Evaluation of a simulation training programme for geriatric medicine

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Abstract

Background: geriatrics encompasses diverse medical, social and ethical challenges requiring a multidimensional, interdisciplinary approach. Recent reports have highlighted failings in the care of older people. It is therefore vital that trainees in geriatrics are afforded opportunities to develop skills in managing this complex population. Simulation has been adopted as a teaching tool in medicine; however, evidence for its use in geriatrics has been limited to small, single-site studies primarily involving role-play or discrete clinical skills training.

Methods: a standardised, two centre, multimodal, interprofessional, geriatrics simulation training programme was developed using curriculum-mapped scenarios in which the patient perspective was central. Simulation techniques used included high-fidelity patient manikins, actors with integrated clinical skills using part-task trainers and role-play exercises. A mixed-methods evaluation was used to analyse data from participants before and after training.

Results: eighty-nine candidates attended 12 similar courses over 2 years. Thematic analysis of candidate feedback was supportive of simulation as a useful tool, with benefits for both technical and non-technical skills. Candidates commented that simulation was a valuable training modality addressing curriculum areas rarely taught formally including continence assessment, end-of-life decisions and multidisciplinary situations. Quantitative analysis of pre- and post-course questionnaires revealed a significant improvement of self-reported confidence in managing geriatric scenarios (mean improvement 11.5%; P < 0.001).

Discussion: this study demonstrated the feasibility of a standardised simulation training programme across two sites in geriatrics. Simulation training affords situational learning without compromising patient safety and is an exciting and novel method of delivering teaching for geriatrics that could be integrated into national training curricula.

Keywords: postgraduate, education, older people, elder abuse, continence

Introduction

The focus of training for health professionals should reflect the demands of a changing population and system deficiencies. Successful ageing in the United Kingdom means that the proportion of older people is growing with individuals over the age of 65 years now making up 17% of the population [1]. Prolonged longevity is correlated with increasing numbers of acute and chronic medical problems, leading to multimorbidity and increasingly complex issues for health and social care services. National reports have highlighted deficiencies in the services delivered for older people [2] from diagnosis of dementia [3] to provision of nutrition [4], inpatient management [5] and end-of-life care [6]. It is paramount that trainees in geriatric medicine are prepared to tackle these issues [7]. Clear objectives are set out in national syllabi [8], but attainment of competence in these areas is influenced by factors including self-motivation, workplace supervision and access to formal teaching. Added pressures
for the trainee come from providing a good inpatient service while being able to capitalise on learning opportunities [9].

Simulation has been used by the aviation industry for over 40 years in an effort to ensure that flight crew are effectively prepared to deal with a variety of situations. Health care now benefits from similar technology as a way of improving practice outcomes, patient safety and the patient care experience [10, 11]. Simulation is defined as a method ‘to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion’ [10]. In addition to utilising patient actors, ‘human patient simulation’ specifically involves life-size, full-body simulators that are equipped with computer software that allows them to replicate humans both physically and physiologically. Simulation training affords situational learning without compromising patient safety and focuses on trainees’ ability to display effective non-technical skills, crucial in the multidisciplinary environment, as well as their ability to manage clinical problems [12]. In this way, it provides a safe and effective learning platform that is also supported by adult educational theory [13].

Simulation has been trialled previously in healthcare settings to improve the care of older people. Studies of these programmes have been single site, with small numbers of participants, teaching geriatric themes to ward-based teams [10], training geriatricians [11], medical students [12] and nurses [13]. This study outlines the development of a standardised, two centre, curriculum-mapped training program using simulation in geriatric medicine and assesses the feasibility and benefits of this educational intervention for those working and training in geriatric medicine.

Methods

A standardised, multi-fidelity, interprofessional, geriatric simulation training programme was developed by an inter-disciplinary working party comprising educationalists and healthcare professionals (from medical, nursing occupational therapy and physiotherapy backgrounds). Course objectives were based on the Joint Royal Colleges of Physicians Training Board geriatric curriculum [8]. The aims of the course were to facilitate experiential learning of both technical and non-technical abilities with a focus on human factor skills, interprofessional geriatric medicine and challenging aspects of geriatric care such as elder abuse, continence and end-of-life care. The course was delivered by members of the course design group (medical, nursing and educationalist backgrounds) over one day, at one of two sites (Simulation and Interactive Learning Centre, St. Thomas’ Hospital or Homerton Simulation Centre, Homerton University Hospital) and was available to medical and nursing staff working in elderly care in the United Kingdom. The course included six curriculum-mapped scenarios, employing a variety of simulation techniques and incorporating key non-technical skills (Table 1). Standardised scenario outlines were given to course faculty to provide educational consistency across the two sites at which the course was being delivered (Supplementary data, Appendix 1, available in Age and Ageing online).

Each course commenced with an introduction to simulation, a description of the course objectives and a discussion about human factors, non-technical skills and patient safety. The simulated scenarios used high-fidelity human patient manikins (with computer-controlled vital signs that allowed changes in patient characteristics to be simulated) and/or standardised patient actors with integrated clinical skills using part-task trainers and role-play exercises. Attendees directly participated in at least one scenario and watched others via a live video feed. Each simulated scenario lasted up to 20 min and was followed by a group debriefing session lasting ~40 min that followed a debriefing model of description, analysis and application which proceeds by: facilitating a detailed description of the scenario; ensuring clinical and treatment issues are clarified; broadening analysis to include non-technical skills such as teamwork and communication; drawing out personal experience and examples from practice; exploring options and alternatives; establishing concrete learning to ‘take away’ [14]. The debriefing faculty comprised geriatricians and educationalists, both experienced in simulation training [15], and they facilitated courses on both sites delivering the course to achieve consistency of scenarios and learning objectives, as in previous standardised multicentre simulation programmes [16].

After all courses, candidates were asked to complete a validated semi-structured questionnaire about their learning and experience of both technical and non-technical skills [17]. Each candidate had the opportunity to answer multiple questions and provide several answers to each. All the question responses were transcribed into a Microsoft Excel spreadsheet (version 14.1). Each response was kept as a separate datum point. All text was thematically analysed by author P.B. Themes were developed by iteratively reading and re-grouping the data. High-level groups were split into smaller themes aiming for no fewer than 20 responses in a theme. Each coded theme was discussed and checked by authors G.R. and J.B.; any discrepancies were discussed and if necessary re-evaluated for alternatives. Once themes were finalised, the data were rechecked and if necessary recoded as appropriate. A single response could be and often was coded against multiple themes. Thematic analysis was employed as a primary evaluation of data collection in view of the opportunity to ‘generate interesting findings beyond the specific research questions for which the study was designed’ [18].

After four courses had been completed successfully, the interprofessional working party overseeing course development and delivery recommended secondary quantitative analysis for improved course evaluation. Participants were then also given a validated pre- and post-course questionnaire to rate their confidence (on a scale from 0 to 100%) in managing geriatric clinical scenarios and in key non-technical skills (e.g. take a leadership role in an emergency clinical care situation) [17]. Results were analysed with Student’s t-test. A sensitivity analysis was carried out using non-parametric tests.
in those items where the difference in means was slightly skewed. Data were analysed using Stata v13.1. All candidates gave written informed consent for feedback data to be aggregated for research purposes in accordance with the terms of the Data Protection Act 1998. Ethical approval was given by the Hospital Research Ethics Committee (South London REC 3; approval ref 09/28), under the terms of the UK NHS Research Ethics Service.

**Results**

Twelve standardised courses were run between 2011 and 2013 with a total of 89 candidates attending (54 specialist trainees in geriatric medicine (ST3-7); 12 core trainees in medicine (CT1-2); 14 nurses in geriatric medicine (Band 5–7); 9 participants did not specify their job title).

Candidates’ free-text completion of semi-structured questionnaires yielded 307 individual responses, which were coded into 10 themes with a total of 526 codes (Supplementary data, Appendix 1, available in *Age and Ageing* online). The majority of responses were related to non-technical skills, all of which were judged to have not been taught as effectively by other learning media. Further analysis of the completed semi-structured questionnaires revealed that four broad categories of ‘Communication’, ‘Clinical knowledge’, ‘Situational awareness and planning’ and ‘Team work’ accounted for over half of the 526 free-text responses (Table 2). The greatest overlap in themes occurred for the ‘Communication’ theme overlapping with ‘Teamwork’ and ‘Patient Centredness’ themes. As examples in Table 2, many of the comments had real-world transferability with reflections regarding past behaviour and planned alteration of future behaviour in clinical practice, rather than only in regard to the simulation scenario on the day.

Candidates commented that simulation was a valuable training modality addressing areas of the curriculum rarely taught formally such as continence assessment, end-of-life decision-making and multidisciplinary situations.

The quantitative data showing the mean self-confidence ratings were collated across all courses for 52 of the 89 candidates. The pre-course and post-course mean and standard deviation ratings were calculated. There was a significant improvement in all domains tested, with an average improved confidence of 11.5% (Table 3). The largest change was in Continence Management improving by 24% and next in domain of Deploying Non-Technical Skills at 18%. Results were unchanged in sensitivity analyses.

<table>
<thead>
<tr>
<th>Curriculum-mapped scenario</th>
<th>Simulation technique</th>
<th>Skills aimed to be incorporated into the training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of the acutely ill elderly patient</td>
<td>High-fidelity life-size manikins</td>
<td>Teamwork, Effective communication, Leadership, Situational awareness, Decision-making, Calling for help, Setting priorities dynamically</td>
</tr>
<tr>
<td>Continence care</td>
<td>Patient actors with integrated clinical skills part-task trainers</td>
<td>Effective communication, Using available resources, Decision-making, Anticipating and planning</td>
</tr>
<tr>
<td>Dementia care</td>
<td>Patient actors</td>
<td>Effective communication, Situational awareness, Decision-making, Using all available information</td>
</tr>
<tr>
<td>Complex discharge planning</td>
<td>Role-play exercises</td>
<td>Leadership and followership, Teamwork, Effective communication, Decision-making, Using all available information</td>
</tr>
<tr>
<td>Management of delirium due to urinary sepsis with renal failure</td>
<td>High-fidelity life-size manikins</td>
<td>Situational awareness, Calling for help, Teamwork, Effective communication, Using available resources, Decision-making, Decision-making</td>
</tr>
<tr>
<td>End-of-life care decision-making in an acutely ill patient</td>
<td>High-fidelity life-size manikins and relative actor</td>
<td>Decision-making, Calling for help, Situational awareness, Setting priorities dynamically, Exercising leadership, Effective communication</td>
</tr>
</tbody>
</table>
Theme 1 Communication
- ‘The importance of careful communication and to improve skills no matter how well you think you normally perform’ (STR)
- ‘I need to prep with [the] team prior to family meetings as well as prep myself before MDMs.’ (STR)
- ‘Always communicate patient’s needs and communicate effectively amongst [the] team.’ (CMT)
- ‘Giving patients and families time to express their agenda and respond to that.’ (STR)

Theme 2 Clinical knowledge
- ‘Safeguarding of elderly patients/addressing potential abuse including techniques in information gathering’ (STR)
- ‘More honest and upfront about a dying patient.’ (STR)
- ‘De-escalating a confused and agitated patient.’ (RN)
- ‘Discussion re: end-of-life care/abuse/DNAR/PEG in an open manner with real-life people, very helpful.’ (STR)

Theme 3 Situational awareness and planning
- ‘Recognising that you can only do so much with resources available.’ (STR)
- ‘In order to run an efficient team, it is good to know the capabilities of the individuals in the team. A good leader can then delegate tasks effectively.’ (STR)
- ‘Importance of identifying clear goals/aims at the start of a family meeting or discussion.’ (STR)
- ‘Delegating, learning own limitation to do everything’ (STR)

Theme 4 Team work
- ‘Having open discussions and learning others’ opinions.’ (STR)
- ‘Better awareness of how individual multidisciplinary team members interact.’ (STR)
- ‘When in a complex situation, stand back, talk aloud and reflect.’ (RN)
- ‘Always communicate [a] patient’s needs and communicate effectively amongst [the] team.’ (CMT)

Table 2. Examples of top four themes encompassing 50% of all responses from the semi-structured questionnaires

<table>
<thead>
<tr>
<th></th>
<th>Pre-course confidence score (0–100)</th>
<th>Post-course confidence score (0–100)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>Entering new clinical situations</td>
<td>73.7 (17.9)</td>
<td>81.7 (13.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Leadership</td>
<td>67.1 (22.2)</td>
<td>77.9 (18.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Emergency management</td>
<td>65.9 (19.1)</td>
<td>77.7 (17.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Continence management</td>
<td>54.7 (21.8)</td>
<td>72.1 (17.7)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Multidisciplinary meetings</td>
<td>66.3 (18.6)</td>
<td>79.4 (14.4)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Communication</td>
<td>76.6 (16.7)</td>
<td>83.6 (12.3)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Managing agitated patients</td>
<td>66.8 (17.9)</td>
<td>79.0 (14.5)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>End-of-life decisions</td>
<td>67.3 (18.8)</td>
<td>77.7 (16.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>End-of-life communication</td>
<td>68.1 (19.7)</td>
<td>78.4 (15.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Deploying non-technical skills</td>
<td>65.0 (17.6)</td>
<td>79.2 (13.0)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Overall</td>
<td>67.2 (5.7)</td>
<td>78.7 (3.0)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

Table 3. Pre- and post-course confidence ratings for managing geriatric scenarios (n = 52)

Discussion
Healthcare professionals training in geriatrics are required to develop a variety of technical and non-technical skills to facilitate their management of a complex and challenging patient population. The evolution of medical training in recent years, however, has resulted in a reduction in time available to develop these skills during clinical duties [19]. Simulation is a useful method of facilitating experiential learning in geriatrics and was shown to be feasible as part of a multiple centre teaching programme. As in previous pilot studies, overall trainee opinion was supportive of simulation as a training tool for geriatrics, and analysis of pre- and post-course questionnaires showed improvement in trainees’ confidence in technical and non-technical skills [17]. A geriatric-specific simulation course allows trainees to reflect on both technical and non-technical skills, thus improving their confidence in working as part of a multidisciplinary team. This form of teaching is becoming more prevalent in all medical specialties and is strongly supported by the Chief Medical Officer’s report 2008 [20]. While simulation courses are typically reliant on high or low-fidelity techniques, the requirements of a geriatric-specific course affords the educational opportunity to use a full range of simulation modalities; high-fidelity, low-fidelity, part-task trainers, patient actors and role-play exercises.

The results of this study are promising, demonstrating that simulation training for geriatrics is a valuable method for providing experience in the human factor skills of multidisciplinary team working, communication, situational awareness and planning. Participants also commented on how patients may be more involved in their own care, but not as frequently as reflecting on their own team work abilities and performance. Insightful feedback highlighted that
simulation addresses clinical knowledge areas that can be more challenging to teach including continence, elder abuse and end-of-life care. Simulation learning is designed to place participants in complex and often uncomfortable clinical situations, so that they may experience provision of clinical care in a protected environment. The experience is then discussed and reflected upon in a supportive environment with knowledgeable clinical faculty [17, 21]. Challenging clinical topics were purposefully incorporated into scenarios to stimulate a facilitated discussion around clinical protocols and good practice. Other topics to incorporate for future scenarios may include whistle blowing, advanced care planning and diagnosis of terminal disease.

The strengths of this study include the successful delivery of a training programme across two centres, providing a larger number of participants and, therefore, interview responses to complete a comprehensive thematic analysis. Efforts were taken to achieve standardisation of course structure with prescriptive scenario outlines and cross-site faculty working in both course design and delivery. Standardisation facilitates the format to be transferable to multiple simulation centres and to future courses. The strengths of this learning model also include the course being curriculum mapped, making learning objectives relevant and useful to training, and its development by an interprofessional working party comprising educationalists and clinicians with specialist geriatrics expertise. Furthermore, the course employed a range of teaching modalities aimed at differing learning styles to reinforce aspects of good care.

Limitations of the study include the lack of use of a control arm to compare those that did not attend a simulation session; it could be postulated that those that lack skills in self-evaluation and improvement may be more likely to sign up for this optional simulation training course and thus have a greater improvement after participation. In addition, the positive effect of the analysis needs to be examined cautiously due to the lack of a control group.

It should be noted that the positive effects of the simulation training were limited by the nature of self-reporting. Students were not provided with any pre-course training on how to identify their own strengths and weaknesses, which may have reduced the usefulness of the post-course reflection and evaluation. This puts into question whether the self-reported improvement in skills and confidence will be maintained into clinical practice. However, self-efficacy rating (e.g. confidence level) is based on the principle of motivation theory where individuals have a relatively good understanding of their own abilities and weaknesses, and a learner’s rating has a good correlation with real-world ability [22]. This underpins the social cognitive approaches to the learning theory used within simulation. Simulation training cannot replace real-life work-based experience, but it may be used to augment knowledge and competencies.

While the course was offered to doctors and nurses, only 1–2 nurses attended each course, 14 in total. For a fully multiprofessional course, we would have liked equal numbers of candidates and faculty from each discipline, as well as candidates from other professions including occupational, therapy, physiotherapy, speech and language therapy and dietetics. Furthermore, using curricula from disciplines other than medicine would have helped to make the course applicable to a wider allied health professional audience. Future study could focus on those areas of teaching that benefit from joint teaching and those that require single discipline sessions.

Future studies require a control arm of those not attending simulation to assess retention of the skills gained from the course, the efficacy of simulation compared with more traditional teaching modalities and the effect on patient outcomes. Additionally, the effect of repeated simulation experiences on longer term learning outcomes require further exploration. Analysis could be extended to include focus groups and formal observation and evaluation by independent assessors. To continue the progress made, on-going course could be analysed with action research to provide an iterative reflective process.

To meet the demands of improvements in clinic care highlighted in recent reports [3–6], doctors and nurses caring for older people need to be afforded opportunities during their training to practise skills for a multidisciplinary holistic approach. Simulation is an effective method of teaching technical and non-technical skills in geriatrics, as reflected in the Chief Medical Officer’s 2008 report stipulating ‘Simulation-based training should be fully integrated and funded within training programmes for physicians at all stages’ [20]. This study demonstrated the feasibility and effectiveness of a standardised, simulation training programme across two separate centres in geriatrics and may encourage established simulation suites to provide trainees with teaching in geriatrics using syllabus-directed objectives. This uniformity, centralisation and continual development of high-quality supervised learning to all trainees should negate the potential variability of workplace teaching, service commitments and access to mentorship while preparing the workforce for the changes of an older population.

**Key points**

- Simulation is an effective method of teaching geriatric themes.
- Simulation can be used to address difficult areas such as continence, elder abuse and end-of-life care.
- Standardised training can be delivered across multiple centres using syllabus-directed objectives.
- Uniformity can help to alleviate variability of workplace and interdisciplinary teaching.

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References


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