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Original article

Prognostic factors for in-hospital cardiopulmonary arrests. A review of 760 cases☆

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ABSTRACT

Background and objective: The aim of this study is to analyze in-hospital cardiopulmonary arrests (CA) that took place in conventional wards and evaluate their prognostic factors.
Patients and method: Retrospective review of in-hospital CA which occurred in our hospital over a 9-year period. CA that took place in intensive care areas, emergency rooms and operating theatres were excluded from the study. The following data were collected: demographic data, cause and initial rhythm of CA, internal control data, time, place, methods and results after cardiopulmonary resuscitation (CPR) (recovery of spontaneous circulation, [ROSC], and survival at discharge [SAD]) and neurologic performance at discharge. Results were analyzed with SPSS® v. 20 predictive analytics software.
Results: Average age was 66.9 ± 17.5 years; 63.5% male. CA team arrived in 1.75 ± 0.74 min on average, and the average length of CPR was 25.8 ± 16.10 min. First rhythm: (a) shockable rhythms = 22.1%; (b) asystole = 66.2%, and (c) pulseless electrical activity = 11.7%. ROSC = 51% and SAD = 24.8%. Factors associated with a better prognostic ($p < 0.05$): age, reason for hospital admission, patient's previous physical condition, principal cause of CA, number of defibrillations and average length of CPR.
Conclusions: Despite having studied several variables as prognostic factors for CA and some of them being statistically significant, early prediction for survival for an in-hospital CA remains uncertain. Our study suggests that applying rational organizational measures, 25% of in-hospital CA could be discharged from hospital in good condition, and therefore, these organizational and educational measures should be extended to large hospitals.

Factores pronósticos en las paradas cardiorrespiratorias intrahospitalarias. Revisión de 760 casos

Palabras clave:
Parada cardiorrespiratoria intrahospitalaria
Equipo de atención a la parada cardiorrespiratoria
Reanimación cardiopulmonar
Factores pronósticos
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RESUMEN

Fundamento y objetivo: Analizar las paradas cardiorrespiratorias (PCR) intrahospitalarias acontecidas en las salas de hospitalización convencional y evaluar los factores pronósticos de las mismas.
Pacientes y método: Revisión retrospectiva de las PCR intrahospitalarias acontecidas en nuestro hospital durante un período de 9 años. Fueron excluidas las PCR en áreas de intensivos, quirófanos y urgencias. Datos recogidos: características demográficas, etiología y ritmo inicial de la PCR, datos de control interno, horario, lugar, métodos y resultados tras la reanimación cardiopulmonar (RCP) (recuperación de la circulación espontánea [RCE] y supervivencia al alta hospitalaria [SAH]) y estado neurológico al alta. Los resultados se analizaron con el paquete estadístico SPSS® v. 20.

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◊ The names of the members of the in-hospital cardiopulmonary arrest care committee of the Hospital Clínico of Barcelona are listed in the Annex.

Resultados: Edad media 66,9 ± 17,5 años; 63,5% hombres. Tiempo medio de llegada del equipo de PCR = 1,75 ± 0,74 min, con una duración media de RCP = 25,8 ± 16,10 min. Ritmo inicial: a) desfibrilable = 22,1%; b) asistolia = 66,2%, y c) actividad eléctrica sin pulso = 11,7%. RCE = 51% y SAH = 24,8%. Factores asociados a un mejor pronóstico (p < 0,05): edad, motivo de ingreso hospitalario, estado previo del paciente, etiología y mecanismo principal de la PCR, número de desfibrilaciones y duración media de la RCP.

Conclusiones: A pesar de haber estudiado diversas variables como factores pronósticos de la RCP y haber obtenido significación estadística en alguna de ellas, la predicción precoz de la supervivencia ante una PCR intrahospitalaria sigue siendo incierta. En cualquier caso, nuestro estudio evidencia que mediante una aplicación racional de medidas organizativas, el 25% de las PCR intrahospitalarias podrían llegar a ser dadas de alta en buenas condiciones, por lo que deberían generalizarse planteamientos organizativos y docentes similares en los grandes hospitales.

Introduction

Basic cardiopulmonary resuscitation (CPR) techniques were introduced in the sixties.[1] In the last 20 years new concepts have been introduced in CPR, mainly dealing with care and educational aspects,[2,3] but the basics have not undergone major changes.[4] Despite the number of years gone by and the growing interest in the field of resuscitation, there are only a few studies in our country assessing CPR performance, prognostic factors and outcomes in patients who have suffered cardiopulmonary arrest (CPA) during admission in a conventional hospital ward (CHW).[5–7] Prognostic factors that determine the success of in-hospital CPR in a given patient are not fully defined and are still the subject of research and debate.[8–15] CPR in conventional wards and examination rooms of a general hospital presents an entirely different problem compared to CPR practiced in operating theatres, emergency rooms or intensive care units, as these latter areas always have the presence of qualified personnel and sufficient equipment to perform advanced CPR.[5] Since both, a full personnel team and a comprehensive technical equipment cannot be provided for every hospital corner, attention to cardiopulmonary arrest must be based on an overall strategy to address an emergency of this kind anywhere in the hospital, at any time and with the least possible infrastructure.[5]

Studies conducted in other countries show that CPR is effective initially in a number of cases, ranging between 33 and 55%, while subsequent survival is much lower.[4,9–17] Thus, in a review of 25 studies published between 1959 and 1992, survival to hospital discharge was 11.2 ± 6.5%,[16] while in a meta-analysis by Schneider et al.,[17] survival to in-hospital cardiac arrest at the time of discharge was not higher than 18%. The latest series show a survival to hospital discharge of about 20%.[4,9–17]

As previously mentioned, there are not enough studies in our country regarding survival and prognostic factors in patients with in-hospital CPA to determine an action strategy that would allow an increased survival for these patients. In this regard, our hospital has had, for over 30 years, a multidisciplinary system established to manage CPA occurring outside intensive care units, operating theatres and emergency departments, which already have their own autonomous resuscitation systems.[5–7] This system is based on three points: (1) prevention measures; (2) implementing basic CPR techniques by any member of the medical staff in order to maintain circulation and respiration until the arrival of CPR team, and (3) forming a team with the necessary personnel, equipment and infrastructure that can quickly arrive on the scene and continue with advanced CPR. This system began operating in 1986, and both, organizational aspects as well as the initial results have been reported in two previously published articles.[5–7]

The objectives of this study are:

(1) Define the clinical and demographic characteristics of patients who underwent CPR in CHW.
(2) Determine the return of spontaneous circulation (ROSC) and survival to hospital discharge.
(3) Determine the neurological outcome at hospital discharge as assessed by the *Glaswegian Outcome Scale* (GOS).
(4) Define the factors of good prognosis for the in-hospital CPA survival.

Patients and methods

Study site

Urban tertiary hospital currently having 682 conventional hospital beds and 42 intensive care beds.

Work methodology

In 1986, a CPA care committee was formed in order to establish the basis for CPR action in cases occurring outside intensive care, operating theatres and emergency departments. This committee is responsible for organizing periodic theoretical and practical courses in basic CPR for all the site's healthcare staff and advanced CPR for medical staff. At the same time, a team of CPA care was created. This is currently made up of an anaesthesiologist, a cardiologist, an internist, a surgeon and a nurse. This team has, for its exclusive use, several trolleys distributed strategically in the hospital containing medication, airway approach equipment, a vacuum and an electrocardiogram monitor with a defibrillator. They are inspected and sealed daily, making sure this material is available and in perfect condition. All CPR team members carry a pager that is permanently connected to a common call number, which is known in all hospital wards and all members of staff in the site. Thus, when a call to the CPR team occurs, they leave whatever they are doing and go to the required place where basic CPR has already been started by that ward's staff.

Data collection

After the CPR team has finished, the ward's own personnel and a member of the CPR team systematically complete a case report form previously prepared by the committee. The following information is added to this form: type of call (patient with CPA, with respiratory arrest or if it was a false alarm call), age