Implementation research in patient safety: The next frontier for improving patient care?

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Collaboration for Leadership in Applied Health Research and Care South London (CLAHRC South London)



Centre for Implementation Science at the NIHR CLAHRC South London, including King's Improvement Science





National Institute for Health Research

Novel, hybrid sciences

Patient Safety Science

Implementation Science

Scientific approach to the prevention, avoidance and amelioration of adverse outcomes or injuries to patients stemming from the healthcare process

...20 years

Scientific study of methods to promote the uptake of research findings into routine healthcare in clinical, organisational or policy contexts

...10 years







UK IMPLEMENTATION SOCIETY

Building capacity, sharing learning, and connecting professionals in implementation, improvement and innovation in services to people

IMPLEMENTATION SCIENCE

Do we have a problem? If yes, how big?



Stafford Hospital



An organisation with a memory

Report of an expert group on learning from adverse events in the NHS chaired by the Chief Medical Officer



Adverse events in British hospitals: preliminary retrospective record review

Charles Vincent, Graham Neale, Maria Woloshynowych

Abstract

Objectives To examine the feasibility of detecting adverse events through record review in British hospitals and to make preliminary estimates of the incidence and costs of adverse events. Design Retrospective review of 1014 medical and nursing records.

Setting Two acute hospitals in Greater London area. Main outcome measure Number of adverse events. Results 110 (10.8%) patients experienced an adverse event, with an overall rate of adverse events of 11.7% when multiple adverse events were included. About half of these events were judged preventable with ordinary standards of care. A third of adverse events led to moderate or greater disability or death. Conclusions These results suggest that adverse events are a serious source of harm to patients and a large drain on NHS resources. Some are major events; others are frequent, minor events that go unnoticed in routine clinical care but together have massive economic consequences. figures.^{4 °} The Australian study estimated that adverse events accounted for 8% of hospital bed days and cost the Australian healthcare system \$4.7bn a year. Adverse events also result in huge personal cost to the affected individuals, both patients and staff.⁷

The epidemiology of adverse events has not been studied in Britain. We report preliminary findings from a pilot study that examined the feasibility of applying United States and Australian methods and the potential value of a parallel study in the United Kingdom.

Methods

Design and procedure

The study was carried out at two acute hospitals in the London area. We reviewed 500 randomly drawn records from site 1 between July and September 1999 and 514 records from site 2 between December 1999 and February 2000. In both sites the index admissions studied occurred in two months in 1998, about a year before the

THE MID STAFFORDSHIRE NHS FOUNDATION TRUST PUBLIC INQUIRY

Chaired by Robert Francis QC

Report of the Mid Staffordshire NHS Foundation Trust Public Inquiry

Executive summary

Clinical Risk Unit, Department of Psychology, University College London, London WCIE 6BT Charles Vincent *professor of psychology* Graham Neale *consultant physician* Maria Woloshynowych *research fellow* Correspondence to: C Vincent cvincent@uclac.uk

Editorial by Alberti

Reviews pp 562, 563

Letters p 548

BMJ 2001;322:517-9

BN vzz vara vz

Headline figure:

1 in 10 hospital inpatients suffers

an adverse event whilst in

Error management

The incidence and nature of in-hospital adverse events: a systematic review

E N de Vries,¹ M A Ramrattan,² S M Smorenburg,² D J Gouma,¹ M A Boermeester¹

What's causing it?



Vincent et al, BMJ 1998;316:1154







Lawton et al, BMJ Qual Safe 2012;21:369-80

Developing understanding & theory

- Latent risks
- Small errors or problems that accumulate
- Not all adverse events are the results of human errors; not all human errors lead to adverse events
- 'High reliability' organisations
- 'Work as imagined vs. as done'
- Safety I vs. Safety II

Table 1 Latent risk factors

Latent risk factors	Issues
Equipment, design, and maintenance	Availability, functioning, standardization design, and maintenance of machines
Staffing	Adequate staffing, skills
Communication	Work-directed communication, openness, interrelation, atmosphere
Training	Training for machines, procedures, team training
Teamwork and team training	Team performance
Procedures	Presence of protocols, adherence to protocols
Situational awareness	Awareness of present situation, own tasks, and future developments
Incompatible goals	Balance between goals and safety
Planning and organization	Process of care
Housekeeping	Hygiene

Van Beuzekom et al. Br J Anaesth 2010;105:52-9

Etc etc...

What can we do to address it?

STRONGLY ENCOURAGED INTERVENTIONS:

- Preop & anaesthesia checklists
- Bundles to prevent CLABSI
- Interventions to reduce use of urinary catheters
- Bundles to prevent ventilator associated pneumonia
- Hand hygiene
- 'Do Not Use' list of risky abbreviations
- Bundles to reduce pressure
 ulcers
- Real time US for central line
 placement
- VTE prophylaxis







Surgical Safety Checklist



Before induction of anaesthesia

(with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?

Yes

Is the site marked?

Yes

Not applicable

Is the anaesthesia machine and medication check complete?

Yes

Is the pulse oximeter on the patient and functioning?

Yes

Does the patient have a:

Known allergy?

- 🗆 No
- Yes

Difficult airway or aspiration risk?

- No No
- Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?

- 🗆 No
- Yes, and two IVs/central access and fluids planned

Before skin incision

(with nurse, anaesthetist and surgeon)

 Confirm all team members have introduced themselves by name and role.

 Confirm the patient's name, procedure, and where the incision will be made.

Has antibiotic prophylaxis been given within the last 60 minutes?

🗌 Yes

Not applicable

Anticipated Critical Events

- To Surgeon:
- What are the critical or non-routine steps?
- How long will the case take?
- What is the anticipated blood loss?

To Anaesthetist:

- Are there any patient-specific concerns?
- To Nursing Team:
- Has sterility (including indicator results) been confirmed?
- Are there equipment issues or any concerns?
- Is essential imaging displayed?
- Yes
- Not applicable

Before patient leaves operating room

(with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:

- The name of the procedure
- Completion of instrument, sponge and needle counts
- Specimen labelling (read specimen labels aloud, including patient name)
- Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:

What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

The first study (2009)







The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

A Surgical Safety Checklist to Reduce Morbidity and Mortality in a Global Population

Alex B. Haynes, M.D., M.P.H., Thomas G. Weiser, M.D., M.P.H., William R. Berry, M.D., M.P.H., Stuart R. Lipsitz, Sc.D., Abdel-Hadi S. Breizat, M.D., Ph.D., E. Patchen Dellinger, M.D., Teodoro Herbosa, M.D., Sudhir Joseph, M.S., Pascience L. Kibatala, M.D., Marie Carmela M. Lapitan, M.D., Alan F. Merry, M.B., Ch.B., F.A.N.Z.C.A., F.R.C.A., Krishna Moorthy, M.D., F.R.C.S., Richard K. Reznick, M.D., M.Ed., Bryce Taylor, M.D., and Atul A. Gawande, M.D., M.P.H., for the Safe Surgery Saves Lives Study Group*

- Major complication rate decreased 36%
- Mortality decreased 47%
- Post-op infection decreased 48%

Within weeks of the publication in England...

WHO Surgical Safety Checklist (adapted for England and Wales)		Netional Patient Safety Agency National Reporting and Learning Service
SIGN IN (To be read out loud) Before induction of anaesthesia	TIME OUT (To be read out loud) Before start of surgical intervention	SIGN OUT (To be read out loud) Before any member of the team leaves the operating room
Has the patient confirmed his/her identity, site, procedure and consent? Veriot be the surgical site marked? Veriot applicable be the anaesthesia machine and medication check complete? Veriot Does the patient have a: Known allergy? No No Vei Vei Difficult alrevay/aspiration risk? No Vei No Vei State of >500ml blood loss (7mi/kg in children)? No Vei, and adequate fv/ access/fluids planned	Have all team members introduced themselves by name and role? Yes Surgeon, Anaesthetist and Registered Practitioner verbally confirm: What is the patient's name? What is the patient's name? What procedure, site and position are planned? Anticipated critical events Surgeon: How much blood loss is anticipated? Are there any spotfic equipment requirements or special investigations? Are there any notical or unexpected steps you want the team to know about? Anaesthetist: What is the patient \$\$A\$ grade? What is the patient \$\$A\$ grade? What is the patient \$\$A\$ grade? Nurse/ODP;	Registered Practitioner verbally confirms with the team: Has it hearn of the procedure been recorded? Has it hearn confirmed that instruments, public Instrument problems been identified that Nearner, the key concerns for recovery and management of this patient? Name: Signature of Registered Practitioner;
Name: Signature of Registered Practitioner: PATIENT DETAILS Last name: First name: Date of birth: NHS Number:	Has the sterility of the instrumentation been confirmed (Induing indicator results)? Are there any equipment issues or concerns? Has the surgical site infection (55i) bundle been undertaken? Yeshon tapplicable Antibiotic prophylaxis within the last 60 minutes Patient warming Hair removal Glycaemic control Has VTE prophylaxis been undertaken? Yeshont applicable Is assential imaging displayed? Yeshont applicable	This checklist contains the core content for England and Wales
Procedure:	Name: Signature of Registered Practitioner:	www.npsa.nhs.uk/nrls

- National policy
- All hospitals were asked to implement the checklist within 12 months
- Rate of implementation to be checked via audits and reported by risk-managers
- Hospitals+specialities urged to adapt it to their needs

Further RCT evidence

OPEN

FEATURE

Effect of the World Health Organization Checklist on Patient Outcomes

A Stepped Wedge Cluster Randomized Controlled Trial

Arvid Steinar Haugen, MSc,*† Eirik Søfteland, MD, PhD,* Stian K. Almeland, MD,‡ Nick Sevdalis, PhD,§ Barthold Vonen, MD, PhD, Geir E. Eide, PhD, 11** Monica W. Nortvedt, PhD, 11 and Stig Harthug, MD, PhD111

Objectives: We hypothesized reduction of 30 days' in-hospital morbidity, mortality, and length of stay postimplementation of the World Health Organization's Surgical Safety Checklist (SSC).

Background: Reductions of morbidity and mortality have been reported after SSC implementation in pre-/postdesigned studies without controls. Here, we report a randomized controlled trial of the SSC.

Methods: A stepped wedge cluster randomized controlled trial was conducted in 2 hospitals. We examined effects on in-hospital complications registered by International Classification of Diseases, Tenth Revision codes, length of stay, and mortality. The SSC intervention was sequentially rolled out in a random order until all 5 clusters-cardiothoracic, neurosurgery, orthopedic, general, and urologic surgery had received the Checklist. Data were prospectively recorded in control and intervention stages during a 10-month period in 2009-2010

Results: A total of 2212 control procedures were compared with 2263 SCC procedures. The complication rates decreased from 19.9% to 11.5% (P < 0.001), with absolute risk reduction 8.4 (95% confidence interval, 6.3-10.5) from the control to the SSC stages. Adjusted for possible confounding factors, the SSC effect on complications remained significant with odds ratio 1.95 (95% confidence interval, 1.59-2.40). Mean length of stay decreased by 0.8 days with SCC utilization (95% confidence interval, 0.11-1.43). In-hospital mortality decreased significantly from 1.9% to 0.2% in 1 of the 2 hospitals post-SSC implementation, but the overall reduction (1.6%-1.0%) across hospitals was not significant.

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DOI: 10.1097/SLA.000000000000716

Annals of Surgery • Volume 261, Number 5, May 2015

Conclusions: Implementation of the WHO SSC was associated with robust reduction in morbidity and length of in-hospital stay and some reduction in mortality

Keywords: checklist, morbidity, mortality, randomized controlled trial, surgery

(Ann Surg 2015;261:821-828)

A s global surgical volume increase and exceed 234 million surgical procedures annually,¹ surgical mortality has declined over the previous decades.2 Still, crude mortality rates are reported to vary between 0.4% and 4% in high-income countries.3-5 Increased risk of mortality is associated with major complications in hospitals with higher overall mortality.6 In-hospital complications occur in 3% to 22% of admitted patients, with 36% to 54% related to surgery.7 Prevention of complications and incidents of iatrogenic harm are deemed feasible for nearly 50% of such incidents.3,9 Introduction of checklists in surgery can intercept and prevent such incidents10-12 and may reduce both morbidity and mortality.13-1

In 2008, the World Health Organization (WHO) introduced the Surgical Safety Checklist (SSC) designed to improve consistency of care.17 The pilot pre-/postevaluation of the WHO SSC across 8 countries worldwide, which found reduced morbidity and mortality after SSC implementation,14 constituted the first scientific evidence of the WHO SSC effects. A number of subsequent studies to date have reported improved patient outcomes with use of checklists.¹⁸ Furthermore, checklists have also been shown to improve communication,¹⁹⁻²² preparedness,²³ teamwork,^{24,25} and safety attitudes26-findings that have been corroborated by a recent systematic review.27

Although checklists are becoming a standard of care in surgery,28 the strength of the available evidence has been criticized as being low because of (i) predominantly pre-/postimplementation designs without controls; (ii) lack of evidence on effect on length of stay; and (iii) lack of evidence on any associated cost savings. Randomized controlled trials (RCTs) are required29-however, in some countries or settings, they can no longer be carried out, as the WHO SSC has already become national policy (eg, United Kingdom).

We report a stepped wedge cluster RCT aimed to evaluate the impact of the WHO SSC on morbidity, mortality, and length of hospital stay (LOS). We hypothesized a reduction of 30 days' inhospital morbidity and mortality and subsequent LOS post-Checklist implementation.

METHODS

Study Design

We conducted a stepped wedge cluster randomized controlled checklist intervention trial in 2 hospitals in Norway30; a tertiary teaching hospital (1100 beds) and a central community hospital (300 beds). Following the WHO implementation guidelines for the SSC,

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isclosure: This study received departmental support. A.S.H. was granted by the Western Regional Norwegian Health Authority (grant numbers 911635 and 911510). N.S. is affiliated with the Imperial Center for Patient Safety and Service Quality, which is funded by the National Institute for Health Research, UK. The funders had no role in the design, conduct, or analysis of this study. The authors report no conflicts of interest.

Largest study to date (2014)

SPECIAL ARTICLE

Introduction of Surgical Safety Checklists in Ontario, Canada

David R. Urbach, M.D., Anand Govindarajan, M.D., Refik Saskin, M.Sc., Andrew S. Wilton, M.Sc., and Nancy N. Baxter, M.D., Ph.D.

Pre-checklist (N=109,341) Post-checklist (N=106,370)

30-day mortality = 0.71% Complications risk = 3.86% 30-day mortality = 0.65% Complications risk = 3.82%

Largest study to date (2014)



Pre-checklist (N=109,341)

Post-checklist (N=106,370)

30-day mortality = 0.71% Complications risk = 3.86%

30-day mortality = 0.65% Complications risk = 3.82%

Large variations in checklist use



ORIGINAL SCIENTIFIC ARTICLES

Measuring Variation in Use of the WHO Surgical Safety Checklist in the Operating Room: A Multicenter Prospective Cross-Sectional Study

Stephanie Russ, PhD, Shantanu Rout, MRCS, Jochem Caris, MD, Jenny Mansell, MSc, Rachel Davies, BA, Erik Mayer, PhD, FRCS, Krishna Moorthy, MD, FRCS, Ara Darzi, MD, FACS(Hon), Charles Vincent, PhD, Nick Sevdalis, PhD

Some poor local implementation



and Ara Darzi, MD, FACS

Behavioural causes of surgical never events





Kwaan et al. Arch Surg 2006;141:353-8

Intervention: skills training + coaching+ standardisation – do we do this routinely...?

Association Between Implementation of a Medical Team Training Program and Surgical Mortality

Julia Neily, RN, MS, MPH	Context There is insufficient information about the effectiveness of medical team	
Peter D. Mills, PhD, MS	training on surgical outcomes. The Veterans Health Administration (VHA) imple-	
Yinong Young-Xu, ScD, MA, MS	mented a formalized medical team training program for operating room personnel on	
Brian T. Carney, MD	Chiestive To determine whether an accessible existed between the VIIA Medical	
Priscilla West, MPH	Team Training program and surgical outcomes.	
David H. Berger, MD, MHCM	Design, Setting, and Participants A retrospective health services study with a	
Lisa M. Mazzia, MD	contemporaneous control group was conducted. Outcome data were obtained from	
Douglas E. Paull, MD	the VHA Surgical Quality Improvement Program (VASQIP) and from structured in- terviews in fiscal years 2006 to 2008. The analysis included 182.409 sampled proce-	
James P. Bagian, MD, PE	dures from 108 VHA facilities that provided care to veterans. The VHA's nationwide	



18% decrease in observed mortality (vs 7% in controls) (2006-08; 74 vs 34 VA hospitals; N=182,409)

Substantial training programme

- ✓ 2 months preparation
- Capacity development: 1 day on-site team training session incl skills, telephone coaching/F-UP for 1 year

Surgical simulation: implementation gap



Stefanidis et al, Ann Surg, 2015;261:846-53

Some food for thought

- Patient safety science is yet to achieve its full potential impact
- This is partly because the science is yet to move from efficacy to effectiveness studies

Safety intervention efficacy:

Can a patient safety intervention work?

Safety intervention effectiveness:

Does a patient safety intervention work?

Two parallel universes?

Research

- Intention to maximise intervention efficacy
- Careful selection of patients
- Specialised+trained staff & researchers implementing & measuring
- Research funds

Health services

- Intention to achieve sustainable delivery
- Widespread adoption



- Generalist practitioners, often no further training, no ad hoc measurement
- Service delivery funds (limited)

From evidence to practice





From evidence to practice



"Across most domains in medicine, practice has lagged behind knowledge by at least several years"



David Bates et al, 2003; JAMIA

Time lag between research and practice



BELLE MELLOR 2012 ADAPTED FROM AN ORIGINAL BY B. MELLOR

Slote Morris et al, J R Soc Med 2011;104:510-20

It may have worked in a RCT, but here's the tricky question....



Dissecting effectiveness (i)



Dissecting effectiveness (ii)



Dissecting effectiveness (iii)

Does an intervention actually (work.).?

For WHOM, HOW EXACTLY, in what CONTEXTS, with what UNINTENDED CONSEQUENCES ?

Key point: effectiveness \neq **efficacy**

Does an intervention actually work...?

Intervention as designed by the researcher vs. as delivered in practice

> Fidelity vs. adaptation tension

Multiple intervention components

Patient safety = 'complex interventions' For WHOM, HOW EXACTLY, in what CONTEXTS, with what UNINTENDED CONSEQUENCES ?

Example: Fidelity tensions in the 'real' world



Developers & evaluators

Implementors

Castro et al, Ann Rev Clin Psychol 2010;6:213-39



Closing the gap: Implementation science

Implementation science supports innovative approaches to identifying, understanding, and overcoming barriers to the adoption, adaptation, integration, scale-up and sustainability of evidencebased interventions, tools, policies, and guidelines

NIH, 2015



New-ish science, gathering pace





'Hybrid' randomised trial (and other) designs



Implementation outcome	Definition
Acceptability	Perception amongst stakeholders new intervention is agreeable
Adoption	Intention to apply or application of new intervention
Appropriateness	Perceived relevance of intervention to a setting, audience, or problem
Feasibility	Extent to which an intervention can be applied
Fidelity	Extent to which an intervention gets applied as originally designed / intended
Implementation costs	Costs of the delivery strategy, including the costs of the intervention itself
Coverage	Extend to which eligible patients/population actually receive intervention
Sustainability	Extent to which a new intervention becomes routinely available / is maintained post-introduction

Example: Hybrid II design: T1 diabetes RCT



Effectivenessimplementation hybrid 2 study design



Amiel et al. BMJ Open 2019; in press [clinical effectiveness arm] – Soukup et al. BMJ Open 2019; in press [implementation arm]

HARPdoc sample measures (1-5 scales)

Outcome	Items
Acceptability How far do you agree that the HARPdoc course is acceptable (agreeable and satisfactory) in helping you manage hypoglycaemia?	 HARPdoc meets my approval HARPdoc is appealing to me I like HARPdoc I welcome HARPdoc
Appropriateness How far do you agree that the HARPdoc course is appropriate (relevant, fit or compatible) in helping you manage hypoglycaemia?	 HARPdoc seems fitting HARPdoc seems suitable HARPdoc seems applicable HARPdoc seems like a good match
Feasibility How far do you agree that the HARPdoc course is feasible (can be successfully used or carried out) in helping you manage hypoglycaemia?	 HARPdoc seems implementable HARPdoc seems possible HARPdoc seems doable HARPdoc seems easy to use

Example: Hybrid III design: WHO checklist implementation in Benin

- Theory: Consolidated Framework for Implementation Research (CFIR)
- Intervention: tailored 3 day MDT training; adapted from Madagascar
- Timeline: longitudinal, Jan 2016 to May 2018; evaluation 3M and 12-18M post-intervention
- Sites & context: 36 hospitals trained; 17 part of the evaluation
- Outcomes: implementation outcomes, WHOBARS (behavioural fidelity), safety surveys and focus groups (qualitative assessment) – <u>no patient level</u> <u>outcomes</u>
- Stakeholders: from MoH to frontline providers
- Summary findings:
 - 1. WHO checklist implementation can be improved
 - 2. The improvement is sustainable over time
 - 3. Scalable implementation strategy (across countries)
 - 4. CFIR offers a practical evaluation framework

White et al. *Br J Surg* 2019;106(2):e91-102 White et al. *BMJ Global Health* 2018;3(6):e001104







- Development & validation of innovative research design guideline
- To facilitate implementation aspects within applied health research



Implementation methodology research

Hull et al. Implement Sci 2019;under



Available here: www.kingsimprovementscience.org

4th Global Ministerial Patient Safety Summit

To reduce the 2nd Translational Gap by supporting implementation and sustainable scale-up of patient safety interventions of known efficacy/effectiveness at national and global level

Declaration point 11



Reflections – for discussion

- Producing more 'can work' research in patient safety is not an efficient investment; focus on 'does work' research instead
- Clinical research is discovering implementation science to embed evidenced interventions – patient safety research needs to follow
- Implementation parameters need to become primary outcomes of safety intervention evaluations
 - Fidelity, acceptability, cost and context assessment, etc
- Significant opportunities for **collaborative work** at the interface of patient safety and implementation sciences!

Join us on July 16th – 18th 2019!

Implementation Save Science Masterclass 2019

What is implementation science?

How can implementation science help ensure services offer the best treatment and care, informed by the latest research?

What is the best way to plan an effective implementation science project?

This two-day course is for health professionals, researchers, patients and service users, policymakers, commissioners and managers in both the public and private sector who want to ensure clinical practice is evidence-based. The Masterclass includes lectures, group work and guidance to help participants work more effectively on their own implementation projects.

The course is led by international experts in the field of implementation science including: Professor Nick Sevdalis, Director of the Centre for Implementation Science, King's College London and Dr Brian Mittman, Senior Research Scientist at the Kaiser Permanente Southern California Department of Research.

What previous Masterclass delegates said:

'I appreciated the international perspectives of the faculty'

'Exceeded my expectations. Very thorough work. Lots of resources and tips. Excellent!'

'The course reinforced concepts I was familiar with and stretched my thinking about challenges and questions to be answered'

'Clearly key experts in the field: a very impressive panel. Thanks'

'I have come away with lots of ideas and plans and resources to further my implementation science work'

Advancing the science of scaling up



Thursday 18 July, King's College London, Denmark Hill Campus

This one-day annual conference will showcase the latest research in the field of implementation science applied to health and social care. Now in its second year, the 2019 conference will explore the theme: Advancing the science of scaling up: Improving efficiency and effectiveness of implementation strategies in healthcare.

Join applied-health researchers, policymakers, clinicians and service user researchers to share how best to implement evidence-based practice and clinical research within health services and systems to improve health outcomes.

The conference will feature presentations from leading international researchers working in the field, oral and poster presentations, and parallel sessions.

The conference is being organised by the Centre for Implementation Science at NIHR CLAHRC South London, a research organisation working to improve health services. It is supported by the UK Implementation Society (UK-IS), an independent organisation connecting those working in implementation science, practice and policy.

Call for abstracts:

We welcome submissions from researchers, policymakers, clinicians and service user researchers for an oral or poster presentation. The deadline for abstract submission is: Monday 15 April 2019.

Download the abstract submission form and guidance at www.clahrc-southlondon.nlhr.ac.uk/events/2019/ Implementation-science-research-conference

Cost:

£142.50 (until 1 April 2019).

£190 thereafter. Discounts available for NHS staff working in CLAHRC South London-affiliated organisations / UK-IS members / charity and NGO staff / service users, students, and those from low- and middle-income countries.

Register and find out more:

www.clahrc-southlondon.nlhr.ac.uk/events/2019/ Implementation-science-research-conference

If you have any questions, please email clahrcshortcourses@kcl.ac.uk

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