Surgery of the Troubles: Lessons for the Future

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IS Ravdin, a remarkable man, was born on October 10, 1894 in Indiana. In 1918, he received his medical degree from the University of Pennsylvania Medical School and in 1928, he was appointed to the new Chair of Surgical Research. In 1945, he was appointed Surgeon in Chief at the Hospital of the University of Pennsylvania (HUP) and became the John Rhea Barton Professor of Surgery. His research led to many publications in gall-bladder and liver disease, and hypoproteinemia in the surgical patient. He studied blood substitutes for war casualties and, treating casualties of Pearl Harbor, he used albumin for the first time.

He was involved with the military for 40 years—with the National Guard in 1916 (Mexico) to the 20th General Hospital in Assam during the World War II, where he was Commanding Officer in 1945. His talents as an administrator were legendary, with “tenacity of a bulldog.” By 1945, he was Brigadier General, and he retired in 1956 as a Major General in the Medical Corps; his many awards included the Legion of Merit (and the Oak Leaf Cluster).

His surgical expertise was such that he was called to treat President Eisenhower as a surgical patient. He was active in the American College of Surgeons (president, 1960) and the American Cancer Society (president, 1962).

In 1957, he was awarded the prestigious Philadelphia Award, and he received many honorary degrees and fellowships. His hobbies included deep sea fishing, stamp collecting, and cultivation of a holly garden! He died in 1972, leaving many legacies, including the Ravdin Lecture in the Basic and Surgical Sciences.

During the War, Ravdin had occasion to meet and treat Lord Louis Mountbatten, for a minor injury. Mountbatten, already a war hero, was later murdered by the Provisional IRA in August 1979. Lord Mountbatten, the last Viceroy of India and the Queen’s second cousin, was one of the highest profile victims of the Troubles.6

Ravdin, among others, recognized that conflicts have been the catalyst for many medical and surgical advances, from the European wars, to the American Civil War, to the world wars of the 20th century, followed by Korea, Vietnam, the Troubles of Northern Ireland, and the current conflicts in Iraq and Afghanistan.4

Progress in medical organization in war took place during the Medical Revolution (1775 to 1783), when 1 surgeon served with each regiment. Triage, which became so important in the Northern Ireland Troubles (from mass casualties from bombings), was originated by Baron Dominique-Jean Larrey (1766 to 1842) during the Napoleonic Wars (1792 to 1815). He also developed horse-drawn “flying ambulances” and placed his surgical teams near the front line.3

The Crimean War (1854 to 1855) brought surgical care close to the front line, although the poor treatment of the British soldiers led Florence Nightingale (1820 to 1910) and her team to the British barracks in Istanbul, where her first act was to instill cleanliness and sanitation! The American Civil War (1861 to 1865) led to improvements in evacuation, hospital trains, and hospital ships, and an effective military medical corps was created.7 Von Eschmar (1823 to 1908), a young surgeon in the German conflicts against Denmark (1848, 1864), made major contributions by further organizing the triage system—the dangerously wounded should receive first attention, regardless of rank!7

Surgeons in World War I (1914 to 1918) first demonstrated the value of motorized transport with the establishment of British Casualty Clearing Stations (CCS), 6 miles behind the front line. Although designed to admit 200 to 400 wounded at a time, more often they were overwhelmed by 1,000 or more patients. The advent of the World War II saw development of a huge medical organization, care beginning with 2 combat medics attached to each company, followed by transfer of the injured to divisional clearing stations.

The Korean War (1950 to 1953) led to development of the new Mobile Army Surgical Hospital (MASH) units led by Michael DeBakey (1908 to 1999). They were usually within 10 miles of the front line and for the first time, the speed of helicopter evacuation permitted treatment within 3 to 12 hours of wounding. Mortality for all wounds decreased to 2.4% (abdominal wounds, 8.8%).8 Similarly, the Vietnam War (1962 to 1974) showed the benefit of helicopter evacuation, with a hospital mortality of 3.6% (abdominal wound mortality, 4.5%).

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The first Iraq War (1990 to 1991) led to the rapidly mobile 20-person Forward Surgical Team (FST), which took resuscitative surgery close to the front line with development of the modular unit of the Combat Support Hospital (CSH) with up to 250 beds.

Current care in Afghanistan comprises 5 levels:

- Level 1: Front line; trained soldiers in first aid; all soldiers carry a tourniquet.
- Level 2: Forward Surgical Team
- Level 3: Trauma center
- Level 4: Surgical hospital outside combat zone, eg, in Germany
- Level 5: Major centers in the US (eg, Walter Reed Army Medical Center in Washington DC) and England (eg, Birmingham). Level 5 includes rehabilitation. The military C17 transport has become a flying ICU.

One of the unique features of the Northern Ireland conflict (spanning 40 years) was the proximity of the shooting or bombing incidents to the major trauma hospitals. Some of the shootings took place within 15 minutes of the hospital and some within the actual hospital! Therefore, some patients were admitted alive who would have died from their severe injuries at the scene of injury in other conflicts.

Similarly, management of wounds advanced in war. Delayed primary suture for bullet wounds was proposed in World War I, continued into World War II, to Vietnam, Korea, and to the Northern Ireland conflict. The advent of antibiotics at the end of World War II, with initial trials by Sir Ian Fraser, an Ulsterman, transformed the problem of infection in later conflicts.

Evacuation in the Vietnam War could take 2 hours by helicopter (more often it was 4 to 6 hours), but for the first time, in conflict, vascular injuries were being repaired frequently, a subject we shall return to later in the arena of “knee cappings.” The advances of permissive hypotension, tourniquets, and hemostatic dressings such as HemCon and QuikClot (Z-Medica) used in the battlefield, combined with damage limitation surgery, became standard practice in later years in Iraq and Afghanistan.

Surgical and anesthetic techniques advanced in conflict/war arenas, from Larrey, one of the fastest surgeons of his day (200 amputations in 24 hours where speed was paramount, in the Battle of Borodino in 1812), to the first widespread use of chloroform as an anesthetic in a war setting, in the Crimean War.

During the Vietnam and Korean Wars, amputation rates were 1.4% to 3.4%, compared with 1.6% in World War I, possibly because of rapid evacuation leading to more severely injured patients surviving to reach surgical care. Col. Norman Rich, chief of surgery in a Vietnam MASH unit, pioneered venous repair for military trauma and established the Vietnam vascular registry. The principles of war wound management in Afghanistan were debridement, delayed primary suture, avoidance of hypothermia, and control of bleeding, were built on the lessons of past conflicts, including that in Northern Ireland. So against the background of multiple conflicts and wars throughout history, what is special about the Northern Ireland conflict?

**Background**

The conflict in Northern Ireland, which has lasted almost 40 years, began with a Civil Rights March on October 5, 1968 and, in theory, ended with the Good Friday Agreement on April 10, 1998, although terrorist deaths have occurred sporadically since that time. More than 3,600 deaths occurred and more than 50,000 were injured. Many of the incidents became worldwide news and bore the names of the day of the week or the place of the atrocity such as Bloody Sunday, Bloody Friday, Kingsmill massacre, and so many others. The dead included civilians, adults, children, terrorists from both sides of the political divide, police officers, soldiers with the British Army, and in 1979, the murder of Lord Mountbatten, whom Ravdin had met in Burma during World War II.

Until 1999, there were 3,636 deaths due to the Troubles; 2,037 of these were civilian, 509 were police officers or Ulster Defence Regiment (Royal Irish Regiment), 503 were British Army, 392 were republican, 144 were loyalists, and 51 were “others.” The majority of the deaths (1,647) occurred in Belfast.

The worse year for deaths was 1972 (500 dead). By 1982, there had been 28,000 shooting incidents and more than 7,000 bomb explosions. Almost 50% of the casualties arrived at one of the major teaching hospitals in Belfast—the Royal Victoria Hospital. By 1982, there were 9,599 casualties of the Troubles, 3,500 of whom required admission, which was an enormous strain on hospital resources.

What was unique about the Northern Ireland conflict was the time between injury and arrival at the hospital. The time lags were 10.5 hours in World War II, 6.3 hours in the Korean War, and 2.8 hours in the Vietnam War. Remarkably, with patients suffering gunshot wounds and bomb blasts so close to the hospital, combined with an efficient ambulance and helicopter service, 50% of patients were admitted within 15 minutes of their injury and 95% within 30 minutes (Fig. 1).

The small country of Northern Ireland, then with a population of 1.6 million and only 5,345 square miles in area, produced the following consequences of what
was euphemistically called, the “Troubles”: 3,606 deaths (1,647 in Belfast), 47,541 injured (30,000 in Belfast), 36,928 shootings, 16,209 bombings, and 500,000 people affected directly or indirectly.

This was a small community, and we all knew, or were related to, victims of the Troubles. In this small population, these 3,606 deaths would be equivalent per population size to 100,000 deaths in Great Britain and 500,000 deaths in the US.

At their height, the Troubles became a way of life. There were countless road checks; daily shootings and bombings; a ring of steel around shopping precincts; shoppers being searched going into stores; warnings not to walk past an unoccupied car because it may contain a bomb; no street lights; no clubs or bars open at night; gunfire easily heard most nights during the 1970s; morning news detailing “who was killed last night”; and a constant stream of funerals.

At times the deaths were very public. Often the modern media were present soon after an atrocity, such as bomb explosions, gun battles (Fig. 2), and the public (almost televised live) murder of 2 British corporals in 1988, which sent waves of revulsion through a population so used to atrocities.

The Troubles: Lessons learned, general principles

In the particular setting of Northern Ireland it was believed that “hospital-based doctors worked best in hospital.”21 William Rutherford, who died in 2007,22 was in charge of the Accident and Emergency Department during the worst of times in the 1970s. His view was that most of the injuries occurred within a mile of the hospital and it was best to “scope and run.” There was little role for doctors at the scene, in an environment of continuing gunfire, secondary bombs, and booby trapped bodies. Occasionally, surgeons and anesthetists would go to the scene to manage a difficult airway, administer pain relief (in the early 1970s), and very occasionally, perform amputations at the scene.

Triage was relearned in the early 1970s, and it was the practice for the most senior surgeon and senior nurse to perform triage, ie, direct the senior residents and other staff surgeons to which patients were salvageable and which required the most urgent attention.23 It was soon realized, even in serious bombing incidents, that less than 25% of victims would require admission, but with the arrival of up to 100 casualties from an individual explosion such as the Abercorn Restaurant explosion in 1972, or the 19 bombs exploding in Belfast on Bloody Friday in 1972, many had relatively minor, non-life-threatening injuries with flying glass/shrapnel and had to be triaged away from the resuscitation area and asked to wait in part of the outpatient area (by now cleared of waiting patients). This triage by the most senior surgeon/and nurse was essential.21 These were days before formal permissive hypotension was standard practice but the principle was recognized that one should not waste time trying to restore blood volume and a normal...
blood pressure in the presence of severe bleeding, but rather, the injured were taken directly to the operating room (Fig. 3).

The remarkable collegiality of the surgical teams, long predating European Working Time Directive, meant that several surgical teams (Residents/consultants) would operate simultaneously. Tribute must be paid to superb nursing and medical staff. Frequently in the “bad” decades of 1970 to 1990, doctors and nurses would come in from home to assist long before the call out was received using the hospital disaster plan. From the beginning, all staff, including the most junior trainee, knew not to suture primarily any wounds of gunshot or blast origin; all were left for delayed suture at day 5.

William Rutherford, in Belfast, must get the credit for developing the first disaster plans in 1971, in which a command structure was set up and the hospital switchboard (in the days before mobile phones) knew which surgeons, nursing, and administrative staff to call. In practice, in the early 1970s, there was little time to rehearse disaster plans because the real disasters were occurring on an almost daily basis! Again, what was unique to the Province was the disaster of a bomb exploding in a small town, where victims and staff were all well known to each other, as described by Brown and Marshall, in the Enniskillen bombing of November 8, 1987 (The Remembrance Day Bomb).

Rutherford pointed out that the x-ray department is a “bottleneck.” Undoubtedly, a rapid CT scan (or FAST

![Figure 2. Royal Victoria Hospital, Police Officer adjacent to main gate. Gun battle taking place (1972). (Figure given to the senior author (Roy Spence) by his surgical colleague, Dr TL Kennedy, who passed away in the 1980s. Dr Kennedy kindly gave the senior author permission to use this figure.)(1)]

![Figure 3. Exit wound of high velocity gunshot (left thigh). (Figure given to the senior author (Roy Spence) by his surgical colleague, Dr TL Kennedy, who passed away in the 1980s. Dr Kennedy kindly gave the senior author permission to use this figure.)(1)]
ultrasound scan) today is beneficial, but in the early days there was no CT scan, and quickly it was decreed that x-ray requests should be screened by a senior doctor because patients can die in the x-ray department! Today it still holds true—patients can die in the CT scanner!

In an environment of explosions and gunshot wounds occurring in a city so close to hospitals and so close to the media, the latter were often on the scene quickly. In today’s environment there would be a media spokesman, but in those early days, often the surgeons fronted the news soon after casualties were dealt with. To the credit of all, comments were factual and no one referred to the “assumed” perpetrators of an incident, especially in that initial chaotic hour or so, in which any indication of the source of the atrocity could lead to rapid revenge or “tit-for-tat” attacks.

Rutherford, in his 1975 paper, discussed disaster plan rehearsals with the wonderful understatement, “I have read accounts of disaster rehearsals but have never been in one myself…I am a little suspicious of their value…” Indeed, in these days, the frequency of the “real disaster” left little time for rehearsals. Of much more value, if time permitted, was a “post mortem” of how the real disaster was handled and what lessons were learned.

Tribute must be paid to our anesthesia colleagues. In 1970, in the Royal Victoria Hospital, a new 12-bed ICU opened and, between 1970 and 1974, 2,040 patients were admitted to the hospital because of civil unrest, and 208 required admission to the ICU. The proximity of ICU to the Accident and Emergency Department meant that expert help was available almost immediately, especially for the difficult airway in patients with major head and neck injuries. Since 1971, immediate management of penetrating blast and gunshot wounds of the head involved intubation and hyperventilation. In these early days, there was increasing knowledge of blast lung injuries and in the 1970s, the value of positive end expiratory pressure (PEEP) was recognized.

Although modern management of the low velocity wounds to the abdomen in the stable patient (as proposed by colleagues in South Africa) may involve a conservative approach with careful observation, in our practice in the 1970s and 1980s, most patients with gunshot wounds to the chest and abdomen underwent a thoracotomy (median sternotomy if the entrance wound was medial to the nipple and where there was concern of cardiac injury) and/or laparotomy, respectively. Throughout the Troubles, the lesson from World War I of delayed primary suture was paramount; the only exceptions to this principle were some facial injuries (due to the excellent blood supply).

The logistics of terrorist bombings in the initial years of the Troubles are well described by Hadden and colleagues. The authors reported 1,532 consecutive patients from terrorist bombings from 1969 to 1972. Of the 1,532 explosion victims, only 9 died in the hospital and major limb amputations were required in 16, of whom 4 died. There were 250 (16%) patients admitted (117 dead at the scene), but a huge number received attention, with minor physical injuries and emotional upset. Seven hundred seventy-five (51%) required no operation, 12% (184) required cleaning of lacerations, and only 58 (3%) required major surgery such as laparotomy and amputation. These numbers demonstrated the need for clear leadership, organization, and triage in the admission area. It was fortuitous that the new Accident and Emergency Department opened in 1969 in the Royal Victoria Hospital (just at the beginning of the Troubles) and could accommodate 100 patients simultaneously.

Head Injuries: Lessons learned

In the early years of the Troubles, gunshot wounds to the head were common, and one of the largest series in civilian practice was reported in 1974. The unique feature of Belfast, in the Troubles, was the proximity of the hospital to the scene of the shooting. In a series of gunshot wounds to the head between August 1969 and April 1973, 93 patients were reported. Remarkably, two-thirds reached the hospital within 30 minutes (a unique feature compared with previous conflicts). Many patients who may have died in other conflicts received surgical help quickly (28 patients within 15 minutes).

Early in the Troubles it was recognized that these patients often had airway obstruction from blood or gastric contents and this subsequent rise in partial pressure of carbon dioxide (pCO2) and low partial pressure of oxygen (pO2) led to increasing secondary cerebral edema, so early in the 1970s a policy of early/immediate intubation and controlled ventilation was followed (Fig. 4). Patients did not go to the x-ray department until they were intubated and ventilated. The principles of surgery were control of bleeding, evacuation of intracranial/intracerebral hematoma, removal of bone and metal fragments to prevent infection, repair of dura, and ensuring scalp coverage. Removal of metal fragments was not sought if their removal would have involved dissection through normal tissue.

Dural repair was by temporal fascia, pericranium, or occasionally, fascia lata. In this series, 53 (56%) of the 93 patients died, the high mortality explained by the severity of the high velocity wounds and rapid transport of moribund patients to the hospital. Of interest in this large series, wound infection occurred in only 2 patients, 3 developed meningitis (1 died), and there were no
abscesses. Six patients had a transient cerebrospinal fluid leak, and 4 had early epilepsy (within 1 week).

From the early 1970s, this principle of early management of cerebral gunshot wounds by avoiding raised intracranial pressure by immediate intubation was standard. In the very early days, no CT scanner was available, but the patients’ clinical state on admission gave a clear guide to prognosis. In almost 100 gunshot wounds, of patients who were alert on admission, 88% survived; of those drowsy on admission, 66% survived; of those unconscious but reacting to painful stimuli, 21% survived. There were no survivors from a group of 24 patients who were admitted in a coma. In the same early years of the Troubles, when more than 100 gunshot wounds of the head were reported, there were 30 patients with gunshot wounds of the spinal cord or equina, usually complete and permanent in the former, although in the latter some of the damage was incomplete. Operation was often required to debride wounds and deal with the cerebrospinal fluid fistula, and often the patients with cauda equina lesions developed complex chronic pain syndromes.

When patients with gunshot wounds of the head survived, they were frequently left with sizable skull defects. After World War II, Spence described plastic cranio-plasty, but this was difficult to mold and shape accurately. Tantalum was used after the Korean War in the 1950s, but it was also difficult to shape accurately.

In 1974, Gordon and Blair, a neurosurgeon and an academic dentist, respectively, in Belfast, reported the use of titanium plate (Fig. 5) in 25 patients with large skull defects, and there were multiple benefits. They were easy to fix, using an on-lay technique with precise cover of the skull defect; there was no tissue reaction; they were radiolucent; they were intrinsically strong and light compared with other alloys; and they could be sterilized. The basis of this technique is still used today in modern conflicts such as Afghanistan, albeit with the advances of computer modelling and the recent development of immediate reconstruction with titanium mesh.

Vascular Injuries
One of the unique features of the Northern Ireland Troubles was the paramilitary punishment shooting of “knee capping.” Here the “victim” would be “lifted” by a paramilitary group and taken to an alley (frequently close to the main trauma hospital). The victim was made to lie prone on the ground and then shot with a handgun in the region of the popliteal fossa. The phrase knee capping was a misnomer because the patella was infrequently struck by the bullet.

As already discussed, many victims of civilian strife who suffered major vascular injuries survived because of the proximity of the bombing or shooting to the trauma hospital, with 50% of such patients being admitted in 15 minutes and 95% within 30 minutes. Although the term permissive hypotension had not come into vogue in...
the early years of the Northern Ireland Troubles, it was recognized that, while resuscitation was taking place, prompt surgery in patients with life-threatening bleeding was mandatory.43

One in 4 patients with penetrating abdominal injuries also had an intrathoracic injury. Remarkably, 50% of those with aortic and caval injuries survived,44 a testament to those being severely injured close to the hospital and given rapid access to aggressive surgery. In the early days of the Troubles, although angiography was available with several excellent radiologists, interventional radiology was in its infancy; today, some vascular injuries would be dealt with using coiling and endovascular stenting. However, in the early years of the Troubles, survival depended on early and aggressive surgery, an awareness that patients can be delayed too long (can die) in the x-ray department (and later in CT scanners), and the principles of previous conflicts of adequate exposure and proximal and distal vascular control.43

Knee cappings

So what was learned from knee capping punishment shootings? It has long been recognized that striated muscle tolerates warm ischemia for 6 to 8 hours depending on the level of the injury and local collaterals. The pathophysiology of ischemic reperfusion injury is well recognized.45,46 In early series of complex limb trauma, amputation rates of up to 85% have been reported.47,48
A major lesson was learned from the terrorist punishment knee capping injury with vascular injury in the mid to late 1970s. In the years 1969 to 1978, no vascular shunts were used for these vascular injuries (the pre-shunt era); after 1979, shunts were used routinely. Before the routine use of vascular shunts, there tended to be a “hurried” repair of the vessels, conflict with the orthopaedic surgeons competing for space and time, and rushed debridement and necrotic tissue excision with an “eye on the clock” (Fig. 6).

The routine introduction of shunting allowed restoration of blood flow and venous drainage, unhurried debridement, permitted the orthopaedic surgeon to use external fixation in an un hurried manner, and then a meticulous vascular repair with vein grafts took place.49-52

In the post-shunt era, indications for fasciotomy became more selective such as delayed admission, delayed restoration of blood flow—all 4 compartments were decompressed with a double incision.53

The pre-shunt and post-shunt eras were compared.54 In a series of 34 patients with pre-shunt penetrating wounds with vascular damage (1969 to 1978), 17 of 30 (56.7%) required fasciotomy and 11 of 34 (32.4%) required amputation. In the post-shunt era (1979 to 2000), among 57 patients, 13 of 48 required fasciotomy (27.1%) and only 5 of 57 (8.8%) required amputation. All pre- and post-shunt comparisons were statistically significant.54

This Belfast approach to shunting for penetrating vascular limb injuries has become routine in more modern areas of conflict. However, in the badly mangled extremity, especially if the leg has lost major motor and sensory nerves, an early amputation may be preferable to multiple operations, and attempted reconstruction which may be doomed to ultimate failure. Such a decision is individual and the patient will benefit from access to an experienced surgeon. The Northern Ireland approach to these severe penetrating vascular injuries is to try to repair both the original artery and adjacent major vein(s), which shunting permits in an unhurried fashion.43,54

Out of the tragedy of almost 40 years of conflict in Northern Ireland, much was learned surgically from necessity and from the remarkably short time from injury to hospital care (more rapid than any conflict heretofore). Many patients survived major life-threatening injuries because of this short time from injury to care. While, of course, surgical treatment of the wounded has progressed in recent decades, the principles of triage, rapid surgery to deal with life-threatening bleeding, early ventilation for head injuries, titanium plate for skull defects, and vascular shunts to buy time in penetrating vascular injuries have stood the test of time.

Recent decades have shown conservative management of selected gunshot wounds of the abdomen, including the liver, is safe.55 Likewise, a more conservative approach (combined with Foley catheter balloon tamponade when necessary) to penetrating neck injury is also safe.56 Similarly, in blunt trauma to the spleen, about two-thirds of patients can have conservative management.57

The benefits of triage have been known for more than a century, yet a recent mass shooting in Norway revealed the need for up-to-date disaster plans.58 During the past decade, major trauma infusions are based on a ratio of 1:1:1 fresh frozen plasma: platelets: blood59; this and the new hemostatic dressings on the battlefield have led to better control of major bleeding in warfare.

The concept of permissive hypotension has been established, as has damage limitation surgery.60 It is now well recognized that metabolic acidosis and hypothermia must be avoided.61 The combination of hypothermia, acidosis (pH < 7.2), and massive blood transfusion are strong indicators of mortality during damage control surgery.62 Although
damage control for surgery in trauma was first proposed by Harlan Stone in 1983, its role in emergency nontraumatic surgery has now been recognized. However, as the management of complex coagulopathy becomes more sophisticated, with “personal tailored cocktails,” the need for damage control surgery in the future is being questioned. However, for the moment, permissive hypotension, damage control surgery, and avoidance of hypothermia, acidosis, and the correction of coagulation is best current practice.

As the remarkable experience of Northern Ireland surgeons from the Troubles draws to an end, recent publications in the UK and elsewhere in Europe have shown that surgical experience in major trauma for an individual surgeon is limited. In a beautifully written piece in the *British Medical Journal* in 1999, reflecting on the Ulster medical profession during the Troubles, Professor Sir Peter Froggatt described the work of the profession over 30 years of continued violence. As did Sir Peter, the senior author of this article pays tribute to his colleagues, both senior and contemporary, who faced great adversity during these 40 years of the Troubles, when death and injury were an ever present danger, some colleagues lost friends and relations, and all of us knew personally someone who died or was badly injured, in the most horrifying manner. This was a place where death came to the doorstep, to the street, to the hotels and places of worship, to the farms and fields, and into the very hospitals themselves, yet the medical profession in Northern Ireland treated all—terrorists, civilians, security forces—without fear or favor, and all to the same high standard of care.

We pay tribute to all such colleagues (junior and senior, past, and contemporary) and to our patients and the population of Northern Ireland, who came through such troubled times and who, as exemplified by the opening of the Titanic Exhibition, the World Police and Fire Games, and the G8 Summit in 2013, are now in a much better place.

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