

Being Ready on The Day ... A Short Report on the Evaluation and Outcomes of a Pilot Ambulatory Surgery Crisis Resource Management Course

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Abstract

Aim: To describe the development, evaluation and outcomes of a pilot crisis resource management (CRM) course developed specifically for the Ambulatory Surgery sector.

Methods: The scenario-based course (DaCRM) covered the diagnosis and management of a number of potential medical emergencies. Evaluation incorporated pre- and post course surveys and follow-up interviews.

Keywords: Ambulatory surgery; Day surgery; Crisis Resource Management; De-skilling; Team-based training; Scenario-based learning.

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Results: All participants applied learnings either clinically or organizationally in their workplace, and one successfully diagnosed and managed a malignant hyperthermia event.

Conclusion: Some important generalizable principles were demonstrated: team-based CRM training of clinical and non-clinical staff can increase confidence, ameliorate possible de-skilling in Ambulatory Surgery settings and can save lives.

Introduction

In the past two decades, pressures on the healthcare system and improvements in technology have led to the exponential use of ambulatory surgery carried out in dedicated day surgery units in public and private hospitals, and in more than 240 free standing day surgery centres throughout Australia [1]. Currently, approximately half of all surgical procedures in Australia are carried out as day surgery and there is considerable potential for increasing that proportion [2]. In the UK and the USA, around 65% and 70% respectively of elective surgery is performed as day procedures [3].

The standard of care in ambulatory surgery units may be high. However, the possibility of unexpected operative complications is ever present [4]. Given that the underlying causes of adverse events often stem from non-technical aspects of clinical performance [5] and that staffing in stand-alone units may be stretched to the limit when responding to crises, the need for crisis resource management (CRM) training is essential. The latter covers non-technical skills such as 'team working, leadership, situation awareness, decision making task management and communication' [5].

The Course

In response to the needs of the private ambulatory surgery sector, the Skills Development Centre developed a multi-disciplinary Day Surgery Crisis Resource Management course (DaCRM). The pilot course was delivered by an anaesthetist, two (anaesthetic) registered nurses and two simulation co-ordinators. The course was scenario-based, since this approach allows participants to "engage with authentic situations and tasks which facilitate immersion with the content within realistic situations" [6]. Eight people (4 females and 4 males; 4 doctors and 4 nurses) participated. The scenarios covered the diagnosis and management of anaphylaxis, malignant hyperthermia, arrhythmia and haemorrhage.

What follows is a description of DaCRM, the evaluation process and its outcomes. The Ethics Committee of The University of Queensland approved the evaluation process.

Evaluation Methodology

The evaluation strategy at the Skills Development Centre (SDC) is based on the four-stage Kirkpatrick model (reactions, learning, transfer, results) [7] which covers:

- participants' initial reaction to the course in terms of
 - the extent to which participants were able to meet their learning objectives;
 - its relevance;
 - its fidelity;
 - appropriateness of format;
 - the learning environment.
- the extent of participants' learning by
 - measuring changes in their levels of confidence before and after the course,
 - assessing students' knowledge before and after the course, and
 - using higher-order questions to ask them to detail the elements of the program they will utilize.
- the level of transfer through
 - a determining as far as possible the extent to which participants actually apply the knowledge and skills acquired in the course, in their workplace.
- the ultimate outcome of the course by
 - obtaining feedback through semi-structured interviews from the participants' supervisors (where appropriate, only) as to their performance in the areas covered by the course, and

comparing that with baseline data (supervisors' assessment of performance in those who have not completed a CRM course).

Evaluation Methods

Evaluation of DaCRM was designed to be in three stages:

- A pre-course evaluation covering:
 - self-reported behavioural characteristics which relate specifically to CRM training (e.g. asking for help, directed communication, planning ahead etc.);
- An immediate post program evaluation to determine:
 - the extent to which participants felt the program and the trainers helped them to reach the learning objectives of the program (using a survey based on CRM principles);
 - the practical ways in which participants will use the CRM principles; and
 - the efficiency of the administrative aspects of the CRM program (participants' orientation, enrolment, learning materials etc.).
- Follow-up interview to determine:
 - the extent to which participants' (self-reported) behaviour might have changed in their response to any critical event(s) they were involved in the 4–6 weeks following their training;
 - the extent to which participants consciously used the techniques they nominated for future use immediately following the program; and
 - upon reflection, the extent to which participants feel the CRM training they received could be further improved.

Given the seniority of the participants involved in the pilot course, no data were collected specifically from their supervisors (Stage 4).

Because of the ordinal nature of the data, non-parametric measures were used in the analysis of the data (Spearman's rho, Kruskal-Wallis, Wilcoxon), and a formula for non-parametric data was used to calculate effect sizes [8]. The number of responses (from 8 participants) was too small for a reliability analysis to be performed on the instrument used in the immediate post DaCRM course evaluation. However, the same instrument has been used for similarly structured CRM courses and has been shown to be reliable with an alpha co-efficient of $>.90$.

Results

All participants ($n=8$) completed the immediate post course evaluation and all but one participant ($7/8$) completed the pre- and post course surveys and interview. Seven of the 8 participants (87.5%) thought the course was "excellent" and 1 participant (12.5%) that it was "very good". All participants would recommend the course to their peers.

Statistically, there were too few participants to the results by training or gender, so the results are reported in the aggregate. However, there was a strong correlation between the number of years since participants' graduation and their comfort with scenariobased learning ($r = .78, p < .05$). Participants reported that the course helped all participants to consolidate or enhance their skills. They were also helped by the debriefing sessions to clarify what needs to be done in an emergency situation, and to learn how to deal with anxiety. Importantly, as confirmation that the course successfully demonstrated its underlying CRM principles, all participants nominated various CRM principles that they would use in the future, namely:

- directed communication (x3);
- seeking help early (x2);
- taking on a leadership role (x 3)
- situational awareness (x1)
- using all available resources (x1).

Additionally, two participants respectively said that they would use the revised techniques they had learned for the management of anaphylaxis.

Although one doctor thought the "dummy" should have changed colour to indicate cyanosis, the best elements of the course for participants were the task fidelity during realistic scenarios, and the opportunity for reflection during the concomitant de-briefing sessions. Comments included:

The simulations were very life-like. I identified weak areas in myself and my team, but it also helped me to know the others' strengths. The scenarios were especially valuable for those of us who had not experienced an emergency for years (Nurse).

It made me aware of what I actually do! (Doctor). It started me thinking about how I do things. It was a refresher for me. I reflected on my own skills and it's led me to increase my research and to change the way I do things, and change my priorities (Nurse).

For two participants, the best element was their learning about new emergency management principles "which have changed over the years": ...

it raised my awareness about the changes in the approach to CPR. They've changed since I last did a course. It updated my CPR skills (Doctor).

Seven of the eight participants completed a semi-structured interview at follow-up. Since DaCRM, participants self-reported that there had been significant improvements in two aspects of their behaviour in a crisis, namely their use of directed communication ($d = .55, p = .04$) and their ability to assert themselves when necessary with more senior staff ($d = .56, p = .038$).

As a consequence of DaCRM, four participants had especially appreciated the need for teamwork, and also recognized what nursing staff were capable of doing in an emergency, for example:

I saw the value of teamwork. It helped me to assess the skills levels of my staff and to appreciate what they can do (Senior Nurse).

I now have more confidence in the nursing staff who did the course and a greater awareness of what nurses are capable of doing (Doctor).

Additionally, participants had since made changes to their environment:

I've updated my skills in resuscitation so that I now feel safer, and I'm much more in control than before. I've [also] checked all the equipment to make sure it's working (Senior Nurse).

I've made changes to the resuscitation equipment and to the way in which it's packaged (Senior Doctor).

Importantly, DaCRM brought home to a number of respondents the dangers of deskilling in a Day-Only environment where

...most of the patients [seen] are healthy [so] we don't get the same problems as we would with sicker patients... (Doctor).

Of course, not getting "the same problems" cannot be relied upon. For example, even patients who have previously had normal anaesthetics may be at risk from malignant hyperthermia [9], and another DaCRM participant reported that he had:

... managed a malignant pyrexia since [DaCRM]. The diagnosis was correct, and then I used what I'd learned (filling the bladder with ice-water, changing the tubing etc.). I did what the text said and it worked well (Doctor).

Although ambivalence towards inter-professional learning initiatives has been reported previously [10], all participants in DaCRM believed it should continue to be run for both nurses and doctors. Some participants thought that it should also include administrative staff in the future:

Having nurses and doctors together was great. The nurses have to have hands-on training (Doctor).

It was nice to have a mix of nurses and doctors. It was nice to have everyone as a group (Nurse).

The mixed training was good. It was good to work as a team. I think it would be a good idea if more nurses and administrative staff also did the course together (Nurse).

The mix of nurses and doctors was good – possibly admin staff should do it as well to give them an overview of what will happen (Nurse).

Discussion

It has been noted that the careful selection of candidates for day surgery has been responsible for much of its success [11]. Nonetheless, this may change as fitness criteria become increasingly less restrictive, the rate of day surgery increases and the surgery undertaken as day cases become more complex [12].

Infrequent exposure to emergencies or the opportunity to practise emergency management skills leads to de-skilling in this important area [13]. Individuals need to receive appropriate training, and institutions should ensure their staff are given the time and resources necessary to train and practise. Above all, however, teams are greater than the sum of their parts and have an obligation to practise together in “real-time, realenvironment scenarios [that] provide practise and [also] test the system” [14]. Simulation is a valuable addition to the teaching armamentarium when it is impossible to practise on live human beings [15]. Additionally, training in a simulated environment

- “... can be standardised, controlled and taught with appropriate instruction, supervision and advice, [and]
- ... can be repeated until a defined performance criterion is met. For some individuals and some activities this may mean one or two attempts, for others it may require many attempts under instruction and supervision.” (RACS, 2005)

The majority of participants at follow-up had not experienced any emergencies following DaCRM but had nonetheless updated their knowledge and skills in relation to communication, resuscitation, anaphylaxis and malignant hyperthermia. Indeed, one medical participant had used the techniques learned in order to deal successfully with the latter. This addresses the possibility voiced by a number of writers that some of the skills learned in a simulated environment may not be transferable to the real world [16–18], or that simulated teaching and learning may become divorced from the clinical context [18]. It is clear from participants' application of CRM principles in their workplace, and from their comments relating to the value of the “interaction between participants in plausible scenarios” and the “realistic setting”, that this is not the case for DaCRM.

An important reason for developing the Day Surgery Crisis Resource Management course was the awareness that staff in stand-alone units do not always have the same panoply of resources available as general hospitals, especially the presence of medical staff once surgery has

finished for the day [19]. Certainly this was reinforced in a request from a nurse participant that more advanced scenarios be written for them only, i.e. “without doctors” since it was felt that this would be more realistic at certain times of the day.

On the face of it this is a reasonable request. However, an important learning objective of CRM courses is that participants realize the potential of using all of the resources available to them. It would appear necessary for future DaCRM courses to reinforce the notion that nurses can and should use the other resources available to them when there are no medical staff around, namely administrative staff. The latter should be trained to fulfil appropriate roles during the management of a medical emergency.

Summary

Although the number of participants in this study was small and the feedback on followup based on self-report, the findings nonetheless support to important generalizable principles.

Medical and nursing staff working in an ambulatory surgery setting are at risk of becoming de-skilled in their management of medical emergencies and need to have their skills updated regularly. The use of realistic scenarios and up-to-date evidence-based techniques taught by DaCRM helped participants to upgrade and actually apply their ‘rusty’ emergency management skills, and to review and improve some of their work practises, including better communication.

To ensure that all available resources may be used by clinicians – especially by nurses later in the day – it would also be appropriate for administrative staff in stand-alone settings to receive CRM training also. Emergency scenarios should be designed with roles for both clinicians and non-clinicians, and it would be ideal if medical, nursing and administrative staff attended a course such as DaCRM as a team.

As the use of day case surgery increases and patient profiles change, so also should stand-alone facilities protect their patients' safety through ongoing team training of their staff in the management of medical emergencies. The pilot Day Surgery Crisis Resource Management course was successful not only in terms of participants' satisfaction, but importantly, in their ability to apply their learnings successfully in the real world.

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