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**Abstract:**

The Society of Critical Care Medicine and the American College of Critical Care Medicine created the first set of sepsis guidelines in 1999. The guidelines were developed in response to a call upon medical professional organizations, by the Institute of Medicine, to develop clinical practice guidelines to facilitate best practices and potentially improve patient outcomes. These guidelines only dealt with adult patients, leaving out the pediatric population. In 2002, the American College of Critical Care Medicine published the first set of pediatric guidelines. The main algorithm from the pediatric guidelines has been incorporated into the Pediatric Advanced Life Support sepsis guidelines. Both the adult and pediatric guidelines have undergone revisions. The most recent pediatric guidelines were published in 2009.

**Keywords:**

sepsis; guidelines; society of critical care medicine; american college of critical care medicine

Department of Pediatrics, Feinberg School of Medicine, Northwestern University, Chicago, IL 60611.

Reprint requests and correspondence:  
Ranna A. Rozenfeld, MD, Associate Professor of Pediatrics, Feinberg School of Medicine, Northwestern University, Attending Physician, Pediatric Critical Care Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago, 225 E. Chicago Ave, Box 73, Chicago, IL 60611.  
[RRozenfeld@northwestern.edu](mailto:RRozenfeld@northwestern.edu)

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# Sepsis Guidelines: The Work of the Society of Critical Care Medicine

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**Ranna A. Rozenfeld, MD**

**T**he Society of Critical Care Medicine (SCCM) and the American College of Critical Care Medicine (ACCM) created the first set of sepsis guidelines in 1999. The guidelines were developed in response to a call upon medical professional organizations, by the Institute of Medicine, to develop clinical practice guidelines to facilitate best practices and potentially improve patient outcomes. The first guidelines were titled "Practice Parameters For Hemodynamic Support Of Sepsis In Adult Patients In Sepsis."<sup>1</sup> These guidelines reviewed the literature and made recommendations for hemodynamic support for adults with sepsis. These guidelines only dealt with adult patients, leaving out the pediatric population.

In 2002, ACCM published the first set of pediatric guidelines. These guidelines, "Clinical Practice Parameters For Hemodynamic Support Of Pediatric And Neonatal Patients In Septic Shock,"<sup>2</sup> brought together members of SCCM with a special interest in neonatal and pediatric septic shock. I had the privilege of being a task force member and working on this first set of guidelines from 1998 to 2001. These guidelines were created after a thorough MEDLINE database search, with the identified literature graded and recommendations created using a modified Delphi method.

These guidelines were developed because neonatal and pediatric sepsis differs from adult sepsis. The adult guidelines did not address the specific recommendations required for pediatric patients. Pediatric patients presenting with septic shock tend to

have profound hypovolemia. It is important to make the diagnosis quickly and begin goal-directed therapy. Pediatric patients respond differently to fluids and medications than adult patients. The pediatric guidelines address these differences. The guidelines were well received and were broadly disseminated. Although originally published in English, they were subsequently published in Spanish and Portuguese. In addition, the main algorithm was incorporated into the Pediatric Advanced Life Support (PALS) sepsis guidelines in the PALS provider manual published by the American Heart Association in 2002.<sup>3</sup>

The primary differences between the pediatric and adult guidelines were the recommendations for higher quantities of fluid resuscitation, which inotropic and vasodilator therapies to use, the use of hydrocortisone, and the possible use of extracorporeal membrane oxygenation for refractory shock.

In 2004, the ACCM adult guidelines were updated.<sup>4</sup> This was the sole update for the adult guidelines as the Surviving Sepsis Campaign (SSC) was initiated in 2004, and the first set of SSC guidelines were published. The SSC brought together individuals across multiple specialties, including critical care and infectious disease and represented 11 international organizations. The first SSC guidelines: "Surviving Sepsis Campaign Guidelines For Management Of Severe Sepsis And Septic Shock,"<sup>5,6</sup> includes a small section on pediatric considerations and used the flow chart from the ACCM pediatric guidelines. The SSC guidelines were published in both *Critical Care Medicine*, the journal of the SCCM as well as *Intensive Care Medicine*, the journal of the European Society of Intensive Care Medicine. The SSC guidelines are more comprehensive than the ACCM guidelines as they deal with more than just hemodynamic support.

I was again a member of the task force writing updates to the pediatric guidelines. We worked on these guidelines from 2004 to 2007. More recent literature was searched and then graded, and recommendations were made using a modified Delphi method. There was greater than 90% expert consensus before publication. An update to the pediatric guidelines, "Clinical Practice Parameters For Hemodynamic Support Of Pediatric And Neonatal Septic Shock: 2007 Update From The American College of Critical Care Medicine,"<sup>7</sup> was published in 2009.

The key difference between the 2002 pediatric guidelines and the 2007 update is the recommendation for beginning inotropic support earlier in treatment, through either a peripheral line or an intraosseous catheter, until central venous access can be obtained. There is often difficulty in

obtaining central venous access in pediatric patients, and the initiation of inotropic support was being delayed while central line placement was being attempted. The updated guidelines recommend beginning inotropic support when indicated, even if via a peripheral catheter, and then, switching the medication to a central venous catheter when the catheter is placed.

In addition, the updated guidelines recommend that high-flow humidified oxygen should be delivered via nasal cannula until more definitive respiratory support can be provided. The guidelines also explicitly state that antibiotics should be administered within the first hour. This was implied in the first set of guidelines but not explicitly stated.

Because most of these patients initially present to the emergency department (ED), it is important that the sepsis algorithm be started by emergency care practitioners. Because the guidelines were published in a critical care journal and not an emergency medicine journal, many emergency physicians were unaware of the pediatric sepsis guidelines. A summary of the guidelines was published in *Pediatric Emergency Care* in 2010 in an effort to further promote awareness.<sup>8</sup> In addition, the 2011 PALS Provider Manual references the updated pediatric guidelines.<sup>9</sup>

Since publication of the updated pediatric sepsis guidelines, multiple studies have been done evaluating the implementation of sepsis pathways in the pediatric ED setting.<sup>10-13</sup> These studies identified barriers to pathway implementation in these EDs that investigators are working to overcome.

The adult SSC guidelines were updated in 2008 and again in 2012.<sup>14-17</sup> These guidelines were again copublished in *Critical Care Medicine* and *Intensive Care Medicine* by the SCCM and the European Society of Intensive Care Medicine. Both revisions have small sections on pediatric considerations in severe sepsis and reference the updated pediatric ACCM guidelines.

Unlike the adult ACCM guidelines, which have not been updated since 2004 due to the SSC guidelines, the pediatric guidelines are currently under revision with an anticipated publication in 2015. Task force members of the SCCM who have special interest in pediatric and neonatal sepsis began work on the revision in 2012. We are currently grading the current literature and will be providing recommendations based upon the new literature that has been published since 2007.

Once the current revisions of the ACCM pediatric guidelines are complete, future directions might include the creation of pediatric surviving sepsis guidelines. Just as the adult surviving sepsis

guidelines provide more comprehensive recommendations than the ACCM adult sepsis guidelines, a pediatric version could also provide a more comprehensive set of pediatric specific recommendations. **+**

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