NHS Education for Scotland

Medical Directorate

EDUCATION RESEARCH AND INNOVATION

Annual Report 2021

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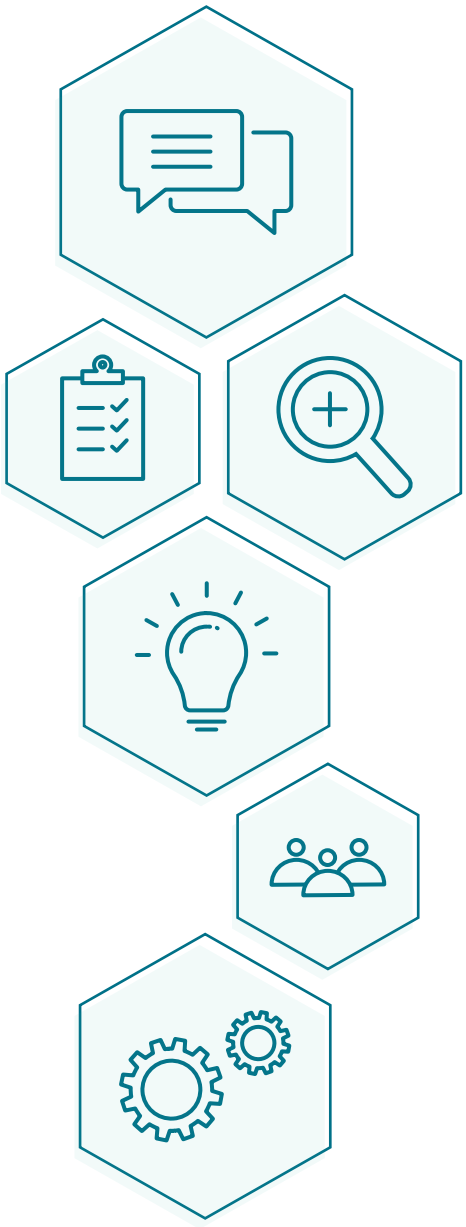

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Introduction

The responsiveness of the Medical Education Research and Innovation Groups (MedRIG) members, their collaborators and affiliates is illustrated in the content of this report. Of course, the activity of MEdRIG has been influenced if not directed by the COVID-19 pandemic. The result has been a great effort in producing work that addresses the two main NES research themes:

+ Developing the workforce
+ Developing the learning environment.

This report describes projects that have been conceived, carried out and completed in curtailed time frames. They have addressed the needs of the workforce as people, professionals, contributors to services, society and culture; they have looked at the learning needs and produced workable solutions to provide training that is immediately relevant and to help ameliorate the effects of lost opportunities on learners and curricular slippage. Innovative uses of simulation point a way forward to speeding up recovery whilst maintaining safety in healthcare systems and the report shows not only how, but that, this can be done.

The wellbeing and career choices of the workforce are also subjects that are acutely relevant to the current situation with focused, evidence based interventions. Multidisciplinary working continues to feature as a rational solution to service delivery, maximising benefit.

Some projects have been put on hold because of the pandemic whilst others have been able to complete work that was near conclusion. The themes around COVID-19 response in workforce and learning environment show innovations, not only in content but in style of working and project design. And shown these changes to be practical and perhaps even beneficial.

This is an impressive collection of stories, of people and their endeavour, collectively and collaboratively. What has been achieved is remarkable; and humbling.

Professor Peter W Johnston
Depute Postgraduate Dean
Interim Director SMERC and Chair MedRIG

SMERC (Scottish Medical Education Research Collaborative)

Higher Education and NHS organisations decided early in the pandemic to pause research, particularly work that was not related to COVID-19. Several researchers were directed to full time clinical work and some SMERC projects were paused. SMERC with NES's cooperation has been able to hold over much of the funding for these projects to enable them to continue as the pandemic subsides. SMERC researchers, however, have been productive and published work has continued to appear. Opportunities to disseminate research findings have been curtailed by the cancellation of conferences and events where SMERC work would customarily be presented. A range of projects have been completed and their contributions are summarised in the following sections.

The need to respond with evidence to support staff in the COVID-19 pandemic became quickly apparent early in 2020. SMERC developed a pan-Scotland project involving all its members – the five Scottish Medical Schools at Aberdeen, Dundee, Edinburgh, Glasgow and St Andrews and NES - to examine how best to support wellbeing in doctors through change and transition in the COVID-19 crisis and its aftermath in Scotland. It is the first SMERC project to involve all participating institutions working as one unit.

Doing this provided a wide range of talents focused on addressing one major issue. It allowed work on a larger scale, daring methodologies and innovative ways of carrying out the study. The project attracted grant funding from the Chief Scientist Office (Scotland) of around £230K and subsequent NES funding of £75K. (See section 1.1 in current numbering).

Looking ahead, SMERC seeks to widen its appeal and inclusivity beyond what is seen as a "core group". SMERC wishes to involve medical education in research more extensively. Part of this requires promotion and publicity and part collegiality among colleagues. We now have a SMREC Twitter account and attention to the website and its currency. The current year's grant round will, we hope, attract applications that build on recent experience and we also hope to support projects that are focused across the breadth of medical education and training. Widening collaboration enabling "doing more quicker" is a model that might be productive – and there is no shortage of enthusiasm. As we conclude a busy, demanding and rewarding year for SMERC, cautious hope and expectation are on the horizon.

Safety, Skills & Improvement

SKIRC brings together the combined innovative capabilities, expertise and experiences of the long-established ‘Safety and Improvement’ and ‘Clinical Skills’ simulation 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. Building on extensive previous research and development activity, SKIRC continues to contribute to the national and international safety, skills, simulation, improvement and human factors evidence bases via wider-ranging practical outputs and impacts which make a direct contribution to organisational service delivery and the training environment.

Theme 1
Developing the Workforce

01 Supporting Doctors' Wellbeing During COVID-19

1.1 Developing evidence-based interventions to support doctors' well-being and promote resilience during COVID-19 related transitions (and beyond).

The COVID-19 pandemic resulted in a sudden and major disruption to the working practices and working environment of medical students, recent graduates, trainees, career grade and retired/returning doctors involved in the healthcare response. Doctors are affected by transitions to new or redeployed roles associated with the current COVID-19 pandemic in many domains (physical, psychological, social, cultural, educational). This project was designed as a multi-streamed, Scotland-wide project to develop an evidence base to inform the development and implementation of interventions to be tailored specifically to the needs of the healthcare staff in Scotland and the working and learning environment in which they will be delivered.

The study was designed around two questions:

- How are doctors across the career continuum experiencing the transitions associated with the current COVID-19 pandemic?
- What interventions will best support doctors' well-being and resilience during transitions associated with the current COVID-19 pandemic and towards long-term future practice?

Four domains of wellbeing were considered – physical, psychological, social, cultural by exploring qualitatively doctors' experience of changes and transitions encountered in the COVID-19 pandemic.

There were four workstreams:

- Rapid literature review
- Empirical qualitative data collection including purposive sampling to elicit doctors' experiences and perceptions of the pandemic across the career continuum, all the Scottish territorial Health Boards including remote and rural locations using virtual interviews and longitudinal diaries
- Intervention design, creation and implementation informed by the above, workshops and expert panels
- Intervention evaluation

The group has completed a report of the first stage of the work (Report 2020) and there is a publication in press (Johnston in press). Scoping the literature revealed a gap around rational intervention to support doctors' wellbeing in pandemics and other health crises (Cairns et al submitted). Further details of methods are available on the Scotland Deanery website (See COVID-19 Doctor Wellbeing Study).

Issues raised by staff are focused around key findings:

01 COVID-19 has magnified already existing challenges to doctors' wellbeing.

02 All 100 participating doctors experienced multiple interacting transitions in role, workplace, home and educational contexts which impacted on them in psychological, physical, social and cultural domains.

03 In primary care, doctors found new working practices challenging. Their role changed with less direct patient contact. They perceived this as losing public confidence and a cause of distress for GPs.

04 Secondary care doctors highlighted significant changes to working practices, environments and increased complexity of decision-making, exacerbated by cancellation of elective work.

05 Many staff experience uncertainty about the future, feeling exhausted, stressed and anxious especially with repeated surges of COVID-19, winter pressures and patients with delayed presentations.

06 Trainee doctors experience disruption in their education and training, for example, redeployment or cancellation of exams leading to delayed CCT.

07 Organisations frequently fail to display how much staff, especially senior staff, are valued. Examples are removal of Rest & Recuperation (R&R) spaces, reduced access to informal psychological support, inconsistent communication.

08 Uncoordinated, duplicative, and, at times, overly prolific communications from multiple organisations during the first wave added stress to doctors' work.

Positive experiences include greater collaboration and team working both within and across specialties, use of virtual meetings saving on travel and the recognition that doctors, their knowledge and skills, are required.

Following analysis of interview data, three key areas were prioritised to design interventions based: institutional support, supporting psychological safety and supporting physical safety; Differences in experience were apparent suggesting, even within this single profession, a one-size fits all intervention is not appropriate. An example is the Trickle App (Trickle App). Five composite narrative animations have been developed to engage the medical workforce in discussing their wellbeing and the group has collaborated with the National Wellbeing Hub (Scotland) on resources for the website (PRoMIS), available to healthcare professionals.

A persuasion document that outlines the benefits of R&R spaces has been produced outlining benefits for wellbeing and of organisational commitment to staff wellbeing. A graphic forms part of this:

This phase of the study ran from May to October and has been followed by a consolidation phase, funded by NES, which allows completion of re-interview data collection, analysis of interviews and audio-diaries and evaluation. The project has provided a body of evidence, collected with robust methodology, about doctors' wellbeing across its domains, with participants through specialty, career stage and geography. The findings inform the NHS and Scottish Government in shaping policies and culture to ensure prioritisation of doctors' wellbeing, feeling of being valued and supported at work. The GMC report Caring for Doctors, Caring for Patients (West M, Coia D, GMC UK 2019) begins with the words "Patient safety depends on doctors' wellbeing". Doctors are, first and foremost, people with personal, professional and strategic concerns around caring for others. We are in a position to facilitate access dialogue around support-seeking behaviours that will help organisational cultures evolve. Emphasis on hearing and valuing staff can be manifested in new working practices, team working, camaraderie, greater collaboration across specialties, and responsive decision making. Organisations thrive when staff have a voice.

1.2 Selection into Medical School – potential effects of Covd-19 on widening access and participation in medicine

Widening access and participation in medicine is an area of interest for SMERC. Recent work has focused on the effects of COVID-19 on widening access (Gibson Smith and Cleland 2020). COVID-19 has required a shift in the way education, teaching and training have been approached by schools, colleges and universities across the world. Many have been closed and thus have had to use online/remote or blended teaching, learning and assessment. These changed ways of working pose challenges to students and are likely to exacerbate existing educational attainment gaps between different societal groups.

This project was based on consideration of published literature on factors that affect widening access and participation to gauge the potential impact of COVID-19 on widening access to medicine.

The study provided an account of the process of applying for medical school using two model applicants from differing backgrounds compared progress through the process of the model candidates. Three key areas of challenge were identified: family circumstances and support (financial security and parental educational support); staying connected (access to educational material, technology and WiFi); getting the grades and meeting other entry criteria (predicting grades and work experience).

The project proposed that medical schools adopt measures to protect widening access including increasing the use of aptitude tests, contextualised admissions, online multiple mini interviews (MMIs), creative outreach and promotion of alternative means of gaining relevant experience.

1.3 Internal Medicine 1 Boot Camps

Building on the success of the 2019/20 three-day simulation boot camps hosted by the Scottish Centre for Simulation and Clinical Human Factors, NES has delivered a further six IM1 boot camps in 2020/21, despite the challenges presented by the global pandemic. In addition, seven IM2 skills day have been delivered between the Royal College of Physicians and Surgeons of Glasgow and the University of Aberdeen.

All IM1 trainees in Scotland starting in August 2020 were given the opportunity to attend the three-day simulation boot camp and all IM2 trainees were invited to skills day. IM1 trainees from all regions of Scotland attend boot camp in groups of 18, to experience face to face training in a COVID-conscious environment. The boot camp schedule maintained its highly rated high fidelity simulation methodology, with minor modifications necessitated by the pandemic restrictions; specifically the social activities external to the core learning and the arrangements at lunchtime.

Despite these small changes, the experience still meets the needs of the new Internal Medicine Training curricular requirements and receives positive feedback from the trainees. IM2 trainees attend the skills day in either Aberdeen (North and East trainees) or Glasgow (West and South East trainees) in groups of 16. Small group learning allows rehearsal of complex procedural skills such as chest drain and central line insertion, and familiarisation with non-invasive ventilation initiation and decision-making.

Many thanks to the excellent faculty for their time and enthusiasm, despite the new challenges that this year has presented.

1.4 Transitions in Postgraduate Medical Training

A multi-perspective qualitative exploration of early career trainees experiences of rotational transitions was a study undertaken by Alistair Smithies reported on in 2019. He is developing two articles for peer reviewed publication and attended the international Ottawa conference in February 2020 to share his findings.

Outputs

Smithies A, Ker J, Johnston P, *In at the deep end: A longitudinal qualitative study of transitions during early postgraduate medical training*, OTTAWA 2020: Assessment of health professionals and evaluation of programmes: Best practice and future development, February 29-March 4, Kuala Lumpur, Malaysia; 2020.

02 Career Decision Making

2.1 Career Preferences. Factors valued by male and female trainees in choosing a post

Work in the current year has been focused at the beginning and the end of medical careers. The first project as part of a SMERC PhD programme explored preferences in specialty training comparing between those identifying as male and female. The study was carried out in an annual cohort of UK foundation year 2 doctors. It addressed the gap in information around gender identity and its influences on work-related preferences in career choice.

The project was a quantitative study using a discrete choice experiment (DCE) methodology, pioneered by SMERC projects in the area of careers research.

The attributes were location; familiarity with specialty; culture of the working and learning environment; earnings; working conditions, and opportunities for professional development. As is customary with DCE based studies, the outcome metric is the willingness or otherwise to accept financial compensation to forgo one what is perceived as a desirable attribute in a training programme and allows ranking of desirability of attributes compared between the two groups.

Within gender groups, the relative value of each of the attributes defined above, was similar for males and females. Location was most valued as has been found in previous studies of foundation doctors and familiarity with the specialty least valued. Doctors of both genders placed high value on culture of the working and learning environment in a training post, but females placed significantly more value on a supportive culture than did males. This was the only significant difference between groups. This finding is in itself interesting as it is in line with previous research that suggests that gender preferences in medicine are beginning to narrow. In an era where equality, diversity and inclusion are important, understanding these dynamics are helpful in considering how to approach workforce planning, staffing and allocation of doctors to training posts.

2.2 Doctors and retirement

The medical workforce is under pressure in the UK as it is internationally – there are not enough doctors. In the UK, numbers of doctors per head of population are low in comparison with other developed and wealthy nations. Doctors at or nearing retirement are thus a valuable resource in terms of experience and capability to provide healthcare and to educate those coming behind. What causes doctors to remain working or to retire is subject to a range of influences related to the society in which they live and work, the job they do and matters that vary doctor by doctor.

This study (Cleland et al 2020) was a qualitative project that used semi-structured interviews to collect data subsequently analysed by inductive methods and embeddedness theory. This allowed results to fall into three main dimensions of link, fit and sacrifice.

Doctors behaviours reflect that where they found work links (formal or informal connections between people that play a role in retention) positive, retiring could feel like a loss but, in contrast, where relationships were poor or peers were retiring too, staying on at work was felt negatively. In the embeddedness model, fit includes the degree to which a person's values and plans fit with job demands, organisational culture and the extent to which a job has a manageable level of challenge. A good fit of work related positively to feeling high levels of job satisfaction however doctors expressed they had less self-confidence as they grew older. In the theory of job embeddedness, sacrifice represents the perceived tangible (e.g., income) and intangible (e.g. feeling valued, supported, having an identity and losing that) costs of leaving a job. In the UK, arduous demands made of doctors and work intensity were negative factors as were taxation penalties associated with keeping working. Maintaining an acceptable work life balance was often seen as incompatible with continuing to work.

The career choice of staying at work or retiring is complex and personal but involved social, cultural and economic structures and practices as they pertain to doctors and the NHS. The study provides impactful data to drive change in the way late career doctors are handled contractually and how taxation regulation is influential as a disincentive to continue working. Providing a supportive system in which doctors feel valued and supported and, indeed, encouraged to keep working may well be beneficial.

2.3 Broad Based Training (BBT)

Broad Based Training (BBT) is a two-year core training programme, first introduced in Scotland in 2018. Designed to be undertaken post-Foundation, it offers trainees experience in four specialties (Internal Medicine Training, General Practice, Paediatrics and Psychiatry) with subsequent direct entry into year two of any of these four specialties.

During each of the four attachments, 10% of training time is spent in one of the other three specialties (to allow trainees to pursue areas of particular interest or something more unusual or niche). A longitudinal research project is underway to study the first and second cohorts of trainees, to find out how well the programme is received by the trainees and how well it prepares them for the next stage of training. This is a largely qualitative project: interviews with BBT trainees, trainees on standard training programmes and Educational Supervisors are being undertaken at key time points, to gain a rounded view of how the programme is perceived and how it compares to conventional training. Early indications show that BBT trainees are very pleased with their choice of programme. It enables them to maintain a more generalist outlook before committing to their final specialty and allows them to develop conviction and confidence in their career choice.

2.4 Internal Medicine Training Simulation Boot Camp Evaluation Study

In response to recommendations set out in the Shape of Training Report and other drivers, the GMC has developed a new model for future physician training. Internal Medicine Training (IMT) now forms the first three years of post-foundation training and replaced Core Medical Training in August 2019. With the support of the Scottish Government Health Department, the implementation of the new curriculum was seen as a unique opportunity to offer enhanced simulation training to IMT trainees in Scotland. A novel simulation-based training package was designed by the NES Medicine Simulation Collaborative, in conjunction with the Medicine STB simulation subgroup. The IM1 boot camp and IM2 skills day aim to embed evidence-based practice to enhance skills, improve efficiency and augment patient safety.

2.5 Investigating associations of postgraduate examination performance with sociodemographic characteristics

This is a SMERC study that aims to examine the relationship between performance in the first stage of MRCP, MRCGP and MRCPsych with sociodemographic characteristics, the EPM (decile and additional educational achievements), Situational Judgement Test (SJT), medical school and foundation school. The study particularly focuses on specialties with a key community component, as well as the MRCP, because candidates, who pursue many other specialties with a community component, begin with the MRCP as a pre-requisite qualification and is a reference point for other such studies. Additionally, it is timely to reconsider the study of McManus et al. (2008) who demonstrated considerable variation in MRCP examination performance relative to candidates' medical school. They concluded that "unexplained differences" at entry to medical school and specific medical school components might explain this variation.

These authors were unable to look at whether candidate socio-economic background was a contributory factor. This is critical to investigate given variation between medical schools in student socio-demographics, increasing policy focus on widening access to medicine and emerging evidence of a relationship between socio-economic background and specialty choice (which will be reflected in who sits particular postgraduate examinations).

Improvements in routine data management and the availability of standard performance measures mean it is now possible to do a more forensic examination of these associations. It is important to look at the educational performance measure (EPM) decile and additional educational achievements separately since the relationship between additional educational achievements and success in postgraduate professional exams remains unknown.

The UKMED database is the resource dataset for this study. The research team has experience with this database and its complexity. Data have been extracted in line with relevant procedures and after cleaning, analysis is now in an advanced stage, prior to reporting the investigation. It is anticipated that this work will improve understanding, inform assessment and selection policy and help inform UK government policy regarding the future of healthcare delivery.

03 Developing Staff

3.1 An exploration of faculty development in three Medical Schools in Scotland

This is a SMERC-funded large grant project that is ongoing within three Scottish Medical Schools (Edinburgh, Dundee and Aberdeen). There have been adjustments necessary to the project as a result of the COVID-19 pandemic, but the project group has managed to undertake the data collection as planned, albeit virtually as opposed to the planned in person process. The funding planned to be used for travel between centres and accommodation costs has been used to extend the employment period of the post-doctoral researcher by an additional three months. Currently, the interview data is being analysed employing a theoretical lens of inhabited institutionalism chosen to best illustrate and describe the contested area that faculty development inhabits. We cannot understand faculty development without considering the wider institutional and contextual factors that influences the experiences of those who engage with such programmes.

Initial planned outputs from the project are:

- clearer description of faculty development within the three medical schools
- methodology paper on inhabited institutionalism
- theoretical paper on faculty development and the project is on track to complete this work by the end of the project (now May 2021).

3.2 Trainees Researching in Collaboration (MEdTRiC)

The trainee research collaborative began in 2007 among surgical trainees to creating a model to undertake research across units. In England, the West Midlands Research Collaborative (WMRC) has been behind several multicentre studies and audits which have significantly influenced practice. Several organisations, including SMERC, encourage trainees to develop skills in medical education. Prior to this project there was no dedicated trainee led medical education research collaborative. Barriers to trainees undertaking medical education research include the construction of training programmes, the need for additional qualifications and the costs involved. Clinical teaching or educational fellowships are available in many places but most are not seen as training posts and have limited capacity to undertake meaningful medical education research.

The project objectives were:

- Measure interest in a medical education trainee research collaborative
- Discuss examples of suitable studies to be run by the collaborative
- Select a co-ordinating committee
- Decide on collaboration structure and provisional authorship policies that will benefit all collaborators.
- Identify potential sources of endorsement
- Identify suitable mentors both in the fields of medical education and collaborative research.

An email invitation disseminated using a snowball method to publicise the project, was sent to Directors of Medical Education and published on the NES website. A resulting 28 members were gathered, mostly from Scotland but including other UK nations.

COVID-19 led to postponement of a planned workshop/launch however the project has still been able to bring benefit. It has demonstrated considerable interest amongst junior doctors to get involved in collaborative medical education research. Better publicity should further broaden the range of grades and specialties represented in the collaborative. Research project proposals submitted to the collaborative were of a high standard and covered a wide range of areas in the medical education continuum. It is felt realistic that, once, the current crisis has passed, MedTRiC will be in a strong position to select and progress this project, with projects which focus on the areas of education and training that are important to trainees.

3.3 The Scottish 'Improving Surgical Training' pilot: a qualitative evaluation

Feedback from early years surgical trainees and recommendations from the 2013 Shape of Training Review prompted UK-wide reform of early years surgical training. Scotland's nationwide approach under the 'Improving Surgical Training' pilot began in 2018, focusing on:

- increasing delivery of surgical training during daytime hours
- improving quality of trainee-trainer supervision time
- developing and implementing a coherent simulation programme to augment clinical experience
- the professionalisation of supervision and remuneration for supervisors

NHS Education for Scotland commissioned a qualitative evaluation, funded as a PhD studentship, by the Royal College of Surgeons of Edinburgh. Using a case study approach, data from interviews with surgical trainees (n=46) and trainers (in progress) across Scotland is being coded and inductive thematic analysis currently being undertaken.

In the context of surgical training in Scotland, this work will inform the current and future directions for surgical training. In the context of medical education, this work may deepen our understanding of professional identity development of surgical trainees in a reformed training programme and the development of effective trainee-trainer relationships. This in turn should offer insight into the educational concepts of entrustment and feedback, and the effect of simulation in the context of improving surgical training.

3.4 Pre-COVID uptake of online pharmacy education over a 5 year period

NES Pharmacy reviewed the change in uptake of online and face-to-face formats of education between 2013-14 and 2018-19. This was to establish a trend in learners' choice of educational format before the COVID-19 pandemic and social distancing restrictions came into effect. Comparing 2013-14 and 2018-19, NES staffing reflected a move from face to face (1.17WTE vs 0.7WTE) to online (0.1WTE vs 0.41WTE) education. The educational contact time of live events (face to face and webinars) had decreased (4047 vs 2375.5 hours) but increased for asynchronous e-learning modules (2982 vs 12782.5 hours). Online learning had increased for pharmacy CPD, naturally, before COVID-19. A further study to compare uptake in 2020-21 would support strategic educational planning for the future.

3.5 Practice-Based Small Group Learning with mixed groups of primary and secondary care doctors *Linsey Stewart and David Cunningham*

Further research into the application of the Practice Based Small Group Learning (PBSGL) conducted by Dr Linsey Stewart (NES GP medical educational fellow) and Dr David Cunningham (Assistant GP director) evaluated the use of PBSGL as part of an NHS Grampian initiative called Reconnect. This offers a variety of shared learning activities to primary and secondary care medical practitioners.

Two PBSGL groups were formed with a total of 13 members drawn from both health care sectors who met over a five-month pilot period. A qualitative research method was chosen to identify the perceptions and experiences of participants.

Four main themes emerged from analysis of the data. Reasons for participation were often related to a desire to improve working relationships between the two sectors and to increase understanding. Practitioners learned about how working conditions and team working affected the working lives of the other sector. Participants found the logistics of arranging further meetings challenging and considered they had a lack of shared learning time together. Considerations to the future of the project were positive but this contrasted with the few meetings that had taken place.

3.6 GP Trainee Prescribing Assessment – An evaluation of the impact of pharmacist involvement in the West of Scotland

Katie Brown, Rachel Allan, Ken Lee

The Royal College of General Practitioners (RCGP) introduced a new mandatory prescribing assessment for GPST3s in August 2019. This self-assessment prescribing review represents a timely opportunity to reduce prescribing errors and improve the quality of prescribing for GPs embarking on their future career. The RCGP assessment does not require formal pharmacist involvement; however, within NES we were keen to evaluate the role of primary care practice-based pharmacists in the review process. This collaborative approach with the GP trainee and trainer, reflects the future ways of working in General Practice with more co-operative working between professionals in primary care delivering front line services. NES GP Fellows, Dr Katie Brown and Dr Rachael Allan designed and delivered a training package with the NES Pharmacy team, to volunteer pharmacists attached to training practices in the West of Scotland, where a GPST3 was undertaking assessment.

The training outlined the new prescribing assessment and the value that specialist pharmacist knowledge could add to this training activity. Evaluation explored the role of appropriately trained pharmacists in the prescribing assessment and feedback of GP trainees and identify the potential impact clinical pharmacists had in their involvement in the assessment, by exploring the views of the GP trainers, GP trainees and pharmacists. An initial questionnaire survey explored aspects of feasibility, acceptability and impact of the initiative. This was followed by in-depth study of these factors using single profession focus groups of those involved in the intervention. The approach was found to be acceptable and feasible. Pharmacist involvement increased understanding of different roles, improved collaborative working and enhanced prescribing safety. We believe this to be an innovative piece of work replicable to our primary care colleagues across Scotland to promote prescribing safety and interprofessional learning with our pharmacy colleagues.

3.7 Using a systems framework to design simulation scenarios, debriefs and evaluation in GP specialty training

Sarah Luty, Ken Lee, Duncan McNab, Jean Ker

Simulation training in General Practice has been promoted to increase knowledge, confidence and skills in dealing with acutely ill patients in Primary Care (PC). While simulation training is often helpful to promote the development of personal skills and behaviours, we aimed to apply a systems based approach to determine if this enhanced understanding of the influence of system factors on why decisions were made (people, technology and tools, tasks, physical environment, organisation factors) and to evaluate the impact of learning to improve GP practice systems to support staff to deliver effective care. The Systems Engineering Initiative for Patient Safety (SEIPS) model was used to design simulation scenarios, structure debriefs and inform evaluation. Training was delivered to year one GP specialty trainees (GPSTs) at the Louisa Jordan Simulation centre. Scenarios included dealing with acutely ill patients in different situations such as the practice building and home visit settings. Participants found the course enjoyable and described personal learning on the impact of situational and contextual factors on decision making. They struggled to implement desired changes into their practice systems. Evaluation of aligning simulation and QI training is planned.

3.8 Primary Care Quality Improvement Training *Duncan McNab, Laura Allison*

The 2018 Scottish General Practice (GP) contract emphasised the importance of Quality Improvement (QI) to drive changes to improve performance and wellbeing in primary care. From 2018, the Scottish Government has commissioned NES to provide QI training to GPs and others in primary care to ensure they had the required skills, knowledge and confidence to participate and lead local QI projects. Since 2018, 210 GPs and 53 other primary care staff (for example practice nurses, managers and pharmacists) have completed the Primary Care Scottish Improvement Foundation Skills (SIFS) programme via remote learning in cohorts of up to 30 participants from across Scotland while undertaking a QI project to enhance their learning. Evaluation showed satisfaction with course delivery and content with the majority of the content was new to over three quarters of participants. Sharing learning between different practices and between different primary care professions was reported to enhance application of learning and understanding of different professional roles. The vast majority of participants had successfully applied learning within their projects. Following course completion, many participants reported teaching QI to primary care colleagues and developing their professional role to undertake more QI at practice, cluster and wider organisational level. A desire for more QI learning and networking opportunities for primary care staff was expressed. This is being piloted with SIFS networking sessions.

3.9 Supporting Remote and Rural Practitioners

1. Realist Evaluation of CSMEN MSU

Susan Somerville is completing the write up and intends submission of her PhD and looks forward to sharing the report and findings with NES later this year and at future national and international conferences.

Outputs

Susan co-ordinated a realist research presentation and workshop for Centre for Healthcare Education Research and Innovation (CHERI) at the University of Aberdeen and in doing so was brought together Realist Research Colleagues from the Universities of Glasgow, Stirling, and Glasgow Caledonian who shared a broad range of health and social care research topics below:

+ Simulation based education (the mobile clinical skills unit)
+ Primary care interventions for obesity management
+ Greenspace interventions for mental health
+ Salutogenesis and The Salvation Army: a community as method – researching alcohol related brain injury
+ Speech and Language Therapy in Children

The five presenters came together to speak to and develop ideas with a diverse group of approx. 50 researchers who have since expressed an interest in a nascent Scottish Realist Research Group.

Publication:
Baker A., Somerville S., Hardie L., Ker J., Analysis of the use of a mobile simulation unit using the principles of a managed educational network (2021) Journal of Remote and Rural health: **www.rrh.org.au/journal/**

2. CSMEN BASICS Response to COVID-19

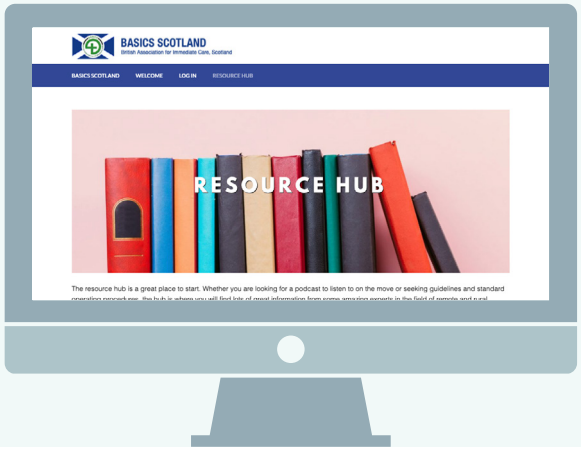
Basics Scotland funded by CSMEN delivers Prehospital emergency care courses (PHEC) to support remote and rural practitioners. In response to the restrictions of the pandemic they had redirected their capabilities away from face to face courses.

Outputs

1. **Development of a new open access resource hub: https://basics-scotland.org.uk/basicslms/resource-hub/**
   They focus on topics such as performing under pressure, triage and keeping well and using podcasts share experiences from well-known experts in prehospital care of the topic area. They have in one quarter released 12 podcast and have had 3015 listens which equates to 1692 hours of content delivery.

2. **Skills pod distribution**
   They have skills Pods strategically placed in Orkney, Lewis, Mull and Fort William where they have continued to deliver and support refresher equipment (Sandpiper Trust bag) and skills sessions.

3. **E-learning modules**
   In relation to e-learning they have developed modules for the e-portfolio on Adult Patient Assessment, Trauma, Paediatrics and Cardiology.



3. Development of the virtual tour of the CSMEN MSU

A virtual tour of the MSU has been developed by Graeme Brown and Lynn Hardie to give new and existing users access to the layout and equipment available. It has been designed using 360 virtual reality technology. It will support faculty in planning simulation-based education sessions prior to the MSU arrival. It enables you to look inside the cupboards and access the interactive equipment guides. This provides a model for building and incorporating interactive learning tools and support for facilitators as well as the prevention of skill decay in learners. Access is currently is on a desktop computer but a mobile compatible version is being developed.

Outputs

To access the tour please use the following link and you will require your Turas Learn login: **https://learn.nes.nhs.scot/43947/clinical-skills-managed-educational-network/mobile-skills-unit-msu/msu-virtual-tour**

3.10 CSMEN supporting the Scottrauma Network

The Scottish Trauma Network had a virtual clinical governance day when they shared regional experience which had learning for all participants. The stories of patient journeys were very powerful especially in relation to the impact of team working and follow up and rehabilitation care. The CSMEN contributed to the development of a job description for an educational coordinator post for across the regions.

Outputs

Appointment of STN national education coordinator for two years.

3.11 Delivering safe FTF Simulation based learning at NHS Louisa Jordan

When the nightingale hospital commissioned by the Scottish Government as a COVID-19 step down facility was no longer required in May 2020 it presented an opportunity for CSMEN to propose the establishment of an interim National Skills Education Hub. Many skills training facilities had been requisitioned throughout Scotland for clinical services. The added need for COVID-19 safety measures such as physical distancing meant that the facility could be adapted for multi-professional skills training for the workforce. CSMEN has led the implementation of the Hub with quality assured processes applied to delivering a standard of skills education.

There were four main pathways of learning:

- A standard induction plan for COVID-19
- Skills training for West of Scotland workforce
- National skills training
- Skills Innovation trials

Outputs

Overall Impact

Total Enquiries for skills courses	373
Total numbers of participants attended to 29/1	5,345
Number of participants July	297
Number of participants August	555
Number of participants September	436
Number of participants October	1,523
Number of participants November	1,556
Number of participants December	780
Number of participants January 29/1	470
Cancellations of courses	96

Step-up to COVID-19 induction programme at NHS Louisa Jordan
A programme, lesson plans, links to online learning resources and scenarios have been developed for an induction to working in any facility caring for COVID-19 patients. This has been shared on Turas Learn on the NHS Louisa Jordan web page.

National programmes at NHS Louisa Jordan
The NHS Louisa Jordan has provided safe facilities for learning for national programmes such as ALS, PROMPT, EPALS, SCOTTIE as well as faculty development.

Innovations at NHS Louisa Jordan
In relation to innovations the NHS Louisa Jordan has piloted an interprofessional ward exercise with team debriefing using a systems approach and this approach has also been piloted by GPs. In addition the first European EyeSi simulator has been piloted at the NHS Louisa Jordan initially to train optometrists but with the incorporated feedback system it will be of support to all those involved in eye care. In addition an innovative face to face multiprofessional skills programme for vaccinators has been developed and introduced.

Evaluation of training at the NHS Louisa Jordan
SKIRC is undertaking a formal evaluation of the National Skills education hub using a mixed methods approach of both quantitative data using Questback surveys and qualitative telephone and face to face interviews of stakeholders and facilitators and participants.

3.12 Developing Ultrasound Guided Regional Anaesthesia (UGRA) capability through the use of simulation

Progress Report

The project led by Graeme McLeod from the University of Dundee supported by CSMEN has been temporarily stopped because of COVID-19. Part 1 of the project, "the validity and reliability of metrics for translation of regional anaesthesia performance from cadavers to patients" has been completed and the results published in the Br J Anaesth.

We conducted part 2 of the project, "validity and reliability of metrics for translation of regional anaesthesia performance from cadavers to patients" We recruited 11 trainees. All underwent basic training at CAHID which consisted of a standardised lecture, basic ultrasound practice and needling on a blue phantom. Trainees were allocated to either interscalene block training on the Thiel cadaver or training on a pork phantom. All participants were tested on the Thiel cadaver under exam conditions and the procedure videoed. Seven participants subsequently conducted interscalene blocks on patients 3 weeks and 3 months after training. Two others conducted clinical interscalene block 3 weeks later.

For analysis, five expert regional anaesthetists have finished assessing the videos from testing on the Thiels and patients (n = 25). Testing used 22 items from the validated checklist developed in Part 1 (15 tasks and 6 errors). A single expert has also identified non-technical behavioural aspects from each video. The analysis of the results will use a mixed models regression analysis. The eye tracking data is being analysed and correlated with non-technical behaviour.

The results will be used to power a larger study investigating the translation of performance from the Thiel cadaver to performance on patients. CSMEN has contributed to the design and write up of this work.

Theme 2
Developing the Clinical Learning Environment

04 The Learning Environment

Improving fairness in undergraduate medical education

Medical education should be fair, with success determined solely by ability. However, candidates from some groups – for example those who are older, ethnically non-white, or originally from outside the UK - are less likely to succeed in UK medical education. This suggests the educational environment does not support these students appropriately. Differential attainment is thus a problem in medical education. A fair medical education system is important for social justice, and to ensure doctors are representative of the communities they serve.

Four Scottish medical schools (Edinburgh, Aberdeen Edinburgh, Glasgow) are working together to understand and investigate how such gaps can be better addressed. The results will be used to identify future strategies and procedures that could apply across Scotland. These recommendations will be incorporated into the curriculum of the medical schools and so improve fairness in medical education.

This PhD project is progressing despite the challenges associated in carrying out the project which result from the effects of the COVID-19 pandemic. The PhD candidate has received training on qualitative data analysis, educational theory, and research methodology. Research questions and methodological approaches have been determined and agreed and the project has gained ethical approval for phase one (interviewing staff around Differential Attainment (DA)). This has allowed data collection to be started and initial results are promising. It is foreseen that interviews will be complete by the end of this year.

4.1 Evaluation of Inter-professional Education (IPE) with medical, nursing and pharmacy students through a simulated IPL Educational Intervention

NES Pharmacy in collaboration with NHS Lanarkshire Medical Education delivered and evaluated a simulated Interprofessional education intervention called 'Evening On-Call'. This involved nursing and medical students and pre-registration pharmacists to participate in observed simulation in a ward setting. Questionnaire surveys were completed immediately after and at six months. Participants reported greater understanding of other professionals' roles, enhanced their professional confidence and improved prioritisation skills. There was some evidence of sustained self-reported effectiveness in teaching certain professional and clinical skills to participants using this type of simulated intervention. This research has been submitted for publication.

4.2 Evaluation of experiential learning initiatives for assessment of outcomes of experiential learning for student pharmacists in Scotland

Work Package led by Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde and in collaboration with the School of Pharmacy & Life Sciences, Robert Gordon University, Aberdeen and Pharmacy NHS Education for Scotland.

The overall aim of this work was to evaluate the structures, processes, outcomes, and feasibility of developing formative and summative assessment of competencies gained during student pharmacist experiential learning (EL) by practice-based facilitators. A 360-degree approach, employing multi-modal methods was utilised to obtain the views of all key players/ stakeholders involved in or affected by the assessment process, including: (1) a nationwide survey to determine current assessment approaches of student pharmacists during EL in UK universities; (2) interviews of facilitators from primary care, community, and hospital pharmacy; (3) interviews, focus groups, and a survey of stakeholders with a role in or impacted by the assessment process which included University academics, NHS staff, NHS Education for Scotland (NES) staff, and student pharmacists; and (4) document analysis to determine assessment policies at the University of Strathclyde and Robert Gordon University around assessment by external staff.

The nationwide survey revealed that most assessments of competencies gained during EL in UK MPharm programmes are only undertaken on return to the university. Findings from the student survey and interviews and/or focus groups with facilitators, staff from NES, and teaching staff from both universities revealed support for this new approach. The majority felt students would benefit from receiving real-time feedback from practitioners in the real-world settings.

Concerns raised were about the impact of these assessments on student's grades and progression through the course. Students were also of the opinion that this would add stress on their learning during EL. Notable barriers and challenges were a lack of marking consistency due to the different experience and facilitators in the placement sites, and the limited duration of placement. No consensus could be achieved with regard to the tools, methods or grading system to be adopted, however the majority agreed that competencies such as communication, professionalism, and clinical skills could be assessed by facilitators. There was a strong call for facilitators to receive training on the assessment structure and procedure, as well as the tools that would be used during the assessment process.

4.3 Exploration and evaluation of inter-professional learning in experiential learning for student pharmacists in Scotland

Work package led by School of Pharmacy & Life Sciences, Robert Gordon University, Aberdeen, and in collaboration with the Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde and Pharmacy NHS Education for Scotland.

Summary

There are efforts to incorporate interprofessional learning (IPL) into experiential learning (EL) but, to date, no extensive review of current practices was conducted. Thus, the overall aim of this work package was to scope existing IPL carried out during EL and the feasibility for development of IPL within EL in the Pharmacy degree in Scotland using multiple methods of data collection from different stakeholders including: (1) a scoping review of published literature on IPL in EL within the pharmacy undergraduate degrees internationally; (2) a theoretically based survey of key personnel in Scottish Medical and Pharmacy Schools; (3) collation and analysis of relevant course documents / workbooks from the Scottish Schools of Pharmacy; (4) interviews with key stakeholders involved in the development and delivery of these activities in Scotland; and (5) a survey of student pharmacists in Scotland.

The scoping review has shown that there are limited papers published on IPL in EL internationally. The majority did not provide enough description of activities performed but often involved a broad spectrum of healthcare professionals and practice sites. Analysis of the documents used by the two Scottish schools of pharmacy showed that neither institution had resources that specifically covered the development, delivery, or evaluation of IPL in EL. The interviews with pharmacy stakeholders as well as the surveys to staff and student pharmacists in Scotland highlighted that the majority of IPL in EL currently undertaken in Scotland is opportunistic. However, there is an overwhelming support, from those interviewed, to develop and deliver IPL in Pharmacy EL. Key enablers to drive implementation include employing a multidisciplinary approach in developing and delivering this for student pharmacists and the expected benefits of these activities on all those involved. However, barriers included funding, timetabling and other logistics. Thus, careful planning of future IPL in EL is needed to ensure its success.

4.4 Proactive Risk Management Interventions for General Practice during the COVID-19 Pandemic *P Bowie, C Leggat, T Crickett, L Innes, F Duff, J Gillies, L Wallace, N Houston, H Vosper, A Carson-Stevens, D McNab*

Due to the COVID-19 pandemic, GP teams had to redesign services; for example, to accommodate physical distancing requirements, infection control measures and use of personal protective equipment (PPE). This required review of existing working procedures, redesign of the physical environment, and integration of new ways of working and novel technologies. To support the GP workforce, a package of risk management interventions to protect the safety and wellbeing of people visiting and working in GP premises during the COVID-19 pandemic and beyond was developed.

A multidisciplinary group of clinicians, managers, administrators and human factors safety experts was formed (n=9) to lead the rapid development, based on co-design principles, of a package of risk management interventions to minimise potential harms from infectious spread of COVID-19 in Scottish GP premises. This involved a rapid literature search; identification and adaptation of existing risk assessment and control methods; and iterative review of developments by GPs and national GP nurse and manager network leads (n=35).

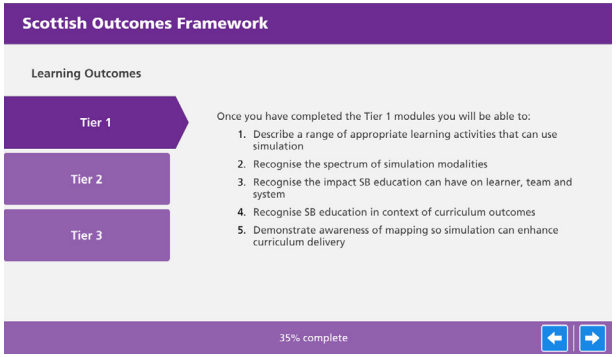
A multi-intervention package of measures was developed to manage risks to as-low-as-reasonably-practicable. These included:

+ an online downloadable training package containing a validated safety checklist for infection control
+ a 10-step guide for teams on how to design user-centred work procedures
+ a 5-step interactive guide to risk assessment of premises
+ a risk control log template and generation of a list of responses to frequently asked questions.

Evaluation of the interventions is planned as part of a larger multi-site study: **https://learn.nes.nhs.scot/32934/patient-safety-zone/primary-care-patient-safety-resources/covid-risk-assessment-tools**

4.5 CSMEN simulation based educators' launch of Tier 1

In August 2020 the on-line tier 1 programme of the Simulation-based Educator National Framework developed by CSMEN was launched on Turas learn. It covers five independent units of learning. The programme fulfils the regulatory bodies teacher training requirements: **https://learn.nes.nhs.scot/33268/clinical-skills-managed-educational-network/educational-resources/faculty-development-becoming-a-simulation-based-educator**



Outputs

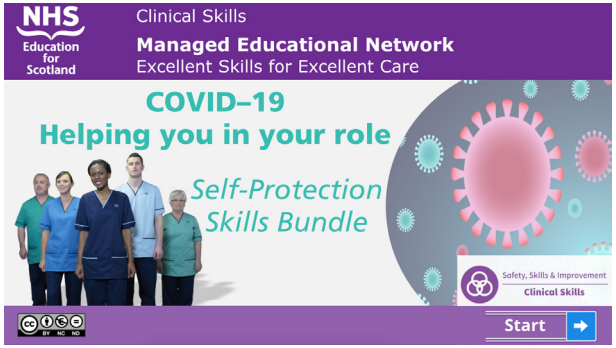
In six months 102 have completed the on-line programme, an 81% completion rate Medicine and Nursing represent the majority of those registering across all grades. Although the majority of boards have accessed the training NHS Lanarkshire , Greater Glasgow and Clyde and NHS Grampian have provided the main uptake.

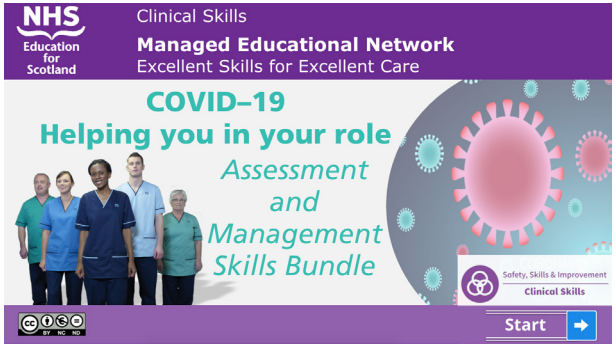
4.6 TEL Improving the quality of skills education using e-learning in the times of COVID-19

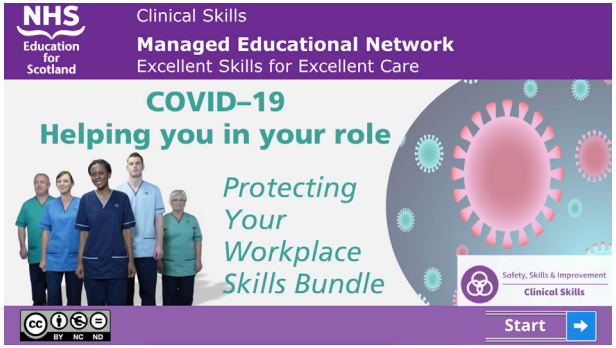
The development of Technology Enhanced Learning (TEL) has become a major workstream in NES over the past year to which CSMEN has contributed at all levels from governance to evaluation, to design of support for learners and trainers. This is based on the CSMEN experience of our quality assured e-learning resources for learner and faculty in relation to simulation based education. Key developments for 2020 with impact are shared on the right.

4.6.1 CSMEN Response to COVID-19

CSMEN developed three main e-learning resources related to skills bundles required to deal with the pandemic using CSMEN quality assured processes and are shown below.







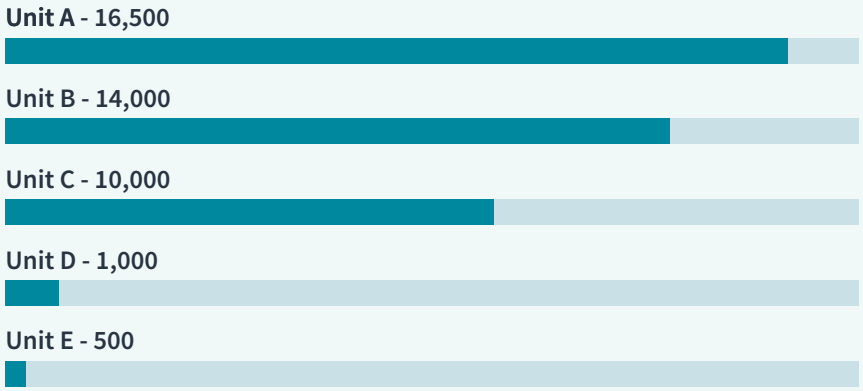
https://learn.nes.nhs.scot/28832/clinical-skills-managed-educational-network/covid-19-resources

A further two units on procedural skills development (D) and rehearsing immersive simulation scenarios (E) were also developed to support skills transition to the workplace. These were reviewed twice weekly for the first two months of the pandemic.

Outputs

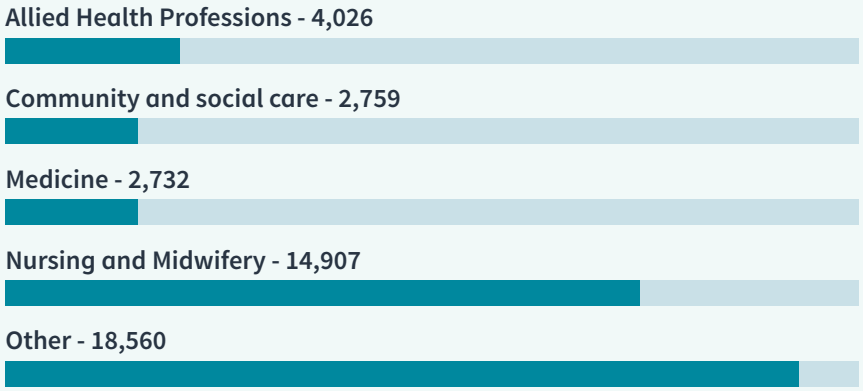
1. The units of Self-Protection(A), Assessment and Management(B) and Workplace Protection (C) were accessed on Turas learn as shown below:

Usage of COVID-19 Units 2020



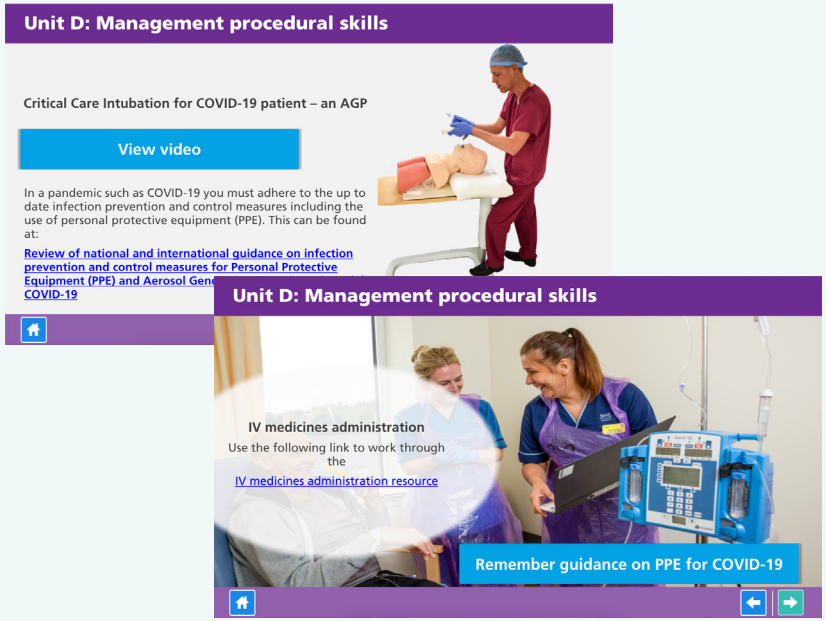
The COVID -19 resources produced by CSMEN were in the top 10 of all NES resources accessed in 2020 with over 43,000 users.

Usage of COVID-19 Units by Healthcare Professionals in 2020



2. CSMEN procedural skills training (Unit D)

Up to date links were given in the resources to link the learner to evidence -based demonstrations and guidelines to enhance reliable delivery of standards of skills.

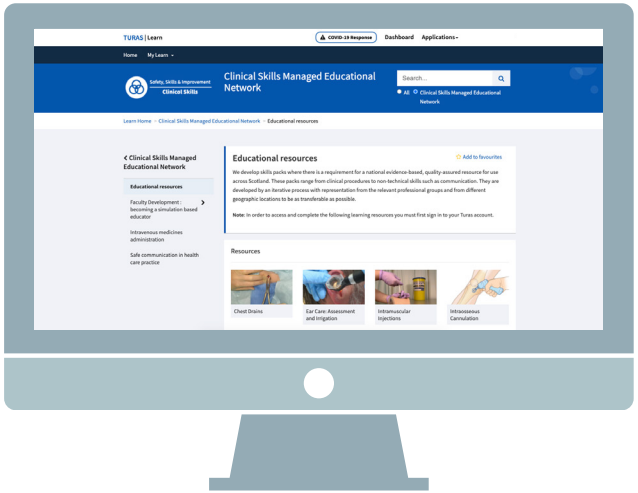


3. CSMEN lockdown in the larder

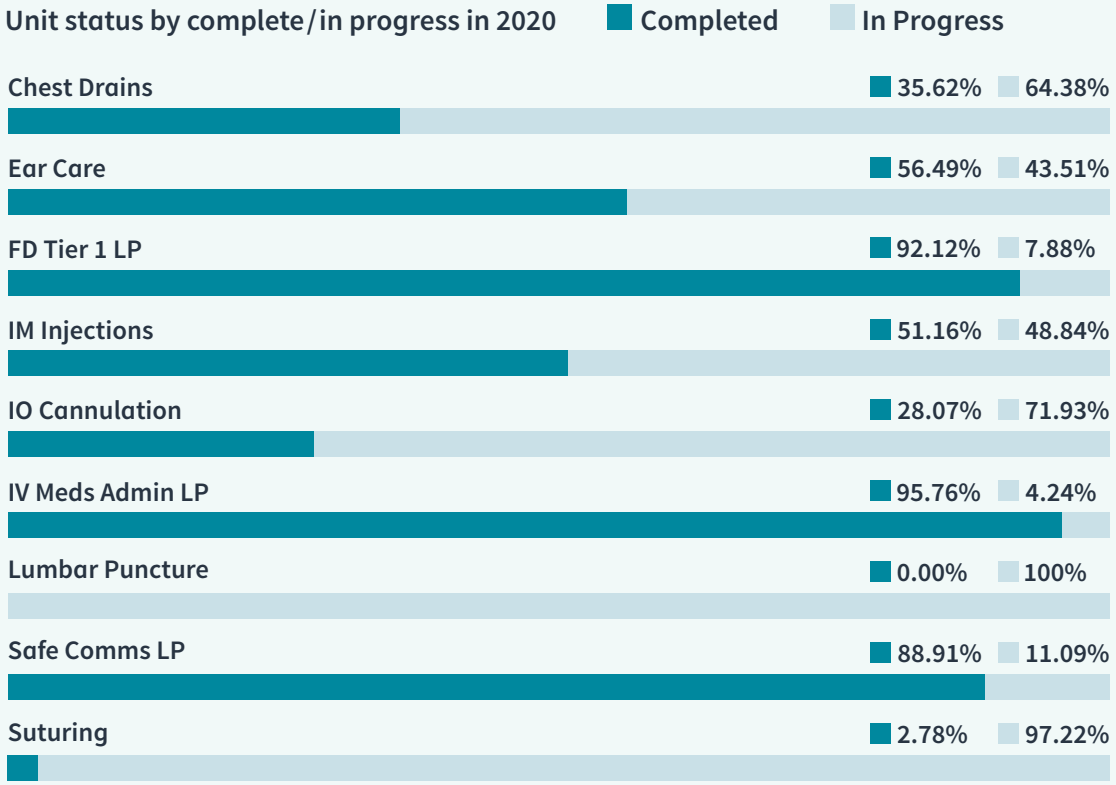
These were recorded interviews with different users of the COVID-19 skills bundles sharing their experience of how the online resources supported their practice. These were shared on the CSMEN webpage and included interviews with rural practitioners educators, and front line nursing, AHP and medical staff: **www.csmen.scot.nhs.uk/resources/covid-19-resources/lockdown-in-the-larder/**

4.6.2 Skills e-learning resources

CSMEN has continued to quality assure its on-line skills resources. IV meds and suturing have been reviewed and updated in 2020. These are accessible on Turas learn: **https://learn.nes.nhs.scot/3721/clinical-skills-managed-educational-network/educational-resources**



Outputs



4.6.3 Immersive Technology in Simulation Collaborative

In order to capture some of the innovative work that is going on in healthcare education in Scotland in relation to the immersive technologies such as Virtual Reality, Artificial Intelligence and Augmented Reality, CSMEN has on behalf of the NES TEL developments commissioned a research and development business proposal for immersive technologies for simulation-based education. This group chaired by Dr Neil Harrison from the Dundee Institute of Healthcare Simulation is due to report in April 2021.

4.6.4 SWAY Resources on Simulation

As part of the TEL user design group CSMEN has lead the development of on-line resource for NES in relation to the evidence and use of simulation to facilitate learning with a particular focus on the evidence of its use in high reliability organisations and the need to develop a bank of quality assured faculty to prepare the workforce for traditional professional roles as well as the new and advanced roles required for the changing requirements of the NHS. Simulation has been shown to shorten training as well as enhance standards. This on-line resource on simulation for facilitators in SWAY in Microsoft teams provides a useful introduction to the evidence behind its use.

Presentation

Demofest 2020, 11/3/2020, Royal Scots Club, Edinburgh
Presentation of CSMEN's e-Learning resources projects in development to industry professionals from the UK on how we use e-Learning software to deliver engaging and immersive resources. The event was hosted by Omniplex/Articulate.

4.7 Identifying the learning needs for Confirmation of Death Procedure

The learning resources developed by a national expert working group led by NMAHP in NHS Education for Scotland to support the implementation of the Scottish Government Confirmation of Death by registered healthcare professionals in Scotland - a framework for implementation of DL (2017) went live in April 2020. CSMEN were on the expert working group.

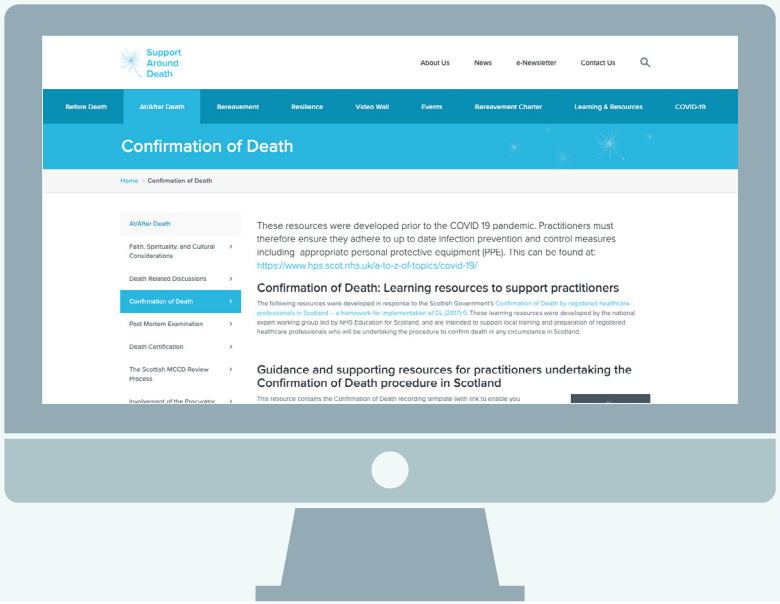
The resource pack embedded in Turas learn and SAD website consists of:

- The Confirmation of Death Recording Template
- Guidance to support registered healthcare professionals (practitioners) completing the recording template with links to key associated organisations and resources
- Frequently Asked Questions on the confirmation of death procedure
- A procedure video on Demonstration of the Confirmation of Death in Scotland
- Pocket Cards - Confirmation of death procedure: Clinical signs.

Outputs

The total number of views for the video itself is currently 2983:
https://vimeo.com/405096065

Google analytics supports around Death (SAD) website Confirmation of Death (CoD) page:
www.sad.scot.nhs.uk/atafter-death/confirmation-of-death/



As of 31/01/2021:

Activity	Numbers
Visits to CoD page	6708
Most visited page	3rd most popular
Average time on page	3.33 minutes (SAD pages 1.41 minutes Avg)

Quotes from users

> As a clinical educator, being able to signpost practitioners to all the NES resources (around Confirmation of Death) and use them when explaining the confirmation of death procedure has been invaluable e.g. detail in the vimeo -position of stethoscope when auscultating for absence of breath sounds.

> The suite of resources are very clear.

> The accessibility of the resource is very helpful as practitioners can access it on their own devices.

> The pocket cards are supportive tools and practitioners are keen to have them.

4.8 The Medical Simulation Collaborative Supporting core psychiatry trainees using simulation the APEx pilot as part of CSMEN

Following the Shape of Training Report and subsequent Ministerial statements on Implementation, major changes to surgical and physician training have been occurring. Improving Surgical Training (IST) was launched in August 2018 and included all trainees entering Core Surgical Training. The Internal Medicine Training (IMT) stage 1 curriculum, replacing Core Medical Training, was implemented in August 2019. CSMEN have been supporting both programmes.

In the past two years the CSMEN short life working group In Psychiatry provided an outline programme using simulation based education for core trainees which was presented at the STB for psychiatry in Dec 2019.

Outputs

A pilot Acute Psychiatric Emergency Course was run in December 2020 in NHS Louisa Jordan for 8 West of Scotland core psychiatry trainees by the UK ALSG (the Advanced Life Support Group. This will be reviewed at the STB to determine the development of a national simulation programme for core psychiatry trainees.

4.9 CSMEN Endoscopy training

Endoscopy training in Scotland has been a cause for concern for a number of years in terms of provision of equitable training for both nurse and medical endoscopists. Post COVID-19 mobilisation of endoscopy services is very variable across Scotland with some sites further ahead in re-establishing endoscopy services than others which impacts on the availability for training.

High fidelity simulators allow trainees to practice both upper and lower GI endoscopy without the need to access patients. They are ideal for allowing trainees to gain the necessary skills, particularly those at an early stage in their training, before having to undertake endoscopy in patients. CSMEN through a SLWG has supported more equitable access to a sustainable model of endoscopy training provision.

Outputs

Four Symbionix GI MentorTM and two Symbionix GI MentorTM Express simulators have been awarded to 6 different health boards (NHS Lothian, NHS Grampian, NHS Lanarkshire and NHS Greater Glasgow and Clyde, NHS Highland and NHS Golden Jubilee).

CSMEN is supporting the establishment of multi-professional training with access to training templates and quality assurance documents and the development of an Endoscopy Simulator Network.

4.10 SKIRC and the Human Factors Response to COVID-19

SKIRC collaborated with the Chartered Institute of Ergonomics and Human Factors (CIEHF) and other organisational partners in bringing together UK and international expert panels of human factors specialists, designers, safety scientists and senior clinicians to support people leading and working in the health and social care to respond rapidly to the many different challenges brought on by the COVID-19 pandemic:

Design Guidance for Novel Manufacturers of Ventilators

The concerns about availability of ventilators offered the first opportunity to support the NHS. A rapid response project was initiated to support the design, development, usability testing and operation of new ventilators.

A five-step approach was taken to (1) assess the COVID-19 situation and decide to formulate a response; (2) mobilise and coordinate Human Factors/Ergonomics (HFE) specialists; (3) ideate, with HFE specialists collaborating to identify, analyse the issues and opportunities, and develop strategies, plans and processes; (4) generate outputs and solutions; and (5) respond to the COVID-19 situation via targeted support and guidance. The response for the rapidly manufactured ventilator systems (RMVS) has been used to influence both strategy and practice to address concerns about changing safety standards and the detailed design procedure with RMVS manufacturers.

Capturing Organisational Learning

A rapid literature and review and synthesis informed the development of this practical guidance to help people working in the health and social care ecosystem capture valuable practice and improvements made during their response to COVID-19 (Fig 1). The aim was to contribute to organisational change at a policy, strategic and operational level. If left too late, there is a real danger that positive change is not documented and will be lost as the health system emerges from the pandemic. The guide provides an explanation of how 'systems thinking' and organisational learning can contribute to sustainable change: **https://bit.ly/312JSEx**

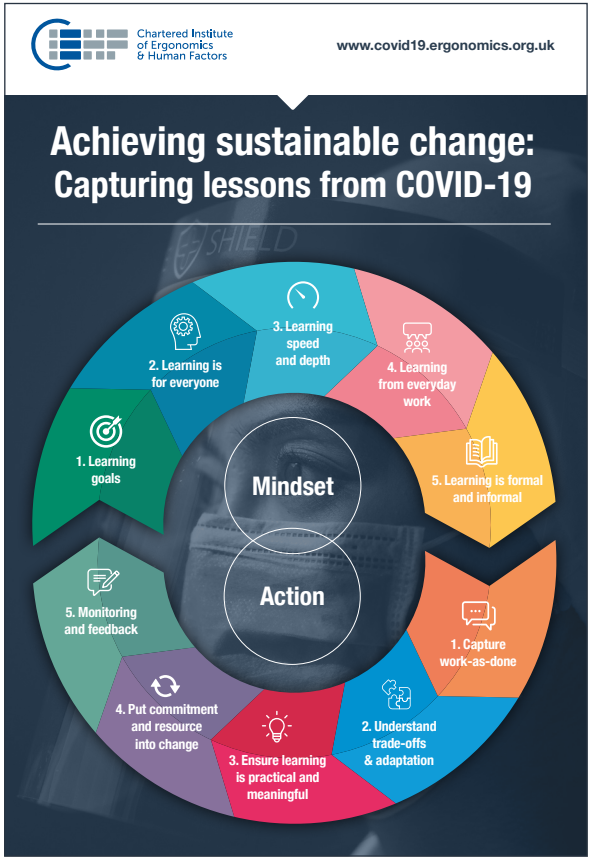


Fig 1. Capturing Lessons from COVID-19 and Beyond.

Guidance on the User-Centred Design of Work Procedures for Care Teams

The purpose of this rapidly-development document **https://bit.ly/3aHS2aB** is to provide health and social care teams with much-needed advice and guidance on the human-centred design of work procedures such as protocols, written instructions, checklists or flow charts. While this issue has long been identified as a learning need from incident investigations, it will be particularly useful during this period of "crisis management" in response to COVID-19 and to support the design and re-design of care services and new ways of working.

Implementation of the guidance by care teams will contribute to safer and easier to use procedures, which better support how people work and reduce risks to themselves, patients, carers and others. This document outlines ten key guidance points that designers of procedures should address at all stages of its development, implementation and review (Fig 2):

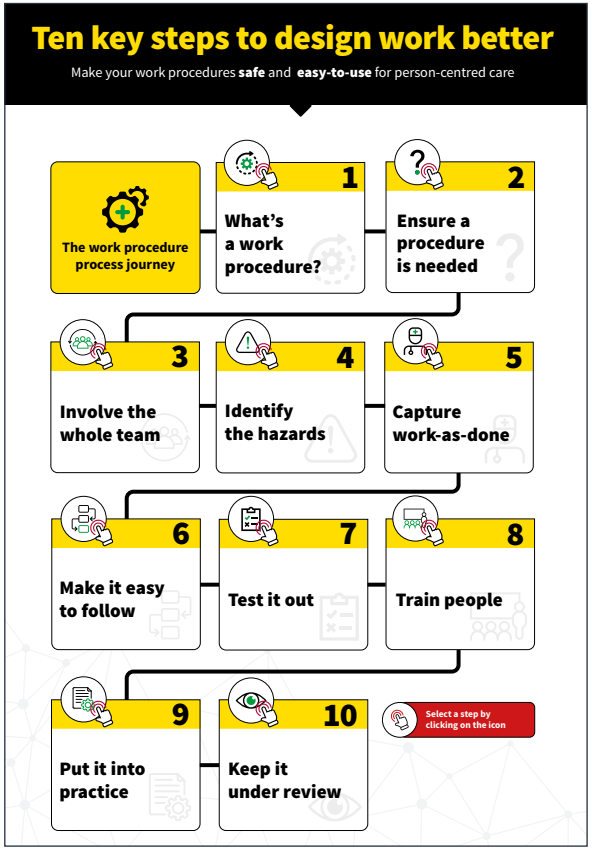


Fig 2. Ten Steps to Design Work Better.

Design of Mass COVID-19 Vaccination Centres

The risks and impact of safety incidents involving patients and vaccinators, such as dose errors, patient mis-identification and needle-stick injury, are well-evidenced for different vaccine types and patient groups. Similar issues are already apparent with the mass rollouts of the COVID-19 vaccines with safety incidents being reported across health systems worldwide. SKIRC led a coalition of UK and international partners in providing specialist guidance to leaders and designers of global COVID-19 vaccination programmes on integrating Human Factors principles and methods to support related safety and efficiency (Fig 3). Informed by this guidance, NES is working in partnership with NHS Ayrshire and Arran and Public Health Scotland to undertake Human Factors based design analysis of vaccination facilities with a view to sharing this learning across Scotland and beyond.

Fig 3. Global COVID-19 vaccination programmes: examples of interacting systemic issues impacting on wanted and unwanted performance and wellbeing outcomes.

UK and International Collaborations

The SKIRC team have responded quickly to requests to collaborate in research activity with organisations across the UK and internationally.

01 The NES guide on 'Achieving Sustainable Change' has been applied by a research team in Italy looking at the implementation of infection prevention and control efforts in surgical settings as these are adapted in response to the COVID-19 pandemic.

02 A primary care research team in France has applied both SKIRC and University of Cardiff outputs on taking systems safety approach to the identification and analysis of patient safety incidents that are occurring in general medical practice during the COVID-19 pandemic.

03 SKIRC research on Human Factors-based systems thinking has been applied by a research team in Wales to identify underlying system design issues that are impacting on care performance for achieving desirable outcomes in palliative care and inform a subsequent theory of change.

4.11 Human Factors Education and Integration

Barrier Management and Proactive Risk Assessment

Informed by a previous SKIRC research study on the application of BowTie Analysis by healthcare teams, Barrier management and proactive risk assessment concepts and methods are well-established in high hazard industries to identify threats of organisational harms and losses and control related risks to acceptable levels. Systematic application of these approaches is limited in healthcare settings worldwide, particularly in understanding and improving highly complex and serious patient safety issues. In this expert guidance, we introduce Bowtie Analysis (BTA) as a method for health and social care organisations to evaluate the key controls relied on to protect against serious adverse events, how they can be defeated and inform what action needs to be taken strengthen the effectiveness of the controls. The practical guidance on performing a BTA in healthcare is presented as a five-stage process (Fig 4):

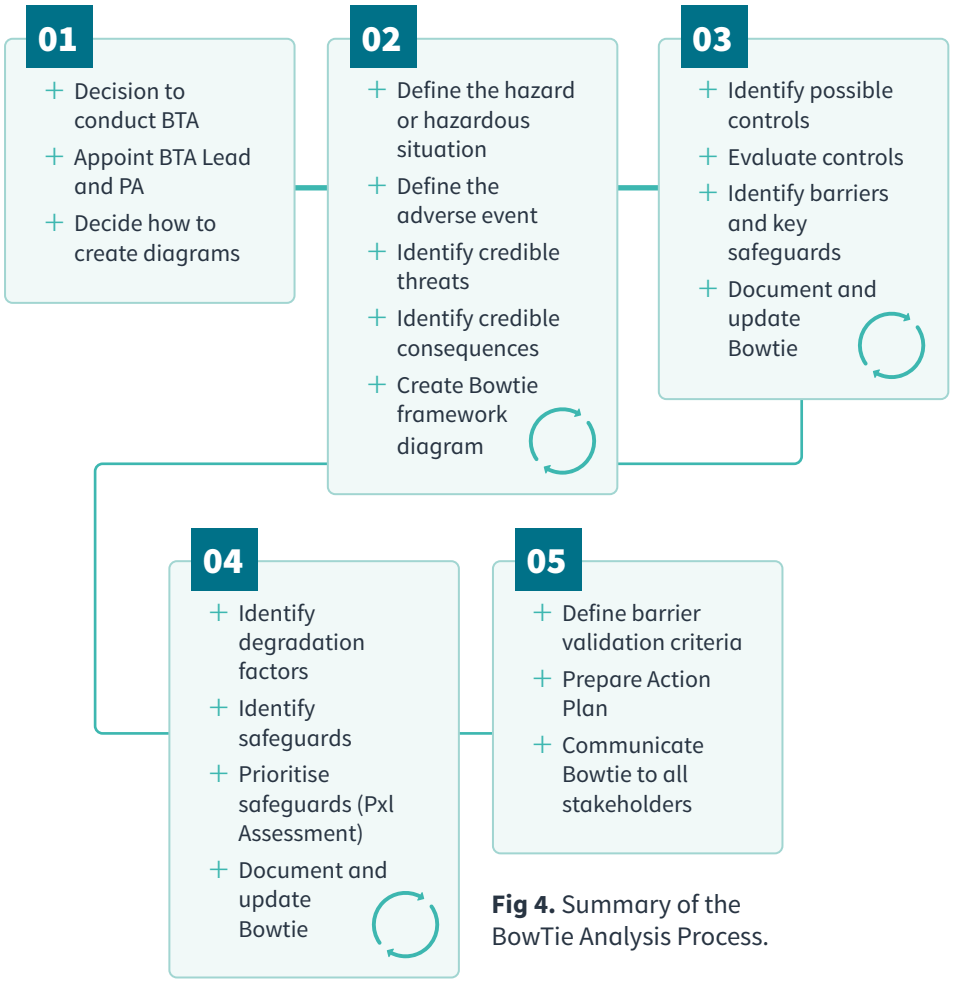


Fig 4. Summary of the BowTie Analysis Process.

SKIRC and the Health Foundation Q Exchange Programme

As part of a highly competitive process, SKIRC and UK partners were successfully awarded 'Q Exchange' funding by the UK Health Foundation to build a community of practice between the healthcare Human Factors and Quality Improvement communities. A key goal was to spread and disseminate SKIRC research outputs to inform the design and implementation of system safety and improvement education and practice at all levels of health and social care. This has involved:

01 The development, testing and evaluation of a hybrid Human Factors and Quality Improvement method.

02 The development of an online community of practice to act as a repository for Human Factors educational resources to inform a modern approach to patient safety, quality improvement and workforce wellbeing: **www.knowledge.scot.nhs.uk/hfe.aspx**

03 The delivery of over 20 one-hour webinars on a whole range of Human Factors concepts and approaches by expert specialists. All are recorded and hosted by NES and can act as a valuable resource for health and social care educators at all levels: **https://learn.nes.nhs.scot/39103/human-factors/human-factors-training/upcoming-webinars/webinar-recordings**

Safety, Skills & Improvement Research Collaborative

Human Factors in Paramedic Practice

The SKIRC research team co-authored three chapters (systems thinking; safety culture; and learning from incidents) to a much-needed new book entitled 'Human Factors in Paramedic Practice' (Fig 5) which was published at the tail-end of 2020. The book is the brainchild of, and is edited by, Gary Rutherford, of the Scottish Ambulance Service. The science and practice of Human Factors have had a limited impact on paramedic education and practice and this book illustrate key areas where a difference can made through including HF in contributions to improve system performance and human wellbeing in pre-hospital care.

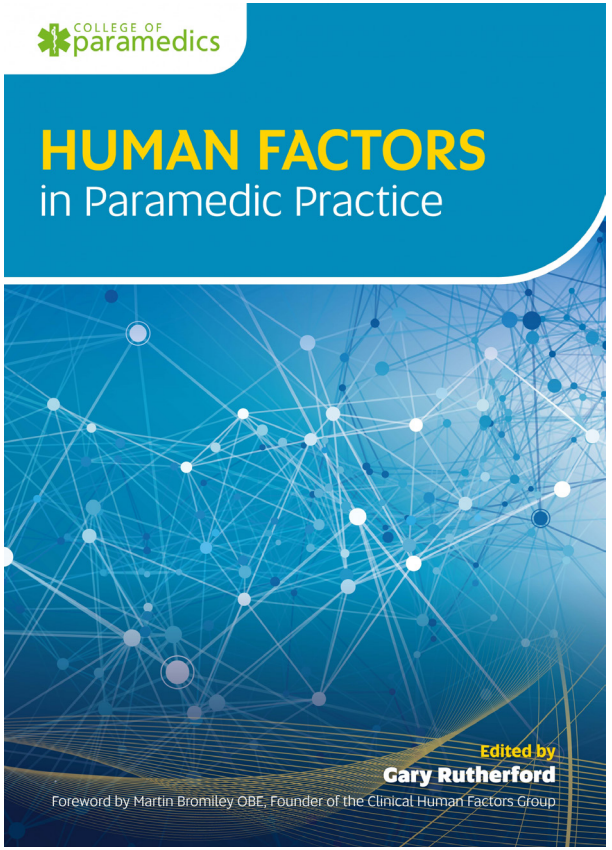


Fig 5. Book Cover: Human Factors in Paramedic Practice.

4.12 SKIRC 'Thought Papers'

In recent years, SKIRC has generated a series of academic Thought Papers, based on our evolving research interests and outputs, as a means of demonstrating international leadership and expertise in the healthcare safety, improvement, clinical skills, simulation and human factors domains. The purpose of these Thought Papers is to demonstrate considered, analytical thinking about the topics concerned and provide a logical and compelling argument or proposition that seeks to influence health and social care policy, education and practice.

Frontiers in Human Factors

Despite the application of a huge range of Human Factors principles in a growing number of care contexts, there is much more that could be done to realize this expertise for patient benefit, staff well-being and organizational performance. Healthcare has struggled to embrace system safety approaches, misapplied or misinterpreted others, and has stuck to a range of outdated and potentially counter-productive myths even as safety science has developed. This paper contains a 'call to action' to health and social care educational, policy and organisational leaders to rethink what we know and currently do about patient safety and other quality of care issues. It outlines the pressing need to embrace safety science expertise in updating and modernising related education and training, national policy and workplace practices.

'Never Events' and the 'Zero Harm' Vision

'Never Events' are a sub-group of rare but serious patient safety incidents that are judged to be 'avoidable' (e.g. administration of medication by the wrong route or wrong tooth extraction). However, issues have been raised regarding the well-intentioned coupling of 'preventable harm' with zero tolerance 'never events,' especially around the lack of evidence for such harm ever being totally preventable. This Thought Paper considers whether the ideal of reducing preventable harm to 'never' is better for patient safety than, for example, the goal of managing risk materializing into harm to 'as low as reasonably practicable,' which is well-established in other complex socio-technical systems and is demonstrably achievable. Alternative safety management strategies are considered, while it is concluded that the 'never event' term and zero harm vision are well intentioned but largely aspirational.

Taking a Professional Approach to Patient Safety

SKIRC has been working with Health Education England, Healthcare Safety Investigation Branch, NHS England/Improvement, Academic Health Science Network (AHSN), Academy of Royal Medical Colleges, Royal College of Nursing (RCN) and the Chartered Institute of Ergonomics and Human Factors to create an innovative Learning Pathway to help 'professionalise' patient safety. The collaboration is proposing a 'professional approach' to educational development around patient safety (Fig. 6) with a strong focus on targeted education and training for patient safety specialists, incident investigators (local and national) and other key risk and improvement personnel.

Fig 6. Taking a Professional Approach to Patient Safety.

A Systems Analysis of the UK COVID-19 pandemic response

In this Thought Paper, SKIRC contributes along with other partners with research experience and expertise in the application of the Functional Resonance Analysis Method (a technique for modelling highly complex care systems; Fig 7) to an attempt to apply a systems analysis approach to the UK's handling of the coronavirus pandemic and identify areas for improvement and learning that can be applied to future national crises.

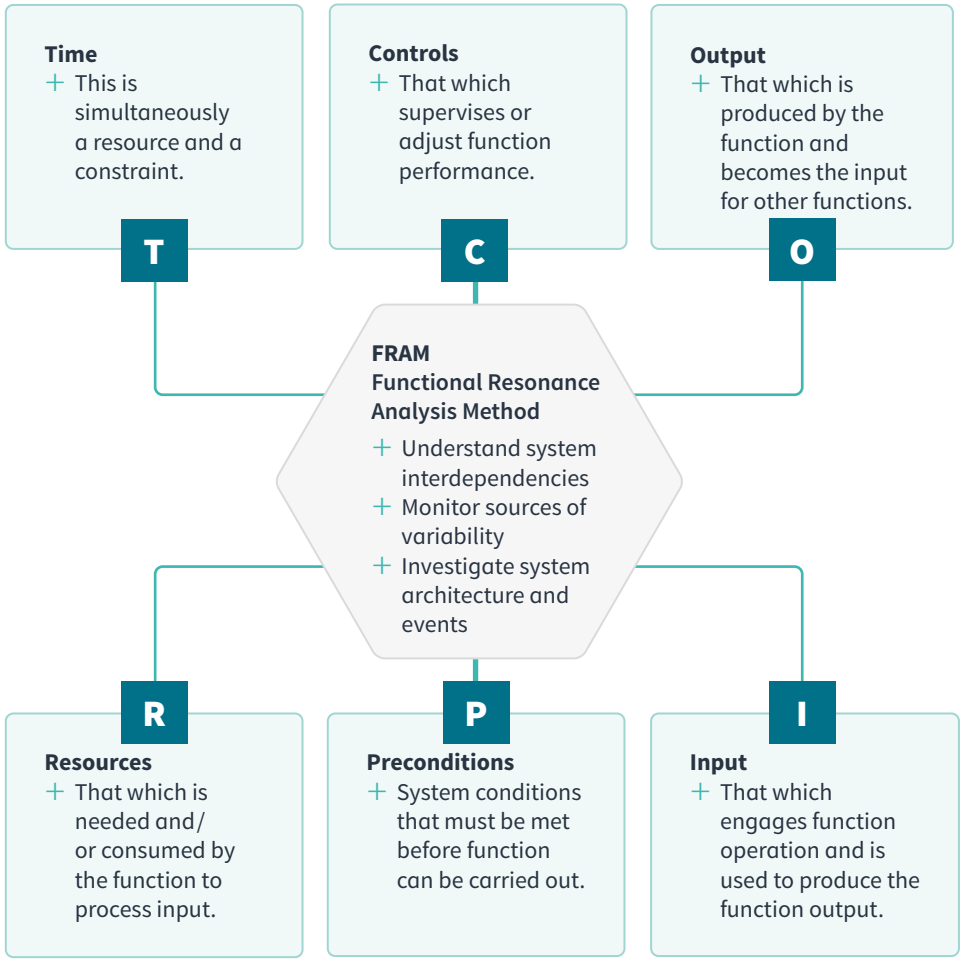


Fig 7. FRAM – Functional Resonance Analysis Method.

Healthcare Human Factors: A call to action for policymakers, leaders and educators

Expert commentaries have recently highlighted the pressing need for professional guidance on Human Factors (HF) integration for the international healthcare education community. In this SKIRC Thought Paper, we outline how to build and embed Human Factors knowledge, capacity and capability across the healthcare workforce. We demonstrate how and where this can be achieved in everyday healthcare practice and clinical education, drawing on previous experiences and the current HF response to the COVID-19 pandemic as evidence. Overall, we offer professional guidance on what actions can be quickly and pragmatically implemented to take the next steps in progressing the HF agenda in Scotland and internationally.

4.13 Evaluation of the Scottish Quality and Safety Fellowship (SQSF)

The Scottish Quality and Safety Fellowship Programme (SQS Fellowship) is a lead level quality improvement and clinical leadership course managed by NHS Education for Scotland (NES), working in partnership with Healthcare Improvement Scotland and NHSScotland. A SKIRC multi-method evaluation provided affirmative evidence of the educational utility of the SQSF in terms of its acceptability to participants, its practical feasibility as a long-standing national training programme and the multiple self-reported personal, professional and organisation benefits associated with participation.

Medically-qualified participants based in the acute hospital setting are potentially over-represented when crudely compared with related national workforce statistics, which is a possible issue for exploration by relevant stakeholders, along with time-management and organisational support challenges to achieving wider impact for some. These potential areas for improvement should be of particular interest to those leading on designing, delivering and evaluating QI education at organisational, regional and national health system levels in the UK and worldwide.

SQS Fellowship

User Redesign of a Safety Checklist for General Practice

Inadequate checking of safety-critical issues can compromise care quality in general practice (GP) work settings (Fig. 8). Adopting a systemic, methodical approach may lead to improved standardisation of processes and reliability of task performance, strengthening the safety systems concerned. This study aimed to revise, modify and test the content and relevance of a previously validated safety checklist by SKIRC to the current GP context.

Working close with a range of GP team members and patient safety experts, the checklist was comprehensively redesigned as a practical safety monitoring and improvement tool for potential implementation in Scottish and UK general practice. Testing and evaluation with NHS Ayrshire and Arran and Healthcare Improvement Scotland demonstrated high levels of checklist content compliance and strong usability feedback, but some variation was evident indicating room for improvement in current safety-critical checking processes.

The checklist will be of interest in similar GP settings internationally and to other areas of primary care practice: **https://bit.ly/2NPkZrK**

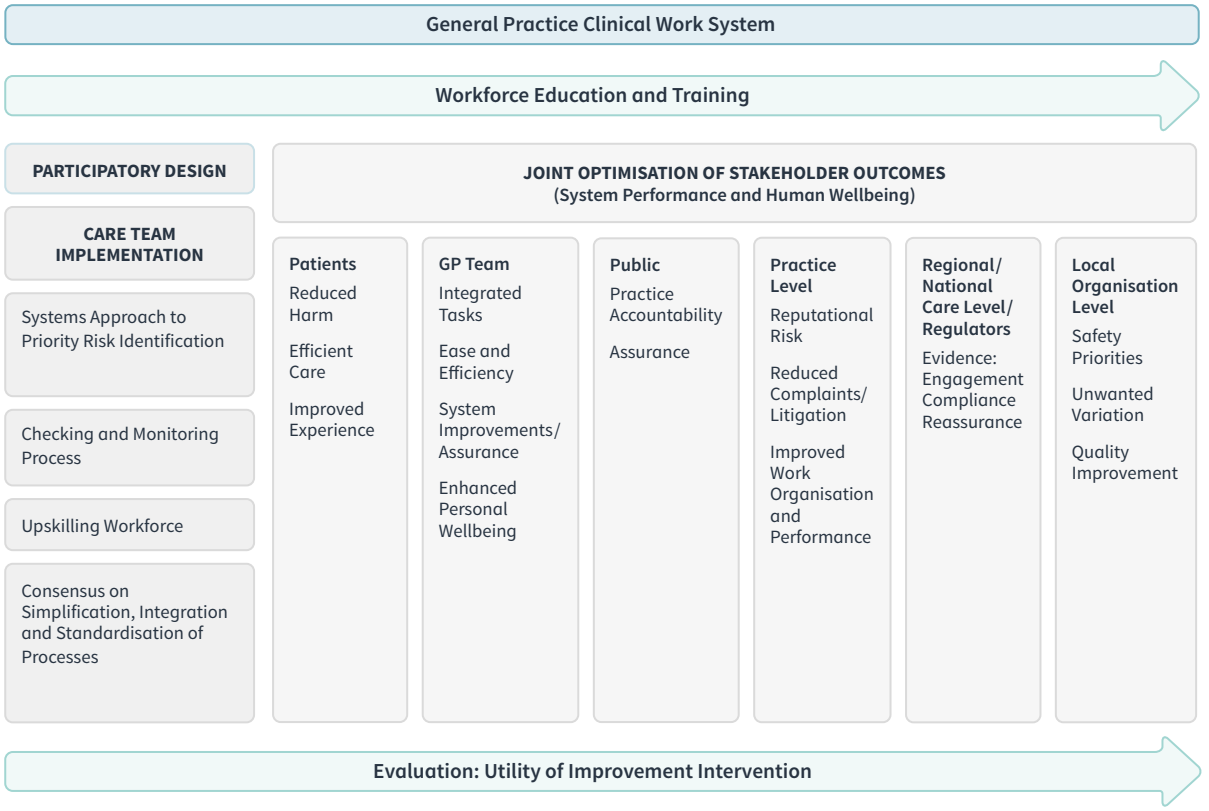


Fig 8. Conceptual model of Monitoring Risk and Improving System Safety in General Practice.

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Appendix 3: Projects Paused by COVID-19

The flowing projects were agreed and funded by SMERC for the current year. As a result of restrictions and practicalities, these projects have been paused and held over until it is possible to pursue them.

01 **SMERC Travelling Fellowships**

+ Educational research training, support and collaboration: NOSM visit.
+ Bringing Balint groups to undergraduate medical education

02 **SMERC SEED Project**

+ A sociocultural analysis of curriculum change: the implementation of a new Year 4 curriculum in Aberdeen Medical School

03 **SMERC Large Grant**

+ Understanding how doctors learn about and enact entrepreneurship and innovation in healthcare

This resource may be made available, in full or summary form, in alternative formats and community languages. Please contact us on **0131 656 3200** or email **altformats@nes.scot.nhs.uk**.

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