NHS Education for Scotland

Medical Directorate

EDUCATION RESEARCH AND INNOVATION

Annual Report 2022

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Contents

Introduction

In their report for the UK General Medical Council in 2019, Michael West and the late Denise Coia clarified the link between safe and healthy doctors and safe patient care.

Our current annual report demonstrates the value of an integrated organisational approach to research and innovation. On the one hand, we celebrate work looking at how we can improve the health and wellbeing of the workforce, the culture and management of the places we work and learn. On the other, we showcase work on safety, highlighting how safe system design needs us to understand and take account of the workforce as the central resource of healthcare – always about people, for people, by people. NES has a record of being on point with work we support and deliver ourselves and with partner organisations. No surprise, then, that this report contains summaries of excellent research, innovation and evaluation.

Foresight was evident when the Medical Directorate established the Scottish Medical Education Research Consortium (SMERC) and the Safety, Skills and Improvement Research Collaborative (SKIRC). Across NES, we see education research, innovation and evaluation. With the inclusion of Social Care in the organisation, the opportunity for closer, more coordinated working across the organisation presents itself. Along with this, we see possibilities of addressing collectively larger and more challenging projects to produce innovative workforce solutions in sustainable environments. SMERC's recent work shows this is achievable (see pages WW-VV 1.1 Heard, Valued, Supported: The Scottish Doctors Wellbeing Study).

Inclusivity allows us to hear different voices, encourages diversity of approach, collaboration and sharing knowledge and skills. We have the chance as an organisation to embrace inclusivity to enable research, innovation and evaluation that creates bridges and addresses big questions. We have shown our resilience in a testing time. The success of our endeavour is presented below. Let us be sure to build on that platform.

Scottish Medical Education Research Consortium (SMERC)

SMERC was awarded the first Institutional Commitment to Scholarship award in spring 2021 by the Association for the Study of Medical Education (ASME). The category of the award was for organisations other than universities or NHS institutions and allowed us to demonstrate the value of cross boundary cooperation in medical education research. The award recognises the contribution SMERC has made to medical education research, practice and capacity building over the preceding 10 years, showing how SMERC has enabled the career development of educational researchers from PhDs, post-doctoral fellowships to lectureships and more senior positions. The award recognises the foresight of NES Medical Directorate in establishing the collaboration and enabling SMERC's development with institutional support and core funding.

Last summer, SMERC made its annual request for grant applications. Applications came in all four categories (large and small grants, PhD studentships, new researcher funding) amounting to around £400K, which was externally reviewed as being of very high quality by an international panel of researchers.

SMERC was keen to ensure funding included a variety of new projects related and unrelated to COVID-19. Most applications and funded work focus on ideas of generic value to medical education. New projects are under way on topics that involved all SMERC organisations across undergraduate and postgraduate sectors. SMERC regrets that we could not fund more of the excellent proposals and looks forward to seeing more applications in the forthcoming funding round.

The achievements of SMERC collaborations are demonstrated in many contributions in this report. A feature of the Scottish doctors' wellbeing project (refer pages XX) was the novel approach of all SMERC institutions working together on one project, with external funding from the Chief Scientist Office (Scotland). This enabled SMERC to carry out a large project across four workstreams to a compressed time schedule. The project has delivered innovative, evidence-based interventions to support doctors across the domains of physical, psychological, social and cultural wellbeing.

It recognises the pressured working environment of the healthcare staff, challenges exacerbated by the pandemic. Other projects (see pages YY-ZZ) described are in earlier stages and describe the range of new work SMERC is undertaking.

SMERC continues to lead the field in studies that develop the workforce and the learning environment. Cultural, wellbeing and environmental projects figure strongly in current work. We look forward with confidence to being able to champion the findings of their endeavours in our next annual report.

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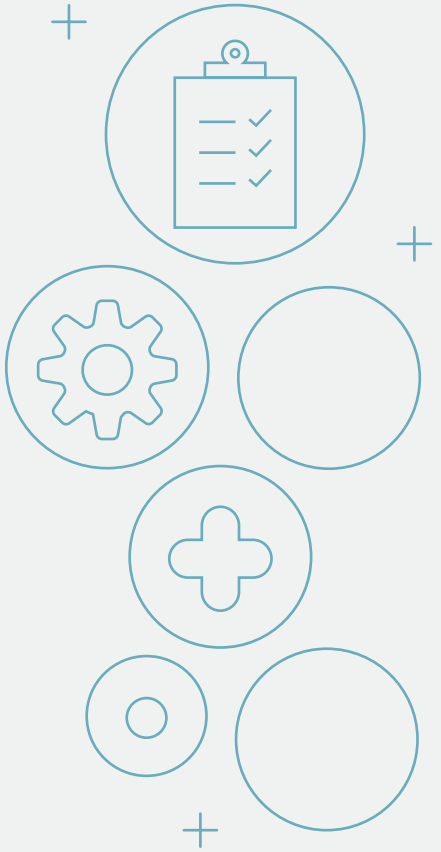
SCOTTISH MEDICAL EDUCATION RESEARCH CONSORTIUM

Safety, Skills & Improvement

SKIRC 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. 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 Wellbeing

1.1 Heard, Valued, Supported: The Scottish Doctors Wellbeing Study

The five Scottish medical schools and NES have been developing evidence- based interventions to support the wellbeing of Scottish Doctors during COVID-19 and beyond. The project was initially funded through the CSO Rapid Research Grant following a competitive allocation process and further funds to support the interventions and dissemination of results were provided by SMERC. This study aimed to form a robust evidence base to inform the development and implementation of interventions to support the wellbeing of and promote resilience within doctors in Scotland during COVID-19 and beyond.

Four workstreams were set up working in parallel to facilitate the rapid research led by different members of the project supported by Research Assistants and Fellows:

1. Rapid scoping literature review
2. Data collection from 3 interviews and longitudinal audio diaries
3. Intervention design and implementation
4. Evaluation

Literature Review

The rapid scoping literature review revealed that there was little published research relating to pandemics and the effect on healthcare workers and it was primarily retrospective studies[1].

Data Collection

The empirical data collection consisted of interviewing 100 doctors across the career continuum from FiY1 to returning and retired doctors from every Health Board in Scotland (including remote and rural geographies).

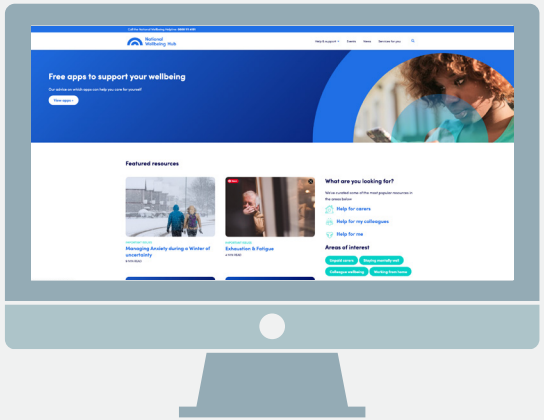
We asked about their experiences in their home, work and learning environments from a physical, psychological, social and cultural perspective. A total of 247 audio transcripts were received, over 2 million words or the equivalent of all the works of J. S. Tolkien.

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. Secondary care doctors highlighted significant changes to working practices, environments and increased complexity of decision-making exacerbated by cancellation of elective work. In primary care, doctors found new working practices, including the sharp decrease in face-to face contact highly challenging. This changing role is perceived to be losing public confidence and is a source of distress to some GP's. The pandemic has magnified existing challenges to healthcare staff well-being[2].

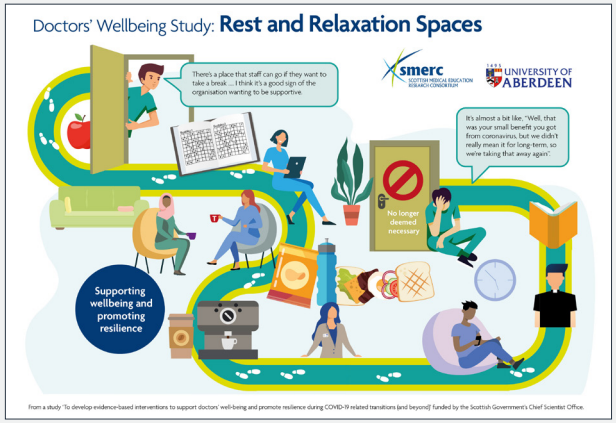
Intervention Design and Implementation

Intervention design and implementation, informed by two expert panel/stakeholder virtual workshops provided insight on outcomes, prioritisation and interventions design, based on initial findings from our empirical data collection. Theoretical domains Framework (TDF) and Behaviour Change Wheel (BCW) frameworks underpinned four stage process of intervention development[3] resulting in the decision to target the behaviour of accessing informal and formal psychological support to enhance accessibility and availability. This led to five interventions being taken forward.

Wellbeing website



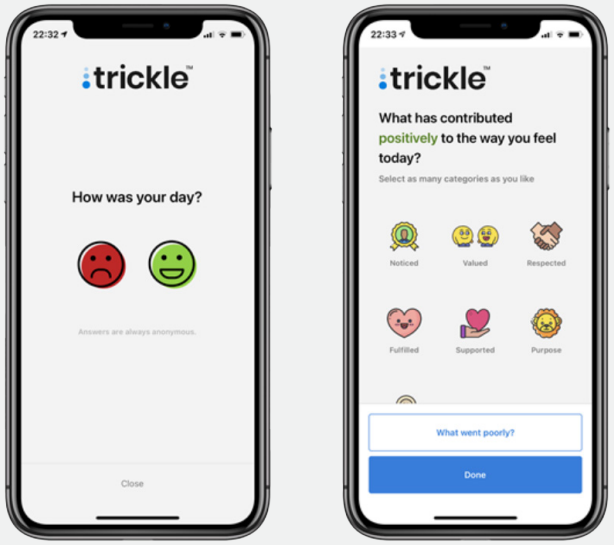
Rest and Relaxation Spaces



Accessing Informal psychological support

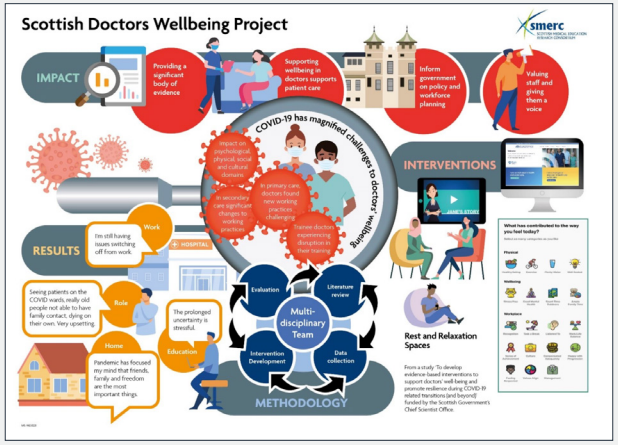
Composite Narrative Animations

How Was Your Day feature as part of the Trickle employee engagement app



Outcomes and Impact

The results of our project have been disseminated widely through reports, visuals, Social Media, attendance at conference (national and international) and publications[4].



Further highlights and impact are listed below:

01 A Knowledge Exchange Workshop was held in collaboration with the Scottish Government.

02 The provision of Rest and Relaxation spaces including accessing support is now part of Scottish Government NHS recovery plan – *"We will offer further practical support for the physical and emotional needs of the workforce - this will include additional funding for rest areas, guidance to promote effective wellbeing conversations, new opportunities for staff to reflect on the emotional aspects of their work and further resources so staff at all levels can access peer support".*

03 The HWYD part of the Trickle works app is now used by many healthcare organisations. It has been cited as the reason for using the app within the organisation to ensure the organisation has oversight of the wellbeing of its staff and how to support them.

04 HWYD feature has been praised by the BMA *"Initiatives such as the 'How was your day?' app have the potential to help support the wellbeing of doctors and other frontline NHS workers. We would encourage them to download and try using it as one method of checking in regularly with their own mental health".*

05 Over 20 presentations at various national and international conferences, eg Scottish Medical Education Conference (SMEC), Developing Excellence in Medical Education Conference (DEMEC), Association for the Study of Medical Education (ASME) Annual Scholarship Meeting, Association for the Study of Medical Education in Europe (AMEE) Annual Conference, NHS Employers.

06 Our work and evidence was cited at The Scottish Policy Conference.

07 Workshops and symposia on the methodology and/or data have been held at ASME RME, AMEE, DEMEC and The International Conference on Residency Education.

08 This major study has provided a significant body of evidence relating to doctors' mental health and wellbeing and what is required to support them in their day-to-day work. Development and implementation of not just our interventions but other sources of help and support based on the evidence will enhance their wellbeing and sense of being valued in these times of great uncertainty.

09 Evidence-based interventions focussed on psychological safety and organisational support for their staff have the potential to improve the wellbeing of the healthcare workforce, with potentially positive impacts on long term patient care. This ultimately contributes to individual workforce and organisational resilience. Doctors are, first and foremost, people with personal, professional and strategic concerns around caring for others.

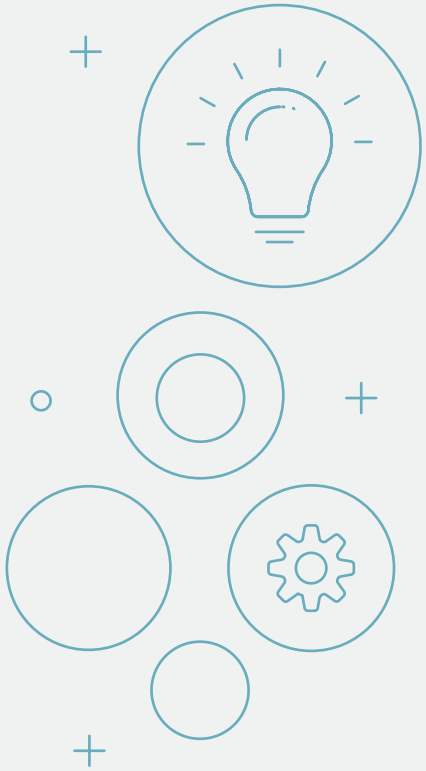
10 This study will help inform the NHS and Scottish Government in shaping policies which ensure that prioritisation of doctors' wellbeing, feeling valued and supported at an individual and organisational level become embedded, beyond the global pandemic.

11 Facilitating access and positive dialogue around support seeking behaviours will help organisational cultures to evolve. This emphasis on hearing and valuing their staff can be manifested in new working practices, team working, camaraderie, greater collaboration across specialties, and responsive decision making. Organisations thrive when staff are HEARD, VALUED, SUPPORTED.

12 Further information can be found on our webpage: **COVID-19 Wellbeing Study I SMERC (nhs.scot)**

Research Team

Dr Kim Walker – Aberdeen – Principal Investigator
Dr Kathrine Gibson Smith – Aberdeen
Dr Lisi Gordon – Dundee
Dr Gillian Scanlan – Dundee
Dr Gill Aitken – Edinburgh
Prof Lindsey Pope – Glasgow
Dr Joanne Cecil – St. Andrews
Dr Anita Laidlaw – St Andrews
Prof Peter Johnston – NES
Dr Julie Ferguson – NES
Dr Judy Wakeling – NES
Mr Patrick Cairns
Dr Tricia Tooman
Dr Kathryn Cunningham



1.2 Exploring the experiences of junior doctors who were 'Shielding' during the COVID-19 pandemic

Introduction and rationale

Shielding was a novel phenomenon introduced to protect clinically extremely vulnerable people during the COVID-19 pandemic. This presented challenges to clinical junior doctors who had to step away from their duties to protect their health. There is a paucity of literature in this area but what is available is mainly survey-based or blog accounts of experiences. It highlights predominantly negative experiences including guilt, isolation, lack of support and concerns about return to work (RTW). It would be valuable to understand the experiences of this group in order to ascertain the impact on them from a PGME perspective and determine their support needs moving forward. This is particularly topical given the emergence of the Omicron variant and the ongoing uncertainty around the development of the pandemic and associated guidance.

Although the shielding programme has formally ended it is important to understand the impact on this group of junior doctors for the reasons outlined above. Furthermore, we cannot rule out that the shielding programme or something similar will not be re-introduced with the advent of another variant of COVID-19, or another pandemic. Knowledge about how best to support these doctors will be valuable in the event of such circumstances.

Methods

Pending ethical approval, we aim to recruit junior doctors from across health boards in Scotland with volunteer and snowball sampling methods. Participants will be interviewed about their experiences of shielding, using semi-structured interviews. The data will be transcribed and analysed using thematic analysis.

Findings and conclusion

These findings will add to a dearth of empirical research around the impact of shielding on healthcare professionals and is, to our knowledge, the only interview-based investigation ongoing. Out-with the pandemic, these findings are potentially transferrable to similar situations where junior doctors take protracted periods of leave away from the clinical environment such as maternity leave. These findings will potentially shed light on the experiences of junior doctors who experienced clinical leave in Scotland and the support they received from a pastoral, educational and practical perspective. A key theme in the literature is RTW support and given the severe implications of inadequate RTW support highlighted by the experiences of Dr Bawa-Garba in recent years, the case for understanding more about the current system in Scotland for junior doctors who RTW in challenging circumstances after shielding is clear.

1.3 How can occupational health resources be optimally used in the management of medical students?

Dr Evelyn Watson, Dr Ruth Cruickshank, School of Medicine, University of St Andrews. Dr Alison Scott, Medical School, University of Edinburgh.

Study background

The General Medical Council (GMC) encourages medical schools to recruit a diverse cohort of medical students[1]. There is a longstanding and growing concern surrounding the mental health of students in Higher Education (HE)[2] exacerbated by COVID-19[3]. Alongside this there is an increasing tension between supporting medical students with often complex health concerns and the requirement for those same students to achieve the competencies outlined in Outcomes for graduates 2018[4]. Medical schools struggle in knowing what adjustments are "reasonable" in the context of preparing students to work in a clinical environment where patient safety must be a priority[5].

A now, somewhat dated (2013) report from the GMC[6] concluded that medical students will, if they can, conceal illness from their medical school due to concerns around stigma, impact on career progression and lack of confidentiality. GMC guidance[7],[8] advocates the use of an occupational health service independent from the University and medical school for independent assessment of students.

Throughout the UK, medical schools have different models[9] of occupational health provision which vary in financial cost. However, little if any guidance exists as to best practice in the use of occupational health services. Students should be able to expect an evidence informed, standardised approach to referral, recognition of acceptable reasonable adjustments and initiation of a "formal process" across all medical schools. A valued expert, occupational health assessment should contribute strategic interventions to enable individuals to inform career decision-making, reach their full potential and minimise the number of doctors who encounter difficulties in later training.

When required, occupational health assessments can inform decision making around fitness to practise. A scoping search of the published literature failed to identify any recent, UK based research relevant to the topic.

Project plan

This recently funded SMERC project aims to compare provision and utilisation of occupational health services across Scottish Medical Schools, identifying areas of good practice. To address this, firstly a systematic review of existing literature will be undertaken followed by semi structured interviews with key staff involved in referring medical students to occupational health. Referral numbers and patterns of health provision across Scottish Medical Schools will also be interrogated.

02 Career Decision Making

2.1 Broad Based Training (BBT)

Longitudinal evaluation of Broad Based Training

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 three-year longitudinal research tracked the first and second cohorts of trainees on this innovative programme, to explore the trainees' experiences and examine how well it prepares them for the next stage of training. This was a largely qualitative project: interviews with BBT trainees, trainees on standard training programmes, Educational Supervisors and Training Programme Directors were undertaken at key time points, to gain a rounded view of how the programme is perceived and how it compares to conventional training (66 interviews in total).

The study showed that all the BBT trainees were pleased with the programme and reported that it had helped to crystalise their career decision. They recognised that the skills and experiences gained will be extremely important for their ongoing careers and their understanding of the NHS as a whole system. The design of the programme, especially the '10% time' in another specialty, enabled trainees to see the links and over-lap between different specialties and understand the interface between primary and secondary care.

This gave them an important understanding of the GP referrals system as well as an understanding of the patient journey when they are discharged back into the community. The importance of doing a psychiatry placement was emphasised because trainees will encounter psychiatric conditions in whatever specialty they ultimately choose. Many of the BBT trainees had been asked about the programme by Foundation trainees considering applying and all had recommended it as an enjoyable and unique programme for anyone interested in keeping their training broader for longer.

TPDs and Educational Supervisors reported that, to help trainees move successfully into their chosen specialty after the programme, it is important that once they have made their specialty decision early in year two, they should be helped to maximize that final year to benefit their ultimate career. This could include using the 10% time to take courses that will be of benefit and making a start on specialty exams.

All ex-BBT trainees in this study who are now in their chosen specialty considered that they were managing well, and they appeared to be very proactive in seeking out opportunities to increase their skill levels and make good any perceived shortfall in experience. Educational Supervisors and TPDs praised the calibre of BBT trainee coming through and noted that they tended to be mature and considered trainees. Whilst more time is needed to fully assess how these trainees progress in their chosen specialties, the broad experiences gained in BBT will prove extremely valuable for patient care in the future.

A final BBT evaluation report is available from Dr J. Wakeling at **Judy.Wakeling@nhs.scot**

2.2 Internal Medicine Training Simulation Boot Camp Evaluation Study

Background

Internal Medicine Training (IMT) 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 continues to offer enhanced simulation training to IMT trainees in Scotland. This novel simulation-based training package was designed by the NES Medicine Simulation Collaborative, in conjunction with the Medicine STB simulation subgroup. This package includes a suite of events aimed to embed evidence-based practice to enhance skills, improve efficiency and augment patient safety.

Theme 1 — Developing the Workforce

The three-day simulation boot camps hosted by the Scottish Centre for Simulation and Clinical Human Factors, and the IM1 boot camps introduced in 2019/20, continue to be delivered successfully despite the challenges presented by the global pandemic.

All IM1 trainees in Scotland starting in August 2021 were given the opportunity to attend the three-day simulation boot camp and all IM2 trainees were invited to a 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.

An additional Registrar ready course has commenced for IM3 trainees from February 2022. This is a 2 day course hosted at the Scottish Centre for Simulation and Clinical Human Factors including immersive simulation of more advanced clinical scenarios, simulation based mastery learning of procedural skills of central line, ultrasound guided peripheral cannulation and arterial line insertion as well as workshops addressing prioritisation and leadership as a medical registrar.

Continued thanks to the excellent faculty for their time and enthusiasm, in these sustained challenging times.

03 Developing Staff

3.1 Longitudinal Integrated Clerkships

Longitudinal Integrated Clerkships exist in undergraduate medicine courses. A pilot Pharmacy Longitudinal Clerkship (pPLC) was funded to investigate delivery of this model of clinical education for student pharmacists. The 11-week pPLC was delivered in GP practices in Scotland. Mixed theory-based methods were used to gather information on the pPLC structures and processes required and qualitative semi-structured Theoretical Domains Framework (TDF) based interviews explored outcomes with key stakeholders[10].

Data were generated on resources and processes required for a pPLC including funds budgeted for and actually spent on staffing, student travel/subsistence and student clinical 'Kit Bags', learning outcomes, curriculum and training timetable, GP Practice/University contracts. Interviews were completed with two students, three linked GP clinical supervisors and two Regional Tutors involved. Seven themes were identified and mapped to seven TDF domains including: increased levels of student confidence, and increased student enthusiasm for a career in pharmacy, need for definition of the role of the Regional Tutor for the PLC and GP positivity towards the expected outcomes of clerkship model versus traditional placements.

Overall, the outcomes of this pilot, although limited by the very small number of participants and settings, were positive in terms of student and tutor experience and information has been gathered on the requirement for resources and processes for future development.

3.2 The lived experiences of postgraduate medical training of doctors from minority ethnic backgrounds in Scotland – A qualitative study

We are conducting a qualitative study to understand the lived experiences of postgraduate medical training of doctors from minority ethnic (ME) backgrounds in Scotland. Award gaps are documented for United Kingdom (UK) doctors from ME backgrounds. In an effort to understand the award gap, also known as differential attainment, factors such as examiner bias and trainee factors such as language barriers and academic performance had been postulated as possible drivers of this gap. Research suggests that the learning environment and the experiences of trainees from ME backgrounds are likely significant influencers of trainee attainment. Research has also has indicated the role of trainees' relationships with peers and trainers in the workplace as a main theme in influencing differential attainment.

Our key research questions include:

+ What are ME trainees' lived experiences of training and working within Scotland?
+ What are trainees' lived experiences of racial discrimination in postgraduate training?
+ How can doctors from ME backgrounds be better supported in their learning and working environments?

This study will enable us to understand experiences of racial discrimination and how we can modify/ adapt the learning environment/ culture to better support the learning/ development needs of doctors from ME backgrounds.

We hope that the study findings will be used to develop effective initiatives to promote inclusion, and interventions to tackle racism and discrimination in the NHS workplace, as well as influence trainee attainment for this group of doctors.

Research Team

Dr Charu Chopra – (Consultant Immunologist, Associate Postgraduate Dean ED&I, NES)

Dr Amudha Poobalan – (Senior Lecturer in Public Health (Scholarship) Institute of Applied Health Sciences, School of Medicine, Medical Sciences and Nutrition, University of Aberdeen)

Dr Kathrine Gibson Smith – (Research Fellow, Centre of Healthcare Education Research and Innovation, Institute for Education in Medical and Dental Sciences, University of Aberdeen)

Professor Peter Johnston – (Consultant Pathologist, NHS Grampian)

Dr Esther Youd – (Autopsy Pathologist, Forensic Medicine and Science, Joseph Black Building, University of Glasgow)

3.3 Interprofessional Immersive Simulation Training

The expanding roles of UK pharmacists have prompted substantial changes to the initial pharmacy education and training, including increasing recognition of the value of learning alongside other professional groups in acute settings. Interprofessional immersive simulation training appears to represent a useful educational tool to meet the evolving needs of the profession, but the impact of such training on workplace behaviour and relationships has not been explored. This study aimed to explore how interprofessional simulation training facilitates transformative learning in pre-registration pharmacists[11].

Across three different locations in Scotland, pre-registration pharmacists were paired with medical students to participate in immersive simulation scenarios with post-scenario debriefs.

Pre-registration pharmacists were individually interviewed shortly after their simulation session, using a semi-structured interview schedule based on the transformative learning framework. Transcripts were analysed using template analysis, with Mezirow's phases of perspective transformation forming the initial coding template.

Interprofessional immersive simulation training involving acute clinical scenarios has been found to be helpful for pre-registration pharmacists and can foster transformative learning. Through this powerful process, they developed new ways to see the world, themselves and their professional relationships. As the patient-facing roles of pharmacists expand, educational practices that translate into meaningful change to workplace behaviour and relationships become increasingly important. Carefully constructed interprofessional immersive simulation training should be utilised within pharmacy education more widely.

3.4 Prescribing Safety Assessment

The *'UK Prescribing Safety Assessment'* (PSA) was developed for medical graduates to demonstrate prescribing competencies in relation to the safe and effective use of medicines[12].

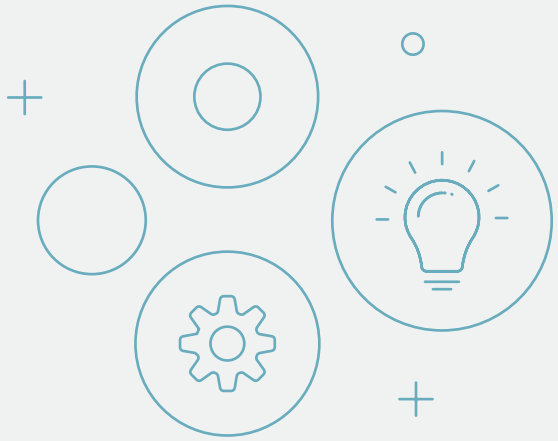
The objectives of this study was to determine PSA performance of final year undergraduate student pharmacists (year 4) and pre-registration pharmacy graduates (year 5) and explore their opinions on its suitability.

Final year undergraduates (n = 238) and pre-registration pharmacists (n = 167) were briefed and undertook the PSA. PSA questions were mapped to specific thematic areas with 30 questions over 60 min. Data was analysed using descriptive statistics. A questionnaire was completed to gauge opinions on appropriateness of the PSA.

Hospital pre-registration pharmacists performed better than the undergraduates, but there is a need to improve prescribing skills in all, most notably in diagnostic skills. The PSA is acceptable to the participants. These results will help inform pharmacy curricula development and provides a cross-disciplinary method of assessment of prescribing competence.

3.5 Practice Based Experiential Learning

Scottish Government funding supports practice based experiential learning (EL) for student pharmacists. Views and experiences of key stakeholders were explored on current practice and future development of inter-professional education (IPE) in EL including barriers and enablers. A pre-piloted schedule was used for online qualitative semi-structured interviews[13].



Twenty interviews were conducted with eight EL facilitators, seven faculty and five policy stakeholders. 'Nature and experience of current IPE in EL activities' and 'Future developments' were the two main themes. Barriers and enablers were also identified at macro, meso, and micro socio-institutional levels. The essence of the analysis highlighted stakeholders' views of the importance of building on current IPE while challenging the ethos and culture of EL practices. All stakeholders should be involved in co-production, training, piloting, and evaluation of curricular developments to overcome logistic barriers and enhanced enablers. Finally, the importance of workload management strategies and continuity of funding for success was also stressed by those interviewed.

3.6 Traps to Avoid in Safety Investigations and Learning Reviews

A recently completed NES research project sought to critically review the safety-related content, language and assumptions embedded in a small but diverse range of health and care safety learning reports, policies, databases and curricula. The following information sources, which were in the public domain or volunteered by care organisations, were selected for review:

+ NHS Board Adverse Event Learning Summaries
+ Publicly available Reports on Complaints
+ Data from incident reporting and learning systems
+ National and organisational management of adverse events policies
+ Organisational incident investigation reports
+ National and international patient safety curricula

The key themes and traps to avoid:

+ Omitting the Systems Approach
+ Using the language of blame and human failure (directly or indirectly)
+ Misapplication of safety and human factors terminology
+ Focussing on 'Human Error' (and its synonyms) as a Cause or Outcome
+ Overlooking the Context
+ Engaging in Counterfactual Thinking
+ Overlooking the Local Rationality principle
+ Making weak, passive or vague recommendations for improvement

NES is currently integrating the findings in the development of good practice guidance for conducting safety investigations and learning reviews to support those in the care workforces who lead, advise and teach in related areas. The findings and guidance may also be useful for the wider public sector.

Examples of quotes related to language bias, blame, counterfactuals and lack of local rationality:

"In a major departure from accepted medical practice, Dr E agreed to see Caroline and simply forgot about her."

"Poor administration and time management by Physio involved."

"He was phoned at least three times after her discharge from the city hospital...but failed to realize the seriousness of her condition."

"There was unreasonable failings in communication between staff involved in Mr A's care and treatment."

"On review, there were signs of sepsis at his initial presentation that should have been recognised leading to appropriate treatment at that stage."

"If a scan had been done in A&E this may have led to an earlier diagnosis."

"An underlying vascular condition was not appropriately considered during initial skin inspections which led to the risk of tissue damage being underestimated."

"Training and guidance on use and monitoring of security doors to be provided to staff."

3.7 Human Factors in Action: Walk-Through-Talk-Through Analysis

Walk-Through-Talk-Through (WTTT) is a combined verbalised walkthrough and observation method commonly used by Human Factors specialists to better understand how everyday 'work is actually done' in real-time by those at the 'sharp-end' of practice. By seeking multiple perspectives from team members on how job tasks are performed, combined with observations of care work in situ, more informative and contextualised improvement and system redesign needs can potentially be uncovered. Mastering and embedding this 'simple' approach can potentially add value to our patient safety and quality improvement tools and activities - and make a useful and important contribution to the integration of Human Factors principles and approaches in healthcare work and education. In this article, we outline guidance, supported with case studies, on how key members of the health and care workforces can apply Walk-Through analysis to understand, evaluate and improve human work.

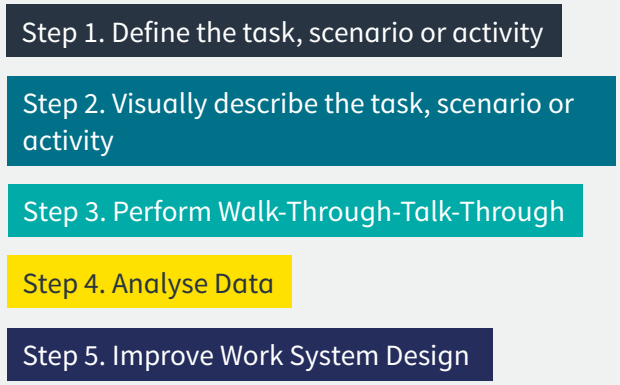


Fig 1. 5-Step Guide to Walk-Through-Talk-Through Analysis.

WTTT is particularly useful for:

01 For clinical risk, patient safety and quality improvement advisors - it can be deployed when working alongside clinical and non-clinical teams to initially explore and better understand how different aspects of human work are undertaken as part of improvement, safety or service redesign projects.

02 For safety investigators, it may have a very specific role as part of post-incident learning investigations where it can be applied in situ when visiting health and care facilities to jointly examine with teams how routine work normally goes well but can sometimes go wrong.

03 For clinicians-in-training it can be applied, with the support of brief practical guidance, as part of Quality Improvement activity, induction or personal development, while established care teams can use it as part of local service evaluations and improvement.

04 Health services and educational researchers may also adapt the method as part of ethnographic observational studies of frontline clinical practices, particularly for those with a focus on patient safety or workforce wellbeing.

05 Finally, health and care educators may wish to consider the need to include this type of method as part of training curricula, and in both designing or debriefing clinical simulation scenarios, given its foundational importance in exploring patient safety and quality improvement issues.

3.8 BowTie Analysis: Training and Support Requirements

There is limited engagement in health and care with the kinds of proactive approaches to risk assessment used in other safety-critical industries. Bowtie analysis (BTA) has previously been shown by NES to have potential as a straightforward approach to proactively assessing risk in healthcare. The visual nature of BTA diagrams can aid communication of the essential elements of a complex risk management system.

The aim of this small case report study was to investigate the training and support likely to be needed for existing healthcare professionals to conduct BTA in compliance with recognised industry best-practice.

Use of the BTA method led to a deeper understanding of the issues and a more thorough understanding of the risks and what was needed to control them than would have been the case if 'normal practice' had been followed.

Classroom-based training supported by written guidance; however, do not appear adequate to support development of competence to carry out a quality BTA in a healthcare setting. BTA seems to have potential though further evaluation of its application and utility is necessary.

The most cost-effective and productive approach is likely to be to train a small number of people to develop deeper skills and experience in BTA. In addition to training and user guidance, the opportunity to facilitate at least one analysis, with some specialist/trainer support.

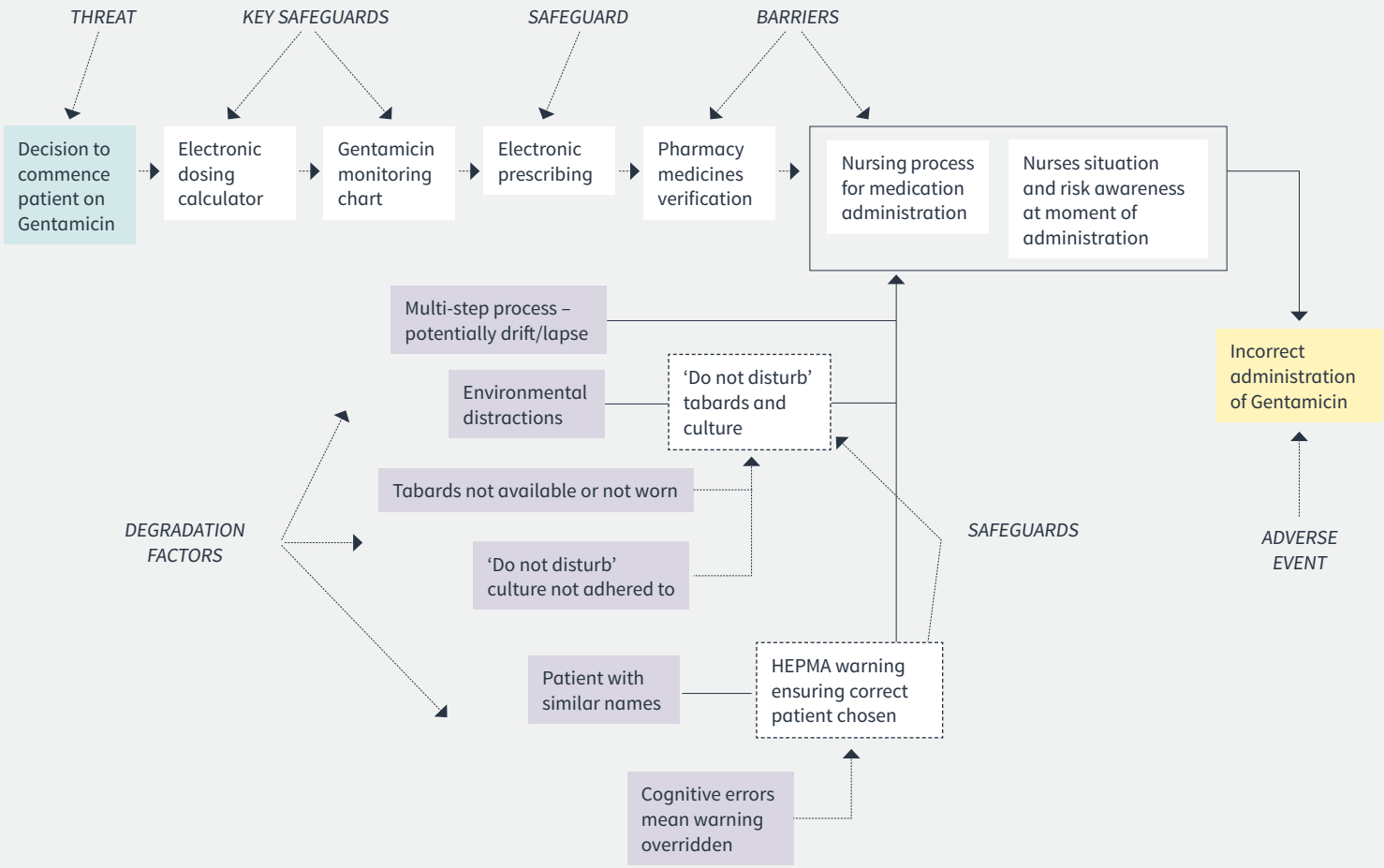


Fig 2. Extract from case report A: degradation factors and safeguards identified for the barrier element 'Nursing process for medication administration'.

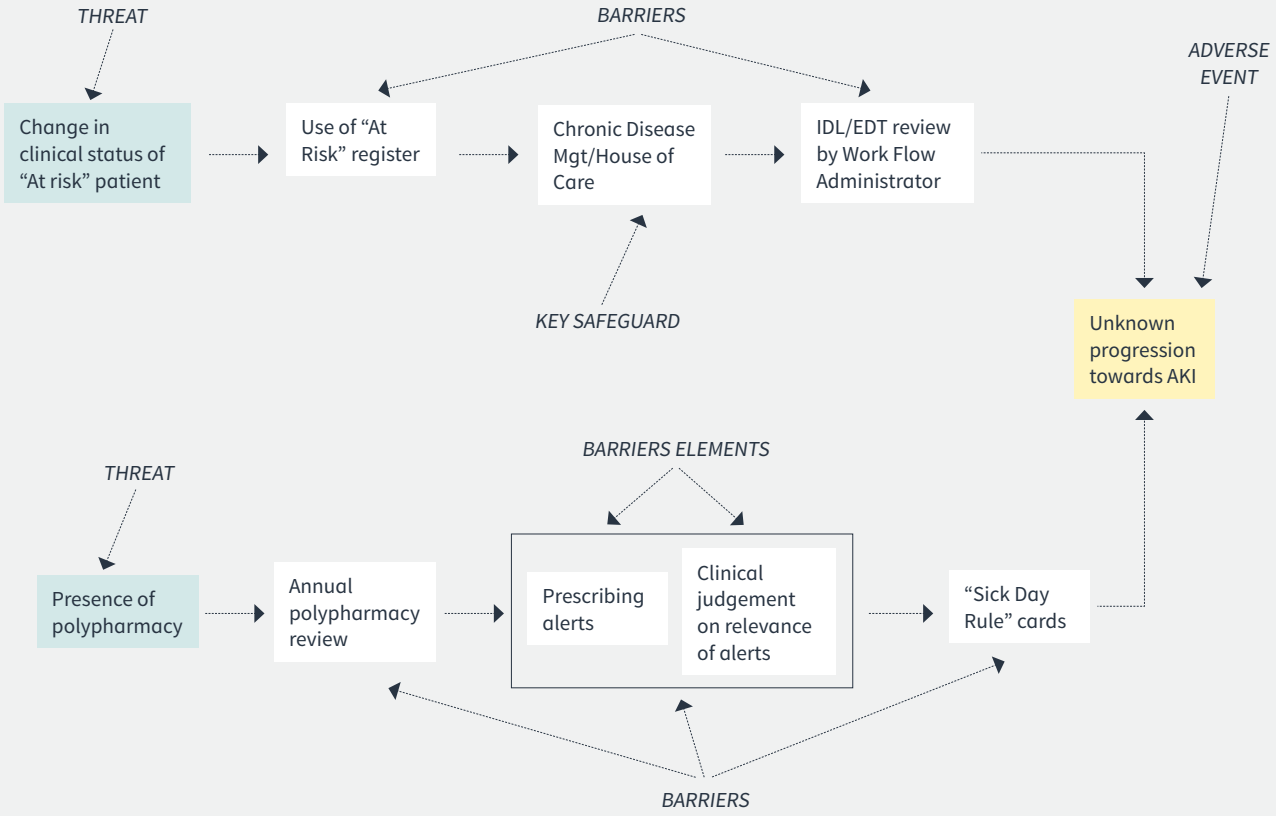


Fig 3. Extract from case report B: controls identified to block two threats from leading to Acute Kidney Injury.

NES Guidance in BowTie Analysis can be accessed here: **https://learn.nes.nhs.scot/54881/human-factors/bowtie-analysis**

3.9 Risk and Safety in Optometry Practice

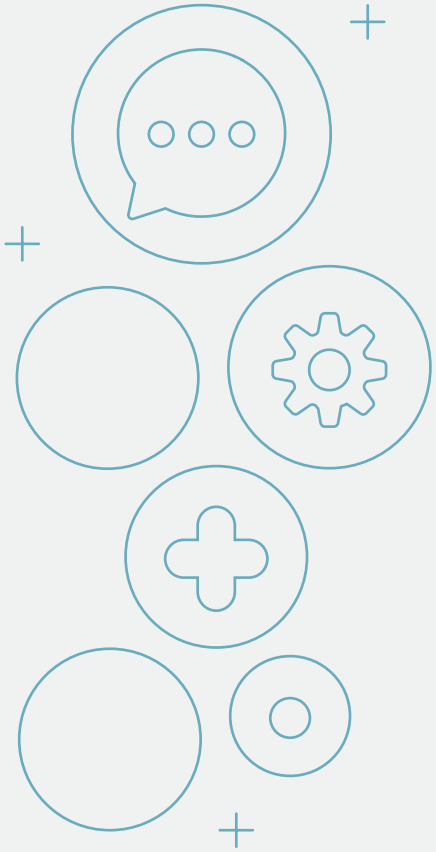
This research study involved a literature review and focus groups with members of the Optometry profession in Scotland to explore safety and risk issues related to everyday clinical practice. Given the dearth of related research in Optometry this is highly likely to be one of the first empirical studies exploring the issues and challenges in the profession. A key output is that the findings are already being incorporated within the NES eLearning module: *Mandatory Training 2022: An introduction to Clinical Risk and Patient Safety.*

Factors that were considered important to mitigate risk were linked to practitioners' level of experience, education and training, clinical audit participation, robust care system processes, cultures which promoted transparency incidents error or complaints, and mentoring and support of staff. The data clearly demonstrated the Optometry profession is concerned that levels of clinical risk are increasing. The factors responsible include technology, scope of practice, role development and changes in consumer demand.

Recommendations made relate to the following:

- Education and training including new and expanded roles
- Reporting, monitoring and audit
- Support to individual and teams when risks are identified through feedback, complaints and adverse events
- Communication and sharing of good practice
- Systems wide approach to higher risk areas such as missed referrals

> ***"Encouraging a culture of being open and honest, sharing mistakes and discussing with peers is crucial to mitigate risks within the profession."***
>
> ***Optometry Focus Group Participant***



Theme 2
Developing the Clinical Learning Environment

04 The Learning Environment

4.1 The Additional Cost of Teaching for Pharmacy (ACTp)

The Additional Cost of Teaching for Pharmacy (ACTp) funding, an initiative to support the expansion of practice based experiential learning (EL) for student pharmacists in Scotland, was launched by the Scottish Government in 2018. The objective of this study was to obtain feedback from experiential leaning (EL) leads about how competency-based assessments could be undertaken by EL facilitators, and to scope existing EL assessment structures in undergraduate Masters in Pharmacy (MPharm) programmes across the United Kingdom (UK)[14].

A cross-sectional survey was conducted utilising a nine-item on-line survey, consisting of five open-ended and four closed-ended question. All UK universities with MPharm programmes (n=30) were invited to participate in the survey. Of the 21 universities that responded (Response rate: 70%), 17 were included in the final analysis. Assessments were mainly undertaken by university staff (59%), with minimal amounts undertaken during EL (39%).

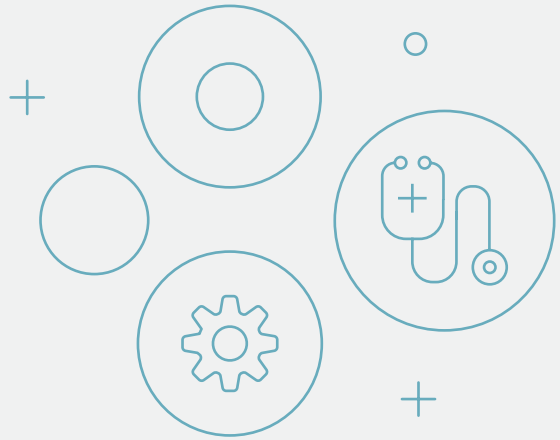
There was unanimous agreement (100%) that facilitators could assess students' communication skills and professionalism during EL. No consensus, however, was achieved with regard to the tool(s) or method(s) to be used to assess student's competencies. Advantages noted were that EL facilitator assessment of students would allow for more accurate evaluation of students in the practice setting, while acknowledging barriers such as the burden of time and the lack of consistency in marking. To address this lack of consistency, the majority highlighted the need for facilitator training.

4.2 What should students learn during a long-term conditions placement? Involving Patients at the point of Curriculum Design (InPaCD)

Patients are the cornerstone of medical education; from ward based teaching, to simulated clinical scenarios and communication skills, students continue to derive great benefit from patient involvement in teaching. As multimorbidity, and the resultant complexity, become more common, the needs of our patients are changing. We have a responsibility to make sure that the curriculum keeps pace with these changes, to allow our future doctors to be well equipped to holistically care for their patients.

The 4th year of the undergraduate medical degree at University of Aberdeen sees all students rotate through a 6 week placement focused on long term conditions. The block is designed to facilitate students understanding of the core concepts, skills and attributes required to care well for patients with long term conditions.

This Qualitative study will explore the experiences of patients with long term conditions to understand their experiences of care and of what good care means to them. 10 patients with long term conditions will be interviewed and the themes analysed. These will then be examined in the context of the pre-existing block objectives to ascertain whether we are teaching medical students what is really important to patients.



4.3 Interprofessional Clinical Reasoning Simulation Update

There is an increasing focus on clinical reasoning within all undergraduate health professions education. Clinical reasoning encompasses communication skills, using and interpreting diagnostic tests, understanding cognitive biases and human factors, critical thinking, patient centred evidenced based medicine and shared decision making[1]. Within clinical practice these skills happen both individually and within multidisciplinary teams (MDT). However, traditionally these skills are taught to individual professions within their curriculum. Given the known benefits of interprofessional education on both individuals and patient outcomes[2], bringing learners together in a simulated environment provides an ideal, safe space for them to develop these skills and reflect on their experiences together as a team.

We developed an immersive interprofessional clinical reasoning simulation course, which takes place within a simulated acute medical receiving ward. The simulated patients have a variety of non-emergency issues, with specific clinical reasoning learning outcomes for each patient. The team comprised of students from medical, nursing, physiotherapy and pharmacy backgrounds, who worked together within the simulated environment. The learners received a handover and entered the ward for 30 minutes. The team decided how to prioritise tasks and deal with situations that arose. Two facilitators from different professional backgrounds observed via an audio visual system. Following the simulation, the student's handed back to the facilitators and participated in a 45-minute team based debrief. Eight courses were run over 3 days, with 31 students attending in total.

Data was collected through pre- and post-course questionnaires, with a follow-up questionnaire planned for 6 months following the course. Additionally, student experiences will be discussed in focus groups around 6 weeks post-course. A focus group will also be conducted for the interprofessional faculty who took part, in order to learn from their experiences. Data from the initial questionnaires is currently being analysed, while the focus groups are awaited.

In previous pilot-runs of the course, students have highlighted the value of working together, understanding others professional roles and the value of the debrief. They focused on being able to learn non-technical skills, communication, the transition from student to healthcare professional and more realistic MDT working.

This course fills a gap within the current curriculums, allowing interprofessional education to take place within a simulated clinical environment and thus learners practice their skills whilst understanding others roles. Learners developed their clinical reasoning skills within a safe environment, allowing them to continue their professional development.

4.4 COVID-19: Clinical Training and 'Burnout'

The COVID-19 pandemic has caused significant disruption to health services in the UK and internationally. This multi-directorate study conducted by NES aimed to determine the training, service work and psychological impacts of the pandemic on clinicians-in-training, with a focus on reported levels of 'burnout'. A national cross-sectional online questionnaire survey was undertaken involving clinicians-in-training in the medical, dental, pharmacy, healthcare science and psychology professions in Scotland during July 2020. A multivariate regression analysis was performed to ascertain variables predicting reported trainee burnout. Data from a follow-up survey are currently being analysed.

7694 trainees were surveyed and 5545 responded (72.1%). 192 trainees reported that they were shielding at home (3.5%) but 69% were able to work from home. 1194 reported they had felt unwell during this time (22%). Of these, 190 trainees tested positive for COVID-19 (16%), while 665 (55%) reported symptoms suspected to be COVID-19, and 409 reported having another illness/health issue (34%).

Around one third of trainees (n=1790, 32%) reported feeling at 'extreme' or 'considerable' risk of contracting COVID-19 at work. 69% of trainees (n=3825) believed their training progression had been negatively affected through the impact of COVID-19. Experiencing burnout symptoms more than once a week was reported by 32% of trainees. Overall 23% of variance in burnout was predicted (adj R sq = .23, F (7, 3482) = 154.9, p<.001). Poorer quality of clinical supervision, more negative workplace behaviours, less ability to raise concerns, a greater perceived impact of COVID-19 on health and wellbeing, feeling busier and less useful at work, and a greater perceived risk of contracting COVID-19 were related to higher reported burnout.

The main messages form this study describe:

+ Significant numbers of trainees had confirmed COVID-19, demonstrating the impact of the pandemic on the NHS workforce
+ Many trainees self-reported symptoms of burnout and other health and wellbeing issues affecting training and work
+ Most trainees reported that their training progression had been negatively affected through the impact of COVID-19

4.5 COVID-19: Evaluation of simulation training at NHS Louisa Jordan

In May 2020 the decision was made utilise the Louisa Jordan as a National Skills Education Hub, an interim base for clinical training and simulation-based training. The aim being to ensure that the necessary training for health professionals continued despite the ongoing pandemic. The evaluation intended to identify impact of NSEH training on learning and job behaviour and provide evidence for need for a Simulation Hub for West of Scotland.

A focus group was carried out with stakeholders and course facilitators took part in one-to-one telephone interviews. An evaluation questionnaire was sent to all course attendees. It was intended to carry out telephone interviews with a sample of the course attendees, however unfortunately, the lack of response to the participation invite email, social media invite and newsletter invite, has meant that no interviews or focus groups with participants were carried out.

The findings are currently being analysed but preliminary findings suggest that a centralised hub for simulation training enabled NHS staff learning and training to continue during the initial stages of the pandemic, and was evaluated favourably by both facilitators and course attendees. The larger area allowed for social distancing, and the fact that numerous courses could be run simultaneously enabled interprofessional working. Specific areas of learning were identified by attendees on the various courses, and it was highlighted that this learning would be put into practice following the course.

4.6 SEIPS: The 'Swiss Army Knife' of Human Factors

SKIRC has a strong track record of conducting Human Factors educational research on patient safety and quality improvement in partnership with healthcare teams and organisations over the past decade. One of our key methodological approaches has been through the application of the Systems Engineering Initiative for Patient Safety (SEIPS) framework (Fig x.).

In a recent 'Thought Paper' on SEIPS co-authored with colleagues from NHS England and Improvement, the Healthcare Safety Investigation Branch and various University research centres we draw on our extensive research experiences to develop guidance for health and care professionals at all levels. In the guidance we illustrate how this multi-functional tool can be applied to a whole range of problem-solving activities related to understanding and improving system safety and human wellbeing.

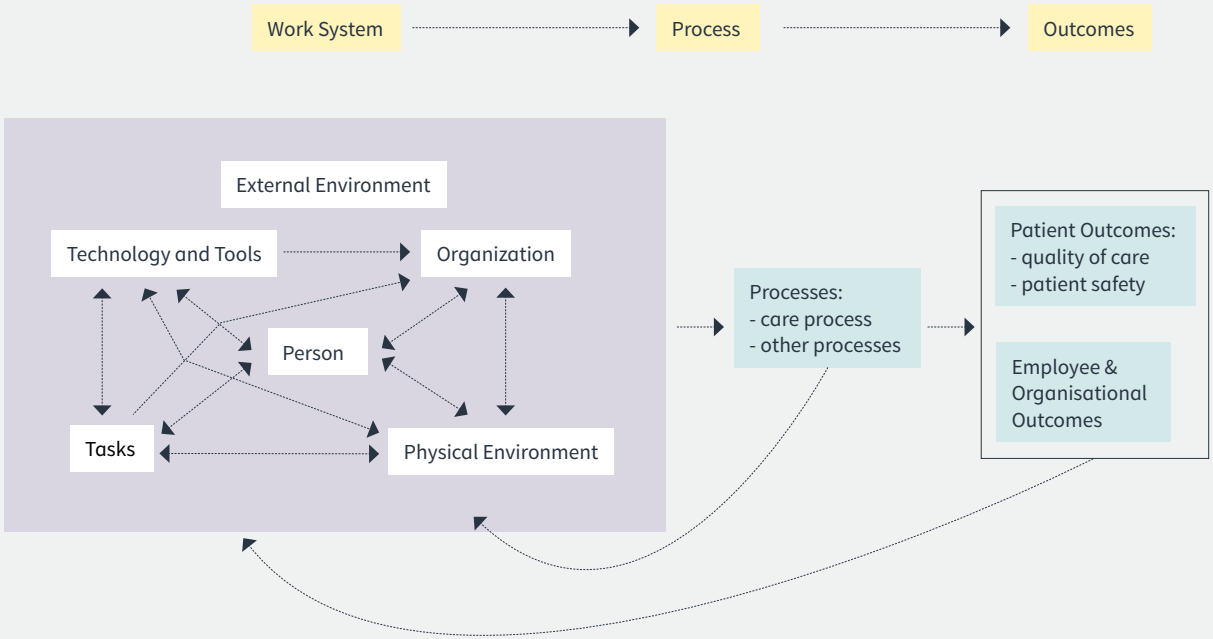


Fig 4. The Systems Engineering Initiative for Patient Safety (SEIPS) Worksheet.

To access the draft SEIPS Guide and related resources, please visit here: **https://learn.nes.nhs.scot/59608/human-factors/seips-worksheet-seips-webinar**

4.7 Good Practice in Safety Investigations and Learning Reviews

In terms of applying modern safety science thinking and approaches, Health and Care typically lags behind other high-risk industries. Based on a combination of NES research on organisational and team-based safety investigations this comprehensive guide and related academic outputs were developed and informed by a Systems Thinking approach and mindset that underpins good practice principles in the following areas for this important learning activity:

+ The Systems Thinking mindset
+ Core Safety Investigation Principles
+ Planning and Starting Safety Investigations
+ Data Gathering
+ Exploring Performance Influencing Factors
+ Systems Analysis and Interpretation
+ Report Writing
+ Writing Effective Recommendations
+ Traps to Avoid

4.8 Vaccinating a Nation: Lessons from Scotland

In this joint study involving NHS Ayrshire & Arran (NHSAA), The Keil Centre Ltd and NHS Education for Scotland, a Human Factors approach was applied to evaluate the design of NHSAA's COVID-19 vaccination service delivery programme. It was noted that the achievements of NHSAA excellent, especially given the nature of the challenges, scale of the operation and the rapid response required.

NHSAA has implemented many recovery mechanisms and risk control measures to guard against the errors identified. Specific areas of practice excellence were identified which would benefit other health boards, particularly around the learning related to good practices which have been implemented to guard against human failure. In addition to shared learning, there were areas which NHSAA identified that they would improve upon for future programmes.

The analysis also revealed eighteen (18) issues which require additional risk control. These issues were grouped into three (3) risk control themes:

1. Improve staff training and awareness, and the management of expectations
2. Improve equipment and information provision
3. Implement additional checks and contingencies

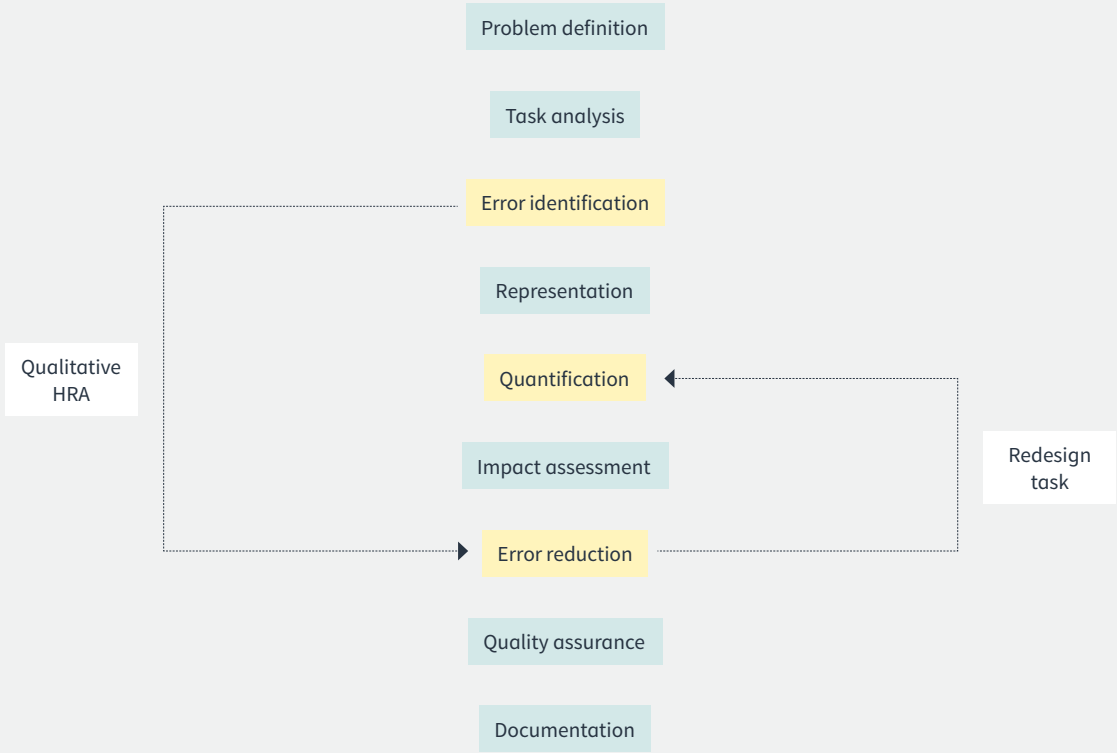


Fig 5. Human Reliability Analysis.

To read the full reports please visit here: **https://learn.nes.nhs.scot/49251/human-factors/vaccinating-a-nation-covid-19**

4.9 SKIRC Thought Papers

Human Factors and Future Health Care

In this special edition of the Royal College of Physician journal *Future Health Care*, human factors specialists from NES and partner organisations introduced the science and profession of human factors and ergonomics (HF/E) as being concerned with the design of work and work systems. While is an increasing appreciation of the value that HF/E can bring to enhancing the quality and safety of care, the professionalisation of HF/E in healthcare is still in its infancy.

The sustainability of health and care workforces and their ability to perform reliably and consistently is intrinsically linked to the context where work occurs. HF/E principles fully integrated within an organisation can help identify and manage the operational risk associated to the design of working conditions to optimise the performance of the workforce.

Healthcare is yet to apply systematically and rigorously the evidence and science that HF/E applies in other industries (see Box 1 for example). The principles behind an HF/E approach recognise that the safety, performance and wellbeing of clinical staff are intrinsically linked to care safety and the performance and efficiency of a care organisations.

In this paper, a vision for HF/E in healthcare is set out based on the research and development work of NES, the Chartered Institute of Ergonomics and Human Factors (the professional body for HF/E in the UK) and other bodies.

Specifically, the paper considers the actual and potential contribution of HF/E in relation to:

+ The design of equipment, work and workplaces
+ Prospective risk analysis
+ Digital transformation, including the introduction of Artificial Intelligence
+ Organisational learning (Fig x)
+ Professionalisation of the
+ The COVID-19 pandemic

The rail industry recognises that staff fatigue can contribute to risk. Rail operators adopt fatigue risk management systems to inform how their organisation can design and monitor shift patterns and working conditions to minimise fatigue, stress and burnout.

The Office of Rail and Road suggests examples of key performance indicators for organisations to consider that indicate the presence of fatigue-inducing factors related to shift design, such as:

+ **percentage of shifts greater that 8 hours**
+ **cumulative hours worked**
+ **duration of rest days**
+ **cumulative time awake**

Box 6. Fatigue key performance indicators in the rail industry.

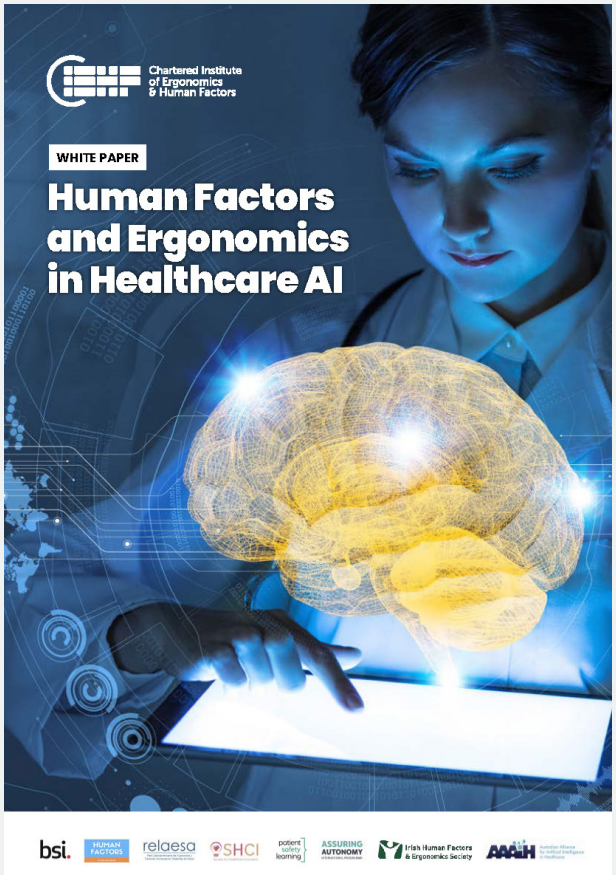


Fig 7. Human Factors in Healthcare AI.

Fig 8. Human Factors and Organisational Learning.

4.10 A Primer on Systems Thinking for Safety and Improvement

Systems Thinking is a fundamental Human Factors approach to understanding, designing and evaluating highly complex health and care systems. For health and care educators, policy leads and practitioners, and especially those with leadership roles in quality improvement and patient safety, it is important to note that Systems Thinking:

01 Is the dominant approach to understanding and improving workplace quality and safety issues across high-risk industries globally.

02 Is recommended by leading scholars in human factors and the safety sciences, especially in understanding problems in highly complex work systems – health and care settings are arguably the most complex work systems ever to exist.

03 Is not well-understood or practised in health and care education, policy and practice.

04 Represents a radically different way of thinking about the nature of complex care system performance and so this may challenge our own assumptions and approaches about how we currently learn and improve – it may therefore take time to both learn about and embrace these concepts, but also to 'unlearn' how we think care problems and incidents come about and can be improved.

The following principles are examples of Systems Thinking concepts which when taken together can inform the mindset or philosophy that anyone at any level working in health and care practice, education and policy can potentially adopt and implement.

Capture Multiple Perspectives and Avoid Blame	Improvement is done 'with people, not to people'
Recognise that quality and safety issues are a *Shared Responsibility* of all system actors	Understand why things go wrong in highly complex care systems
Apply the Systems Approach to problem-solving	Explore both the Situation and Context
Consider the Local Rationality Principle	Explore Trade-Offs, Adaptations and Workarounds
It's "Up and Out" NOT "Down and In"	Manage Risks to be As-Low-As-Reasonably-Practicable (ALARP)

Fig 9. The Systems Thinking Mindset.

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Appendix 2 — Publications

O'Donnell J, Davidson I, Bowie P. Safety investigations and learning reviews in Health and Care. A Good Practice Guide. [SKIRC Technical Report, 2022] (4.7)

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Appendix 3 — SMERC Summary

December 2021 SMERC Summary							
Principal Investigator	**Co-Investigator**	**Funder**	**Title**	**Start Date**	**End Date**	**Interim Report Dates**	**End of Award Report Due**
Anita Laidlaw	N/A	SMERC Travelling Fellowship	Educational research training, support and collaboration: NOSM visit.	01/02/2019	28/06/2019 due to COVID-19 now 30/06/2021 now 30/06/2022		28/06/2019 now 30/06/2021 now 30/06/2022
David Hope	Japp (UofE) Kluth (UofE) Hothersall (UofD) Leach (UofG) Cameron (UofA)	SMERC PhD	Improving fairness in undergraduate medical education.	01/09/2019	18/11/2022	31/08/20 Year 1 31/08/21 Year 2	18/11/2022
Jen Cleland now Judy Wakeling	Johnston (NES) Leese (NES) Stirling (NES) Wakeling (NES)	SMERC Small Grant	Enhancing the quality and safety of care through training generalist doctors: a longitudinal, mixed-methods study of broad-based training programmes in Scotland.	01/05/2019	28/02/2021 now 31/03/2022	31/03/2020	28/02/2021 now 31/03/2022

Appendix 3 — SMERC Summary

December 2021 SMERC Summary							
Principal Investigator	**Co-Investigator**	**Funder**	**Title**	**Start Date**	**End Date**	**Interim Report Dates**	**End of Award Report Due**
Lorraine Hawick	Cleland (UofA) Gibson Smith (UofA) Gates (UofA) S Kitto (UofOttowa) M Moffat (Uof D)	SMERC SEED	A sociocultural analysis of curriculum change: the implementation of a new Year 4 curriculum in Aberdeen Medical School.	01/01/2020	31/12/2020 due to COVID-19 now 30/09/2021 CONCLUDED	N/A	31/12/2020 now 31/09/2021
Lisi Gordon	Arshed (UofD) Moffat (UofD) Reid (UofStA) Urquhart (NHS Tayside)	SMERC Small Grant	Understanding how doctors learn about and enact entrepreneurship and innovation in healthcare.	01/04/2020	31/03/2021 due to COVID-19 now 31/12/2021	30/09/2020 now 31/03/2021	31/03/2021 now 31/12/2021
Kim Walker	Aitken (UofE) Cecil (UofStA) Gibson Smith (UoA) Gordon (UofD) Johnston (UoA) Laidlaw (UofStA) Pope (UofG) Scanlon (UofD)	SMERC Funding Opportunity	Doctor's wellbeing through transitions in COVID-19 and beyond. A proposal for consolidation and future innovation.	01/09/2020	31/03/2021 now 31/08/2022	N/A	31/03/2021 now 31/08/2022

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Jeni Harden	McElhinney (UofD) Richards (UofE) Scully (UofStA)	SMERC Large Grant	Healthcare professionals' pathways into medicine: experiences of healthcare professionals on two Scottish graduate entry medical programmes.	01/01/2022	31/12/2025		31/12/2022 31/12/2023 31/12/2024
Amy Martin	Hunter (NHS Lanarkshire) Jamieson (UofG)	SMERC SEED	Exploring the impact of shielding on medical trainees working in Scotland during the COVID-19 pandemic.	01/11/2021	31/10/2022	N/A	31/10/2022
Fiona Mosgrove	Khan (UofA)	SMERC SEED	Involving patients at the point of curriculum design (InPaCD).	01/11/2021	31/10/2022	N/A	31/10/2022
Catriona Neil and Dr Daniel Slack	Paton (NHS Lanarkshire)	SMERC SEED	Interprofessional clinical reasoning simulation.	01/11/2021	31/10/2022	N/A	31/10/2022

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December 2021 SMERC Summary							
Principal Investigator	**Co-Investigator**	**Funder**	**Title**	**Start Date**	**End Date**	**Interim Report Dates**	**End of Award Report Due**
Charu Chopra	Gibson Smith (UofA) Johnston (UofA) Youd (UofG) Poobalan (UofA)	SMERC SEED	The lived experiences of racial discrimination in specialty trainees in Scotland Deanery: A qualitative study.	01/11/2021	31/10/2022	N/A	31/10/2022
Emudiaga Emanuwa	Walker Kenneth (UofA) Cleland (NTU) Aitken (UofE) Parks (UofE)	SMERC SEED	A mixed-methods exploratory study assessing the role of video-assisted debrief in consultation skills training for surgeons.	01/11/2021	31/10/2022	N/A	31/10/2022
David Hope	Dewar (UofE) Marson (UofE) Hothersall (UofD) Cameron (UofA) Dobson (UofStA) Jaap (UofE)	SMERC Small Grant	Exploring approaches to Widening Participation at four Scottish medical schools.	15/12/2021	15/12/2022	30/05/2022	15/12/2022
Evelyn Watson	Scott (UofE) Cruickshank (UofStA)	SMERC Small Grant	How can Occupational Health resources be optimally used in the management of medical students?	01/11/2021	31/10/2022	30/04/2022	31/10/2022

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**.

NHS Education for Scotland
Westport 102
West Port
Edinburgh EH3 9DN

Tel: 0131 656 3200

www.nes.scot.nhs.uk

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