Patient-specific simulation: a new avenue to be explored

Greta K. Wood¹ · Louise Kenny²

Received: 6 June 2017 / Accepted: 8 June 2017 / Published online: 16 June 2017
© The Japanese Association for Thoracic Surgery 2017

We read with interest the recent article ‘Preoperative simulation of minimally invasive aortic valve replacement using patient-specific replica’ by Murakami and colleagues which describes the development of patient-specific replicas to guide preoperative planning during minimally invasive aortic valve replacement [1].

As early as the 1800s, surgeons have used simulation training to hone their skills, practicing on animals and cadavers [2]. In the past decade, simulation has developed rapidly, and in the UK, a portfolio of ‘bootcamp’ courses is now offered throughout specialisation targeting skills relevant to each stage of training. This development has been motivated by changing attitudes towards patient safety and the surgical ‘learning curve’ as well as limitations in trainee exposure due to the high-risk nature of the speciality, the infrequency of many presentations, and constraints of the European Working Time Directive [3, 4]. The online publication of surgeons’ mortality rates may have further impacted training opportunities [5]. The appeal of standardised training without a risk to patient safety is clear.

There is ongoing debate about the optimum form of simulation as every model, by nature, is a compromise. Replicas, including patient-specific models, offer pathology but are limited by their representation of tissue; conversely, cadaveric or animal tissue-based models offer

excellent tissue quality but little pathology [1]. High-fidelity computer-programmed models do not offer live tissue but do provide real-time physiology and repetition. There have been calls for a standardised way to assess simulation models as compared to the traditional apprenticeship model popularised by Halstead in the early twentieth century [2]. Perhaps, an integrated approach in which each simulator is used at an appropriate time to complement apprenticeship training would be a powerful form of multi-faceted training. High-quality studies assessing long-term impact on trainee performance and patient safety will be central in enabling provision of safe and evidence-based training for the next generation of cardiac and thoracic surgeons.

Compliance with ethical standards

Conflict of interest The authors have declared that no conflict of interest exists.

References

1. Murakami T, Yasumizu D, Hosono M, Sakaguchi M, Takahashi Y, Shibata T. Preoperative simulation of minimally invasive aortic valve replacement using patient-specific replica. *General Thorac Cardiovasc Surg*. 2017;65(5):302–3.
2. Trehan K, Kemp CD, Yang SC. Simulation in cardiothoracic surgical training: where do we stand? *J Thorac Cardiovasc Surg*. 2014;147(1):18–24 (e2).
3. Beckerman Z, Mery CM. Teaching congenital heart disease: A new era? *J Thorac Cardiovasc Surg* 2017;153(6):1541
4. Benes V. The European Working Time Directive and the effects on training of surgical specialists (doctors in training): a position paper of the surgical disciplines of the countries of the EU. *Acta Neurochir*. 2006;148(11):1227–33.
5. Khan OA, Iyengar S, Pontefract DE, Rogers V, Ohri SK, Livesey SA. Impact of surgeon-specific data reporting on surgical training. *Ann R Coll Surg Engl*. 2007;89(8):796–8.

This comment refers to the article available at doi:[10.1007/s11748-016-0696-2](https://doi.org/10.1007/s11748-016-0696-2).

✉ Greta K. Wood
g.k.wood@ncl.ac.uk

¹ Newcastle University, Newcastle-upon-Tyne NE1 7RU, UK

² Department of Cardiothoracic Surgery, Freeman Hospital, Newcastle-upon-Tyne NE7 7DN, UK