

Critical appraisal

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Introduction

This is a critical appraisal report of a recent article published in 2018. In this appraisal, we have critically evaluated the various aspects of the given article in the light of standard guidelines for a quantitative study. This critical appraisal is based on answering standard questions for quantitative study. We have analyzed the research design, aims and objectives, research questions and hypothesis formulation for this study. How strongly the literature view supports the hypothesis, has also been evaluated. The methodology section was also analyzed to study to find out the accuracy of methods and understand the limitations and shortcomings. Results and discussion section was even more important as it provided a backbone of the relevance and future directions of the current research on the topic. Other aspects like the connection between of various sections of the articles, referencing and relevance of the findings has also been critically appraised.

Critical Appraisal

In the given paper study is well described, concise and grammatically correct without the use of slang. The corresponding author of this study is a Professor in the Department of Pediatrics, Division of Pediatric Critical Care, Faculty of Medicine, Chulalongkorn University, Bangkok. The study was conducted in collaboration with the Division of Pediatric Critical Care and Division of Pediatric Pulmonary and Critical Care, Bangkok, Thailand by qualified researchers. The report title is clear, proper and unambiguous. It clearly defines the topic of the research study.

The abstract of the article provides a vivid picture of the research done, incorporating the research problem, sampling done, method used, results and recommendations. It's a well-written abstract which helped to provide an overview of the article. It is divided into background, methods, results, and conclusions. Each section of the abstract clearly serves its purpose of summarizing the paper. From the abstract one can easily understand the aim and objectives and relevance of the given study.

In the given paper, the purpose of the research problem is clearly given and backed by previous studies done on the topic. As explained by Bryman (2016) it is necessary for a researcher to mention the purpose or the aim of the study so that the reader and other scholars can understand

the implication of the study (Bryman, 2016). It should also be noted here that the purpose of the study is necessary to mention by any researcher because purpose or aim or objectives help in defining the most suitable methodology for any study.

If we go by the way the report is presented and organized in the given paper, then we can say the structure is logical. The sequence is abstract, introduction, methods, results, discussion conclusion, acknowledgment, financial support, conflict of interest and references. Each section of the paper is properly linked to the next section. However, in the methods section, they have not defined the control and experimental group appropriately. Methods section could be written better. Though, after reading the paper it is clear, how the study was conducted and what were the results. Moreover, in methods section sampling and the difference between case and control groups is not clearly given. How the two groups were recruited is also not mentioned. Besides this, the sample size for both the case and control groups and their selection process in the study is not mentioned in the methods section. Results are adequately presented and justify the rationale of the study.

The literature review is clearly organized in the given paper. Most of the articles except a few were published in last five years. Though a lot of literature based findings are not given, they are authentic and based on adequate evidence and provide a balanced critical analysis of literature. Most of the studies described in the literature are primary and experimental and provide a strong background for the research aim and objectives. Systematically done literature review forms the basis of any study design (Hart 2018; Machi and McEvoy 2016; Webster and Watson 2002). The conceptual framework in the present study is properly defined based on primary studies and control trials. This framework is appropriate based on the published work. The conceptual framework of a study defines its robustness (Eldridge et al., 2016; Ovaskainen et al., 2017; Ravitch and Riggan 2016).

In this paper aims and objectives of the study are given in introduction in brief. From abstract also the objectives of the study become clear. Research questions of the given article become clear from the aims and objectives. However, the hypothesis becomes more clear in the result section where they test the formulated hypothesis to answer the research questions. The hypothesis formulated in the paper clearly reflects the information given in the literature review. The clearly

defined research hypothesis is important in any quantitative research (George 2019; Marczyk et al 2017).

However, in the methodology section, the universe that is the population of study and sample drawn is not clear. Sampling is not given the methods section. Though, it is generally given in case-control studies. It seems from the study that it was a nonprobability sample through the sampling method is not given. Sample size given in the results section seems to be adequate if we consider case and control group as a whole. From the method section inclusion and exclusion criteria is not very clear. In any quantitative study design, it is important to define the universe and sample of the study and how the sample was selected (Brannen 2017; Etikan et al 2016). Sampling is important as it provides the basis of an unbiased study and offers a true representation of the universe so that results from the sample can be extrapolated to the entire universe of the study from which the sample was drawn (Brannen 2017; Etikan et al 2016). Thus, in any study, correct sampling method and the adequate sample size are very important (Brannen 2017; Etikan et al 2016).

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In the methodology section, they have mentioned that ethical approval of the study was sought from the "Institutional Review Board and Joint Research Ethics Committees of the hospitals". Besides this from the interventional groups content was sought. In the experimental group, the subjects had a higher survival rate due to interventions provided compared to the control group. It seems that subjects were protected from harm as they had a better survival rate.

The ethical approval was taken for this study. Even the consent from the subjects was sought before providing the interventions. Ethical approval in clinical research is utmost important (Grady 2018). Except a few most of the terms, theories and concepts are clearly defined. In the methodology exclusion and inclusion criteria is not very clear. Sampling method and recruitment of patients is clearly defined. How the sample size was determined is also not clear. The study talks about a restricted environment for interventions, however, it was not properly described. Thus the methods section is poorly written. In the given paper research design is not adequately explained in the methods section. Data gathering tools and techniques are not adequately given. It was given that samples were taken along with the demographic information. However, data collection tools and method is not given.

Data were analyzed using SPSS, version 16. The data collected were analyzed for normality of distribution. In case it was a normal distribution, Student's t-test was used for comparative study. In the case where data were not normally distributed Mann–Whitney test was used for comparative analysis. Moreover, Fisher's exact test was used for the comparing proportion variability. Multivariate logistic regression was used to find out the correlation between various risk factors and death rate. Two-tailed tests with significance at $P < 0.05$ were used in this study.

A total of 519 children were used as subjects in the study. Among them, 188 were included in the case group to whom interventions were given and 331 participated control group. Case group had 57.4% male and 42.6% female. In the control group, 49.5% were male and 50.4% were female. In the case group, 77.6% had some diseases other than sepsis. In the intervention group, 53.1% of subjects suffered respiratory failure and needed mechanical ventilation that compared to the control group.

As a result of an intervention that is using SSC care bundles, it was observed that there was a significant decline in mortality rates 29%, due to septic shock in the case group from $37\% \pm 20.7\%$ before intervention to $19.4\% \pm 14.3\%$ after the intervention. Even the length of PICU stay was also considerably reduced from 12.5 ± 10.2 days to 9.2 ± 11.5 days. The results of the present study fulfill the aims and objectives of the study. This study strengthens the findings from the previous study and proves the efficacy of SSC care bundles in controlling septic shock. These findings are relevant as they provide strong clinical evidence in support of the SSC care bundles as an intervention for the septic shock.

In this paper, the findings from the studies are properly linked to the literature review. The hypothesis formulated in the given study was proved and it was observed that there was a significant decline in mortality rate due to sepsis among children after the intervention given in the form of SSC care bundles. The strengths and limitations of the given study are properly given in the discussion. There were some limitations such as differences in underlying diseases or adjunctive of sepsis management. There were more subjects with hematologic malignancies in case -group that could have affected the mortality rate. There were subgroup differences which in ailments which might affect the intergroup mortality rate. However, they have described the challenges in the given study. On the basis of the given challenges, future research can be

formulated targeting to overcome these challenges. These challenges included "early sepsis detection" and "optimum hemodynamic resuscitation", Both of these factors lead to an efficient sepsis management strategy and positive results. In this study, the results were generalized based on the findings from the given study and previous studies conducted related to the issues. The study proves that the intervention given for the sepsis, in the form of SSC care bundles leads to a significant decline in mortality rate among children. In this study, the recommendations for future research are not mentioned. However, based on the limitations and challenges future studies can be designed in the light of current findings. All the books, journals and other media present in the study seem to be properly referenced. Overall this study was a well- designed and meticulously carried out. Robust data analysis provided strong evidence in support of the hypothesis.

Conclusion

In this critical appraisal, it has been found that the given quantitative, case-control study was based on a strong literature review. In the paper aims and objectives were well defined. The methodology section was not very detailed, however, the results provided strong empirical evidence in support of the hypothesis. The study was well designed as it is evident from the collaboration between several hospital departments and researchers who contributed to the work. All the necessary ethical approval and consent from the subjects was taken before providing intervention. Data analysis was well planned and provides strong comparative evidence. Results from the study provide strong evidence in support of the previous findings that about the efficacy of SSC care bundles in controlling septic shock. These findings are relevant as they provide strong clinical evidence in support of the SSC care bundles as an intervention for septic shock. The discussion section was elaborate enough to logically describe the findings in the light of previous studies. It provides enough basis and insight into the relevance of the study. There were some limitations and challenges presented in the study. The limitations and challenges provide the scope of improvement in future studies.

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