Moral Application of SNAP-II and SNAPPE-II in Neonatal Intensive Care Units

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Introduction

When a premature baby is born, parents and clinicians in the delivery room are asked to make difficult decisions regarding whether to start or withhold lifesaving treatment. In order to make an ethical decision, accurate prognostication is needed. However, when a preterm baby comes into the world between the 22nd and the 26th week of gestation, a wide prediction of outcomes using SNAP-II and SNAPPE-II. The three studies published in 2014, 2015, and 2019 were found on PubMed, by searching “ethics and algorithm in NICU,” “ethics and SNAP-II,” “ethics and SNAPPE-II.”

Methods

Research was conducted to gather data pertaining to the predictability of outcomes using SNAP-II and SNAPPE-II. The collected empirical data was compared with articles that question the morality of using algorithms in neonatal decision-making, especially in order to reach a more general understanding of how algorithms are used and how decisions are made in the NICUs. To focus on the selected score system, only articles that refer to SNAP-II and SNAPPE-II were included. A limitation of this project concerns the use of empirical data provided by studies conducted in developing countries, such as India, Nepal, and Paraguay. The results of the research could differ if analyzed data from more medically developed countries like South Korea, Denmark, or the United States of America.

Background

In 1993, Richardson, et al., formulated the first model of Score for Neonatal Acute Physiology (SNAP) which included 34 variables in order to predict mortality and morbidity. Three more factors were added to create its perinatal extension (SNAPPE-II). Then this algorithm was simplified reducing the variables to 5, obtaining SNAP-II and SNAPPE-II. Before the widespread usage of algorithms, outcomes where calculated based on gestational age and birthweight.

Results

The study published in 2014 and conducted between January 2010 and December 2011 in Paraguay involved newborns admitted to the PICU at different postnatal ages. The study was able to prove that SNAP-II score could predict mortality in newborns admitted in their first six days after birth and in those admitted between 7 and 14 days after birth. SNAP-II score was able to predict mortality in the first week of age and in babies between 15 and 28 days of age. It also showed that newborns admitted with the youngest postnatal age are more likely to have higher severity scores, meaning they will receive a worse prognosis.

The study conducted in India from January 2012 to July 2013, was published in 2015 and involved 248 newborns admitted to the NICU in their first 48 hours after birth. The authors were able to prove that SNAP-II is a good score to predict mortality, but it cannot predict the length of stay in the NICU. However, in their analysis, they showed how scores are interpreted differently in different studies. They considered a score of 37 to be associated with higher rate of mortality. Other studies, however, reached this same conclusion at scores of 30, 40, 33, 30, or 51.

The study conducted in Nepal between June 2015 and May 2016 and published in 2019 involved 255 newborns. The authors were able to prove that SNAPPE-II score was higher in newborns who died. They concluded that SNAPPE-II could be used to assess the severity of condition and to prognosticate outcomes and can be a helpful tool to determine treatments and how to counsel parents.

Conclusion

In high pressure situations, like a premature baby’s birth, the clinicians in the NICU have a duty to sustenance life by doing what is best for the child. At such a young and vulnerable age, circumstances and health change fast. It is ethical to use the means of algorithms, for example SNAP-II, to best understand the premature baby’s probability of survival. These scores can provide motivation for perseverance in treatment and could help a family prepare for physiological challenges that could arise from an early birth. As clinicians have a duty to sustain life, if a baby’s outlook of life is high on the mortality score, SNAP-II can offer statistical data that may help in the decisions. It may give insight whether a cure should be switched to care, transitioning treatment to focus on the reduction of the baby suffering in the face of imminent death. This is a hard decision to make. However, if used effectively, algorithms could save the child from unnecessary harm and treatment. That being said, it is unethical to use SNAP-II and other algorithms alone to decide whether to withdraw a life-sustaining treatment. Newborn outcomes can vary based on the specific child. Even though the scores are accurate in the first 12 hours of life, they are only guidelines that cannot be considered definitive. The possibility of recovery or a dignified death must be respected and not hindered by direct actions of clinicians based only on the results of the algorithm.

Analysis

As one of the article pointed out, SNAPPE-II is an admission score that can be used in the first hours of admission to the NICU. However, it cannot predict outcomes with absolute certainty. In the span of 10 days, the score drastically diminishes its ability to distinguish between newborns who will survive and those who will not. Additionally, a scientific consensus about how to interpret the score has not been reached.

Given the wide uncertainty of antenatal and at birth prognosis in preterm newborns, a better system to make decisions is trying to be formulated. Hard data such as algorithms have been merged to soft data such as clinical judgement. However, some authors have proven that algorithms based on the principle that babies with more physiological issues will surely die, are wrong. The SNAPPE-II score is able to predict newborns who will die quickly in the first hours of life, but it is not able to give more information on outcomes for those babies who will survive the first assessment and to predict quality of life.

Different preterm newborns may react in different ways to treatments, leading to outcomes that were not predictable. The level of uncertainty makes it necessary for neonatologists to use both clinical judgement and algorithms, such as SNAPPE-II score, when making clinical decision and counseling parents.

Research Question and Aim

This poster aims to investigate if the use of SNAP-II and SNAPPE-II, as an algorithm that helps qualify possible outcomes in preterm newborns, can ethically be used to help in the decision-making process of starting or withholding treatment in this population.

Therefore, can evidence-based ethics be ethically applied to predict outcomes in preterm babies?

References


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