

Written Evidence for the Health Committee Parliamentary Inquiry, 22 September 2008

1. The Clinical Human Factors Group

1.1 Since 2007 the Clinical Human Factors Group (CHFG) has brought together leading experts in human factors (HF), both academics and frontline clinicians, to identify and promote best practice. It is an independent charitable trust (Registered no 1123424). Its members believe that the lack of HF training in medicine means that patient care is more hazardous than it could and should be.

2. Executive Summary

2.1 Many safety-critical industries have reduced accidents and harm by knowledge of error theory and HF principles. The inevitability of human error is accepted. Importantly it is not viewed as poor performance, and so concealed, but openly reported to drive improvement. Systems design and the appropriate training of staff assure safety.

2.2 Training in HF skills such as teamwork and communication is virtually absent in healthcare. It should be mandated by regulation, taught and examined. The appropriate professional bodies should be active partners in examining and assessing competencies in non-technical skills (NTS) and HF for both trainees and qualified staff.

2.3 Those who work together should train together. Research has shown that teamwork training may reduce technical errors by 30-50%.

2.4 There is a clear correlation between HF skills and the frequency of error in operations. Minor errors are frequently tolerated but they are significant as they accumulate to cause major hazards. Minor errors must be recognized and reduced by HF training.

2.5 Clinical staff must be involved in both defining the problem and suggesting the solutions. Sustainable improvements have been demonstrated by this approach. The prevailing top-down culture of clinical governance does not work.

2.6 Blame invites denial among professionals doing their best in poor systems. Central policy should ensure a 'fair blame' culture so that the reporting of error is encouraged. Inadvertent error that is openly reported should attract immunity from sanction.

2.7 We are concerned that the current model whereby internal investigations are carried out by healthcare staff after a short training. This is not a robust approach to embedding incident investigation and results in a lack of independence. The current approach should be reviewed by an expert from another industry.

3. Introduction

3.1 This evidence relates to the following terms of reference:

3.1.1 What the risks to patient safety are and to what extent they are avoidable

3.1.2 The effectiveness of education in ensuring patient safety

3.1.3 What the NHS should do next regarding patient safety

3.2 The evidence has been produced by a working group of the CHFG;

3.2.1 Martin Bromiley, Chairman. Current airline pilot and widower of the late Elaine Bromiley

3.2.2 Professor Rhona Flin, Professor of Applied Psychology, University of Aberdeen.

3.2.3 Tony Giddings, Fellow of the Royal College of Surgeons of England & Chairman of the Alliance for the Safety of Patients.

3.2.4 Peter McCulloch, Reader in Surgery and Ken Catchpole, Senior Post-Doctoral Scientist, Nuffield Department of Surgery, Quality, Reliability, Safety & Teamwork Unit (QRSTU), University of Oxford.

3.2.5 Krishna Moorthy, Clinical Senior Lecturer, and Nick Sevdalis, Non Clinical Lecturer in Patient Safety, both of the Division of Surgery, Oncology & Reproductive Biology and Anaesthetics, Imperial College, London.

3.3 In many industries well-publicized disasters have served as a turning point for safety. Piper Alpha, Three Mile Island, and Hillsborough Stadium are examples. However in healthcare only one person dies at a time and the death is rarely investigated independently and with the depth required. However in 2005 one such event occurred and was properly investigated; it is now serving as a sentinel event.

4. Human Factors – Real life

4.1 Elaine Bromiley was admitted for elective surgery for an ongoing serious sinus problem. At induction of anaesthesia airway problems occurred. She was transferred unconscious to ICU but died 13 days later having never regained consciousness. In a letter from the Surgeon it was explained to her husband, “I still do not see how we could have anticipated or avoided the problems we encountered”. Mr Bromiley accepted this but (as would have been normal in aviation) he expected it to be investigated, not to blame but to learn. He persuaded the hospital to do this. Professor Michael Harmer, then President of the Association of Anaesthetists of Great Britain and Ireland conducted a thorough review. From this and from the Inquest a clear picture has emerged (Harmer 2005, Coroner’s Report 2005 & Bromiley 2008).

4.2 Pre-operative assessment did not identify any problems but when anaesthetised Elaine could not be ventilated. Within 4 minutes she had become visibly blue, with oxygenation falling to 40% (less than 90% is critical). Despite others arriving to help, at 10 minutes Elaine had suffered critically low oxygen levels for 6 minutes and all attempts to intubate had failed. This was situation of “can’t intubate, can’t ventilate”, a recognised emergency in anaesthesia. Surgical access is vital.

4.3 The team were in a well-equipped theatre. The principle anaesthetist had 16 years experience and was regarded as “diligent” by his colleagues. The ENT Surgeon had over 30 years experience; another anaesthetist who came to help had additional skills pertaining to difficult airways and 3 of the 4 nurses present were skilled in theatre or recovery. If this emergency had to occur, this was arguably the ideal team.

4.4 Despite this we now know that the 3 consultants persisted with their attempts to intubate, apparently to the exclusion of any other option and despite strong hints from the nursing staff. Two of the nurses stated later that they knew exactly what needed to be done “but didn’t know how to broach the subject”. In his own words the lead anaesthetist “lost control”. There was a dispute in the Inquest about who was felt to be in charge. Among the consultants, there was a collective loss of situational awareness, especially of the passage of time and the seriousness of the situation.

4.5 Failings in leadership, decision-making, prioritisation, situational awareness, communication and teamwork were identified at the inquest as leading directly to Elaine’s death. These same “human factors” are the direct cause of 75% of aviation accidents. Many safety critical industries refer to these NTS yet no member of this team, and virtually no clinician in the UK receives any training in these vital skills.

4.6 This is not a problem of bad or negligent people. As Martin Bromiley has said

“They are not bad people, they are not poor clinicians. They were good people doing a good job who had the technical skills to deal with what happened(but)...not having the benefit of the training and development available in other industries, found themselves following a blind alley”.

4.7 They lacked the knowledge and skills of human factors.

5 “What are the risks to patient safety and to what extent they are avoidable, including the role of human error and poor clinical judgement; and systems failure.”

5.1 The overall problem of human error/systems failure in healthcare.

5.1.1 “...it is estimated that for one patient in every 300 entering hospitals in the developed world, medical error results in, or hastens death”.

5.1.2 This arresting figure is from “Good doctors, safer patients” published by the CMO for England in July 2006. It based on calculations by Dr Lucian Leape of the Harvard School of Public Health.

5.1.3 Adverse events are defined as an unintended injuries caused by medical treatment rather than disease. Recent hospital studies consistently show that 8-12% of patients suffer an adverse event, half of which are preventable (Vincent, 2006). A review by de Vries et al. (2007) showed that the most such hospital events occur during or as a result of an operative (40%) or medication (15%) error.

5.1.4 Thus 1 in 10 patients will be harmed during an admission, over half due to operation or medication. Surgery is associated with the greatest number of recorded errors; obstetrics with the greatest financial cost (NHSLA). Acute care is therefore the focus of this evidence, not because there are no concerns in non- acute sectors but because they have no data. These findings are consistent worldwide.

5.2 Human Error, Poor Clinical Judgement & Systems Failure

5.2.1 There is strong circumstantial evidence that clinicians have been trained to believe that error should not occur rather than to recognize that all humans make mistakes and need skills to manage and avoid them. In the NHS error is still viewed as weakness and poor performance (Bromiley, 2008). It is illustrated by major under-reporting of adverse events (NAO 2005). Such a culture fosters denial and is the hallmark of hierarchy in the workplace. No major safety-critical industry would accept this at a strategic or operational level. The Civil Aviation Authority states “human error is inevitable – what is important is to ensure that (this) does not result in adverse events such as...accidents”; “specific training should concentrate particularly on “error detection”. (CAA CAP737 2006).

5.2.2 Studies of surgical adverse events reveal a large number of causal factors embedded within a highly complex system (Vincent, Moorthy, Sarker, Chang, & Darzi, 2004). There is an interplay of organisational, cultural and team factors that constantly threaten safety. These factors, often referred to as the “system” are critical to performance, but all systems are operated by people. Improvement therefore depends on educating and empowering them. With help they will know how to make their own work safer. The nuclear and aviation industry act as clear and successful examples. The same approach is required in surgery (Giddings and Williamson 2007).

5.3 “Never” events & more common “complications”

5.3.1 Wrong site, wrong procedure, and wrong person surgery are examples of avoidable and catastrophic events which should “never” happen (Makary, 2006). Failure in pre-operative communications between surgeons and anaesthetists are common causes. The Joint Commission on Accreditation of Healthcare Organisations found that 70% of wrong site events could have been prevented by better communication. The incidence of retained foreign body in surgery is 1 in 1000. It attracts considerable media attention and censure in the surgical community; it is associated with 2% risk of mortality and a re-operation rate of 69% (Gawande, 2003). Failures in team communication are however only one aspect of the systems failures in surgery. Routine surgical and anaesthetic checks are not carried out, equipment problems are frequent and adherence to basic procedures is variable (Healey, Sevdalis, & Vincent, 2006). In the absence of pre-operative checks, crucial equipment and prostheses are missing in many operating theatres.

5.3.2 The relatively rare and catastrophic “never” events, however, represent only the tip of the “iceberg of harm” caused by error and non-compliance in surgical systems. Recognised preventable complications such as deep venous thrombosis (DVT) and surgical site infection are more likely where standard prophylactic measures are not carried out. The degree to which other “inevitable complications” of surgery are also attributable to process or compliance failures are unknown but are likely to be significant. Reported frequency varies by as much as 500% between Units and it is striking that Units with the best outcomes are those with the best systems and teamwork practices. As an example, DVT and pulmonary embolism constitute 9% of adverse events (Gawande, 1999) but although guidelines for DVT prophylaxis are widely available, adherence can be as low as 30%.

6. The Impact of Non Technical Skills Training (or Teamwork & Communication)

6.1 A significant body of research on teamwork and communication in operating theatres, confirms that communication breakdown is frequent and hazardous (Christian et al 2006). Problems shared with the aviation industry have been highlighted, particularly difficulties with cultural hierarchy, which inhibits team members from sharing their situational awareness clearly in critical situations.

6.2 Studies in paediatric cardiac surgery at Great Ormond Street showed a clear correlation between the quality of teamwork and the frequency of technical and procedural errors in operations (Catchpole et al. 2007) and this has been confirmed by the QRSTU group in Oxford (Catchpole, Mishra et al. 2008). Not surprisingly, operations where there are a large number of minor technical errors are more likely to result in a serious major problem.

6.3 Despite the differences between surgery and civil aviation, in HF issues, there are striking similarities. In Oxford, a detailed before and after training study has shown that staff exposed to teamwork training based on aviation Crew Resource Management (CRM) made 30-50% less technical errors after training (McCulloch et al. 2008). The effect was variable, but it is likely that changing team culture in the operating theatre will reduce harm to patients.

6.4 There are however major differences between the professional cultures of surgery and aviation. Resistance to teamwork training in the Oxford study often came from well-respected, highly professional doctors. To accept that error is inevitable, and a systems approach is needed to prevent patient harm or that other team members are important in protecting patients from one's own errors may be seen as hurtful. Perhaps for this reason, teamwork training proved unsustainable in Oxford, once the stimulus of the study was removed. Many NHS professionals lack the culture to embrace such change.

6.5 Sustainability may be assisted by "Lean thinking" to improve safety practices on surgical wards. This method, which stresses involvement of front line staff both in defining the problem and producing the solution, has the potential to effect culture change in healthcare. For example Kreckler et al. (2008) have demonstrated sustainable improvements from 35% to 94% in compliance with thrombosis prevention.

7. Education for Health Professionals

7.1 Every day, every hour, every minute there are uncontrolled events in healthcare which would not be permitted in any other high risk industry. We need to ask why? It is partly because healthcare is uniquely complex but it is also because what could have been done to improve the training of staff and the systems in which they work has not yet been done. This is despite clear identification of the need for at least eight years, since the publication of 'An Organization with a Memory' and the NHS Plan, to which there was a clear professional response identifying 'the central importance of improved investment in surgical education and training' (FSSA Response 2000).

7.2 The case of Bethany Bowen illustrates the continuing problems.

7.2.1 Bethany was a 5 year old girl who suffered from hereditary spherocytosis, a condition sometimes requiring removal of the spleen. Bethany died on the operating table due to uncontrolled bleeding. At the operation the surgeon and the assistant were using a morcellator, an instrument with rotating blades, to fragment the spleen for easier removal. This is an instrument more commonly used in gynaecology and is known to be capable of serious internal injury. It appears that neither the surgeon nor the assistant had had previous experience with this technique.

7.2.2 The death of this young child illustrates two important and avoidable causes of failure in healthcare.

7.2.2.1 A series of failures on the part of the surgeon; to display insight, to anticipate hazards and to undertake the necessary training. This was not only a failure as a surgeon but as a trainer and role model for a vulnerable and inexperienced trainee and as the leader of a surgical team. It raises serious issues about how surgeons see themselves, their responsibilities for their patients, their trainees, and their team.

7.2.2.2 The case also illustrates a complete failure of the system of clinical governance in this hospital. The hospital had already been the subject of a recent Healthcare Commission report into another surgical service. In both cases HF issues may well have been at the root of the problems identified. In theory such failures would be prevented by the operation of effective clinical governance. Unfortunately it is generally the case that the bureaucratic processes of clinical governance imposed from above operate, as it were, in a parallel universe. They have little effect on the behaviour of semi autonomous professionals in the front line.

7.3 This is not to suggest that professional dysfunction is widespread but where it exists it may be persistent and ignored. Neither is it to suggest that professional autonomy is inappropriate; indeed a degree of autonomy is essential to the delivery of appropriate, patient-centred treatment but that autonomy must be exercised within the boundaries of an overt and effective system of governance. It must be balanced by clear accountability.

7.4 Effective education must be supported by regulation, an appropriate curriculum, time, and money. It also requires a workforce of trainers who have been selected and trained to teach. It must also be quality- assured, assessed and examined. In the generic and critically important field of HF none of this has taken place.

7.5 The heavy reliance of the NHS on the service contribution of trainees has led to a ratio of excess trainees to fewer trainers, which is the reverse of that found in every other developed country. There, trained doctors deliver the majority of care.

8. What the NHS should do next regarding Patient Safety

8.1 The task is to improve individual and team performance and the systems in which they work. But without ownership and collaboration, workarounds, defensive routines, bullying and negative dictatorship will continue.

8.2 Even sensible ideas such as the four hour wait target for A&E may cause harm if applied in a mechanical way by diversion of patients or the bullying of staff to comply, while denying them the means to do so. Examples are common and details known to us.

8.3 Staff must be given the skills to recognise problems and the cultural freedom to express them. They must also be encouraged and expected to provide the solutions and to manage the process; clearly they will depend on the resources to monitor and adapt as they progress. Solutions must be built into systems that deliver evidence-based, best practice and protect patients and staff from hazard. The focus should be on the process if we are to achieve sustainable change.

8.4 A need to develop team working skills will be too challenging for some senior clinicians, denied the cultural barriers by which they have obscured their deficiencies as leaders of their team or as members of the wider team. Others must then replace them.

8.5 The NHS has benefited from huge recent investment but little of that has been applied to the overwhelming and generic need to change the systems in the workplace and the culture of professionals.

8.6 If the safety of patients is to be improved, a sustained and overt commitment to training in human factors and systems improvement is unavoidable. This is a moral imperative not a strategic option.

8.7 Specific recommendations are in our Executive Summary.