](#).

Nic Harrison, Principal Analyst and NHS Lead for Northern and Eastern Devon collaborative COVID analysis and modelling said: "This is work that the NHS is having to deliver at pace, so we

are delighted that the University is helping to support us with this at such a challenging time so that key decisions are based on the strongest possible evidence-base."

Angela Hibbard, Director of Finance and Performance at Northern Devon Healthcare NHS Trust and also representing the Royal Devon and Exeter NHS Foundation Trust has been leading the project for the local NHS. She described the tool as "being hugely important in informing the decision-making within both Trusts during the COVID-19 crisis. It has helped us make well-informed and evidence-based decisions across a range of key issues such as PPE and ventilators being available to frontline staff when they need them. More importantly, it is helping us model scenarios as we start to come out of lockdown and what this may mean to our hospital capacity requirements going forward."

For more information, please see the [PenARC news story](#) and video presentation from Prof Gavin Shaddick to the National Covid Operational Research Network (N-CORN): https://youtu.be/XgDkl22T-Fs.

Supporting people with dementia and their carers during the pandemic

[The IDEAL Project](#), led by PenARC Dementia theme lead, Professor Linda Clare, has produced evidence-based guidance on how those living with dementia can stay well during the coronavirus outbreak and made recommendations about the support needs of people with dementia and their family carers during the COVID-19 pandemic. People with dementia are particularly vulnerable to the psychological and social impacts of isolation and lockdown.

The IDEAL COVID-19 Dementia Initiative (IDEAL-CDI) team produced online guidance and information leaflets in English and Welsh for people living with dementia, and for family carers, based around five key messages. The aim was to support those living in the community during the outbreak to manage the psychological and social impacts of social distancing, self-isolation and lockdown. The guidance was distributed online through a network of organisations and formed part of Alzheimer's Society's support package via helplines and frontline staff. They were also distributed through the national ARC network and to AHSNs. The leaflets were subsequently adapted and translated into 10 more languages by the Race Equality Foundation.

The research team monitored online networks and conducted telephone interviews with a sample of people with dementia and carers participating in the IDEAL cohort, and a sample of black and Asian people with dementia and carers also involved in the IDEAL programme, to explore their experiences during the pandemic as they faced isolation and reduced contact with services.

People living with dementia described concerns about maintaining supplies of food and medications, anxiety about what would happen if they were admitted to hospital, lack of confidence, feelings of loss and grief, increases in symptoms like agitation, and a more rapid decline in cognitive and functional ability.

For carers, lockdown meant they are more captive in their role and lack respite opportunities. Many carers found it difficult to explain the current restrictions and enable the person with dementia to remain safe, and were deeply worried about the safety and well-being of their relatives.

Based on these accounts, the team put forward a number of recommendations including maintaining and strengthening 'just checking' telephone support, improving public awareness, exploring how respite care could be adapted to meet social distancing requirements, and taking into account cultural preferences for information content and delivery. The team discussed these recommendations with colleagues from DHSC, NHS-E, NHS-I, PHE and Alzheimer's Society.

The team are continuing to explore the impact of the pandemic on all IDEAL cohort participants through a round of COVID-specific data collection, called INCLUDE. Comparing pre- and post-

COVID responses from this group will provide a unique means of assessing the short-term impact of the pandemic on the well-being of people with dementia and carers. A further round of IDEAL data collection will help in understanding the longer-term impact. The evidence gathered is being used to develop the Living Well alongside COVID toolkit which will offer a comprehensive set of resources to support well-being for people with dementia in the community and family carers. INCLUDE has been shortlisted for an Alzheimer's Society Dementia Heroes award.

Health Service Modelling Associates Programme

In October 2020 we launched the third round of our Health Service Modelling Associates Programme – HSMA 3. In light of the pandemic, we designed the programme to be delivered entirely online, this has had the significant benefit of allowing us to vastly increase the scope and scale of the programme. For HSMA 3, we recruited 52 HSMAs – double the size of the cohort for the last round of the programme. The cohort included representatives from health and social care organisations, as well as representatives from policing organisations, as we restarted our funded pilot of the Police Service Modelling Associates programme to run as part of HSMA 3.

The scope of the training in the programme has also vastly increased – from 6 days of training for the last round to 17 days for HSMA 3. The training now covers a much wider range of methods and application areas, including whole systems modelling approaches for tackling system-wide issues, and Artificial Intelligence approaches to teach machines to make decisions or extract information from free text.

At the end of the first phase of the programme (December 2020), HSMAs pitched a number of project proposals to take forward to Phase 2. With the help of patient representatives, we selected 7 projects to mentor – four in health and social care settings and three in policing settings.

The projects are looking at:

- Identifying the links between offenders and their victims using network analysis
- Using Natural Language Processing to extract data from GP patient notes to try to teach a machine whether a patient is likely to be imminently admitted to hospital
- Using Natural Language Processing to identify the positive and negative tweets about police forces in England and the aspects of their services about which people feel positively and negatively
- Using geographic modelling to identify the carbon impact of virtualising outpatient clinics, and using Natural Language Processing to extract information from patient surveys about how virtual clinics work for them
- Using simulation to model pathways in orthopaedics services to identify ways in which the post-pandemic backlog can be reduced and managed
- Optimising the location and resourcing of Paediatric Critical Care beds
- Improving the allocation of police investigation resourcing to demand using simulation modelling

Projects are running until September 2021, where they will be presented at a national virtual event.

We are also currently developing our plans and content for HSMA 4, which will launch in October 2021. HSMA 4 will, for the first time ever, be opened up to anyone working in health, social care and policing based anywhere in England. The programme will remain online, and will have 100 places available, including 10 places for other Operational Researchers and Data Scientists to provide external mentoring to increase mentoring capacity in the programme. HSMA 4 will serve as a pilot for a larger national rollout in HSMA 5, for which we are currently exploring funding opportunities to support the increased resourcing required to support this.