

# LIMITS OF VIABILITY: SHOULD WE PLAY GOD?

Milan Stanojevic

Department of Obstetrics and Gynecology Medical School University of Zagreb, Clinical Hospital "Sveti Duh" Zagreb, Croatia

e-mail: milan.stanojevic@optinet.hr

Milan Stanojevic: concept and design of the article, writing the manuscript, literature searches

## SUMMARY

**A**im is to show that the definition of the infants born at the limits of viability within the countries is dependent on the social and medical conditions in which the infant is born, and even in one country in which neonatal intensive care is available, it depends on the place of birth and organization of perinatal care.

With decreasing gestational age mortality, short- and long-term morbidity of preterm infants are increasing while their survival to discharge is decreasing. It is questionable how to define viability and where the limit of viability can be set. The definition of the limits of viability is not quite clear. There are at least two ways of understanding it: the first, defining the gestational age and/or birth weight at which human fetus has the capability of survival outside the uterus; and the second, gestational age and/or birth weight at which more than 50% of infants survive to discharge home from the hospital. While in developing countries infants of less than 28 weeks of gestation without neonatal intensive care have 95% probability of dying, survival of infants between 22 and 25 gestational weeks in developed countries is reaching 90%.

Up to now the definition of the limits of viability has not been established, and precise definition of viability scientifically has not been produced yet. Currently, the World Health Organization sets lower limit of viability at 22 weeks of gestation, or 500 g birth weight, or 25 cm of birth length. The universal definition of the limit of viability is probably not possible, because of its variability from one individual to the other, from one setting to the other and from one community to the other.

**Key words:** fetus, viability, survival, neonatal intensive care, morbidity, mortality

## INTRODUCTION

Preterm birth is any birth occurring before 37 weeks of gestation or 259 days of pregnancy with the global rate of 10.6% with lowest rate in Europe (8.7%) and highest in North Africa (13.4%) (Chawanpaiboon et al. 2014, Vogel et al. 2018). The country with more than 3.5 million of premature babies in a year is India, followed by China with 1.5 million out of 14.8 million of premature babies born every year in the world (Chawanpaiboon et al. 2014, Vogel et al. 2018). The baby can be born between 32 and <37 gestational weeks (GW) (accounting for 84.7% of entire population of premature babies), 28 and <32 GW (ac-

counting for 11.3% of premature babies), and <28 GW (accounting for 4.1% of premature babies) (Chawanpaiboon et al. 2014, Vogel et al. 2018). The categories of premature and term infants are given in the table 1 for better understanding (Glass et al. 2015). Extremely preterm infant account for less than 1% of all births and moderate preterm babies account for more than 60% of infant mortality (Glass et al. 2015).

With decreasing gestational age mortality, survival to discharge, short- and long-term morbidity of preterm infants are increasing. It is questionable how to define viability and where the limit of viability can be set. The definition of the limits of viability is not quite clear. There are at least two ways of

Label	Definition (completed gestation in weeks)
Extremely Preterm	< 28
Very Preterm	28 to <32
Moderate Preterm	32 to <34
Late Preterm	34 to <37
Early-Term	37 to <39
Term	38 to <41
Late-Term	41 to <42
Post-Term	>42
Small for gestational age (SGA)	Weight less than 10th percentile for gestational age
Large for gestational age (LGA)	Weight greater than 90th percentile for gestational age
Very low birth weight (VLBW)	Less than 1500 g
Extremely low birth weight (ELBW)	Less than 1000 g

**Table 1.** Terminology of prematurity (Glass et al. 2015)

understanding it: the first, defining the gestational age and/or birth weight at which human fetus has the capability of survival outside the uterus; and the second, gestational age and/or birth weight at which more than 50% of infants survive to discharge home from the hospital (El-Metwally et al. 2000, Seri & Evans 2008, Mercurio & Drago 2019). Historically, limits of viability dropped from 2200 g in 1900s to 600 g in 2000s (Obladen 2011, Stanojevic 2018). World Health Organization (WHO) set the limit of viability in 1993 at 500 g, 25 cm of the birth length, and/or 22 gestational weeks (GW) and above, with the obligation to register these newborns as infants not abortions (Obladen 2011, WHO 2011, Stanojevic 2018). Historically, the registration of infants born at the limits of viability was not universal and many of them were not registered (Tzoumaka-Bakoula 1987, Obladen 2011, WHO 2011, Stanojevic 2018). On the other hand, in the developed countries if the infant is born at 28 GW, it has 95% of the probability to die if neonatal intensive care is not available (Blencowe et al. 2012). Only 1% of infants born at 28 GW in the world have access to the neonatal intensive care (Blencowe et al. 2012). Without any doubt, the treatment of infants at 28 GW without lethal congenital malformations in developed countries is obligatory, with survival to discharge of more than 90% (Stoll et al. 2015 Lemos A, et al. 2020 Rysavy et al. 2021).

The aim of the paper is to show that the definition of the infants born at the limits of viability within the countries is dependent on the social and medical conditions in which the infant is born, and even in one country in which neonatal intensive care is available, it depends on the place of birth and organization of perinatal care.

## DEFINITION OF THE LIMITS OF VIABILITY

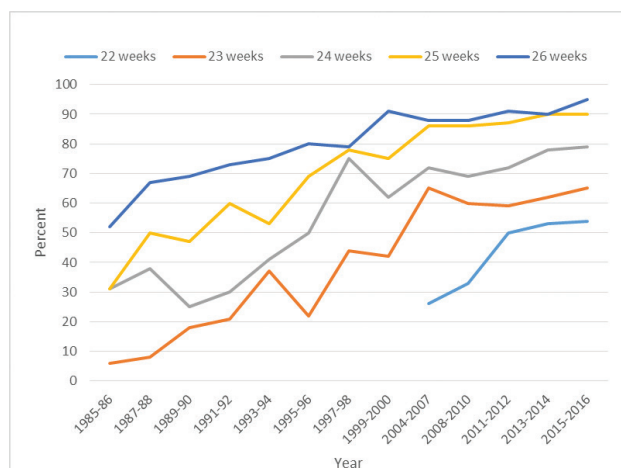
Certain gestational age or certain birth weight at which the survival to discharge is above 50% could be one of the definitions of the limits of viability (El-Metwally et al. 2000). At the beginning of 20<sup>th</sup> century, it was concluded that defining limits of viability using gestation and body measures should be avoided, because it could encourage withholding life-saving support to infants believed to be unviable (Obladen 2011). Introduction of the brain development and consciousness to the definition of the limits of viability made even more confusion because it was not easy to define the consciousness and to set the limit when the brain development has achieved a minimum level of consciousness (Obladen 2011). It could be concluded that up to the present days the definition of the limits of viability has not been established, and that precise definition

of viability scientifically has not been produced yet (Obladen 2011). Currently, the WHO sets lower limit of viability at 22 weeks of gestation, or 500 g birth weight, or 25 cm of birth length, at least for perinatal statistics. The 10<sup>th</sup> revision of the International Classification of Diseases describes perinatal period as starting at 22 completed weeks (WHO 2011) The concept of viability is variable, sometimes meaning the gestational age, weight, or length at which the smallest known infant survived, while sometimes meaning the stage at which specified percentage of infants survived with the assistance of given technological and other therapeutic means (Pignotti 2010, Obladen 2011). Technological and therapeutic resources essential for the survival of infants at the limits of viability are not available equally in the world, so viability involves social and economic issues as well (Pignotti 2010, Obladen 2011). Sometimes to be viable means to be discharged alive from the hospital regardless of the quality of life which, is important at least for the survivors and their parents (Pignotti et al. 2021). The universal definition of the limit of viability is probably not possible, because of its variability from one individual to the other, from one setting to the other and from one community to the other (Pignotti 2010, Obladen 2011). Therefore, it should be described statistically as a survival curve for specific gestation or birthweight for certain institution or other location for the specified period (Pignotti 2010, Obladen 2011, Chow et al. 2015). Human viability, defined as gestational age at which the chance of survival is 50%, is currently approximately 23 to 25 weeks in developed countries. Infant girls, on average, have better outcomes than infant boys (Glass et al. 2015 Brumbaugh et al. 2019). From the neonatologist point of view, viable infants are those whom most of the clinicians would treat, while nonviable are those whom most of the clinicians would not treat, and those in between are so called gray zone (Bucher et al. 2018 Silberberg et al. 2018). In so called gray zone the treatment of infants is optional and has been set at 22-23 weeks (Japan, Germany, Sweden), 23-24 weeks (United Kingdom, USA, Canada), 24-26 weeks (France, Netherlands, Switzerland), at 25 weeks in Argentina, and at 23 weeks in the Czech Republic (Obladen 2011, Domellöf & Jonsson 2018, Silberberg et al. 2018 Šimják et al. 2018). Recently in the USA recommendation on resuscitation, the limit at which it should be initiated was set at 22

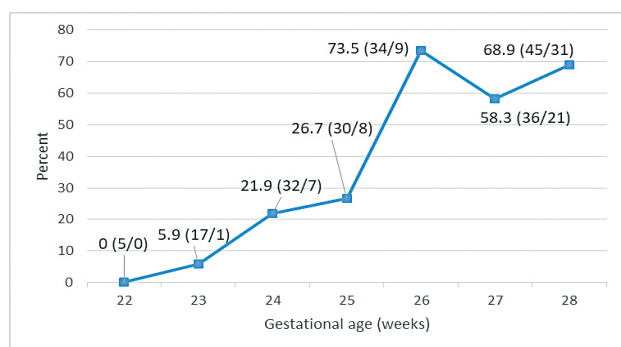
GW (American College of Obstetricians and Gynecologists & Society for Maternal-Fetal Medicine 2017, Chen et al. 2021). There were substantial differences in terms of the initiation of intensive care and/or resuscitation of the infants at the limits of viability between neonatologists, neonatal nurses, and obstetricians (Geurtzen et al. 2016, Bucher et al. 2018). The differences between obstetricians and neonatologists were investigated when counselling the parents on the issue of the limits of viability, with heterogeneity in prenatal counselling, the differences between preferred counseling and actual practice (Geurtzen et al. 2017, Geurtzen et al. 2018a Geurtzen et al. 2018b, Reed et al. 2020).

## LIMITS OF VIABILITY: HISTORICAL AND CONTEMPORARY PERSPECTIVE

Although fetal viability should be considered as the intrinsic probability of the fetus to survive outside the uterus, nowadays it is still only the function of the technological and biomedical capabilities which are different in different parts of the world, meaning that understanding of the viability is not universal (Breborrowicz 2010). As it was already pointed out, in the period of 130 years (from 1876 to 2006) the limit of viability dropped from the birth weight of 2200 g to 600 g (Obladen 2011). In the period of 30 years, survival of infants at the limits of viability in Sweden has changed considerably, as shown in the Figure 1 (Domellöf & Jonsson 2018). Neonatal survival above 50% at 26 GW was reached in 1985, while nowadays more than 90% of that infants survive (Domellöf & Jonsson 2018). Survival of more than 50% of infants born after 25 GW was reached in the years 1991-1992 while for 24 GW survival above 50% was observed in the years 1995-1996 (Domellöf & Jonsson 2018). In the period from 2004 to 2007 infants of 23 weeks reached the survival above 50%, while at 22 GW survival of more than 50% was observed in the period 2013-2014 (Domellöf & Jonsson 2018). Similar data have been published for the period of 25 years in industrialized countries (Glass et al. 2015). It is obvious from the Figure 1 that infants at 22 GW were not followed and registered systematically till the period 2004 to 2007 (Domellöf & Jonsson 2018).



**Figure 1.** Neonatal survival of extremely preterm, live-born infants at 22 to 26 completed weeks' gestation in Sweden between 1985 and 2016 by gestational age and year of birth. Data are from the Swedish Birth Registry (1985–2000), the Extremely Preterm Infants in Sweden Study (EXPRESS) (2004–2007), and the Swedish Neonatal Quality Register (SNQ) (2008–2016). Data from the EXPRESS and SNQ are based on infants who were admitted to the neonatal unit (Domellöf & Jonsson 2018)



**Figure 2.** Survival to discharge of infants born at the Neonatal Unit Department of Obstetrics and Gynecology Medical School University of Zagreb, Clinica Hospital "Sveti Duh", Zagreb, Croatia in the years 2003 to 2017 (numbers in brackets: number of liveborns / survivors to discharge)

Figure 2 is showing the data on survival to discharge of inborn infants treated at the Neonatal Unit, Department of Obstetrics and Gynecology Medical School University of Zagreb, Clinical Hospital "Sveti Duh", Zagreb, Croatia in the years 2003 to 2017. The number of liveborn infants in the 15 year period are presented as the first number in the brackets, while

the number after slash presents te infants who survived to discharge. Numbers are small and it is possible that some liveborn infants from 22 to 24 weeks of gestation were not registered. If the data are compared with the data from the Figure 1, the results in Zagreb are worse: the same as they were 30 years ago in Sweden for all infants born at the limits of viability. Croatian national data on the survival of infants born at the limits of viability regarding their gestational age are not available, which is the reason why the data from one center are presented. From the national Croatian data for the year 2018, there were no survivors to discharge with the birthweight below 500 g (all 13 liveborns died in the early neonatal period), while for the infants between 500 g and 999 g 52.3% (69 out of 132 liveborn) survived to discharge, and for the group between 1000 g and 1499g survival to discharge was 93% (Filipović-Grčić et al. 2019).

If we look at the data from developing countries, then in one center in the ten-year period (from 2005 to 2014) the survival rate of infants with birth weight of less than 1500 g was only 18%, while no survivors were found in the group below 750 g at birth (Abdulkadir et al. 2015). In Ghana, the mortality rate of extreme preterm infants (below 26 weeks of gestation) in the period from 2011 to 2015 was 80.2% (survival to discharge 19.8%), while for the infants of gestational age from 26 to 27 weeks it was 68.9% (survival to discharge 31.1%) (Sackey & Tagoe 2019,). In recently published Ethiopian study (covering period from 2014 to 2017) mortality rate of premature infants above 28 weeks of gestation was 50.8% (Seid et al. 2019). In the study of the literature on the mortality rates at the limits of viability in developed and developing countries, it was concluded that the mortality rates ranged from 4 to 46% in developed countries and 0.2 to 64.4% in developing countries, meaning that they remain high in developing and in developed countries (Chow et al. 2015).

## DEVELOPMENT OF THE CARE FOR INFANTS AT THE LIMITS OF VIABILITY

It is obvious that development of medical and perinatal care in particular enabled better survival of the infants at the limits of viability (Glass et al. 2015). Antenatal use of corticosteroids and magnesium sulphate improved the survival of those infants sub-

stantially (Shepherd et al. 2018, Wolf et al. 2020). Development of artificial ventilation and oxygen use, exogenous surfactant, targeted oxygen therapy, prophylactic methylxanthines and some other therapeutic modalities influenced positively outcome of those tiny infants, while postnatal corticosteroid use in the first week of life, ethamsylate versus placebo for prevention of morbidity and mortality in preterm or very low birthweight infants, volume expansion versus no treatment, gelatin versus fresh frozen plasma for prevention of morbidity and mortality in very preterm infants, prophylactic indomethacin versus placebo for preventing mortality and morbidity in preterm infants did prove to be effective based on evidence (Shepherd et al. 2018, Wolf et al. 2020). There are some experimental trials on the use of new promising therapeutic modalities for infants at limits of viability like artificial uterus or placenta (Charest-Pekeski et al. 2021). Historical perspective of the therapeutic modalities for care of infants at the limits of viability in developed countries is shown in the Table 2 (Glass et al. 2015, Charest-Pekeski et al. 2021).

Short and long-term outcome of infants at the limits of viability

In developed countries we are witnessing lowering the gestational age at which neonates at the limits of viability are surviving, while in developed world infants below 28 GW are not counted at all in perinatal statistics, because the probability of their survival without neonatal intensive care is virtually not possible (Blencowe et al. 2012, Ceriani Cernadas 2018). These data are the result of huge inequity between developed and developing world, which can be illustrated by the fact that time for developing

countries to reach the same chance of neonatal survival as in 2012 for newborn babies in high-income countries, based on average annual rate of reduction from 2000–12 was 110 years for sub-Saharan Africa (Lawn et al. 2014).

For the purposes of counselling the parents of those infants in developed world, it is important to have the information on the short- and long-term outcome of the infants at the limits of viability (Geurtzen et al. 2018). Short- and long-term adverse outcome, postnatal growth restriction and increased prevalence of cardiovascular diseases in adulthood of infants born at the limits of viability remained unsolved, raising many medical, legal, and ethical issues (Farooqi et al. 2006, Jarjour 2015, Källén et al. 2015, Stoll et al. 2015). The most important for those surviving infants and their families and for the entire society is the issue of the quality of life without major disability and significant health problems later in life. Although ethical principles are universal, they could not be applied to the same way in all neonatal intensive care units (NICUs) within one country, while the variations are even more emphasized in developed and developing world (Chow et al. 2014, Owens et al. 2015). Survival to discharge without major morbidity in one recent study did not change in the 22 years, and the change for the entire group of infants from 22 to 28 GW was 21% in the year 1990 and 29% in the year 2012, but if we look at the group of infants between 22 and 25 GW, then the percentages of infants without major morbidity are decreasing (Stoll et al. 2015). In recently published Swedish study, they concluded that the Swedish proactive approach to care at the border of viability has not resulted in an increased

Treatment method	Year of development
CPAP, Mechanical Ventilation	1980s
Exogenous Surfactant	Early 1990s
Antenatal Steroids	Mid/Late 1990s
Avoiding Postnatal Steroids	Early 2000s
Targeted Oxygen Therapy	Mid 2000s
Artificial uterus and/or placenta	Experimental only on animal models

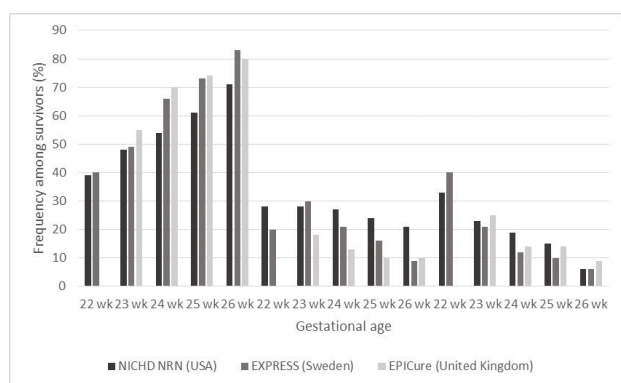
**Table 2.** Historical perspective of the therapeutic modalities for care of infants at the limits of viability in developed countries (Glass et al. 2015, Charest-Pekeski et al. 2021)

CPAP = Continuous positive airway pressure

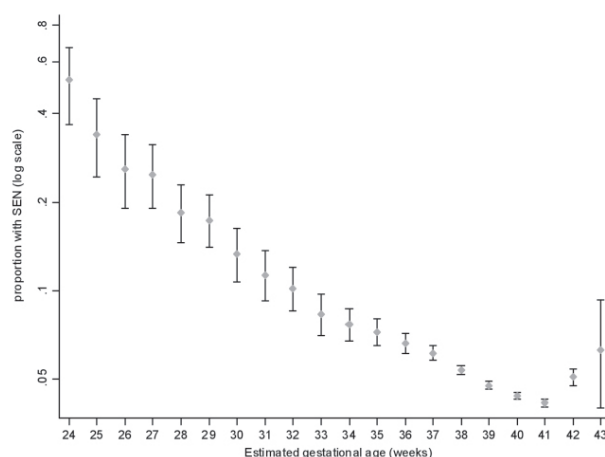
proportion of functional impairment among survivors (Domellöf & Jonsson 2018).

In the review of literature on the neurodevelopmental outcome of infants at the limits of viability, the rates of surviving unimpaired or minimally impaired are 6% to 20% for live-born infants at  $\leq 25$  weeks' gestation and  $< 5\%$  for infants born at 22 and 23 weeks' gestation (Jarjour 2015). Figure 3 shows that in different studies from three developed countries (USA, Sweden and United Kingdom), the data on the mild, moderate and severe disability are very similar, and they are dependent on gestational age. With decreasing gestational age number of infants with the disabilities is increasing (Moore et al. 2012, Serenius et al. 2013, Rysavy et al. 2015, Patel 2016).

Long-term disability like intellectual disability (5% to 36%), cerebral palsy (9% to 18%), blindness (0.7% to 9%), and deafness (2% to 4%) occurring later in life of the infants at the limits of viability are influencing their quality of life (Jarjour 2015). Milder degrees of disability involving cognition, behavior, and learning are increasingly recognized among older preterm children, teens, and young adults (Jarjour 2015). Besides neurodevelopmental disability, there is also the problem of postnatal growth restriction affecting at least in the first 12 years of life weight, height, and particularly head growth with significant growth delay expressed as 20% of children throughout the whole period of 12 years having smaller head circumference compared to their term born counter-



**Figure 3.** The spectrum of disability among surviving extremely preterm infants (NICHD, National Institute of Child Health and Human Development; NRN, Neonatal Research; EXPRESS, Extremely Preterm Infants in Sweden Study;) (Moore et al. 2012, Serenius et al. 2013, Rysavy et al. 2015, Patel 2016)



**Figure 4.** Special educational needs (SEN) of infants at the lower limit of viability (MacKay et al. 2010)

parts (Farooqi et al. 2006). It has been published that the percentage of infants with special educational needs is increasing with decreasing gestational age, which is shown in the Figure 4 (MacKay et al. 2010). The highest rates are for infants at the lower limit of viability from 22 to 25 gestational weeks (MacKay et al. 2010).

## ETHICAL DILEMMAS IN THE CARE FOR INFANTS AT THE LIMITS OF VIABILITY

If there is a threatened preterm labor at the limits of viability either due to the maternal or fetal conditions, many ethical dilemmas arise even prenatally (van Eerden et al. 2014, Källén et al. 2015, Ceriani Cernadas 2018). In the Dutch study the termination of pregnancy due to the maternal indications occurred at the average gestational age of 24 weeks and 3 days in 1 per 1000 pregnancies in the ten-year period, with the overall perinatal mortality of 99.4% (van Eerden et al. 2014). In the Swedish study several obstetric factors influenced the outcome of infants at the limits of viability like delivery by the Cesarean Section lowering the risk of death in the first day of life but not later, prenatal corticosteroid decreasing the risk of death in the first 365 days of life, while the risk of mental developmental delay was increased after vaginal breach delivery (Källén et al, 2015). Interventions for extremely preterm infants bring up many ethical



questions: to resuscitate or not to resuscitate, to treat or not to treat, is intensive care indicated, how to prevent severe morbidity, and many others. If guidelines for intervention in the “perivable” period are available, then infants are categorized using predefined categories, such as “futile,” “beneficial,” and “gray zone” based on completed 7-day periods of gestation; however, such definitions often differ among countries (Dupont-Thibodeau et al. 2014). As emphasized before, it is questionable to use the gestational age as the criterion for the definition of viability, which should be more thoroughly discussed from the ethical point of view (Dupont-Thibodeau et al. 2014). If some decision like life-sustaining treatment is to be made, then prognostic information should be as precise as possible. While trying to define prognosis, we will face other very severe obstacles like how to define severe disability and how to accurately predict late outcome (Dupont-Thibodeau et al. 2019). This may prevent professionals from producing precise guidelines for the care of infants at the limits of viability, because they are based on imprecise data (Dupont-Thibodeau et al. 2019). These data are expressing the inability of healthcare professional to make precise, accurate and practically applicable guidelines from the ethical point of view, while the situation is even worse when trying to perceive the decisions from the parental point of view (Stanak & Hawlik 2019). For the doctors it is always very important to give the information, which is empathetic, sincere, and as accurate as possible, and not influenced by medical providers believes (non-directive counselling) (Geurtzen et al. 2018b). That kind of counselling or decision making is not easy at all, because it is connected with many dilemmas: do we try to save these babies knowing that our procedures are likely to be unsuccessful, or do we provide just a comfort care for them with the consciousness that we may allow some babies to die who might have been saved (Brunkhorst et al. 2014). Proposed by Brunkhorst et al. ten suggestions for the doctors caring for the babies at the limits of viability seem practically applicable, accurate and to the point (Brunkhorst et al. 2014):

- (1) accept that there is a ‘gray zone’ during which decisions are not black and white;
- (2) do not place too much emphasis on gestational age;
- (3) dying is generally not in an infant’s best interest;
- (4) impairment does not necessarily equal poor quality of life;

- (5) just because the train has left the station doesn’t mean you can’t get off;
- (6) respect powerful emotions;
- (7) be aware of the self-fulfilling prophecies;
- (8) time lag likely skews all outcome data;
- (9) statistics can be both confused and confusing;
- (10) never abandon parents.

Although it is expected from medical professionals to be objective and to make counselling without emotions, sometimes it is not likely to be achieved. On the other hand, the parents are using probabilities and medical data, which are not the main decision-making tool, because emotions like fear, concern, regret, hope, quality of life, personalized and individualized approach are essential (Janvier et al. 2014). The example of the end-of life decision making process for the infants at the limits of viability can be given as useful for the communication with parents, including the following issues according to Janvier et al. (Janvier et al. 2014):

- (1) What is the Situation? Is the baby imminently dying? Should withholding or withdrawing life-sustaining interventions be considered?
- (2) Opinions and options: personal biases of healthcare professionals and alternatives for patients.
- (3) Basic human interactions.
- (4) Parents: their story, their concerns, their needs, and their goals.
- (5) Information: meeting parental informational needs and providing balanced information.
- (6) Emotions: relational aspects of decision making which include the following: emotions, social supports, coping with uncertainty, adaptation, and resilience.

The situation concerning the education of trainees in neonatology on the issues of counseling patients at the limits of viability in Europe is worrisome, because only 7% of them got some education, while the others are not aware even of the mortality data (Geurtzen et al. 2016).

## **RIGHT OF THE NEWBORN TO BE BORN IN THE BEST POSSIBLE CONDITIONS**

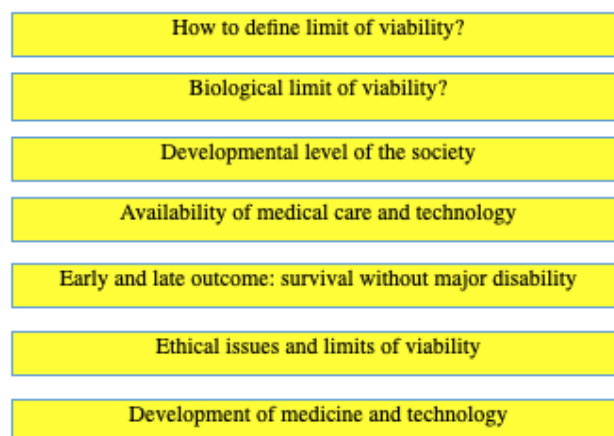
According to the articles 6 and 24 of the Convention on the Rights of the Child, every child has the inherent right to life and to the enjoyment of the highest attainable standard of health (WHO 1989, Eidelman

2005, Yu 2005). Twenty five years ago in the developed countries there was a tendency for both obstetricians and pediatricians to underestimate the potential for survival and to overestimate the risks for disability for infants at the limits of viability (Eidelman 2005, Yu 2005). In accordance with the principles from the Convention, the practice of conservative approach of withholding neonatal resuscitation or delaying intensive care should be changed to a proactive approach that results in early intensive care becoming more available to a larger proportion of these preterm infants, because, according to the recent data, more proactive treatment is not increasing the proportion of functional impairment among survivors (Silberberg et al. 2018, Domellöf & Jonsson 2018). To realize this principal, more infants at the limits of viability should be born at institutions with the possibility of the delivery of appropriate neonatal intensive care. Changes in the organization of health care system influenced survival and mortality rate of the infants born at the limits of viability. Although prematurity rate is globally increasing with expectedly increasing morbidity, the mortality rate has decreasing tendency (Yu 2005). Therefore, any effort should be made to organize the best perinatal care in order to improve survival and decrease possible consequences of intensive care in developed and in developing countries (Owens et al. 2015). The Declaration on the Rights of the Child is universal and applies to any newborn child on Earth, but we should be aware of the strikingly different chances of survival and outcomes depending on the place of birth and social origin (WHO 1989).

## CONCLUSION

At the moment we have reached the plateau of the survival of the infants at the limits of viability. From the historical perspective it could be considered a big achievement of medical science, but still there is a place for improvement. Defining limit of viability is gestational age and birth weight sensitive and is dependent on the biological capability of the infant to survive in certain society which is dependent on development and wealth of the country. That is why the definition of the limits of viability is not universal and should rely on the local statistical data on the survival, short- and long-term outcome of the babies born at the threshold of viability. Availability and the organization of medical care, technology, and approach

of medical professionals and parents are influencing survival and early and late outcome of the infants at the limits of viability. Lack of capability to cope with the issues connected with the care of the infants at the limits of viability is creating some ethical and emotional dilemmas for parents and for medical professionals. As medicine and technology are developing and improving, new ethical issues are arising, which should be solved by availability of appropriate medical care for every child born at the limits of viability. This will change the definition of the limit of viability in accordance with the biological potential of the individual infant, while the issues of inequity and poverty which are now importantly affecting survival of those infants should be solved, in order to make the proclamations from the Convention on the Rights of the Child a reality. In this way the circle of the care of infants at the limits of viability would be closed in the universal and timeless manner. Further development of care for infants at the limits of viability is shown in the Figure 5. When counselling the parents, healthcare providers should always bear on mind the best interest of the child and the family to provide them with the best possible care in existing conditions. They are not expected to play God, but to do no harm.



**Figure 5.** Past, present, and future of the care for the infants at the limits of viability

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## SAŽETAK

### Granice preživljavanja: trebamo li se igrati Boga?

Cilj je prikazati da definicija novorođenčadi rođene na granici preživljavanja u svim državama ovisi o socijalnim i medicinskim uvjetima u kojima se dijete rađa, a čak i u jednoj zemlji u kojoj je dostupna neonatalna intenzivna skrb ovisi o mjestu rođenja i organizaciji perinatalne skrbi.

Smanjenjem gestacijske dobi nedonoščadi povećava se njihova smrtnost, kratkotrajni i dugoročni morbiditet, a smanjuje se preživljavanje do otpusta iz bolnice. Upitno je kako definirati granice preživljavanja i gdje se one mogu postaviti. Definicija granica preživljavanja nedonoščadi nije sasvim jasna. Postoje najmanje dva načina na koje se granice preživljavanja mogu razumjeti: prvi, definiranje gestacijske dobi i/ili porođajne mase pri kojoj ljudski fetus ima sposobnost preživljavanja izvan maternice; i druga, gestacijska dob i/ili porođajna masa pri kojoj više od 50% novorođenčadi preživi do otpusta iz bolnice. Dok u zemljama u razvoju dojenčad mlađa od 28 tjedana gestacije bez dostupne intenzivne skrbi ima vjerojatnost umiranja od 95%, dotle u razvijenim zemljama preživljavanje nedonoščadi između 22 i 25 tjedana gestacije doseže 90%. Prema sadašnjim spoznajama definicija granica preživljavanja nije znanstveno precizno i nedvojbeno utvrđena i određena. Trenutno Svjetska zdravstvena organizacija postavlja donju granicu preživljavanja na 22 tjedna gestacije, i/ili porođajnu masu od 500g i/ili porodnu dužinu od 25 cm. Univerzalna definicija granica preživljavanja vjerojatno nije moguća zbog individualnih razlika od jednog nedonoščeta do drugog, od jedne zdravstvene ustanove do druge kao i od jedne društvene zajednice do druge.

**Ključne riječi:** plod, preživljavanje, novorođenačka intenzivna skrb, pobol, pomor

