

A literature review of the epidemiology of sepsis in Latin America

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ABSTRACT

Objectives. *Epidemiological studies from the United States of America and from Europe have shown that sepsis is a widely prevalent syndrome, with either steady or slightly decreasing rates of morbidity and of mortality in recent decades. The objective of this paper is to provide a systematic review regarding the description and characterization of sepsis in Latin America.*

Methods. *To locate materials on sepsis in Latin America, a comprehensive search strategy was employed with three medical bibliographic databases, using combinations of the terms "sepsis," "septicemia," "bacteremia," "sepsis syndrome," "epidemiology," "incidence," and "prevalence." The materials selected were in English, Spanish, or Portuguese.*

Results. *The titles of more than 1 000 potentially relevant articles were screened, and more than 600 selected abstracts were reviewed in detail. Twenty papers published from 1990 through 2004 were selected and analyzed. The studies described in the 20 articles were extremely heterogeneous in design, population, sample size, end points, and follow-up. The studies did not all apply the same clinical definition for sepsis, thus making it impossible to produce a precise overall estimate of the magnitude of the problem of sepsis in Latin America.*

Conclusions. *The results of the literature review suggest that the clinical and epidemiological approaches to the problem of sepsis in Latin America have sometimes been inappropriate with respect to research design, study population, and clinical outcome. Further, some data suggest that in terms of both frequency and mortality the situation with sepsis and severe systemic infections may be worse in Latin America than it is in developed countries.*

Key words

Sepsis, hospital mortality, intensive care units, Latin America.

At the congress of the European Society of Intensive Care Medicine held in Barcelona, Spain, in October 2002,

the Surviving Sepsis Campaign issued the "Barcelona Declaration," a call for global action against sepsis. The Campaign, a collaborative effort of the European Society of Intensive Care Medicine, the Society of Critical Care Medicine, and the International Sepsis Forum, estimates that the number of sepsis cases in the world has reached 18 million annually. With a mortality rate of almost 30%, sepsis is considered a leading cause of death world-

wide (1). As such, any effort made toward improving prevention, diagnosis, and treatment represents a potentially valuable response to an urgent need.

This paper provides an overview of the global challenges with sepsis, gives a clinical definition of sepsis, and describes the magnitude of the problem in North America and Europe. In addition, a systematic review of the scientific literature describes and charac-

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terizes the situation with sepsis in Latin America.

Definition of sepsis

Over the last three decades the syndrome now commonly referred to as sepsis has alternately been called septicemia (2), sepsis syndrome (3), and simply sepsis. One definition of sepsis was described jointly with the closely related concept of systemic inflammatory response syndrome (SIRS) (4). SIRS is considered present when patients show more than one of the following four clinical characteristics: (1) body temperature $> 38^{\circ}\text{C}$ or $< 36^{\circ}\text{C}$; (2) heart rate > 90 beats/min; (3) hyperventilation, evidenced by a respiratory rate > 20 breaths/min or $\text{PaCO}_2 < 32$ mmHg; and (4) white blood cell count $> 12\,000$ cells/ μL or $< 4\,000$ cells/ μL or with $> 10\%$ immature forms.

A statement from a 1991 consensus conference of the American College of Chest Physicians and the Society of Critical Care Medicine hypothesized that sepsis is a systemic response to infection (4). Infection, in turn, was defined as a process whereby pathogenic or potentially pathogenic microorganisms invade normally sterile tissues, fluids, or body cavities. According to this definition, a diagnosis of sepsis requires the presence of both infection (usually caused by bacteria) and SIRS. Following the same model, sepsis with signs of organ dysfunction would be characterized as severe sepsis, and sepsis with acute circulatory failure would be defined as septic shock (4).

However, as various reports (5–7) have indicated, despite the fact that the SIRS definition states that a systemic inflammatory response can be triggered by a variety of conditions, this combination of criteria is neither specific nor sufficiently sensitive to be useful in clinical practice. It now seems clear that even though no epidemiological evidence exists to support a change in the syndrome's definition, the list of signs and symptoms of sepsis should be expanded to reflect clinical bedside experience. According to the last International Sepsis Defini-

TABLE 1. Potential sepsis-related markers

General variables	
	Temperature $> 38.3^{\circ}\text{C}$ or $< 36.0^{\circ}\text{C}$
	Heart rate > 90 beats/min
	Tachypnea (respiratory rate > 20 breaths/min in adults)
	Altered mental status
Inflammatory response variables	
	White blood cell count $> 12\,000$ cells/ μL , $< 4\,000$ cells/ μL , or with $> 10\%$ immature forms
	Plasma C-reactive protein > 2 standard deviations above the normal value
	Plasma procalcitonin > 2 standard deviations above the normal value
Hemodynamic variables	
	Systolic blood pressure < 90 mmHg or mean arterial blood pressure < 70 mmHg
	Mixed venous oxygen saturation $> 70\%$
	Cardiac index > 3.5 L/min/ m^2
Organ dysfunction variables	
	$\text{PaO}_2/\text{FiO}_2 < 300$
	Urine output < 0.5 mL/kg/hr or creatinine increase > 0.5 mg/dL
	International normalized ratio > 1.5 or activated partial thromboplastin time > 60 sec
	Platelet count $< 100\,000$ cells/ μL
	Plasma total bilirubin > 4 mg/dL
Tissue perfusion variables	
	Hyperlactatemia > 1 mmol/L
	Decreased capillary refill or mottling

Source: Levy et al. (8), with modifications.

tions Conference, which was held in 2001, a diagnosis of sepsis should be considered in the presence of a documented or suspected infection concurrent with markers of general illness, inflammation, hemodynamic disturbance, organ dysfunction, or tissue perfusion abnormalities (Table 1) (8).

Notwithstanding the lack of conclusive criteria for sepsis, the definitions of severe sepsis (sepsis complicated by organ dysfunction) and septic shock (systolic blood pressure below 90 mmHg, or a reduction of > 40 mmHg from baseline despite adequate volume resuscitation) remain undisputed. In fact, most studies concerning the epidemiology of sepsis, as well as virtually all recent clinical trials for new therapies, have focused on these two study populations. Unfortunately, this simple classification and range of definitions have strong limitations for precise characterization of sepsis, and mainly for the early staging of patients. Therefore, on the basis of ideas that arose in October 2000 at the Fifth Toronto Sepsis Roundtable (9), the 2001 International Sepsis Definitions Conference proposed a classification scheme called "PIRO" (8). The PIRO

staging system proposes to stratify patients based on their predisposition (P), the type and extent of the infection (I), the nature and magnitude of the host response (R), and the degree of associated organ dysfunction (O). However, comprehensive evaluation and further improvements on the PIRO approach are needed.

The magnitude of the sepsis problem in the United States

The first relevant general public disclosure of the magnitude of the sepsis problem in United States came from the Centers for Disease Control and Prevention (CDC) in 1990, in a comparison of hospital discharge rates for septicemia from 1979 through 1987 (10). The data were obtained from the National Hospital Discharge Survey of the CDC's National Center for Health Statistics. The report used the discharge diagnosis of septicemia ("systemic disease associated with the presence and persistence of pathogenic microorganisms or their toxins in the blood") of the International Classification of Diseases, Ninth Revision, Clin-

ical Modification (ICD-9-CM). The analysis covered all records of persons one year old or older in which a discharge diagnosis of septicemia was recorded from 1979 through 1987. During this period, septicemia rates increased 139%, from 73.6 per 100 000 persons (164 000 discharges) to 175.9 per 100 000 persons (425 000 discharges). Although the septicemia rate increased for all age groups, the increase was greatest (162%) for persons aged 65 years or older, from 326.3 per 100 000 in 1979 to 854.7 per 100 000 by 1987. The fatality rate for patients with a discharge diagnosis of septicemia declined during the study period for all age groups, from 31.0% to 25.3%. However, even by 1987, patients were at significantly greater risk of death if septicemia was one of the discharge diagnoses (relative risk = 8.6; 95% confidence interval = 8.14–9.09) (10).

The most comprehensive study on the clinical significance of the early stages of septic syndrome appeared in 1995 (11). The study assessed the incidence of SIRS, sepsis, severe sepsis, and septic shock among 3 708 patients admitted during a nine-month period to three intensive care units (ICUs) and three wards of a 900-bed teaching hospital in the state of Iowa, in the United States. The study found that 68% of the patients met at least two criteria for SIRS at some point during their hospital stay. Of those patients with SIRS, 26% developed microbiologically confirmed sepsis, 18% developed severe sepsis, and 4% developed septic shock. Positive blood cultures were found in 16.5%, 25.4%, and 69.0% of the samples drawn from patients with sepsis, severe sepsis, and septic shock, respectively. A noteworthy finding was that fewer than 50% of the episodes overall were microbiologically documented. This proportion ranged from 42% for patients who only met the criteria for SIRS to 57% for patients with septic shock. Since clinical suspicion of infection was enough to initiate antibiotic treatment, the precise cause of the systemic inflammatory response in these culture-negative populations is unknown. However, they had morbidity and

mortality rates that were similar to those of the corresponding culture-positive populations (11).

Clearly, these definitions are self-contained, since severe sepsis includes sepsis, and, in turn, sepsis includes SIRS. Therefore, only in a tautological sense might we consider that there is a true continuum through different stages of an inflammatory response, from SIRS to septic shock. Indeed, in the same Iowa study (11), among 649 patients with sepsis, only 285 of them (44%) had earlier met at least two criteria for SIRS. Among those who met the criteria for severe sepsis (culture-proven; $n = 467$), 58% of them ($n = 271$) had been previously classified as being afflicted with sepsis or SIRS. On the other hand, among those with two SIRS criteria, 32% developed sepsis by day 14, and for those with three SIRS criteria, 36% developed sepsis by day 14. Forty-five percent ($n = 439$) of the 975 subjects with four criteria developed sepsis between days 14 and 21. Thus, even without a categorical progression, a close relationship clearly exists between clinical stages reflecting some degree of systemic inflammation and the presence of infection. Whether infection is confirmed or is clinically suspected, the outcomes seem similar in terms of mortality and most organ dysfunctions, within each corresponding stage.

In 1997, Sands et al. (12) evaluated the incidence of sepsis syndrome in both the ICU and ward populations at eight academic tertiary-care medical centers in the United States (12). Each center monitored a weighted random sample of ICU patients and of non-ICU patients who had blood cultures drawn during a 15-month period. Sepsis syndrome was defined as the presence of either a positive blood culture or the combination of fever, tachypnea, tachycardia, clinically suspected infection, and any one of seven confirmatory criteria, all of them related to organ dysfunction. In total, 12 759 patients were monitored, and 1 342 episodes of sepsis syndrome were documented. The extrapolated, weighted estimate of hospitalwide incidence (mean \pm 95% confidence limit) of sepsis syndrome was

2.0 ± 0.16 cases per 100 admissions. Among the centers the unadjusted attack rate for sepsis syndrome ranged from 1.1 to 3.3 cases per 100 admissions. Patients in ICUs accounted for 59% of total extrapolated cases, non-ICU patients with positive blood cultures for 11%, and non-ICU patients with negative blood cultures for 30%. Septic shock was present at the onset of the sepsis syndrome in 25% of patients. Bloodstream infection was documented in 28% of patients, and the total 28-day mortality was 34%.

The most compelling evidence of systemic infection is bacteremia. For this reason, some evaluations of the incidence of sepsis have focused on bacteremia. Furthermore, requesting blood cultures, as in the study of Sands et al. (12) mentioned above, is considered a proxy for clinical sepsis. Although clinically appealing, this last "surrogate marker" is not reproducible enough, and it should be viewed with caution. There are patients with potential infection who may not have a blood culture performed, and other patients without infection who have cultures requested inappropriately. Furthermore, since patients with comorbidities often are suspected of being at increased risk for infection, clinicians may have a lower threshold for requesting blood cultures in these patients. Therefore, any analysis about these cases should take into account the real denominator of population at risk. Nevertheless, positive blood cultures clearly identify infected individuals at higher risk of mortality, and appropriate inferences may be derived from this population.

Despite using somewhat different definitions, two recent reports have added important information regarding the epidemiology of sepsis in the United States in the last 20 years (13, 14). Based on hospital discharge records for 1995 for seven large states in the United States, Angus et al. (13) estimated that for the United States as a whole there were 3.0 cases of severe sepsis per 1 000 population, and 2.26 cases per 100 hospital discharges. Of the some 751 000 severe sepsis cases in the study, almost 70% of them

(513 000) received intensive care. The estimated mortality rate was 28.6%, or a total of 215 000 deaths nationally, and the average cost per case was US\$ 22 100, with a total annual cost of US\$ 16.7 billion. Using a more restrictive definition that included only a few codes from the ICD-9-CM and working with data from the National Hospital Discharge Survey, Martin et al. (14) found an increase in the incidence of sepsis, from 82.7 cases per 100 000 population in 1979 to 240.4 per 100 000 population in 2000. This represents an annualized increase of 8.7% in the incidence. The authors also described a decline in the overall in-hospital mortality rate, from 27.8% during the 1979–1984 period to 17.9% during the 1995–2000 period, even though the total number of deaths continued to increase.

The results from Angus et al. (13), Martin et al. (14), and the CDC (10) may be limited by the quality of the state and National Hospital Discharge Survey databases, and by the inability to audit their data. Moreover, the accuracy of the ICD-9-CM coding for the identification of specific medical conditions, and sepsis in particular, remains controversial (15). Administrative data sets have become essential

resources for epidemiological investigations in which the prospective identification of patients is difficult or not feasible. However, strict reliance on such data sets for sepsis surveillance or research planning may produce substantial error.

The magnitude of the sepsis problem in Europe

In Europe the first hospitalwide epidemiologic study on bacteremia and sepsis was a French multicenter one, conducted in 1993 in 24 public or public-affiliated hospitals (16, 17). The authors performed a two-month prospective survey of 85 750 admissions to adult wards and ICUs, and they found an overall incidence rate of bacteremia of 9.8 per 1 000 admissions (16). The bacteremia incidence rate in the ICUs (69/1 000) was more than eight times as high as the rate in the wards (8.2/1 000) (17). Of the 842 bacteremic episodes detected, 63% occurred in medical wards, 19% in ICUs, and 18% in surgical wards (16). Extrapolating these results to all of France would give a figure of approximately 67 500 bacteremic episodes per

year (17, 18). Of note, nearly half of the bacteremic episodes were of nosocomial origin (16). Although ICU patients were at much higher risk of severe sepsis than were ward patients, bacteremic severe sepsis was proportionally less often encountered in ICU patients than in non-ICU patients (16, 17). This suggests that there is an important subset of patients who have overwhelming infections, besides the patients in ICUs, which traditionally have been considered the natural setting for sepsis (19).

Despite the broad distribution of sepsis and severe bacterial infections among hospitalized patients, all the recent studies outside the United States have only considered patients admitted to ICUs (20–24). Whether on prospective cohorts (20, 23, 24) or with administrative databases (21, 22), all of the studies but one (20) have focused on severe sepsis or septic shock (Table 2).

The wide range of incidence and mortality rates found in the studies mentioned above reflects different definitions of outcome measures as well as differences in data collection procedures or methodological approaches. Three of these studies provide some understanding of time trends (21–23).

TABLE 2. Studies on the epidemiology of sepsis in various countries around the world

Author, year (reference)	Countries	Design	Number of intensive care unit (ICU) admissions screened	Outcome	Relative frequency (%)	Mortality (%)
Alberti, 2002 (20)	Six European countries, Canada, and Israel	Prospective cohort study	14 364	Infectious episodes	21.1	22.1 vs. 43.6 (community- vs. hospital-acquired infection)
Padkin, 2003 (21)	England, Wales, and Northern Ireland	Administrative database	56 673	Severe sepsis	27.1	35 vs. 47 (ICU vs. hospital mortality)
Annane, 2003 (22)	France	Administrative database	100 554	Septic shock	8.2	60.1
EPISEPSIS, 2004 (23)	France	Prospective cohort study	3 738	Severe sepsis or septic shock	14.6	35 vs. 41.9 (30-day vs. 2-month mortality)
Finfer, 2004 (24)	Australia and New Zealand	Prospective cohort study	5 878	Severe sepsis	11.8	26.5 vs. 32.4 (ICU vs. 28-day mortality)

Padkin et al. (21) assessed data for 1995 through 2000 from 91 adult general ICUs in England, Wales, and Northern Ireland. The relative frequency of severe sepsis for all ICU admissions increased from 25.9% in 1996 to 29.7% in 1999. In the same period there was a slight decrease in the hospital mortality rate, from 50.2% to 47.0%. The database of the CUB-Réa Network has information from 35 ICUs in Paris and its suburbs (22). An analysis of the data for 1993 through 2000 showed that the overall frequency of septic shock increased from 7.0 to 9.7 per 100 admissions, while the crude mortality rate declined from 62.1% to 55.9% over that same period. Similarly, the EPISEPSIS Study Group (23) compared findings for 2001 with studies performed in 1993 in France by some of the same researchers (16, 17). They found that there was an increase in the attack rate of severe sepsis in ICU patients between 1993 and 2001, from 8.4% to 14.6% for clinically severe sepsis, and from 6.3% to 9.0% for microbiologically documented severe sepsis. The 42% hospital mortality rate found for 2001 (23) was substantially lower than the 59% rate in 1993 (16, 17).

From the information presented above, it is clear that sepsis is a common and frequently fatal condition in developed countries. Dealing with it involves spending considerable funds and other resources. While the overall mortality rate among patients with sepsis is declining, the incidence and the number of sepsis-related deaths have increased substantially over the past two decades.

Developing countries are different from developed nations in many ways. For example, Latin American countries differ substantially from the United States and from European nations in terms of ethnic background, cultural heritage, health services, and clinical research. These differences highlight the importance of exploring sepsis in Latin America from an epidemiological and clinical point of view. The objective of the rest of this paper is to provide a systematic review of the situation surrounding sepsis in Latin America.

MATERIAL AND METHODS

To begin the review of the sepsis situation in Latin America, the first step was to search bibliographic databases for possibly relevant articles. Three databases were used: PubMed (National Library of Medicine of the United States), EMBASE (Excerpta Medica (<http://www.embase.com>)), and LILACS (*Literatura Latino-Americana e do Caribe em Ciências da Saúde*, of the Latin American and Caribbean Center on Health Sciences Information, in São Paulo, Brazil (<http://www.bireme.br>)). Different combinations with the search terms "sepsis," "septicemia," "bacteremia," "sepsis syndrome," "epidemiology," "incidence," and "prevalence" were employed. For PubMed and EMBASE, the search strategy additionally included the terms "Latin America," "South America," and "Central America," or restriction to items in Spanish or Portuguese. The database searching produced more than 1 000 potentially related articles, most of them from LILACS. The next stage of the screening involved a detailed review of more than 600 selected abstracts. Articles were retained based on their appropriateness and relevance, with no restrictions on design, sample size, year(s) in which the study was done, year of publication, or journal that published the study.

RESULTS AND DISCUSSION

The process of searching the databases, locating relevant titles, and screening the abstracts yielded 20 articles, which had been published between 1990 and 2004 (5, 25–43). There was a noticeably large number of high-quality papers regarding neonatal sepsis and severe infections in pediatric populations in Latin America. For adult patients, however, the number and scope of the investigations was more limited. Additionally, for one article only the abstract could be obtained (25), and 7 out of the remaining 19 articles (26, 28, 29, 34, 38, 40, 41) analyzed sepsis as a secondary outcome from a wide definition of nosocomial infections (Table 3).

The studies described in the 20 selected articles were extremely heterogeneous in design, population, sample size, end points, and follow-up. Furthermore, the fundamental challenge of lack of consensus on the clinical definition of sepsis seems to be more critical in Latin American literature. Therefore, it is impossible to infer any overall estimate of the magnitude of the problem in Latin America. Moreover, some data suggest that in terms of frequency and mortality, the situation with sepsis and severe systemic infections in Latin America may be even worse than in developed countries.

In an article published in 1990, Zanon et al. (25) used ICD-9-CM codes for septicemia at 10 hospitals in Brazil and estimated a mortality rate of 46% for community-acquired sepsis and of 58% for nosocomially acquired sepsis. In spite of potential underreporting, the incidence of bacteremia in these hospitals was roughly similar to estimates for France (16). Studies performed in ICUs (27, 30, 33, 34, 39) between 1993 and 2001 found mortality rates ranging from 33.6% in a cross-sectional study by Ponce de León-Rosales et al. in Mexico (34) to 56% in a retrospective case-series by Bilevicius et al. in Brazil (39). These figures are roughly similar to those reported for ICUs elsewhere around the world. However, all the Latin American studies but one (33) recruited a general population of sepsis patients, without restrictions as to organ dysfunction (i.e., severe sepsis) or septic shock. These patients with severe sepsis and/or septic shock have been the usual study populations for sepsis in developed nations (13, 22–24). Therefore, a much higher mortality rate for the subset of those with severe sepsis is expected in Latin American countries. Two prospective cohort studies from Colombia (5, 35), in infected patients admitted to the emergency room with SIRS criteria, found a mortality rate ranging from 24% (35) to 31% (5), which increased to 40% for patients in the ICU or with a positive blood culture (36). Assuming these cohorts correspond to a "less ill" population, the mortality rates are similar to the global estimates for sepsis.

TABLE 3. Research on sepsis in Latin America

Author, year (reference)	Country	Design	Study population(n)	Main clinical outcome	Frequency of sepsis or of bacteremia (denominator)	Mortality (%)
Zanon, 1990 (25) ^a	Brazil	Administrative registers	Discharges at 10 hospitals (n = 23 079)	Septicemia	3/1 000 vs. 7/1 000 ^b (discharges)	45.8 vs. 58.2 (community- vs. nosocomially acquired)
Del Río, 1993 (26)	Cuba	Surveillance	Surgical patients in community hospital (n = 324)	Nosocomial infection	184/324 ^c (nosocomial infections)	Not reported
Pazmiño, 1993 (27)	Ecuador	Prospective case-series	Sepsis patients in intensive care unit (ICU) (n = 435)	Characterization of sepsis patients	Not reported ^c	50.6
Ponce de León, 1994 (28)	Mexico	Case-control	Patients with nosocomial bacteremia (n = 245)	Risk factors for primary nosocomial bacteremia	25/1 000 (hospital discharges)	40
Bembibre, 1997 (29)	Cuba	Surveillance	Patients with nosocomial infection (n = 299)	Nosocomial infection	91/299 ^c (nosocomial infections)	Not reported
Arcienega, 1998 (30)	Bolivia	Retrospective case-series	Sepsis patients in ICU (n = 222)	Characterization of sepsis patients	Not reported	30
Jaimes, 1998 (31, 32) ^d	Colombia	Retrospective case-series	Patients with bacteremia (n = 432)	Characterization of bacteremic patients	1.7/100 vs. 7/100 ^e (hospital discharges)	38
Hernández, 1999 (33)	Chile	Cross-sectional	SIRS ^f plus organ dysfunction in five ICUs (n = 102)	Clinical course of severe SIRS vs. severe sepsis	79/518 (ICU admissions)	43 vs. 51 (ICU vs. hospital mortality)
Ponce de León, 2000 (34)	Mexico	Cross-sectional	Admissions to 254 ICUs (n = 895)	1-day prevalence of infections	294/895 (ICU admissions)	33.6
Zapata, 2001 (35, 36) ^d	Colombia	Prospective cohort study	Patients with nontraumatic SIRS at 2 hospitals (n = 533)	Sepsis	Not reported	23.5
Sifuentes, 2001 (37)	Mexico	Cross-sectional	Patients with bacteremia (n = 600)	Characterization of bacteremic patients	3 428/19 530 ^g (blood cultures)	28
Morales, 2001 (38)	Cuba	Cross-sectional	Hospitalized patients ^h	Nosocomial infections	4/100 ^{c,h} (discharges)	Not reported
Bilevicius, 2001 (39)	Brazil	Retrospective case-series	Admissions to ICU (n = 249)	Sepsis	54/249 (ICU admissions)	56
Luján, 2002 (40)	Cuba	Surveillance	Patients with nosocomial infections at 3 hospitals ^h	Nosocomial infections	5.3/100 ^{c,h} (discharges)	Not reported
Cordero, 2002 (41)	Cuba	Retrospective case-series	Patients with nosocomial infection (n = 1 241)	Nosocomial infections	219/1 241 ^c (nosocomial infections)	Not reported
Notario, 2003 (42)	Argentina	Retrospective case-series	Patients with bacteremia (n = 596)	Characterization of bacteremic patients	596/6 605 ^g (blood cultures)	Not reported
Jaimes, 2003 (5)	Colombia	Prospective cohort study	Patients admitted at two emergency rooms (n = 734)	Sepsis	657/734 (infection as cause for admission)	30.7
Jaimes, 2004 (43)	Colombia	Cross-sectional	Patients with request for blood cultures (n = 500)	Nosocomial bacteremia	89/500 ^g (blood cultures)	22.6 vs. 36 (negative vs. positive blood cultures)

^a Only abstract available.^b Community-acquired vs. nosocomially acquired.^c The definition of sepsis was not clearly established.^d Two different research questions with the same study population.^e Positive blood cultures vs. requested blood cultures.^f SIRS = systemic inflammatory response syndrome.^g Positive blood cultures among total requested.^h Only rates reported.

For a tertiary center in Mexico in 1989, Ponce de León et al. (28) found a rate of nosocomial bacteremia without an identified source (designated "primary bacteremia") of 25/1 000 discharges, with a mortality rate of 40%. This subset of primary bacteremia may represent less than 20% of the total affected population with bacteremia and/or sepsis (44, 45); hence, the real estimate for bacteremia or sepsis should be more than 100 cases per 1 000 discharges for this hospital. Jaimes et al. (31, 32) estimated that severe infections and/or bacteremia were the main causes for emergency admission in 7 out of 100 patients at a university hospital in Colombia. Similarly, in the same hospital, blood cultures were requested in 2 out of 10 in-patients at some time during their hospitalization (32, 43).

Working with data from a referral center in Mexico, Sifuentes-Osornio et al. (37) developed the only study that gives some information on time trends. Those authors found an overall frequency of bacteremia of 18% among patients from whom a blood culture was requested. The crude mortality rate was 70% for nosocomially acquired bacteremia, and 30% for community-acquired bacteremia. The authors analyzed randomly selected samples of positive blood cultures for three different periods: from 1981 to 1984, from 1985 to 1988, and from 1989 to 1992. Surprisingly, the overall mortality rate showed a modest decrease for the three study periods, with it being 29.5%, 27.5%, and 27.0%, respectively. The authors pointed out that

the mortality rate also remained almost the same whether the bacteremia was community-acquired or nosocomially acquired. Their findings contrast with the description of decreasing trends of mortality in the United States and Europe over the last two decades (14, 21–23).

An additional concern with the published literature on sepsis in Latin America is that only the study by Hernández et al. (33) had an average patient age higher than 50 years; that study had a population with a mean age of 61 years and a range of 18 to 87 years. All of the other study populations, whether in ICUs, general wards, or emergency rooms, had mean ages of 50 years or below. This contrasts sharply with the studies done in Europe and the United States, in which the mean age was 60 years or above (13, 14, 20, 22, 24). Whatever the demographic or epidemiological explanation, it seems that Latin America doctors and health care systems are facing sepsis in a younger and probably "healthier" population, but with morbidity and mortality rates at least as high as those from developed countries.

Finally, in a cross-sectional study of 254 multidisciplinary ICUs throughout Mexico in 1995, Ponce de León-Rosales et al. (34) found a one-day point prevalence of 16% for sepsis and of 17% for severe sepsis or septic shock. For sepsis and other diseases with short duration and early mortality, prevalence studies may underestimate their frequency, and the studies do not provide a true estimate of risk.

Even so, these one-day point prevalence figures in Mexico are higher than those in corresponding prospective cohort studies performed in ICUs in Europe and Australia (23, 24, 46).

In summary, sepsis is a problem around the world, and the problem is growing. It produces a high burden of mortality and morbidity, and it consumes large amounts of resources. The results of this study suggest that in Latin America the clinical and epidemiological approaches to the problem have sometimes been inappropriate in terms of research design, study population, and clinical outcome. It is unlikely that in Latin America there is a lower incidence of sepsis or a better prognosis for the condition than there is in the developed countries of the world. Instead, it seems that the first two points of the action plan stated by the "Barcelona Declaration" (1) are especially needed in the countries of Latin America: (1) "Increase awareness of health care professionals, governments, health and funding agencies, and the public of the high frequency and mortality associated with sepsis" and (2) "Improve the early and accurate diagnosis of sepsis by developing a clear and clinically relevant definition of sepsis and disseminating it to our peers."

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Revisión bibliográfica de la distribución epidemiológica de la septicemia en América Latina

RESUMEN

Objetivos. Algunos estudios epidemiológicos realizados en Estados Unidos de América y en Europa han demostrado que la septicemia es un síndrome de muy amplia distribución cuya frecuencia ha permanecido estable o ha descendido ligeramente en los últimos decenios. El presente trabajo tiene por objetivo presentar los resultados de una revisión bibliográfica sistemática a fin de describir y caracterizar el problema de la septicemia en América Latina.

Métodos. Para localizar materiales sobre el tema de la septicemia en América Latina, se efectuó una búsqueda global en tres bases de datos médicas usando los términos "sepsis", "septicemia", "bacteremia", "sepsis syndrome", "epidemiology", "incidence" y "prevalence". Se abarcaron materiales en inglés, español y portugués.

Resultados. Se examinaron los títulos de más de 1 000 artículos de posible interés, y se revisaron detenidamente los resúmenes de más de 600 de ellos. En total se escogieron y analizaron 20 trabajos publicados entre 1990 y 2004 con gran heterogeneidad en cuanto a diseño, población, tamaño muestral, criterios de valoración y seguimiento. No en todos se aplicó la misma definición clínica de septicemia, lo cual impidió calcular con precisión la magnitud general del problema de la septicemia en América Latina.

Conclusiones. Según los resultados de la revisión bibliográfica, algunos estudios de carácter clínico u epidemiológico efectuados en América Latina en torno a la septicemia han sido deficientes en cuanto a diseño, población estudiada y resultado clínico evaluado. Además, hay datos que apuntan a que la septicemia y las infecciones generalizadas graves podrían ser más frecuentes y acarrear mayor mortalidad en países de América Latina que en países desarrollados.

Palabras clave Sepsis, mortalidad hospitalaria, unidades de terapia intensiva, América Latina.

ERRATUM

Ferrero F et al. Prevalencia del consumo de tabaco en médicos residentes de pediatría en Argentina. (Rev Panam Salud Publica/Pan Am J Public Health 2004;15(6):395-99).

La redacción llama la atención de los lectores a un error en la versión publicada del artículo señalado.

P. 395, tercera línea de la tercera nota al pie de página: Versión equivocada: "Verónica Rodríguez". Versión correcta: "Viviana Rodríguez".