Resuscitation 105 (2016) 130–137

Contents lists available at ScienceDirect

Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

Clinical paper

An evaluation of three methods of in-hospital cardiac arrest educational debriefing: The cardiopulmonary resuscitation debriefing study☆

Keith Couper[a,b], Peter K. Kimani[b], Robin P. Davies[a], Annalie Baker[a], Michelle Davies[a], Natalie Husselbee[a], Teresa Melody[a], Frances Griffiths[b], Gavin D. Perkins[a,b,*]

[a] Heart of England NHS Foundation Trust, Birmingham, B9 5SS, UK
[b] Warwick Medical School, University of Warwick, Coventry, CV4 7AL, UK

ARTICLE INFO

Article history:
Received 2 November 2015
Received in revised form 4 May 2016
Accepted 12 May 2016

Keywords:
Cardiac arrest
Cardiopulmonary resuscitation
Debriefing
Quality improvement

ABSTRACT

Background: The use of cardiac arrest educational debriefing has been associated with improvements in cardiopulmonary resuscitation (CPR) quality and patient outcome. The practical challenges associated with delivering some debriefing approaches may not be generalisable to the UK health setting. The aim of this study was to evaluate the deliverability and effectiveness of three cardiac arrest debriefing approaches that were tailored to UK working practice.
Methods: We undertook a before/after study at three hospital sites. During the post-intervention period of the study, three cardiac arrest educational debriefing models were implemented at study hospitals (one model per hospital). To evaluate the effectiveness of the interventions, CPR quality and patient outcome data were collected from consecutive adult cardiac arrest events attended by the hospital cardiac arrest team. The primary outcome was chest compression depth.
Results: Between November 2011 and July 2014, 1198 cardiac arrest events were eligible for study inclusion (782 pre-intervention; 416 post-intervention). The quality of CPR was high at baseline. During the post-intervention period, cardiac arrest debriefing interventions were delivered to 191 clinicians on 344 occasions. Debriefing interventions were deliverable in practice, but were not associated with a clinically important improvement in CPR quality. The interventions had no effect on patient outcome.
Conclusion: The delivery of these cardiac arrest educational debriefing strategies was feasible, but did not have a large effect on CPR quality. This may be attributable to the high-quality of CPR being delivered in study hospitals at baseline.
Trial registration: ISRCTN39758339.

Introduction

In-hospital cardiac arrest is a major health problem, which carries a significant mortality burden. Data from the UK National Cardiac Arrest Audit reports an incidence of 1.6 events per 1000 hospital admissions, of which 18.4% patients survive to leave hospital.[1]

Cardiac arrest educational debriefing is a technique where clinicians review cardiac arrest performance using data collected during the cardiac arrest with a view to improving subsequent practice.[2] Its use is recommended in international resuscitation guidelines.[3,4] A variety of debriefing approaches are described in the literature, but the most effective approach remains unclear.[2–4] A common approach is weekly group educational meetings at which clinical staff review recent cardiac arrest events.[5–7] In an American hospital, the implementation of this educational debriefing approach was associated with a significant improvement in cardiopulmonary resuscitation (CPR) quality and return of spontaneous circulation (ROSC).[5] In a study covering 131 US hospitals, the presence of at least monthly debriefings was independently associated with improved survival to discharge.[8]

The CPR Quality Improvement Initiative was a three-centre cohort study that examined the effect of realtime audio-visual feedback and weekly group educational debriefing on CPR quality and patient outcome in a UK hospital trust.[9] In the CPR Quality

☆ A Spanish translated version of the abstract of this article appears as Appendix in the final online version at http://dx.doi.org/10.1016/j.resuscitation.2016.05.005.

* Corresponding author at: University of Warwick and Heart of England NHS Foundation Trust, Birmingham B9 5SS, UK.
E-mail address: g.d.perkins@warwick.ac.uk (G.D. Perkins).

http://dx.doi.org/10.1016/j.resuscitation.2016.05.005
0300-9572/

Improvement Initiative study, we identified challenges in delivering weekly group educational debriefing that might preclude its widespread adoption. In particular, delivery was resource-intensive and it was often challenging to release clinical staff to attend meetings. This highlighted the need to develop debriefing approaches better tailored to UK working practices. We developed three such debriefing approaches, using the process described by Medical Research Council framework for the development and evaluation of complex interventions.[10] The aim of this follow-on study was to test the feasibility of delivering these approaches and to assess their effect on CPR quality and patient outcomes.

Methods

Study design and setting

The Cardiopulmonary Resuscitation Debriefing (CODE) study was a before/after study, conducted at three hospitals. The three study hospitals comprise Heart of England NHS Foundation Trust, a large NHS Trust with over 1400 beds. The hospitals are geographically distinct, although there is rotation of clinical staff between sites.

Table 1 summarises the hospital characteristics and their approaches to CPR quality feedback and educational debriefing during the pre-intervention and post-intervention study periods. Some of the patient and process outcome variables for the pre-intervention period have been previously reported.[9]

Cardiac arrests at study hospitals are attended by a multidisciplinary emergency team, which is activated through a bleeper system. The team leader is an Advanced Life Support provider, whilst other clinical team members are either Advanced Life Support or Immediate Life Support providers. Treatment is delivered in accordance with current Resuscitation Council (UK) guidelines.[11]

Approvals

The study was approved by the Oxford C Research Ethics Committee who authorised a waiver of initial consent in accordance with the Mental Capacity Act. Consent to continue was obtained from surviving patients or their representative if they lacked capacity.

Study participants

The study recruited both patient and staff participants. Patient participants were consecutive adult patients (aged ≥ 18 years) who had a cardiac arrest at the study hospitals that was attended by the hospital emergency team. This included patients that had an out-of-hospital cardiac arrest and who were admitted to the hospital with CPR ongoing. Patients that had a valid do not attempt cardiopulmonary resuscitation (DNACPR) order at the time of the cardiac arrest were excluded.

Staff at hospital one were eligible to attend cardiac arrest debriefing meetings if they were involved, or potentially involved, in the care of cardiac arrest patients. Staff at hospitals two and three were eligible to receive cardiac arrest debriefing if they attended a cardiac arrest where accelerometer data were collected and where the CPR had lasted at least 5 min. At hospitals one and two, staff provided consent to study participation at the time of receiving the intervention. Staff at hospital three were sent feedback, but were only recorded as having received it if they replied to the email to confirm that they had reviewed the feedback and consented to study participation.

Table 1
study design.

	Pre-intervention (Nov 2011–May 2013)	Post-intervention (Sept 2013–July 2014)
Hospital one	Weekly group debriefing*	Monthly group debriefing*
Hospital two	No debriefing*	Oral personal debriefing*
Hospital three	No debriefing	Written Feedback*

Key: * Real-time audiovisual feedback provided.

Interventions

Educational debriefing interventions were developed through synthesis of systematic review, process and qualitative data that were collected during the pre-intervention period.[12,13] This process utilised the theoretical domains framework and prioritised the development of interventions that would be deliverable in the UK setting.[14] Interventions were allocated by hospital, based on the character of the hospital and where it was thought they would work most effectively. The focus of each intervention was improvement in CPR delivery.

Hospital one: staff received monthly group debriefing, enabling the measurement of the effect of reducing the frequency (weekly to monthly) of the group debriefing intervention that hospital one staff received during the pre-intervention period of the study. Hospital two: staff received an individual verbal debrief, that lasted approximately 5 min and was intended to be delivered within 4 days of the cardiac arrest. Hospital three: written feedback sheets were emailed to cardiac arrest attendees following the cardiac arrest event.

All interventions were delivered by the first author (KC). Full details of each intervention are included in the electronic supplement.

Study data collection

Cardiac arrest events were identified through review of the emergency call log maintained by the hospital switchboard. For each eligible cardiac arrest, a core data set was collected, which comprised patient demographic, cardiac arrest, CPR quality and patient outcome data. Data items were based on standardised definitions.[15,16]

Demographic data and cardiac arrest characteristics were contemporaneously collected and recorded on a local database by a member of the cardiac arrest team. Patient outcome data were collected from clinical records and discharge summaries.

During the study period, most hospital cardiac arrest trolleys were equipped with a Phillips MRX QCPR defibrillator (Philips Healthcare, Andover, MA, USA). These defibrillators incorporate a puck attachment. When placed on a patient's chest during cardiac arrest, the accelerometer collects CPR quality metric data (compression depth, compression rate, flow-fraction, compression incomplete release, and peri-shock pause). Data are automatically extracted (Phillips Heartstart Event Review Pro 4.2 software, Phillips Healthcare, Andover, MA, USA). Full details of the device are described elsewhere.[17,18] Where the puck device is not used, transthoracic impedance data (chest compression rate, flow-fraction, peri-shock pause) may be extracted manually from the defibrillator record using manufacturer software (QCPR Review V2.1 software, Laerdal Medical, Stavanger, Norway).

Cardiac arrest events were included in the analysis of CPR quality outcomes only if the record contained at least five 1 min data periods. For eligible cases, the first five 1 min periods of available data for each CPR quality metric were extracted. This approach has been used in previous studies, and provides a consistent measure of the emergency team's best CPR performance.[5,9,18]