Simulation of realistic nephrology case scenarios to facilitate intra-professional team learning

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Abstract

Background Learning in the workplace maximises relevance to clinical practice and facilitates the education of the whole multiprofessional team. Provision of structured teaching is becoming increasingly challenging with shift pattern working and staff shortages. This article describes a simulation course designed to facilitate team learning to improve the care of nephrology patients, and presents outcome data over 2 years.

Methods A full-day course, using high fidelity manikins, was designed for nephrology specialty trainees and nurse specialists. Nineteen learners (eleven specialty trainees and eight nurse specialists) and nine multidisciplinary team faculty members attended. Evaluation used pre- and post- course assessments, with a 1-year follow-up questionnaire.

Results Following the course, improved knowledge scores, 56% to 72% ($P<0.05$), and confidence scores, 57% to 71% ($P<0.005$), were demonstrated. Qualitative analysis found ‘intra-disciplinary interaction’, ‘reflection’ and ‘practical skills’ were the greatest enablers of learning. In the 1-year follow-up questionnaire, specialty trainees reported that the course improved clinical practice and helped preparation for consultant roles.

Conclusions This course improved knowledge and confidence in managing nephrology scenarios across the multidisciplinary learning group, and the model could be used in other hospital specialties.

Key words: Mentorship; Multidisciplinary; Reflection; Simulation; Training programme

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Introduction

Finding opportunities for direct consultant supervision with guided reflection during the working day is challenging as a result of shift working, multidisciplinary staff shortages and increasing service demands (Mason et al, 2013), creating a more stressful learning environment.

In nephrology, patient management is often complex, involving multiple members of the intra-professional team, and is time critical. New specialty trainees are required to rapidly accrue a large knowledge base and apply it to unfamiliar situations (Motola et al, 2013). Specialist nurses have a wealth of relevant experience, but new specialty trainees are often not aware of or open to the support they can provide (O’Daniel and Rosenstein, 2008).

This article describes a specialist intra-professional nephrology course, which aims to create a safe teaching forum for learners to gain practical experience of managing nephrology-specific clinical scenarios (Watson et al, 2019). The aim of the course is to provide a simulated clinical encounter which the trainee manages together with nurse specialists, fostering a culture of intra-professional team learning (Watson et al, 2017). The high multidisciplinary faculty to participant ratio facilitates time for personalised feedback and mentoring (McGaghie et al, 2010). The course was developed to align with best simulation practice guidance (Motola et al, 2013).

Although this article describes a nephrology course, this model could be used in other specialty training schemes to improve specific knowledge, complex decision making and multidisciplinary team working.

Methods

A full-day simulation course designed around nephrology case scenarios and patient communication was held in consecutive years, November 2018 and December 2019, at the

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St George's University Hospitals NHS Foundation Trust, London simulation laboratory, GAPS. All learning material was peer reviewed by a panel of multidisciplinary nephrology experts and medical educationalists. Nephrology specialty trainees in their first 2 years of specialty training and nephrology nurse specialists were invited to attend. A bespoke website was available to all learners both before and after the course to introduce the course, simulation facility, and to provide pre- and post-course learning materials. Table 1 shows the high fidelity manikins and patient actor communication scenarios simulated during the day.

Realism was maintained where possible with the manikin receiving haemodialysis via an arteriovenous fistula and peritoneal dialysis through an inserted Tenckhoff catheter (Figure 1).

Peer learning occurred before, during and following the scenario. Before the scenario, the PARROTS model (Table 2) was used for team planning and anticipatory thinking (Snelgrove and Fernando, 2018). It helped determine the group's learning specific goals and set the agenda for debrief. During the scenario, practical demonstrations of the haemodialysis and peritoneal dialysis machines were given by specialist nurses. Following the scenario, the debrief, structured using the 'diamond' model (Jaye et al, 2015), provided a tool to analyse how the team worked together, focusing on communication and leadership skills and facilitated 'roundtable' guided discussions.

Evaluation of the course was obtained through anonymised questionnaires. These included:

1. Pre- and post-course written assessments of knowledge across different domains of renal medicine
2. Pre- and post-course self-confidence scoring using a five-point Likert scale
3. Free-text boxes to ascertain what facilitated learning (questions included 'How did the course facilitate development of human factors; such as communication, leadership and teamwork?' and 'What did you like or dislike about the course?').

Table 1. Simulated scenarios using high fidelity manikin and patient actors

Scenario	Part A: High fidelity manikin	Part B: Patient actor communication
1	Management of pulmonary renal syndrome in a young woman presenting to the emergency department	Consenting for immunosuppression
2	Safe management of fluid overload in a patient receiving peritoneal dialysis in a peripheral clinic	Counselling for change of dialysis modality
3	Managing sepsis and diabetic ketoacidosis in recent renal transplant recipient on an outlying ward	Duty of candour discussion with patient around missed medications
4	Management of cardiogenic shock in a patient receiving haemodialysis on the haemodialysis unit	Discussion regarding withdrawal of dialysis therapy

Figure 1. Manikin receiving (a) haemodialysis via an arterio-venous fistula and (b) peritoneal dialysis via a Tenckhoff catheter.

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Table 2. Model for enhancing learning with three stages to support and promote performance. PARROTS: promote reflection; align feedback; retrieve peer input; reveal standards; outline gaps; turn up strategies and summarise

Before the simulation	Prime performance	Clarify goals of the exercise
		Make evaluation criteria explicit
		Promote mental simulation
		Explore personal feedback preferences
		Assign observer tasks for 'aligned' feedback
During the simulation	Monitor performance	Take note
		Consider video stills or clips
		Ensure observer participation
After the simulation	Facilitate debrief	Let people come out of role – elicit reactions
		Signpost transitions
		Promote active participation
		Align feedback to goals of exercise
		Reveal performance gaps
		Observational feedback culture
		Turn up strategies to close gaps
		Summarise – plan future learning

Faculty members completed part three of the evaluation. A non-parametric paired *t*-test, the Wilcoxon signed rank test, was used to test for statistical significance. A follow-up questionnaire was sent at 1 year to all specialty trainees attending the November 2018 course to evaluate whether it had led to any changes in the individual's clinical practice.

Results

The courses took place at St George's University Hospitals NHS Foundation Trust, London simulation laboratory, GAPS. A total of 19 learners attended the courses (November 2018: six nephrology specialty trainees and four specialist nephrology nurses; December 2019: five nephrology specialty trainees and four specialist nephrology nurses). Specialist nurses included a peritoneal dialysis, haemodialysis and transplant nurse specialist. The faculty included four consultant nephrologists, one senior nephrology specialty trainee, a nephrology practice development nurse and three educationalists. A total of 17 out of 19 learners completed pre- and post-matched questionnaires (89% response rate). Three of the nine faculty members completed the post-course qualitative evaluation.

The mean knowledge scores increased among all the participants in relation to questions on areas of renal medicine including acute kidney injury, peritoneal dialysis, transplantation, and haemodialysis. A statistically significant increase was seen in total knowledge scores across all domains ($P<0.05$) (Figure 2).

The mean confidence score of the participants increased after all simulation scenarios, with statistically significant increases in six of the eight scenarios. These were the management of pulmonary renal syndrome ($P<0.005$), consenting for immunosuppression ($P<0.05$), interpreting peritoneal equilibration test results ($P<0.05$), altering peritoneal dialysis prescriptions ($P<0.005$), managing sepsis in a renal transplant recipient ($P<0.05$), and managing cardiogenic shock in a patient receiving haemodialysis ($P<0.05$) (Figure 3).

The themes identified from qualitative evaluations are listed in Table 3, with responses from faculty shown in italics.

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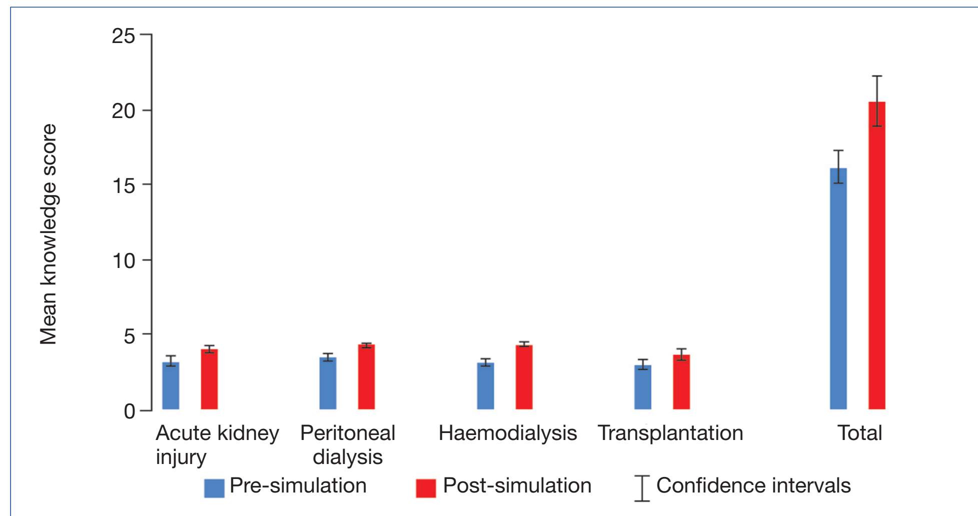

Figure 2. Knowledge across different areas of renal medicine pre- and post intra-professional simulation training.

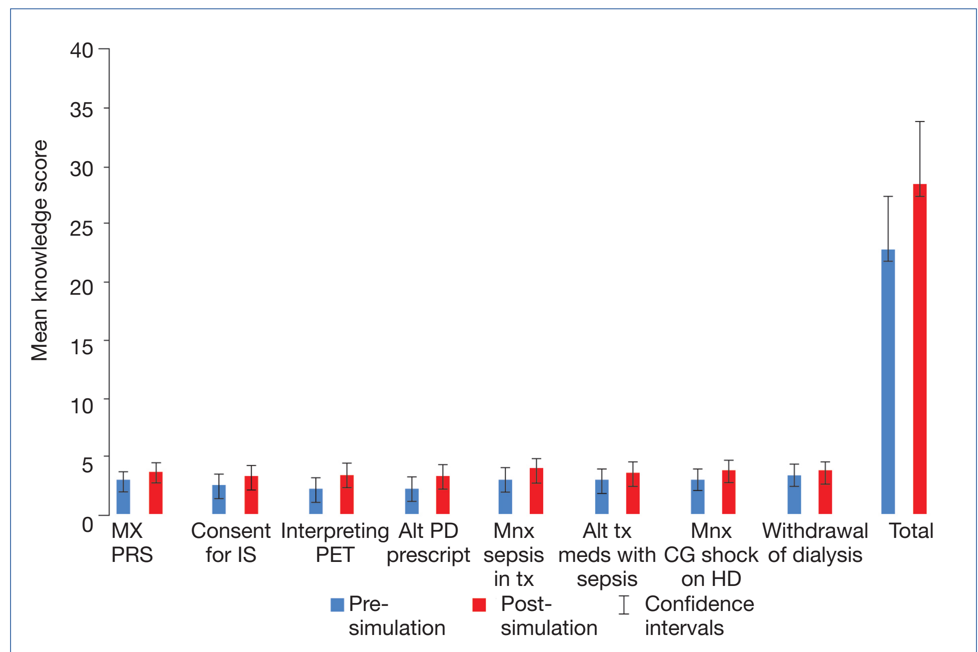

Figure 3. Confidence pre- and post intra-professional simulation training. Alt PD prescript = altering peritoneal dialysis prescriptions; Alt tx meds with sepsis = changing transplant medications with sepsis; Consent for IS = consenting for immunosuppression; Interpreting PET = interpreting peritoneal equilibration test; Mnx CG shock = managing cardiogenic shock in a patient receiving haemodialysis; Mx PRS = management of pulmonary renal syndrome; Mnx sepsis in tx = managing sepsis in a renal transplant recipient; Withdrawal of dialysis = discussions around withdrawal of dialysis.

The 1-year follow-up questionnaire was completed by four of the six specialty trainees who attended the 2018 course. In 17 of 20 domains (85%) they reported that the simulation course led to a direct improvement in their clinical practice. All reported that it was a useful addition to the training programme, and three of the four specialty trainees reported that it could also prepare them for stepping up into the consultant role.

Discussion

This intra-professional team simulation led to a statistically significant increase in knowledge and confidence across the entire intra-professional learning group. The intra-disciplinary

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Table 3. Themes from qualitative analysis of course from participants with faculty comments in italics

Themes	Comments
Intra-disciplinary interaction	'Realistic nurse and doctor interaction' 'Patient and clinician interaction added to learning experience' 'Learning from and alongside specialist nurses and doctors' *'Opportunity to share clinical experiences and refresh knowledge from expert faculty and participants'*
Reflection	'Chance to focus on the emotional aspect' 'Time to reflect facilitated by a safe learning environment' 'The pre and post scenario debrief enabled wider discussions around managing a variety of renal scenarios' *'Valuable opportunity to observe trainees, identify actual practice and reflect as a group'*
Practical skills	'Opportunity for application of clinical skills in a variety of common renal scenarios' 'Useful communication scenarios around various difficult areas in renal medicine' 'Hands on opportunity to use a haemodialysis and peritoneal dialysis machine' 'Facilitated transfer of skills from the simulation lab to the clinical work place' *'Opportunity to improve skills of giving constructive feedback'*

interaction, guided reflection and opportunity for practical involvement were the greatest enablers of learning.

One-year follow-up questionnaires demonstrated that the course led to improvements in the specialty trainees' clinical practice and could help in preparation for a consultant role.

This course focused on team discussions before simulation to facilitate anticipatory thinking, mental rehearsal and goal-directed planning. This is a vital ingredient of learning and a key under-structure of 'safe clinical practice' (Iedema, 2011).

Limitations of this work are the small numbers involved, particularly at 1-year follow up, and the general availability of simulation facilities. However, despite the small numbers of participants, statistically significant improvements in knowledge and confidence were demonstrated. The large faculty team was resource heavy but allowed individual feedback which was valued by the learners and provided an opportunity for direct observation of trainees' practice and a rapport to develop between trainee and trainer. This lends itself to a potential innovative means of facilitating the role of educational supervisors. The large faculty allows opportunity for peer observation of the course to facilitate its development and enables provision for a faculty training scheme, whereby a previous learner can be supported by faculty to facilitate on a future course, thereby investing in the sustainability of the programme.

An intra-professional simulation course such as this, through being more aligned with clinical practice, could be used to identify clinical competency (Quraishi et al, 2019) and assess Capabilities in Practice (Joint Royal Colleges of Physicians Training Board, 2019). Having a risk-free environment facilitates the learner to make more senior level decisions and may prepare trainees to gain confidence for transitions in the workplace, such as from internal medical trainee to specialty trainee, or specialty trainee to consultant.

Future considerations include how best to incorporate other nephrology multidisciplinary team participants and provide them with relevant learning without distracting from the higher level learning needs of the specialty trainee.

Conclusions

This intra-professional simulation course improved knowledge and confidence in managing nephrology scenarios and patient communication across the multidisciplinary learning group. This model could be used in other hospital specialties. Although resource intense, this can be justified by effective trainee upskilling and through enabling peer learning among the intra-professional team.

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Key points

- Providing opportunities for direct observation of practice with guided reflection in the workplace is becoming increasingly challenging.
- This intra-professional course was established to facilitate team learning through simulating a patient encounter, with a high faculty to learner ratio to focus on personalised feedback and mentoring.
- The course led to a statistically significant increase in knowledge and confidence managing the nephrology case scenarios across the intra-professional team.
- Learners reported that the intra-professional interaction within the scenario, the practical experience and guided reflection on their practice was the greatest enabler of learning.
- This teaching model could be used in other specialty training schemes to improve specific knowledge, complex decision making and multidisciplinary team working and provide an innovative way of facilitating the role of the educational supervisor.

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Conflicts of interest

The authors declare no conflicts of interest.

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