

Knowledge of Pediatric Sepsis among Trainees

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Abstract

Introduction: Sepsis is one of the leading causes of death in children in the developing world. Several studies have shown that the knowledge and implementation of current American College of Critical Care Medicine-Pediatric Advanced Life Support (ACCM-PALS) guidelines on recognition and initial management of sepsis in children leads to significant improvement in outcomes. There is little known about the knowledge of current guidelines on recognition and initial management of pediatric sepsis among healthcare providers in Pakistan. **Objectives:** To assess the retention of knowledge among trainees of pediatrics after a 30 minutes didactic session on recognition and initial management of pediatric severe sepsis and septic shock.

Materials and Methods: We conducted 1-hr educational session, which consisted of 30-min lecture, 20-min for assessment through 20 single best multiple choice questions and 10-min of debriefing for pediatric residents at seven academic institutions in Pakistan. The key components of this exercise were recognition, initial five-minute management, fluid resuscitation, inotrope, antibiotics and steroid.

Results: Of the 222 residents who participated, 42% (91/222) correctly answered >60% of questions with a median score of 10/20 and IQR of 18. Recognition was done correctly by 41.2% (93/222); 54% (121/222) knew about fluid resuscitation, and 27.7% (62/222) about inotropic support. Eighty % (177/222) and 70.8% (158/222) had knowledge of steroid and antibiotic use respectively.

Conclusion: The knowledge of the recognition and initial management of sepsis in children among pediatric residents is suboptimal, even after a 30 minutes didactic session on the subject.

Key Words:

Sepsis, Septic shock, Knowledge, Residents, Mortality

Introduction:

Sepsis is one of the leading causes of childhood death globally. Its incidence and mortality is particularly high in developing world, where 60 - 80% of under-five year mortality is attributed to sepsis-related illness¹. Recent advances over the last three decades reveal that sepsis is a dynamic process of continuum when shock, which is not reversed in early stages, progresses to multi-organ dysfunction syndrome, and which results in high mortality rate². Previous published reports show that the mortality in children from septic shock in pediatric intensive

care units of developing countries is about 50%³⁻⁷. The American College of Critical Care Medicine-Pediatric Advanced Life Support (ACCM-PALS) published time-sensitive, goal-directed and step-wise clinical practice guidelines for recognition and initial management of severe sepsis and septic shock in children in 2002 and revised in 2007^{8,9}. Use of these recommendations resulted in significant reduction in mortality in children with such conditions from various countries^{10,11}. These guidelines were published in Journal of Critical Care Medicine which is not freely available¹². Khilnani et al published guidelines for resource-limited countries¹³. Therefore, many pediatricians are not aware of these guidelines in developing countries, which results in delayed recognition and treatment of sepsis and are associated with high mortality rates.

In Pakistan, little is known about knowledge

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of current guidelines on recognition and initial management of severe sepsis and septic shock in children among healthcare providers. Post graduate trainees (residents) are generally the front-line physicians in the early care of sick children in Pakistan. Several studies have shown positive impact of educational intervention in recognition and treatment of sepsis both in adult and pediatric clinical practices globally^{10, 11, 13-15}. In this study, we aim to determine the effectiveness of a brief educational intervention aimed towards pediatric resident physicians in Pakistan in improving their knowledge about the recognition and initial management of pediatric severe sepsis and septic shock.

Materials and Methods:

Pediatric residents from seven teaching institutions participated in this program. The educational sessions were conducted at seven teaching institutions where pediatric residency program is recognized by the College of Physicians and Surgeons of Pakistan. All pediatric residents of these institutions were eligible for participation.

Each educational session was of one hour, and consisted of three parts:

- a. A 30-minutes didactic power point presentation on the recognition and management of pediatric sepsis based on ACCM-PALS 2007 guidelines and Pediatric Sepsis guidelines for resource-limited country delivered by a trained pediatric intensive care physician^{8,13}.
- b. 20-minutes for knowledge assessment of participants through a multiple choice questionnaire. The assessment included five questions covering the domain of sepsis recognition, three questions covering vascular access and respiratory management, six questions covering fluid therapy, four questions covering inotropes and vasopressors and one question each covering antibiotics and corticosteroid use.
- c. 10-min for debriefing.

The half hour talk was delivered emphasizing the recognition and initial management of severe sepsis and septic shock in children based on ACCM-PALS guidelines. Following the talk, all participants were

asked to answer 20 MCQ questions in 20 minutes. Each correct answer was given one score and the overall score was expressed from 0 to maximum of 20.

Data was analyzed on SPSS V 19, along with the median, mean and IQR score, frequency and percentages of total correct answers as well as correct answers in each domain is reported.

Results:

A total of 222 pediatric residents participated in this program. Out of 7 teaching institutions, two belonged to private sector while the rest were in public sector. Median number of participants in these sessions was 25 (IQR 46). The median test score on the knowledge of pediatric sepsis was 10 out of 20, with IQR of 18. Half of the residents answered fewer than half of the questions correctly and 42% (91/222) were able to correctly respond to >60% of questionnaires. The performance of residents on specific test items is shown in figure 1. The components of systemic inflammatory response syndrome (SIRS) were correctly recognized by 47.3% (105/222). The definition of severe sepsis and septic shock was identified correctly by 46% (102/222) and 32% (71/222) respectively. The overall response rate of recognition of sepsis was 41.8% (93/222). The correct response about initial management of sepsis in first five-minutes was 48% (106/222). Fifty-four percent (121/222) residents responded correctly for the fluid-resuscitation management. Twenty eight percent (62/222) correctly answered the questions regarding the use of inotropes. Question about steroids use was correctly answered by 80% of the responders (177/222) while 70.8% (158/222) of the participants correctly answered regarding the use of antibiotics.

Discussion:

Our study demonstrates that pediatric residents have suboptimal knowledge about diagnosis of sepsis and its immediate management, even after a thirty minutes didactic session on the subject. Published literature has reported few studies on the knowledge about sepsis among physicians and nurses¹⁶⁻²¹. Most of the

studies have similar results. Zilgam et al showed that 48% and 67% of young doctors correctly identified severe sepsis and septic shock in their reports¹⁶. We found that 46% and 32% of our pediatric trainees correctly identified severe sepsis and septic shock respectively. Assuncao et al also found inadequate physicians' knowledge of severe sepsis (56.7%)¹⁸. Fernandez et al showed that only 31.4 % were able to identify SIRS in study of physician's knowledge in Surviving Sepsis Campaign²². This is close to our study, in which 47.3% participants correctly identified SIRS. We found a particular deficiency in knowledge of correct use of inotropes in pediatric septic shock (27.7%) in our participants.

This study highlights very low level of knowledge of pediatric sepsis recognition and management from a developing country like Pakistan where sepsis-related death rate is still very high. Even though our 30 minute didactic session did not lead to optimal knowledge in the residents, Larsen *et al* and Cruz *et al* have shown that implementation of an educational program based on ACCM-PALS guidelines improves the survival of children with severe sepsis and septic shock. Perhaps a longer and more intense training workshop than the current 30 minute didactic session is needed to improve the knowledge related to pediatric sepsis in our trainee physicians.

Our study has few particular strengths and limitations. Limitations include that we did not perform a pre-educational intervention assessment of knowledge, which would have allowed us to determine the impact of our educational intervention more robustly. Secondly, the number of questions to check a particular domain was small, which could lead to lower precision of our assessment of knowledge of our participants. The strengths of the study include that this is the first study from Pakistan which highlights lack of critical, life-saving knowledge regarding pediatric sepsis management in the trainee physicians of Pakistan. We also show that just a brief 30 minutes didactic session is not enough to raise the awareness of the ACCM-PALS guidelines, and more robust workshops and training sessions are required, which should be conducted on regular basis.

Conclusion:

The knowledge of the recognition and initial management of sepsis in children among pediatric residents is suboptimal in Pakistan. Residency programs should emphasize evidence-based learning objectives to improve the recognition and initial management of pediatric sepsis to decrease the mortality rate in children from sepsis.

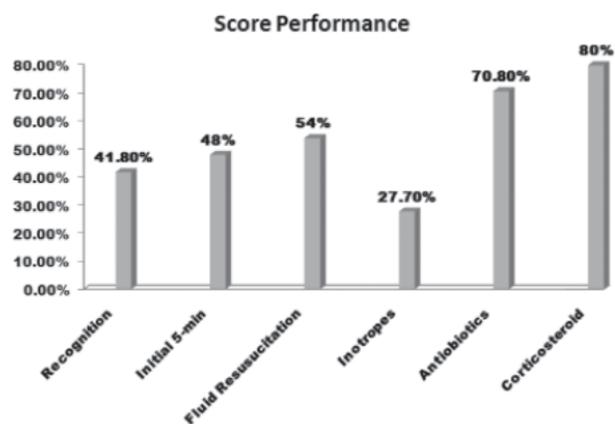


Figure 1. Score Performance on Knowledge Assessment of Pediatric Trainees on Management of Sepsis

Conflict of Interest: None **Source of Funding:** None

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