

Emergency department implementation of a severe sepsis code

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RECEIVED:

13-1-2009

ACCEPTED:

18-3-2009

CONFLICT OF INTEREST:

None

Objective: To analyze the degree of compliance with a severe sepsis code and the achievement of hemodynamic goals under that code.

Methods: Prospective observational study (October 2006 through March 2007) of patients meeting the following sets of inclusion criteria: 1) suspicion of infection; 2) temperature $< 36^{\circ}\text{C}$ or $> 38^{\circ}\text{C}$, or heart rate > 90 beats/min or respiratory rate > 20 breaths/min, or diminished level of consciousness; and 3) systolic blood pressure < 90 mm Hg, or mean arterial pressure < 70 mm Hg, or a decrease in blood pressure > 40 mm Hg in hypertensive individuals. We recorded clinical variables, degree of compliance with measures specified in the code in the first 6 hours, success in reaching hemodynamic goals, and hospital mortality.

Results: The mean (SD) age was 58.4 (20) years and 70.7% were men. The respiratory tract was the most frequent focus of infection (in 50% of the cases). The code was implemented in 64.5% of the cases. In-hospital mortality was 17.5%. Regarding achievement of hemodynamic goals, a mean arterial pressure ≥ 65 mm Hg was reached in 77.5%, diuresis ≥ 0.5 mL/kg/h was observed in 82.5%, and a central venous pressure of 8 mm Hg to 12 mm Hg was reached in 45.4% and a central venous oxygen saturation (SvcO₂) of $\geq 70\%$ in 15.6%. The level of compliance with each stipulated measure was as follows: blood cultures before starting an antibiotic, 90%; administration of an antibiotic within 3 hours, 95.7%; measurement of lactate level, 97.5%; resuscitation with adequate volume, 80%; administration of noradrenalin, 80%; and measurement of central venous pressure and SvcO₂, in 72.7% and 31.2%, respectively.

Conclusions: Implementing a severe sepsis code facilitated the achievement of consistent management of this condition. Emergency personnel were alert to detecting sepsis and treating it early, and they became aware of aspects of care that could be improved. [Emergencias 2009;21:255-261]

Key words: Early treatment. Code. Sepsis. Emergency health services. Bundle of measure.

Introduction

Infections constitute 10.4% of Emergency Department (ED) consultations¹ but only 5-10% meet diagnostic criteria for sepsis², which, in our country is about 50-100,000 cases / year. An estimated 30% develop septic shock or severe sepsis with mortality rates of 47% and 84% respectively³, superior even to that of acute myocardial infarction or stroke.

In 2001, Rivers et al showed that in cases of septic shock/severe sepsis, the implementation of early resuscitation (during the first 6 hours), guided by hemodynamic goals (RPGO) managed to

reduce hospital mortality (33.3%; compared to 49.2% in the group receiving standard treatment)⁴. Thus, it became clear that early treatment, focused on antibiotic therapy⁵ and correcting hemodynamic alterations and tissue hypoxia may prevent the onset of organ dysfunction responsible for increased mortality.

Following the "Barcelona Declaration" in October 2002, an international campaign called *Surviving Sepsis Campaign* (SSC) was initiated, promoted by different scientific societies and aimed at achieving a 25% reduction in mortality associated with septic shock/severe sepsis by 2009. For this purpose, there has been a call for emergency

services and intensive care medicine to implement the new clinical guidelines for the management of septic shock/severe sepsis⁶⁻⁸. The guidelines differentiate two sets of measures: one set is for implementation in the first 6 hours and the other for implementation in the first 24 hours. The latter includes measures that are sometimes associated with intensive services, such as those relating to mechanical ventilation or the use human recombinant activated protein C⁶.

The hemodynamic goals and the set of measures to apply during the first 6 hours are: (1) Obtain blood cultures before starting antibiotic treatment. (2) Start early of antibiotic treatment in the first 3 hours if the patient is treated in the ED. (3). In the presence of hypotension or lactate >4 mmol/L, resuscitation should begin with a minimum of 20-30 ml/kg of crystalloid (or colloid equivalent dose), using vasopressors to treat hypotension during and after liquid replacement (dopamine or norepinephrine). (4) In the presence of septic shock or lactate > 4 mmol/l, central venous pressure (CVP) should be measured and maintained at ≥ 8 mm Hg and central venous oxygen saturation (CVSatO₂) should be maintained at $\geq 70\%$ by transfusion if the hematocrit (Ht) < 30% and/or dobutamine if Ht $\geq 30\%$. The hemodynamic objectives to be achieved in the first 6 hours are: (1) mean arterial pressure (MAP) ≥ 65 mm Hg. (2) Diuresis ≥ 0.5 ml/kg/hour. (3) CVP: 8-12 mm Hg (in the presence of septic shock or lactate > 4 mmol/l). (4) CVSatO₂ $\geq 70\%$ (Once the CVP is ≥ 8 mmHg, maintain the CVSatO₂ $\geq 70\%$ by transfusion if the Ht < 30% and/or dobutamine if the Ht $\geq 30\%$ to a maximum of 20 $\mu\text{g}/\text{kg}/\text{min}$).

With this new approach, septic shock/severe sepsis becomes another time-dependent condition, where any delay in diagnosis and treatment negatively affects the evolution, as with stroke or acute coronary syndrome. Thus the ED now plays a crucial role in early detection and initial treatment of septic shock/severe sepsis⁸. To ensure timely effective attention, sepsis codes have been created whose activation is based on clinical data, like Stroke or Chest Pain Codes. These codes have been shown to reduce morbidity and mortality by optimizing timely care and treatment. Early detection of septic shock/severe sepsis is hindered because its definition includes analytical data, such as leukocyte count and lactate levels². The reality of many emergency services in our country, in a permanent state of overcrowding, is that attention may be delayed several hours and, therefore, a screening protocol that includes analytical data could prove very effective.

Therefore, we decided to develop a Severe Sepsis Code (SSC) whose activation is based on clinical parameters that can be obtained on patient arrival at the ED and prior to medical attendance.

The aim of our study was to assess the difficulties in implementing the code in our ED, analyzing the degree of activation of the SSC, the degree of implementation of measures and the achievement of hemodynamic goals in the first 6 hours, in order to identify areas for improvement.

Method

Hospital del Mar is a 431-bed university hospital whose ED attends a mean 152 medical-surgical emergencies per day, without regard to ophthalmologic, trauma, gynecological, pediatric, or psychiatric emergencies. The ED has a triage area for initial assessment which includes vital signs, 4 rooms for low complexity cases, two bays for immediate attention (cardiopulmonary code, polytrauma, severe intoxication, stroke and chest pain codes), 12 bays for severe disease, and an observation unit with 11 bays. There are also other areas such as the surgical and trauma care, pediatric emergencies, gynecological and psychiatric emergencies.

Triage is performed by an ED physician from 9 am to 9 pm and a resident physician from 9 pm to 9 am.

We performed a prospective, observational cohort study, of all consecutive cases of septic shock/severe sepsis in which the SSC was activated in the adult medical-surgical ED of Hospital del Mar, from October 1 to 2006 to March 31, 2007.

We developed an activation code based on clinical criteria applicable at the time of triage or during patient stay in the ED and a performance protocol during the first 6 hours, based on the guidelines proposed by the SSC⁶. We designed a data base that included a performance protocol. Training sessions were conducted with resident doctors, deputies and emergency nurses.

The criteria used to activate SSC were: A. Suspected infection. B. Temp < 36°C or > 38°C or CR > 90 x 'or RF > 20 or altered level of consciousness. C. SBP < 90 mmHg or MAP < 70 mmHg or decreased blood pressure > 40 mmHg in hypertensive patients.

Activation of the SSC involved prioritizing emergency care and patient location. When no bay was available, the patient was placed in a bay for immediate attention. The code could be acti-

vated by both doctors and nurses from the triage area or from the bays.

For all patients we recorded the following variables: blood pressure (BP), MBP, heart rate, respiratory rate, blood oxygen saturation, assessment of the state of consciousness using the Glasgow Scale, at the time of triage and at the time of activation. We also recorded data on age, sex, pathological history, analytical data, including arterial acid-base balance, lactate, microbiological results and the measures implemented and the objectives achieved, data on hospital stay, hospital mortality and the final diagnosis. We excluded those patients with an indication of limitation of therapeutic effort.

To assess the degree of activation it was necessary to know how often the code was not activated in patients who met the inclusion criteria. To this end, we requested a listing from the Clinical Documentation Service of patients admitted to ED during the same period and who were discharged with the following diagnoses ICD-9: 038.0-038.9 (septicemia), 790.7 (bacteremia), 785.52 (septic shock), 995.92 (systemic inflammatory response syndrome due to an infectious process with organ dysfunction) and 995.91 (systemic inflammatory response syndrome due to an infectious process without organ dysfunction).

The medical records of patients not included in the study were reviewed by three senior doctors to determine when the SSC should have been activated. The degree of activation of the code is expressed as the percentage of patients actually included in the protocol with respect to the total number of patients who met criteria for activation. The degree of compliance with measures in the first 6 hours is expressed as the number of patients actually receiving these measures with respect to the total number of patients that were identified. The degree of compliance with the objectives is expressed as the number of patients who actually met the objectives with respect to the total number of eligible patients. Descriptive analysis was performed with SPSS 15.0 for Windows.

Results

The SSC was activated in 64.5% (40/62) of cases recorded during the study period. Of these, 20 patients were diagnosed with severe sepsis and the remaining 20 with Shock. SSC was activated in triage for 9 cases (22.5%), and in ED bays in the remaining 31 (77.5%) cases. In this second

group, median time to activation was 93.5 minutes, with a range of between 19 and 659 minutes. In 71% of cases, the code was activated in less than 18 minutes from patient arrival at ED. Patient characteristics are shown in Table 1. In our series, there was only one postoperative patient (2.5%) who had septic shock due to urinary tract infection by *Proteus mirabilis*.

The most common type of infection was respiratory (50%) followed by urinary (35%), abdominal (12.5%) and skin (2.5%). Of blood cultures performed, 42.5% (17/40) were positive and 5% (2/40) were contaminated. The list of diagnoses is shown in Table 2. The most frequent germ was *Escherichia coli* (5 cases) followed by *Enterococcus* (3 cases), *Streptococcus pneumoniae* (3 cases) and *Pseudomonas aeruginosa* (two cases).

Table 3 shows the degree of compliance with the therapeutic set of measures in the first 6 hours and the degree of fulfillment of the objectives. Blood cultures were performed in all patients, although in 4 cases this was done following the administration of antibiotics. The average time from the activation of the SSC to the administration of first dose of antibiotic was 52.1 ± 61.7 minutes; 95% of patients received the antibiotic within the first three hours, 72.5% within the first hour and 90% within the first two hours. 65% of patients were treated entirely by the emergency

Table 1. Characteristics of the 40 patients for whom the Severe Sepsis Code was activated

Age (years)	58.40 ± 20.0
Sex (%)	
Men	70.7
Women	29.3
Underlying pathology (%)	
Cardiopathy	12.5
Hypertension	30.0
Cancer	10.0
AIDS	12.5
Chronic pneumopathy	25.0
Diabetes	17.5
Postoperative	5.0
Chronic hepatitis	17.5
Chronic renal failure	12.5
Initial Vital Constants	
MAP (mmHg)	59.5 ± 9.1
Heart rate (bpm)	115.1 ± 20.8
Respiratory rate (rpm)	25.39 ± 7.07
Temperature (°C)	37.9 ± 1.3
Arterial oxygen saturation (%)	94 ± 4.5
Laboratory results	
Lactate (mmol/l)	4.23 ± 2.9
Bicarbonate (mmol/l)	22.4 ± 5.6
Leucocytes (x 10 ³ /μl)	14.2 ± 9.5
Creatinine (mg/dl)	1.8 ± 1.3
Hematocrit (%)	37.3 ± 6.7
PaO ₂ /FiO ₂	257 ± 91
APACHE II score	16.3 ± 6.4
SOFA score	8 ± 4
Glasgow Coma Scale score	14 ± 1

Table 2. Diagnoses in the 40 patients for whom the Severe Sepsis Code was activated according to the degree of sepsis

	Degree of sepsis		
	Severe sepsis	Septic shock	Total
Periprostatic abscess	1	0	1
Peritoneal abscess	0	1	1
Acute cholangitis	3	0	3
Pleural empyema	1	0	1
Acute gastroenteritis	1	0	1
Bronchial infection	1	1	2
Pneumococcal Meningitis	0	1	1
Acquired pneumonia	6	8	14
In-hospital Pneumonia	0	1	1
Urinary tract infection	6	7	13
Sepsis by <i>S. viridans</i>	1	0	1
Sepsis in IVDUs	0	1	1
Total	20	20	40

IVDUs: Intravenous drug users.

department. The rest required Intensive Medical attention before the end of the first 6 hours. Hospital stay was 13.03 ± 8.9 days and hospital mortality was 17.5% (7/40).

Discussion

The introduction of a new code of activation for urgent time-dependent conditions is no easy task, considering that this involves changing established habits and attitudes of professionals working in a diverse area such as the ED. As seen in our work, despite training sessions on the new code for medical residents, and assistant nurses, the degree of activation of the code was 64.2%. In the literature reviewed we found no such analysis, so that we cannot compare our rate with

Table 3. Implementation of measures and achievement of objectives in the first 6 hours in the 40 patients for whom the Severe Sepsis Code was activated

Measures	Applied/Indicated	Degree of compliance
Measurement of lactate	39/40	97.5%
Blood cultures before antibiotic	36/40	90%
Antibiotic in the first 3 hours	38/40	95%
Sufficient volume in the first hour	32/40	80%
Use of norepinephrine	16/20	80%
Measurement of CVP	24/33	72.7%
Measurement of CVSatO ₂	10/32	31.2%
Transfusion	3/8	37.5%
Dobutamine	1/2	50%
Objectives	Fulfilled/Indicated	Degree of compliance
MAP \geq 65 mm Hg	31/40	77.5%
Diuresis \geq 0.5 ml/Kg/hour	33/40	82.5%
PVC 8-12 mm Hg	15/33	45.4%
CVSatO ₂ \geq 70%	5/32	15.6%

MAP: mean arterial pressure; PVC: central venous pressure; CVSatO₂: central venous oxygen saturation.

that of other series. However, we believe that this result could and should be improved.

Another difficulty for the introduction of a SSC is to identify a guiding symptom or sign that allows early detection, since it does not seem feasible to include all patients with fever or suspected infection of any kind. In addition, factors that limit early implementation of the code and compliance with the times marked are the delay in attendance due to frequent ED overcrowding and also the delay in obtaining analytic results allowing early identification of patients with severe sepsis or septic shock, such as lactate levels, leukocyte count, acid-base balance, and the results that would allow us to identify the presence of organ dysfunction such as renal and liver function. In our case, we decided that for early detection of these patients, before all these data became available, it was necessary to devise a code based on vital signs and guided by the signs of depressed level of consciousness and the presence of hypotension.

While the early detection of ST segment elevation in coronary syndrome or the presence of neurologic focality in stroke seems feasible, in our case we only detected and activated the code in 22.5% of severe sepsis and septic shock at the time of triage. The remaining 77.5% were patients with an infectious process, who at the time of triage preserved their level of consciousness and were normotensive. Recording vital constants while waiting to be attended or being placed in a bay for the medical visit allowed code activation in 71% of cases in less than 18 minutes as from arrival at the ED.

Thanks to the introduction of the SSC, we managed to implement certain measures in over 80% of the cases, including lactate level measurement, blood sampling for culture before antibiotic therapy, administration of antibiotics in the first three hours, and resuscitation with an adequate volume of fluid and administration of noradrenalin in the absence of response (Table 3). When other studies have evaluated the degree of compliance with these measures EDs without the existence of an established protocol, the results were poor, as revealed by the study by Miguel-Yanes⁹.

Comparison with other studies (Table 4) should be made with caution because the designs are varied; some were performed in intensive care units (Gao, Kortgen and Ferrer)¹⁰⁻¹², while others only included patients with septic shock (Kortgen and Miceck)^{11,13} and did not analyze all the hemodynamic measures and targets. For example, several of them did not consider whether the volume administered during the first 30 minutes was in

line with the SSC recommendations for the first 6 hours, but included the total volume administered.

With regard to the administration of antibiotics in our series, 90% received them in the first two hours and 72.5% in the first hour, as currently recommended. The initial guidelines of the SSC campaign, on which our SSC code was based, recommended antibiotic administration in the first three hours for ED patients and within one hour for ICU patients¹⁴. However, the consensus document of Spanish Societies of Emergency Medicine and Intensive Care Medicine recommends antibiotic administration in the first hour⁸. In the series of Kumar et al., antibiotics were administered within the first 6 hours in only 50% of cases, and every hour of delay resulted in an estimated increase in mortality of 7.6%¹⁵. Other authors have reported similar results: Nguyen: 90.3% in the first 4 hours¹⁶; Shapiro: 98% in the first 6 hours¹⁷; Gao: 74% in the first hour¹⁰.

At present, it is reasonable for an emergency department to have a protocol that will facilitate obtaining analytical data, including the determination of lactate levels and blood cultures, with early hemodynamic resuscitation (with serum and noradrenalin if necessary) and the prompt administration of a broad-spectrum antibiotic. However,

in practice we see that the placement of a central catheter and measurement of PVC and CVSatO₂ are more difficult to achieve in the first 6 hours. Although in our series central venous catheters were placed in 72.7% of the cases specified under the guidelines, CVSatO₂ was only determined in 31.2%. Furthermore, the hemodynamic goals for the CVP and CVSatO₂ were only achieved in 45.4% and 15.6% respectively. Other authors analyze these data without limiting their achievement in the first 6 hours, and thus report achievement in 100% of cases¹⁸.

In the series of Nguyen and Micek^{13,16} the authors achieved the goal of CVP in a similar proportion to ours, but in contrast, achieved better results concerning the CVSatO₂ objective. However, there are authors who exclude CVSatO₂ from their measures, arguing that the early placement of a catheter in the ED is unsafe given the limited human resources, lack of mastery of technique and lack of ultrasound control¹⁰. In our experience, although our percentage of achievement of all measures (62.5%) was higher than that of other series (Table 4), achievement of hemodynamic goals was low (22.5%), offset by the results related to central catheter placement. Nevertheless, we stabilized the MAP in 77.5% of cases and achieved correct diuresis in 82.5%. These two da-

Table 4. Comparison with other series

Series	H Mar	Gao ¹⁰	Trzeciak ¹⁸	Nguyen ¹⁶	Shapiro ¹⁷	Ferrer ¹²	Jones ¹⁹	Micek ¹³	Kortgen ¹¹
Year	2008	2005	2006	2007	2006	2008	2007	2006	2006
No. patients	40	90 ICU	22	330	116	1465	77	60	30
Setting	ED	11 ED	ED	ED	ED	ICU	ED	ED	ICU
Measures									
Measurement of lactate	97.5%	52%	ND	48.5%	ND	50.1%	ND	78.3%	ND
Blood cultures prior to ATB	90%	74%	ND	ND	ND	62.4%	ND	85%	ND
ATB < 3 h	95%	74% (<1 h)	ND	90.3% (<4 h)	98% (<6 h)	68.9%	ND	86.7%	100% (<6 h)
Sufficient volume	80%	84%	ND	ND	ND	46.7%†	ND	88.3%	ND
Noradrenalin	80%	70%‡	59.1%	45%	58%	46.7%†	69%	71.7%	100%
CVP	72.7%	NI	100%§	63%§§	100%	ND	ND	48.3%	ND
CVSatO ₂	31.2%	NI	100%	63%§§	ND	ND	ND	48.3%	ND
RBC transfusion	37.5%	70%‡	13.6%	13%	7%	ND	5%	20%	16.6%
Dobutamine	50%	NI	9.1%	25.75%	6%	ND	3%	ND	20%
All	62.5%	52%	ND	23.3%	ND	10%	ND	ND	ND
Objectives									
MAP ≥ 65 mm Hg	77.5%	ND	100%	71.8%	ND	ND	ND	ND	ND
Diuresis ≥ 0.5 ml/Kg/h	82.5%	ND	91%	ND	ND	ND	ND	ND	ND
CVP: 8-12 mmHg	45.4%	ND	100%	50.9%	ND	26.7%	ND	48.3%	ND
SatO ₂ > 93%	100%	ND	100%	ND	ND	ND	ND	ND	ND
Hematocrit > 30%	90%	ND	91%	ND	ND	ND	ND	ND	ND
VCSatO ₂ ≥ 70%	15.6%	ND	91%	40.9%	ND	11.4%	ND	45%	17.3%
All	22.5%	ND	91%	23.3%	ND	10%	ND	ND	ND
Apache score	16.3	19	23	29.6	22.6	21.3	ND	23.3	35
Mortality	17.7%	35.6%	18.2%	35.2%	18.1%	39.7%	18%	35%	27%
		23-49%**		20.8*-39.5%**					

ATB: antibiotics; NI: not included in the study, ND: no data; ICU: Intensive care unit; ED: emergency department; CVP: central venous pressure; CVSatO₂: central venous oxygen saturation, MAP: mean arterial pressure; SO₂: arterial oxygen saturation; †: volume and vasopressors jointly ‡: norepinephrine and transfusion jointly §: value if its measurement has been performed in ED or ICU; §§: CVP and CVSatO₂ together; *: mortality when all measures were achieved; **: mortality without achieving all measures.

ta variables seem to be the most relevant for describing the usefulness of our SSC. In fact, as recommended by the CSS, the centers have to adapt the recommendations for action to their particular circumstances^{6,8}.

The severity of our patients was lower than that reflected in other studies (Table 4). A possible explanation is that in our protocol, the activation of SSC was based on hemodynamic parameters and aimed for high sensitivity as from the early triage stage and this could constitute a selection bias of patients. Our patient mortality of 17.7% is comparable to that of other ED studies¹⁹, but lower compared to other series in intensive care units with predominantly septic shock patients (Table 4).

We should consider as a limitation of our work the fact that this was an observational study, so we cannot assess whether it actually meant a 25% decrease in mortality, as proposed by the CSS. Although at present a randomized study would be unethical, given the evidence in the literature⁴, it would be necessary to compare the data with a historic series from our centre. Another limitation is that our study did not take into account the analytical data, nor the presence of organ dysfunction at the time the code was activated, but as already mentioned, it was designed to seek early detection applicable as from the triage stage.

In conclusion, the application of a SSC in our emergency department has allowed us to homogenize and probably improve the management of severe sepsis and septic shock, raise health professional awareness on the importance of early detection and treatment, and to identify areas for improvement, such as code activation. The vast majority of patients that presented at our emergency department with severe sepsis of septic shock did not initially meet the criteria for activation at the time of triage; hence the importance of maintaining strict control of vital signs and the integration of analytical data as they become available, to carry out the earliest possible activation of the SSC. Achieving all the goals and measures, both in our work as in other series, is not always easy, so it seems more effective to try to adapt the SSC to the characteristics of each centre.

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Implementación de un "Código Sepsis Grave" en un servicio de urgencias

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Objetivo: Analizar el grado de cumplimiento y de consecución de los objetivos hemodinámicos de un Código de Sepsis Grave (CSG).

Método: Estudio prospectivo-observacional (octubre 2006-marzo 2007) de los pacientes que cumplían los tres criterios siguientes: 1. Sospecha de infección; 2. $T^a < 36^{\circ}\text{C}$ o $> 38^{\circ}\text{C}$ o $\text{FC} > 90 \text{ x'}$ o $\text{FR} > 20 \text{ x'}$ o alteración del nivel de conciencia. 3. Presión arterial sistólica (PAS) $< 90 \text{ mmHg}$ o presión arterial media (PAM) $< 70 \text{ mmHg}$ o disminución de la presión arterial $> 40 \text{ mmHg}$ en hipertensos. Se recogieron variables clínicas, y el grado de aplicación medido en las primeras 6 horas, de consecución de objetivos hemodinámicos y mortalidad intrahospitalaria.

Resultados: La edad media fue de $58,4 \pm 20$ años y el 70,7% eran hombres. El foco infeccioso más frecuente fue el respiratorio (50%). El grado de activación fue del 64,5%. La mortalidad intrahospitalaria fue del 17,5%. El grado de consecución de objetivos hemodinámicos fue: PAM $\geq 65 \text{ mmHg}$ en el 77,5%, diuresis $\geq 0,5 \text{ mL/Kg/h}$ en el 82,5%, presión venosa central (PVC) 8-12 mmHg en el 45,4% y saturación venosa central de oxígeno (SvcO_2) $\geq 70\%$ en 15,6%. El grado de aplicación de medidas fue: hemocultivos previos a antibiótico: 90%, administración de antibiótico antes de 3 horas: 95,7%, medición de lactato: 97,5%, resucitación con volumen suficiente: 80%, administración de noradrenalina: 80%, medición de PVC: 72,7% y medición de SvcO_2 : 31,2%.

Conclusiones: La implantación de un CSG ha permitido homogeneizar el manejo de la sepsis grave/shock séptico, sensibilizar al personal sanitario para su detección y tratamiento precoz y detectar aspectos susceptibles de mejora. [Emergencias 2009;21:255-261]

Palabras clave: Terapia precoz. Código. Sepsis. Urgencias. Paquete de medidas.