



Tackling Knife Violence Through Simulation Professor Roger Kneebone

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Introduction

In my series of Gresham Lectures around the theme *Performing Medicine, Performing Surgery*, I have set out the idea that medicine and surgery can be considered as performance. This view widens how medical professionals frame clinical practice and surgical treatment, moving beyond the acquisition and application of scientific knowledge and procedural skill (though these remain central) to the holistic care of sick or injured people. If clinicians are performers, then patients are our key audience. Part of this framing entails becoming aware of that audience and recognising their perspectives.

Interrogating surgery through a performance lens brings into focus aspects of clinical practice that might otherwise escape attention. In previous lectures I have examined how experts outside medicine can shine light on facets of clinical practice. During these lectures I've invited puppeteers, musicians, a chef, a close-up magician, a bespoke tailor, a forensic scientist and professionals whose work entails high levels of risk for themselves and others (such as polar exploration and combat flying) to share the platform and explore ideas through conversation. With them I've explored issues such as team working, responding to the unexpected through improvisation, decision-making under stress, resilience and recovery, and the shaping and direction of attention when working with patients and other audiences.

In these lectures I have drawn on my own experience as a clinician, first as a trauma surgeon in the 1980s and then as a general practitioner for almost twenty years. A lifelong fascination with education in the world of medicine led to my interest in developing and researching simulation as an educational approach. This became a focus in the current phase of my career, as an academic at Imperial College London. Initially this work concentrated on supporting professionals (individuals and teams) as they developed their skills in providing clinical care, using the safety of simulated settings to ensure that no patients would be placed in jeopardy during training. Later I explored how simulation could be used to engage with members of the general public (adults and young people), inviting them to share their personal perspectives with healthcare professionals to achieve a 'reciprocal illumination' for all who took part.

My Experience of Treating Patients with Knife Injuries

In this lecture I start by returning to my own experience during my postgraduate training as a trauma surgeon. For several years in the 1980s I worked at a large hospital in Soweto, on the outskirts of Johannesburg in South Africa. At that time Soweto was one of the most violent places in the world, with a very high incidence of penetrating wounds. I gained extensive experience treating victims of knife violence whose life-threatening injuries required immediate resuscitation and operative surgery. Often, I first encountered these patients when they were unconscious, critically ill from blood loss after sustaining serious damage such as a stab wound to the heart, neck or abdomen. Working under the supervision of experienced consultants and other colleagues, I learned how to assess and manage these critically ill patients, gradually taking on more responsibility and eventually leading surgical teams myself. But the incidence of serious injury amongst the people I

was working with was so high that once patients were over the postoperative period and on the road to recovery they were discharged into their community, and I seldom if ever saw them again.

Looking back at that experience, I recognise many performative elements to operative surgery. As with music, theatre, dance, puppetry and magic, each procedure has an arc. Once started, an operation must carry on to a conclusion, whether or not it goes according to plan. Team-working is vital, and effective professional relationships between members are a crucial determinant of success. When things don't go according as expected, clinicians must respond swiftly and effectively, maintaining their focus on their patient and placing that person's safety above all. Especially in areas with a high level of unpredictability, such as trauma surgery, the ability to improvise in response to the unexpected is key. And as performers, clinicians must recognise the impact on themselves and one another of working under pressure in a high stakes setting. Care, respect, support and resilience are vital.

Simulation for Clinical Teams

After completing my surgical training, I changed direction and retrained as a general practitioner (GP). For almost twenty years I practised in a group of GPs in the southwest of England. At the same time, I developed my interest in medical and surgical education, exploring the use of simulation to help clinicians develop surgical skills. A further career move brought me to Imperial College London, helping to establish and develop the field of surgical education. As part of this work, I designed immersive simulations for hospital clinicians.

In the years that followed, my colleagues and I designed innovative approaches to simulation which addressed the perspectives of clinicians, patients and families. These included *Hybrid Simulation* (applying silicon 'wounds' to professional actors to recreate the appearance of injury or disease); *Distributed Simulation* (realistic yet portable and relatively low-cost simulations of clinical settings); and *Sequential Simulation* (portraying stages in an unfolding story, from injury or onset of illness through hospital treatment and eventual discharge home or elsewhere in the community).

At first this work focused on clinicians, helping them to gain the skills they needed to provide the best possible care for their patients. Many of our scenarios recreated care pathways around injury, focusing on teamwork and communication as well as procedural skills in the operating theatre.

Though early work took place within hospitals and medical schools, we soon recognised the potential of simulation for interacting with the wider public, both adults and young people. Through a series of engagement events in science fairs and museums, we used Distributed Simulation to explain the work of surgical teams, inviting members of the public to observe and participate. There we developed the concept of reciprocal illumination, a collaborative process framing all participants' perspectives as equally though differently expert. One such strand focused on knife injury and its devastating impact on young people across the UK, especially in large cities.

Framing the Problem

Knife violence within the UK continues to increase, especially in London and other major conurbations. Every day seems to bring tragic reports of more young people seriously and often fatally injured. The causes of knife violence are complex, despite numerous studies attempting to shed light. But some factors are clear. For example, a recent review (Haylock et al, 2020) identifies adverse childhood experiences and poor mental health as crucial factors. Community and societal risk factors such as economic inequality and discrimination play a major role, though they found no association with gender or ethnicity. This indicates the complexity of the challenge and the need to avoid oversimplification.

The impact of the Covid-19 pandemic has been complex too. The St Mary's Major Trauma Centre

(MTC) in London (one of four such centres in the capital) usually sees more than 3,000 trauma calls per year. Of course, this excludes the tragic toll of those who die before reaching hospital. The Covid pandemic saw a drop of approximately 20% in trauma patient numbers at the St Mary's MTC, but the percentage of severely injured patients (those with an Injury Severity Score of over 15) remained unchanged. Of these patients with serious injury, around 30% suffered penetrating trauma (most commonly stabbing as a result of an assault). Male patients in the age group 16-44 years make up the majority of major trauma presentations in Northwest London. Fortunately, survival rates are high, owing to the expertise of the clinical teams and support services with the NHS.

Yet a natural focus on the immediate treatment of life-threatening injury, whether at the roadside or in hospital, can mask the longer-term impacts of knife violence. Often those who survive initial injury are left with life-changing effects, both physical and mental. Some of these are direct consequences of their initial injury. For example, patients who have been stabbed in the abdomen frequently suffer damage to the intestinal system and this may require treatment with a stoma such as a colostomy. This diversion of the intestinal contents into a stoma bag (a 'poo bag') may be permanent, but even a temporary stoma may have devastating effects on a young person's personal and social life. Statistics of knife injury often overlook the enduring consequences of trauma in the lives of young people and the profound damage it inflicts at a critical stage in their development.

For clinicians providing acute care, it is easy to lose sight of these wider impacts on patients who suffer injury and overlook the complexities of challenge. The following testimony by a young man in one of our collaborations gives a sense of the devastating long-term impact of knife violence and the life-changing effects of injury. Personal details have been removed to ensure his anonymity.

'Feeling under threat, like you need to protect yourself, is a big part of carrying a knife, big part, that's like the biggest part. It makes you feel safer, I mean it puts you in danger, but you feel safer. Truly you don't even realise what's happening, it's like the pack mentality, you stop thinking for yourself almost, you get caught up in just like ... the madness.

The second time I was stabbed I was in my early 20s. It was kind of mad, you know, it was mad cos it just happened so quick. Like, in a manner of seconds everything was done. You're thinking so fast, your adrenaline is pumping.

I was in hospital for a long time, I was in a coma for weeks, I had like eight operations, I had infections, I had so much go wrong. The hospital was scarier than the actual incident. I had to get a stoma bag, oh the stoma bag was the worst, colostomy bag I mean. Imagine, when I was eventually able to walk around and be going places, my colostomy bag would fill up and I couldn't do anything, I'm just walking along supporting poo in my hand.

Eventually, after a year, they did an operation to get rid of the colostomy. Once it was reversed it took a while for it to heal. Sometimes the scar itself, it gets ... like, it contracts ... and it tightens up and it really hurts. The more I think about it, the more I worry about it. I'm all on edge now.

Honestly, you know what, I feel like it's braver for me to not carry a knife. It's that old habit of taking a knife everywhere, take it to school, take it to college. It's not that I'd be using it all the time, it's just that you feel calm. That there is what I'm trying to be brave enough to not do'.

Simulation and Knife Injury

The simulations my colleagues and I developed initially aimed to support healthcare professionals in the management of critically injured patients when they reached hospital. And of course, that is an essential aspect of clinical care. But it's only part of the picture. Many other professionals play key roles, including police at the scene of an incident, paramedics providing roadside assistance and rapid transport to hospital, multi-professional trauma teams at the time of admission, and specialist nurses and rehabilitation experts skilled in ongoing care and support.

Over several years, my colleagues and I developed simulation-based events which invited members of the public (adults and young people) to witness and even take part in a sequence of events

starting when a young person was stabbed. One of these, entitled '*Life on a Knife Edge*', took place at the Big Bang Fair for children and young people with their families and teachers. In our simulation we showed how expert professionals from the police, ambulance and emergency medical services come together as a critically injured young man is rushed to hospital and treated by emergency surgery. The final scene showed the patient and his mother in conversation with the operating surgeon as she explains that although she and her team were able to save the patient's life, she had to create a colostomy. This marked the start of long path, supporting the patient and his family in coming to terms with a life-changing event.

Further work with schools brought simulations into public spaces, including Haggerston Park in the London Borough of Hackney. There we showed the stab injury pathway to groups of young men, using a small marquee equipped as a simulated operating theatre and hospital bed. Volunteers who had suffered stab injury shared their experience with the young people, allowing us to explore in a non-judgmental way some wider issues around carrying knives.

Simulation-Based Holistic Approach for Reducing and Preventing Knife Violence (SHARP) Project

In 2020 we were fortunate to gain support from the Youth Endowment Fund for a collaborative project with two charity partners. The Prince's Trust and The Change Foundation have extensive experience of working with young people in London, collaborating closely with schools and community networks. This project funds us to work with young people between 11 and 14 years in developing simulation-related approaches to reducing knife injury. Our aim is to work with schools and communities in areas where knife violence is especially evident, raising awareness of issues and strategies for reducing involvement in gangs. By working with young people as co-developers, we will integrate the adverse childhood experiences and issues around decreased mental health (as outlined above) in our simulation design. Our funders are also supporting an evaluation of our project by independent experts as it develops. We expect this to be published towards the end of next year.

Our initial intention was to use Distributed and Sequential Simulation to engage with young people in schools and community spaces. The Covid-19 pandemic has prompted us to develop new approaches to simulation, integrating virtual reality with arts-based debriefing to address the emotional and physical aspects of knife violence in an age-appropriate way.

Where Next?

Much of our work to date has focused on the victim's perspective, tracing a pathway from injury and roadside assistance to immediate hospital care, operative surgery and subsequent rehabilitation. This addresses the long-term implications of sudden serious injury on patients, their families and communities.

Yet when people carry knives, the line between being a victim and an attacker is slender. Many people who sustain knife injuries are stabbed with the weapon they themselves are carrying. The pathway for those who inflict knife wounds is equally challenging, as the police and criminal justice systems may include arrest, remand, trial, imprisonment and eventual reintegration in the community. In the future we aim to involve young people as co-creators of simulations in these areas too, working with the courts, judges, police, Crown Prosecution Service, and statutory and voluntary sector organisations whose work aims to reduce the number of young people affected by knife violence and its repercussions.

Conclusion

This lecture concludes a series of explorations of clinical medicine through the lens of performance. Previous lectures have examined how experts from areas as diverse as the performing arts, fine

dining, safety-critical industries and forensic science can shine a light on the practices of clinical care. This final lecture explores how involving young people as co-developers and co-performers in simulation can reduce their involvement in knife violence, a major challenge in many communities.

This series challenges traditional approaches to clinical education. It moves beyond acquiring and applying scientific knowledge and procedural skill, placing the relationship of care between performers (clinicians) and audiences (patients, colleagues and publics) at the centre of what it means to be a clinician.

This lecture sets the scene with a presentation by Roger Kneebone, outlining the nature of trauma surgery for patients with stab injuries and describing the approaches he and his collaborators have developed for using simulation to engage with healthcare professionals and publics.

This leads to a conversation between Kneebone and a surgical colleague, Mr Sacha Harris. Harris has recently completed his surgical training and is about to become a consultant. He has worked extensively in one of London's Major Trauma Centres, leading surgical teams as they treat patients who have suffered serious stab injuries. Earlier in his training he worked with Kneebone as part of a research group exploring how realistic simulation could be used to engage with young people from communities with high rates of knife injury and gang violence.

The conversation will explore how present-day issues might be addressed by bringing together the perspectives of clinicians, patients and communities in unexpected ways.

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References

Haylock, S., Boshari, T., Alexander, E. C., Kumar, A., Manikam, L., & Pinder, R. (2020). Risk factors associated with knife-crime in United Kingdom among young people aged 10-24 years: A systematic review. *BMC Public Health*, 20(1). <https://doi.org/10.1186/s12889-020-09498-4>

Tribe, H., Harris, A., & Kneebone, R. (2018). Life on a knife edge : Using simulation to engage young people in issues surrounding knife crime. *Advances in Simulation*, 3(20), 1–9. <https://doi.org/10.1186/s41077-018-0079-0>

Kassab, E., Tun, J. K., Arora, S., King, D., Ahmed, K., Miskovic, D., ... Kneebone, R. (2011). "Blowing up the barriers" in surgical training: Exploring and validating the concept of distributed simulation. *Annals of Surgery*, 254(6). <https://doi.org/10.1097/SLA.0b013e318228944a>

Kneebone, R., Kidd, J., Nestel, D., Asvall, S., Paraskeva, P., & Darzi, A. (2002). An innovative model

for teaching and learning clinical procedures. *Med.Educ.*, 36(7), 628–634.

Kneebone, R. (2020). *Expert: Understanding the Path to Mastery*. London: Viking Penguin (<https://www.penguin.co.uk/books/313248/expert/9780241392034.html>)

Kneebone's podcast *Countercurrent* features conversations with many of the experts described above (<http://apple.co/2n5ROy1>)