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العنوان باللغة العربية

**Enhance the experience of neonatal care among the critical care
units & Newborn care areas**

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Abstract Abstract : المستخلص

This study examines how prepared neonatal intensive care units (NICUs), delivery rooms, emergency departments, and postpartum wards are to implement the Neonatal Resuscitation Program (NRP) based on standards from the American Heart Association (AHA) and the Saudi Society of Neonatology. It points out the importance of having the right equipment, well-trained staff, and consistent use of standard protocols in medical facilities

The study used both quantitative and qualitative methods, including surveys, semi-structured interviews, and reviews of medical records. Doctors and nurses from NICUs, obstetrics wards, emergency rooms, and operating rooms at Alyammah Hospital in Riyadh took part

The results show that staff compliance with NRP certification increased from 9.34% in January 2024 to 60.42% in July 2025. Despite this progress, it remains below the 95% target for December 2025. The number of uncertified staff fell from 262 to 114, but this is still above the target of 25

The research shows that better training and improved equipment have strengthened neonatal resuscitation preparedness, but further improvements are needed. The study suggests training more in-house certified instructors, expanding simulation-based training, and adopting structured planning systems. These actions can help hospitals raise survival rates, reduce complications, and deliver better care for newborns

Keywords: Neonatal Resuscitation Program (NRP), neonatal intensive care, healthcare readiness, training, certification, Saudi Society of Neonatology

الفصل الأول

المقدمة:

Neonatal resuscitation is a vital part of newborn care. Delivery rooms, neonatal units, postnatal and antenatal wards, emergency departments, and operating rooms all require proper equipment to provide effective care during emergencies. Having the right environment and equipment can directly affect infant survival and outcomes.

The American Academy of Paediatrics and the Saudi Neonatology Society recommended that resuscitation tools and equipment be regularly reviewed to verify readiness

This study examines the readiness of all neonatal units and newborn care areas at the maternity and children's hospital in Riyadh.

Research indicates that organizing department spaces and assuring the availability of proper equipment can shorten the time needed to access tools during emergencies, making resuscitation more effective.

Regular training for medical and nursing teams on NRP protocols, along with frequent updates, is key for maintaining preparedness. Developing skills and increasing communication between team members leads to better performance during resuscitation. Supplying immediate feedback on procedures also helps teams work more efficiently.

Applying these strategies can raise the quality of neonatal care among departments, resulting in greater survival rates and better long-term health for newborns.

The study will also identify the main challenges in performing CPR effectively and propose new solutions to improve care and ensure the highest level of safety for newborns.

Neonatal resuscitation is a critical procedure for newborns with breathing or circulation problems at birth or in the hospital. Departments like delivery rooms, emergency units, NICUs, and postpartum wards often find it difficult to be fully prepared for resuscitation. Challenges entail missing equipment, poor space planning, and the demand for ongoing staff training. Even with advances in NRP and training, teams still find it difficult to apply NRP quickly and effectively. These issues affect the quality of care for newborns, making it important to assess how prepared these departments are to provide NRP.

Key Issues in Implementing NRP

- Lack of Medical Equipment

A lack of basic equipment, such as an NRP trolley, is a major challenge that affects how well teams can respond to emergencies. The American Heart Association and the Saudi Pediatric Neonatology Society recommend that neonatal units have all necessary equipment and check it regularly to assure readiness. However, some studies show that many departments either lack this equipment or do not inspect it often, which can reduce the efficiency of resuscitation efforts. (Jeejeebhoy et al., Ortiz-Movilla et al., 2022)

- Variation in Clinical Practices Between Units

Studies in Level IV neonatal intensive care units have found big differences in how resuscitation teams are made up and in the use of different protocols, such as the Neonatal Resuscitation Program. These differences generate variations in care, so there is a need to standardize protocols and improve training to ensure a consistent response to emergencies (Ali et al., 2024).

- Lack of training and lack of coordination among medical teams

Irregular training and poor coordination among medical teams can lead to lower quality NRP. Research shows that not having ongoing training and weak communication between team members can negatively affect outcomes during NRP. Improving simulation-based training can help medical teams perform better in emergencies (Ali & Sawyer, 2024; Bolding et al., 2020). Lack of training also causes differences in how well teams respond to emergencies (Rubio-Gurung et al., 2014).

Theoretical Importance:

- Demonstrating the role of medical equipment and modern strategies in increasing the success rates of neonatal cardiopulmonary resuscitation (CPR).
- Applying the latest research and practical recommendations on equipping neonatal intensive care units, labor and delivery departments, and postpartum departments, in line with the global standards of the American Heart Association and the Saudi Pediatric Neonatology Society.
- Enhancing practical understanding of how the work environment, medical team efficiency, and space planning affect the quality of CPR and reduce potential complications.

Applied Importance:

- Providing practical proposals for improving the environment of neonatal care units in terms of the availability of medical equipment and continuous training for medical teams.
- Raising the efficiency of medical and nursing staff by developing expert training programs focused on clinical simulation and the use of modern technologies to monitor CPR quality.
- Proposing design standards to assure optimal space distribution within delivery rooms, emergency departments, and neonatal intensive care units, resulting in better medical performance and fast response to emergency situations

This study strives to assess how ready neonatal intensive care units (NICUs), emergency departments, and postpartum departments are to carry out the Neonatal Resuscitation Program (NRP) according to standards set by the American Heart Association and the Saudi Pediatric Society of Neonatology. The study has the following objectives:

- General objectives:

To assess the readiness of neonatal healthcare environments in terms of infrastructure, medical equipment, and the competence of healthcare teams in implementing NRP.

- To identify factors affecting the success of NRP in various departments and analyze associated shortcomings and challenges.

- To propose strategies to improve performance and training to improve the efficiency of medical teams and ensure an effective response to emergencies.

- Specific objectives:

To assess the accessibility of essential medical devices and equipment required to implement NRP in delivery rooms, emergency departments, neonatal intensive care units, and postpartum departments.

- To examine the level of medical teams' adherence to recommended clinical procedures during NRP, and to identify differences between different departments.

- To study how ongoing training and clinical simulation affect medical team performance, and to see how much these factors reduce errors and improve quick responses. The study will also propose a standard model for developing neonatal care environments, with recommendations for planning, ongoing training, and improving the environment to increase NRP success rates.

-تساؤلات الدراسة-

Main Question

To what extent are neonatal medical facilities prepared in terms of infrastructure, medical equipment, and the competence of healthcare teams to perform NRP according to approved standards?

Sub-Questions

To what extent are the basic devices and equipment needed to perform NRP available in delivery rooms, emergency departments, neonatal intensive care units, and postpartum departments?

To what extent do medical teams adhere to clinical standards to improve the efficiency of medical teams in performing NRP and reduce clinical errors?

What role does work environment design play in facilitating or hindering medical teams' response to cardiorespiratory emergencies?

What challenges do medical teams face when performing NRP in various neonatal care settings?

What are the best strategies and recommendations that can be implemented to improve the preparedness of neonatal units and enhance the quality of NRP?

-فروض الدراسة-

Based on the study's objectives and questions, the following hypotheses • were formulated to test the readiness of neonatal intensive care units, maternity wards, emergency departments, and postpartum departments to implement neonatal resuscitation program (NRP) according to the standards approved by the American Heart Association and the Saudi Pediatric Society of Neonatology.

• Main Hypothesis

There is a statistically significant relationship between the readiness of neonatal healthcare environments in terms of infrastructure, medical equipment, and the competence of healthcare teams and the success of NRP and the reduction of clinical complications.

• Sub-Hypotheses

- The availability of basic devices and equipment in neonatal units positively impacts the speed and capability of NRP implementation.
- Adherence to recommended clinical protocols improves the quality of NRP and reduces clinical error rates.
- Continuous training and clinical simulation improve the efficiency of medical teams in dealing with cardiorespiratory emergencies and reduces response time.
- The design of work environments within medical departments directly affects ease of access to medical equipment and the speed of response in NRP cases.
- The existence of disparities between different departments in the availability of equipment, training, and protocols leads toward variations in the quality of NRP.
- Improving work environments, continuous training, and redesigning the internal spaces of units contributes to increasing CPR success rates and reducing the resulting complications

-النظرية العلمية المتبعة لإعداد البحث-

1. Donabedian's Model of Healthcare Quality (1980)

This model focuses on three main dimensions of healthcare quality:

2. Structure: Availability of critical medical supplies and resuscitation equipment.

3. Process: How well healthcare teams follow NRP steps and stick to clinical guidelines.

Outcome: Results like how many newborns survive and fewer problems caused by slow or poor resuscitation. .4

Relevance to the study:

This model is useful for examining the preparedness of neonatal units, assessing whether they have the necessary equipment, follow protocols, and provide staff training to improve outcomes and reduce risks.

Kolb's Experiential Learning Theory (1984) .1

Kolb's theory suggests that people learn best through direct experience, which fits well with the use of clinical simulation for NRP training.

The four stages of learning are:

Concrete Experience: Practicing NRP in simulated scenarios. .2

Reflective Observation: Reviewing performance and recognizing points for improvement. .3

Abstract Conceptualization: Gaining a better understanding of medical practices by using feedback. .4

Active Experimentation: Applying improved skills in real-life clinical settings. .5

Relevance to the study:

This theory explains why simulation-based training is vital for boosting the efficiency of healthcare teams, decreasing errors, and improving their performance in emergency situations.

Systems Theory in Healthcare (Bertalanffy, 1968) .1

Neonatal care units are detailed systems where multiple factors interact:

- Human factors: neonatologists, nurses, and other healthcare professionals.
- Technical factors: resuscitation equipment and medical devices.
- Environmental aspects: the design of NICUs, maternity wards, and emergency units.

Relevance to the study:

This theory suggests that people, equipment, and the environment must all work together to achieve the best NRP results. It shows that working well as a team, having the right training, having equipment ready, and following the steps are all important.

Ulrich's Supportive Design Theory (1991) .1

This theory focuses on how the design of healthcare spaces can improve the effectiveness of medical teams and improve patient results. Its main ideas are:

Rapid access to medical equipment: decreasing delays in emergencies. .2

Lessening stress and confusion: by structured and well-organized workspaces. .3

Strengthening communication: by designing spaces that facilitate quick coordination among medical teams. .4

Relevance to the study:

This theory helps us examine how the setup and organization of neonatal care areas, such as the placement of equipment and the utilization of space, can impact the speed of team response, the frequency of errors, and the overall standard of care.

الفصل الثاني

الدراسات السابقة

Studies on the Readiness of Neonatal Care Units

- Usman et al.'s study (2022)

This study looked at how prepared medical teams and health facilities in Nigeria are to carry out the neonatal resuscitation program (NRP). It found that missing equipment and not enough training make NRP less successful.

- Ortiz-Movilla et al.'s study

This study reviewed how ready NRP rooms and equipment were through immediate audits. It showed that better organization of the medical environment leads to faster emergency responses and fewer mistakes.

Studies on the Impact of Training on NRP Efficiency

- Utomo et al.'s study (2022)

This study measured how ready medical staff in neonatal units were by using a cross-sectional approach. It found that differences in training among health care workers strongly affect NRP quality, showing the need for standard training programs.

- Rubio-Gurung et al.'s study

This study looked at how clinical simulation training affects medical team performance in NRP. It found that regular simulation training lowers medical errors and helps teams respond faster in emergencies.

Studies on the impact of work environment and spatial design on NRP efficiency.

- Ali & Sawyer (2024)

This study examined the impact of work environment on NRP success rates in government hospitals in Nepal and revealed the impact of hospital environmental design on the quality of NRP implementation, indicating that refining space and reducing clutter within neonatal units increases the efficiency of medical staff during emergencies (Hamal et al., 2025).

Theoretical bases of the study:

- Healthcare quality theory (Donabedian's Model of Healthcare Quality, 1980)

This theory looks at three main areas when judging healthcare quality:

Structure: Includes the availability of basic medical Structure: This .1
means having the basic medical supplies and equipment needed for
NRP.plementation by medical teams and the extent of adherence to
clinical guidelines.

Outcome: Includes clinical outcomes such as survival rates and .2
miOutcome: This covers results like survival rates and fewer
complications resulting as a result of delayed NRP.ate the readiness of
neonatal units in terms of equipment, conformity to protocols, and the
impact of training on improving medical performance and diminishing
mortality and complication rates.

- Simulation learning theory in medical education (Kolb's Experiential Learning Theory, 1984)

This theory says people learn best through direct experience, which fits
with using clinical simulations for NRP training.

It is blt has four main stages:ete Experience: Implementing NRP in
simulated scenarios.

Reflective Observation: Analyzing performance after training and .3
identifying points for improvement.

AbstracAbstract Conceptualization: Building a better understanding of .4
clinical practices by using feedback.e Experimentation: Improving
performance through repeated training and applying acquired skills in
actual care settings.

Relationship of Theory to Study:

This theThis theory helps explain how simulation training makes
medical teams better at CPR and reduces mistakes.ms Theory in
Healthcare (Bertalanffy, 1968)

Neonatal units are complex workplaces where many factors interact,
such as:

Human factors: doctors, nurses, and other healthcare professionals. .5

Technical factors: such as medical equipmentTechnical factors: medical .6
equipment and CPR devices.gn of maternity, emergency, and intensive
care units.

Relationship of theory to study:

This theory explains hoThis theory shows how different parts of the
healthcare system can work together to improve CPR quality, stressing
teamwork, training, equipment, and complying with protocols. Theory
in Healthcare (Ulrich's Theory of Supportive Design, 1991)

This theory shows how designing healthcare spaces can help medical teams perform better and improve treatment results. Its main ideas are:

Rapid access to medical equipment: so teams can respond faster in emergencies. .7

Decreasing stress and confusion: by keeping neonatal units organized. .8
Promoting communication between medical teams: by designing spaces to promote rapid coordination.

Relationship of theory to study:

This theory helps us look at how the design of neonatal units affects CPR and helps reduce medical errors.

-الإطار النظري

Donabedian's Model of Healthcare Quality (1980) .1

This model focuses on three main dimensions of healthcare quality:

Structure: Availability of key medical supplies and resuscitation equipment. .2

Process: How well healthcare teams follow NRP steps and stick to treatment guidelines. .3

Outcome: Results like how many newborns survive and fewer problems caused by slow or poor resuscitation. .4

Relevance to the study:

This model is useful for examining the preparedness of neonatal units, assessing whether they have the necessary equipment, follow protocols, and provide staff training to improve outcomes and reduce risks.

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Diminishing stress and confusion: using structured and well-organized workspaces. .3

Strengthening communication: by designing spaces that facilitate quick coordination among medical teams. .4

Relevance to the study:

This theory helps us see how the setup and organization of neonatal care areas, like where equipment is placed and how space is used, can affect how quickly teams respond, how often errors happen, and the overall level of care

الفصل الثالث

منهجية الدراسة

-مقدمة.-

Research methodology is essential in any scientific study because it shows how data is collected and analyzed to assure accurate and reliable results. In this study, we assess how prepared neonatal intensive care units (NICUs), delivery rooms, emergency departments, and postpartum wards are to implement the Neonatal Resuscitation Program (NRP) according to standards from the American Heart Association (AHA) and the Saudi Society of Neonatology. We used a descriptive analytical approach that merges both quantitative and qualitative methods. This approach lets us measure the availability of equipment and infrastructure, see how well medical teams follow protocols, and learn about the experiences and issues encountered by clinical staff during NRP implementation. With this information, the study can provide evidence-based recommendations to improve care quality and emergency response.

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-المنهجية وطرق البحث-

This study used a descriptive analytical approach to assess how ready neonatal intensive care units (NICUs), delivery rooms, emergency departments, and postpartum departments are to implement the NRP, following standards from the American Heart Association (AHA) and the Saudi Pediatric Neonatology Society. The research methods collected both quantitative and qualitative data to help us understand the current situation and supply practical recommendations to improve care quality.

Study Type:

This descriptive analytical study uses both quantitative and qualitative methods to more effectively understand how prepared neonatal units are to implement the Neonatal Resuscitation Program (NRP).

Research Design:

Quantitative Analysis:

We gathered information about equipment, training, protocol adherence, and clinical outcomes applying standardized surveys and hospital reports.

Qualitative Analysis:

We held semi-structured interviews with medical teams to learn about the challenges and factors that influence how well the NRP works

The study population consists of doctors, nurses, and respiratory therapists. The study includes between 80 and 200 participants, all working in the NICU, obstetrics wards, emergency room, or operating room.

-حدود البحث

Objective Limits (Scope) •

This study evaluates how prepared neonatal intensive care units (NICUs), maternity wards, emergency departments, and postpartum wards are to implement the NRP, following standards from the American Heart Association (AHA) and the Saudi Pediatric Neonatology Society.

Topics covered include:

Availability of basic equipment and supplies.

Competence of medical and nursing training.

Adherence to clinical protocols.

Work environment design and its impact on response time.

Spatial Limits (Site) •

The study was conducted at Alyammah Hospital in Riyadh, which has specialized neonatal and emergency departments.

The study includes:

Alyammah Hospital with Level II or III NICU.

Maternity wards, emergency departments, and postpartum wards.

Time Limits (Study Period) •

The study was conducted from April 1, 2025, to December 30, 2025.

During this period:ough questionnaires and interviews.

Field visits were conducted and checklists were completed.

Medical records of CPR cases were analyzed.

Human Limits (Participants) •

The study sample is limited to:

Neonatologists and emergency physicians.

Nursing staff in NICU, maternity, and emergency departments.

الفصل الرابع

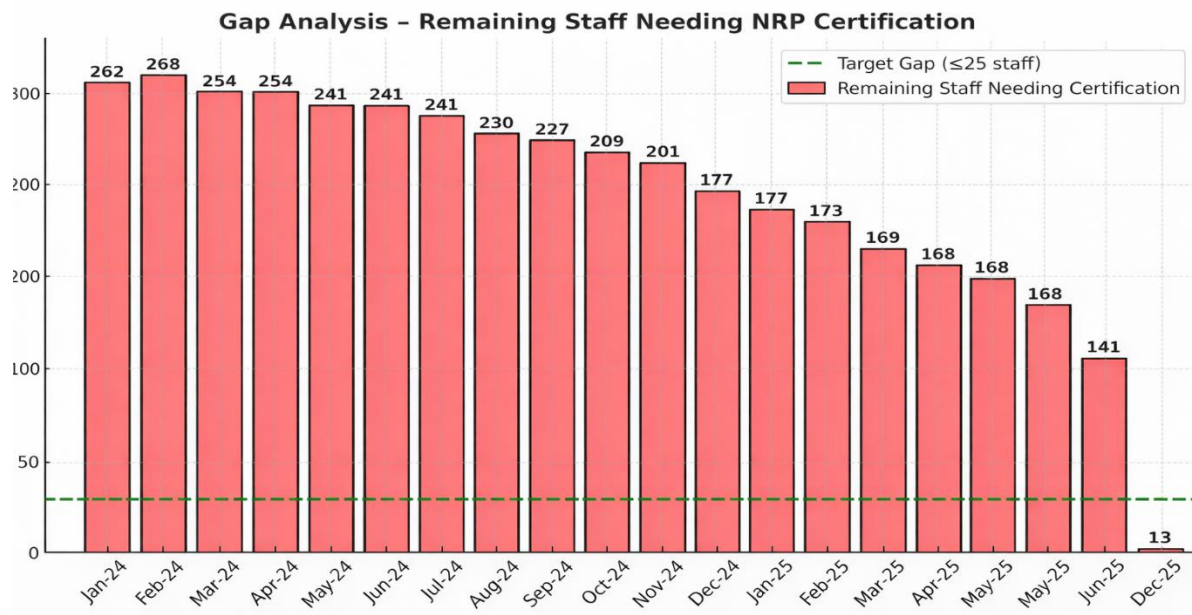
النتائج والتوصيات

-مقدمة

Presenting results is an important part of any scientific study because it shows what was found in relation to the study's goals and questions. These results show the strengths and weaknesses of neonatal intensive care units, delivery rooms, emergency departments, and postpartum wards in their readiness to implement the Neonatal Resuscitation Program (NRP). The following recommendations, based on these results, suggest practical ways to improve the work environment, strengthen the skills of medical and nursing teams, and modify policies and procedures to meet both national and international standards. This chapter links the study's findings with evidence-based recommendations to improve performance and ensure better safety for newborns.

-تحليل البيانات

In early 2023, the hospital lacked an accredited organization or certified instructors to provide Neonatal Resuscitation Program (NRP) training. As a result, staff had to depend on external courses, which were often unavailable or too costly. This led to low compliance, with only 9.34% of nursing staff certified in January 2024. Even after the facility received accreditation from the Saudi Heart Association, the compliance rate in July 2025 was only 60.42%, still below the target of 95% or higher.



The graph shows a steady monthly decrease in the number of staff needing NRP certification, dropping from 262 in January 2024 to just 13 in the latest assessment. This surpasses the target of having 25 or fewer uncertified staff by December 2025. This significant improvement shows that the training strategies .and quick interventions have been effective.

Saudi Heart Association has been obtained, the current compliance rate as of July 2025 is only 60.42%, far from the $\geq 95\%$ target

-النتائج

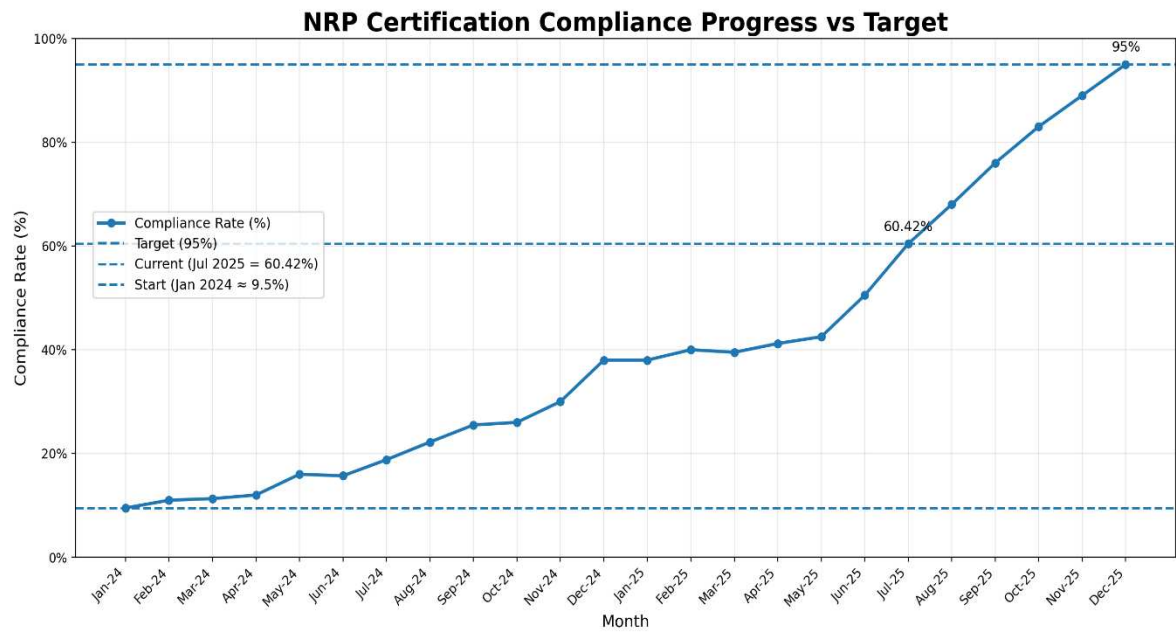
Increase NRP certification compliance from 60.42% (Jul 2025) to $\geq 95\%$ by .Dec 2025

.Reduce the number of uncertified nurses to ≤ 25 staff

Ensure sustainable, cost-free access to accredited NRP training through in-house

.programs supported by the Saudi Society of Neonatology

Enhance staff competence and patient safety by standardizing NRP training delivery



جدول 2

-التوصيات

Nominate and train at least 2–4 certified in-house NRP instructors through the Saudi Heart Association and the Saudi Neonatology Society .

Implement a mandatory scheduling system for non-certified staff to ensure they are enrolled in the next available course.

Increase the number of simulation rooms to allow each certified instructor to train 6 participants per session (up to 18 per day).

Utilize the free accreditation obtained from the Saudi Neonatology Society (supported by the National Center for Non-Profit Sector) to provide free-of-charge in-house NRP courses starting September 2025

Implement a weekly tracking dashboard to monitor individual staff certification status and identify gaps in real time

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