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LECTURE NOTES

Reframing simulation

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Abstract

Engagement is an important element of the work of medical professionals, both with patients and members of the public, and within and between professions allied to medicine. Simulation can be reframed for different applications within medicine and surgery, and also as a tool for engagement. A number of examples are discussed illustrating, for example, how simulation can be stretched wider to engage non-experts in the concepts behind surgery, or how focusing on an essential element of a surgical procedure and presenting this in abstract form using simulation creates an intensifying effect.

Keywords: *simulation; engagement science; textile body*

Professor Kneebone has been a surgeon, then a GP and finally an educationalist, now holding the Chair at the Imperial College Centre for Engagement and Simulation Science (ICCESS). His thoughts about simulation were presented at the conference over a half-hour talk. The initial presentation by slides and video took us through Professor Kneebone's thinking on how simulation can be viewed differently when different audiences are being addressed. This was followed by a practical example of quite a radical departure for surgical simulation.

Professor Kneebone's talk comprehended two extremes of his current stance on simulation. On the one hand, simulation can be stretched wider to include engagement of the public, of patients, even of children in the concepts behind surgery. On the other hand, focusing on an essential element of a surgical procedure and presenting this in abstract form using simulation creates an intensifying effect.

To illustrate these ideas, a number of collaborations and events were described. Firstly, the collaboration of ICCESS with the Royal College of Music. Professor Aaron Williamon is the Co-director for the Centre for Performance Science with Professor Kneebone, for which a simulator has been constructed to allow musicians to simulate auditions and performances, as opposed to merely rehearsing. In turn, surgeons can benefit from the idea of rehearsal. A joint simulation event was outlined between Masters students of the two colleges, in which the music performance science students participated in a surgical operation, and surgical education students performed a song in front of an audience.

Such simulations can be facilitated by the use of the "pop up" theatre, a low-cost simulator that allows for the possibility of travelling simulation, known as "distributed simulation". A highly realistic illustration of a video from a trauma laparotomy was shown, which was put on for school children at the Cheltenham Science Festival.

Professor Kneebone illustrated his point of different perceptions of the same event by different people with the famous duck/rabbit ambiguous image, and he went on to explain his collaborations with experts from the worlds of craft and of performance to bring out the idea that experts in other craft fields can allow surgeons to learn in ways not previously entertained. Simulation is a means to enabling this conversation.

This article is a summary of a presentation given at the 7th Annual Homerton Simulation Conference: Novel thinking and new technology in healthcare and education, Homerton University Hospital, London, UK, on 7 December 2017, and forms part of a special issue devoted to this meeting. It has been accepted for publication after review by the Guest Editor.

Figure 1. Three-dimensional lace leaf. Photo courtesy of Fleur Oakes, 3D lacemaker.

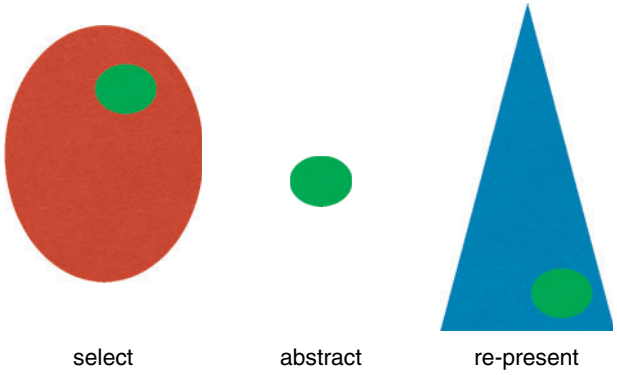

Figure 2. Select, abstract, re-present. Photo from R. Kneebone.

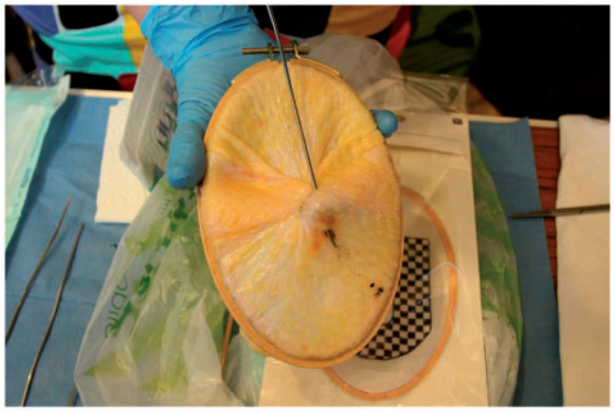

Figure 3. Anal fistula simulation created using chicken skin.

One of the most interesting of these collaborations is between a three-dimensional lacemaker, Fleur Oakes (Fig. 1, an example of her work) and the vascular department at St Mary's Hospital, in particular with lead vascular surgeon, Mr Colin Bicknell. Professor Kneebone explained the thinking around the joint working, around expertise to do with materials and thread, expounded in his *Lancet* commentary[1] and on frames through which this expertise is viewed. To a medical audience, the concept of a lacemaker being in a vascular theatre is as alien as a pianist scrubbing in to an operation. However, it is the viewpoint of the outsider that can be of such illuminating influence, as Professor Kneebone explained.

A different set of viewpoints can also be included if the variable is time. The distributed simulation operating theatre was used by his team to roll back time with the reuniting of a retired surgeon and his retired scrub nurse. Professor Kneebone's team looked at their familiar wordless communication with the instruments they had always used for a laparotomy, and compared it with today's fragmentary team working.

Simulation seen through different frames was presented by Professor Kneebone in the latter part of his talk.[2] He illustrated this in simple diagrammatic form whereby the central concept to be simulated, the learning point of the task, can be abstracted. It is only this that is then simulated – and in the process it is found to be intensified (Fig. 2). A series of stills and video from a cross-disciplinary day was shown at which a series of craft makers and surgeons had each brought a one-concept simulation to demonstrate. The anal fistula simulation was created using chicken skin with a central defect stretched over an embroidery ring, with an elastic band holding the opening closed (Fig. 3). A fistula probe crossing the "anus" was cut down onto with a scalpel by attendees on the day, who were an invited audience of experts and opinion formers within the arts. The experience of cutting through sphincter, with the subsequent loosening of the anal opening was powerful enough to make one participant feel faint. Other examples were given where a simple reconstruction of an accurate element of an operation was a powerful simulation, such as the insertion of a grommet, demonstrated by an ENT surgeon with a yoghurt pot and some fine forceps.

Professor Kneebone finally introduced the practical element of the presentation, being the story behind the "textile body" created by Fleur Oakes. Her colleagues in the world of lacemaking and sewing were struggling to understand Fleur's descriptions of her experience of the abdomen at Colin Bicknell's open operations. She understood the abdomen as a series of layered materials each with their own texture. She decided to create a physical box with layers of material within it to illustrate her impression. A conceptual abdomen, with the surgical challenges of knot tying and

anastomosis deep inside, was constructed. The difficulty in accessing and performing delicate sutures deep inside was reproduced by a threading task in the base of the box; the anatomical layers of the abdomen were represented by knotted elastic bands for the gut, a thick yellow knitted fat layer and layers of lace for the crinkly skin of an elderly patient. This box was demonstrated for the audience who were invited to come down and feel its layers, retracted by two helpful volunteers and assisted by Tamzin Cuming.

In conclusion, Roger Kneebone's presentation at the simulation event illustrated that reframing simulation can pinpoint precise learning moments, and that cross-fertilisation of ideas between experts can result if we think widely around the concept of simulation in medicine and surgery and engage different audiences.

Conflict of interest

None declared.

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References

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