NHS
Education for Scotland

MEDICAL DIRECTORATE
EDUCATION RESEARCH & INNOVATION
## Annual Report 2018
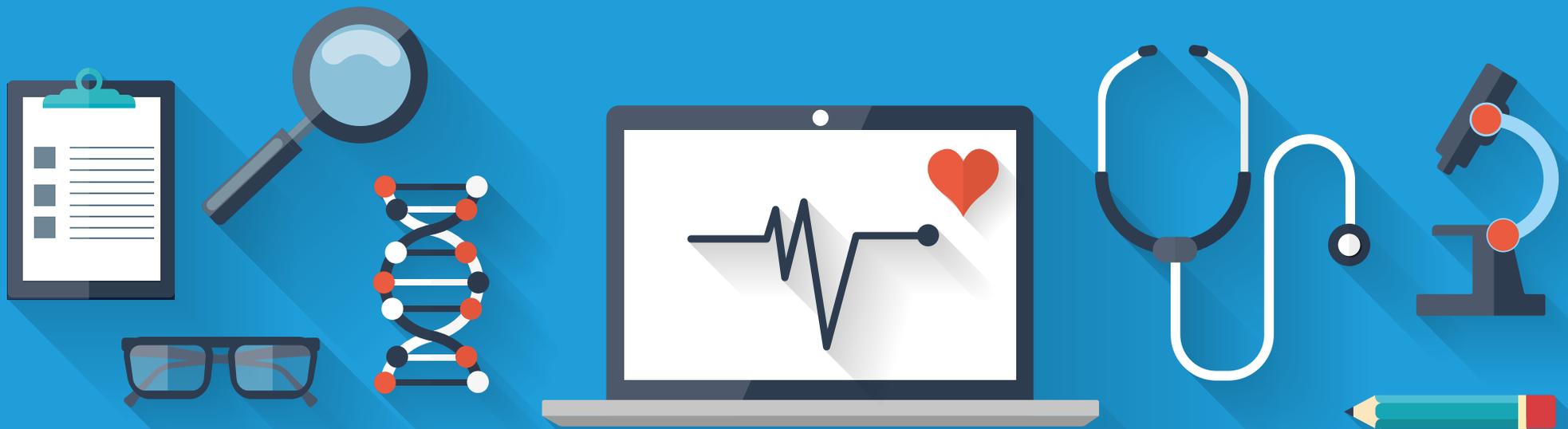
Contents

Background

This inaugural publication is an attempt to gather together the research undertaken under the auspices of the Medical Directorate within NES.

During 2016-2017 it was decided to establish a Medical Directorate Research & Innovation Governance Board (MedRIG) to provide strategic leadership for all research and innovation activity that would be accountable to the Medical Directorate Executive Team (MDET) through the Strategic Planning and Directorate Support (SPDS) Workstream. This provided an opportunity to bring together and co-ordinate a number of research themes and provide a forum for interaction and collaboration.

The strategic vision of MedRIG is to achieve internationally-excellent, locally-relevant medical and healthcare education research and innovation. It was recognised that there was a diverse range of research activity and several very active hubs of activity.

These included SMERC (Scottish Medical Education Research Collaborative), SKIRC (Safety, Skills & Improvement Research Collaborative), Primary Care Research, Pharmacy Research and a Medical Directorate Research Interest Group (RIG). The direction for MedRIG was also informed by a national survey of stakeholders to identify medical education research priorities[1].

The strategic vision of MedRIG is to achieve internationally-excellent, locally-relevant medical and healthcare education research and innovation.

SMERC (Scottish Medical Education Research Collaborative)

SMERC was established in 2011 as a collaborative between NES and the five Scottish Medical Schools. It is core funded by NES and aims to conduct high quality and important medical education research in Scotland and beyond, build capacity within Scotland, and develop collaborations with leading international researchers.

SMERC has built a critical mass of experienced researchers and is developing emerging researchers who have a deep understanding of medical education and training, to understand and develop the new knowledge, skills and workplace behaviours essential for addressing current and future healthcare challenges.

SMERC activities include:

- The establishment and support of 15 PhD studentships, four of which are core funded by NES and the others are funded by competitively won external sources, including the only Intercollegiate Surgical Curriculum Programme (ISCP) Fellow in the UK. Supervision is provided from medical schools, NES, other NHS authorities, and key international collaborators. These doctoral students give us probably the greatest medical education research capacity in the UK, and build sustainability in terms of developing a breadth of understanding and knowledge of medical education research across Scotland.

- Support of medical students, trainees and research fellows in developing skills and knowledge via Summer Studentship Schemes, B Med Sci studentships, an Academic Foundation Programme in Medical Education, and by providing teaching in research to Foundation Doctors. SMERC has supervised Clinical Lecturers and Teaching Fellows who have gone on to senior posts in medical education with active interests in carrying out and supervising educational research.

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SCOTTISH MEDICAL EDUCATION
RESEARCH CONSORTIUM

SKIRC (Safety, Skills & Improvement Research Consortium)

SKIRC is a novel initiative that brings together the combined innovative capabilities, expertise and experiences of the long-established 'Safety and Improvement' and 'Clinical Skills' research & development teams within NES.

The key purpose of SKIRC is to research, design, innovate, implement and evaluate complex educational interventions that focus on facilitating individual, team, organisational and national learning and upskilling of the NHS Scotland workforce. The goal is to improve overall healthcare system performance (e.g. safety, efficiency, productivity, effectiveness) and the wellbeing (e.g. health & safety, experience, joy, satisfaction) of patients, carers and staff groups.

The new partnership has led to the development of a unique educational research and development group with a worldwide reputation in the inter-related fields of patient safety, clinical skills and simulation, quality improvement, and human factors & ergonomics sciences. Building medical education research capacity and capability in these fields is an important objective. Two NES staff members have graduated with PhDs in the past 5 years, one is currently undertaking a PhD and multiple others having published journal research papers in these areas.

Overall, SKIRC provides an exciting platform for integrated joint working within and across NES directorates, territorial and special health boards, higher education institutions and professional bodies. The future aim is to further develop important collaborations in these scientific domains in NHS Scotland and internationally.

Safety, Skills & Improvement

Introduction

The following report has aimed to capture some of the key research themes over the past 3-4 years but it is not completely exhaustive.

We have aimed to group the research into two major themes and 6 key chapters as outlined below:

Theme 1: Developing the Workforce

Chapter 1: Selection / Widening Access

Chapter 2: Career Decision Making

Chapter 3: Developing Staff

Theme 2: Developing the Clinical Learning Environment

Chapter 4: Factors that Affect the Clinical Learning Environment

Chapter 5: Building a Safety & Learning Culture

Chapter 6: New Ways of Working

There may be other areas of valuable research that have not been captured in this report, but it is anticipated that we will continue to refine and develop this process for subsequent reports in the years to come.

I am indebted to several individuals who have contributed significantly to the content of this report, namely Professor Jen Cleland (SMERC Director), Dr John McKay (Patient Safety, SKIRC), Dr Paul Bowie (Patient Safety/Human Factors & Ergonomics, SKIRC), Professor Jean Ker (Simulation, SKIRC), Dr Kim Walker (RIG), Dr Ailsa Power (Associate Postgraduate Pharmacy Dean) and Professor Peter Johnston (Associate Postgraduate Dean for Research).

I am also very grateful to the assistance of Paul Bowie and Niall MacIntosh who have helped with formatting and referencing, and to the NES Design Team who have created the final report.

Professor Rowan Parks
Deputy Medical Director and Chair of MedRIG

Theme 1:

Developing the Workforce
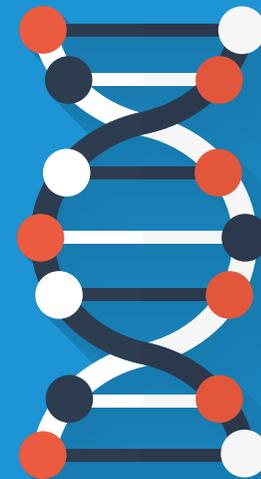
Theme 1: Developing the Workforce

1. Selection / Widening Access

1.1 Selection into Medical School

SMERC has a 7-year programme of work that is led by Prof Jen Cleland, Aberdeen, in collaboration with a number of UK universities including Dundee, QMUL, Cambridge, Durham, Edgehill), externally-funded by the General Medical Council (GMC) and Medical Schools Council (MSC).

PROFESSOR JEN CLELAND
Director, SMERC

Outputs from this work have informed UK national policy and international practice on how best to select at the point of entry into medical school and widen access to medical school.

The focus of this work is two-fold.

First, it has examined and extended the evidence on the best selection tools (e.g. prior attainment, interviews, aptitude tests, assessment of personal attributes and values), and how these tools should be combined and weighted. This work extends the boundaries of what is known and will form the basis for selection practice guidance for medical schools, the Selecting for Excellence Group (SEEG) and the MSC. This work will help medical schools across the UK achieve the goals of the Government's White Paper: *"Success as a Knowledge Economy: Teaching Excellence, Social Mobility and Student Choice"* (May 2016).

Outputs from this work have informed UK national policy and international practice on how best to select at the point of entry into medical school.

Theme 1: Developing the Workforce

Second, this programme is leading edge in terms of gathering the evidence on how best to attract applicants from diverse backgrounds to medicine. This is particularly important in the Scottish context as there is evidence that medical students from less traditional backgrounds are more likely to work in under-served areas and in primary care on qualification.

SMERC projects have identified how best to use highly-accessed sources of information (e.g. medical school websites) to attract applicants; how to support teachers in encouraging their able pupils to consider medicine; the evidence base for, and utility of, different types of contextual evidence (e.g. postcode, school) in medical school admissions; and importantly, how medical students from widening access backgrounds perform at medical school and in the Foundation Programme in comparison with their more traditional counterparts.

This work promotes best practice and transparency by opening up data held by the sector, informing choice and promoting social mobility. Moreover, Prof Cleland's expertise in this topic has been recognised in the postgraduate sphere and internationally. She is advising the Royal College of Surgeons in how best to develop and pilot selection processes for run-through general and vascular surgery training. She has also been invited to speak on this topic across the UK, USA, Canada and Australia. Important outputs from this work include numerous academic papers and reports[2-4].

1.2 Selection into Foundation Training

The aim of this area of research was to examine the relationships between a broad range of sociodemographic variables (including pre-entry performance and medical school attended) and performance on the UKFPO selection process measures. This was a SMERC funded PhD project in

DR KIM WALKER
Educational Director

collaboration with the University of Aberdeen. UKMED data was used to identify what factors, prior to entering medical school and during medical school, affected foundation programme outcomes. Building on previous work[5] , a further paper has been submitted to BMJ Open and is currently being reviewed. A preliminary report has also been submitted to the UKMED Board.

A further study in collaboration with WPG/UKFPO and commissioned by the Department of Health investigated the validity of Situational Judgement Tests (SJT) for selection into the foundation programme. It also assessed the impact of outcomes and its relationship with academic assessment and provided the evidence for the continued use of SJT's in foundation selection[6-8].

Theme 1: Developing the Workforce

2. Career Decision Making

2.1 Career Preferences

Numerous specialties and localities face issues in recruiting and retaining trainees and consultants. A nine-year programme of work funded by NES initially, then via SMERC and external funding bodies (e.g. UKCAT Research Consortium), examined the aspirations of senior medical students, Foundation Doctors and trainees, and investigated how they select jobs and what they want from a job.

PROFESSOR PETER JOHNSTON
Assoc. Postgraduate Dean for Research

This work is led by Cleland and Johnston (Aberdeen) who have looked at topics including:

- The value medical students and trainees place on factors relating to their careers

- The central importance of the clinical working and learning environment in recruitment and retention

- How best to support medical students, trainees and staff, and hence help recruit and retain trainees, and ensure NHS Scotland has the right staff, in the right places, to meet healthcare needs.

- Medical shortages – research collaboration with health economists identified that doctors-in-training are willing to be compensated financially if training posts do not meet their preferences (ie take up unattractive posts if financial incentives are offered). However, other work indicates that this approach is likely to be, at best, a "short term" solution to filling training posts and improving working conditions is likely to be a more sustainable approach, and one that is more likely to have an impact on retention.

- A SMERC funded PhD project in collaboration with the University of Aberdeen utilised innovative methodology to identify preferences and factors affecting career choices using a Discrete Choice Experiment (DCE) for all foundation doctors in Scotland.

- A UKMED project in collaboration with SMERC entitled "Getting on" in medicine was a programme of study of careers trajectories and decisions of doctors. The use of the National Training Survey data about careers preferences was used to gain understanding of the socio-demographic characteristics and preferences influencing medical careers decision making in a contemporary cohort of FY2 doctors.

Theme 1: Developing the Workforce

SMERC research has refined our understanding of what is valued by the medical workforce. This is being used to establish approaches to enhance recruitment and retention across under-recruiting specialties and localities. For example, SMERC was commissioned by the Strategy for Attracting and Retaining Trainees (StART) to carry out an online qualitative survey with senior medical students, Foundation doctors and trainees in 2013. This was completed by 508 individuals (327 trainees and 181 students), 48% of whom were Scottish-born. A dominant theme in the data was a strong preference to be based near family and friends.

To illustrate:

The location for my FY1 was the most important factor for me, I did not want to leave Scotland and wanted to be in an area that I knew and would be comfortable living and working in.

The finding that Scottish medical students and graduates value opportunities to work in Scotland has been replicated in other, quantitative SMERC projects.

Additionally, as yet unpublished work by Kumwenda and colleagues at the University of Aberdeen has identified that medical students from lower socio-economic groups are more likely to apply for a foundation programme nearer their parental home.

Taken as a whole, SMERC work[9-16] on this topic suggests that increasing the number of places for Scottish-born/domiciled medical school applicants is a potential solution to addressing the shortage of doctors throughout Scotland, and encouraging those domiciled in regions which are under-staffed and do not traditionally send pupils to medical school may help address maldistribution of doctors.

2.2 **Foundation Programme Destination Survey Report**

This commissioned research by the UKFPO investigates the Foundation Programme across the UK and provides an annual report that outlines the number of doctors being trained and their destination on completion of FY2. The destination survey has been analysed for the whole of the UK and a report produced for Scotland that has been published on the UKFPO website. This information is used by key stakeholders including medical schools, Health Boards and the four nations to inform future workforce and policy frameworks.

Theme 1: Developing the Workforce

2.3 **General Practice/Primary Care**

Undergraduate:

A study examining factors influencing the career choice of Foundation Doctors has impacted on how medical schools can promote a career in General Practice[17]. Along with associated studies this has highlighted the positive (and biggest influence on a positive GP career choice) is the effect of exposure to General Practice through GP placements in the undergraduate curriculum - thus influencing the curriculum development within Scottish medical schools.

Speciality training:

GP and primary care research[18] have provided evidence of the added value that could be found in existing hospital posts for GP trainees to inform hospital educational supervisors and programme directors on optimising the educational and service opportunities within training posts. This has impacted on the creation and content of the innovative, community facing posts for the new GP 100 posts that commenced in February 2017.

Remote and Rural Workforce:

Research has also added evidence to help clarify policy discussion in relation to remote and rural primary care - both as a career structure for GPs[19] and in relation to professional education and skills development[20-22].

This has impacted on the creation and content of the innovative, community facing posts for the new GP 100 posts that commenced in February 2017.

Theme 1: Developing the Workforce

3. Developing Staff

3.1 Practice Based Small Group Learning (PBSGL)

The NES model of Practice Based Small Group Learning (PBSGL) is now an established uni-professional and inter-professional educational method for GPs, pharmacists and nursing professionals within NHS Scotland[23]. There are now over 2,100 clinicians in 370 groups across the UK. The programme is used by all 14 territorial health boards in NHS Scotland. Research evaluation of the feasibility, acceptability and educational impact of this learning approach has identified the most salient aspects of PBSGL for participants - meeting learning needs, learning from peers and peer support[18-20].

In addition, as well as providing a mechanism to demonstrate to regulatory bodies participation in high quality Continuing Professional Development (CPD), using a participatory approach to prioritise subscribers' learning needs has allowed specific groups of healthcare practitioners (such as those working in areas of high deprivation) to tailor their needs to that of their practice population[26].

As service provision is scrutinised and reorganised, research on this model has been found to serve as an effective complex educational intervention to address specific quality and safety issues (particularly in relation to communication between senior clinicians) at the 'interface' between primary and secondary care[27-29].

3.2 Leadership in Practice

a) General Practice

SKIRC led primary care research into the feasibility, acceptability and impact of specific safety leadership approaches. These included building evidence bases around implementing and applying a trigger review method (TRM) and assessing the prevailing organisational safety climate, ensuring these approaches were incorporated into GP contractual requirements as part of the national patient safety agenda.

The innovative TRM approach[30-35] highlighted the importance of this safety tool in identifying previously unrecognised patient safety incidents within GP practices nationally. Research served to highlight the major benefit of using this tool to address primary-secondary care 'interface' medication/prescribing issues. The TRM has also attracted international recognition and has been adapted in different countries, including England, Ireland and New Zealand.

Theme 1: Developing the Workforce

The most recent research publication in the prestigious BMJ Quality and Safety journal attracted an accompanying Editorial[36] by a prominent international researcher in the field who commented:

> *This research is very important because for the first time it shows that a primary care patient safety measurement can be implemented across a health system and that it can prompt GPs to recognise opportunities to improve the care they provide and to make changes. All three stages of trigger tool use are applied in this report. If they can do it in Scotland they can do it in other places too."*
>
> **Professor Susan Dovey**
> **University of Otago**

This work also serves as a great example of Improvement Science in Action and how NES and HIS worked in partnership over a number of years to design, develop, test and refine this method, deliver targeted training to the GP workforce nationally, and implement and evaluate the intervention as part of the Scottish Patient Safety Programme[37-38].

> *NES and the SPSP Primary Care team have worked collaboratively and with great success to design, develop and implement a number of safety-related learning and improvement interventions in primary care settings in Scotland. A particular area of expertise we have utilised from our R&D colleagues in NES is in supporting evaluation of our improvement collaboratives in general practice, community pharmacy and the dental setting".*
>
> **Jill Gillie**
> **Portfolio Lead, Primary Care Portfolio**
> **Healthcare Improvement Scotland.**

b) **Practice Management**

A system wide safety checklist for the GP working environment focuses on enhancing the safety leadership role of practice managers who will have responsibility for monitoring and improving this organisational element of system safety[39-40]. This intervention has been implemented by at least one NHS Board as an 'enhanced service' Quality Improvement (QI) activity and has also been added to a 'toolbox' of QI methods for GP clusters to undertake nationally, if desired. In England, Wales and Ireland the UK Medical Protection Society have adapted this safety checklist tool and are implementing it across their Member practices in these countries. The checklist is also included in the Royal College of General Practitioners (RCGP) Patient Safety Toolkit.

c) **Speciality Training**

NES primary care research recognises NHS Scotland and UK policy and regulatory strategies in relation to GP trainees demonstrating the ability to lead on QI initiatives as part of their training and subsequently as professional 'leads' in independent practice. Studies have examined the practical opportunities for developing leadership skills during GP training[41] to match to the GMC Generic Professional Capabilities (GPC) framework and identified gaps between knowledge and application. This has served to direct educational initiatives to encourage trainees to undertake feasible QI projects within their training environment and demonstrate quality through peer review and/or publication[42-43].

Theme 1: Developing the Workforce

A SKIRC led Human Factors study to identify what safety skills GP educators reported as being important for GP specialty training highlighted that 'leadership' was not perceived as an important professional attribute in developing the safety culture in General Practice. The effect of this finding was to improve communication between NES and GP educators on the importance of GP leadership and provide impetus to developing leadership opportunities for GPs within the training environment[44].

d) Wider NHS Workforce

With a renewed primary and community care focus in Scotland, professionals will be required to take on more of a leadership role to assist preparatory work with NHS Boards, local authorities, third and independent sectors to deliver effective integrated health and social care partnerships.

DR AILSA POWER
Assoc.Postgraduate Pharmacy Dean

Power et al (2017) reported on the comparison between primary care professionals in terms of the extent and type of previous leadership training received and future leadership development in the advent of transformational health care change [45]. This study indicated that across providers within primary care in Scotland there is a gap in leadership training as the timeline for the 2020 vision approaches, and suggests that to date, leadership provision for primary care in Scotland could be improved.

e) Lay Representatives

An evaluation of the role and responsibilities of lay representatives following their period of tenure. This qualitative study used a semi-structured questionnaire and has been finalised in a report.

This has been discussed by the Medical Directorate Executive Team and is due to be sent to the GMC.

f) The Community Pharmacy Team

Effective strategies are needed to translate knowledge (evidence) into practice to improve the quality of community pharmacy services. Newlands et al [2017] reported the first step of a novel knowledge translation process which involved the systematic identification and prioritisation of community pharmacy services in Scotland which were perceived to require improvement and/or guideline development [46].

Consensus was achieved with six topics:

1 promoting the appropriate sale and supply of over-the-counter medicines

2 patient counselling for prescribed medication

3 pharmaceutical care to promote medication adherence

4 promotion and delivery of a Minor Ailment Scheme

5 pharmaceutical care of vulnerable patients

6 effective use of community pharmacy workforce.

Of these, the priority topic selected for the next stage of the programme was promoting the appropriate sale and supply of over-the-counter medicines and resulted in NES creating a distance learning pack sent to every community pharmacy in Scotland on 'Effective Management of Over-the-Counter (OTC) Consultations' with funding from Scottish Government to allow each member of the Pharmacy Team to undertake this training and assessment.

Theme 1: Developing the Workforce

3.3 **Prescribing by Pharmacists**

Prescribing is a complex task requiring considerable knowledge and skills. The Prescribing Safety Assessment (PSA) was developed by the British Pharmacological Society and the UK Medical Schools Council.

Between February and June 2014, over 7000 final year medical students undertook the PSA, with an overall pass rate of 94%. Independent prescribing for suitably trained pharmacists was introduced in the UK in 2006. Reid et al [2017] undertook a study to test the PSA performance of a pilot group of pharmacist prescribers in Scotland relative to medical students and to test the feasibility and acceptability of running the PSA within the pharmacy profession[47].

In this study pilot events benchmarked the PSA performance of pharmacist prescribers with final year medical students, and feedback confirmed feasibility and acceptability. Further studies are now ongoing to assess where within Pharmacy Training the PSA may be most useful. Both the pre-registration governance research and the PSA work will now input into the development of the new Scottish 5-year integrated degree for the initial education of Pharmacists in Scotland commencing from 2020.

Between February and June 2014, over 7000 final year medical students undertook the PSA, with an overall pass rate of 94%.

Theme 2:
Developing the Clinical
Learning Environment

Theme 2: Developing the Clinical Learning Environment

4. The Learning Environment

4.1 Factors that Affect the Clinical Learning Environment [48-51]

The SMERC work focusing on early career decision making also informed a relatively new SMERC programme of research, examining what medical students and trainees want from the clinical learning environment (CLE), how they experience their working and learning environments, and what improvements will best meet their educational needs. Within the medical context, the clinical learning/working environment (CLE) may support, or undermine, individuals in achieving the necessary competencies to progress in training. While work-related activities and learning from and with other people are the foundation of trainee doctor learning, there is increasing evidence from other areas that these depend on the functioning of the groups and systems in which people work and learn. In other words, getting organisational factors right underpins good education and educational improvement.

There are two ongoing SMERC projects within this theme. The first draws on management theory, and focuses on exploring the experience of working in various clinical environments, some which are rated positively, others less so, in external reviews such as the NTS, to identify the group and systems factors which influence the quality of the CLE. The second looks at the key interventions that are used to address the learning/care balance at the interpersonal and organisational levels.

Theme 2: Developing the Clinical Learning Environment

4.2 Developing the Learning Environment using Simulation

As part of its commitment to research and development, the Clinical Skills Managed Education Network (CSMEN) has provided £90,075 seed corn funding to more than 25 projects over the past 8 years, to develop an evidence base in relation to enhancing clinical skills practice using simulation.

In addition areas of focus for simulation based education related to health priorities have been related to suicide prevention[52], Optometry[53], Paediatrics[54] and Surgery[55]. Much of this work has been led by Professor Jean Ker (Dundee) who has lectured extensively both nationally and internationally as the CSMEN clinical lead and in 2017 was awarded the William Evans Travelling Scholarship that enabled her to visit New Zealand to disseminate and share areas of CSMEN research such as Feedback[56] and Leadership in different health contexts[57].

PROFESSOR JEAN KER
Simulation, SKIRC

CSMEN funded projects are listed in Appendix 3.

The Clinical Skills Managed Education Network (CSMEN) has provided £90,075 seed corn funding to more than 25 projects over the past 8 years

Theme 2: Developing the Clinical Learning Environment

Outputs

Eighteen final reports are now on the website:

www.csmen.scot.nhs.uk/research-and-development/
research-and-development-awards-2010-2014

Three of the awards have supported MDs and three have funded Masters projects.

Cleland and Walker's work on surgical Bootcamps has received international tributes and prizes since it was published in 2016 in Medical Education[58], the highest impact journal in the field. This work, externally funded by CSMEN, was the first study to take a socio-cultural approach to exploring and understanding context, complexities, uncertainties and learning associated with simulation based education (SBE). It showed that this kind of SBE is as much about social and cultural processes as it is about individual, cognitive and acquisitive learning. Acknowledging this explicitly will help plan similar enterprises and open up a new perspective on simulation research, which could be led from Scotland with appropriate funding and cross-organisational support.

Other peer reviewed publications showcase important work on pharmacy support for developing prescribing skills[59]; developing clinical skills bundles[60]; inter-professional education in practice[61]; and understanding the behaviour of newly qualified doctors in acute care contexts[62].

Theme 2: Developing the Clinical Learning Environment

5. Building a Safety and Learning Culture

Examples of SKIRC developments and outputs that have contributed significantly to individual, team, organisational and national learning around the safety of care systems in Scotland and internationally, include:

5.1 GP-SafeQuest:

GP Safe-Quest is a safety climate assessment tool [63-64] which was implemented nationally in general medical practice as a core element of the Scottish Patient Safety Programme in Primary Care (SPSP-PC), and was subsequently adapted for implementation in community pharmacy [65]. The purpose of the tool is to help facilitate a team-based discussion, analysis and learning related to how safety work is really undertaken at the local level, which will lead to change actions to improve safety systems and ways of working. In terms of outputs, a SKIRC research reports describes the national safety climate in general practice over a 2-year period and, most importantly, outlines the range of learning and system wide improvements implemented by care teams from participating in this activity – the first such evidence of impact in this important aspect of patient safety and quality improvement and as such has been submitted for journal publication [66].

DR JOHN MCKAY
Patient Safety, SKIRC

Finally, in a systematic review of international safety culture instruments for primary care [67], the GP-SafeQuest Tool was recognised as a leading intervention in this field in terms of its psychometric soundness and utility. The Tool has since been successfully adapted and implemented by community pharmacy and dentistry as part of the evolving SPSP in primary care, and applied as a safety intervention by researchers in England and Ireland, based on advice and support from SKIRC leads.

> *"Using the NES safety climate survey tool really helped us understand the differing perspectives in the practice teams and this prompted discussions about how we considered 'safety' and where we might improve. The tool was simple to use and gave everyone a 'voice'"*
>
> **Owen McEleavey**
> **Practice Quality Lead, Mearns Medical Centre, Glasgow**

> *"Scotland's commitment to patient safety is second to none and seeking to understand the tricky areas such as safety beliefs, behaviours and cultures within teams is central to our work. NHS Education for Scotland's GP-SafeQuest tool has been adapted for use in a variety of healthcare setting across the country and is a fundamental part of how local teams understand, discuss and act to improve patient safety".*
>
> **Dr Brian Robson**
> **Medical Director, Healthcare Improvement Scotland**

Theme 2: Developing the Clinical Learning Environment

5.2 Medicines Reconciliation in the Community by Pharmacists:

A ground-breaking systematic review and meta-analysis by a NES PhD student[68] reported important international evidence which outlined that while pharmacists can identify and resolve discrepancies when completing medication reconciliation after hospital discharge, patient outcome or care workload improvements were not consistently seen. It is recommended that future research should examine the clinical relevance of discrepancies and potential benefits on reducing healthcare team workload. This research was reported in the high impact international healthcare journal BMJ Quality and Safety. The work has potentially important implications for decision-making by healthcare leaders and policymakers in terms of the design of new models of primary care services and new job roles for pharmacists in the community.

5.3 Safety of the MRI Working Environment:

In a ground-breaking research study[69], NES and NHS Lothian joined forces to understand how the discipline of Human Factors can support the understanding, management and improvement of safety and performance in MRI working environments. The MRI work system environment poses a significant risk of harm to patients and frontline care practitioners, but knowledge of hazards and potential design improvements are limited as safety research is lacking. The findings suggest the need for national co-ordination and standardisation of MRI safety management and educational strategies, based on safety science and human factors evidence and approaches to improve system design and reduce risk to patients and staff. Outputs include a series of provisional recommendations for NHS organisations and policymakers which if implemented may reduce the existing gap between the current design and operation of MRI units and those recommended within UK national guidelines. Educationally, a safety-related e-learning module for all care teams and visitors (e.g. fire service, contractors) interacting with the MRI environment has also been developed and tested. From a research perspective, a further output is the usefulness of the systems-centred methods employed to understand the interacting complexities of the MRI working environment which are being put to use in other Human Factors related research.

Theme 2: Developing the Clinical Learning Environment

5.4 Safe Systems for Laboratory Test Ordering and Results Handling:

The systems based management of laboratory test ordering and results management is a safety-critical issue in primary care settings worldwide. SKIRC is arguably the leading research organisation in this field and has conducted multiple studies that have made important contributions to new knowledge in this area, the development of conceptual safe system modelling and evidence based safe practice guidance for the international community as well as the design and implementation of a related care bundle QI intervention that formed part of SPSP in primary care [70-75]. As a recognised leader in this area, NES was also appointed as an expert independent investigator by a large NHS England Clinical Governance Group to review and report on a serious system failure between clinical laboratories and the local primary care sector [76]. The investigation findings also highlight a mismatch in policy expectations about how serious patient safety incidents should be investigated by NHS organisations and the capabilities of frontline leaders/investigators in terms of assumed knowledge and skills related to understanding system complexity, safety science and human factors concepts and approaches, and how and why things go wrong in complex sociotechnical systems. Examples of key SKIRC outputs include multiple journal publications which informed the development of evidence based safety guidance in this area for UK and other European primary care settings, a quality improvement tool to monitor and enhance system reliability adapted for SPSP-PC, and practical interventions to enhance safe communication between team members and between reception staff and patients.

As a recognised leader in this area, NES was also appointed as an expert independent investigator by a large NHS England Clinical Governance Group
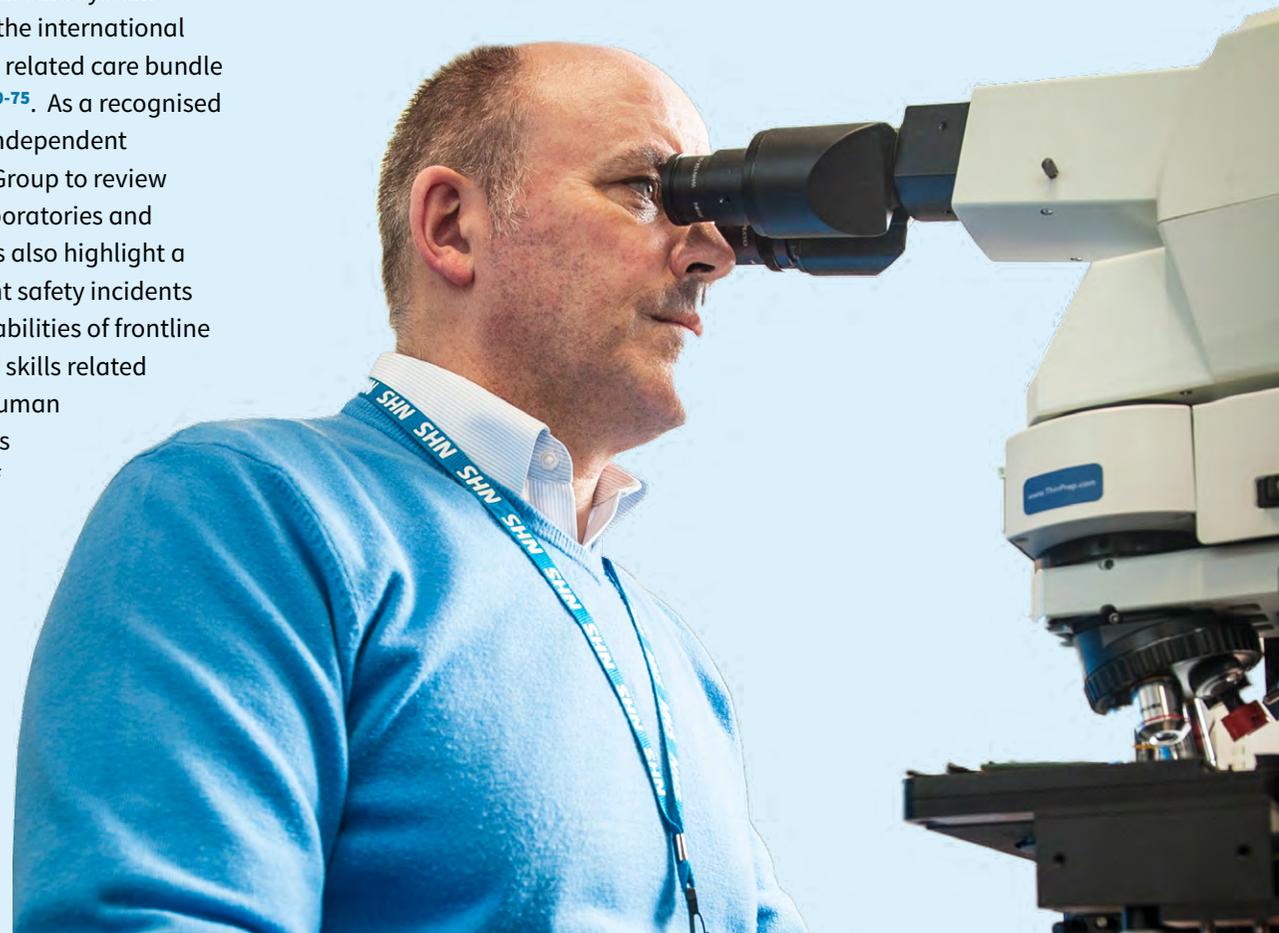
Theme 2: Developing the Clinical Learning Environment

It is hoped the outcomes of this study will inform the development of training and interventions to be used with undergraduate medical students

5.5 **Hand Hygiene**

CSMEN worked with Dr Vivien Swanson's group on a project with the five medical schools to explore influences on hand hygiene behaviour. A sample of 647 (27.7% response rate) first (n=237), third (n=136) and fifth (n=274) year medical students were recruited from four Scottish Universities. Participants completed a 50-item self-report questionnaire assessing adherence to hand hygiene (HH) guidelines, and a comprehensive coverage of possible influences on HH guideline adherence in simulated and actual healthcare settings, ensuring a wide range of potential theoretical explanations were assessed. Influences were grouped within seven components labelled; 'passive social prompts', 'perceived outcomes', 'knowledge', 'perceived HH culture', 'habit', 'social reinforcement', and 'mental workload'.

Facilitating healthcare workers to modify their behaviour in line with evidence-based guidance is an important method of determining quality patient care (French et al., 2012). Behaviour change interventions can be used to facilitate improved practice at different levels within healthcare systems. It is hoped the outcomes of this study will inform the development of training and interventions to be used with undergraduate medical students to increase uptake of, and sustained adherence to, effective HH behaviour throughout their medical careers.

Theme 2: Developing the Clinical Learning Environment

6. New Ways of Working

6.1 Integration of Human Factors and Ergonomics (HFE) in Healthcare Education and Practice

a) Learning from Patient Safety Incidents

SKIRC Research on undertaking a systems-based approach using Human Factors/ Ergonomic (HFE) principles has served to impact on the educational training and content of NES safety and improvement initiatives [77-80].

DR PAUL BOWIE
Patient Safety/Human Factors and Ergonomics, SKIRC

Using the systems approach to the analysis of patient safety incidents has impacted on how primary care professionals, including GP's, pharmacists, dentists, practice nurses and optometrists analyse 'significant' patient safety incidents within their professional practice [81-83].

This method of analysis has informed much wider healthcare safety reviews - for example: in Morbidity and Mortality meetings undertaken within Acute Hospital care and dealing with complaints [84].

"The Scottish Mortality and Morbidity Programme is delighted to be in partnership with NES whose expertise, research and work in developing and spreading Systems Principles and Human Factors is helping progress this key aspect of the national programme. Principles from Enhanced SEA (an NES innovation) in in carrying out safety reviews has also been incorporated into the training and development of better M&M review processes. We very much value this collaborative with NES and look forward to progressing this vital piece of work together".

Mr Manoj Kumar
Consultant Surgeon - Aberdeen Royal Infirmary, Hon Senior Lecturer - University of Aberdeen, National Clinical Lead - Scottish Mortality and Morbidity Review Programme

"I have used enhanced SEA for nearly 4 years, both in my capacity as a GP and in my Occupational Health Physician role. I have found the guidance, learning module and reporting format extremely useful, particularly in its use of Human Factors to help understand and analyse where a process has contributed to thing going wrong in a wide range of scenarios"

Dr Graham Gauld
GP and National Clinical Lead for SPSP in Primary Care

Theme 2: Developing the Clinical Learning Environment

b) Proactive Learning and Improvement Approaches to "Never Events" and Serious Patient Safety Incidents

SKIRC has been instrumental in raising awareness of and exploring proactive learning and risk management approaches to the prevention of serious patient safety incidents (including 'never events') across general practice, dental and surgical settings [85-90]. Working in partnership with the University of Manchester and International Human Factors experts in BowTie Analysis (a prospective Barrier Management technique) we have been building an evidence base on this topic [91-92] which is informing the development of educational resources and proactive methods for application at the team, organisational and national levels, as well generating new research ideas and approaches which are currently being tested out in partnership with NHS Boards.

> *"I have been impressed with the interest and willingness shown by NES to investigate the potential application of the concepts of Barrier Management, and in particular Bowtie Analysis, to improving patient safety in NHS Scotland. These concepts and methods have been developed over the past twenty years in oil and gas and other high hazard industries. They are now widely used in many industries and are central to thinking about proactively identifying and managing risk associated with major hazards. They clearly have great potential value in different health and social care settings…NES is showing commendable leadership in researching these issues and seeking to develop effective, pragmatic solutions which takes account of culture and context".*
>
> **Professor Ron McLeod**
> **Formerly Global Discipline Lead for Human Factors, Shell International**

c) Professional Guidance on Integrating Human Factors & Ergonomics (HFE) Principles in Healthcare Educational Curricula

The key principles and approaches tested as part of ongoing Human Factors research work have informed development of expert guidance by a NES-led consortia for embedding fundamental HFE principles in healthcare educational curricula [77, 93-94]. As part of educational development and research work in this field NES is working in close collaboration with HFE experts, academics and professional representative in England and in Eurocontrol (the organisation responsible for air traffic control across Europe). These outputs are having a further impact on how NHS Scotland stakeholders are taking forward development of a strategic plan for HFE, and will also be an important element of the UK Chartered Institute of Ergonomics and Human Factors White Paper on HFE Integration for the NHS. They have also informed design and delivery of entry-level e-learning and interactive workshops for the NHS Scotland workforce.

> *"I went into the review with a bias. I expected to find a piece which followed the usual route of mixing nomenclature and confusing concepts of Human Factors/Non-Technical Skills/Quality Improvement/Patient Safety work. To say I was wrong is an understatement. I think this is a masterful digest that dispels myth, clarifies points of misappropriation and at the same time very clearly sets out what Human Factors education can be."*
>
> **Anonymous Peer Reviewer**
> **Medical Teacher Journal**

Theme 2: Developing the Clinical Learning Environment

A NES Scoping Review... was the first attempt worldwide to understand the nature and scale of HFE issues across different care professions and settings within primary care.

d) Human Factors in International Primary Care Settings

A NES Scoping Review of International Literature on HFE in Primary Care settings, commissioned by the UK Clinical Human Factors Group was the first attempt worldwide [95] to understand the nature and scale of HFE issues across different care professions and settings within primary care. The research highlights HFE concepts, interventions and educational approaches have been slow to develop across the primary care professions internationally. Most of the evidence has adopted a narrow interpretation of human factors, for example, physical ergonomics issues (e.g. care home and dental settings), understanding error and harm (e.g. general medical practice), and the assessment of safety culture (e.g. general medical practice and care homes). A small but growing safety literature is available, with most attention focused on general medical practice, but we still have limited knowledge on the breadth of human factors issues and evidence that can inform the design of primary care systems and technology to improve patient safety, system performance and wellbeing of the primary care workforce.

Theme 2: Developing the Clinical Learning Environment

e) **Integrating Novel Human Factors/Ergonomics Concepts and Methods**

SKIRC is evolving as a research leader internationally in adapting, developing and testing new modes of practice [87, 91-92, 96-99] around understanding and modelling system safety in complex sociotechnical systems of secondary and primary healthcare. Innovative research that involves applying Resilience Engineering principles, including Safety-I and Safety-II approaches, to more effectively understanding how and why things go right most of the time (and wrong occasionally) in complex care systems has led to the testing of these concepts and methods in partnership with NHS Boards/Academics. This is enabling us to understand and model care systems related to the MRI working environment, the taking of blood samples by clinicians in acute settings, proactive risk management of 'never events' in primary care, the early detection and management of Sepsis in General Practice, and surgical list errors in hospital departments and theatres. In turn, this gives the NHS a much more comprehensive picture of the functioning of these systems which is enabling the more effective design of complex improvement interventions. A NES conceptual model on 'systems thinking' to understand everyday clinical work has recently been developed (Figure 1). The research has also transformed how we now teach the inter-related concepts of safety, improvement and complexity.
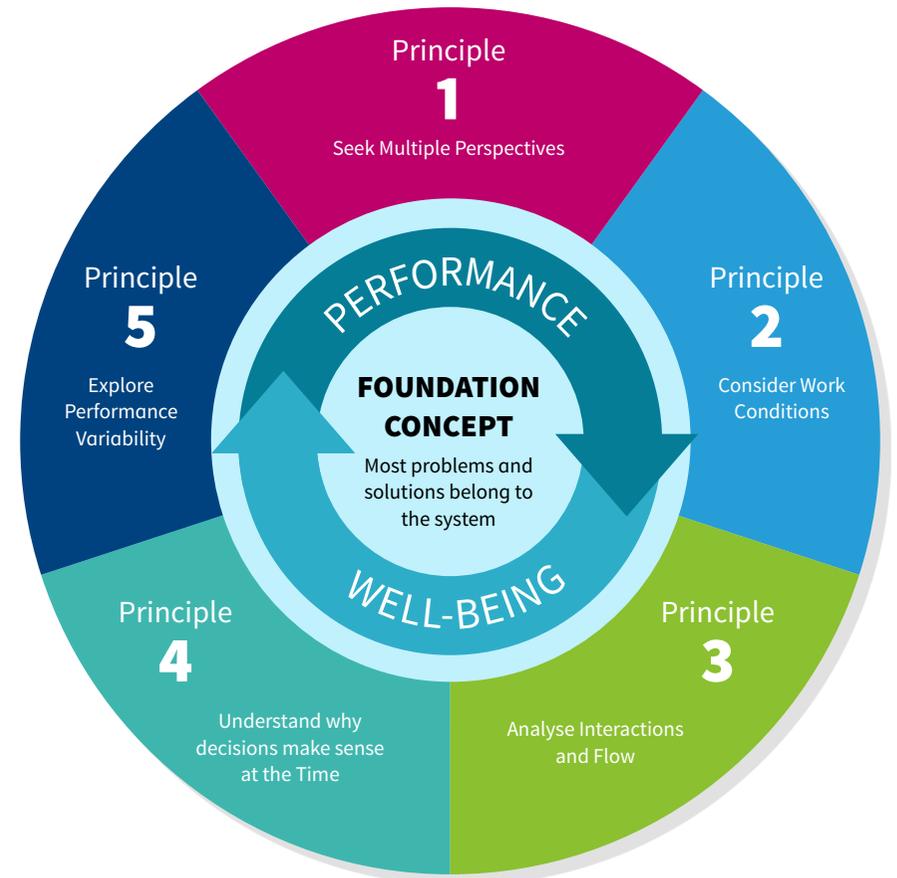

Figure 1. NES Developed Conceptual Model for Systems Thinking to Explore Everyday Work (STEW) [99]

Theme 2: Developing the Clinical Learning Environment

"The approach being taken by NES for introducing and supporting professional Human Factors in Scotland is both nationally and internationally leading. I am sure that people using services and also working in NHS Scotland are already benefiting from this ground-breaking Human Factors work".

Professor Sue Hignett
Professor of Healthcare Ergonomics & Patient Safety, Loughborough Design School, Loughborough University

f)   Enhancing Patient Experience – Linking Quality Improvement, Person-centredness and Patient Safety

As part of a highly competitive process, NES was successfully funded by the UK Health Foundation to adapt and test the 'Always Event' concept as a generic educational QI intervention for all health and care teams across NHS and social sectors [100-101]. The outputs from this work has given NHS Boards and GP Quality Clusters a person-centred method to enhance service provision that has been offered by at least one NHS Board as a local 'enhanced service' from which GP practices can demonstrate innovation and leadership in responding to patient wishes on service delivery. NES is also working closely with NHS Board Emergency Department and Out-of-Hours services in further refinement and testing of the approach, which is also available as part of the GP QI toolkit for trainees, supervisors and to support medical appraisal. Participation in this study has also led to partnership working with the University of Manchester to identify the scale and nature of avoidable harm as reported by patients and carers [80].

6.2 Enhanced Educational Infrastructure

a)   Primary Care

Exploring the views of GP trainers, and exploring the GP training environment has informed the development of a national structured evaluation standard for 'GP trainers' and their practices within NHS Scotland [102-103].

To improve the effectiveness of training for non-UK graduate General Practice trainees, research has given an evidence base to stratifying characteristics of those trainees most likely to struggle to pass the RCGP assessments. This in turn has been used to inform the content development of the Scottish Trainee Enhanced Programme (STEP) which aims to provide support for this important group of doctors [104]. This type of programme has been recognised by the GMC as an area of good practice in supporting learning, while the impact of programme has been positive for participants [105].

The use of e-mail as an 'intermediate' form of advice between GPs and hospital consultants was examined with particular reference to remote and rural practice. While both the positive and negative outcomes for NHS Scotland professionals and patients were described, this research highlighted the benefits in avoiding referral and improving the patient journey [27].

Theme 2: Developing the Clinical Learning Environment

b) Pharmacy - Virtual Working

By introducing novel approaches to ensure effective education and training Zlotos et al [2016] developed and piloted scenario-based virtual patient programs to educate preregistration pharmacists on injecting equipment pro-vision (IEP) and opiate substitution therapy (OST) services in the community pharmacy setting [106]. In this learning, trainees can make clinical decisions and then see the outcomes of their decisions. This mode of education was successful at increasing confidence and knowledge immediately after and at six months after the intervention but showed a gradual loss of clinical knowledge over time despite students maintaining confidence. Because of this research, NES is looking at further topics using this educational approach.

c) Realist Evaluation of the Mobile Skills Unit

The focus of this NES funded PhD research project is the use and impact of a mobile facility for clinical skills and simulation based education for healthcare staff in Scotland. The design and deployment of a Mobile Clinical Skills Unit (MSU) was a key objectives of the Scottish Clinical Skills Strategy and part of the proposed solution to the reported "inequity of provision of clinical skills education using simulation" [107]). The MSU was part of a proposal to address the perceived lack of reliability in safe and quality assured practice for healthcare practitioners in remote and rural Scotland.   The MSU was intended to facilitate simulation based training and education as part of a national strategy for the healthcare workforce of Scotland.

In this learning, trainees can make clinical decisions and then see the outcomes of their decisions.

Theme 2: Developing the Clinical Learning Environment

The objectives of the research study are structured around two stages:

Stage 1 - Realist Synthesis

- To identify the initial program theories (the underlying ideas and assumptions about how an intervention is proposed to work) via broad literature scoping, strategy and policy document review and fieldwork, including scoping visits to venues.

- To search for evidence to test the program theories within the literature.

- To refine the initial program theories, which will then be tested in Stage 2 using primary data collection.

Stage 2 – Realist Evaluation

- Details will be influenced by the exploratory findings of the Stage 1 synthesis of secondary data, therefore Stage 2 will involve primary data collection.

d) **Review of BASICS Scotland Tele-Education Project**

Since 2011, BASICS Scotland has delivered tele-education courses to remote and rural health care staff. Courses are presented live through an internet-based video conference system. Each session is recorded and made available along with supporting materials so that participants can view sessions in their own time. A report was commissioned by BASICS Scotland to analyse activity on their online courses.

Twelve tele-education courses have been delivered, involving 775 participants. Almost three quarters of participants were doctors, and most worked in a remote and rural area.

The 78 participants on the April 2016 course viewed the 10 sessions 1209 times. Participants accessed online resources for the course 5702 times (73 views per participant). There was variation in the number of times individuals accessed the resource. 57% of views were out of normal office hours. Observation of training sessions ascertained that most participants did not attend the live sessions. The number of live participants varied from 1-4. However, the set up was good, the lectures seemed clear, interaction took place, and there appeared to be real benefits to interaction. The general consensus from participants was that this was an excellent course well presented, with main topics addressed. The vast majority of participants had no problems connecting to the course. Being able to access the video session at any point was seen as invaluable.

An estimate of total savings by BASICS Scotland delivering their tele-education courses online rather than face-to-face to date is £852,500, equivalent to savings per course of £71,042 and savings per participant of £1,100.

The analysis demonstrates that BASICS Scotland are providing tele-education, at scale, to remote and rural primary care staff, in a way that is saving considerable resource, and which is raising interesting issues about the future of delivery of education to the health workforce[108].

Summary of Research Impact

Summary of SMERC Impact

SMERC's focus is on policy and practice priorities, notably workforce planning, support and development.

SMERC has:

- Identified how best to support medical students, trainees and staff, and hence help recruit and retain trainees, with an aim to ensure NES has the right staff, in the right places, to meet healthcare needs.

- Collaborated with health economists and identified that compensating doctors-in-training financially if training posts do not meet their preferences is likely to be, at best, a "short term" solution to filling training posts – improving working conditions is likely to be a more sustainable approach, one which will have more impact on retention.

- Made major externally recognised contributions to understanding the importance of the clinical working and learning environment in medical careers decision making.

- Played a central role in changing practice related to optimising effective selection into medical school, in Scotland, the UK and beyond.

- Worked at a national policy level to understand how best to attract applicants from diverse backgrounds to medicine.

- Provided evidence to underpin leadership and management development that enables positive change, values and behaviours within the medical workforce.

- Previously proposed the creation of UKMED (**http://www.ukmed.ac.uk**), an exciting resource, which can be used to address important questions as well as workforce planning.

- Provided intelligence to NES and ultimately Scottish Government on topics including widening access to medicine and workforce planning,

Finally, NES core funding has enabled Scotland to build a critical mass of experienced researchers and develop emerging researchers who have a deep understanding of medical education and training.

Summary of Research Impact

Summary of SKIRC Impact

Examples of the wide-ranging practical outputs and impacts from SKIRC research and development being implemented in service delivery and education & training, include:

- Adoption of care team and organisational safety and improvement learning approaches as part of the General Medical Services contract and delivered via the Scottish Patient Safety Programme in Primary Care

- Integration of key principles and methods for systems thinking within the Scottish Mortality and Morbidity Programme for Secondary Care

- Implementation of developed safety and improvement approaches to support specialty and vocational training, medical appraisal and continuing professional development obligations

- Generating evaluation evidence of the utility of multiple safety and improvement concepts and approaches (e.g. safety climate assessment and learning; design and implementation of safety checklists; team learning from patient safety incidents) for enhancing care system performance and the wellbeing of people

- Challenging orthodox approaches around, for example, current delivery of patient safety and human factors education, and working in partnership to co-design and implement new developments and practices with clinical educators and leaders

- Leading and influencing national developments in Scotland and the UK around integration of human factors & ergonomics in healthcare education and practice

- Enhancing the credibility, reputation and stature of NES and its educational researchers on the international stage in contributing new knowledge and evidence in the application of safety, improvement and human factors sciences in healthcare

- Building Educational R&D practitioner and leadership capacity and capability e.g. Supervision of PhD candidates, supporting and advising NES and wide NHS colleagues, and mentoring of Clinical Fellows

Summary of Research Impact

Research and development by CSMEN has:

- Disseminated over 15 Peer reviewed publications nationally and internationally with prize winning papers at international conferences (AMEE 2016) and awards at national level (Royal Pharmaceutical Society 2016)

- Developed a national inter-professional simulation faculty database due to the scholarly approach used for identifying outcomes for the national simulation based educator framework

- Evaluated the use of the mobile skills unit by over 7000 participants, leading to the commissioning of a new unit in 2018 and informed the strategy for health service workforce development for the South Island Alliance in New Zealand

- Contributed to the development of enhanced skills profiles for remote and rural health care practitioners due to the provision of standards for simulation based training by nationally trained faculty

- Influenced the development of criteria for Excellence in Simulation (CSMEN membership of international ASPIRE Expert Group)

- Funded a research project informing the role out of team training using simulation

- Funded a research project in NHS Lothian that is being used to develop a national approach to mastery learning using simulation for core trainees in complex procedures

- Funded a research project being used to explore how newly qualified doctors can be prepared for acute care. This project was awarded a prize (ASME 2012) and the study has informed the Foundation simulation based training programme for Scotland

- Supported the approach to Scottish Government to fund simulation for surgical training through both peer reviewed CSMEN publications and CSMEN membership of the Scottish Surgical Skills Collaborative

- Collaborated to secure a national grant of £70k relating to enhancing the practice of ultrasound guided regional anaesthesia

- Developed an in-depth research study on the mobile skills unit using a realist evaluation lens to inform and share best practice in the use of simulation delivering learning in local communities.

Summary of Research Impact

Key research outputs and impacts from General Practice and the wider primary care team include:

- Adoption by primary care professionals and teams of a broader suite of validated safety and improvement methods to inform both proactive and reactive responses to Patient Safety Incidents (PSI). This has been applied through contractual, professional developmental, appraisal and vocational training activities

- Contributing to information for medical schools on the positive influence of GP placements within the undergraduate curriculum to GP as a positive career choice, particularly in areas of challenging recruitment such as remote and rural.

- Delivering GP speciality trainees who have developed Leadership and Quality Improvement (QI) skills through undertaking mentored QI projects with subsequent cascade to the wider primary care workforce through CPD and appraisal.

- Improved effectiveness of training for non-UK graduate General Practitioners through delivery of the Scottish Trainee Enhanced Programme (STEP).

- A national structured evaluation standard for GP Educational Supervisors and their GP Training practices to ensure quality and consistency within NHS Scotland

- Increased inter-professional and 'interface' learning through the iterative evaluation of Practice Based Small Group Learning Groups(PBSGL).

- The adoption of a Human Factors based approach to safety incident reviews within the different levels of primary care organisation.

- Outlining how the GP training curriculum would benefit from integration of Human Factors and Systems Thinking principles to strengthen the patient safety and quality improvement skills and knowledge of trainees and educational supervisors

Appendix 1: References

1. **Dennis A, Cleland JA, Johnston P, Ker JS, Lough M, Rees CE.** Identifying multiple stakeholders' views of medical education research priorities: A national survey. Medical Education 2014; 48 (11) 1078-91)

2. **Cleland JA, Dowell J, McLachlan J, Nicholson S, Patterson F.** Identifying best practice in the selection of medical students. A project commissioned by the General Medical Council (GMC): **www.gmc-uk.org/Identifying_best_practice_in_the_selection_of_medical_students.pdf_51119804.pdf**

3. **Cleland JA, Nicholson S.** A project commissioned by the Selecting for Excellence Group (SEEG). The report from this commissioned work was published in full in their 2013 end-of-year report **www.medschools.ac.uk/Publications/Documents/MSC-Selecting-for-Excellence-End-of-year-report.pdf**

4. **Cleland JA, Dowell J, Nicholson S, Patterson F.** How can greater consistency in selection between medical schools be encouraged? A project commissioned by the Selecting for Excellence Group (SEEG). The report from this commissioned work was published in full in their 2014 end-of-year report, and received widespread national press coverage: **www.medschools.ac.uk/SiteCollectionDocuments/Selecting-for-Excellence-research-Professor-Jen-Cleland-et-al.pdf**

5. **MacKenzie RK, Dowell J, Ayansina D, Cleland JA.** Do personal attributes assessed on medical school admission predict exit performance? A UK-wide cohort study. Advances in Health Sciences Education (AHSE) 2016 doi:10.1007/s10459-016-9715-4

6. **F. Cousans, F. Patterson, H. Edwards, K. Walker, J. Mclachlan & D. Good. (2017)** Evaluating the complementary roles of an SJT and academic assessment for entry into clinical practice. Adv. In Health Sci. Educ. DOI 10.1007/s10459-017-9755-4

7. **K. Petty-Saphon, K.A. Walker, F Patterson, V. Ashworth, & H. Edwards.** Situational Judgement Tests reliably measure professional attributes important for entry clinical practice. Advances in Medical Education and Practice 2017, 8, 21-23

8. **F. Patterson and K. Walker.** The independent validation of the Foundation Programme application process: a closer look. Clin. Med. 2016, 16 (6), 606-608

9. **Cleland JA, Johnston P, French FH, Needham G.** Associations between medical school and career preferences in Year 1 medical students in Scotland. Medical Education, 2012; 46: 473-484.

10. **Cleland JA, Johnston PW, Walker L, Needham G.** Attracting healthcare professionals to remote and rural medicine: learning from doctors in training in the north of Scotland. Medical Teacher, 2012; 34: e476-e482.

11. **Cleland JA, Johnston PW, Michael A, Khan N, Scott NW.** A survey of factors influencing career preference in new-entrant and exiting medical students from four UK medical schools. BMC Medical Education 2014, 14:151.

12. **Cleland JA, Johnston P, Watson V, Krucien N, Skatun D.** What do UK doctors-in-training value in a post? A discrete choice experiment. Medical Education 2016: 50; 189-202.

13. **Cleland JA, Burr J, Johnston PJ**. A qualitative evaluation of the Scottish Staff and Associate Specialist Development Programme. Scottish Medical Journal, OnlineFirst, published on May 10, 2016 as doi:10.1177/0036933016649872.

14. **Moore JN, McDiarmid AJ, Johnston PW, Cleland JA**. Identifying and exploring factors influencing career choice, recruitment and retention of Anaesthesia trainees in the UK. Postgraduate Medical Journal, Online First, published on June 15, 2016 as 10.1136/postgradmedj-2015-133518

15. **Cleland JA, Johnston P, Watson V, Krucien N, Skatun D.** What do UK medical students value most in their career? A discrete choice experiment. Medical Education 2017; 51: 839-851

16. **Scanlan G, Cleland J, Johnston P, Walker K, Krucien N, Skåtun D.** What Factors Are Critical to Attracting NHS Foundation Doctors into Speciality or Core Training: A Discrete Choice Experiment. BMJ Open (In Press)

17. **Wiener-Ogilvie S, Begg D.** Foundation doctors career choice and factors influencing career choice. Education for Primary Care. 2015; 26:296-403.

18. **Denney ML.** Signposting GP trainees to relevant learning opportunities in hospital posts- the Super Condensed Curriculum Guide. BMJ Quality Improvement Reports, online May 2014.

19. **Douglas J.** The case for a rural primary care consultant using education as a facilitator of change Education for Primary Care, 2015; 26:134-8.

20. **Douglas J.** Professional Development Programmes for Rural Doctors. WONCA Rural Medical Education Guidebook; 5:1:5.

21. **Douglas J.** Advanced skills training for rural doctors. WONCA Rural Medical Education Guidebook; 5:2:4.

Appendix 1: References

22. **Cunningham DE, Zlotos L.** Ten years of practice based small group learning (PBSGL) in Scotland – a survey of general practitioners. Education for Primary Care, 2016, 26:3 139-145

23. **Cunningham DE, Zlotos L, Power A.** Scottish Pharmacists perceptions and experience of a practice based small group learning pilot: a qualitative study. Education for Primary Care, 2014; 25:155-62.

24. **Wakeling J, Ferguson J, Cunningham DE, Zlotos, L, Power A**. Inter-professional small group learning: a case study of two pharmacist-facilitated groups in Scotland. Pharmacy Education, 2016; 16(1):210-217.

25. **Cunningham DE, Wakeling J, Ferguson J, Cunningham DE, Zlotos, L, Power A.** GP and pharmacists inter-professional Learning – a grounded theory study. Education for Primary Care, 2016, 26:3 139-145

26. **MacVicar R, Williamson A, Cunningham DE, Watt G.** What are the CPD needs of GPs working in areas of high deprivation? Report of a focus group meeting of 'GPs' at the deep end. Education for Primary Care, 2015; 26:3 139-145

27. **Sampson R, Barbour R, Wilson P.** Email communication at the medical primary – secondary care interface: a qualitative exploration. British Journal of General Practice, 2016; DOI: 10.3399/bjgp16X685273.

28. **Sampson R, Barbour R, Wilson P.** The relationship between GPs and hospital consultants and the implication for patient care: a qualitative study. BMC Family Practice, 2016; 17:45 DOI 10.1186/s12875-016-0442-y.

29. **Sampson R, MacVicar R, Wilson P.** Development of an interface-focused educational complex intervention. Education for Primary Care, 2017; DOI: 10.1080/14739879.2017.1309690.

30. **de Wet C & Bowie P.** The preliminary development and testing of a global trigger tool to detect error and patient harm in primary-care records. Postgraduate Medical Journal 04/2009; 85(1002).

31. **de Wet & Bowie P.** Screening electronic patient records to detect preventable harm: a trigger tool for primary care. Quality in Primary Care 01/2011; 19(2).

32. **Bowie P, Halley L, Gillies J, Houston N, de Wet C.** Searching primary care records for predefined triggers may expose latent risks and adverse events. Clinical Risk 02/2012; 18(1).

33. **de Wet C, Black C, Luty S, McKay J, O'Donnell K, Bowie P.** Implementation of the trigger review method in Scottish general practices: patient safety outcomes and potential for quality improvement. BMJ Quality & Safety 03/2016; DOI:10.1136/bmjqs-2015-004093

34. **McKay J, de Wet C, Kelly M, Bowie P.** Applying the Trigger Review Method after a brief educational intervention: potential for teaching and improving safety in GP specialty training? BMC Medical Education 08/2013; 13(1). DOI:10.1186/1472-6920-13-117

35. **de Wet C, Johnson P, O Donnell C, Bowie P.** Can we quantify harm in general practice records? An assessment of precision and power using computer simulation. BMC Medical Research Methodology 03/2013; 13(1). DOI:10.1186/1471-2288-13-39

36. **Dovey SM, Leitch S.** Triggering safer general practice care. BMJ Quality & Safety 2017; 26:259-260.

37. **Bowie P, Halley L, Gillies J, Houston N.** Qualitative evaluation of the Safety and Improvement in Primary Care (SIPC) pilot collaborative in Scotland: Perceptions and experiences of participating care teams. BMJ Open, 2016; 6(1)., DOI:10.1136/bmjopen-2015-009526.

38. **Houston N & Bowie P.** The Scottish patient safety programme in primary care: context, interventions and early outcomes. Scottish Medical Journal, 2015; DOI:10.1177/0036933015606577.

39. **Bowie P, Ferguson J, Macleod M, McNab D, McKay J, Atkinson S.** Participatory design of a preliminary safety checklist for general practice. British Journal of General Practice, 2015; 65(634)., DOI:10.3399/bjgp15X684865

40. **Bowie P, McNab D, Crickett T, McCulloch J, Young P, Houston N, Gillies J and McKay J.** Re-design, testing and evaluation of the MoRISS (Monitoring Risk and Improving System Safety) checking procedure for general practice. [SKIRC Technical Report: Edinburgh, February 2017]

41. **Curry N, Denney ML.** Are there practical opportunities for developing leadership skills during GP training and beyond? A survey of trainees and GPs in South East Scotland. Education for Primary Care, 2016; DOI:10.1080/14739879.2015.1102852.

42. **Denney ML, Wiener-Ogilvie S.** Piloting a Quality Improvement Project in Final Year General Practice Trainees: Setting up and evaluating the processes. Education for Primary Care, 2016; DOI: 10.1080/14739879.2016.1144965.

Appendix 1: References

43. **McNab D, McKay J, Bowie P.** Quality Improvement training for core medical and general practice trainees: a pilot study of project participation, completion and journal publication. Scottish Medical Journal, 2015; 60(4) DOI:10.1177/0036933015606586

44. **Ahmed M, Arora S, McKay J, Long S, Vincent C, Kelly M, Sevdalis N, Bowie P.** Patient safety skills in primary care: A national survey of GP educators. BMC Family Practice 12/2014; 15(1). DOI:10.1186/s12875-014-0206-5

45. **Power A, Allbutt H, Munro L, MacLeod M, Kennedy S, Cameron D, Scoular K, Orr G, Gillies J.** An evaluation of experiences and views of Scottish leadership training opportunities amongst primary care professionals. Education in Primary Care 2017;28(3):159-164.

46. **Newlands R, Power A, Young L, Watson MC.** Quality improvement of community pharmacy services: A national prioritisation exercise. International Journal of Pharmacy Practice 2017 Mar 27. doi: 10.1111/ijpp.12354. [Epub ahead of print]

47. **Reid F, Stewart D, Maxwell S, Watson A, Power A, Zlotos L, McIntosh T, Campbell D.** Piloting the United Kingdom 'Prescribing Safety Assessment' with Pharmacist Prescribers in Scotland. Research in Social and Administrative Pharmacy 2017; S1551-7411(16)30209-1.

48. **Cleland JA, Roberts R, Kitto S, Strand P, Johnston PJ.** Using paradox theory to discern responses to service-training tensions in general surgery. Medical Education 2017; early view from 6th Nov. **http://onlinelibrary.wiley.com/doi/10.1111/medu.13475/full**

49. **Roberts R, Cleland JA, Strand P, Kitto S, Johnston PJ.** Medical students' views of clinical environments. The Clinical Teacher 2017; 14: 1-6.

50. **Cleland JA, Reeve J, Rosenthal J, Johnston P.** Resisting the tick box culture: refocusing medical education and training. British Journal of General Practice, 2014; 64: 422-424.

51. **Johnston PW and Cleland JA.** Developing an educational environment in healthcare settings. Clinical Tutor 2014; 19: 8-10.

52. **De Mello, G, Fraser F, Nicholl, P, Ker, J, Green G, Laird C.** Mental health care training for practitioners in remote and rural areas. The Clinical Teacher 2013: 10:384-388

53. **Jarvis I, Ker J.,** Ensuring standards for the extended role of optometry. The Clinical Teacher 2014:11 (3):184-7

54. **Clerihew L., Rowney D., Ker J.,** Simulation in paediatric training. Arch Diseases in Childhood Pract Ed (2016) 101(1) 8-14

55. **Johnstone T., Tang B., Alijani A., Tai I., Steele R., Ker J., Nabi G.,** Laparoscopic surgical skills are significantly improved by the use of portable laparoscopic simulator: results of a randomized controlled trial. World Journal of Surgery 2013 37(5) 957-6

56. **Urquhart l., Ker J., Rees C.,** Exploring the influence of context on feedback at medical school: a video-ethnography study. Ad in Health Sci Educ, 2017 DOI 10.1007/s10459-017-9781-

57. **Gordon L., Rees C., Ker J., Cleland J.,** Dimensions, discourses and differences: conceptualization healthcare leadership and followership. Medical Education (2015) 49(12) 1248-62)

58. **Cleland J., Walker K., Gale M., Nicol LG.** Simulation based education: understanding the socio-cultural complexity of a surgical training boot camp. Medical Education 2016, 50 (8) 829-41

59. **McGuire A, McEwan T, Ker JS, Stafford DA.** Pharmacy support in developing prescribing skills. Clinical Teacher 2015; 12(6) 408-12 doi:10.1111/tct. 12324

60. **Mok M, Ker JS.** Developing clinical skills bundles. Clinical Teacher 2015; 12(6) 403-7

61. **Joseph, S., Diack, L., Haxton, J. and Garton, F.** Inter-professional education in practice. The Clinical Teacher, 2012, 9(1), pp. 27-31

62. **Tallentire V Smith SE Skinner J Cameron H.,** Understanding the behaviour of newly qualified doctors in acute care contexts. Medical Education 2011 45(10) 995-1005

63. **de Wet C, Spence W, Mash R, Johnson P, Bowie P.** The development and psychometric evaluation of a safety climate measure for primary care. Quality and Safety in Health Care 12/2010; 19(6). DOI:10.1136/qshc.2008.031062

64. **de Wet C, Johnson P, Mash R, McConnachie A, Bowie P.** Measuring perceptions of safety climate in primary care: A cross-sectional study. Journal of Evaluation in Clinical Practice 02/2012; 18(1). DOI:10.1111/j.1365-2753.2010.01537.x

65. **Newham R, Bennie M, Maxwell D, Watson A, de Wet C, Bowie P.** Development and psychometric testing of an instrument to measure safety climate perceptions in community pharmacy. Journal of Evaluation in Clinical Practice 11/2014; 20(6). DOI:10.1111/jep.12273

66. **MacWalter G, McKay J, Russell M, McNab D, Gillies J, Houston N, Bowie P.** Measurement of safety climate and related learning and improvement in Scottish general medical practice: A cross-sectional mixed methods study. [SKIRC Technical Report: Edinburgh, July 2017]

Appendix 1: References

67. **Curran C, Lydon S, Kelly M, Murphy A, Walsh C, O'Connor P.**
A Systematic Review of Primary Care Safety Climate Survey Instruments: Their Origins, Psychometric Properties, Quality, and Usage. J Patient Saf 2017;00: 00–00

68. **McNab D, Bowie P, Ross A, Ryan M, MacWalter G, Morrison J.** A systematic review and meta-analysis of the effectiveness of pharmacist-led medication reconciliation in the community after hospital discharge. BMJ Quality and Safety (in Press)

69. **Bowie P. Nugent B, Pickup L.** A Human Factors analysis of the MRI work system: implications for safety and recommendations for designing improvements. [SKIRC Technical Report: Edinburgh, May 2017]

70. **Bowie P, Forrest E, Price J, Kelly M, Cunningham D, Verstappen W, McKay J.** Good practice statements on safe laboratory testing: A mixed methods study by the LINNEAUS collaboration on patient safety in primary care. The European Journal of General Practice, 2015; 21 (Suppl 1): 19-25

71. **Cunningham DE, McNab D, Bowie P.** Quality and safety issues highlighted by patients in the handling of laboratory test results by general practices – a qualitative study. BMC Health Services Research, 2014; 14(1):206, DOI:10.1186/1472-6963-14-206.

72. **Bowie P, Price J, Hepworth N, Dinwoodie M, McKay J.** System hazards in managing laboratory test requests and results in primary care: Medical protection database analysis and conceptual model. BMJ Open, 2015; 5(e008968)., DOI:10.1136/bmjopen-2015-008968.

73. **Bowie P, Halley L, McKay J.** Laboratory test ordering and results management systems: A qualitative study of safety risks identified by administrators in general practice. BMJ Open, 2014; 4(2): e004245., DOI:10.1136/bmjopen-2013-004245.

74. **Bowie P, Ferguson J, Price J, McKay J.** Measuring system safety for laboratory test ordering and results management in primary care: international pilot study. Quality in Primary Care, 2015; 22(5):245-48.

75. **Grant S, Checkland K, Bowie P and Guthrie B.** The role of informal dimensions of safety in high-volume organisational routines: an ethnographic study of test results handling in UK general practice. Implementation Science [In Press]

76. **Bowie P, Pickup L and McKay J.** Organisational incident reporting and investigation expectations in NHS England: A case study review of 'work-as-imagined' versus 'work-as-done' involving a Clinical Commission Group. [SKIRC Technical Report: Edinburgh, December 2016]

77. **McKay J, Pickup L, Atkinson S, McNab D, Bowie P.** Human factors in general practice - Early thoughts on the educational focus for specialty training and beyond. Education for Primary Care 05/2016; 27(3). DOI:10.1080/14739879.2016.1181533

78. **McNab D, Bowie P, Morrison J, Ross A.** Understanding patient safety performance and educational needs using the 'Safety-II' approach for complex systems. Education for Primary Care DOI: 10.1080/14739879.2016.1246068

79. **McNab D, Bowie P, Ross A, Morrison J.** Understanding and responding when things go wrong: key principles for primary care educators. Education for Primary Care 2016 Jul;27(4):258-66.

80. **Bowie P & Jeffcott S.** Human factors and ergonomics for primary care. Education for Primary Care 03/2016; 27(2). DOI:10.1080/14739879.2016.1152658

81. **Bowie P, McNaughton E, Bruce D, Holly D, McNab D et al.** Enhancing the Effectiveness of Significant Event Analysis: Exploring Personal Impact and Applying Systems Thinking in Primary Care. Journal of Continuing Education in the Health Professions, 2016; 36(3).

82. **McNab D, McKay J and Bowie P.** Evaluation of a Primary Care Safety Improvement Intervention using Enhanced Significant Event Analysis in a Regional Scottish Health Board. Quality in Primary Care (2017) 25 (3): 148-156

83. **Bowie P, Jeffcott S, McNaughton E, Holly D, Moneypenny M, McNab, Bruce D, Pope L, Black I, Power A, Davies J, Taylor K, Price J, Kumar M, Johnston M, Long J, McMillan F, McKay J.** Practical guidance on event analysis, learning and improvement for healthcare teams and clinical educators. Clinical Risk (in Press)

84. **Kumar M and Bowie P.** Practice Guide for Mortality and Morbidity Meetings. [Healthcare Improvement Scotland: Edinburgh, November 2016]

85. **de Wet C, O'Donnell C, Bowie P.** Developing a preliminary 'never event' list for general practice using consensus-building methods. British Journal of General Practice 03/2014; 64(620). DOI:10.3399/bjgp14X677536

86. **Stocks SJ, Alam R, Bowie P, Campbell S, de Wet C, Esmail A, Cheraghi-Sohi S.** Never Events in UK General Practice: A Survey of the Views of General Practitioners on Their Frequency and Acceptability as a Safety Improvement Approach. Journal of Patient Safety 2017;00: 00–00

Appendix 1: References

87. **Geraghty A, Ferguson L, McIlhenny C, Bowie P.** Incidence of wrong site surgery list errors over a two-year period in a single NHS Board. Journal of Patient Safety (In Press)

88. **Black I and Bowie P.** Patient safety in dentistry: development of a candidate 'never event' list for primary care. British Dental Journal 2017; 222 (10)

89. **Morris RL, Cheraghi-Sohi S, Bowie P, Esmail A, de Wet C, Campbell S.** "Never say never": a qualitative study exploring General Practitioner views of the 'Never Events' concept and the implementation of strategies to prevent them into routine practice. (In Press)

90. **Stocks SJ, Donnelly A, Esmail A, Beresford J, Gamble C, Luty S, Deacon R, Danczak A, Mann N, Townsend D, Ashley J, Bowie P, Campbell SM.** Development and piloting of a survey to estimate the frequency and nature of potentially-harmful preventable-problems in primary care from a UK patient's perspective. BMJ Open (In Press)

91. **McLeod R & Bowie P.** Application of Bowtie Analysis (BTA) to the prospective assessment of the risk of 'Never Events' in primary healthcare [SKIRC Technical Report – NES, Edinburgh, November 2017]

92. **McLeod R & Bowie P.** Bowtie Analysis (BTA) as a Prospective Risk Assessment Technique in the National Health Service and Social Care [SKIRC Technical Report – NES, Edinburgh, November 2017]

93. **Vosper H, Hignett S, Bowie P.** Twelve tips for embedding human factors and ergonomics principles in healthcare education. Medical Teacher (in Press)

94. **Vosper H, Edwards B, Bowie P, Hignett S.** System redesign based on Human Factors competencies to support an enhanced role for pharmacists. Pharmaceutical Journal (in Press)

95. **Bowie P, MacWalter G, Pickup L, Ahmed M.** A Scoping Review of Human Factors and Ergonomics Issues, Interventions and Resources in Primary Health Care. [SKIRC Technical Report: Edinburgh, April 2017]

96. **Hignett S, Lang A, Pickup L, Ives C, Fray M, McKeown C, Tapley S, Woodward M, and Bowie P.** More Holes than Cheese. What prevents the delivery of effective, high quality, and safe healthcare in England? Ergonomics DOI:10.1080/00140139.2016.1245446

97. **Pickup L, Atkinson S, Hollnagel E, Bowie P, Gray S, Rawlinson S, Forrester K.** Blood sampling - Two sides to the story. Applied Ergonomics 59 (2017) 234e242

98. **McNab D, Freestone J, Black C, Carson Steven A & Bowie P.** Participatory design of a complex improvement intervention for the primary care management of Sepsis using the Functional Resonance Analysis Method [SKIRC Technical Report – NES, Edinburgh, October 2017]

99. **McNab D, McKay J, Shorrock S & Bowie P.** Systems Thinking to explore Everyday Work (STEW Model) in healthcare safety: A Safety-II approach. [SKIRC Technical Report – NES, Edinburgh, October 2017]

100. **Bowie P, McNab D, Ferguson J, McKay J.** Quality improvement and person-centeredness: a participatory mixed methods study to develop the 'always event' concept for primary care. BMJ Open 2015; 5(4)., DOI:10.1136/bmjopen-2014-006667.

101. **Bowie P, McNab D, Watson P, McKay J, Luty S, Smith G and Morrison J.** Designing and testing 'always events' as a person-centred quality improvement approach in multiple care settings in NHS Scotland [Health Foundation Innovating for Improvement Report: London, February 2017]

102. **Wiener-Ogilvie S, Bennison J, Smith V.** The General Practice training environment and its impact on preparedness. Education for Primary Care, 2014; 25:8-17.

103. **Ferguson J, Wakeling J, Cunningham DE.** General Practice training in Scotland, the views of GP trainers and educators. Education for Primary Care, 2014; 25:211-20.

104. **Ragg E, O'Rouke J, MacVicar R.** International medical graduates: a qualitative exploration of factors associated with success in the clinical skills assessment. Education for Primary Care, 2015; 26:6 378-385.

105. **Anderson C, Lee K, Wakeling J, Bowie P.** An enhanced induction programme for general practice speciality training: a qualitative study of trainee perceptions and experience. Education for Primary Care, 2017, **http://dx.doi.org/10.1080/14739879.2017.1278621**

106. **Zlotos L, Power A, Hill D, Chapman P.** A scenario based Virtual Patient Program to support pharmacist education: a pilot in pre-registration training. Am J Pharm Educ 2016;80 (3): Article 48.

107. **Ker J., Cachia P., Beasant B.,** A national approach for the use of simulation to educate and train the NHS workforce - The First National Clinical Skills Strategy. Scottish Medical Journal (2015) 60(4)220-2

108. **Heaney D.**, Review of BASICS Tele-education project (2016). **https://basics-scotland.org.uk/wp-content/uploads/2016/10/BASICS-Scotland-teleeducation-report-cs-edit.pdf**

Appendix 2: Phase 2 NES SMERC Projects

Phase 2 NES SMERC Projects

December 2017 Phase 2 NES SMERC Projects

* Principal Investigator	Co-Investigator	Funder	Title	Start Date	End Date	Award Amount
Charlotte Rees / Divya Jindal-Snape	Lisi Gordon (DU), Divya Jindal-Snape (DU), Siebert (GLA), Needham (NES/AB), J Morrison (GLA)	SMERC Large Grant	Exploring the transition experiences of higher-stage medical trainees: A longitudinal audio-diary study across the trainee-trained doctor transition.	01/02/2015	31/07/2017	£69,123
Charlotte Rees	Sarah Sholl (DU), Divya Jindal-Snape (DU), Rola Ajjawi (DU), Jill Morrison (GLA), Helen Allbutt (NES)	NES (SMERC)	Balancing student/trainee learning with the delivery of patient care in the healthcare workplace: A realist synthesis.	05/01/2015	05/05/2016	£27,242
Anita Laidlaw / Jo Cecil	J Cecil (StA) A Dennis (DU), J Cleland (AB)	SMERC Small Grant	Burnout and health behaviours in medical undergraduate students.	16/06/2015	31/10/2016	£10,000
Fernando Fernandes	T McConnachie (DU), S Carson (DU), J Kennedy (DU), R Freeman (DU), A Laidlaw (StA), G Humphris (StA)	SMERC Small Grant	An exploration of inter-professional learning with nursing, medical and dental students engaging with marginalised groups in experiential communication skills teaching.	31/03/2015	31/03/2016	£10,000
Vicky Tallentire	Sam Smith (ED), Anita Laidlaw (StA), Jill Morrison (GLA), Lindsey Pope (GLA)	SMERC Small Grant	Foundation Year 2 doctors' reasons for leaving UK medicine: an In-depth analysis of decision-making.	01/09/2015	01/09/2016	£10,000
Alan Jaap	David Hope (ED), Duncan Henderson (NES), Richard Fuller (LEEDS) Gary Mires (DU), Richard Phillips (KCL), Matthew Walers (GLA), Helen Cameron (ED)	SMERC Small Grant	How ready is Scotland to adopt Entrustable Professional Activities in supporting transition to the early years of clinical practice?	01/09/2015	15/02/2017	£10,000

Appendix 2: Phase 2 NES SMERC Projects

Phase 2 NES SMERC Projects (continued...)

December 2017 Phase 2 NES SMERC Projects						
* Principal Investigator	Co-Investigator	Funder	Title	Start Date	End Date	Award Amount
Jennifer Cleland	J Skatun (AB), P Johnston (NES/AB), C Rees (DU), K Walker (NES/AB)	SMERC PhD	What the doctor does next: A mixed-methods study of career decision making in Foundation Programme doctors.	01/09/2015	01/09/2018	£73,000
Michael Ross Now Derek Jones	T Stenfors-Hayes (SWE), L Pope (GLA), C McRae (DU-EDIN)	SMERC PhD	Understanding, valuing and enhancing the role of clinicians who teach.	01/09/2015	01/09/2018	£73,000
Jen Cleland	Peter Johnston (NES/AB), Rona Patey (AB)	SMERC Small Grant	Understanding medical student and trainees perceptions of clinical learning environments: a multi-method and multi-unit study.	01/09/2015	31/10/2017	£9,801
Laura Gates	Waiter (UofA), Jamieson (UofG), Cleland (UofA), Durning (USUHS)	SMERC Small Grant	Relationship of Neuroimaging to Typical Sleep Times during a Clinical Reasoning Task: A Pilot Study.	01/01/2017	31/12/2017 extended to 30/03/2018	£10,000
Kenneth Mavor	Dennis(UofD), Ozakinci (UoStA), Laidlaw (UoStA), McNeill (Australian National University), O'Reilly (RCH Melbourne), Ryan (UoStA)	SMERC Small Grant	Identity-potent stressors: The interplay of professional (social) identity and specific work-related stressors; and the implications for wellbeing of doctors and medical trainees.	01/01/2017	31/12/2017 extended to 30/03/2018	£10,000
Tania Fahey Palma	Cleland (UofA), Currie (UofA and NHS Grampian), Denison (UofA and NHS Grampian), Johnston (UofA and NHS Grampian)	SMERC Small Grant	Language and Effecive Communication in multi-disciplinary team (MDT) meetings.	01/01/2017	31/12/2017	£10,000
Jennifer Cleland	Johnston (NES), Strand (Lund University), Kitto (University of Ottawa), Roberts (UofA)	SMERC Post-doc Small Grant, co-funded by NHS Grampian Endownments	How postgraduate clinical learning environments differ: a multi-speciality case study.	01/01/2017	31/12/2017	£12,0000

Appendix 3: CSMEN funded projects

An overview of CSMEN funded projects

Name of Applicant	Title of Project	Year	Status
Ghulam Nabi	Role of laparoscopic simulation in surgical skills acquisition: a feasibility study	2010/11	Final Report on website
Vicky Tallentire	As easy as ABC? How can newly-qualified doctors be better prepared in acute care?	2010/11	Final Report on website
Agi Holland	Development, implementation & evaluation of online video in clinical skills education to UG student nurses	2010/11	Final Report on website
Michelle Dunphy	Can podiatrists impact on self-management for people with Type II diabetes? Proposal for a randomised trial.	2010/11	
Bryan Allan	Variation in training of SPs across Scottish medical schools. What is best practice?	2010/11	Final Report on website
Alna Robb	Evaluating the effectiveness of podcasts in UG practical procedure training.	2010/11	
Janet Skinner	Significant Event Analysis: a reflective tool for UG medical students.	2010/11	Final Report on website
Mairi McLeod	Critical Incident training: does inter-disciplinary training enhance critical decision making and team performance	2010/11	
Sundari Joseph et al	Robert Gordon University, Aberdeen: Peer teaching of clinical skills by undergraduate students from medicine, nursing and health sciences.	2011/12	Final Report on website
Jean Ker et al	University of Dundee: Standards of safe clinical practice in the elderly - identifying the components for a core clinical skills bundle.	2011/12	Publication

Appendix 3: CSMEN funded projects

An overview of CSMEN funded projects (continued...)

Name of Applicant	Title of Project	Year	Status
Kenneth Walker et al	North Deanery, NHS Education for Scotland: Highland Surgical Bootcamp: using self-regulated learning microanalysis to determine if sequential simulations can accelerate non-technical and technical skills acquisition in new-start surgical trainees.	2011/12	Final Report on website
Kirsty Egan	Edinburgh Patient Partnership/ University of Edinburgh: Exploring ways of gathering feedback from patients involved in UG Medical Education.	2011/12	Final Report on website
Edward Mellanby	University of Edinburgh: Development of a behavioural marker system for newly qualified doctors in managing acutely unwell patients.	2011/12	Final Report on website
Sofia Chaudhri et al	RAH, NHS Greater Glasgow & Clyde: Evaluation of the introduction of a skills-based difficult airway training programme for critical care.	2011/12	Final Report on website
Ian Thomas	The use of a simulated ward round and its impact on medical error making amongst medical undergraduates.	2012/13	Final Report on website
Jane Ritch	Development of a board game for clinical decision-making and human factors in clinical practice	2012/13	Final Report received
Sara Wood	Clinical skills teaching for speech and language therapists using the evidence-base to treat sound disorders using electropalatography.	2012/13	Final Report
Frederic Pender	The use of storyboarding and digital storytelling to better represent the patient: a missed opportunity to reinforce clinical skills?	2012/13	Final Report on website

Appendix 3: CSMEN funded projects

An overview of **CSMEN funded** projects (continued...)

Name of Applicant	Title of Project	Year	Status
Keith Stevenson	Developing interprofessional "Team Objective Structured Clinical Assessment" within a simulated environment to improve health and social care quality.	2012/13	Final Report on website
Margaret Brown	Walk in my shoes: Simulated learning and the care of the person with dementia.	2012/13	Final Report on website
Iain Drummond	The role of Tactical Decision Games (TDGs) as a novel method of teaching Non-Technical Skills (NTS) to final year medical students.	2013/14	Final Report approved.
Alistair Geraghty	Multidisciplinary Simulation Based Ad hoc Team Training.	2013/14	Final Report November 2016
James Tiernan	NHS Lothian Clinical Skills Mastery Programme-Implementing Safe and Effective Clinical Performance.	2013/14	Final Report received
Effie Dearden	What skills are required for junior doctors to prescribe safely in the workplace? **Paper published in British Journal of Clinical Pharmacology in 12/2015**	2013/14	Interim Report received

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