

THE NATIONAL SIMULATION DEVELOPMENT PROJECT: SUMMARY REPORT

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“Simulation is a technique—not a technology—to replace or amplify real experiences with guided experiences that evoke or replicate substantial aspects of the real world in a fully interactive manner.”

Professor David Gaba, Sim Healthcare (2:126–135, 2007)

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We thank everyone who put themselves forward to form our network of Simulation Development Officers during the project, and their institutions for supporting them in this role.

There have been many other individuals who have provided advice and time to successfully progress the project to this provisional outcome point. These individuals are too numerous to name, but they are representative of the many educators, clinical practitioners, administrators, educational managers, academics, commercial colleagues and organisational leaders who are tirelessly dedicated to improving the quality of simulation-based education and training in the UK.

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SOME KEY DEFINITIONS USED IN SIMULATION BASED EDUCATION (SBE)

Simulation:	Any technique that evokes or replicates substantial aspects of the real world in a fully interactive manner. ¹
Simulation Based Education (SBE):	The use of any simulation in the formative or summative education of healthcare professionals ²
Technical Fidelity: ³	The technological complexity of the simulation technique e.g.
Low Fidelity	Patient actors, Simulated Interviews, Written Problems
Task Trainers	Intubation manikins, Venepuncture arms
High Fidelity	Human patient simulators, virtual reality computer systems with haptic feedback
Situational Fidelity: ⁴	The degree to which a simulated situation replicates the real world:
Environmental Fidelity:	the degree to which the simulator replicates motion cues, visual cues, or sensory information from the task environment
Engineering fidelity:	the degree to which the simulation device or training setting reproduces the physical characteristics of the real task
Psychological fidelity:	the degree to which the trainee perceives the simulation to be believable for the tasks
Advanced Simulation Centre:	Centre offering simulation training on one or more high-fidelity systems
Faculty	Anyone designing or delivering educational content

EXECUTIVE SUMMARY

This report brings together information on the current state of play within the field of simulation based education (SBE), a key part of the technology enhanced learning agenda. It summarises the data contained within separate supplementary reports that together make up The National Scoping Project Full Report (2014). These are:

- Supplement Report 1 Survey of Faculty and Educator Community
- Supplement Report 2 Simulation Practice – Literature Review
- Supplement Report 3 Case Studies in Simulated Practice

KEY FINDINGS

- There is a growing body of evidence to support the use of SBE in healthcare
- The funding, training and availability of faculty is a key constraint to wider adoption of SBE
- SBE is used widely for training in core technical skills for craft specialties and other disciplines
- The presence of SBE in core curricula for most medical specialties and in nursing is increasing
- SBE is established as an essential component of human factors training but remains underutilised for this purpose
- The UK has the highest number of advanced simulation centres in Europe and the UK NHS is regarded as a global leader in the field of SBE
- The key problems facing those involved in delivering SBE in the UK are similar to those experienced elsewhere in the world.
- The management, sharing and co-ordination between centres delivering SBE remains poor in many areas
- The evidence that SBE can develop and assess skills and can change behaviours and improve patient outcomes requires further research and appropriate evidence to support future investment
- The development of multi-professional training has increased but the disconnect between under and post graduate and between nurse and doctor training remains
- Over 80% of advanced simulation centres have spare capacity
- There is limited availability of virtual reality and procedural skills training simulators hampering delivery of some specialty curricula that now include simulated practice competency requirements
- Use of in-situ simulation for all healthcare professionals is increasing but requires further support for effective delivery
- The value of public and patient involvement in the design of SBE is not widely recognised
- Quality control to guide the development of robust programmes of SBE and evidence the value and outcomes of these activities is required

ACTION URGENTLY REQUIRED

- Development of national standards or guidance (as a complement to existing professional standards) for those educators delivering SBE
- The development of guidance for SBE in relation to patient safety and human factors training.
- Increase funding, training and support for faculty using SBE

LONGER-TERM DEVELOPMENT REQUIRED

- The development of a dynamic and up to date resource and contact database to enable improved sharing and co-ordination of SBE training
- Facilitate high quality pedagogic research evidence supporting investment in SBE
- Improved funding for the National Association to facilitate the gathering of global information and passing on to organisations and linked local networks.
- Introduce guidance and monitoring of quality of courses, faculty and evidence of outcomes
- Increase availability of medium and high fidelity systems for specialist skills training and assessment
- Improve public and patient involvement in SBE The development of educational initiatives that can be integrated into core curricula for health and social care professionals at pre and post registration learning
- Develop SBE across communities to facilitate greater adoption and application of SBE within the area of curriculum redesign and innovative pedagogy
- Develop educational initiatives that can be integrated into core curriculum for health and social care professionals at pre and post registration learning
- Drive multi-professional training initiatives to break down the disconnect between doctor, nurse and allied health professionals training
- Recognise SBE within all qualifying educational curricula with guidance as to its usage and application within learning and teaching

PROJECT OVERVIEW

OVERALL PROJECT AIMS

The main objective of the project was to inform commissioners, regulatory bodies and standard setting organisations about effective practice in the use of SBE and to support workforce development with the ultimate aim of improving patient outcomes. This initiative also aims to foster a growing collaborative network of educators and practitioners involved with the development and enhancement of SBE.

To this end, the higher-level aims of this project are to:

- improve pedagogic understanding and development of simulation in healthcare education;
- improve current practice in the use of simulation in healthcare education; and
- enhance the knowledge base around the provision and utilisation of SBE.

OUTCOMES

The specific outcomes identified to underpin these aims are to:

1. Improve the current understanding, description and mapping of how SBE is being integrated into existing curricula by and for healthcare professions in the UK, including optimal and effective use of SBE that maximises impact and enhances the evidence-base available for others
2. Ensure that SBE continues to be innovative and able to respond to the dynamic requirements for flexible learning and future employability of newly qualified practitioners;
3. Develop a practical and relevant approach to quality assurance in SBE that will inform future commissioning of high quality education for all healthcare professionals
4. Accelerate the development of 'communities of practice' in SBE across institutional and professional boundaries;
5. Strengthen the strategic relationships between the HEA and policy making organisations influencing workforce development, education commissioning and quality assurance across the health and social care sector;
6. Ensure appropriate links are made between this project and similar activities across the spectrum of e-learning and mobile learning technologies.

OUTPUTS

To achieve these, the project set out to:

1. Establish a network of Simulation Development Officers (SDOs) to develop and feedback back on communities of practice;
2. Map relevant sections of the emerging or published education outcomes framework to the standards described for SBE;
3. Establish links with the incoming educational commissioning framework at a national and local level, i.e. via HEE and the LETBs within England;
4. Produce a sustainable and dynamic database of existing practice including key contacts, equipment, courses and other resources (Simulation Resources Database, SRD) that enables

stakeholder organisations to participate in strategic and operational communication with SBE communities of practice across the UK at all levels; the primary access point for this database will be via the TEL HUB.

5. Produce a professional standards framework for educators (faculty) involved with SBE that is applicable across institutional and professional boundaries, and which includes recommendations for training, outcomes, and monitoring;
6. Deliver of a series of workshops, stakeholder meetings and dissemination events across the UK to seek engagement, encourage open discussion and develop consensus in support of the project aims, including opportunities for student, public and patient involvement

BACKGROUND

There has been considerable change in national healthcare policy in the United Kingdom in recent years (Darzi, 2008; Department of Health, 2010a, 2013c). It is now clear that modernisation requires a more flexible workforce, better able to respond to the changing health and social care needs of society and the patient should be at the heart of the system (Department of Health, 2010b). The structures, processes and funding of the healthcare system in which this workforce will be employed have also been changing rapidly.

Whilst the four nations of the United Kingdom have individual strategies and supporting infrastructures, each has similar interdependencies between higher education institutions (HEIs) and the National Health Service (NHS) provider organisations. There is a common goal to develop a workforce with appropriate values and behaviours to complement their professional clinical and leadership capabilities. These goals are apparent in reports such as 'The Shape of Training' (Greenaway, 2013) and are core to the latest workforce planning documents published by HEE (Health Education England, 2013).

Until relatively recently medical simulation has had a limited uptake in the UK, with Anaesthetics, Emergency Medicine and Resuscitation being pioneers for the introduction. Drivers for more rapid development include:

- Increasing evidence of the high frequency of adverse events within the NHS, as described in the 2001 Department of Health (DH) report 'An Organisation with a Memory'
- The Chief Medical Officer's (CMO) annual report 2008⁵ which stated: 'Simulation offers an important route to safer care for patients and needs to be more fully integrated into the health service', and that 'training should be integrated and funded within training programmes for clinicians at all stages'
- The European Working Time Directive (EWTD), which has compacted the training into a significantly shorter period of time, reducing the opportunities for experiential learning
- Investments by Deaneries in facilities and equipment to encourage the uptake of SBE into training programmes, across the 25 medical specialties
- Moves by professional societies and colleges to support and co-ordinate the use of medical simulation
- HEFEC agendas for the education and training of the 21st Century graduate and the desire to develop enhancements to student learning, applying technology in areas of innovative pedagogy, curriculum redesign and transition of students during their programme of study
- The Nursing and Midwifery Council (NMC) (2007) advocating that simulation should be utilised to prepare pre-registration nursing students for practice. They stated that up to a maximum of 300 hours

of the 2300 hours practice component could be used to provide clinical training within a simulated practice learning environment in support of providing direct care in the practice setting ⁶

In the context of these competing pressures on time, resources and professional priorities, simulation practices in healthcare provide an approach to education and CPD that has the potential to meet all the needs of policy makers, practitioners and educators alike. The use of simulation integrated into healthcare education and professional development curricula is recognised as one of the core approaches that will help support attainment of strategic workforce development goals (Department of Health, 2009, 2011). This is relevant to the education and training provided under the immediate jurisdiction of HEIs, but also relates to the provision of properly supported high quality placement-based learning across the NHS health and social care sectors. Simulation can offer innovative solutions to address gaps or constraints with some aspects of traditional curriculum delivery, either as an alternative or by enhancing workplace-based learning opportunities ⁷. Similarly, simulation can support learners during the transitory phase from student to qualified practitioner and help prepare them for the realities of clinical practice (Illing et al., 2008; Lauder et al., 2008; Stirling, Smith, & Hogg, 2012).

There is a growing research base of simulation being applied to:

- improvements in patient safety (Ironsides, Jeffries, & Martin, 2009);
- inter-professional practice (Van Soeren, Macmillan, Cop, Kenaszchuk, & Reeves, 2009);
- development of communication skills (Kameg, Mitchell, Clochesy, Howard, & Suresky, 2009); and
- enhanced team working (Brindley, 2009; Miller, Riley, & Davis, 2009).

In Scotland, the need for an integrated approach to healthcare workforce planning was highlighted at a national policy level through publication in 2007 of 'Better Health, Better Care: Planning Tomorrow's Workforce Today' (The Scottish Government, 2007). This was followed by the development and implementation of a managed educational network related to clinical skills education involving HEIs and NHS organisations under the strategic leadership of NHS Education Scotland (Clinical Skills Managed Education Network, 2007).

In England, the Department of Health (DH) commissioned the Inventures Report (Inventures, 2010) which examined how the recommendations from the Chief Medical Officer's 150th Annual Report (Department of Health, 2009) on simulation had been embedded. This was a precursor to publication of 'A Framework for Technology Enhanced Learning' (Department of Health, 2011)⁸ that described a number of principles and recommendations to support the successful development and implementation of innovative learning opportunities through the use of simulation and other learning technologies (Figure 1). The key principles of the Technology Enhanced Learning (TEL) framework are:

- A. Be patient-centred and service-driven** – technological applications must focus on equipping the workforce with the necessary skills for safe and effective patient care
- B. Be educationally coherent** – any technological application should address clearly articulated learning needs that are aligned to service needs
- C. Be innovative and evidence-based** – applications should enhance training, be informed by the best available evidence, and where possible be future-proof by being flexible and adaptive so minimising redundancy
- D. Deliver high quality educational outcomes** – meets and wherever possible exceeds agreed standards

- E. Deliver value for money** – technological applications should enhance training, improve productivity, reduce duplication and be affordable and cost effective
- F. Ensure equity of access and quality of provision** – applies across the health and social care workforce

The DH TEL Framework is intended to provide guidance to both commissioners and providers of health and social care in delivering high quality, cost effective education, training and continuous development to the workforce for the benefit of patients through the effective use of technology as part of a blended learning process.

This project offered the opportunity for HEE to demonstrate strategic commitment to a nationally relevant educational project, building on several simulation related pilot projects being supported by the 'Better Training Better Care' work stream. This has enabled HEE to gain significant contextual benefit by working alongside both an established learned organisation in ASPIH and HEA to enable further engagement from policy makers and key stakeholder groups.

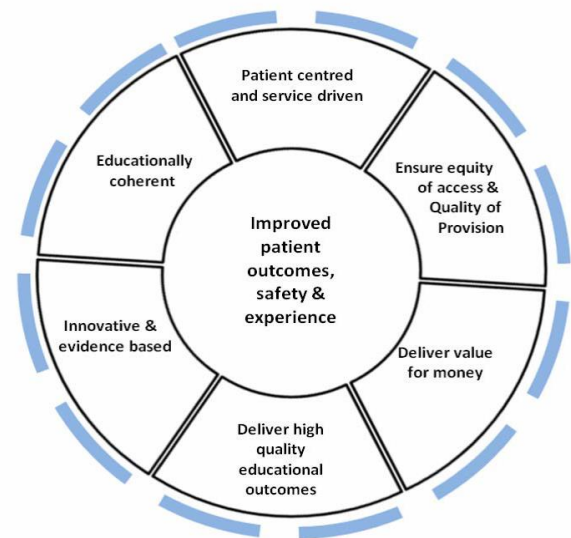


Figure 1 TEL Components

In October 2013 a new joint Technology Enhanced Learning (TEL) programme was announced between HEE and HEA. The primary goal of this programme was to oversee the development and implementation of a TEL Hub forming a single point of reference for information on simulation, e and mobile learning. Over the two years of report activity, there have been continued changes to the structure of this programme, the medical education environment and within HEE and HEA. Figure 2 represents the education environment at the time of writing.

A key deliverable of the project was the setting up and populating of a national simulation resources database (SRD) that will form a key resource for the TEL HUB.

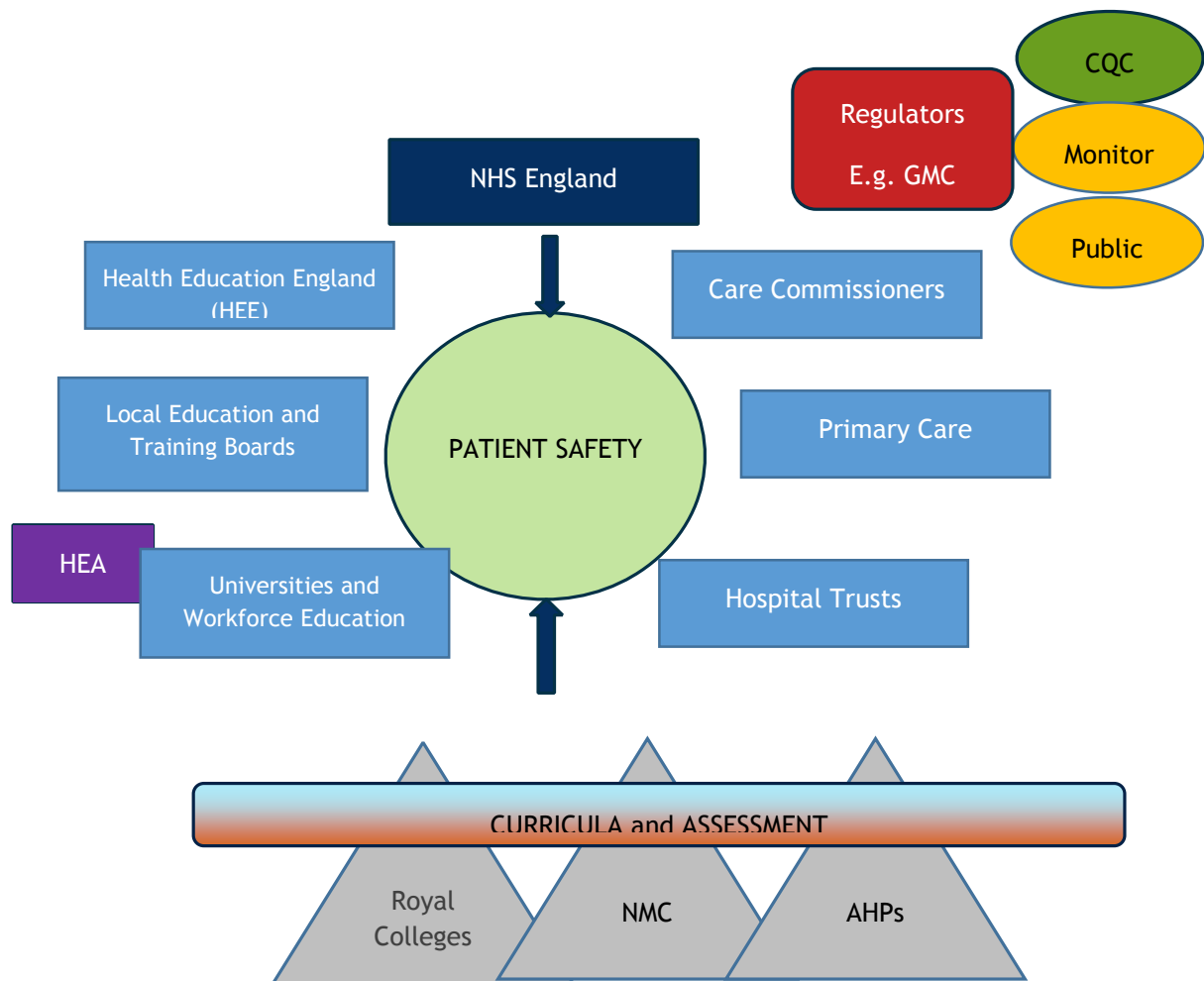


Figure 2 Representation of key stakeholders and bodies involved in healthcare education in England 2014

COMMISSIONING AND SPONSORSHIP

In April 2012 ASPIH and the HEA initiated the national simulation development project related to SBE in health and social care as a joint project; and after its initial formation in June 2012 HEE joined the partnership. ASPIH has been responsible for managing and delivering the project.

THE HIGHER EDUCATION ACADEMY (HEA)

The HEA is the UK body for enhancing learning and teaching in higher education. A team of higher education specialists and subject experts are committed to helping institutions towards their goals. The team works in partnership with universities, colleges and national bodies. This includes providing guidance and support for educators and managers, developing leadership, enabling changes at strategic or discipline levels, and investing in research that creates a body of evidence to inform and influence national policy and practice. The HEA also manages the UK Professional Standards Framework (UKPSF) that supports the development and recognition of teaching staff throughout their careers. In relation to this project the HEA has provided leadership and support predominately through their Health and Social Care team.

HEALTH EDUCATION ENGLAND (HEE)

HEE was established as a Special Health Authority in June 2012, taking on some functions from October 2012, before assuming full operational responsibilities from April 2013. HEE provides leadership for the new education and training system within the NHS in England. It ensures that the shape and skills of the future health and public health workforce evolve to sustain high quality outcomes for patients in the face of demographic and technological change. HEE ensures that the workforce has the right skills, behaviours and training, and is available in the right numbers, to support the delivery of excellent healthcare and drive improvements. HEE supports healthcare providers and clinicians to take greater responsibility for planning and commissioning education and training through the development of Local Education and Training Boards (LETBs), which are statutory committees of HEE.

THE ASSOCIATION FOR SIMULATED PRACTICE IN HEALTHCARE (ASPIH)

The simulation community can be defined as a:

Rapidly growing group of stakeholders who utilise a variety of simulation techniques for education, testing, and research in health care...to improve performance and reduce errors in patient care using all types of simulation tools including computer screen-based simulators, task trainers, human patient simulators, virtual reality, hybrid devices, and standardised patients.⁹

The Association for Simulated Practice in Healthcare (ASPiH) is a not-for-profit membership community dedicated to improving professional performance and organisational learning in healthcare through the use of simulated practice and technology enhanced learning. Established in 2009 by professionals using simulation for education, assessment and research in healthcare, ASPiH promotes the science and practice of simulation by replicating significant aspects of the real world in an appropriately interactive and immersive manner. It is the primary learned body addressing the development and application of simulation in healthcare education and practice in the United Kingdom and Ireland. The diversity of ASPiH's membership is unique and brings together a multi-disciplinary network spanning medical, nursing and associated professions alongside academics and leaders from outside healthcare, all of whom have a shared interest in the current and potential future uses of simulation and technology based learning modalities.

ASPiH is regarded by other simulation and educational organisations as one of the most developed National Associations. ASPiH seeks to connect those working in healthcare with technologies that support continuous learning to improve patient safety. ASPiH interacts with a wide variety of organisations and other associations around the world and provides expertise and information to the UK community, acting as a connection between global, national and local networks. (Figure 3).

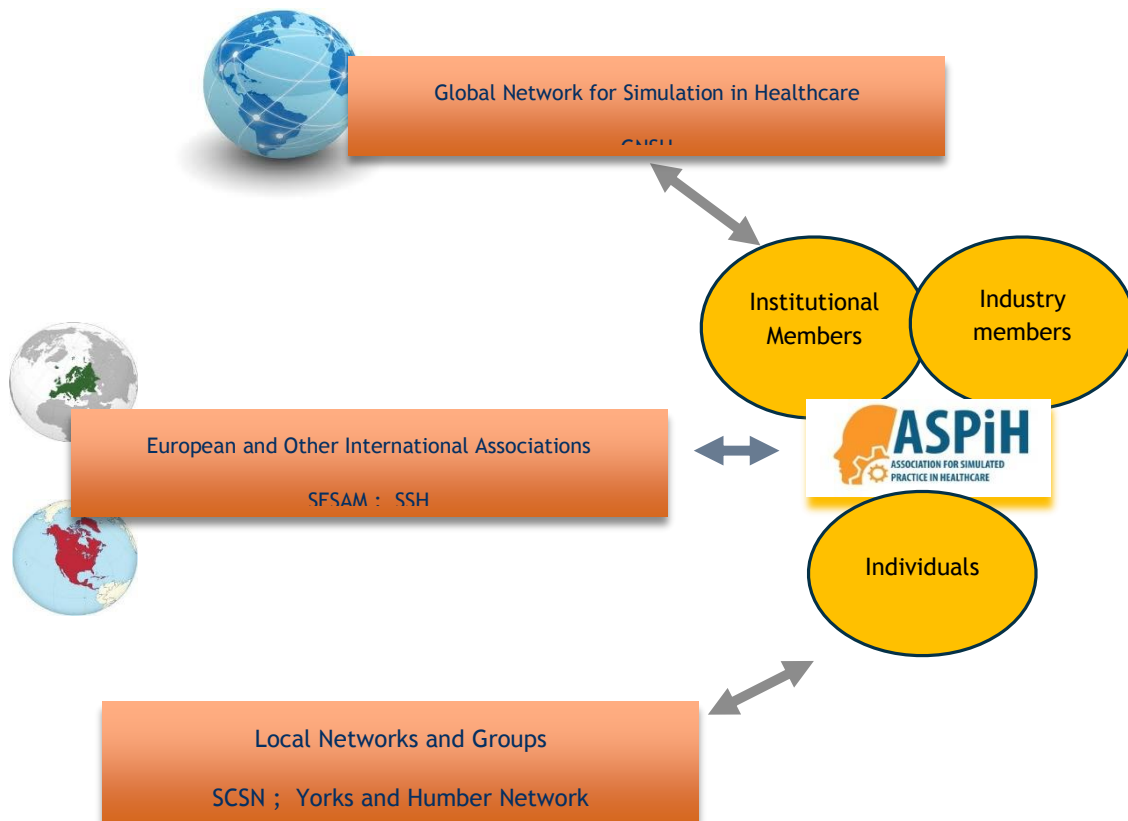


Figure 3 - The ASPIH Connections

The ASPIH Network includes the following affiliations and collaborations:

SSH	The Society for Simulation in Healthcare (North America)
ASPE	The Association of Standardised Patient Educators
INACSL	The International Nursing Association for Clinical Simulation and Learning
SimGHOSTS	The Gathering of Healthcare Simulation Technology Specialists
ASME	Association for the Study of Medical Education
AMEE	Association for Medical Education Europe
SESAM	Society in Europe for Simulation Applied to Medicine
GNSH	Global Network for Simulation in Healthcare
BACCN	British Association of Critical Care Nurses
CAIPE	Centre for the Advancement of Interprofessional Education
ASSH	Australian Society for Simulation in Healthcare
SCSN	Scottish Clinical Skills Network
IEHF	Institute of Ergonomics and Human Factors
CHFG	Clinical Human Factors Group

ASPiH receives income from membership (corporate, institutional and individual) and an Annual Scientific Meeting. The latter has become the major scientific meeting for simulated practice in the UK and now attracts over 400 delegates. Abstracts and submissions from this meeting inform some of the analysis within this report.

REPORT RESEARCH METHODS

The project gathered data from a number of sources as follows:

NETWORK DEVELOPMENT	including the ASPiH membership, local networks and the information from Simulation Development Officers (SDOs),
SURVEYS and MARKET ANALYSIS	data from on-line questionnaires from faculty and educators in addition to market research data
CASE STUDIES	via the SDO network and ASPiH contacts a case studies of good practice were collected to demonstrate practical examples of what is happening in simulated practice across the UK
LITERATURE REVIEWS	two literature reviews were commissioned to collate the current research evidence around SBE
OTHER SOURCES	these included group events held at national conferences, specific focus groups with invited experts and telephone surveys including a specific project contacting all medical royal colleges to ascertain if they had a simulation lead or could provide data on their simulation strategy. Expert opinion was also provided by the ASPiH Executive committee throughout the project.

A more detailed summary of these methodologies and strategies is included as Appendix 1.

OUTPUTS AND RESULTS

SUMMARY OF OUTCOMES AGAINST ORIGINAL DESIRED OUTPUTS

OUTPUT	OUTCOME
Establish a network of Simulation Development Officers (SDOs) to develop and feedback back on communities of practice;	<p>Network established. Some SDOs did not engage. Others developed good local networks but were hampered by time allocation and difficulty in finding key contacts. They did</p> <ul style="list-style-type: none"> • identify providers/commissioners within their region • identify and share previous scoping data that had been carried out within regions or other networks • establish links with regional networks and contacts (old and new) to help raise awareness of the project • populate the simulation resources database
Establish links with the incoming educational commissioning framework at a national and local level, i.e. via HEE and the LETBs within England;	<p>A database of 1123 contacts was established to whom the initial scoping questionnaire was sent. This database is being combined with the ASPIH members list to provide contacts for the TEL HUB,</p> <p>Re-organisations did hamper contact development.</p>
Produce a professional standards framework for educators (faculty) involved with SBE that is applicable across institutional and professional boundaries, and which includes recommendations for set outcomes, criteria and monitoring processes;	<p>Not completed but platform work undertaken. There are several groups within the UK and Internationally developing or using standards in SBE. ASPIH is involved in several of these initiatives.</p>
Map relevant sections of the emerging or published education outcomes framework to the standards described for SBE;	<p>This awaits the outcome of ongoing discussions on SBE standards.</p>
Produce a sustainable and dynamic database of existing practice that enables stakeholder organisations to participate in strategic and operational communication with SBE communities of practice across the UK at all levels;	<p>Combining data from the SDO network and ASPIH membership database will provide this resource and be delivered through the TEL HUB</p>
Deliver of a series of workshops, stakeholder meetings and dissemination events across the UK to seek engagement, encourage open discussion and develop consensus in support of the project aims, including opportunities for student, public and patient involvement;	<p>Three workshops have been held at National meetings and two focus groups have taken place that inform this project report. Public participation has been identified as an area for development.</p>

Table 1 Summary of Outputs and Outcomes

SURVEYS AND MARKET ANALYSIS

WIDER CONTEXT - SIMULATION CENTRES AROUND THE WORLD ¹¹

As part of an ongoing partnership with the British Medical Journal to develop a peer review journal for SBE and TEL, ASPIH and the BMJ conducted some research into the global market for advanced simulation. Results are presented here to provide global context for the UK work in SBE. Figure 4 provides a summary of the data.

US TOTAL: 995		Canada and South America TOTAL: 113			
Europe TOTAL: 214					
UK	87	Germany	53	Netherlands	9
Sweden	9	Italy	8	France	5
Portugal	5	Norway	5	Hungary	5
Spain	5	Ireland	4	Switzerland	4
Austria	4	Poland	3	Finland	2
Turkey	2	Belgium	1	Israel	1
Slovenia	1	Turkmenistan	1		
Australasia TOTAL: 30					
Australia	24	New Zealand	6		
Asia Pac TOTAL: 205					
Japan	66	China	57	South Korea	20
Taiwan	11	Philippines	9	Singapore	9
Hong Kong	7	Saudi Arabia	7	India	6
Malaysia	6	UAE	2	Kuwait	2
Brunei	1	Jordan	1	Oman	1
Africa TOTAL: 8					

Figure 4 - Advanced simulation centres by region/country

Alternative market size estimates the total number of medical simulation centres worldwide at approx. 250 due to differences in definitions (medical simulation centres can range from the very basic to the very complex). Simulation centres appear to be being built at a quickening pace worldwide. During a one week period in September 2012 the opening of two centres was reported in the US and the donation of \$7.1 million to open another facility in 2013. Earlier in June, the University of Texas in San Antonio opened a new \$3.9 million Simulation Centre and Clinical Learning Lab for its School of Nursing, and in Australia a \$1.3 million

mobile simulation centre is expected to revolutionise the way clinical training is delivered in regional and remote areas of New South Wales. The embryonic Sidra Medical and Research Center's Clinical Simulation Center in Qatar, promises to be one of the leading facilities in the world. Dubai has also been touted as a potential hot spot for emerging medical simulation activities.

SIMULATION RESOURCES DATABASE (SRD)

The development of a single resource of equipment, courses etc. is being collated for populating the new TEL HUB. Sources of this data include:

- ASPIH Membership database
- Local network data e.g. Yorkshire and Humber network
- Data gathered from the SDO network including key LETB contacts
- Industry
- Survey responses
- ASPIH Annual Conference 2014

The data will be accessed via the TEL HUB after launch in 2015.

NATIONAL SURVEY OF FACULTY AND EDUCATORS

The participating institutions were:

Core Business	Number
Higher/Further Education	69
Hospital Based Care	126
Hospital and Community based care	8
Primary Care / Community Services	14
Ambulance Service	2
Military	1
Educational or Clinical Care Network	5
Educational Commissioning body	4
Professional body	1
Learned Society	0
Regulatory Body	0

The survey results are contained in full in Supplementary Report 2. The following table summarises the key question subjects, findings from the hospital and higher education sectors and some associated comments:

Question	Key Findings Hospital	Key Findings HE	Comments
Current Use of Resources	60% use simulated patients 77% have full body or advanced simulator manikins 31% have advanced procedural systems with haptics	81% use simulated patients 80% have full body or advanced simulator manikins 25% have advanced procedural systems with haptics	Use of SPs in HBC should be increased The availability of human patient simulators is good in both sectors The availability of advanced haptic based systems for skills training is poor
Type of Resources	Virtual reality and advanced trainers were the least used resources.	Virtual reality and advanced trainers were the least used resources Life support and simulated patients highest use.	The cost of high fidelity VR simulators was a barrier to adoption. The reality of many systems is now sufficiently high to enable effective training and assessment of complex skills
Workplace Settings	50% advanced sim suite 80% use in situ	49% advanced sim suite 38% in situ	Hospitals increasingly see the value of in situ simulation
Target Audiences For SBE	Nursing staff and trainees are the largest users of SBE. 19% of centres do some training of managers	Greatest use in undergraduate training for nurses and medics.	Wide engagement in the NHS, particularly of consultants and higher grade practitioners is poor.
Patient Involvement	29% have none	48% have none	The involvement of patients may be via using in scenarios rather than in helping design appropriate training.
Capacity Use	Only 14% in full use with no spare capacity	Only 16% in full use with no spare capacity	Much equipment is not used at all or to technical capacity and there is considerable spare training capacity available in both sectors. Faculty availability is affecting capacity.

Register of activities	14% have none	38% have none	This partially explains the deficits in this report and the difficulty of obtaining outcome data.
Formal mechanism for sharing of resources	25% no	18% no	Sharing would lead to efficiencies and avoid artificial competition between institutions.
Are you a member or access to a local support network? Do you have access to a network?	51% yes, 27% no but would like a network	43% yes, 35% no but would like a network	Regional and local networks are an effective and efficient way of driving national strategies
Do you have an Identified simulation lead?	85% have named lead or leads	81% have named lead or leads	Many institutions have more than one lead, usually departmental, that do not communicate across the institution or across disciplines
Is Interprofessional learning supported in your institution?	64% not supported at all or only occasionally	43% not supported at all or only occasionally	A cultural change is required to increase ipl Including SBE could provide part of the solution. There remains a disconnect between nursing and medical training
Do you provide specific training for SBE educators?	Only 26% work exclusively or regularly with SBE	Only 30 work exclusively or regularly with SBE	A key issue – faculty training and availability was the MAJOR issue facing most respondents
What time resource do your faculty have?	One third spend less than 25% of their time on SBE	Over two thirds spend over 75% of their time on SBE	Faculty are mainly experienced educators who apply standards from other educational settings to SBE calling into question the need for standards specifically for SBE
Job Plans	60% not or only partially supported	63% fully supported	Education requires resourcing and support from managers and institutions

Faculty Preparation Programmes	Only 11% compulsory	Very low response rate < 5% compulsory	Very low rates give weight to concerns regarding quality assurance in SBE
Feedback metrics for performance evaluation	Self-reflection or feedback on the day. 53% peer or faculty feedback	Self-reflection or feedback on the day. 55% peer or faculty feedback	Feedback is vital to maintain quality of course delivery
Annual appraisal inc. SBE	50% either not done or not annually	70% done annually	Requires improvement and SBE being recognised as a skilled educational practice
Fellowship programmes	46% have them	11% have them	Where they have been introduced they have been successful in driving research in SBE
Technical Support	33% of faculty have little or no technical support	17% of faculty have little or no technical support	The role of technicians/SBE specialists is vital in ensuring equipment and facilities provide a good ROI.
Barriers to SBE expansion (HE and Hospital)	<ul style="list-style-type: none"> • Faculty time • Learner time • Time for SBE exercises • Release from job environment • Scenario development time • CPD recognition • Cost/funding of equipment • Lack of management buy in 		

Table 2 Survey Report Summary

LITERATURE REVIEW

In March 2014 the project team began two parallel literature reviews to provide a concurrent evidence base for this report, and to set the context against which current practices could be gauged. This had specific librarian support external to the project, and two separate small groups were selected from the SDO network and ASPIH community to complete these reviews.

The topics for the two reviews were:

- What types of evidence are available to support the use of simulation based education in improving patient outcomes?
- Review of faculty preparation and development for simulation-based education

These topics were chosen because they met with the original project aims, linked with key principles (DH TEL Framework) and their relevance had been further emphasised from interim analysis of scoping data and discussion with the wider community of educational commissioners and providers at engagement events.

A summary of the methodology is included in Appendix 3 and the surveys are explored in full in Supplement Document 2.

CASE STUDIES

Some questionnaire respondents were asked to provide exemplars of effective practice across a spectrum of SBE in different healthcare contexts. These were collected using a predesigned template to allow easy comparisons across case studies. The case studies were also mapped against key statements and principles of good practice identified within the DH TEL Framework and the NHS Educational Outcomes Framework to demonstrate direct links between SBE practice and key reference documents. A final series of outlining case studies was sought from established faculty development programmes identified through the scoping data, or from known international colleagues. Supplement 3 contains these studies and associated analysis.

DISCUSSION AND RECOMMENDATIONS

DISCUSSION

GENERAL COMMENTS

It is clear SBE is now established as an important tool in the armamentarium for training and assessing healthcare practitioners. We found many examples of excellent practice across the country at local and regional levels but lack of national strategies lead to inefficiencies and variability in standards. In 2014 ASPIH hosted a 3 day conference for the Global Network for Simulation in Healthcare (GNSH) and the discussion with colleagues from around the world (academic and industry) demonstrated many of the issues and possible solutions referred to in this report are to be found in other countries.

MAPPING RELEVANT SECTIONS OF THE EMERGING EDUCATION OUTCOMES FRAMEWORK TO THE STANDARDS DESCRIBED FOR SIMULATION BASED HIGHER EDUCATION

The Education Outcomes Framework (Department of Health, 2013) published in March 2013 is intended for use in the promotion and measurement of improvements in education, training and workforce development; ultimately the aim is for improvement in the quality and safety of services for patients. In some areas it overlaps the DH TEL Framework because of these aims. Both of these publications call for the highest standards of education and training that are pedagogically coherent and innovative. As part of this project case studies were collected from a number of respondents and a matrix produced that cross references the case studies to both the Educational Outcomes Framework and the TEL Framework (See Appendix B, Main Report). A separate table is included below which links the Tel Framework recommendations to this project's outputs and findings to date.

Patient Centred and Service Driven	
1. Learning skills in a simulation environment or with other learning technologies before performing in practice	The principle would appear to be a very likely expectation at undergraduate / pre-registration levels. We cannot comment about likelihood of adhering to this at postgraduate / qualified practice levels but the lack of provision of some VR simulators is hampering this aim
2. Healthcare and education providers should identify a lead to support access and appropriate use of resources	Data suggests this is still inconsistently achieved across and within institutions, with no common or easily identified role in different HEI or NHS organisations.
3. Purchasers of learning technologies should review and confirm requested additional resources meets the needs of patients and service	There are currently no commissioning standards for SBE, and data demonstrates that formal evaluation of achieving learning outcomes with any external or peer review is uncommon at present. An improving and more professional relationship with industry might strengthen opportunities to meet this recommendation in the future.
4. Students and learners should have appropriate access to systems to manage, record and evaluate their learning	The lack of a consistent and accepted procedure for evaluation of training was identified. Experience of the authors and project advisors suggests such systems are multiple in number and their use is driven according to requirements of institutions or professional bodies for QA purposes as much by learners to evaluate their own progress rather than in QC of the course delivery/content
Educationally coherent	
5. (a) Organisations involved in curriculum development or learning frameworks should have a strategic lead for TEL	As for (2) above, there is inconsistency about having a named TEL lead in NHS organisations where workforce development needs are identified and which might be simulation based. It is also not clear if this expertise currently exists consistently at the commissioning level, and our experience when contacting the medical Royal Colleges is that there is sometimes uncertainty in identifying individual strategic leads.
(b) Being able to recommend role of simulation or another learning approach in support of learning and assessment within curricula, and able to facilitate opportunities for multi-professional or inter-professional learning where possible	Opportunities for IPL and shared access to resources at HEI and NHS facilities have been demonstrated although survey responses suggest a much lower adoption. A series of case studies have been identified to illustrate successful examples of IPL. Future development of a template and mechanism to share these directly or indirectly via the TEL Hub will promote opportunities for simulation based team training and IPL.

(c) Use of simulation ... should be achievable and mapped to specific learning outcomes in curricula	The report on use of simulation in Primary Care practice describes a mapping exercise undertaken by the RCGP. Similar work has been undertaken by the joint Royal Colleges of Surgeons, and by the Royal College of Anaesthetists. At a local level it is anticipated this activity could be incorporated into more advanced levels of faculty development.
(d) Blended approach to use of simulation and other learning technologies	The outcome of providing contacts and directing learning resources towards the TEL Hub will promote these opportunities.
Innovative and evidence-based	
6. Organisations should aspire to educational excellence by encouraging innovation, evaluation (including benefits realisation) and the dissemination and adoption of evidence-based, good practice	<p>There is evidence that in some areas evaluation is being undertaken that can be linked to changes in practice, which will be more likely in those institutions that support educational Fellowships linked to simulation resources / facilities. A series of case studies have been identified to illustrate successful examples of evaluation and impact. A literature review has focused explicitly on publications that provide this level of evidence.</p> <p>ASPiH seeks to promote dissemination and adoption of good practice through its conference programme and will further promote this when the new journal (BMJ Simulation and Technology Enhanced Learning) is launched formally.</p>
Deliver high quality educational outcomes	
7. Clear statement of the purpose of the facility, equipment or content, target group(s), learning outcomes and appropriate guidance on use.	Data collated regarding purpose, resources, and learner groups in general terms. It is anticipated that formal statements and detailed accounts of these factors will form part of any future standards framework for SBE facilities.
8. Organisations should ensure educators/trainers are competent to use the required simulation facilities/equipment/e-learning and other technological tools	<p>Majority of HEI and NHS sector does not address this recommendation satisfactorily. Data suggests that in most cases faculty development in SBE is recommended but not compulsory.</p> <p>With regard to familiarisation and training in use of equipment/resources, data was presented regarding access to dedicated technical support for more advanced equipment. There are still gaps in this provision, thus placing an extra responsibility on faculty.</p>
Deliver value for money	

9. Organisations should work collaboratively to share resources, to maximise purchasing power and increase opportunities for multidisciplinary and interprofessional training across the entire care pathway.	<p>Data suggests that this is happening in some NHS facilities and HEI's, more so in NHS organisations. A series of case studies have been identified to illustrate successful examples of IPL.</p> <p>There are examples described in the literature regarding use of simulation to test systems and help enhance team training or IPL that focus on transitions and handovers of care, whether within institutions or between community and hospital settings</p>
10. (a) A national register covering e-learning modules, simulation scenarios and toolkits should be maintained to provide the facility to search for existing tools or projects in development.	Data suggested that many HEI and NHS institutions do not keep a rigorous register of activities that they provide, although many acknowledged the benefit of a national register that could be accessed to support local SBE. The majority of project contacts agreed for their details to be registered with the TEL Hub, and it is anticipated this will provide a purpose made vehicle to address this recommendation.
(b) Organisations, either individually or working collaboratively, should search the register before developing or procuring any new technologies to support learning to reduce duplication and secure value for money.	As above.
Ensure equity of access and quality of provision	
11. Content to support e-learning on computers or mobile devices should be developed according to agreed technical standards to ensure easy access across different learning management systems	<p>Not addressed under the remit of this project.</p> <p>However, some data and discussion at engagement events highlights that practical limitations are often encountered in relation to NHS IT firewalls and local policies.</p>
12. Organisations should ensure that they can demonstrate equity of access and quality of provision through effective local educational governance mechanisms considering feedback from students, trainees and staff, and to the satisfaction of the relevant professional regulator.	<p>Data does reinforce that SBE is delivered to different learner groups according to training needs and the corresponding requirement to access appropriate resources, although we did not explore this in detail at this stage. This would form part of any future commissioning standards.</p> <p>The data also demonstrates a number of feedback mechanisms are being employed in order to gain feedback from students/trainees and staff.</p>

Table 3: Mapping data from scoping questionnaire and wider intelligence against the TEL Framework principles and recommendations

Some of case studies in Supplementary Document outline several established faculty development programmes currently offered across the UK, with one comprehensive case study describing a national model used in Australia.

ANALYSIS AGAINST ORIGINAL TARGET OUTCOMES

IMPROVE THE CURRENT UNDERSTANDING, DESCRIPTION AND MAPPING OF HOW SBE IS BEING INTEGRATED INTO EXISTING CURRICULA BY AND FOR HEALTHCARE PROFESSIONS

The project has identified several examples of how simulation is being integrated into existing curricula, primarily in postgraduate specialty training in surgery, medicine, anaesthetics, paediatrics, and general practice and is increasingly applied within most pre-registration medical and nursing degrees. SBE is being used on a widespread basis in formative and summative assessment processes across HEI and NHS sectors, although there are differing levels of simulation practice across profession groups and low fidelity activity e.g. role play and use of actors, has been applied for a number of years though not under the title of simulation based education.

There is a significant variation in how such strategies are implemented, with gaps and deficiencies in local leadership and the co-ordination of resources; any commonly agreed standards of practice against which commissioners can monitor quality and optimal use of SBE resources is lacking. Hence, development of quality assurance processes against clear and purposeful standards that translate across HEI and NHS sectors is the ideal route to develop optimal use of simulation-based education in healthcare to maximise the impact and enhance the evidence-base available. A previous CMO Report⁷ recommended a named simulation lead was identified within organisations, including the professional bodies and at commissioning and provider levels. This has still to be achieved. Further attention is required for successful high quality education commissioning and quality assured provision of SBE linked to improved patient safety, quality of care and clinical outcomes.

ENSURING THAT SBE IS INNOVATIVE AND RESPONSIVE ABLE TO RESPOND TO THE DYNAMIC REQUIREMENTS FOR FLEXIBLE LEARNING AND FUTURE EMPLOYABILITY OF NEWLY QUALIFIED PRACTITIONERS

This project has provided insights into the uses of simulation based education across institutions, how it is being accessed flexibly, and the adaptations made to meet local and national needs. From an educational perspective SBE should be seen as an innovative pedagogy that has significant potential for the redesign of curricula and the creation of curricula that can make significant contributions to the skills and competencies of future graduates. The application of SBE across communities of academia and practice based learning provide a 'step change' opportunity for real creativity in student learning, creating an environment for multi-professional developments that have a genuine impact on patient care and enhancement of standards.

The next important step will be to link current activity with emerging or new workforce planning strategies that relate to national workforce policy. This work should be aligned with developments in Greenaway's Shape of Training Report¹², which addresses future postgraduate and specialty medical training.

The GMC conducts an annual National Training Survey of doctors in training to identify the access to educational resources and well-supported learning environments. SBE is one of the indicators in which they have a particular interest; and this has provided a key indicator that access is improving but is not necessarily equitable on a regional or institutional basis.

There is existing evidence from the Better Training Better Care program, exemplified in several of their local implementation pilots, of how simulation has been used to generate improvements in education and training, and clinical practice¹³. Such initiatives should be considered strategically in order to benefit flexible learning and support newly qualified practitioners at any subsequent career transitions that they encounter.

The disconnect between under and post graduate education in medicine is apparent although the nursing profession has addressed this issue effectively.

SBE also has a role in other areas including trouble-shooting, correcting medical errors, standardisation or re-validation but the awareness of the potential in these arenas seems poor.

FACULTY

This report highlights that the provision of well trained and resourced faculty are the key to delivering high quality SBE though there is considerable variation across professional areas. A common concern is that faculty are not suitably supported either with time, training or funding. Additionally, formal development of the faculty for SBE is not promoted. The Inventures report commented that validating trainers or training faculty was felt to be desirable by most stakeholders. However, with no explicit benchmarked standards or guidance, it is difficult for educators to demonstrate standardised professional competence. This report provides strong support for this work to move ahead. Most faculty are medical or nursing educators who already use guidelines for best practice and educational governance outside SBE.

The very phrase ‘faculty’ may not be familiar to practitioners beyond medical education and nursing and allied health academics may well be required to accommodate SBE into their existing role as lecturers or clinical tutors. The development of SBE is often seen as a sub set of skills for such professions and the development of SBE should be expanded and enhanced for such groups in order to maximise pedagogic impact within such professions.

DEVELOP A PRACTICAL AND RELEVANT APPROACH TO QUALITY ASSURANCE IN SBE THAT WILL INFORM FUTURE COMMISSIONING OF HIGH QUALITY EDUCATION FOR ALL HEALTHCARE PROFESSIONALS

The commissioning process needs to link to a high quality educational practice evidence base. The two literature reviews that have been conducted as part of this project give a solid foundation against which high quality SBE can be referenced. In order to develop a practical and relevant approach to quality assurance there must be clear standards of practice that are applicable across both HEI and NHS sectors. This will give a common approach and consistent accountability, linking the design of SBE programmes to the formal evaluation of their outcome.

Engagement in developing these standards should be a shared responsibility of the SBE provider community working with relevant stakeholders amongst the regulatory bodies, professional organisations and education commissioners. It would be valuable to link this project with the care commissioning processes and organisational regulators (e.g. Care Quality Commission) to emphasise the shared benefits of applying simulation to patient safety, quality, and systems improvements within healthcare organisations. Establishing this shared approach across the commissioning processes will encourage and accelerate describing the relationships between the educational and clinical outcomes.

ACCELERATE THE DEVELOPMENT OF ‘COMMUNITIES OF PRACTICE’ IN SBE ACROSS INSTITUTIONAL AND PROFESSIONAL BOUNDARIES;

NATIONAL AND LOCAL NETWORKS

Although there are excellent networks in some regions there are still barriers to shared resources, networking opportunities and collaboration. Organisations may not identify a clear lead for SBE, or have several who do not communicate across disciplines, and although ASPIH provide a national forum for exchange and dissemination more funding and resources are required to ensure efficient sharing of best practice. In larger institutions it was apparent that different departments did not appear to know what else was going on in the institution let alone in the wider region.

Notwithstanding these issues, there are effective communication and academic networks *within* the simulation community itself. These support networks are needed to promote inquiry, innovation and dissemination of ‘appropriate’ practice (whether perceived or proven) locally, regionally and nationally. These academic and operational networks could be developed further.

The SDO network proved valuable in helping access some case studies and reports from local networks, with information willingly shared from, for example, Yorkshire and Humber, the North East, North West and West Midlands regions of England, and the Clinical Skills Managed Education Network in Scotland. These reports helped build intelligence in the regions, although their individual remit and formats of presentation varied significantly. The Yorkshire and Humber Skills Network is widely regarded as an example of how to build a sustainable local community. Some details are included in Appendix 4

The establishment of the SDO network created new communities within regions and enabled accelerated development of new relations across institutional and professional boundaries. There now exist new communities of practice in many regions that continue to develop and grow. These communities of practice have enabled sharing of expertise, faculty and environmental resources with members being drawn from across HEI and NHS sectors (see Case Study 26, Supplementary Report 3).

The SDO network will develop into a new ASPIH Regional Representatives (ARR) network in 2015. It is anticipated these individuals will be based in all LETB areas and act as a conduit for information gathering and dissemination to maintain and develop the information gained in this report. They will also act as local ambassadors for HEA and for the TEL HUB.

STRENGTHENED RELATIONSHIPS BETWEEN THE HEA AND POLICY MAKING ORGANISATIONS INFLUENCING WORKFORCE DEVELOPMENT, EDUCATION COMMISSIONING AND QUALITY ASSURANCE

This project has acted as one of the foundations upon which HEA has developed and strengthened its relationships with HEE and NHS Education Scotland. HEA is now working in partnership with HEE on the national TEL Programme, a major initiative that will benefit workforce development in health and social care across the UK. From this project there has been contact between the HEA Health and Social Care Lead and senior representatives of various regulatory and professional bodies through the joint TEL Programme. This has occurred across the nation states of the UK despite HEE being focused in health and social care in England.

The SDO network comprises colleagues from across the HEI and NHS sectors, with the majority being HEI based (68%). During their interaction with many institutions and colleagues based locally and nationally they have raised the profile of the HEA across both sectors, but predominantly in the NHS, where knowledge and understanding of the HEA is sometimes limited or absent.

STANDARDS, QUALITY ASSURANCE AND DEVELOPING EVIDENCE OF IMPROVED OUTCOMES

There is a clear need to develop a stronger and more robust approach to the quality assurance of SBE. This requires suitable indicators or metrics to be agreed, relevant to the educational providers (for formative development purposes), and for commissioners to ensure ‘value’ and return on any investment.

There is a need for further high-quality research into SBE to establish what constitutes best practice, and so help define what constitutes ‘appropriate use’ of simulation in healthcare education. Further translational research could explore the impact of simulation on clinical services and provide better linkage between educational and clinical productivity.

Longitudinal research is required to identify the long term effect of SBE on a practitioner's clinical practice and capabilities. There is evidence of skills decay following undergraduate study¹⁰ and SBE in postgraduate education may be used to offset deprecation in performance.

ROYAL COLLEGES

The medical Royal Colleges are responsible for defining curriculum and education, (re)validation and standards in their specialties. Responses to telephone contact were received from the Ophthalmologists, Pathologists, and Paediatricians, the Royal College of Physicians of Glasgow; a verbal update was provided by the Royal College of Physicians (England). However, it is known that several other colleges (Surgeons, Obstetrics, and Anaesthetics being the most prominent) have simulation programmes and, in the case of RCS England, their own simulation suite within the College premises.

A number of the colleges for Pathology, Psychiatry, Radiology responded that they did not carry out any SBE; it may be the language being used creates potential misunderstandings. The Royal College of Ophthalmologists has an exemplary model based upon a register of all simulators across the UK, a blended learning programme incorporating these and recently a mandatory simulation based training programme allied to their competency framework. They also have a clear simulation lead and associated colleagues that drive the SBE agenda.

Other professional organisations and stakeholder groups became aware of and interacted with SDOs or ASPIH executive throughout this project, examples include NHS Employers, Skills for Health, and the Patients Association.

ENSURING APPROPRIATE LINKS ARE MADE WITH ACTIVITIES ACROSS THE SPECTRUM OF E-LEARNING AND MOBILE LEARNING TECHNOLOGIES

This project began before publication of the DH TEL Framework, which explicitly linked current use and future development of simulation, e-learning and mobile learning technologies to a key set of principles and recommendations that would combine to improve patient safety, quality of experience, and clinical outcomes.

The project outputs will be shared with the Strategy Group and various working groups of the TEL programme to integrate findings and to support future focused work that arises from its recommendations. It is anticipated that a requirement to continue scoping and sharing simulation-based practices and resources will emerge; this project's infrastructure will provide a solid platform upon which to develop this activity.

The SRD will be launched as part of the TEL HUB but will require ongoing maintenance to ensure the information it contains is up to date. This will require engagement of all providers of the data to continue to provide information to ASPIH as the primary guardian of this resource.

RECOMMENDATIONS

URGENT

1. National standards or guidance (as a complement to existing professional standards) for those educators delivering SBE are urgently required. We recommend that any on-going standards framework development includes strategic leadership and support from HEE, ASPIH, NES, HEA and AoME. Input should be sought from the relevant professional bodies and should take into account existing UK and international models currently in use. Future work should address the evidence that demonstrates successful completion, and subsequent progress from novice to expert; and will provide guidance on a portfolio approach to evidence that demonstrates the standards are being maintained through an

appraisal process, or similar. This could also be an opportunity to establish support and a clear professional development pathway for those seeking to pursue scholarly development, or broader leadership qualities in SBE.

2. Funding, training and management support for faculty requires urgent attention. The availability of well trained, prepared and time resourced educators using SBE resources should be a key target for HEE, Local Health Boards, PSRBs (Professional Statutory or Regulatory Body) and Health education commissioners. The availability of faculty is also one of the key constraints limiting full utilisation of SBE resources. We recommend a national funding framework to support those delivering SBE and associated recognition in job plans and career portfolios.
3. The development of guidance for SBE in relation to patient safety and human factors training. There needs to be a national lead to ensure all those delivering SBE recognise and deliver effective human factors training by using simulated environments to drive home team skills, leadership and other key issues that affect patient safety. Human factors training provision should be a key criteria for commissioners of SBE. HEA and HEE should also develop a specific programme for SBE team training for medical, nursing and AHP students.

OTHER RECOMMENDATIONS

1. The production of the SRD will provide a key platform for the TEL HUB simulation stream Development of a system to ensure the data it contains is dynamic and up to date is required to enable improved sharing and co-ordination of SBE training. The development of a successor to the SDO network should be supported with local ASPIH Regional Representatives (2 per LETB region in England, 2 in Wales and 6 in Scotland) linking to TEL leads and local networks. This programme requires specific central funding and should be co-ordinated by ASPIH in partnership and in parallel with the development of the TEL HUB.
2. Drive the production of high-quality pedagogic research evidence supporting investment in SBE. The new BMJ Simulation and Technology Enhanced Learning Journal should be used to drive an increase in the quality and quantity of SBE research.
3. Improved funding for the National Association (ASPIH) to facilitate the gathering of global information and passing on to organisations and linked local networks. The sharing of best practice from other countries would improve efficiency and reduce costs and ASPIH should continue to promote the NHS/UK as a leader in the field of SBE.
4. Increase availability of medium and high fidelity systems for skills training, focusing on systems to support those curricula that mandate or recommend simulated practice.
5. Improve public and patient involvement in SBE, focusing on course design, communication skills and safety improvements.
6. Funding to support grant applications for research should be made available to establish robust evidence for impact of SBE on performance, patient safety and error reduction.
7. A well-resourced national association for SBE is required to help develop the TEL hub, keep its content up to date and deliver some of the recommendations of this report. Central funding support to ensure ASPIH and associated local networks are sustained is recommended. These networks should be targeted to ensure inclusion of all relevant organisations in the SBE community.

8. Educate and inform regulators about the role and value of SBE. Include PSRBs to assure engagement with nursing, allied health professions and social care groups. This will assure greater recognition of SBE within all professional areas and assure take up by health and social care communities.
9. A centrally co-ordinated and funded programme of purchasing high-fidelity simulators should be introduced. This would improve efficiency, reduce costs and ensure competencies based around SBE in craft medical specialities and other disciplines can be delivered.
10. The promotion of the TEL hub should increase awareness of resources but there are other strategies to ensure spare capacity of simulation resources is exploited. These include:
 - co-ordination with suppliers regarding training for practitioners and improved parts availability and technical support
 - business case development showing cost and patient benefits to commissioners and trust/university managers
 - awareness of equipment and course availability via tel hub
 - database of faculty skills and availability
 - a co-ordinated programme across royal colleges to make simulation based competency assessment compulsory. The NMC mandatory programmes need to be co-ordinated with this.
11. A national course certification system should be developed that would include patient input to course design and an on line quality feedback system for all participants of SBE programmes. This system could also gather quality control information centrally around national programme delivery. As an independent body it is recommended that ASPIH are funded to undertake this initiative.
12. Introduce a funded programme or competition focusing on 'other' simulated environments seeking genuine innovation within SBE, acting as a catalyst for integrated care SBE across health and social care communities.
13. HEE should drive the development of a specific programme for SBE team training for medical, nursing, allied health and social care students ensuring all receive as many opportunities for multi-professional training as possible.

SUMMARY

This project has produced the most comprehensive scoping of current SBE practice across HEI and NHS sectors of healthcare, albeit with some themes and communities of practice better represented than others. However, the methodology has been established to complete the data collection, and the survey remains open and supported by ASPIH. It is anticipated that dissemination of the project's outcomes and publication of aspects of the data, along with increasing publicity and engagement with the TEL Hub, will garner further interest from those underrepresented areas of educational practice.

This report builds on previous attempts to understand the issues and opportunities surrounding the rapidly developing world of SBE. The development of local and national communities of practice via ASPIH linked to HEE and HEA strategies provides a platform for ensuring this important educational platform is delivered effectively and provides the outcomes seen in other industries of high reliability and safety. The initiatives and processes contained herein should be seen as interim work with some, e.g. the successor to the SDO network and information on resources in the TEL HUB, being supported for many years to come.

APPENDICES

APPENDIX 1 – METHODOLOGY DETAILS

1. DEVELOPING A COLLABORATIVE NETWORK INCLUDING SIMULATION DEVELOPMENT OFFICERS (SDOS)

The creation of a network of SDOs was central to the project to optimise access to existing institutions and groups supporting SBE and training. The initial role of SDOs was to develop a contact database of practitioners across geographical, institutional and professional boundaries, and to promote engagement with a broad survey-based scoping exercise. The geographical distribution of funded SDOs is shown in Figure 3.

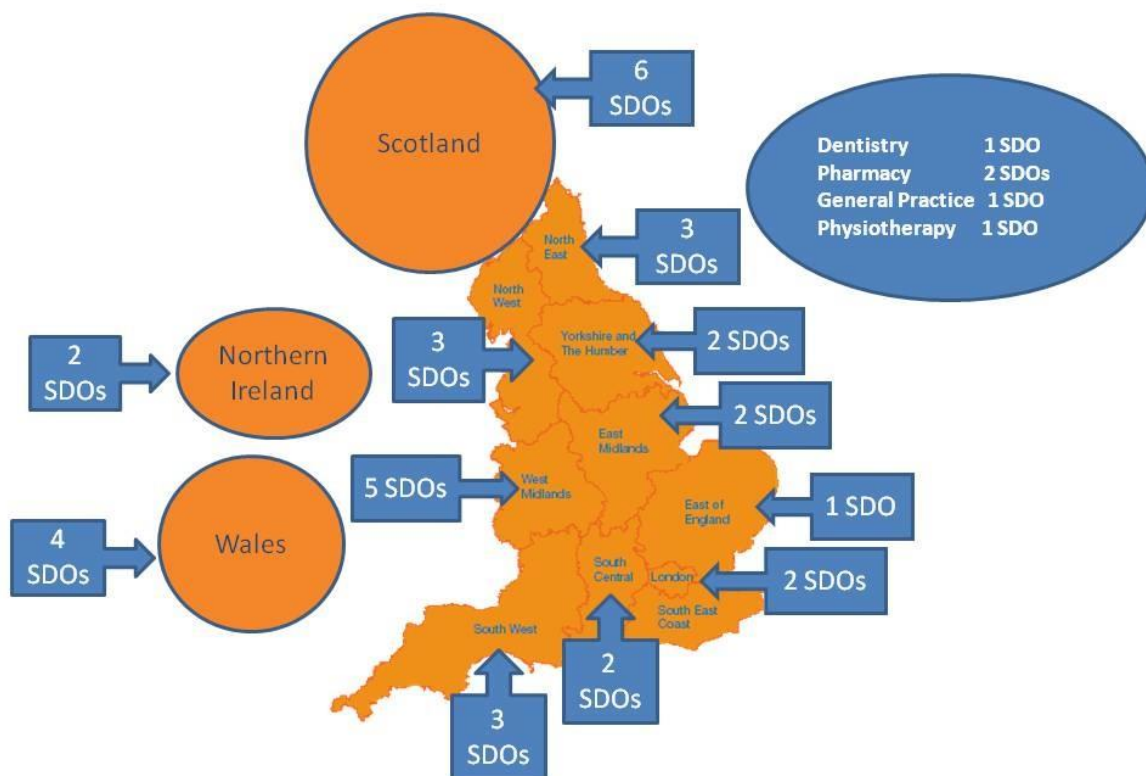


Figure 4 SDO Network

STRATEGIC AND SUBJECT SPECIFIC SDOS

Not all SDO appointments were allocated a region: some were appointed to focus on specific subject areas such as dentistry, general practice, pharmacy or physiotherapy. Areas of professional practice are better engaged through individuals on a national basis to match existing infrastructures for education and training.

In addition to the funded SDOs there were a number of individuals identified who were asked to provide a more strategic input to the overall project. These individuals were offered an advisory role and were invited to attend and contribute to key events and workshops throughout the project.

APPENDIX 2 - MEDICAL SIMULATION INDUSTRY

Simulation is a relatively small industry within the healthcare field, comprised of a large number of small businesses. As such, research is not heavily industry-funded and there is likely to be limited promotional/marketing expenditure. Sponsorship of major simulation events appears to be a popular method of industry promotion. The industry has, to date, been technology driven but is increasingly focusing on answering the needs of users and as a result a number of new players are entering the UK market.

KEY SEGMENTS

Market Segment	Description	Key industry players
Human patient simulators	Manikins plus monitors that can display simulated vital signs. Used in a range of scenarios from physical examination to major trauma. Manufacturers offer several models to accommodate specific healthcare niches.	CAE, Laerdal, Gaumard
Virtual clinical environments	1) Second Life® is the platform upon which the majority of medically oriented implementations to-date have been delivered. 2) Serious games: collaborations with the medical and military industries to create sophisticated training simulations	1) Second Life® virtual world, hosted online by Linden Lab® 2) Virtual Heroes, Inc.; TruSim
Simulated task trainers	1) 'Virtual procedure' stations (surgical simulators) designed for learning specialty procedures including endoscopic (bronchoscopy and colonoscopy), laparoscopic (general surgery, urological, gynecological) arthroscopic and endovascular (including angio and vascular access) related techniques. 2) Manikin/model based task trainers including IV arms, airway management heads, urinary catheter and pelvic exam trainers. 3) Virtual tutors: interactive simulation software for step-by-step teaching of new medical procedures	1) CAE®, Haptica®, Mentice®, Simbionix®, Surgical Science®, Simulated Surgical Systems 2) Simulation®, Simulab Corporation®, Limbs and Things®, IngMar Medical®, Laerdal® 3) SimPraxis®, WebSurg®
Performance recording	'Simulation centre management' services include digital audio/visual recording, storing and reviewing of simulation video content.	B-Line Medical®, EMS, CAE,

INDUSTRY DEVELOPMENTS

SIMULATION COMPANIES MOVING INTO HEALTHCARE FROM PARALLEL INDUSTRIES AND ACQUIRING TECHNOLOGY

CAE, considered to be the gold standard in the flight simulator industry, now has product offerings that it divides into five segments: its core aviation training and services, military services, public safety and security, mining, and healthcare. In March of 2010, CAE acquired three medical simulation product lines from Immersion and in August 2011 acquired Medical Education Technologies, Inc. for (US)\$130 million. CAE expects

that, in time, the medical simulation market will be bigger than the military simulation market. The most recent acquisition is that of Simbionix by 3D Systems Corporation for \$120 million.

PARTNERSHIPS BETWEEN LEARNING CONTENT PROVIDERS AND SIMULATION TECHNOLOGY PROVIDERS

In June 2012 Elsevier and CAE Healthcare, a leading provider of medical simulation and health care learning solutions, announced a new electronic nursing education programme. This is the first product to result from the Elsevier - CAE collaboration, announced in May 2011. Elsevier and CAE Healthcare have combined CAE's human patient simulators with Elsevier's suite of nursing simulation products, including the Simulation Learning System (SLS). This online toolkit helps instructors and facilitators effectively standardize and incorporate simulation into their nursing curriculum. The new offering features Elsevier's evidence-based scenarios programmed for CAE's METI line of human patient simulators, including an integrated electronic health record (EHR) and a library of teaching support resources to guide the student through the simulation.

Sources: [AIMS medical simulation brief](#); [Medical Simulation Technology: Educational Overview, Industry Leaders and What's Missing](#); [Elsevier press release](#); [Cantech Letter](#)

2. DESIGNING A QUESTIONNAIRE-BASED APPROACH TO SCOPE CURRENT PRACTICE NATIONALLY

From November 2012 to February 2013 previous reports and publications were reviewed to support the design of a web-based questionnaire data collection tool (Qayumi, 2012, Inventures, 2010). This tool was refined with input from some of the SDO group, the project team and the advisory group, with additional commentary from international experts involved in previous large scale reviews of SBE practice in North America. Two broad categories were defined:

Education Managers: anyone who is classed as an educational lead, manager, senior administrator, clinical lead, service manager or governance lead with a responsibility for running SBE course.

Faculty: teachers, educators, resuscitation officers, clinician or healthcare practitioner and any other professionals who teach in a simulated environment.

SUBSEQUENT REQUEST FOR DATA ACCESS PERMISSIONS WITH REGARD TO HEE TEL HUB

As the project developed it transpired that this project would be closely linked with the joint HEE/HEA TEL Programme. A key resource being a web-based portal of relevant simulation-based education and training resources. Project contacts were contacted seeking permission to register their details with the TEL Hub, and enabling them to contribute to (and benefit from) any of the total Hub resources. Therefore all respondents to the follow-up questionnaires were contacted in May/June 2014 to gain permission to share selected data, namely:

- Institution / Centre name
- Primary contact details
- Types of SBE resources (equipment) available
- Types of educational courses activities supported
- Types of learner

OTHER SOURCES OF INFORMATION USED TO INFORM THIS REPORT

ASPIH EXECUTIVE –	The executive team represents a wide range of expertise across the UK and has made significant contributions to this report.
ASPIH ANNUAL CONFERENCE –	The Annual ASPIH Conference is the premier event bringing together practitioners in SBE from the UK and abroad. Abstracts and presentations from these conferences are a snapshot of the current themes and issues in SBE and have informed some of our conclusions and recommendations.
OTHER CONFERENCES –	ASPIH members and the executive team attend other conferences including IMSH (International Meeting on Simulation in Healthcare), AMEE (Association for Medical Education Europe), ASME (Association for Medical Education) and SESAM (Society in Europe for Simulation Applied to Medicine) and the joint ASPIH/Scottish Clinical Skills Network (SCSN) meeting. This provides an international overview of trends and issues within SBE.
GNSH MEETING	The Global Network for Simulation in Healthcare is an increasingly valuable strategic forum bringing together global experts, academics, industry and national associations to collaborate and share best practice in SBE. ASPIH hosted the 2014 meeting and proceedings informed this report.
TELEPHONE SURVEYS	A specific survey was undertaken in July 2014 of the medical royal colleges including the Academy of Medical Educators. The Colleges were asked for the name of their simulation lead and for any information on their curricula development and approaches to SBE. Not all colleges were able to identify a simulation lead and others felt they did not use simulation (e.g. Royal College of Pathologists).

NETWORK DEVELOPMENT – YORKSHIRE AND HUMBER MODEL

Following an SHA review into clinical skills and simulation provision in 2008 an investment of £15-20M was made in clinical skills centres, facilities, resources, equipment, faculty and training support during the course of 2010 and 2011. It was provided for the benefit of all grades and professions of healthcare staff, and not just the medical staff.

This investment included a team of seven Strategic Clinical Skills Advisors appointed to deliver and embed the clinical skills strategic aims and objectives and ongoing funding for the Yorkshire and the Humber Clinical Skills Executive Committee, the Clinical Skills Network and Simulated Patients UK. This investment has continued to the present day.

All of the 11 Speciality schools within the Yorkshire and the Humber are expected to integrate simulation into their teaching programmes. However, simulation activity is already being seen in some of the medical specialties, including Acute Medicine, Core Medical Training and Respiratory medicine. Yorkshire School of Medicine's 2012 Simulation Strategy proposes that at least one topic of simulation training be in place for the trainees who joined the programmes in the Summer of 2012 for delivery within their first year of training, with full implementation of a range of topics for the majority of specialties by the Summer of 2013.

The priority for the School is developing SBE in Core Medical Training, to build upon the simulation training that is being embedded in medical school and Foundation training, and then to extend into ST3+ training.

Faculty

In early 2012 the Deanery supported funding for The Future Leaders Programme, which offers opportunities for HEYH trainees to do a one year “out of programme experience” (OOPE) Clinical Leadership Fellowship to help grow and develop their personal leadership skills. A number of the fellows specialise in Simulation within their chosen specialty. Their main task is to liaise with the Training Programme Directors to facilitate the introduction of simulation training to all trainees. The trainees will, in addition to developing simulation expertise, undertake a one year postgraduate qualification e.g. in leadership or medical education and engage in simulation research.

Sources: [Yorkshire School of Medicine Simulation Strategy April 2012](#);
http://www.ics.ac.uk/education/ics_ficm_simulation/ics_ficm_simulation;
<http://www.collemergencymed.ac.uk/Training-Exams/Training/Simulation%20Training/>

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http://www.shapeoftraining.co.uk/static/documents/content/Shape_of_training_FINAL_Report.pdf_53977887.pdf
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