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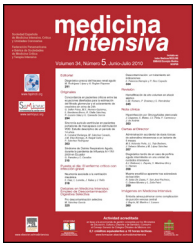

CONSENSUS STATEMENT

Hemodynamic monitoring in the critically patient. Recommendations of the Cardiological Intensive Care and CPR Working Group of the Spanish Society of Intensive Care and Coronary Units☆

A. Ochagavía[a,*], F. Baigorri[a], J. Mesquida[a], J.M. Ayuela[b], A. Ferrándiz[c], X. García[a], M.I. Monge[d], L. Mateu[c], C. Sabatier[a], F. Clau-Terré[e], R. Vicho[f], L. Zapata[g], J. Maynar[h], A. Gil[d], Working Group Intensive Care and Cardiology CPR SEMICYUC

[a] *Servicio de Medicina Intensiva, Hospital de Sabadell, CIBER Enfermedades Respiratorias, Corporació, Sanitària Parc Taulí, Institut Universitari Parc Taulí, Universitat Autònoma de Barcelona, Sabadell, Barcelona, Spain*
[b] *Servicio de Medicina Intensiva, Hospital de Burgos, Burgos, Spain*
[c] *Servicio de Medicina Intensiva, Hospital Universitario General de Castellón, Castellón, Spain*
[d] *Servicio de Cuidados Críticos y Urgencias, Hospital del SAS Jerez, Jerez de la Frontera, Cádiz, Spain*
[e] *Institut Reçerca, Hospital de Vall d'Hebron y Consorci Sanitàri Terrasa, Barcelona, Spain*
[f] *Servicio de Medicina Intensiva, Clínica USP-Palmaplanas, Palma de Mallorca, Spain*
[g] *Servicio de Medicina Intensiva, Hospital de la Santa Creu i Sant Pau, Barcelona, Spain*
[h] *Servicio de Medicina Intensiva, Hospital Universitario Araba, Vitoria, Álava, Spain*

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Abstract Hemodynamic monitoring offers valuable information on cardiovascular performance in the critically ill, and has become a fundamental tool in the diagnostic approach and in the therapy guidance of those patients presenting with tissue hypoperfusion. From introduction of the pulmonary artery catheter to the latest less invasive technologies, hemodynamic monitoring has been surrounded by many questions regarding its usefulness and its ultimate impact on patient prognosis. The Cardiological Intensive Care and CPR Working Group (GTCIC-RCP) of the Spanish Society of Intensive Care and Coronary Units (SEMICYUC) has recently impulsed the development of an updating series in hemodynamic monitoring. Now, a final series of recommendations are presented in order to analyze essential issues in hemodynamics, with the purpose of becoming a useful tool for residents and critical care practitioners involved in the daily management of critically ill patients.

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* Corresponding author.
E-mail address: aochagavia@tauli.cat (A. Ochagavía).

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PALABRAS CLAVE
Monitorización hemodinámica;
Paciente crítico;
Hipoperfusión tisular

Monitorización hemodinámica en el paciente crítico. Recomendaciones del Grupo de Trabajo de Cuidados Intensivos Cardiológicos y RCP de la Sociedad Española de Medicina Intensiva, Crítica y Unidades Coronarias

Resumen La monitorización hemodinámica nos permite obtener información sobre el funcionalismo cardiovascular del paciente crítico, por lo que constituye una pieza fundamental en la aproximación diagnóstica y en la guía terapéutica del paciente con hipoperfusión tisular. Desde la aparición del catéter de arteria pulmonar hasta el desarrollo reciente de tecnologías mínimamente invasivas, la monitorización hemodinámica se ha rodeado de interrogantes en cuanto a su utilidad y su impacto final sobre el pronóstico de nuestros pacientes. El Grupo de Trabajo de Cuidados Intensivos Cardiológicos y RCP (GTCIC y RCP) de la SEMICYUC ha impulsado recientemente la realización de la serie de «Puesta al día en monitorización hemodinámica» y ha querido además desarrollar unas recomendaciones que pretenden analizar cuestiones fundamentales en la valoración cardiovascular del paciente crítico, con la intención final de ser una herramienta útil para residentes, intensivistas y otros profesionales que afrontan el manejo diario de estos pacientes.

Introduction

The study of cardiovascular function is a fundamental aspect in critical patient care. Hemodynamic monitoring allows us to obtain information on cardiocirculatory physiopathology that will help in establishing a diagnosis and in orienting patient management in situations of hemodynamic instability. The pulmonary artery catheter (PAC) has been the most widely used technique since its introduction over 40 years ago. Although its contribution to the in-depth knowledge of cardiovascular function is undeniable, the use of the PAC has decreased because of controversy regarding its indications and its limitations. This in turn has intensified the search for new monitoring methods. At present, a range of technological advances offer us many systems that can be used to explore the most important aspects of hemodynamics (preload, ventricular function, hemodynamic resuscitation targets or goals, etc.). In the same way as PAC, these systems have advantages and limitations that must be known before they are used in clinical practice.[1,2] Echocardiography, while not a continuous monitoring system in the strict sense, offers anatomical and functional information that can be enormously useful for the hemodynamic assessment of the critically ill patient.[3,4]

The Cardiological Intensive Care and CPR Working Group (GTCIC-RCP) of the Spanish Society of Intensive Care and Coronary Units (SEMICYUC) has impulsed an ''Update in hemodynamic monitoring'' series,[5] composed of different chapters that offer a review of the most relevant aspects in the field. The series has recently been published in this journal. On the other hand, it has been the aim of the Working Group to develop and publish a series of recommendations on specific issues in hemodynamic monitoring and resuscitation, essentially based on the contents of the mentioned chapters and on the respective supporting literature searches. The objective of these recommendations is to afford a guide that is useful in clinical practice. The concrete issues or questions raised are the following: (1) What are the objectives of hemodynamic resuscitation? (2) How do we evaluate the factors determining cardiac yield? (3) Initial basic hemodynamic monitoring. Continuous hemodynamic monitoring. When and with what? (4) What role does echocardiography play in hemodynamic resuscitation? (5) What evidence is there of the usefulness of hemodynamic monitoring in the critical patient? Each of these five issues was addressed by a group composed of several of the professionals who participated in the drafting of the recommendations—all of them experts in hemodynamic monitoring and/or echocardiography in the critical patient. The final document was discussed, and consensus was established among all the participants. In addition, the document was forwarded to the members of the Working Group for due assessment and approval. The document has received the scientific endorsement of the SEMICYUC.

The level of recommendation and the quality of the evidence have been defined according to the criteria of the GRADE system,[6] which scores evidence as high (grade A), moderate (grade B), low (grade C) or very low (grade D), according to factors that include the methodology of the studies and the consistency and precision of the results, among other aspects. The GRADE system classifies the recommendations as strong (L1) or weak (L2), on the basis of factors such as the balance between benefit and risk, the quality of the evidence, the costs, and resource utilization.

Definition of the scenario. Type of patients and professionals to whom the recommendations are addressed

The recommendations refer to patients with systemic hypoperfusion, independently of the underlying cause, and run parallel to the specific measures applicable to each