

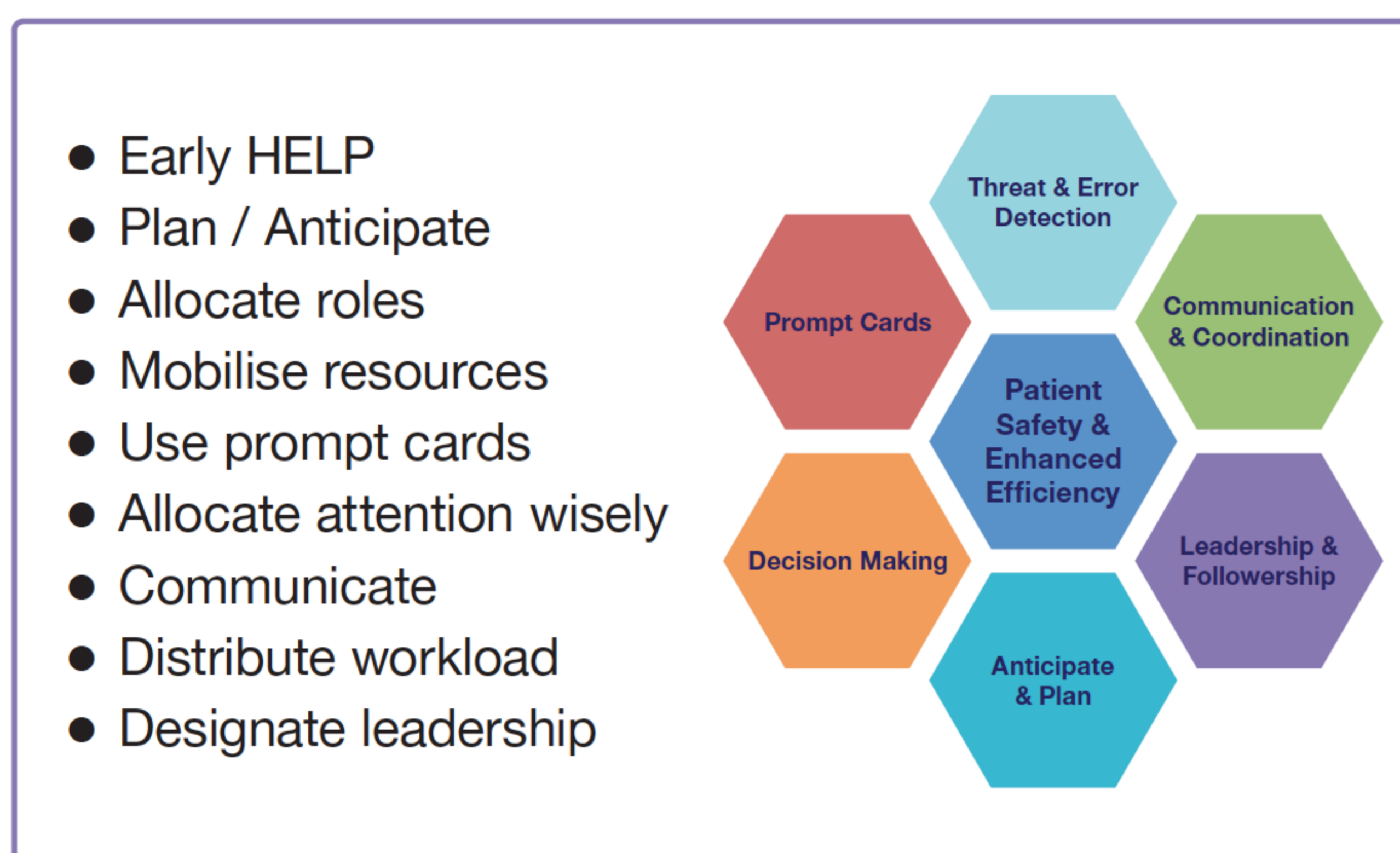
# The impact of combined Crew Resource Management training and use of prompt cards on operating theatre team performance during an emergency: A pilot study.

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## BACKGROUND

Team performance during operating theatre emergencies (potentially life-threatening events requiring time critical, key lifesaving actions) is a major source of surgical mortality and morbidity variation (1). Key processes are often omitted where clinicians' memory of lifesaving steps is relied upon. Emergency prompt cards and Crew Resource Management (CRM) training are purported to improve team performance (see figs 1&2) (2).




**Crisis Resource Management** 

Fig 1. Crisis Resource Management outline

**Emergency Treatment**

1. Call for **HELP** and inform team
  - Get the crash trolley and anaphylaxis box
2. Increase to **100% oxygen** high flow
3. Remove all causative agents (nb. chlorhexidine impregnated central lines)
4. Give **adrenaline** bolus
5. Give **rapid iv fluid** bolus (crystalloid)
6. Elevate legs
7. Stop non-essential surgery
8. If cardiac arrest or BP < 50mmHg → **PROMPT CARD 1**
9. Rule out differential diagnoses
10. Consider:
  - Adrenaline infusion
  - Glucagon to B-blocked patients unresponsive to adrenaline
  - Consider vasopressin, noradrenaline or metaraminol if adrenaline resistant.
  - Secondary agents
  - Taking blood for mast cell tryptase at 0hr, 1-2hr, and 24 hour
  - Contact Intensive Care Team

**Drugs**

**Adrenaline:**

Adult doses:

- 50mcg bolus iv (0.5mls 1:10,000)
- 500mcg bolus im (0.5mls 1:1000)
- Infusion 0.05-0.1mcg/kg/min iv
  - 5mg in 50mls 5% dextrose (100mcg/ml)
  - Start at 2.1mls/hr in 70 kg adult

Paediatric doses:

- 1mcg/kg bolus iv
  - Take 1ml of 1:10,000 and dilute to 10mls with saline
  - Give 0.1ml/kg
- 1:1000 bolus im
  - <6 yrs 0.15ml
  - 6-12 yrs 0.3ml
  - >12 yrs 0.5ml

**Glucagon (Adult):** 1mg  
**Vasopressin (Adult):** 2U, repeated as required (+/- infusion)

**Secondary treatment:**

	Chlorphenamine (im/slow iv)	Hydrocortisone (im/slow iv)
Adult / Child > 12yrs	10mg	200mg
Child 6-12 yrs	5mg	100mg
Child 6months - 6yrs	2.5mg	50mg
Child < than 6 months	250mcg/kg	25mg

- Salbutamol 5mg neb / 250mcg iv
- Magnesium 1g bolus iv

**Differential Diagnosis**

- Pulmonary embolism
- Myocardial infarction → **PROMPT CARD 12**
- Anaesthetic overdose
- Pneumothorax
- Haemorrhage → **PROMPT CARD 13**
- Aspiration → **PROMPT CARD 8**
- Breathing circuit obstruction
- Air embolism → **PROMPT CARD 14**

**Anaphylaxis**  
Acute hypersensitivity reaction to a known or unknown allergen

**19**

Fig 2. Emergency Prompt Card for Anaphylaxis

## OBJECTIVES

To assess the impact of a set of newly developed emergency prompt cards (see fig 1 & 2) on UK theatre team emergency performance after CRM training; report key findings to inform future implementation.



## METHODS

Thirty-three emergency prompt cards covering a range of theatre-based emergencies were developed. From a CRM trained cohort, eight operating theatre teams (40 participants in total) underwent six high-fidelity emergency simulations where emergency prompt cards were randomly assigned for use.

The primary outcome was successful completion of predetermined key processes. Additional quantitative and qualitative data was collected through questionnaires and facilitated focus groups.

## RESULTS

209 (74.6%) of 280 key processes were completed, irrespective of prompt card use. 26.4% of key processes were missed with the prompt cards versus 24.3% without the cards ( $p=0.54$ ). Prompt card use increased perceived team performance ( $p<0.0001$ ).

Key Processes Achieved	Emergency Prompt Cards		Total
	Without	With	
No	34 (24.3)	37 (26.4)	<b>71</b>
Yes	106 (75.7)	103 (73.6)	<b>209</b>
	<b>140</b>	<b>140</b>	<b>280</b>

The qualitative data findings indicated improved decision-making, situational awareness, communication and team working with the cards, but were team and situation dependent. Focus group feedback was broadly supportive of prompt card use (see below).

***"I was all out of ideas and trying to remember... I was just distracted by that trying to remember and when we had the tool it was very 'ok that's that and ... that's that!" (Anaesthetist, Group 2)***

***"It put us straight and put us in order to do things in the right order. For me if I had a definitive role or responsibility within a scenario, I felt fine, I felt confident and I could do it, so if I was the reader of the cards, loved that." (Scrub Nurse 1, Group 5)***

## CONCLUSIONS

CRM training and the use of emergency prompt cards improved perceived theatre team performance ( $p<0.0001$ ) during simulated theatre emergencies. This was not associated with an objective improvement. This pilot study provides insights into the complex interactions and ingrained culture in UK healthcare which need to be considered in future designs, implementation and the role of multidisciplinary CRM training.

## REFERENCES

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- 2) Harrison TK, Manser T, Howard SK, et al. Use of Cognitive Aids in a Simulated Anesthetic Crisis. *Anesth Analg* 2006;**103**:551–6