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Recommendation for Newborn Safety in Hospitals and Intensive Care Units (ICU)-An Updated Review

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Abstract:

Background: The safety and care of newborns, particularly those in critical condition, are paramount in hospital settings, especially in Newborn Intensive Care Units (NICUs). Since the 1976 publication of the *Toward Improving the Outcome of Pregnancy* guidelines, various standards have been developed and updated to improve the design and functionality of NICUs. These guidelines are meant to provide optimal environments for neonatal care while promoting effective collaboration between healthcare providers and families.

Aim: This review aims to update and refine the safety measures in NICUs, offering practical recommendations for creating safe, family-centered environments that meet the evolving needs of newborns and their caregivers.

Methods: The review synthesizes standards set by the American Academy of Pediatrics (AAP), the American College of Obstetricians and Gynecologists (ACOG), and the American Institute of Architects. Through comprehensive literature review and expert consultation, the study analyzes the physical and operational aspects of NICU design, focusing on aspects like room configurations, equipment standards, environmental factors, and patient care protocols.

Results: The updated recommendations emphasize several key improvements, including the integration of specialized areas for newborn resuscitation and stabilization, the creation of couplet care rooms, and the

introduction of ECMO and MRI facilities for critical care. Enhanced guidance on space requirements, airflow systems, and temperature controls in NICU rooms are also highlighted. Additionally, the document stresses the importance of post-occupancy evaluations to ensure continued effectiveness.

Conclusion: These standards represent a collaborative effort to improve neonatal care by creating environments that support both medical treatment and emotional well-being for families. Future NICU designs should incorporate these standards while remaining flexible to adapt to emerging medical technologies and patient care needs.

Keywords: Newborn Intensive Care Units, NICU design, safety measures, neonatal care, facility planning, couplet care, resuscitation, ECMO, hospital guidelines.

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Introduction:

The formal development of planning guidelines for Newborn Intensive Care Units (NICUs) began with the publication of *Toward Improving the Outcome of Pregnancy* in 1976 [1]. This seminal work, authored by a multidisciplinary committee and released by the March of Dimes, established the foundation for regionalized perinatal care, outlining essential policies and planning recommendations for the design and roles within NICUs. Since its publication, the American Academy of Pediatrics (AAP) and the American College of Obstetricians and Gynecologists (ACOG) have published multiple editions of their comprehensive *Guidelines for Perinatal Care* [2], while the American Institute of Architects has periodically updated its *Guidelines for Construction of Hospital and Healthcare Facilities* [3]. The committee's objective is to augment the aforementioned documents by providing a detailed set of standards based on clinical expertise and an evolving body of scientific knowledge. These guidelines aim to serve healthcare professionals, architects, interior designers, state health regulators, and others involved in NICU planning, ensuring the development of facilities that align with current best practices.

In January 1992, a multidisciplinary team—including physicians, nurses, state health planning officials, consultants, and architects—convened with the support of Ross Products Division/Abbott Laboratories to reach a consensus on the initial edition of these recommendations. The document was distributed to the members of the American Academy of Pediatrics Section on Perinatal Pediatrics to solicit their feedback, and additional input was gathered from participants at the 1993 Parent Care Conference and an open, multidisciplinary conference on newborn ICU design in Orlando. Subsequent editions of the standards were developed through consensus committees in 1993, 1996, 1999, 2002, 2006, 2007, 2012, and 2019 under the auspices of the Gravens Conference. Parts of these standards have now been incorporated into the *American Institute of Architects/Facilities Guidelines Institute Guidelines* [3], the *AAP/ACOG Guidelines* [2], and standards in several other countries. Going forward, these recommendations will continue to evolve, incorporating new research, clinical experience, and expert suggestions. The document aspires to provide a consistent framework that can be adopted by states and endorsed by relevant national organizations while maintaining its relevance in the international context. Although many of these standards represent minimum requirements, the aim is to optimize facility design within the limits of available resources, ensuring that excellent healthcare can be delivered in environments that support both the family unit and the needs of healthcare professionals. It is also acknowledged that some decision-makers may have access to additional resources, enabling them to exceed the basic standards and pursue more ideal design solutions.

Application of These Standards

Unless stated otherwise, the recommendations provided in this document are primarily intended for the physical environments of newborn intensive care units, although they also have broader implications for the care of critically ill infants and their families. When the term "shall" is used, it reflects the committee's consensus that the standard is appropriate for future NICU construction. However, it is recognized that these standards may not always be feasible for existing NICUs or those undergoing partial renovations. Furthermore, the document refrains from making mandatory compliance statements unless

there is clear scientific evidence or broad consensus to support such a requirement. These standards focus on areas where such consensus or data is available. It is important to note that this document is not exhaustive. Rather, it is designed to offer guidance to planning teams as they address the functional needs of NICUs, with a particular focus on meeting the needs of infants, families, and healthcare staff. The design and planning process should integrate research, evidence-based recommendations, and expert input from both the internal interdisciplinary team and external specialists, including families who have firsthand experience of newborn intensive care. The design process should creatively capture the vision and spirit of the NICU's patients, families, and staff, reflecting the unique needs and challenges they face. Key components of the planning process should include:

- The development of a clear vision and goals for the project.
- Education on design principles and the processes for fostering organizational change.
- A thorough review of literature on patient- and family-centered care, individualized developmental care, team-building, evidence-based design, facility planning, and other relevant clinical practices.
- Site visits to new and renovated NICUs to observe design and operational considerations.
- Vendor fairs to explore potential suppliers and solutions.
- Program and space planning, including three-dimensional visualization of spaces.
- Operations planning, addressing aspects such as traffic flow, functional areas, and their relationship to ancillary services.
- Detailed interior planning, including selection of surface materials.
- Comprehensive review of architectural blueprints, specifications, and other relevant documents.
- Construction of mock-ups and simulation environments to test and refine designs.
- Preparation for staff and family adaptation to new practices and environments.
- Post-construction verification, simulation, and remediation as part of the implementation process.
- Post-occupancy evaluations to assess the effectiveness and functionality of the unit after it has been operational for some time.

Substantive Changes in the 10th Edition

In the revised 10th edition, Standards 6 and 7 have been merged, incorporating guidelines on space requirements for both multi-bed and private rooms. This revision also modifies the number of subsequent standards. Additional references are made to Extra-Corporeal Membrane Oxygenator (ECMO) and special care rooms, which are now specifically defined in terms of space requirements.

- **Standard 7 (previously Standard 8)** on Couplet Care Rooms now mandates that hospitals with both obstetric services and NICUs provide dedicated couplet care rooms. These rooms must be equipped to deliver intensive care for newborns alongside postpartum care for mothers, allowing them to stay together in the same room or suite.
- **Standard 9 (previously Standard 10)** has redefined the requirements for separate hallways, aligning them with the minimum standards of the Facilities Guidelines Institute (FGI) for similar spaces. The ECMO guidelines have been incorporated into Standard 6, and it is emphasized that procedure rooms should be considered enclosed spaces providing high levels of environmental control, rather than open areas.
- **Standard 15 (previously Standard 16),** concerning Support Spaces for Ancillary Services, now addresses the integration of infant MRI facilities, specifying space and weight capacity requirements.
- **Standard 20 (previously Standard 21)** introduces color considerations for wall finishes, suggesting that colors be chosen based on local cultural preferences and climate considerations.

- **Standard 29 (previously Standard 30)** provides further guidance on high-quality usability testing, expanding the interpretation to include more detailed recommendations.

The Newborn Intensive Care Unit

The American Academy of Pediatrics has outlined NICU levels of care [2], primarily distinguishing them based on the availability of specialized equipment and medical staff. Many NICUs offer a combination of intensive and step-down care for critically ill infants. These recommended standards are specifically designed for level III and IV NICUs, which provide the highest level of care. In this document, newborn intensive care is defined as care for infants who are medically unstable or critically ill, requiring constant nursing, complex surgical procedures, continuous respiratory support, or other intensive medical interventions. Intermediate care, or level II NICU care, includes care for infants who require less intensive nursing but may still require respiratory support. When an intensive care nursery is available, the intermediate nursery serves as a "step-down" unit. In facilities where infants of varying acuity are housed in the same area, it is essential that intensive care design standards be followed to maintain flexibility in clinical operations.

Delivery Room Standards

Infant Resuscitation/Stabilization Areas:

Designated spaces for infant resuscitation and stabilization must be integrated within operative delivery rooms, as well as Labor/Delivery/Recovery (LDR), Labor/Delivery/Recovery/Post-partum (LDRP) rooms, and other non-operative delivery areas. These delivery rooms may directly link to the nursery or Newborn ICU (NICU) through pass-through windows or doors. The ventilation system within each delivery and resuscitation room should maintain an ambient temperature between 72-78 degrees Fahrenheit (22-26 degrees Celsius) during newborn delivery, resuscitation, and stabilization. Furthermore, the design must comply with lighting and acoustical standards as outlined in standards 23, 24, 25, 26, and 28. For each area where infant resuscitation or stabilization occurs, specific guidelines must be followed:

Operative Delivery Rooms:

The operating rooms intended for NICU patients must adhere to the guidelines set forth in Standard 9, with the following exceptions: A minimum clear floor area of 80 square feet (7.5 square meters) dedicated to the infant must be provided, in addition to the space needed for other operational functions. The room should include three oxygen, three air, three vacuum, and twelve simultaneously accessible electrical outlets for the infant, all of which must comply with the specifications outlined in NICU Standard 10. The infant space is required in the operative delivery room, even when a separate infant resuscitation/stabilization room is available [5].

LDR, LDRP, or Other Non-Operative Delivery Rooms:

These rooms must provide a minimum clear floor area of 40 square feet (3.7 square meters) designated for the infant, which may be utilized for various purposes, including resuscitation, stabilization, observation, examination, sleep, or other infant-related needs. The room should feature one oxygen, one air, one vacuum, and six simultaneously accessible electrical outlets for the infant, in addition to those required for the mother. The infant space must be maintained in the LDR, LDRP, or non-operative delivery room even when a separate infant resuscitation/stabilization room is provided.

Pass-Through Windows and Doors:

Windows and doors must be designed to ensure visual and acoustical privacy while facilitating the safe transfer of an infant between healthcare personnel. When a pass-through window or door is installed in an operative delivery room, it should be designed with positive pressure, ensuring that air flows out of the infant room when the window or door is opened.

Interpretation:

All delivery rooms, whether operative or non-operative, must include dedicated resuscitation spaces and outlets for the infant. These spaces provide a suitable environment for uncomplicated term infants; however, they may not be sufficient for optimal management of infants requiring NICU care. Some term and most preterm infants face greater thermal risks and often need additional personnel, equipment, and time to achieve proper resuscitation and stabilization. For such infants, whose care should follow NICU standards from birth, it is recommended to provide resuscitation and stabilization in environments specifically designed for NICU standards. This setup ensures that parents can witness the efforts made by staff to stabilize and care for their infants prior to NICU transfer, enhancing their involvement in the care process. Moreover, integrating ongoing support within a designated admission room or the NICU via pass-through windows or doors enables greater staff efficiency and access to specialized equipment. Airflow concerns, particularly in sterile operative rooms, are mitigated by designing airflow systems that direct air out of the sterile area when windows and doors are opened. Ensuring an appropriate ambient temperature during resuscitation is crucial for high-risk preterm infants, as their stabilization depends on maintaining the optimal thermal environment. This temperature should be achieved quickly, as many high-risk deliveries occur unexpectedly. The functional plan should also support skin-to-skin care post-delivery, accommodating family members and necessary equipment. For hospitals catering primarily to high-risk populations, exceeding the minimum space and equipment standards is encouraged. Equipment storage should be efficiently organized, with wall-hung boards or similar methods that allow easy access to all resuscitation tools [6].

Newborn ICU Standards

Standard 1: Unit Configuration:

The design of the NICU should be driven by a well-developed program of goals and objectives that define the unit's purpose, service provision, space requirements, projected bed space demand, staffing needs, and other fundamental operational parameters. The design strategies must address the medical, developmental, educational, emotional, and social needs of infants, families, and staff, allowing for flexibility and creativity to achieve these goals. Additionally, the NICU must provide an adequate number of single-family rooms to accommodate families wishing to stay with their babies, including those of twins or other multiples [7].

Interpretation:

A planning team, including healthcare professionals, families of previous NICU patients, administrators, and design experts, should collaboratively develop the program's goals and objectives. These goals should address the full range of services necessary for the NICU's operations and allow for potential future expansion to meet growing demand. The design must carefully evaluate the balance between single-family rooms and other patient bed arrangements (e.g., open-bay rooms, couplet care rooms) to ensure efficient and optimal space utilization over the NICU's expected lifespan. Careful consideration must be given to patient care spaces to foster effective monitoring, prompt responses to patient and family needs, and appropriate social interaction. A systematic approach to identifying parental needs and overcoming barriers to their presence is critical. Parental involvement, crucial to the infant's well-being, requires providing necessary services like Wi-Fi, laundry facilities, rest areas, and on-site counseling to address the needs of parents.

Standard 2: NICU Location Within the Hospital:

The NICU must be a distinct, controlled area within the healthcare facility, featuring controlled access and environmental management. The NICU should be positioned in close proximity to the birthing area, with controlled access pathways to ensure staff, family, and equipment can circulate efficiently. The NICU should be physically separate from other hospital services, with no traffic passing through it. Additionally, if obstetric and neonatal services are located on different floors, an elevator with controlled access and priority calling should be provided for transportation between the birthing unit and NICU [8-9].

Interpretation:

The goal of this standard is to ensure the safe and efficient transport of infants while maintaining their privacy. The NICU should be located near perinatal services, except where justified by local conditions (e.g., in free-standing children's hospitals). To enhance safety, transport of infants within the hospital should not involve public corridors.

Standard 3: Family Entry and Reception Area: The NICU must have a clearly marked entrance and reception area for families, where they will have direct and immediate contact with staff upon arrival.

Interpretation:

This area should be designed to foster positive first impressions, demonstrating that families are integral members of the infant's healthcare team. This design also enhances security for infants by controlling access. Equipment and supplies should not be stored in the entry area. The reception area should include secure storage for family belongings and may also feature handwashing and gowning facilities.

Standard 4: Signage and Art:

Signage and art within the NICU should reflect the diversity of the community served, conveying a welcoming message and reinforcing the importance of family involvement in the care of their infants. Information provided to families should be accessible in languages and/or symbols that accommodate the cultural and linguistic diversity of the community.

Interpretation:

Signage at the NICU entrance and throughout the unit plays a significant role in shaping family perceptions and fostering engagement. It is essential that families are not viewed merely as visitors, but as key participants in their infant's care. Signage should align with the unit's policies, promoting family participation in care, decision-making, and essential processes such as rounds and nurse shift changes. Temporary signage should also emphasize collaboration, particularly in times of heightened health concerns, like cold and flu seasons. This messaging should underscore a partnership approach, reinforcing that families and staff work together to ensure the safety and well-being of the infant [10].

Safety Measures for Newborn and Avoiding Newborn Mix:

Ensuring the safety of newborns is paramount in any healthcare setting, particularly in neonatal intensive care units (NICUs), delivery rooms, and postnatal wards. From birth until the first few weeks of life, newborns are vulnerable to various risks, both physiological and environmental, which can have long-lasting effects if not properly managed. Healthcare facilities must employ rigorous safety measures to safeguard infants, minimize risks, and ensure that no mix-ups occur among newborns. This requires well-defined protocols, advanced technology, and meticulous attention to detail in every aspect of care.

1. Immediate Postpartum Care

The first moments after birth are critical in determining a newborn's immediate health. The delivery room should be equipped to handle any emergencies, such as resuscitation, stabilization, and prevention of hypothermia. One of the most fundamental aspects of newborn safety is ensuring that the infant is kept warm. Hypothermia is a common risk for newborns and can lead to complications like respiratory distress and metabolic instability. A well-maintained temperature-controlled environment is crucial for newborns during resuscitation and stabilization. Delivery rooms and neonatal resuscitation areas should have regulated heating systems to maintain ambient temperatures between 72-78°F (22-26°C). Furthermore, staff must be trained in the correct use of radiant warmers and thermal mattresses to prevent heat loss. It is also important to prevent newborn mix-ups during these critical moments. Clear identification protocols such as wristbands, tags, or barcode scanning should be implemented to ensure that each infant is correctly matched to their mother and assigned proper care without confusion.

2. Identification Protocols and Technology

Preventing newborn mix-ups is an area of critical importance in neonatal safety. Given the resemblance between newborns, the risk of mix-up is higher in busy healthcare settings. Mix-ups can lead to devastating consequences, including misidentification of parents, medical errors, and even accidental switch-ups of newborns. Therefore, hospitals should have rigorous identification procedures in place. The most widely used method for identification is the application of identical wristbands to both the infant and the mother at the time of birth. These wristbands should include information such as the infant's name, date of birth, and a unique identification number that corresponds with the mother's details. In addition to wristbands, barcode or RFID (Radio Frequency Identification) tags can be used, and scanning the infant's barcode upon admission and transfer to any unit within the facility can confirm the infant's identity and ensure no mix-up occurs. Advanced biometric systems, such as facial recognition technology, are also becoming increasingly popular as a method for preventing mix-ups. This technology scans the newborn's face to create a unique identifier, which is then used in conjunction with wristbands and other identification techniques to provide multiple layers of verification.

3. The Role of Staffing and Procedures in Prevention

Hospital staff must be thoroughly trained on procedures that help prevent newborn mix-ups and ensure infant safety. From the time a newborn enters the world until they are safely handed to their parents or moved to a neonatal care facility, every action must be performed with careful attention to detail. Standardized handoff procedures between shifts or when transferring infants to different care areas are essential. These handoffs must include a verification process where both the infant's and mother's details are reviewed, ensuring that no mix-up occurs during transfer between the maternity ward, NICU, or postnatal units. When infants are transferred, the identification tags should be double-checked, and the staff should follow a checklist to confirm both the mother's and baby's identity. In NICU settings, where infants often require critical and continuous monitoring, additional safety protocols must be followed. Nurses and caregivers should be instructed to always use two identifiers when verifying an infant's identity, particularly before administering medications, taking blood samples, or performing any procedures.

4. Room Design and Layout for Safety

The design of maternity and neonatal units plays a crucial role in ensuring the safety of newborns. Delivery rooms, postnatal wards, and NICUs should be structured in a way that minimizes the risk of mixing up newborns or exposing them to infection. For example, each delivery or recovery room should have a designated and clearly identified space for the newborn. In addition, the rooms should be designed to allow healthcare professionals to work efficiently without compromising infant safety. Infant resuscitation areas should be in close proximity to the delivery room to facilitate immediate care, and the ventilation systems should be engineered to provide optimal air quality and temperature regulation. One of the key strategies in preventing newborn mix-ups involves the creation of dedicated spaces for each infant. When an infant is born, their space should be immediately available, with no shared areas for other newborns to ensure clarity in care and identification. The use of bassinets and cribs with built-in identity verification systems (e.g., RFID tags) can further reinforce this system. For NICU environments, the provision of single-family rooms is essential for protecting newborns from unnecessary exposure and minimizing risks associated with mixing up infants. Single rooms allow for greater monitoring and individualized care. Furthermore, they also help reduce the spread of infections by limiting unnecessary interactions with other babies and their families.

5. Parental Involvement in Safety

Parents play a crucial role in the identification and care of their newborns. Their involvement not only helps ensure the infant's safety but also fosters a connection between the parents and the healthcare team. Parents should be actively encouraged to participate in their baby's care, which includes identifying their newborn by checking wristbands, confirming the details on the identification tags, and verifying the infant's identity when visiting different areas of the hospital. Healthcare institutions should also offer

family-centered care, where parents are invited to engage in their baby's treatment and care, especially in neonatal care units. By involving parents in daily activities like diaper changes, bathing, and even infant feeding, staff can ensure that the newborn's identification is never compromised. Moreover, continuous communication with the family, ensuring that they are informed about the safety protocols in place, is crucial. This communication can include educating families about the importance of following hospital protocols, such as verifying their baby's identity whenever a nurse or healthcare provider enters the room.

6. Infection Control Measures

Newborns are highly susceptible to infections, especially in the first few weeks of life, which is why infection control measures should be integrated into safety protocols. Proper hand hygiene is essential for anyone interacting with the newborn, and handwashing stations should be strategically placed in every area of the hospital where infants are present. In addition, healthcare providers should use sterile gloves, gowns, and masks when necessary to prevent the transmission of infections from caregivers to infants. In the NICU, additional infection control measures, such as isolating high-risk infants and using negative pressure rooms for those with contagious conditions, should be considered. Staff should also be vigilant about ensuring that any equipment used with newborns is thoroughly sanitized. Newborn safety is a critical component of quality healthcare. From the initial moments of birth, hospitals must employ multiple safety measures to ensure the infant's well-being, minimize the risk of mix-ups, and protect them from infections or other complications. Implementing clear identification protocols, ensuring the availability of appropriate equipment, and fostering parental involvement are all key strategies to enhance the safety of newborns. As healthcare technologies continue to evolve, hospitals must integrate the latest innovations to ensure a safe and secure environment for both the newborns and their families.

Conclusion:

The safety and quality of newborn care in hospitals, particularly within Newborn Intensive Care Units (NICUs), have always been a critical concern. The evolving guidelines outlined in this review provide an up-to-date framework for ensuring that NICUs meet the medical, emotional, and developmental needs of newborns, families, and healthcare staff. By reviewing the progression of NICU standards and incorporating new evidence, the latest recommendations aim to optimize neonatal outcomes by focusing on physical design, equipment standards, and care practices. One of the most significant changes in the updated guidelines is the shift toward more family-centered care, particularly through the establishment of couplet care rooms that allow mothers and their newborns to remain together during critical periods. This innovation acknowledges the importance of familial presence in supporting neonatal recovery and overall well-being. Furthermore, the integration of specialized equipment such as ECMO and MRI capabilities into NICUs provides hospitals with the tools necessary to address a wider range of neonatal complications and ensures that critical care can be administered within the same space, minimizing potential risks from patient transfer. In addition to physical and technological advancements, the guidelines emphasize the importance of an environment conducive to neonatal stabilization. This includes optimized lighting, temperature control, and acoustics in resuscitation and stabilization rooms, as well as dedicated spaces for infant care within delivery rooms. By addressing these elements, hospitals can reduce the risk of medical complications and provide a safer, more comfortable environment for both infants and their families. The document also calls for rigorous post-occupancy evaluations to ensure that NICUs continue to function effectively and meet evolving medical standards. These evaluations, alongside regular updates to facility guidelines, will allow healthcare professionals to stay informed about the latest advancements in neonatal care. Moreover, the planning process for NICUs should include input from interdisciplinary teams, including healthcare professionals and families, to ensure that the space reflects both the medical needs of newborns and the emotional needs of their caregivers. In conclusion, these updated NICU standards reflect a holistic approach to neonatal care that goes beyond just medical treatment. They acknowledge the importance of creating environments that promote both the physical health and emotional well-being of newborns and their families. With continued advancements in medical technology and a commitment to family-centered care, NICUs will remain pivotal in improving outcomes for critically ill infants. Future NICU designs should

continue to prioritize flexibility, efficiency, and safety, ensuring that they meet the challenges of modern neonatal care.

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مراجعة محدثة - (ICU) التوصيات لسلامة حديثي الولادة في المستشفيات ووحدات العناية المركزة

الملخص:

الخلفية: تعتبر سلامة ورعاية حديثي الولادة، خاصة أولئك الذين في حالات حرجة، أمرًا بالغ الأهمية في بيئات المستشفيات، لا سيما في وحدات العناية المركزة لحديثي الولادة (NICUs). منذ نشر إرشادات "التحسين نحو نتائج الحمل" في عام 1976، تم تطوير وتحديث العديد من المعايير لتحسين تصميم ووظائف وحدات العناية المركزة لحديثي الولادة. تهدف هذه الإرشادات إلى توفير بيئات مثالية لرعاية حديثي الولادة مع تعزيز التعاون الفعّال بين مقدمي الرعاية الصحية والأسر.

الهدف: تهدف هذه المراجعة إلى تحديث وتوضيح تدابير السلامة في وحدات العناية المركزة لحديثي الولادة، وتقديم توصيات عملية لإنشاء بيئات آمنة تتمحور حول الأسرة وتلبي احتياجات حديثي الولادة ومقدمي الرعاية لهم.

الطرق: تجمع هذه المراجعة المعايير التي وضعتها الأكاديمية الأمريكية لطب الأطفال(AAP) ، والكليات الأمريكية لأطباء النساء والتوليد(ACOG) ، والمعهد الأمريكي للمهندسين المعماريين. من خلال مراجعة الأدبيات الشاملة والتشاور مع الخبراء، تقوم الدراسة بتحليل الجوانب الفيزيائية والتشغيلية لتصميم وحدات العناية المركزة لحديثي الولادة، مع التركيز على الجوانب مثل تكوين الغرف، معايير المعدات، العوامل البيئية، وبروتوكولات رعاية المرضى.

النتائج: تؤكد التوصيات المحدثة على عدة تحسينات رئيسية، بما في ذلك دمج مناطق متخصصة لإنعاش وتثبيت حديثي الولادة، إنشاء غرف رعاية مشتركة للأم والطفل، وتقديم خدمات ECMO والتصوير بالرنين المغناطيسي للرعاية الحرجة. كما يتم تسليط الضوء على الإرشادات المحسنة بشأن متطلبات المساحات، أنظمة تدفق الهواء، وضوابط درجات الحرارة في غرف وحدات العناية المركزة لحديثي الولادة. بالإضافة إلى ذلك، يشدد الوثيقة على أهمية تقييمات ما بعد الإشغال لضمان فعالية مستمرة.

الخاتمة: تمثل هذه المعايير جهدًا تعاونيًا لتحسين رعاية حديثي الولادة من خلال إنشاء بيئات تدعم العلاج الطبي والرفاهية العاطفية للعائلات. يجب أن تتضمن تصاميم وحدات العناية المركزة لحديثي الولادة المستقبلية هذه المعايير مع الحفاظ على المرونة للتكيف مع التقنيات الطبية الناشئة واحتياجات رعاية المرضى.

الكلمات المفتاحية: وحدات العناية المركزة لحديثي الولادة، تصميم وحدات العناية المركزة لحديثي الولادة، تدابير السلامة، رعاية حديثي الولادة، تخطيط المنشآت، الرعاية المشتركة، الإنعاش، ECMO، إرشادات المستشفيات.