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## At the Threshold of Viability – To Resuscitate or Not to Resuscitate – The Perspectives of Israeli Neonatologists

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# At the Threshold of Viability – To Resuscitate or Not to Resuscitate – The Perspectives of Israeli Neonatologists

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**Abstract**

**Objective:** To examine the perspectives of neonatologists in Israel regarding resuscitation of preterm infants born at 22-24 weeks' gestation and their consideration of parental preferences. The factors that influence physicians' decisions at the verge of viability were investigated, and the extent to which their decisions align with the national clinical guidelines were determined.

**Study design:** Descriptive and correlative study using a 47-questions online questionnaire.

**Results:** Ninety (71%) of 127 active neonatologists in Israel responded. 74%, 50%, and 16% of the respondents believed that resuscitation and full treatment at birth are against the best interests of infants born at 22-, 23-, and 24-weeks' gestation, respectively. Respondents' decisions regarding resuscitation of extreme preterm infants showed significant variation and were consistently in disagreement with either the national clinical guidelines or the perception of what is in the best interest of these newborns. Gender, experience, country of birth and the level of religiosity were all associated with respondents' preferences regarding treatment decisions. Personal values and concerns about legal issues were also believed to affect decision-making.

**Conclusion:** Significant variation was observed among Israeli neonatologists regarding delivery room management of extreme premature infants born at 22-24 weeks' gestation, usually with a notable emphasis on respecting parents' wishes. The current national guidelines do not fully encompass the wide range of approaches. Country's guidelines should reflect the existing range of opinions, possibly through a broad survey of caregivers before setting the guidelines and recommendations.

- **What is already known on this topic** – Managing deliveries at the limit of viability (broadly defined as 22 0/7 weeks through 24 6/7 weeks' gestation) remains one of the most challenging issues faced by neonatologists. Guidelines regarding treatment for infants born at the threshold of viability may be confusing and lead to various courses of action.
- **What this study adds** – Significant variation was observed among Israeli neonatologists regarding delivery room management of extreme premature infants born at 22-24 weeks' gestation, with a notable emphasis on respecting parents' wishes.

**How this study might affect research** – Country's guidelines should reflect the existing range of opinions, possibly through a broad survey of caregivers before setting the guidelines and recommendations.

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**Introduction**

Birth at a very immature stage of intrauterine development imposes a high risk of death or severe long-term neurologic disability. This can generate medical, ethical, and legal controversies, challenges, and opportunities.[1–4] It is questionable whether initiating resuscitation after birth in these extremely preterm infants could be considered in their best interests. However, how to translate this concern into clinical action may be unclear.[5] To this, the large gaps in the law regarding treatment of infants born in the gray zone of viability should be added.[6]

The counseling and management of deliveries at the limit of viability (broadly defined as 22 0/7 weeks through 24 6/7 weeks’ gestation) remains one of the most challenging issues faced by neonatologists. Physicians and parents make complex and challenging decisions.[7] Those rely, as in many other ethical dilemmas, on prognostic data.[8–10]

Multiple factors are associated with the outcomes of extreme prematurity in addition to gestational age at birth. These include non-modifiable factors (including gender, birth weight and plurality), but also potentially modifiable antepartum factors (the location of the delivery (country, hospital), administration of antenatal corticosteroids and magnesium sulfate), and of course the decision whether to start or withhold intensive care after delivery.[8,9] While there is a clear trend of improvement in survival of extreme premature infants in recent years, a significant variation in outcomes exists between countries and even between hospitals in the same country. [8,11–14]

Deliveries occurring between 22- and 23-weeks' gestation are associated with the most complicated dilemmas. In countries like Japan, Sweden, United Kingdom, United States of America and Canada, full intensive care is sometimes provided and neurodevelopmental outcomes are assessed even after deliveries at these gestational ages.[10,12–15] The data from these countries suggest that survival without moderate to severe neurodevelopmental impairment is a possibility even in -preterm infants born at these very premature range of gestational ages.



Guidelines regarding treatment for infants born at the threshold of viability may be confusing and lead to various courses of action. A position paper published by the Israeli Neonatal and OBGYN societies 2020 [16] serves as a guideline for managing threatened deliveries at the verge of viability. According to this statement, intensive care should not be given to infants born between 22.0-22.6 weeks' gestation, while those born at or after 24.0 weeks should get full intensive care by default. For infants born between 23.0-23.6 weeks, the decision on whether to provide intensive care should depend on the parents' preferences and the newborn's medical condition and initial response to treatment.

The health system in Israel is a National Health Insurance system, and NICU stay is subsidized and freely accessible to all. In Israel, a rich mosaic of religions and ethnicities comes together, complicating the formulation of generalized guidelines for ethical questions. In this study, we examined the attitudes of neonatologists in Israel regarding resuscitation at the threshold of viability. In addition, we examined whether the guidelines, set in Israel as in the rest of the world by a small group of physicians, reflect the opinion of most neonatologists. We hypothesized that we would find diversity in attitudes and results, with some deviation from the current Israeli guidelines for managing births at the verge of viability.

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**Methods**

*Aims and design*

The research aims were to investigate Israeli neonatologists' views and attitudes regarding resuscitation of newborns at 22-24 weeks and their responses to parents' requests to resuscitate or not resuscitate these premature infants. It also seeks to explore the additional factors that influence physicians' decisions and how their approaches correspond with the Israeli clinical guidelines.

This was a descriptive and correlative study that utilized a 47-questions online questionnaire developed by the researchers and sent to all Israeli neonatologists. The study was approved by the ethics committee of the University of Haifa, Israel (approval # 412/21, dated 4h July, 2021).

*The study population:*

Following a pilot testing by five neonatologists, a final online questionnaire was developed and distributed as URL link using an existing email distribution list of all Israeli neonatologists, who are registered in the Israeli Neonatal Society, 127 physicians altogether. The email was sent weekly, five times between April 13th and May 11th, 2020.

*The questionnaire:*

We created the questionnaire (see supplementation) with input from a team of expert neonatologists and conducted preliminary pilot testing involving 10 neonatologists to assess internal consistency and inter-rater reliability using Cronbach's alpha. The participants were presented with a scenario where they had to consider the best interests of premature infants born at 22-, 23- or 24-weeks' gestation. The following questions were designed to identify the main factors that affect decisions regarding postpartum treatments. We used Likert scales and multiple-choice questions.

In the following items, respondents had to choose one of five postpartum treatments in one of the three following situations applying to deliveries at 22, 23, and 24 weeks (three situations per each

week): 1) parents seek to avoid any treatment following birth. 2) parents' wish is unknown 3) parents seek full treatment. The alternative treatments included: 1) No resuscitation, compassionate care only. 2) "Non-invasive" resuscitation procedures only (i.e., bag and mask ventilation only, no intubation, no chest compressions, no medications). 3) Intubation and positive pressure ventilation only, and only if the newborn is vital (i.e., had body movements and/or breathing effort). 4) Full resuscitation as needed only if the newborn is vital. 5) Full resuscitation as needed in any case. (Table 1)

Afterward, participants selected statements that they believed accurately reflected the legal status and professional guidelines related to deliveries at 22-24 weeks. The following questions assessed the participant's opinions on managing conflicts between the treating physician and the parents regarding postpartum treatment after delivery at weeks 22-23. Additionally, we asked about the participant's inclination towards administering steroids in the case of a clinical indication of early threatened delivery at 22 or 23 weeks' gestation.

#### *Data analysis:*

We used descriptive statistics to analyze the socio-demographic characteristics, views, and attitudes towards resuscitation and postpartum care for premature infants born at 22-24 weeks gestation. We also examined the relationships between these factors, using various statistical methods depending on the variable types, including Chi-square test for independence or Fisher exact test (for nominal data), Wilcoxon tests, Kruskal-Wallis tests and Spearman correlations (for ordinal data) and t-tests (for continuous data). Our analysis was performed for according to gestational age. We assessed the internal consistency of attitudes towards resuscitation and postpartum care according to gestation using Cronbach's alpha coefficient, conditional on three possible parental preferences: full care, no treatment, or unknown.

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**Results**

Ninety (71%) questionnaires were correctly and fully completed, and were thus analyzed for this research. The characteristics of the participants are presented in table-2.

*General attitudes*

Overall, 74%, 50%, and 16% of respondents believe that resuscitation and full treatment at birth is contrary to the best interests of infants born at 22, 23, and 24 weeks' gestation, respectively (Figure 1).

The principal factor influencing most (62%) of the respondents' treatment decisions was their knowledge regarding infant survival without severe impairment after discharge. The importance ascribed to the sanctity of life was very scarce among respondents (3%).

The answers regarding the respondents' preferred resuscitation decisions (table 1) in weeks 22, 23- and 24 of gestations, in the different scenarios of parents' wishes (against, asking for full resuscitation, or unknown to the attending staff) are shown in Figure 2.

The highest consistency was found when parents requested full care ( $\alpha=0.65$ ), while lower consistency was observed when parents wanted to avoid treatment ( $\alpha=0.55$ ). The lowest consistency was detected when parental preferences were unknown ( $\alpha=0.34$ ), indicating inconsistency in the doctor's position across different preterm birth dates in the absence of parental preferences.

Respondents' views on whether resuscitation is in the best interest of premature infants born at 22, 23 and 24 weeks' gestation were linked to their willingness to offer intensive/ non-intensive care in the scenario that parents' wishes were unknown or when parents seeked to withhold treatment ( $p<0.001$ ,  $p<0.001$  and  $p=0.045$ , respectively). At 22 weeks 3 days' delivery, such a relationship was also significant when parents seek full care immediately after birth ( $p=0.013$ ).

### *Attitudes regarding the legal position*

Twenty-six percent of responders believe that at 22 weeks, there is no legal obligation to provide postpartum treatment, even if requested by the parents. For infants born at 23 weeks, most respondents (73%) believe that there is no legal obligation to resuscitate the premature infant but it may be done if requested by the parents.

### *Attitudes and Knowledge Regarding the Clinical Guidelines*

In this study, respondents' replies did not always correspond with the clinical guidelines on the management of deliveries at the border of viability. Hence, per deliveries at 22 weeks, while most of the respondents understand that according to the clinical guidelines resuscitation should not be offered and management of deliveries should be made in accordance with maternal indications, 25% of them hold that resuscitation can be offered following parents' request, and 5% of them believe that resuscitation is at the full discretion of physicians or that there is a clinical recommendation to offer it even if this is contrary to parents' wishes. This latter position significantly increases and is prevalent among 19% of respondents when asked about deliveries at 23 weeks, although clinical guidelines do not hold that.

Clinical guidelines do not address conflicts between parents and physicians regarding resuscitation of infants born at 22 weeks. Respondents' opinions are divided: 30% support neonatologists' views, 24% prioritize parents' views, and 45% consider the infant's medical status, specifically vitality, as the deciding factor. For infants born at 23 weeks, there is less division: 3% support physicians' views, while 44% believe parents' wishes should prevail.

Respondents who believe resuscitation contradicts the best interests of the infant tend to provide less intensive care. Conversely, respondents who think the guidelines grant discretion to physicians or recommend resuscitation despite parents' objections are more willing to offer intensive care in such situations. ( $\chi^2(4)=16.81$ ,  $p=0.002$ ).

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Most respondents (56%) think that providing full care to infants born at 22 and 23 weeks should be avoided, even if it could enhance neonatal care and survival rates for larger infants born at 24-25 weeks. Eleven percent do not believe that such a contribution would be significant. However, approximately 23% of the respondents argue that all efforts should be made to improve viability at 24-25 weeks.

Fifty three percent (53%) of the respondents stated that they agree/ very much agree that every living creature has the right to live, even with severe disability. However, most (86%) of the respondents believed that the quality of life of an infant born on 22 or 23 weeks and his/ her chances of survival are more important than their mere living existence. Respondents were divided as to whether neonatologists have (43%) or do not have (57%) a moral right to determine if the life of a premature infant born on 22 or 23 weeks are worth living.

Over half of respondents (54%) believe the neonatologist's legal risk affects decision-making for premature infants at 22 or 23 weeks. A higher percentage (89%) think personal values of the physician influence these decisions, while a lower percentage (23%) see financial considerations as influential.

*The influence of physicians' biographical characteristics on care decision making*

At 22 weeks, male and non-Jewish physicians tend to offer more intensive treatment when parents wish to withhold care ( $p=0.049$  and  $p=0.009$ , respectively).

At 23 weeks, male physicians tend to provide more intensive treatment when parents seek full care ( $p=0.031$ ), while non-Jewish or non-secular Jewish physicians offer more intensive treatment when parents wish to withhold care ( $p=0.014$  and  $p=0.038$ , respectively). The more experienced the physician, the more he or she tends to offer intensive treatment, even when the infant's parents seek to withhold treatment ( $r=0.239$ ,  $p=0.036$ ).

At 24 weeks, female, foreign-born, or religious physicians offer more intensive treatment when parents want to withhold care ( $p=0.018$ ,  $p=0.013$  and  $p=0.039$ , respectively). Otherwise, no significant relationship has been observed between respondents' biographical characteristics, type and size of healthcare organization or work experience and respondents' preference as to postpartum treatments offered to infants born at 22-24 weeks. When parents' wishes are unknown, the more experienced the physician, the more he or she is likely to offer intensive treatment ( $r=0.247$ ,  $p=0.030$ ).

## Discussion

In our national survey, we examined neonatologists' attitudes towards resuscitation at the verge of viability, specifically the attitude regarding infant's best interest at 22, 23 and 24 weeks' gestation. We asked about the resuscitation decisions during these weeks, and the basis for these decisions, and assessed how they correspond with the published national guidelines. Overall, the physicians demonstrated diversity and occasional discrepancies with the national guidelines concerning resuscitation at the border of viability. Israel is a melting pot of religions and ethnicities and this variation could inform policy makers and the health fraternity on best ways to handle a question that really has no answer.

When asked about resuscitation preferences according to parents' wish, at 22 weeks, 14% answered that they would perform some resuscitation actions even if the parents wish to avoid it. If the parents' wish was unknown, almost half preferred some resuscitation effort, especially if the newborn was vital. If the parents desired full treatment, over 70% would resuscitate the newborn, regardless of vitality. This variability in the approach regarding resuscitation is inconsistent with the recommendations of the National Neonatology Association that supports compassionate care only, and

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does not correspond to the fact that over 75% thought that resuscitation is not in the best interest of the preterm newborn at this gestation.

At 23 weeks' gestation, most physicians aligned with parents' wishes and national guidelines, choosing not to resuscitate if the parents were against it or fully resuscitate if the parents wanted it. However, 25% of physicians would initiate some resuscitation, especially if the newborn was vital, even against parents' wishes. If parents desired full treatment, all physicians tended to provide care, but often limited to intubation. Interestingly, if the parents' wish is unknown, only 16% would provide compassionate care, despite 50% declared previously that resuscitation is not in the newborn's best interest at 23 weeks. Overall, our findings reveal a gap between the neonatologists' perception as to what is or is not in the best interest of the newborn and their pragmatic view, which is mostly affected by parents' wishes, but is also related to deeper personal attitudes and beliefs that may contradict each other.

Physicians tend to provide resuscitation when attending birth at 24 weeks' gestation. However, even in such cases medical discretion is exercised. Hence, almost half and more than half will resuscitate only if the infant is vital, if the parents' wish is unknown or against providing care, respectively. When the parents are against care, 17% will choose compassionate care only. In general, participants' attitudes regarding resuscitation at the age of 24 weeks of pregnancy were variable, but in line with the 2020 national guidelines.

Our findings show that neonatologists' personal beliefs as to whether provide full and intensive care immediately after a premature infant is born is in the best or not in the best interests of the infant is mostly expressed in two scenarios: when parents' wishes are unknown, and when parents seek to withhold care. However, when parents seek full care, such personal views are less powerful in determining the course of treatment. Despite religious and cultural diversity in Israel, and similar to another study [17], which surveyed Israeli neonatologist' views on life and death issues, our study also



reveals that Israeli neonatologists' ethnic, religious or religiosity levels have little impact on their decision of whether to resuscitate a premature child. Instead, they refer mostly to considerations such as the child's chances of survival, caring for a handicapped child and respecting parents' wishes.

Around the globe, neonatologists acknowledge the significance of including parents in the decision-making process, but their approach varies depending on the infant's gestational age (GA).[18,19] Belgian neonatologists noted the existence of a gray zone, placed at 23-24 weeks gestation, where parents were perceived as the primary decision-makers due to the significant clinical ambiguity. Beyond this gray zone, i.e., below 23 weeks and above 24 weeks' gestation, physicians were considered the main decision-makers, and while parents' desires were considered, counseling became more authoritative and the physician made the ultimate decision.[19]

In their study, Tan et al showed differences between clinicians and parents when deciding on resuscitation or neonatal intensive care treatment. Parents appeared to be more tolerant of a higher mortality and averse to disability risks compared to clinicians.[18] However, parents do not approach these decisions from one common perspective.[20] In addition, there is significant variation among neonatal professionals' assessments of survival and severe disability rates for extremely premature infants, which can further affect the precision of informed shared decision making.[21] Accordingly, Haward et al suggested moving from doctor-driven to parent-personalized discussions when counseling at the gray zone of viability.[20]

The findings in this study reveal that neonatologists' views regarding the resuscitation at 22 weeks, and in some circumstances at 23 weeks as well, do not correspond to the national guidelines. Resuscitation guidelines in the threshold of viability vary among different countries, but they generally recommend that infants born at or beyond 23 weeks' gestation should be considered for active resuscitation, while those born earlier will receive comfort care or should be managed according to individual circumstances. Decisions about resuscitation take into account factors such as gestational age, birth weight, parental preferences and the infant's overall condition. In Canada and UK palliative

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care is suggested when there is high risk for mortality or severe neurodevelopmental disability, which includes for example all infants born at 22 weeks GA, or birth-weight <400g irrespective of additional risk factors, and intensive care or palliative care are both usual care options for infants at 23 weeks. [22,23]. Based on survival rate without major impairment, in Australia and New Zealand, guidelines suggest that for infants born at 23 weeks', decisions about the baby's best interests should be done in partnership with parents and can be flexible, while those born at 22 weeks' gestation will usually receive comfort care. Infants born at 24 weeks will usually receive full resuscitation and care. [24] In Belgium, from 24 weeks resuscitation is mandatory. Below 24 weeks, resuscitation is generally not recommended, but exceptions are considered.[19] In the US, the guidance by the American College of Obstetricians and the AAP is to consider resuscitation at 22 and 23 weeks and recommend it at 24 and 25 weeks. [25–27] As mentioned, the Israeli guidelines<sup>16</sup> state that no intensive care should be provided at 22.0-22.6 weeks' gestation, and that providing intensive care to preterm infants born at 24.0 gestation and higher is the default. At 23.0-23.6 gestation, treatment should be in accordance with the parents' wishes and the newborn's clinical status and response to intensive care after birth.<sup>16</sup>

Although many guidelines resemble the Israeli guidelines, in some countries, a more proactive approach is common even at 22 weeks.[28] Outcomes of infants delivered at 22 to 24 weeks of gestation vary significantly between countries and even between centers.[5] The data on survival of extreme premature infants in Israel shows practically no survival at 22.0-22.6 weeks' gestation, around 17% survival for preterm infants born at 23.0-23.6 weeks' gestation, and 50-60% at 24.0-24.6 weeks .[29] Among other explanations for the low survival rate in Israel, which is considered a modern developed country with good medical capabilities, one can argue for a self-fulfilling prophecy explanation. Accordingly, if neonatologists in Israel believe that survival is extremely rare in 22-23 weeks' gestation, they will refrain from providing intensive care to newborns born at these weeks. Adhering to this argument, it is possible, theoretically, that if neonatologists offer more intensive care at 23 and even at 22 weeks' gestation, the survival rate may increase.

Similar to our research, other studies have shown that the approach of medical staff to resuscitation at the threshold of viability varies and does not always adhere to published guidelines and framework. One possible cause is that the prognosis of premature birth at the threshold of viability is not solely dependent on gestational age and is more complex.[9] To better reflect the views of medical professionals, guidelines should take into consideration additional factors that affect the survival and survival without impairment of these newborns. This may result in guidelines that more accurately represent the diversity of opinions.[30]

Despite having more detailed guidelines that consider various factors when determining whether resuscitation should be recommended or avoided beyond gestational age, the medical staff still have their own attitudes and make decisions that deviate from these guidelines. In the UK, neonatal professionals' interpretation and subsequent management decisions do not always follow the guideline framework's recommendations.[21] Lore et al found that physicians' views of extremely early newborns' future quality of life correlated with self-reported resuscitation preferences and varied by specialty and level of training.[31] Varying approaches utilized by midwives, obstetricians, neonatologists, and nurses who provide perinatal counseling to parents at extremely low gestational ages lead to conflicting advice, particularly when opinions regarding treatment decisions diverged. [32] In the US, Boghossian et al demonstrated a significant regional disparity in perinatal interventions for the care of neonates at 22 and 23 weeks' gestation. Regional and racial-ethnic differences can also influence perinatal interventions. Thus, for example, in the Northeast and West regions in the US, neonates from minority backgrounds at 22 and 23 weeks' gestation received a greater amount of postnatal life support.[26]

As suggested by Williams et al, plausible solution to bridge the gap between the viewpoints of healthcare providers and the guidelines would be to create guidelines based on comprehensive and extensive survey of medical professionals from various specialties who manage premature infants. This would enable the creation of guidelines that reflect a diverse range of accepted perspectives.[33]

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Our study has limitations. We acknowledge the potential controversy surrounding the strategy of resuscitating if the baby is deemed 'vital' (as outlined in Table 1, strategies 3&4). It is noted that Apgar scores and heart rates at 1 and 5 minutes may not reliably predict survival or intact neurologic survival.[32] Nevertheless, similar to the consideration of other treatment options, neonatologists contributed suggestions regarding these options during the construction of the questionnaire, and they were all chosen intermittently in the survey itself. Seventy-one response rate, while good, may be considered moderate for such an important topic and given its descriptive nature. Non-responders' characteristics were similar to responders (data not shown). Additionally, this is a survey, and there might be a gap between what neonatologists say they would do and their actual practices. Further studies should compare the results of the survey to actual data regarding resuscitation and survival rates in various neonatal deliveries.

**Conclusion**

Our survey revealed significant variability in delivery room management decisions at 22 to 24 weeks' gestation among Israeli neonatologists, with a majority (but not all and not at every scenario) placing emphasis on respecting parents' wishes. National guidelines, developed by selected neonatologists, do not fully capture this diversity.

Given the uncertainty of infants' outcomes at the viability threshold, it is reasonable that management would be individualized and family-centered, considering fetal and maternal conditions, risk factors, and parental beliefs. Each country's guidelines should incorporate a wide range of opinions, possibly through surveys of caregivers, including nurses or parents for reflection and formulation. Regardless of guidelines, promoting optimal decision-making in delivery room management should involve joint discussions between parents and neonatal care providers whenever possible.

Confidential: For Review Only

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Table 1: Questions regarding resuscitation preferences according to parents' wish\*

Gestational week **	Parents' wish towards resuscitation	Your preferred treatment strategy ***				
22+3/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5
23+3/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5
24+2/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5

\* Part of the questionnaire.

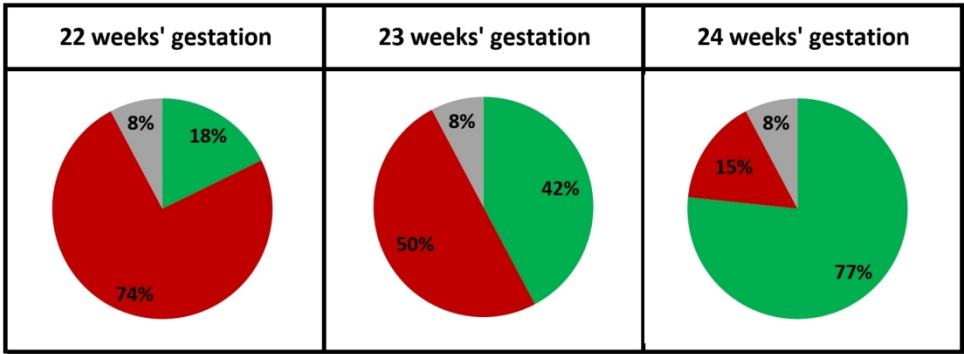
\*\* Assume 48h after prenatal steroid treatment, regardless of your institute's policy.

\*\*\*

- 1) No resuscitation, compassionate treatment only.
- 2) "Non-invasive" resuscitation procedures only (e.g., no intubation, no chest compressions, no medications).
- 3) Intubation and positive pressure ventilation only, and only if the newborn is vital (i.e., had body movements and/or breathing effort).
- 4) Full resuscitation as needed only if the newborn is vital.
- 5) Full resuscitation as needed in any case.

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Table 2: Participants characteristics	
Gender, Female/Male (%)	52/48
Age (years), mean (range);SD	51 (31-82);10
Place of Birth (%)	
Israel	64
Previously USSR	14
Europe/USA	16
other	6
Marital Status (%)	
Married	86
In partnership	5
Divorced	8
Single	1
Nationality (%)	
Jewish	83
Arab	8
Other/unknown	9
Religion (%)	
Jewish	83
Christian	8
Druze	2
Agnostic	2
Unknown	5
Religiosity (%)	
Secular	78
Traditional	12
Religious	8
Ultra-Orthodox Jews/Very religious;.	2
Work Experience (Years), mean (range);SD	17 (0.2-56);12
Type of Healthcare organization (%)	
Governmental hospitals	33
public hospitals	57
Private hospitals	10
Hospital's volume of care (births per year) (%)	
< 3000	10
3000-5000	30
5000-8000	26
> 8000	34






- 1  Resuscitation is in the infants' best interest
- 2  Resuscitation is against the infants' best interest
- 3  Did not answer

Figure 1 - best interest by week percentage  
158x78mm (300 x 300 DPI)

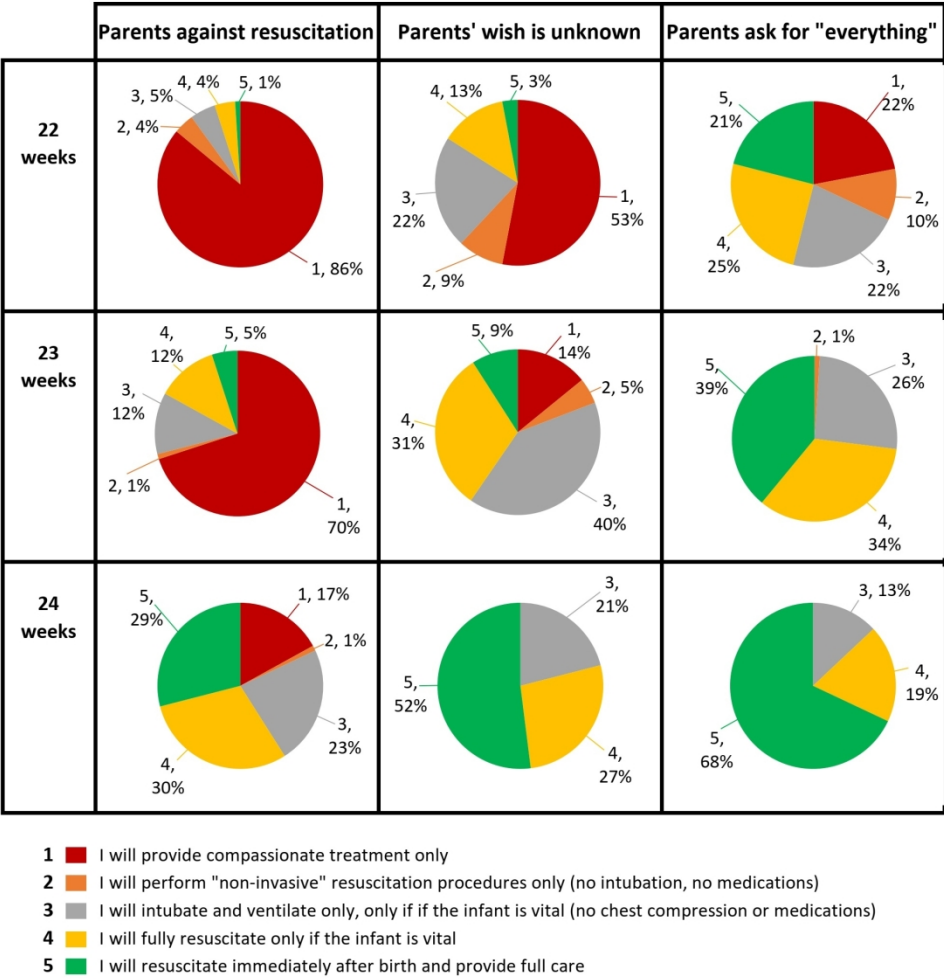


Figure 2 - Resuscitation decisions, percentage

176x182mm (300 x 300 DPI)

# BMJ Paediatrics Open

## At the Threshold of Viability – To Resuscitate or Not to Resuscitate – The Perspectives of Israeli Neonatologists

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# At the Threshold of Viability – To Resuscitate or Not to Resuscitate – The Perspectives of Israeli Neonatologists

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**Short title:** Resuscitation at the threshold of viability- Israeli Neonatologists' Perspectives.

**Key words:** Neonate, Prematurity, threshold of viability, resuscitation.

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**Abstract**

**Objective:** To examine the perspectives of neonatologists in Israel regarding resuscitation of preterm infants born at 22-24 weeks' gestation and their consideration of parental preferences. The factors that influence physicians' decisions at the verge of viability were investigated, and the extent to which their decisions align with the national clinical guidelines were determined.

**Study design:** Descriptive and correlative study using a 47-questions online questionnaire.

**Results:** Ninety (71%) of 127 active neonatologists in Israel responded. 74%, 50%, and 16% of the respondents believed that resuscitation and full treatment at birth are against the best interests of infants born at 22-, 23-, and 24-weeks' gestation, respectively. Respondents' decisions regarding resuscitation of extreme preterm infants showed significant variation and were consistently in disagreement with either the national clinical guidelines or the perception of what is in the best interest of these newborns. Gender, experience, country of birth and the level of religiosity were all associated with respondents' preferences regarding treatment decisions. Personal values and concerns about legal issues were also believed to affect decision-making.

**Conclusion:** Significant variation was observed among Israeli neonatologists regarding delivery room management of extreme premature infants born at 22-24 weeks' gestation, usually with a notable emphasis on respecting parents' wishes. The current national guidelines do not fully encompass the wide range of approaches. Country's guidelines should reflect the existing range of opinions, possibly through a broad survey of caregivers before setting the guidelines and recommendations.



- **What is already known on this topic** – Managing deliveries at the limit of viability (broadly defined as 22 0/7 weeks through 24 6/7 weeks' gestation) remains one of the most challenging issues faced by neonatologists. Guidelines regarding treatment for infants born at the threshold of viability may be confusing and lead to various courses of action.
- **What this study adds** – Significant variation was observed among Israeli neonatologists regarding delivery room management of extreme premature infants born at 22-24 weeks' gestation, with a notable emphasis on respecting parents' wishes.

**How this study might affect research** – Country's guidelines should reflect the existing range of opinions, possibly through a broad survey of caregivers before setting the guidelines and recommendations.

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**Introduction**

Birth at a very immature stage of intrauterine development imposes a high risk of death or severe long-term neurologic disability. This can generate medical, ethical, and legal controversies, challenges, and opportunities.[1–4] It is questionable whether initiating resuscitation after birth in these extremely preterm infants could be considered in their best interests. However, how to translate this concern into clinical action may be unclear.[5] To this, the large gaps in the law regarding treatment of infants born in the gray zone of viability should be added.[6]

The counseling and management of deliveries at the limit of viability (broadly defined as 22 0/7 weeks through 24 6/7 weeks’ gestation) remains one of the most challenging issues faced by neonatologists. Physicians and parents make complex and challenging decisions.[7] Those rely, as in many other ethical dilemmas, on prognostic data.[8–10]

Multiple factors are associated with the outcomes of extreme prematurity in addition to gestational age at birth. These include non-modifiable factors (including gender, birth weight and plurality), but also potentially modifiable antepartum factors (the location of the delivery (country, hospital), administration of antenatal corticosteroids and magnesium sulfate), and of course the decision whether to start or withhold intensive care after delivery.[8,9] While there is a clear trend of improvement in survival of extreme premature infants in recent years, a significant variation in outcomes exists between countries and even between hospitals in the same country. [8,11–14]

Deliveries occurring between 22- and 23-weeks' gestation are associated with the most complicated dilemmas. In countries like Japan, Sweden, United Kingdom, United States of America and Canada, full intensive care is sometimes provided and neurodevelopmental outcomes are assessed even after deliveries at these gestational ages.[10,12–15] The data from these countries suggest that survival without moderate to severe neurodevelopmental impairment is a possibility even in -preterm infants born at these very premature range of gestational ages.

Guidelines regarding treatment for infants born at the threshold of viability may be confusing and lead to various courses of action. A position paper published by the Israeli Neonatal and OBGYN societies 2020 [16] serves as a guideline for managing threatened deliveries at the verge of viability. According to this statement, intensive care should not be given to infants born between 22.0-22.6 weeks' gestation, while those born at or after 24.0 weeks should get full intensive care by default. For infants born between 23.0-23.6 weeks, the decision on whether to provide intensive care should depend on the parents' preferences and the newborn's medical condition and initial response to treatment.

The health system in Israel is a National Health Insurance system, and NICU stay is subsidized and freely accessible to all. In Israel, a rich mosaic of religions and ethnicities comes together, complicating the formulation of generalized guidelines for ethical questions. In this study, we examined the attitudes of neonatologists in Israel regarding resuscitation at the threshold of viability. In addition, we examined whether the guidelines, set in Israel as in the rest of the world by a small group of physicians, reflect the opinion of most neonatologists. We hypothesized that we would find diversity in attitudes and results, with some deviation from the current Israeli guidelines for managing births at the verge of viability.

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**Methods**

*Aims and design*

The research aims were to investigate Israeli neonatologists' views and attitudes regarding resuscitation of newborns at 22-24 weeks and their responses to parents' requests to resuscitate or not resuscitate these premature infants. It also seeks to explore the additional factors that influence physicians' decisions and how their approaches correspond with the Israeli clinical guidelines.

This was a descriptive and correlative study that utilized a 47-questions online questionnaire developed by the researchers and sent to all Israeli neonatologists. The study was approved by the ethics committee of the University of Haifa, Israel (approval # 412/21, dated 4h July, 2021).

*The study population:*

Following a pilot testing by five neonatologists, a final online questionnaire was developed and distributed as URL link using an existing email distribution list of all Israeli neonatologists, who are registered in the Israeli Neonatal Society, 127 physicians altogether. The email was sent weekly, five times between April 13th and May 11th, 2020.

*The questionnaire:*

We created the questionnaire (see supplementation) with input from a team of expert neonatologists and conducted preliminary pilot testing involving 10 neonatologists to assess internal consistency and inter-rater reliability using Cronbach's alpha. The participants were presented with a scenario where they had to consider the best interests of premature infants born at 22-, 23- or 24-weeks' gestation. The following questions were designed to identify the main factors that affect decisions regarding postpartum treatments. We used Likert scales and multiple-choice questions.

In the following items, respondents had to choose one of five postpartum treatments in one of the three following situations applying to deliveries at 22, 23, and 24 weeks (three situations per each

week): 1) parents seek to avoid any treatment following birth. 2) parents' wish is unknown 3) parents seek full treatment. The alternative treatments included: 1) No resuscitation, compassionate care only. 2) "Non-invasive" resuscitation procedures only (i.e., bag and mask ventilation only, no intubation, no chest compressions, no medications). 3) Intubation and positive pressure ventilation only, and only if the newborn is vital (i.e., had body movements and/or breathing effort). 4) Full resuscitation as needed only if the newborn is vital. 5) Full resuscitation as needed in any case. (Table 1)

Afterward, participants selected statements that they believed accurately reflected the legal status and professional guidelines related to deliveries at 22-24 weeks. The following questions assessed the participant's opinions on managing conflicts between the treating physician and the parents regarding postpartum treatment after delivery at weeks 22-23. Additionally, we asked about the participant's inclination towards administering steroids in the case of a clinical indication of early threatened delivery at 22 or 23 weeks' gestation.

#### *Data analysis:*

We used descriptive statistics to analyze the socio-demographic characteristics, views, and attitudes towards resuscitation and postpartum care for premature infants born at 22-24 weeks gestation. We also examined the relationships between these factors, using various statistical methods depending on the variable types, including Chi-square test for independence or Fisher exact test (for nominal data), Wilcoxon tests, Kruskal-Wallis tests and Spearman correlations (for ordinal data) and t-tests (for continuous data). Our analysis was performed for according to gestational age. We assessed the internal consistency of attitudes towards resuscitation and postpartum care according to gestation using Cronbach's alpha coefficient, conditional on three possible parental preferences: full care, no treatment, or unknown.

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**Results**

Ninety (71%) questionnaires were correctly and fully completed, and were thus analyzed for this research. The characteristics of the participants are presented in table-2.

*General attitudes*

Overall, 74%, 50%, and 16% of respondents believe that resuscitation and full treatment at birth is contrary to the best interests of infants born at 22, 23, and 24 weeks' gestation, respectively (Figure 1).

The principal factor influencing most (62%) of the respondents' treatment decisions was their knowledge regarding infant survival without severe impairment after discharge. The importance ascribed to the sanctity of life was very scarce among respondents (3%).

The answers regarding the respondents' preferred resuscitation decisions (table 1) in weeks 22, 23- and 24 of gestations, in the different scenarios of parents' wishes (against, asking for full resuscitation, or unknown to the attending staff) are shown in Figure 2.

The highest consistency was found when parents requested full care ( $\alpha=0.65$ ), while lower consistency was observed when parents wanted to avoid treatment ( $\alpha=0.55$ ). The lowest consistency was detected when parental preferences were unknown ( $\alpha=0.34$ ), indicating inconsistency in the doctor's position across different preterm birth dates in the absence of parental preferences.

Respondents' views on whether resuscitation is in the best interest of premature infants born at 22, 23 and 24 weeks' gestation were linked to their willingness to offer intensive/ non-intensive care in the scenario that parents' wishes were unknown or when parents seeked to withhold treatment ( $p<0.001$ ,  $p<0.001$  and  $p=0.045$ , respectively). At 22 weeks 3 days' delivery, such a relationship was also significant when parents seek full care immediately after birth ( $p=0.013$ ).

### *Attitudes regarding the legal position*

Twenty-six percent of responders believe that at 22 weeks, there is no legal obligation to provide postpartum treatment, even if requested by the parents. For infants born at 23 weeks, most respondents (73%) believe that there is no legal obligation to resuscitate the premature infant but it may be done if requested by the parents.

### *Attitudes and Knowledge Regarding the Clinical Guidelines*

In this study, respondents' replies did not always correspond with the clinical guidelines on the management of deliveries at the border of viability. Hence, per deliveries at 22 weeks, while most of the respondents understand that according to the clinical guidelines resuscitation should not be offered and management of deliveries should be made in accordance with maternal indications, 25% of them hold that resuscitation can be offered following parents' request, and 5% of them believe that resuscitation is at the full discretion of physicians or that there is a clinical recommendation to offer it even if this is contrary to parents' wishes. This latter position significantly increases and is prevalent among 19% of respondents when asked about deliveries at 23 weeks, although clinical guidelines do not hold that.

Clinical guidelines do not address conflicts between parents and physicians regarding resuscitation of infants born at 22 weeks. Respondents' opinions are divided: 30% support neonatologists' views, 24% prioritize parents' views, and 45% consider the infant's medical status, specifically vitality, as the deciding factor. For infants born at 23 weeks, there is less division: 3% support physicians' views, while 44% believe parents' wishes should prevail.

Respondents who believe resuscitation contradicts the best interests of the infant tend to provide less intensive care. Conversely, respondents who think the guidelines grant discretion to physicians or recommend resuscitation despite parents' objections are more willing to offer intensive care in such situations. ( $\chi^2(4)=16.81$ ,  $p=0.002$ ).

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Most respondents (56%) think that providing full care to infants born at 22 and 23 weeks should be avoided, even if it could enhance neonatal care and survival rates for larger infants born at 24-25 weeks. Eleven percent do not believe that such a contribution would be significant. However, approximately 23% of the respondents argue that all efforts should be made to improve viability at 24-25 weeks.

Fifty three percent (53%) of the respondents stated that they agree/ very much agree that every living creature has the right to live, even with severe disability. However, most (86%) of the respondents believed that the quality of life of an infant born on 22 or 23 weeks and his/ her chances of survival are more important than their mere living existence. Respondents were divided as to whether neonatologists have (43%) or do not have (57%) a moral right to determine if the life of a premature infant born on 22 or 23 weeks are worth living.

Over half of respondents (54%) believe the neonatologist's legal risk affects decision-making for premature infants at 22 or 23 weeks. A higher percentage (89%) think personal values of the physician influence these decisions, while a lower percentage (23%) see financial considerations as influential.

*The influence of physicians' biographical characteristics on care decision making*

At 22 weeks, male and non-Jewish physicians tend to offer more intensive treatment when parents wish to withhold care ( $p=0.049$  and  $p=0.009$ , respectively).

At 23 weeks, male physicians tend to provide more intensive treatment when parents seek full care ( $p=0.031$ ), while non-Jewish or non-secular Jewish physicians offer more intensive treatment when parents wish to withhold care ( $p=0.014$  and  $p=0.038$ , respectively). The more experienced the physician, the more he or she tends to offer intensive treatment, even when the infant's parents seek to withhold treatment ( $r=0.239$ ,  $p=0.036$ ).



At 24 weeks, female, foreign-born, or religious physicians offer more intensive treatment when parents want to withhold care ( $p=0.018$ ,  $p=0.013$  and  $p=0.039$ , respectively). Otherwise, no significant relationship has been observed between respondents' biographical characteristics, type and size of healthcare organization or work experience and respondents' preference as to postpartum treatments offered to infants born at 22-24 weeks. When parents' wishes are unknown, the more experienced the physician, the more he or she is likely to offer intensive treatment ( $r=0.247$ ,  $p=0.030$ ).

## Discussion

In our national survey, we examined neonatologists' attitudes towards resuscitation at the verge of viability, specifically the attitude regarding infant's best interest at 22, 23 and 24 weeks' gestation. We asked about the resuscitation decisions during these weeks, and the basis for these decisions, and assessed how they correspond with the published national guidelines. Overall, the physicians demonstrated diversity and occasional discrepancies with the national guidelines concerning resuscitation at the border of viability. Israel is a melting pot of religions and ethnicities and this variation could inform policy makers and the health fraternity on best ways to handle a question that really has no answer.

When asked about resuscitation preferences according to parents' wish, at 22 weeks, 14% answered that they would perform some resuscitation actions even if the parents wish to avoid it. If the parents' wish was unknown, almost half preferred some resuscitation effort, especially if the newborn was vital. If the parents desired full treatment, over 70% would resuscitate the newborn, regardless of vitality. This variability in the approach regarding resuscitation is inconsistent with the recommendations of the National Neonatology Association that supports compassionate care only, and

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does not correspond to the fact that over 75% thought that resuscitation is not in the best interest of the preterm newborn at this gestation.

At 23 weeks' gestation, most physicians aligned with parents' wishes and national guidelines, choosing not to resuscitate if the parents were against it or fully resuscitate if the parents wanted it. However, 25% of physicians would initiate some resuscitation, especially if the newborn was vital, even against parents' wishes. If parents desired full treatment, all physicians tended to provide care, but often limited to intubation. Interestingly, if the parents' wish is unknown, only 16% would provide compassionate care, despite 50% declared previously that resuscitation is not in the newborn's best interest at 23 weeks. Overall, our findings reveal a gap between the neonatologists' perception as to what is or is not in the best interest of the newborn and their pragmatic view, which is mostly affected by parents' wishes, but is also related to deeper personal attitudes and beliefs that may contradict each other.

Physicians tend to provide resuscitation when attending birth at 24 weeks' gestation. However, even in such cases medical discretion is exercised. Hence, almost half and more than half will resuscitate only if the infant is vital, if the parents' wish is unknown or against providing care, respectively. When the parents are against care, 17% will choose compassionate care only. In general, participants' attitudes regarding resuscitation at the age of 24 weeks of pregnancy were variable, but in line with the 2020 national guidelines.

Our findings show that neonatologists' personal beliefs as to whether provide full and intensive care immediately after a premature infant is born is in the best or not in the best interests of the infant is mostly expressed in two scenarios: when parents' wishes are unknown, and when parents seek to withhold care. However, when parents seek full care, such personal views are less powerful in determining the course of treatment. Despite religious and cultural diversity in Israel, and similar to another study [17], which surveyed Israeli neonatologist' views on life and death issues, our study also

reveals that Israeli neonatologists' ethnic, religious or religiosity levels have little impact on their decision of whether to resuscitate a premature child. Instead, they refer mostly to considerations such as the child's chances of survival, caring for a handicapped child and respecting parents' wishes.

Around the globe, neonatologists acknowledge the significance of including parents in the decision-making process, but their approach varies depending on the infant's gestational age (GA).[18,19] Belgian neonatologists noted the existence of a gray zone, placed at 23-24 weeks gestation, where parents were perceived as the primary decision-makers due to the significant clinical ambiguity. Beyond this gray zone, i.e., below 23 weeks and above 24 weeks' gestation, physicians were considered the main decision-makers, and while parents' desires were considered, counseling became more authoritative and the physician made the ultimate decision.[19]

In their study, Tan et al showed differences between clinicians and parents when deciding on resuscitation or neonatal intensive care treatment. Parents appeared to be more tolerant of a higher mortality and averse to disability risks compared to clinicians.[18] However, parents do not approach these decisions from one common perspective.[20] In addition, there is significant variation among neonatal professionals' assessments of survival and severe disability rates for extremely premature infants, which can further affect the precision of informed shared decision making.[21] Accordingly, Haward et al suggested moving from doctor-driven to parent-personalized discussions when counseling at the gray zone of viability.[20]

The findings in this study reveal that neonatologists' views regarding the resuscitation at 22 weeks, and in some circumstances at 23 weeks as well, do not correspond to the national guidelines. Resuscitation guidelines in the threshold of viability vary among different countries, but they generally recommend that infants born at or beyond 23 weeks' gestation should be considered for active resuscitation, while those born earlier will receive comfort care or should be managed according to individual circumstances. Decisions about resuscitation take into account factors such as gestational age, birth weight, parental preferences and the infant's overall condition. In Canada and UK palliative

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care is suggested when there is high risk for mortality or severe neurodevelopmental disability, which includes for example all infants born at 22 weeks GA, or birth-weight <400g irrespective of additional risk factors, and intensive care or palliative care are both usual care options for infants at 23 weeks. [22,23]. Based on survival rate without major impairment, in Australia and New Zealand, guidelines suggest that for infants born at 23 weeks', decisions about the baby's best interests should be done in partnership with parents and can be flexible, while those born at 22 weeks' gestation will usually receive comfort care. Infants born at 24 weeks will usually receive full resuscitation and care. [24] In Belgium, from 24 weeks resuscitation is mandatory. Below 24 weeks, resuscitation is generally not recommended, but exceptions are considered.[19] In the US, the guidance by the American College of Obstetricians and the AAP is to consider resuscitation at 22 and 23 weeks and recommend it at 24 and 25 weeks. [25–27] As mentioned, the Israeli guidelines<sup>16</sup> state that no intensive care should be provided at 22.0-22.6 weeks' gestation, and that providing intensive care to preterm infants born at 24.0 gestation and higher is the default. At 23.0-23.6 gestation, treatment should be in accordance with the parents' wishes and the newborn's clinical status and response to intensive care after birth.<sup>16</sup>

Although many guidelines resemble the Israeli guidelines, in some countries, a more proactive approach is common even at 22 weeks.[28] Outcomes of infants delivered at 22 to 24 weeks of gestation vary significantly between countries and even between centers.[5] The data on survival of extreme premature infants in Israel shows practically no survival at 22.0-22.6 weeks' gestation, around 17% survival for preterm infants born at 23.0-23.6 weeks' gestation, and 50-60% at 24.0-24.6 weeks .[29] Among other explanations for the low survival rate in Israel, which is considered a modern developed country with good medical capabilities, one can argue for a self-fulfilling prophecy explanation. Accordingly, if neonatologists in Israel believe that survival is extremely rare in 22-23 weeks' gestation, they will refrain from providing intensive care to newborns born at these weeks. Adhering to this argument, it is possible, theoretically, that if neonatologists offer more intensive care at 23 and even at 22 weeks' gestation, the survival rate may increase.

Similar to our research, other studies have shown that the approach of medical staff to resuscitation at the threshold of viability varies and does not always adhere to published guidelines and framework. One possible cause is that the prognosis of premature birth at the threshold of viability is not solely dependent on gestational age and is more complex.[9] To better reflect the views of medical professionals, guidelines should take into consideration additional factors that affect the survival and survival without impairment of these newborns. This may result in guidelines that more accurately represent the diversity of opinions.[30]

Despite having more detailed guidelines that consider various factors when determining whether resuscitation should be recommended or avoided beyond gestational age, the medical staff still have their own attitudes and make decisions that deviate from these guidelines. In the UK, neonatal professionals' interpretation and subsequent management decisions do not always follow the guideline framework's recommendations.[21] Lore et al found that physicians' views of extremely early newborns' future quality of life correlated with self-reported resuscitation preferences and varied by specialty and level of training.[31] Varying approaches utilized by midwives, obstetricians, neonatologists, and nurses who provide perinatal counseling to parents at extremely low gestational ages lead to conflicting advice, particularly when opinions regarding treatment decisions diverged. [32] In the US, Boghossian et al demonstrated a significant regional disparity in perinatal interventions for the care of neonates at 22 and 23 weeks' gestation. Regional and racial-ethnic differences can also influence perinatal interventions. Thus, for example, in the Northeast and West regions in the US, neonates from minority backgrounds at 22 and 23 weeks' gestation received a greater amount of postnatal life support.[26]

As suggested by Williams et al, plausible solution to bridge the gap between the viewpoints of healthcare providers and the guidelines would be to create guidelines based on comprehensive and extensive survey of medical professionals from various specialties who manage premature infants. This would enable the creation of guidelines that reflect a diverse range of accepted perspectives.[33]

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Our study has limitations. We acknowledge the potential controversy surrounding the strategy of resuscitating if the baby is deemed 'vital' (as outlined in Table 1, strategies 3&4). It is noted that Apgar scores and heart rates at 1 and 5 minutes may not reliably predict survival or intact neurologic survival.[32] Nevertheless, similar to the consideration of other treatment options, neonatologists contributed suggestions regarding these options during the construction of the questionnaire, and they were all chosen intermittently in the survey itself. Seventy-one response rate, while good, may be considered moderate for such an important topic and given its descriptive nature. Non-responders' characteristics were similar to responders (data not shown). Additionally, this is a survey, and there might be a gap between what neonatologists say they would do and their actual practices. Further studies should compare the results of the survey to actual data regarding resuscitation and survival rates in various neonatal deliveries.

**Conclusion**

Our survey revealed significant variability in delivery room management decisions at 22 to 24 weeks' gestation among Israeli neonatologists, with a majority (but not all and not at every scenario) placing emphasis on respecting parents' wishes. National guidelines, developed by selected neonatologists, do not fully capture this diversity.

Given the uncertainty of infants' outcomes at the viability threshold, it is reasonable that management would be individualized and family-centered, considering fetal and maternal conditions, risk factors, and parental beliefs. Each country's guidelines should incorporate a wide range of opinions, possibly through surveys of caregivers, including nurses or parents for reflection and formulation. Regardless of guidelines, promoting optimal decision-making in delivery room management should involve joint discussions between parents and neonatal care providers whenever possible.

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Table 1: Questions regarding resuscitation preferences according to parents' wish\*

Gestational week **	Parents' wish towards resuscitation	Your preferred treatment strategy ***				
22+3/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5
23+3/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5
24+2/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5

\* Part of the questionnaire.

\*\* Assume 48h after prenatal steroid treatment, regardless of your institute's policy.

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- 1) No resuscitation, compassionate treatment only.
- 2) "Non-invasive" resuscitation procedures only (e.g., no intubation, no chest compressions, no medications).
- 3) Intubation and positive pressure ventilation only, and only if the newborn is vital (i.e., had body movements and/or breathing effort).
- 4) Full resuscitation as needed only if the newborn is vital.
- 5) Full resuscitation as needed in any case.

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Table 2: Participants characteristics	
Gender, Female/Male (%)	52/48
Age (years), mean (range);SD	51 (31-82);10
Place of Birth (%)	
Israel	64
Previously USSR	14
Europe/USA	16
other	6
Marital Status (%)	
Married	86
In partnership	5
Divorced	8
Single	1
Nationality (%)	
Jewish	83
Arab	8
Other/unknown	9
Religion (%)	
Jewish	83
Christian	8
Druze	2
Agnostic	2
Unknown	5
Religiosity (%)	
Secular	78
Traditional	12
Religious	8
Ultra-Orthodox Jews/Very religious;.	2
Work Experience (Years), mean (range);SD	17 (0.2-56);12
Type of Healthcare organization (%)	
Governmental hospitals	33
public hospitals	57
Private hospitals	10
Hospital's volume of care (births per year) (%)	
< 3000	10
3000-5000	30
5000-8000	26
> 8000	34

**Figure 1 - best interest by week percentage**

[Respondents' beliefs regarding whether resuscitation and full treatment are in the best interests of infants born at 22, 23, and 24 weeks' gestation.]

**Figure 2 - Resuscitation decisions, percentage**

[Respondents' preferred resuscitation decisions at weeks 22, 23, and 24 of gestation, across different scenarios of parental wishes (against resuscitation, requesting full resuscitation, or unknown to the attending staff)]

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**At the Threshold of Viability – To Resuscitate or Not to Resuscitate –  
The Perspectives of Israeli Neonatologists**

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**Key words:** Neonate, Prematurity, threshold of viability, resuscitation.

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**Research Ethics Approval:** The study was approved by the ethics committee of the University of Haifa, Israel (approval # 412/21, dated 4h July, 2021).

## Abstract

**Objective:** To examine the perspectives of neonatologists in Israel regarding resuscitation of preterm infants born at 22-24 weeks' gestation and their consideration of parental preferences. The factors that influence physicians' decisions at the verge of viability were investigated, and the extent to which their decisions align with the national clinical guidelines were determined.

**Study design:** Descriptive and correlative study using a 47-questions online questionnaire.

**Results:** Ninety (71%) of 127 active neonatologists in Israel responded. 74%, 50%, and 16% of the respondents believed that resuscitation and full treatment at birth are against the best interests of infants born at 22-, 23-, and 24-weeks' gestation, respectively. Respondents' decisions regarding resuscitation of extreme preterm infants showed significant variation and were consistently in disagreement with either the national clinical guidelines or the perception of what is in the best interest of these newborns. Gender, experience, country of birth and the level of religiosity were all associated with respondents' preferences regarding treatment decisions. Personal values and concerns about legal issues were also believed to affect decision-making.

**Conclusion:** Significant variation was observed among Israeli neonatologists regarding delivery room management of extreme premature infants born at 22-24 weeks' gestation, usually with a notable emphasis on respecting parents' wishes. The current national guidelines do not fully encompass the wide range of approaches. Country's guidelines should reflect the existing range of opinions, possibly through a broad survey of caregivers before setting the guidelines and recommendations.

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- **What is already known on this topic** – Managing deliveries at the limit of viability (broadly defined as 22 0/7 weeks through 24 6/7 weeks' gestation) remains one of the most challenging issues faced by neonatologists. Guidelines regarding treatment for infants born at the threshold of viability may be confusing and lead to various courses of action.
- **What this study adds** – Significant variation was observed among Israeli neonatologists regarding delivery room management of extreme premature infants born at 22-24 weeks' gestation, with a notable emphasis on respecting parents' wishes.

**How this study might affect research** – Country's guidelines should reflect the existing range of opinions, possibly through a broad survey of caregivers before setting the guidelines and recommendations.



## Introduction

Birth at a very immature stage of intrauterine development imposes a high risk of death or severe long-term neurologic disability. This can generate medical, ethical, and legal controversies, challenges, and opportunities.[1–4] It is questionable whether initiating resuscitation after birth in these extremely preterm infants could be considered in their best interests. However, how to translate this concern into clinical action may be unclear.[5] To this, the large gaps in the law regarding treatment of infants born in the gray zone of viability should be added.[6]

The counseling and management of deliveries at the limit of viability (broadly defined as 22 0/7 weeks through 24 6/7 weeks' gestation) remains one of the most challenging issues faced by neonatologists. Physicians and parents make complex and challenging decisions.[7] Those rely, as in many other ethical dilemmas, on prognostic data.[8–10]

Multiple factors are associated with the outcomes of extreme prematurity in addition to gestational age at birth. These include non-modifiable factors (including gender, birth weight and plurality), but also potentially modifiable antepartum factors (the location of the delivery (country, hospital), administration of antenatal corticosteroids and magnesium sulfate), and of course the decision whether to start or withhold intensive care after delivery.[8,9] While there is a clear trend of improvement in survival of extreme premature infants in recent years, a significant variation in outcomes exists between countries and even between hospitals in the same country. [8,11–14]

Deliveries occurring between 22- and 23-weeks' gestation are associated with the most complicated dilemmas. In countries like Japan, Sweden, United Kingdom, United States of America and Canada, full intensive care is sometimes provided and neurodevelopmental outcomes are assessed even after deliveries at these gestational ages.[10,12–15] The data from these countries suggest that survival without moderate to severe neurodevelopmental impairment is a possibility even in -preterm infants born at these very premature range of gestational ages.

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Guidelines regarding treatment for infants born at the threshold of viability may be confusing and lead to various courses of action. A position paper published by the Israeli Neonatal and OBGYN societies 2020 [16] serves as a guideline for managing threatened deliveries at the verge of viability. According to this statement, intensive care should not be given to infants born between 22.0-22.6 weeks' gestation, while those born at or after 24.0 weeks should get full intensive care by default. For infants born between 23.0-23.6 weeks, the decision on whether to provide intensive care should depend on the parents' preferences and the newborn's medical condition and initial response to treatment.

The health system in Israel is a National Health Insurance system, and NICU stay is subsidized and freely accessible to all. In Israel, a rich mosaic of religions and ethnicities comes together, complicating the formulation of generalized guidelines for ethical questions. In this study, we examined the attitudes of neonatologists in Israel regarding resuscitation at the threshold of viability. In addition, we examined whether the guidelines, set in Israel as in the rest of the world by a small group of physicians, reflect the opinion of most neonatologists. We hypothesized that we would find diversity in attitudes and results, with some deviation from the current Israeli guidelines for managing births at the verge of viability.

## Methods

### *Aims and design*

The research aims were to investigate Israeli neonatologists' views and attitudes regarding resuscitation of newborns at 22-24 weeks and their responses to parents' requests to resuscitate or not resuscitate these premature infants. It also seeks to explore the additional factors that influence physicians' decisions and how their approaches correspond with the Israeli clinical guidelines.

This was a descriptive and correlative study that utilized a 47-questions online questionnaire developed by the researchers and sent to all Israeli neonatologists. The study was approved by the ethics committee of the University of Haifa, Israel (approval # 412/21, dated 4h July, 2021).

### *The study population:*

Following a pilot testing by five neonatologists, a final online questionnaire was developed and distributed as URL link using an existing email distribution list of all Israeli neonatologists, who are registered in the Israeli Neonatal Society, 127 physicians altogether. The email was sent weekly, five times between April 13th and May 11th, 2020.

### *The questionnaire:*

We created the questionnaire (see supplementation) with input from a team of expert neonatologists and conducted preliminary pilot testing involving 10 neonatologists to assess internal consistency and inter-rater reliability using Cronbach's alpha. The participants were presented with a scenario where they had to consider the best interests of premature infants born at 22-, 23- or 24-weeks' gestation. The following questions were designed to identify the main factors that affect decisions regarding postpartum treatments. We used Likert scales and multiple-choice questions.

In the following items, respondents had to choose one of five postpartum treatments in one of the three following situations applying to deliveries at 22, 23, and 24 weeks (three situations per each

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week): 1) parents seek to avoid any treatment following birth. 2) parents' wish is unknown 3) parents seek full treatment. The alternative treatments included: 1) No resuscitation, compassionate care only. 2) “Non-invasive” resuscitation procedures only (i.e., bag and mask ventilation only, no intubation, no chest compressions, no medications). 3) Intubation and positive pressure ventilation only, and only if the newborn is vital (i.e., had body movements and/or breathing effort). 4) Full resuscitation as needed only if the newborn is vital. 5) Full resuscitation as needed in any case. (Table 1)

Afterward, participants selected statements that they believed accurately reflected the legal status and professional guidelines related to deliveries at 22-24 weeks. The following questions assessed the participant's opinions on managing conflicts between the treating physician and the parents regarding postpartum treatment after delivery at weeks 22-23. Additionally, we asked about the participant's inclination towards administering steroids in the case of a clinical indication of early threatened delivery at 22 or 23 weeks’ gestation.

*Data analysis:*

We used descriptive statistics to analyze the socio-demographic characteristics, views, and attitudes towards resuscitation and postpartum care for premature infants born at 22-24 weeksgestation. We also examined the relationships between these factors, using various statistical methods depending on the variable types, including Chi-square test for independence or Fisher exact test (for nominal data), Wilcoxon tests, Kruskal-Wallis tests and Spearman correlations (for ordinal data) and t-tests (for continuous data). Our analysis was performed for according to gestational age. We assessed the internal consistency of attitudes towards resuscitation and postpartum care according to gestation using Cronbach's alpha coefficient, conditional on three possible parental preferences: full care, no treatment, or unknown.

## Results

Ninety (71%) questionnaires were correctly and fully completed, and were thus analyzed for this research. The characteristics of the participants are presented in table-2.

### *General attitudes*

Overall, 74%, 50%, and 16% of respondents believe that resuscitation and full treatment at birth is contrary to the best interests of infants born at 22, 23, and 24 weeks' gestation, respectively (Figure 1).

The principal factor influencing most (62%) of the respondents' treatment decisions was their knowledge regarding infant survival without severe impairment after discharge. The importance ascribed to the sanctity of life was very scarce among respondents (3%).

The answers regarding the respondents' preferred resuscitation decisions (table 1) in weeks 22, 23- and 24 of gestations, in the different scenarios of parents' wishes (against, asking for full resuscitation, or unknown to the attending staff) are shown in Figure 2.

The highest consistency was found when parents requested full care ( $\alpha=0.65$ ), while lower consistency was observed when parents wanted to avoid treatment ( $\alpha=0.55$ ). The lowest consistency was detected when parental preferences were unknown ( $\alpha=0.34$ ), indicating inconsistency in the doctor's position across different preterm birth dates in the absence of parental preferences.

Respondents' views on whether resuscitation is in the best interest of premature infants born at 22, 23 and 24 weeks' gestation were linked to their willingness to offer intensive/ non-intensive care in the scenario that parents' wishes were unknown or when parents sought to withhold treatment ( $p<0.001$ ,  $p<0.001$  and  $p=0.045$ , respectively). At 22 weeks 3 days' delivery, such a relationship was also significant when parents seek full care immediately after birth ( $p=0.013$ ).

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3 *Attitudes regarding the legal position*  
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6 Twenty-six percent of responders believe that at 22 weeks, there is no legal obligation to  
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8 provide postpartum treatment, even if requested by the parents. For infants born at 23 weeks, most  
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10 respondents (73%) believe that there is no legal obligation to resuscitate the premature infant but it  
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12 may be done if requested by the parents.  
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16 *Attitudes and Knowledge Regarding the Clinical Guidelines*  
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20 In this study, respondents' replies did not always correspond with the clinical guidelines on the  
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22 management of deliveries at the border of viability. Hence, per deliveries at 22 weeks, while most of  
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24 the respondents understand that according to the clinical guidelines resuscitation should not be offered  
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26 and management of deliveries should be made in accordance with maternal indications, 25% of them  
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28 hold that resuscitation can be offered following parents' request, and 5% of them believe that  
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30 resuscitation is at the full discretion of physicians or that there is a clinical recommendation to offer it  
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32 even if this is contrary to parents' wishes. This latter position significantly increases and is prevalent  
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34 among 19% of respondents when asked about deliveries at 23 weeks, although clinical guidelines do  
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36 not hold that.  
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40 Clinical guidelines do not address conflicts between parents and physicians regarding  
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42 resuscitation of infants born at 22 weeks. Respondents' opinions are divided: 30% support  
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44 neonatologists' views, 24% prioritize parents' views, and 45% consider the infant's medical status,  
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46 specifically vitality, as the deciding factor. For infants born at 23 weeks, there is less division: 3%  
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48 support physicians' views, while 44% believe parents' wishes should prevail.  
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52 Respondents who believe resuscitation contradicts the best interests of the infant tend to  
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54 provide less intensive care. Conversely, respondents who think the guidelines grant discretion to  
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56 physicians or recommend resuscitation despite parents' objections are more willing to offer intensive  
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58 care in such situations. ( $\chi^2(4)=16.81$ ,  $p=0.002$ ).  
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Most respondents (56%) think that providing full care to infants born at 22 and 23 weeks should be avoided, even if it could enhance neonatal care and survival rates for larger infants born at 24-25 weeks. Eleven percent do not believe that such a contribution would be significant. However, approximately 23% of the respondents argue that all efforts should be made to improve viability at 24-25 weeks.

Fifty three percent (53%) of the respondents stated that they agree/ very much agree that every living creature has the right to live, even with severe disability. However, most (86%) of the respondents believed that the quality of life of an infant born on 22 or 23 weeks and his/ her chances of survival are more important than their mere living existence. Respondents were divided as to whether neonatologists have (43%) or do not have (57%) a moral right to determine if the life of a premature infant born on 22 or 23 weeks are worth living.

Over half of respondents (54%) believe the neonatologist's legal risk affects decision-making for premature infants at 22 or 23 weeks. A higher percentage (89%) think personal values of the physician influence these decisions, while a lower percentage (23%) see financial considerations as influential.

#### *The influence of physicians' biographical characteristics on care decision making*

At 22 weeks, male and non-Jewish physicians tend to offer more intensive treatment when parents wish to withhold care ( $p=0.049$  and  $p=0.009$ , respectively).

At 23 weeks, male physicians tend to provide more intensive treatment when parents seek full care ( $p=0.031$ ), while non-Jewish or non-secular Jewish physicians offer more intensive treatment when parents wish to withhold care ( $p=0.014$  and  $p=0.038$ , respectively). The more experienced the physician, the more he or she tends to offer intensive treatment, even when the infant's parents seek to withhold treatment ( $r=0.239$ ,  $p=0.036$ ).

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At 24 weeks, female, foreign-born, or religious physicians offer more intensive treatment when parents want to withhold care ( $p=0.018$ ,  $p=0.013$  and  $p=0.039$ , respectively). Otherwise, no significant relationship has been observed between respondents' biographical characteristics, type and size of healthcare organization or work experience and respondents' preference as to postpartum treatments offered to infants born at 22-24 weeks. When parents' wishes are unknown, the more experienced the physician, the more he or she is likely to offer intensive treatment ( $r=0.247$ ,  $p=0.030$ ).

**Discussion**

In our national survey, we examined neonatologists' attitudes towards resuscitation at the verge of viability, specifically the attitude regarding infant's best interest at 22, 23 and 24 weeks' gestation. We asked about the resuscitation decisions during these weeks, and the basis for these decisions, and assessed how they correspond with the published national guidelines. Overall, the physicians demonstrated diversity and occasional discrepancies with the national guidelines concerning resuscitation at the border of viability. Israel is a melting pot of religions and ethnicities and this variation could inform policy makers and the health fraternity on best ways to handle a question that really has no answer.

When asked about resuscitation preferences according to parents' wish, at 22 weeks, 14% answered that they would perform some resuscitation actions even if the parents wish to avoid it. If the parents' wish was unknown, almost half preferred some resuscitation effort, especially if the newborn was vital. If the parents desired full treatment, over 70% would resuscitate the newborn, regardless of vitality. This variability in the approach regarding resuscitation is inconsistent with the recommendations of the National Neonatology Association that supports compassionate care only, and



does not correspond to the fact that over 75% thought that resuscitation is not in the best interest of the preterm newborn at this gestation.

At 23 weeks' gestation, most physicians aligned with parents' wishes and national guidelines, choosing not to resuscitate if the parents were against it or fully resuscitate if the parents wanted it. However, 25% of physicians would initiate some resuscitation, especially if the newborn was vital, even against parents' wishes. If parents desired full treatment, all physicians tended to provide care, but often limited to intubation. Interestingly, if the parents' wish is unknown, only 16% would provide compassionate care, despite 50% declared previously that resuscitation is not in the newborn's best interest at 23 weeks. Overall, our findings reveal a gap between the neonatologists' perception as to what is or is not in the best interest of the newborn and their pragmatic view, which is mostly affected by parents' wishes, but is also related to deeper personal attitudes and beliefs that may contradict each other.

Physicians tend to provide resuscitation when attending birth at 24 weeks' gestation. However, even in such cases medical discretion is exercised. Hence, almost half and more than half will resuscitate only if the infant is vital, if the parents' wish is unknown or against providing care, respectively. When the parents are against care, 17% will choose compassionate care only. In general, participants' attitudes regarding resuscitation at the age of 24 weeks of pregnancy were variable, but in line with the 2020 national guidelines.

Our findings show that neonatologists' personal beliefs as to whether provide full and intensive care immediately after a premature infant is born is in the best or not in the best interests of the infant is mostly expressed in two scenarios: when parents' wishes are unknown, and when parents seek to withhold care. However, when parents seek full care, such personal views are less powerful in determining the course of treatment. Despite religious and cultural diversity in Israel, and similar to another study [17], which surveyed Israeli neonatologist' views on life and death issues, our study also

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reveals that Israeli neonatologists' ethnic, religious or religiosity levels have little impact on their decision of whether to resuscitate a premature child. Instead, they refer mostly to considerations such as the child's chances of survival, caring for a handicapped child and respecting parents' wishes.

Around the globe, neonatologists acknowledge the significance of including parents in the decision-making process, but their approach varies depending on the infant's gestational age (GA).[18,19] Belgian neonatologists noted the existence of a gray zone, placed at 23-24 weeks gestation, where parents were perceived as the primary decision-makers due to the significant clinical ambiguity. Beyond this gray zone, i.e., below 23 weeks and above 24 weeks' gestation, physicians were considered the main decision-makers, and while parents' desires were considered, counseling became more authoritative and the physician made the ultimate decision.[19]

In their study, Tan et al showed differences between clinicians and parents when deciding on resuscitation or neonatal intensive care treatment. Parents appeared to be more tolerant of a higher mortality and averse to disability risks compared to clinicians.[18] However, parents do not approach these decisions from one common perspective.[20] In addition, there is significant variation among neonatal professionals' assessments of survival and severe disability rates for extremely premature infants, which can further affect the precision of informed shared decision making.[21] Accordingly, Haward et al suggested moving from doctor-driven to parent-personalized discussions when counseling at the gray zone of viability.[20]

The findings in this study reveal that neonatologists' views regarding the resuscitation at 22 weeks, and in some circumstances at 23 weeks as well, do not correspond to the national guidelines. Resuscitation guidelines in the threshold of viability vary among different countries, but they generally recommend that infants born at or beyond 23 weeks' gestation should be considered for active resuscitation, while those born earlier will receive comfort care or should be managed according to individual circumstances. Decisions about resuscitation take into account factors such as gestational age, birth weight, parental preferences and the infant's overall condition. In Canada and UK palliative

care is suggested when there is high risk for mortality or severe neurodevelopmental disability, which includes for example all infants born at 22 weeks GA, or birth-weight <400g irrespective of additional risk factors, and intensive care or palliative care are both usual care options for infants at 23 weeks. [22,23]. Based on survival rate without major impairment, in Australia and New Zealand, guidelines suggest that for infants born at 23 weeks', decisions about the baby's best interests should be done in partnership with parents and can be flexible, while those born at 22 weeks' gestation will usually receive comfort care. Infants born at 24 weeks will usually receive full resuscitation and care. [24] In Belgium, from 24 weeks resuscitation is mandatory. Below 24 weeks, resuscitation is generally not recommended, but exceptions are considered.[19] In the US, the guidance by the American College of Obstetricians and the AAP is to consider resuscitation at 22 and 23 weeks and recommend it at 24 and 25 weeks. [25–27] As mentioned, the Israeli guidelines<sup>16</sup> state that no intensive care should be provided at 22.0-22.6 weeks' gestation, and that providing intensive care to preterm infants born at 24.0 gestation and higher is the default. At 23.0-23.6 gestation, treatment should be in accordance with the parents' wishes and the newborn's clinical status and response to intensive care after birth.<sup>16</sup>

Although many guidelines resemble the Israeli guidelines, in some countries, a more proactive approach is common even at 22 weeks.[28] Outcomes of infants delivered at 22 to 24 weeks of gestation vary significantly between countries and even between centers.[5] The data on survival of extreme premature infants in Israel shows practically no survival at 22.0-22.6 weeks' gestation, around 17% survival for preterm infants born at 23.0-23.6 weeks' gestation, and 50-60% at 24.0-24.6 weeks. [29] Among other explanations for the low survival rate in Israel, which is considered a modern developed country with good medical capabilities, one can argue for a self-fulfilling prophecy explanation. Accordingly, if neonatologists in Israel believe that survival is extremely rare in 22-23 weeks' gestation, they will refrain from providing intensive care to newborns born at these weeks. Adhering to this argument, it is possible, theoretically, that if neonatologists offer more intensive care at 23 and even at 22 weeks' gestation, the survival rate may increase.

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Similar to our research, other studies have shown that the approach of medical staff to resuscitation at the threshold of viability varies and does not always adhere to published guidelines and framework. One possible cause is that the prognosis of premature birth at the threshold of viability is not solely dependent on gestational age and is more complex.[9] To better reflect the views of medical professionals, guidelines should take into consideration additional factors that affect the survival and survival without impairment of these newborns. This may result in guidelines that more accurately represent the diversity of opinions.[30]

Despite having more detailed guidelines that consider various factors when determining whether resuscitation should be recommended or avoided beyond gestational age, the medical staff still have their own attitudes and make decisions that deviate from these guidelines. In the UK, neonatal professionals' interpretation and subsequent management decisions do not always follow the guideline framework's recommendations.[21] Lore et al found that physicians' views of extremely early newborns' future quality of life correlated with self-reported resuscitation preferences and varied by specialty and level of training.[31] Varying approaches utilized by midwives, obstetricians, neonatologists, and nurses who provide perinatal counseling to parents at extremely low gestational ages lead to conflicting advice, particularly when opinions regarding treatment decisions diverged. [32] In the US, Boghossian et al demonstrated a significant regional disparity in perinatal interventions for the care of neonates at 22 and 23 weeks' gestation. Regional and racial-ethnic differences can also influence perinatal interventions. Thus, for example, in the Northeast and West regions in the US, neonates from minority backgrounds at 22 and 23 weeks' gestation received a greater amount of postnatal life support.[26]

As suggested by Williams et al, plausible solution to bridge the gap between the viewpoints of healthcare providers and the guidelines would be to create guidelines based on comprehensive and extensive survey of medical professionals from various specialties who manage premature infants. This would enable the creation of guidelines that reflect a diverse range of accepted perspectives.[33]

Our study has limitations. We acknowledge the potential controversy surrounding the strategy of resuscitating if the baby is deemed 'vital' (as outlined in Table 1, strategies 3&4). It is noted that Apgar scores and heart rates at 1 and 5 minutes may not reliably predict survival or intact neurologic survival.[32] Nevertheless, similar to the consideration of other treatment options, neonatologists contributed suggestions regarding these options during the construction of the questionnaire, and they were all chosen intermittently in the survey itself. Seventy-one response rate, while good, may be considered moderate for such an important topic and given its descriptive nature. Non-responders' characteristics were similar to responders (data not shown). Additionally, this is a survey, and there might be a gap between what neonatologists say they would do and their actual practices. Further studies should compare the results of the survey to actual data regarding resuscitation and survival rates in various neonatal deliveries.

## Conclusion

Our survey revealed significant variability in delivery room management decisions at 22 to 24 weeks' gestation among Israeli neonatologists, with a majority (but not all and not at every scenario) placing emphasis on respecting parents' wishes. National guidelines, developed by selected neonatologists, do not fully capture this diversity.

Given the uncertainty of infants' outcomes at the viability threshold, it is reasonable that management would be individualized and family-centered, considering fetal and maternal conditions, risk factors, and parental beliefs. Each country's guidelines should incorporate a wide range of opinions, possibly through surveys of caregivers, including nurses or parents for reflection and formulation. Regardless of guidelines, promoting optimal decision-making in delivery room management should involve joint discussions between parents and neonatal care providers whenever possible.

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Table 1: Questions regarding resuscitation preferences according to parents’ wish\*

Gestational week **	Parents' wish towards resuscitation	Your preferred treatment strategy ***				
22+3/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5
23+3/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5
24+2/7	No treatment	1	2	3	4	5
	Unknown	1	2	3	4	5
	Full care	1	2	3	4	5

\* Part of the questionnaire.

\*\* Assume 48h after prenatal steroid treatment, regardless of your institute's policy.

\*\*\*

- 1) No resuscitation, compassionate treatment only.
- 2) “Non-invasive” resuscitation procedures only (e.g., no intubation, no chest compressions, no medications).
- 3) Intubation and positive pressure ventilation only, and only if the newborn is vital (i.e., had body movements and/or breathing effort).
- 4) Full resuscitation as needed only if the newborn is vital.
- 5) Full resuscitation as needed in any case.

<b>Table 2: Participants characteristics</b>	
Gender, Female/Male (%)	52/48
Age (years), mean (range);SD	51 (31-82);10
Place of Birth (%)	
Israel	64
Previously USSR	14
Europe/USA	16
other	6
Marital Status (%)	
Married	86
In partnership	5
Divorced	8
Single	1
Nationality (%)	
Jewish	83
Arab	8
Other/unknown	9
Religion (%)	
Jewish	83
Christian	8
Druze	2
Agnostic	2
Unknown	5
Religiosity (%)	
Secular	78
Traditional	12
Religious	8
Ultra-Orthodox Jews/Very religious;.	2
Work Experience (Years), mean (range);SD	17 (0.2-56);12
Type of Healthcare organization (%)	
Governmental hospitals	33
public hospitals	57
Private hospitals	10
Hospital's volume of care (births per year) (%)	
< 3000	10
3000-5000	30
5000-8000	26
> 8000	34

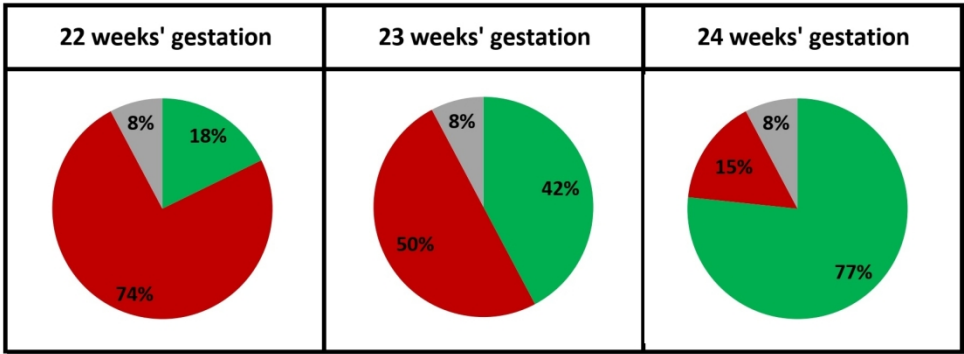
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**Figure 1 - best interest by week percentage**

[Respondents' beliefs regarding whether resuscitation and full treatment are in the best interests of infants born at 22, 23, and 24 weeks' gestation.]

**Figure 2 - Resuscitation decisions, percentage**

[Respondents' preferred resuscitation decisions at weeks 22, 23, and 24 of gestation, across different scenarios of parental wishes (against resuscitation, requesting full resuscitation, or unknown to the attending staff)]



- 1 ■ Resuscitation is in the infants' best interest
- 2 ■ Resuscitation is against the infants' best interest
- 3 ■ Did not answer

Figure 1 - best interest by week percentage  
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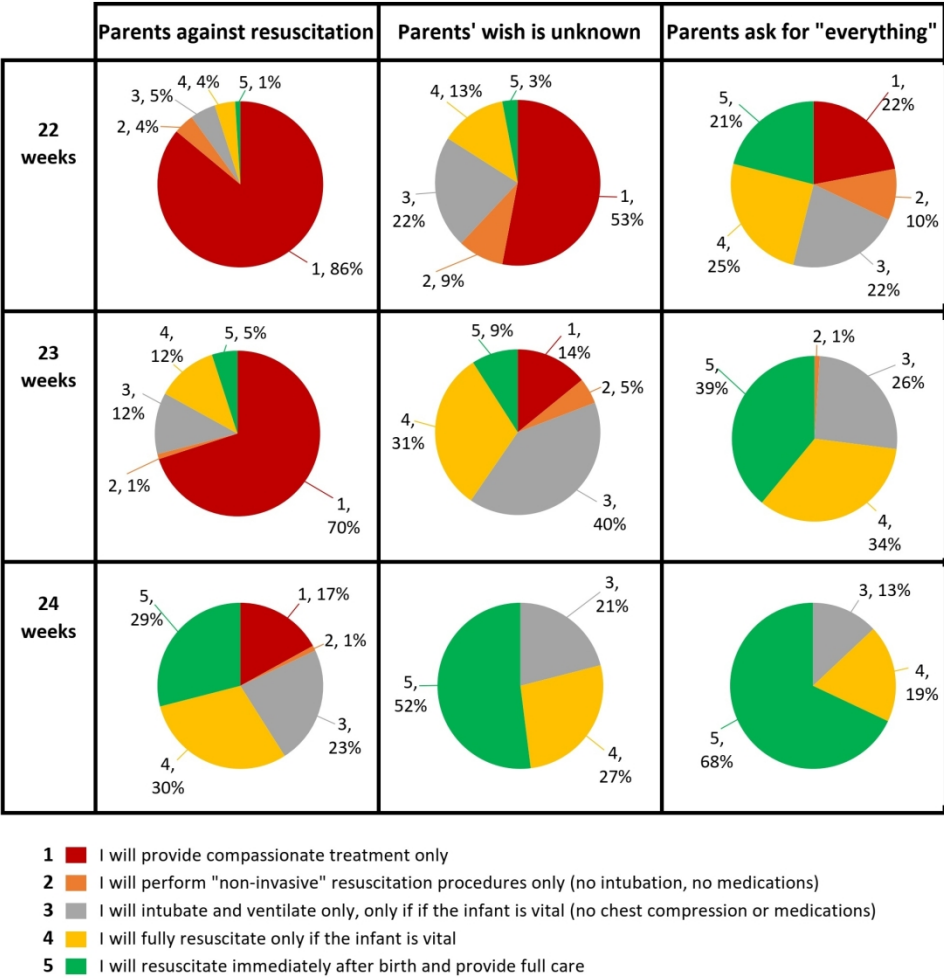


Figure 2 - Resuscitation decisions, percentage

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