

## Emergencies in General Practice: could checklists support teams in stressful situations

### Authors:

Paul Greig<sup>1 2</sup>

Anne Maloney<sup>3</sup>

Helen Higham<sup>1 4</sup>

<sup>1</sup> OxSTaR Centre, Nuffield Department of Clinical Neurosciences, University of Oxford

<sup>2</sup> Department of Anaesthetics, Guy's and St Thomas' NHS Foundation Trust

<sup>3</sup> Eastfield Surgery, Newbury, Berkshire

<sup>4</sup> Department of Anaesthetics, Oxford University Hospitals NHS Foundation Trust

**Corresponding author:** Paul Greig

**Contact:** OxSTaR Centre  
Level 6 West Wing  
John Radcliffe Hospital  
Headley Way  
Oxford  
OX3 9DU

**Email:** [paul.greig@ndcn.ox.ac.uk](mailto:paul.greig@ndcn.ox.ac.uk)

Words: 1139

## Emergencies in General Practice: could checklists support teams in stressful situations?

### Introduction

It is widely reported that emergency presentations in General Practice are increasing [1,2] and recent audit data from practices we have worked with in Thames Valley support these observations: 74/76 (97%) GPs reported seeing at least one emergency presentation in the previous year and 61/67 (91%) experienced delays ambulance attendance. Managing conditions such as a myocardial infarction, life-threatening asthma, or acute sepsis places a burden on primary care teams to initiate management for potentially seriously unwell patients. Despite the increasing frequency of these scenarios across the NHS as a whole, individual clinicians may go months or even years without having to manage one personally, and most staff do not receive regular training updates. In many cases there is no nationally agreed training programme. While guidelines exist for many presentations, most have been written with hospital practice in mind, and their applicability to primary care can be limited.

Recently checklists (a form of cognitive aid) have been developed to support safe practice in hospitals, but checklists as mandated safety aids actually date back to the mid-1930s with the B-17 'Flying Fortress'. Early test flights were associated with serious accidents, and 'pilot error' was implicated, but these were experienced test-pilots crewing the aircraft. It was difficult to believe that a lack of training was the problem, rather, *'the number of procedures necessary... are far too many for even the most experienced pilot to carry in his head. The best trained pilots are likely to forget things occasionally'* [3]. Additional training would not solve this problem, so checklists were introduced to reduce the dependence on memorised steps. These were highly successful, and from near cancellation the aircraft went on to achieve great success.

Checklists became essential to aircraft operations, both in routine and emergency situations. Safety-critical industries all now use checklists; Michael Collins, command module pilot on Apollo 11, even described checklists as the mission's 'fourth crew member' [4].

### Checklists work

Cognitive capacity is surprisingly limited, and in demanding or stressful situations high-level functions such as the ability to perform calculations, or more basic mental tasks such as perception and recall suffer. Checklists protect against forgetfulness, minimise omissions of critical steps, and can prompt users to adopt a 'rules-based' decision making model, making it easier to work in stressful or pressured situations [5].

Studies show that checklists can be effective in healthcare: implementation of the WHO surgical safety checklist for example has been an important part of recent improvements in peri-operative mortality [6]. Checklists are also increasingly used in emergencies, with evidence showing substantial reductions in missed treatment steps when checklists are used [7]. Recently the Association of Anaesthetists has developed a series of checklists based on this model to assist with rare but serious in-theatre emergencies.

### Why might checklists fail?

Although intended to reduce workload cognitive aids may add to individuals' workload, particularly in situations where the aid is poorly designed, or users are untrained in its use. In one aviation example, a safety system tested in simulation actually *increased* the rate of critical errors [8]. This was attributed to the additional demands of using the device causing the pilots to become overloaded.

Equally in clinical settings some studies have shown little or no improvement in team performance using checklists [9], and others have shown teams can even become slower [10].

## Designing for success

Why should some checklists show benefits where others fail? Largely this comes down to design and implementation.

The Boeing 777 (a twin-engine aircraft) checklist for in-flight engine restart has only eight points, arranged over a single side of A5 [11]. There will be little argument that restarting an engine in-flight is important, high-stakes, and probably somewhat stressful for the aircrew. Compare this with a clinical checklist encountered by one of the authors, which was intended to support intubation of ICU patients. Intubation can be stressful and time-pressured, but is a reasonably commonplace activity. The checklist ran to *seven* sides of A4, comprising 42 check points *on the first page alone*.

This illustrates two fundamental problems of many healthcare checklists:

1. The expectation that it must be exhaustive; adding complexity increases risk of mistakes, so tension exists between comprehensiveness and usability. Checklists can neither micromanage a team nor replace clinicians' expertise, and to expect otherwise is to invite failure.
2. Lack of engagement of key stakeholders (i.e. the people who will be using it) in the design and testing of the checklist

A checklist will *not* be suitable for every task, but where they are appropriate they must be designed well. The task it aids should be well understood and defined. There needs to be clarity over how the checklist is to be used, by whom, and when it will be implemented; this is termed its 'philosophy of use'. Word presentation on the page and utilisation of vocabulary also affect usability greatly; style guides exist to help potential checklist designers reach these decisions [12].

Importantly it must be recognised that the use of checklists is not always intuitive. While the content such cognitive aids simply reflects best-practice, there is a requirement to train teams to use the checklists effectively. An apparent contradiction therefore arises, since any specific emergency is a relatively rare event (hence the value of the checklist), but using the checklist itself benefits from familiarity.

Fortunately, there is a way to reconcile these conflicting demands: rigorous standardisation. Checklists for a variety of events can be compiled into a 'Quick Reference Handbook' that serves as a 'one-stop' source of guidance. Each of the individual checklists uses the same formatting, iconography, vocabulary, and even typeface to ensure that, as designer Don Norman describes, users can 'learn once and remember forever'. As long as users are familiar with at least one checklist, all become usable. This is the approach that the Association of Anaesthetists has taken, compiling checklists for around 25 conditions into a single, standardised format.

## Conclusions

Although often seen as an easy fix after an incident, checklists are neither straightforward to develop nor simple to deploy. They require deep understanding of human performance, the task under study, and experience of design principles. They need to undergo testing before deployment, and teams require training in their use.

We feel strongly that multidisciplinary teams in primary care would benefit from the introduction of checklists in a similar way to teams in hospitals. A collaboration of GPs and primary care practitioners in Thames Valley and clinical academics, and human factors experts in the University of Oxford have therefore produced checklists to aid teams in emergency situations in GP practices. Our checklists exemplify the principles described above and in pilot testing have been extremely popular. They are forming the basis of an ongoing process of research and refinement. Checklists in primary care could serve the purpose of assisting management of emergencies and providing best practice guidance which is currently unavailable.

## References

1. Bury G, Prunty H, Egan M, Sharpe B Experience of prehospital emergency care among general practitioners in Ireland. *Emergency Medical Journal* 2008; **25**: 450-4.
2. Liddy C, Dreise H, Gaboury I Frequency of in-office emergencies in primary care. *Canadian Family Physician* 2009; **55**: 1-4.
3. United States Air Force. *B-17 Training Manual* Washington D.C., United States Air Force, 1944.
4. Collins M. *Carrying the fire: an astronaut's journey* New York, Farrar, 1974.
5. Glavin RJ Human performance limitations (communication, stress, prospective memory and fatigue). *Best Practice & Research Clinical Anaesthesiology* 2011; **25**: 193-206.
6. Ramsay G, Haynes AB, Lipsitz SR, et al. Reducing surgical mortality in Scotland by use of the WHO Surgical Safety Checklist. *British Journal of Surgery* 2019; **106**: 1005-11.
7. Arriaga AF, Bader AM, Wong JM, et al. Simulation-Based Trial of Surgical-Crisis Checklists. *New England Journal of Medicine* 2013; **368**: 246-53.
8. Crawford J, Neal A A Review of the Perceptual and Cognitive Issues Associated With the Use of Head-Up Displays in Commercial Aviation. *International Journal of Aviation Psychology* 2006; **16**: 1-19.
9. Marshall SD, Mehra R The effects of a displayed cognitive aid on non-technical skills in a simulated 'can't intubate, can't oxygenate' crisis. *Anaesthesia* 2014; **69**: 669-77.
10. Hagiwara MA, Sjoqvist BA, Lundberg L, Suserud BO, Henricson M, Jonsson A Decision support system in prehospital care: a randomized controlled simulation study. *American Journal of Emergency Medicine* 2013; **31**: 145-53.
11. Delta Airlines. *777 Quick Reference Handbook* Atlanta, Georgia, Delta Airlines, 2008.
12. <https://www.implementingemergencychecklists.org/implementing-the-checklist/references/> (accessed 25th January 2020)