Impact case study (REF3)

REF2021

Institution: University of Birmingham

Unit of Assessment: UoA 3, Allied Health Professions, Dentistry, Nursing and Pharmacy

Title of case study: eLearning for safer prescribing practice

Period when the underpinning research was undertaken: 2000–2020

Details of staff conducting the underpinning research from the submitting unit:

Name(s):	Role(s) (e.g. job title):	Period(s) employed by submitting HEI:
Prof. Robin Ferner	Hon. Senior Lecturer in Clinical Pharmacology	1993–2006
	Hon. Prof. of Clinical Pharmacology	2006–Present
Prof. Una Martin	Senior Lecturer in Clinical Pharmacology	1996–2008
	Reader in Clinical Pharmacology	2008–2015
	Professor of Clinical Pharmacology	2015–Present
	Dean of Birmingham Medical School	2019-Present
Prof. Jamie Coleman	Senior Lecturer in Clinical Pharmacology	2009–2015
	Prof. of Clinical Pharmacology and Medical Education	2015–Present
Prof. John Marriott	Prof. of Clinical Pharmacy	2011–Present
Dr Sarah Pontefract (formerly Thomas)	SCRIPT Editorial Lead	2010–2017
	Lecturer in Clinical Pharmacy and Therapeutics	2017–Present
	SCRIPT Programme Director	2019–Present
Dr Anthony Cox	Senior Lecturer in Clinical Pharmacy and Therapeutics	2011–2020
	Reader in Clinical Pharmacy and Drug Safety	2020–Present

Period when the claimed impact occurred: August 2013–December 2020

Is this case study continued from a case study submitted in 2014? No

1. Summary of the impact

University of Birmingham research has developed SCRIPT (safeprescriber.org), an award-winning, web-based eLearning programme for prescribing and therapeutics education. Specifically, we have:

1. **Established best practice in UK prescribing and therapeutics education.** SCRIPT has been recommended as a mandatory resource for all 300,000 registered prescribers across the NHS;
2. **Provided standardised prescribing education and training across the NHS workforce**, leading to improved professional knowledge and confidence in prescribing practice and benefitting over 55,000 NHS staff, and 11,500 medical and nursing students, and helping to improve the safety of patients.

2. Underpinning research

An estimated 237 million medication prescription errors occur in England each year, with avoidable errors costing £1.6 billion and contributing to 22,303 deaths per annum.

In 2000, University of Birmingham (UoB) research led by Robin Ferner described how mistakes in the medication process can arise from inadequate knowledge and proposed that these could be prevented by teaching and training [R1]. To address the need for increased prescribing knowledge, Ferner and Martin introduced an objective structured clinical examination at UoB to test the practical aspects of prescribing in medical students.

Although feasible and useful, the teaching and assessments were "labour-intensive" highlighting the need for a new modality of education that could provide standardised prescribing and therapeutics teaching to large cohorts, with less demand on educator time [R2]. In 2011, a portfolio of 38 e-learning modules, the Standardised Computerised Revalidation Instrument for Prescribing and Therapeutics (SCRIPT), was developed and integrated into the West Midlands NHS 'Foundation' training programme for doctors to test e-learning as a solution.

In 2012, UoB researchers Coleman and Pontefract provided expert opinion as part of a European working group set up by the University of Heidelberg and supported by the German Federal Ministry of Health to identify medication safety strategies [R3]. eLearning was identified as an intervention to minimise the risk of error-prone steps in the medication process. This finding supported further development of eLearning for Foundation trainee doctors and dentists, specialist paediatric trainees, general practitioners, and nurses (2013–2015). The benefits of SCRIPT were illustrated through a questionnaire study of UK regional Foundation trainee doctors, where a sixth of respondents (n=43/320, 13.4%, 2013) reported the eLearning had prevented them from making a prescribing error [R4].

Analysis of engagement data from the SCRIPT eLearning Management System of a cohort of UK Foundation trainee doctors (2016, n=688) indicated that the frequency of modules completed was greatest prior to bi-annual reviews of progression, but the time spent on the learning was reduced [R5]. This indicated that learners were motivated to complete the learning to progress, rather than for professional development. Trainees who spent less time completing modules were also found to have lower pre-test scores and showed smaller improvements in their knowledge from pre-test to post-test [R5]. Together the findings highlighted the need for the eLearning to be fully integrated into postgraduate education, with allocated study time and with engagement of postgraduate educators.

Guidance was provided for trainees and educators to encourage optimal use of SCRIPT and, in 2015, focus groups were conducted with trainee doctors to investigate their perception of SCRIPT at improving prescribing competency. Trainees used SCRIPT to fill gaps in knowledge that they were unable to gain from other resources, reporting that the SCRIPT modules learning would be a useful resource to help students prepare for postgraduate medicine and prescribing [R6].

Key findings of the research:
- **KF1.** Mistakes in the prescribing process can arise from inadequate knowledge and can be prevented by teaching and training [R1].
- **KF2.** There was a need for a new modality of education for prescribing and therapeutics teaching that can standardise provision for large cohorts [R2].
- **KF3.** There was a consensus that eLearning was an effective strategy to safeguard drug prescribing and drug administration [R3].
- **KF4.** eLearning can target large cohorts and could prevent prescribing errors, which would benefit patient safety [R4].
- **KF5.** eLearning should be integrated into postgraduate education to achieve its intended benefit [R5].
- **KF6.** Clinical trainees used SCRIPT to fill gaps in knowledge that they were unable to gain from other resources and felt that it would have been useful at undergraduate level [R6].

3. References to the research

R1. Ferner RE, Aronson JK. Clarification of terminology in medication errors. Drug safety. 2006 Nov 1;29(11):1011-22. **DOI: 10.2165/00002018-200629110-00001**
R2. Langford NJ, Landray M, Martin U, Kendall MJ, Ferner RE. Testing the practical aspects of therapeutics by objective structured clinical examination. *Journal of Clinical Pharmacy & Therapeutics* 2004; **29**: 263-6. **DOI: 10.1111/j.1365-2710.2004.00561.x**

R3. Seidling HM, Stützle M, Hoppe-Tichy T, Allenet B, Bedouch P, Bonnabry P, Coleman JJ, Fernandez-Llimos F, Lovis C, Rei MJ, Störzinger D, Taylor LA, Pontefract SK, van den Bemt PM1, van der Sijs H, Haefeli WE. Best practice strategies to safeguard drug prescribing and drug administration - an anthology of expert views and opinions. *International Journal of Clinical Pharmacy.* (2016); 38(2):362-73. **DOI: 10.1007/s11096-016-0253-1**

R4. Thomas SK, Blackwell N, Cox A, Ferner RE, Coleman JJ *et al*. SCRIPT eLearning for Prescribing and Therapeutics: impact on knowledge, skills and patient safety. Pharmacology 2013 (London, UK). Abstract

R5. Brooks HL, Pontefract SK, Hodson J, Blackwell N, Hughes E, Marriott JF, Coleman JJ. An evaluation of UK foundation trainee doctors' learning behaviours in a technology-enhanced learning environment. BMC medical education. 2016 May;16(1):133. **DOI: 10.1186/s12909-016-0651-z**

R6. Brooks HL, Pontefract SK, Vallance HK, Hirsch CA, Hughes E, Ferner RE, Marriott JF, Coleman JJ. Perceptions and Impact of Mandatory eLearning for Foundation Trainee Doctors: A Qualitative Evaluation. PloS one. 2016 Dec 22;11(12):e0168558. **DOI: 10.1371/journal.pone.0168558**

4. Details of the impact

We have developed and nationally disseminated an electronic education resource, which standardises undergraduate and postgraduate training in the high-risk clinical practice of prescribing and therapeutics. Specifically, we have:

1. Established best practice in UK prescribing and therapeutics education

SCRIPT was recommended as a **mandatory resource for all 300,000 registered prescribers across the NHS workforce** by a 2019 independent report published by the UK Healthcare Safety Investigation Branch [S1]. This report stated "it would be beneficial to roll out SCRIPT as a mandatory requirement for all prescribers" [S1i]. SCRIPT is included in professional guidelines and training standards. Most notably:

i) The 2017 Royal College of Physicians Guidance on supporting junior doctors in safe prescribing recommends SCRIPT "to supplement material covered during induction and to encourage self-directed learning" [S1ii];

ii) Public Health England, who since 2016 use SCRIPT as part of their official toolkit for antimicrobial stewardship to promote the appropriate use of antibiotics in dentistry [S1iii];

iii) The Royal College of Paediatrics and Child Health (RCPCH) recommend SCRIPT for targeted development on prescribing to prepare senior paediatric trainees for the START assessment (Specialty Trainee Assessment of Readiness for Tenure), taken to progress to consultant working (S1iv–v).

The success of the SCRIPT programme is evidenced by:

- It being listed in the UK's Good Practice Repository (2019) as supporting the World Health Organization global challenge of reducing medication errors by half [S2i].
- It being recognised as one of the "most-valued best-practice digital resources" in an independent study across the European Union, addressing the highest proportion of learning objectives relating to prescribing and therapeutics of all UK learning resources analysed [S2ii–iii], with "potential to change workplace behaviour and improve patient outcomes".

2. Provided standardised prescribing education and training across the NHS workforce leading to improved professional knowledge and confidence in practice

Our web-based resource is the first resource of its kind to standardise prescribing and therapeutics training nationally, benefitting over 55,000 NHS staff and 11,500 medical and nursing students [S3], such that SCRIPT is now embedded in the training as follows:

2.i. In 2015, 45% of **all Foundation trainee doctors** (n=6400) were using the SCRIPT resource, by 2020 this had increased to 72% across England and Wales (S3). In 2015, the RCPCH added SCRIPT to their MedsIQ platform — a sharing quality improvement resource for paediatric medicines safety [S1v]. By July 2020, 90% of paediatric trainees engaged with SCRIPT [S3].

SCRIPT is effective teaching for improving prescribing skills, evidenced by accredited content by the Royal College of General Practitioners and national dissemination [S4]. That SCRIPT is effective in improving prescribing skills is shown by an independent randomised controlled trial (2017) which demonstrated a statistically significant and sustained improvement in doctors' knowledge and confidence in relation to prescribing for older adults following completion of a SCRIPT module on the topic [S5]. The study also found that decision-making and prescribing skills were enhanced when faced with real patient cases.

2.ii. Provision of access to SCRIPT in universities has benefited **11,500 medical students** and **286 nursing students** who have completed over 85,575 modules [S3; KF6]. Medical schools use SCRIPT to prepare students for prescribing practice and for sitting the national 'Prescribing Safety Assessment (PSA)' [S6i–ii] introduced in 2016. Universities have reported an increased pass rate in the exam after integrating SCRIPT into teaching [S6i] and it is used nationally by the UK Foundation Programme to remediate candidates who fail to pass the PSA, supporting 200–300 students/year [S6ii]. The benefit of the learning is evidenced by our reach across UK HEIs, which has risen from 2/42 in 2014–2015 (n=528 learners) to 18/42 in 2019–20 (n=3,451 learners), including one of three UK Medical Schools overseas (Malta) [S6(i)].

2.iii. SCRIPT was **integrated into West Midlands Foundation dental training** in 2015 and disseminated nationally in 2017, engaging 75% of UK trainee dentists by 2020 [S3]. In September 2020, Dental SCRIPT **was integrated with the HEE Foundation Dentist ePortfolio**, allowing learning progress to automatically be recorded for training (S3). The resource has also benefitted CPD of **qualified dentists**, with nearly 900 completing over 4800 modules since August 2016 [S3].

2.iv. We have **fulfilled urgent training needs** by contributing training in the following ways:
- In 2018, we responded to a call to develop healthcare professionals' knowledge of Cannabis-based products for medicinal use [S7i]. Launched in June 2019, 1,250 NHS staff have benefitted from our learning [S3, S7ii].
- Health Education London and South East mandated completion of the SCRIPT module on palliative and end-of-life care following the publication of the Public Inquiry into the Gosport War Memorial Hospital (2018) [S7iii].
- We produced a COVID-19 module for staff returning to work or being redeployed in the NHS during the COVID-19 pandemic. Nearly 3,000 staff engaged with our freely disseminated portfolios and completed 5,300 modules to develop their knowledge in prescribing and therapeutics [S3 and S7iv]. The COVID-19 module was completed by 2,800 staff.

2.v. SCRIPT is being utilised beyond the UK. For example, through the Charity REACHE, SCRIPT has supported 45 Refugee and Asylum-Seeking healthcare professionals to access NHS specific healthcare education [S3, S8i]. SCRIPT has influenced design and delivery of curriculum for medical graduates in India, working with the Indian Medical Schools Council [S8ii].

Sources to corroborate the impact

S1. (i) Healthcare Safety Investigation Branch. Inadvertent administration of an oral liquid medicine into a vein. April 2019. Report; (ii) Royal College of Physicians. Supporting junior doctors in safe prescribing; 2017. [*Induction in safe prescribing* p. 5 and *Case study 1: Prescribing assessment at Kent, Surry and Sussex*; p. 6], (iii) Public Health England. Dental Antimicrobial Stewardship toolkit (iv) RCPCH A Guide to Start Assessment Feedback and Targeted Development for Educational Supervisors Forms and guidance; (v) RCPCH Meds IQ – sharing QI resources for paediatric medicines safety;
S2. (i) UK WHO good practice repository; (ii) Bakkum, M.J., Tichelaar, J., Papaioannidou, P., Likic, R., Sanz Alvarez, E.J., Christiaens, T., Costa, J.N., Mačiulaitis, R., Dima, L., Coleman, J. and Richir, M.C., 2020. Harmonizing and improving European education in prescribing: An overview of digital educational resources used in clinical pharmacology and therapeutics. British Journal of Clinical Pharmacology. 2021 Mar;87(3):1001-1011, doi: 10.1111/bcp.14453 article;

(iii) Testimonial (01/08/19): Education working group of the European Association of Clinical Pharmacology and Therapeutics: Research and Expertise Centre for pharmacotherapy education.

S3. SCRIPT eLearning access: Data maps captured from the learning management system illustrating engagement of practitioners with SCRIPT programme (14/1010—31/07/20).

S4. RCGP: Accreditation of the Primary Care SCRIPT Portfolio email confirmation.

S5. Cullinan, S., D. O'Mahony, and S. Byrne, Use of an e-Learning Educational Module to Better Equip Doctors to Prescribe for Older Patients: A Randomised Controlled Trial. Drugs Aging, 2017. 34(5): p. 367-374. Journal article online

S6. (i) Testimonials: Use of SCRIPT in training in medical schools worldwide (Apr 2019−Dec 2020); **(ii)** Prescribing Safety Assessment 2019. Foundation School Administrators' Guidance. Appendix E: Remediation for candidates who fail the PSA, p. 22. Forms and guidance;

S7. (i) Department of Health and Social Care. Gateway Publications Clearance 001120. Gateway publications Clearance 011120, **(ii)** eLfH CBPM module completion data; **(iii)** Testimonial: Foundation Pharmacist Training Programme Director, Health Education England - London and South East (18/04/19); **(iv)** Pharmacy in Practice. News: *SCRIPT modules made freely available for all UK NHS staff.* 29th March 2020 modules for NHS staff.

S8. (i) REACHE North West resources **(ii)** Testimonial: Dr. Mrs. Nilima A. Kshirsagar, National Chair Clinical Pharmacology, ICMR Govt. of India (06/01/21)