

A novel modelling and simulation capacity development initiative for the National Health Service

Journal:	<i>BMJ Simulation & Technology Enhanced Learning</i>
Manuscript ID	bmjstel-2017-000205.R1
Article Type:	In Practice reports
Date Submitted by the Author:	n/a
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Keywords:	Healthcare, Capacity building, Modelling, Simulation, Discrete event simulation

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4 **National Health Service**
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37 Keywords: Capacity building, modelling, simulation, health care, health services

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39 Word count: 995 words
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A novel modelling and simulation capacity development initiative for the National Health Service

Introduction

Operational research techniques such as simulation modelling are common place in many public and private sector services and industries from aviation to manufacturing and logistics [1]. The benefits of such techniques are well known but the healthcare sector in the United Kingdom (UK) has been slower to utilise simulation and modelling as part of their routine practices to inform operational changes [2]. A major barrier to healthcare organisations conducting such work has been the awareness of and capacity to use simulation and modelling approaches.

This report outlines the Health Service Modelling Associates (HSMA) Programme – a novel capacity building initiative being undertaken in the South West of England. This is a mentoring programme where experienced healthcare operational researchers mentor health service employees to each undertake a modelling project over 12 months. The provision of training, mentoring and regular group support for somebody already embedded in the healthcare organisation is expected to improve the awareness and use of the simulation modelling approach within the organisation.

Outline of the programme

The first iteration of the HSMA programme began in April 2016 and will run until March 2017. The six health service employees enrolled in the programme are released from their usual role for one day per week to undertake advanced Discrete Event Simulation modelling projects to address a priority problem for their organisation. They are using software provided by Simul8 Corporation (www.simul8.com) due to its inherent ease of use and functionality for use in modelling healthcare systems. Throughout the programme participants are guided through the modelling process from structuring their problems to communication of the model findings within their respective trusts. A timeline of the programme development and implementation is presented in Figure 1.

The programme was designed in consultation with UK National Health Service (NHS) executives in the South West of England to ensure it would receive support from and meet the needs of the local NHS organisations. Participation in the programme was subject to a competitive application process to ensure that selected candidates had the required skills and potential to learn and apply the principles of simulation modelling.

Successful applicants were selected in February 2016 and assigned a mentor from the operational research team based at the University of Exeter (Research Associate and Fellow grades) whose research and experience most appropriately aligned with the associate's project. A senior colleague of the associate from within their organisation was assigned to the associate as a workplace supervisor to facilitate development and delivery of the project from inside their organisation.

To facilitate learning and support, associates meet with their mentors at monthly learning set meetings where they discuss progress on their projects, issues and challenges they have/are facing and decide on their goals for the following month. Outside of these formal meetings the associate can contact their mentor for help on an agreed day of the week.

Insert Figure 1 here

Figure 1 Outline of the HSMA programme timeline and interventional aspects of the programme

The research questions for the associates' respective projects are:

- How would the implementation of a clinical decision unit affect patient flow and waiting times in the hospital Accident and Emergency Department?
- What are the bottlenecks in the pathway for getting out of hospital cardiac arrest patients definitive care?
- Where are delays the in the acute eye service pathway and how can these be minimised?
- How can patient flow in acute adult inpatient mental health care be improved to reduce the number of people being sent out of county?
- What impact will a clinical decision unit have on the patient flow and waiting times in the hospital accident and emergency department?
- How would weekday discharge rates be affected by the addition of a medical specialist registrar dedicated to discharge review over the weekend?

Evaluation

To understand if and how this novel programme contributes to informing a decision or change in practice at the participant's organisation, a formative realist evaluation [3,4] that seeks to develop propositions or theories about how the programme creates change is being used to evaluate the programme.

Interviews are being conducted with the associates, programme designers, mentors and work place supervisors at various points throughout the programme and these will form the main source of data for the evaluation. Data is also being collected in the form of a quarterly questionnaire (assessing technical capability and confidence) and project documentation including monthly report forms and an issues log. The Framework Method [5] will be used to analyse what worked well, to identify improvements, and to assess how the programme works as a form of knowledge mobilisation.

Initial observations

During the first few months of the programme we have observed significant collaboration between the associates including the sharing of ideas and experiences. Invitations have also been extended for associates to observe how systems work in other associates' organisations.

A major challenge has been ensuring that the associate's time to undertake their projects is protected. The work place supervisors have been important in mediating between the associate and their colleagues to ensure they are given the time they require to deliver their project.

The associates are already using the skills they have learnt during the programme and applying them to other problems, including modelling the introduction of a frailty unit and modelling discharge

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3 delays in acute mental health care. These projects have arisen due to increased visibility of the
4 Simul8 software and operational research methods within the associates' organisations.
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6 7 **Next steps**

8 The HSMA programme will officially end on the 30th March 2017 with a seminar event for the
9 associates to present the findings and impact from their work to local NHS staff and academics. The
10 findings of the evaluation will be communicated to the programme designers in mid-2017, and this
11 will help to inform the design and development of any future iterations of the programme. The
12 operational research team at the University of Exeter will continue to support the associates and
13 their organisations to embed operational research techniques in their organisations until they are
14 sufficiently independent and form part of a culture of evidence-based decision making in the health
15 service.
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18 19 **Acknowledgements**

20 This research was funded by the National Institute for Health Research (NIHR) Collaboration for
21 Leadership in Applied Health Research and Care South West Peninsula. The views expressed are
22 those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health.
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38 39 **Competing interest statement**

40 We have read and understood BMJ policy on declaration of interests and declare that we have no
41 competing interests.
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43 44 **Contributorship statement**

45 Contributors: SM aided in the design of the programme, was part of the team running the
46 programme and a mentor, the design of the evaluation, designed data collection tools for the
47 evaluation and drafted and revised the article. He is the guarantor. DC led the development of the
48 programme, was part of the team running the programme and a mentor, oversaw the running of the
49 programme and drafted and revised the article. M, Pearson contributed to the design and
50 management of the evaluation, drafted and revised the article. JD designed and conducted the
51 evaluation and drafted and revised the article. IL oversaw the evaluation of the programme and
52 drafted and revised the article. KS proposed the development of the programme, was a programme
53 designer, part of the senior management team overseeing the programme and drafted and revised
54 the article. M, Pitt was a programme designer, part of the senior management team overseeing the
55 programme and drafted and revised the article.
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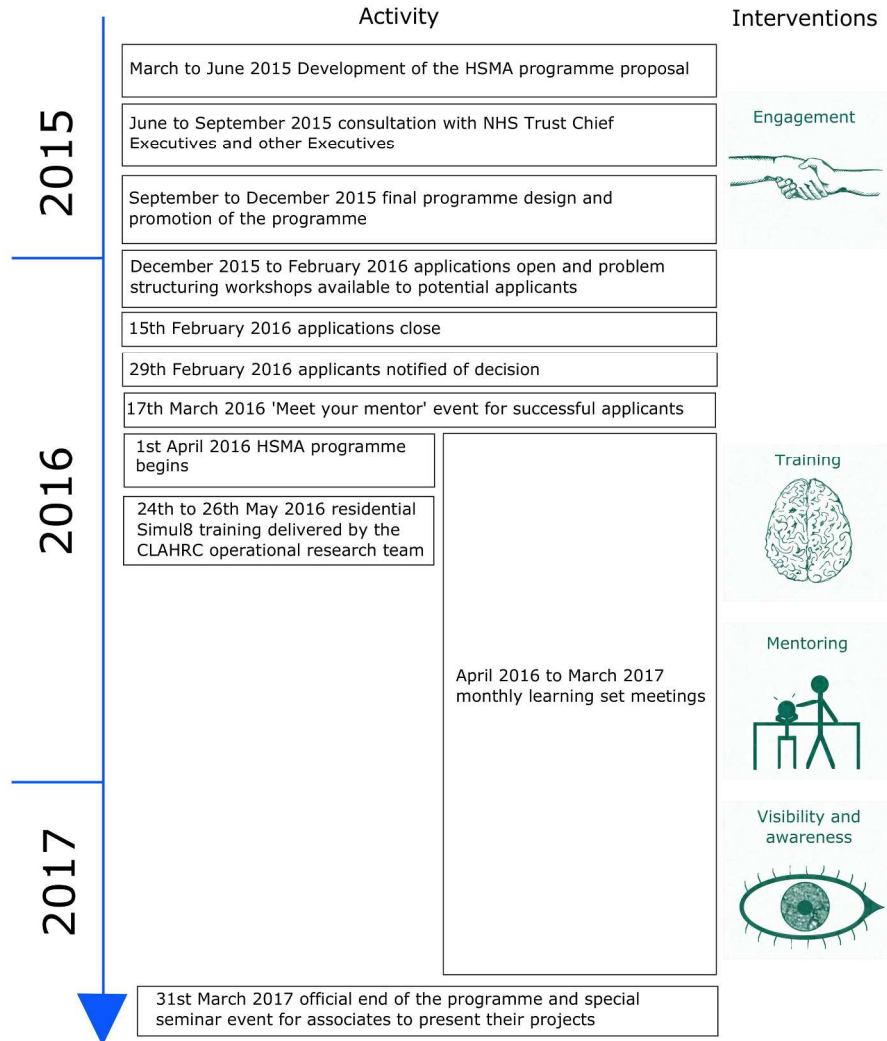


Figure 1 Outline of the HSMA programme timeline and interventional aspects of the programme

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