Neonatal Intensive Care Unit Infection Control Assessment and Response (ICAR) Supplemental Questions and Observations

The comprehensive Infection Control Assessment and Response (ICAR) tool for General IPC Across Settings is intended to help assess infection prevention and control (IPC) across acute care, long-term care, and outpatient settings. The current comprehensive suite of ICAR modules may be accessed at the following link: https://www.cdc.gov/healthcare-associated-infections/php/toolkit/icar.html

The Neonatal Intensive Care Unit (NICU) ICAR Supplement is intended to: a) assess IPC needs unique to NICU settings; b) only be used in NICU settings; and c) be used along with select ICAR modules (e.g., Modules 1–11) to provide a comprehensive assessment based on allotted time, facility-specific concerns, or applicability to an organism of concern. The following supplemental questions and observations are intended to guide discussions and focus on areas associated with outbreaks in the NICU. This supplement primarily focuses on environmental sources of transmission, rather than person-to-person transmission of pathogens which are covered in greater detail in the other ICAR modules (e.g., hand hygiene module).

Neonates and infants in the NICU are susceptible to healthcare-associated infections (HAIs) and outbreaks due to their unique physiology, high rate of medical device utilization, prolonged hospitalization, shared medical equipment, and other factors associated with delivery of care, design, and layout in the NICU. Outbreaks in NICUs often revolve around gaps in basic infection prevention practices (e.g., hand hygiene, environmental cleaning), exposure to water, and shared medical equipment (Johnson, et al, 2017). Examples of pathogens that have been transmitted during NICU outbreaks include skin commensals (e.g., methicillin-sensitive and methicillin-resistant Staphylococcus aureus [MSSA/MRSA], *Staphylococcus epidermidis*), environmental pathogens (e.g., *Acinetobacter baumannii, Pseudomonas aeruginosa, Serratia marcescens*), and viral organisms (e.g., respiratory syncytial virus, influenza, norovirus).

The following supplemental questions and observations are intended to begin a conversation around some of these important IPC topics to prevent transmission of these organisms and promote the health of this vulnerable population.

In the following tool, the "CDC Recommendation" sections below questions contain quotations and links from relevant CDC guidance and web resources where available. "Additional Consideration from Common Practice" is included to fill gaps for questions and items in the tool that are not directly addressed by CDC resources. This additional information is provided for consideration and supported by common practice but may not be supported by the level of evidence needed for a CDC recommendation.

Additional use of comprehensive ICAR modules (i.e., modules 1–11) may facilitate a deeper assessment of some of these practices if gaps are identified, the facility has specific challenges related to a given module topic, or a more thorough assessment of that topic is warranted.

Source: Johnson J, Quach C. Outbreaks in the neonatal ICU: a review of the literature. Curr Opin Infect Dis. 2017 Aug;30(4):395-403. doi: 10.1097/QCO.0000000000000383. (https://pubmed.ncbi.nlm.nih.gov/28582313/).

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DEMOGRAPHICS

Similar to the ICAR modules, the demographics section is intended to document the basics of who, what, where, when, and why. It also includes some general infection prevention questions to better understand infection prevention and control infrastructure and larger policies that may affect this unit (e.g., question #19 on visitor restriction). These questions do not have a single best answer but instead are intended to help facilitate a conversation revolving around the NICU.

General NICU Demographics and Layout

1. Date of Assessment: _____ **2.** Facility Name: _____

3. State/Territory: _____ **4.** Zip Code: _____ **5.** County: _____

6. Rationale for Assessment (*Select all that apply*):

- ☐ Requested by facility
- ☐ Requested by accrediting agency/licensing organization
- ☐ Requested by state or local health department
- ☐ Healthcare-associated infection prevention focused
- ☐ Prevention collaborative
- ☐ Outbreak
- ☐ Other (*specify*): _____

7. Who is accountable for infection prevention and control (IPC) oversight in the NICU? (Select all that apply. Refers to formal responsibility for infection prevention and control policy oversight, implementation authority, and monitoring.)

- ☐ Infection preventionist
- ☐ Nursing manager
- ☐ Nurse champion
- ☐ Hospital epidemiologist
- ☐ Other (*specify*): _____
- ☐ Unknown
- ☐ None of the above
- ☐ Not assessed

8. What is the maximum number of NICU beds (including flex beds, if applicable)? _____

9. Number of pod(s) / bay(s) with NICU beds: _____

10. Number of floors containing NICU beds (if applicable): _____

11. Number of private rooms (e.g., single-family room): _____

11a. Number of airborne infection isolation rooms (AIIRs): _____

12. Number of semi-private rooms (e.g., room with multiple bed spaces or for siblings): _____

13. Number of couplet care rooms (i.e., mother and child are cared for in the same room in NICU): _____

14. What is the current NICU census? _____

15. What is the average NICU census in the past 30 days? _____

CDC Recommendation: No CDC recommendation specific to NICU layout.

Additional Consideration from Common Practice:

NICUs vary in their layout and may include:

- Pods or bays where isolettes/incubators are kept in a common area
- Single/private rooms intended for one infant
  - AIIRs may be included in this category for infants that have a potential airborne infectious disease to limit spread to other patients
  - Mother-baby rooms may be included in this category which allows for simultaneous care of a critically-ill neonate and also support the mother's postpartum care.
- Shared/semi-private rooms which may house multiple gestation births (i.e., twins, triplets) or unrelated infants

Each layout has pros and cons for infection prevention and control based on many different factors including patient density and healthcare personnel access to supplies. The American Academy of Pediatrics' and American College of Obstetricians and Gynecologists' Guidelines for Perinatal Care states: "Large, open rooms allow greater flexibility in the use of equipment, enhanced communication between staff and families, and more efficient assignment of personnel, but offer less privacy for family involvement. Single family rooms may enhance breastfeeding, facilitate family visitation, and potentially improve neurodevelopmental outcomes, if the family is able to be present on a regular basis and the proper supports, including nursing care workflows, are in place. However, there is not sufficient evidence to recommend single-family units as a standard at this time."

Source: *American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Guidelines for Perinatal Care, Eighth Edition. Elk Grove Village (IL): AAP; Washington, DC: ACOG. p. 74-75.*

The Facility Guidelines Institute (FGI) publishes building codes for healthcare facilities. More information on NICU-specific building and design codes may be found on their website: https://fgiguidelines.org/. Note that State codes may modify or supersede those of FGI .

Notes:

General NICU Policies and Practices

16. Are surgical procedures performed in the NICU?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

If yes,

16a. What types of surgical procedures are performed in the NICU?

16b. Does the NICU have a policy on how to maintain a sterile surgical environment?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

CDC Recommendation: No CDC recommendation specific to performing surgical procedures in the NICU.

Additional Consideration from Common Practice: The American Academy of Pediatrics' and American College of Obstetricians and Gynecologists' Guidelines for Perinatal Care states: "In some cases, surgical procedures (e.g., ligation of a patent ductus arteriosus) are performed in an area in or adjacent to the NICU. Specific policies should address preparatory cleaning, physical preparation of the unit, presence of other newborn infants and staff, venting of volatile anesthetics, and quality assessment. Ideally, procedures, equipment, facilities, and supplies for this area should be comparable to those required for similar procedures in the surgical department of the hospital."

Source: *American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Guidelines for Perinatal Care, Eighth Edition. Elk Grove Village (IL): AAP; Washington, DC: ACOG. p. 557.*

17. Are float staff (i.e., staff who do not normally work in the NICU) ever utilized in the NICU?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

If yes,

17a. Which float staff may be utilized in the NICU? (*Select all that apply*)

- ☐ Nursing
- ☐ Respiratory therapy
- ☐ Nutrition
- ☐ Pharmacy
- ☐ Environmental services
- ☐ Other (*specify*): _____
- ☐ Unknown
- ☐ Not assessed

17b. Describe how float staff are trained on NICU-specific infection prevention and control policies:

Staff who do not routinely work in the NICU may be unfamiliar with NICU-specific policies and procedures for infection prevention and control or other patient safety aspects. Float staff from another ICU or other parts of the hospital may be asked to work in the NICU and might not be aware of NICU-specific policies and procedures for IPC.

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"1. Provide job-specific, infection prevention education and training to all healthcare personnel for all tasks."

" 2. Develop processes to ensure that all healthcare personnel understand and are competent to adhere to infection prevention requirements as they perform their roles and responsibilities."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

ICAR Module 1. Training, Auditing, & Feedback **may be helpful in further assessment of training practices in the unit.**

18. Are all non-float staff who periodically work in the NICU (e.g., radiology, consultants, students/trainees, volunteers) trained on NICU-specific infection prevention and control policies?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

18a. If yes, describe how non-float staff who may periodically work in the NICU are trained on NICU-specific infection prevention and control policies:

Staff who do not routinely work in the NICU may be unfamiliar with NICU-specific policies and procedures for infection prevention and control or other patient safety aspects. Staff from another ICU or other parts of the hospital may be asked to work in the NICU and might not be aware of NICU-specific policies and procedures for IPC.

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"1. Provide job-specific, infection prevention education and training to all healthcare personnel for all tasks."

" 2. Develop processes to ensure that all healthcare personnel understand and are competent to adhere to infection prevention requirements as they perform their roles and responsibilities."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

ICAR Module 1. Training, Auditing, & Feedback **may be helpful in further assessment of training practices in the unit.**

19. Are visitor restrictions, either ongoing or intermittent, ever used in the NICU as an infection prevention strategy? (e.g., restricting individuals with a contagious illness or time-limited visitor restriction during an outbreak, time-limited during periods of high respiratory virus transmission in the community, ongoing restriction for children under a certain age).

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

19a. If yes, describe any visitor restrictions used in the NICU as an infection prevention strategy:

CDC Recommendation: The Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)

"I.E. Develop and implement policies and procedures to limit patient visitation by persons with signs or symptoms of a communicable infection. Screen visitors to high-risk patient care areas (e.g., oncology units, hematopoietic stem cell transplant [HSCT] units, intensive care units, other severely immunocompromised patients) for possible infection."

Source: https://www.cdc.gov/infection-control/hcp/isolation-precautions/recommendations.html

In general, visitors with contagious diseases should not be visiting patients in healthcare settings to minimize the risk of transmission to others. However, facilities should adhere to local, territorial, tribal, state, and federal regulations related to visitation. In addition to the above, HHS' FAQs on Patient Visitation at Certain Federally Funded Entities and Facilities states that:

- "8. Can facilities limit patient visitation during infectious disease outbreaks?
- Yes. During infectious disease outbreaks such as COVID-19, 42 C.F.R. Sections 482.13(h), 483.10(f)(4), and 485.614(h), allow hospitals, long term care facilities, and critical access hospitals to limit patient visitation if the covered facility determines that the limitation is clinically necessary or otherwise reasonable and does not restrict, limit, or otherwise deny visitation privileges on the basis of race, color, national origin, religion, sex, sexual orientation, or disability. As with any other reason for limiting visitation, if a facility limits visitation in response to a public health emergency or disease outbreak, it must still comply with applicable regulatory requirement."
- ***Source:*** https://www.hhs.gov/civil-rights/for-individuals/special-topics/emergency-preparedness/faqs-patient-visitation/index.html

Additional Consideration from Common Practice: Some examples include limiting visitors, particularly limiting children under a certain age, in winter months or other times where there is wide circulation of respiratory viruses in a community. During an outbreak, depending on the organism, other restrictions that have been placed on visitors include screening for symptoms or possibly asking about skin lesions/breakdown in the setting of a methicillin-resistant Staphylococcus aureus outbreak, for example. The SHEA NICU white paper series: Practical approaches for the prevention of viral respiratory infections suggests "additional caregiver and visitor limitations during times of increased transmission risk in the unit, including but not limited to viral respiratory season or times of high viral respiratory activity within the community, and unit clusters and/or outbreaks."

Source: *Thampi N, Guzman-Cottrill J, Bartlett AH, et al. SHEA NICU white paper series: Practical approaches for the prevention of viral respiratory infections. Infect Control Hosp Epidemiol. 2024;45(3):267-276. doi:10.1017/ice.2023.120 (**https://pubmed.ncbi.nlm.nih.gov/37877172/**)*

20. Are outborn infants (i.e., not born at this hospital, transfer from another hospital) admitted to the NICU?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

20a. If yes, describe if any admission screening or isolation is used when an outborn infant is admitted:

21. Are infants ever readmitted to the NICU after discharge or transfer to a lower level of care?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

Infants who are not born at the same hospital as the NICU they are admitted to are sometimes referred to as "outborn." Outborn infants may be transferred from another NICU, or they may have a surgical need or other acute condition that requires a higher level of care, leading to transfer to another facility.

CDC Recommendation: Recommendations for Prevention and Control of Staphylococcus aureus Infection in Neonatal Intensive Care Unit Patients

"If active surveillance testing for S. aureus colonization in neonatal intensive care unit patients is implemented, consider testing outborn infants or infants transferred from other newborn care units on admission to promptly identify newly admitted colonized patients. (Conditional Recommendation)"

Source: https://www.cdc.gov/infection-control/media/pdfs/Guideline-NICU-Saureus-H.pdf

Notes:

Hand Hygiene

Consistent and effective hand hygiene prevents healthcare-associated infections in all areas of care. Hand hygiene is covered in great detail in ICAR Module 2: Hand Hygiene Facilitator Guide (https://www.cdc.gov/infection-control/media/pdfs/IPC-mod2-hand-hygiene-508.pdf) and is an important part of evaluating policies and practices, including observations, within the NICU for both prevention- and outbreak-related assessments. In addition to what is covered in the hand hygiene ICAR Module 2, there are additional practices that may come up in the NICU. These may include:

- Scrub on entry to the NICU: This practice is not addressed in CDC guidance but generally refers to a hand hygiene scrub upon first entry to the NICU each day and, when included in facility policies, typically involves cleaning hands with soap and water for upwards of 2-3 minutes and may include a nail brush or scraper. Some may include a surgical antiseptic scrub. This practice often applies to both staff and family members or visitors entering the NICU. There is limited evidence to support or refute this practice, however, it is widely practiced and will depend on the NICU policies. If a facility has such a policy in place, it is not a replacement for performing hand hygiene in circumstances recommended by CDC (e.g., before and after contact with an infant).
- Bare-below-the-elbows: This practice is not addressed in CDC guidance but is a policy requiring nothing to be worn below the elbows, including sleeves, jewelry (e.g., ring, watch, bracelet), and artificial nails. This policy generally pertains to healthcare personnel working in the NICU, not necessarily to family members or visitors entering the NICU. The rationale is that healthcare personnel will be reaching into isolettes and this practice is aimed to avoid contamination of the isolettes with organisms that may be present on sleeves, jewelry, or other items. This practice will depend on NICU policies.
- Family and visitor engagement: Given how medically fragile infants in the NICU are, family and visitors are often engaged on the importance of hand hygiene to help protect the infant. Facilities have engaged with family members and visitors by "sharing hand hygiene videos with patients and families, asking patients and families/visitors to demonstrate proper technique, providing family members and visitors access to handwashing stations and hand hygiene supplies, and asking patients [family members] to speak up if they observe staff not following safe practices."
  Source: https://www.cdc.gov/infection-control/media/pdfs/Strive-PFE101-508.pdf

A supplemental question for hand hygiene in the NICU, in addition to those covered in Module 2, includes:

22. What education is provided to family/visitors on hand hygiene?

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide appropriate infection prevention education to patients, family members, visitors, and others included in the caregiving network. Include information about how infections are spread, how they can be prevented, and what signs or symptoms should prompt reevaluation and notification of the patient's healthcare provider. Instructional materials and delivery should address varied levels of education, language comprehension, and cultural diversity."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

CDC/STRIVE Infection Control Training - Engaging Patients and Families in Infection Prevention.

Facilities can engage family members and visitors by "sharing hand hygiene videos with patients and families, asking patients and families to demonstrate proper technique, providing family members and visitors access to handwashing stations and hand hygiene supplies, and asking patients [family members] to speak up if they observe staff not following safe practices."

Source: https://www.cdc.gov/infection-control/media/pdfs/Strive-PFE101-508.pdf

The Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007):

"II.B. Provide instructional materials for patients and visitors on recommended hand hygiene and Respiratory Hygiene/Cough Etiquette practices and the application of Transmission-Based Precautions."

Source: https://www.cdc.gov/infection-control/hcp/isolation-precautions/recommendations.html

Additional CDC webpages focused on hand hygiene in healthcare settings include:

- Guideline for Hand Hygiene in Healthcare Settings (2002) (https://www.cdc.gov/infection-control/hcp/hand-hygiene/index.html)
- Clinical Safety: Hand Hygiene for Healthcare (https://www.cdc.gov/clean-hands/hcp/clinical-safety/index.html)
- Clean Hands in Healthcare Training (https://www.cdc.gov/clean-hands/hcp/training/index.html)
- About Hand Hygiene for Patients in Healthcare Settings (https://www.cdc.gov/clean-hands/about/hand-hygiene-for-healthcare.html)

Two additional non-CDC resources which discuss best practices for hand hygiene in the NICU include:

- *Brachio SS, Gu W, Saiman L. Next Steps for Health Care-Associated Infections in the Neonatal Intensive Care Unit. Clin Perinatol. 2023 Jun;50(2):381-397. doi: 10.1016/j.clp.2023.02.001. Epub 2023 Apr 4.* (https://pubmed.ncbi.nlm.nih.gov/37201987/)
- *Glowicz JB, Landon E, Sickbert-Bennett EE, et al. SHEA/IDSA/APIC Practice Recommendation: Strategies to prevent healthcare-associated infections through hand hygiene: 2022 Update. Infect Control Hosp Epidemiol. 2023;44(3):355-376. doi:10.1017/ice.2022.304 (https://pubmed.ncbi.nlm.nih.gov/36751708/)*

Hand hygiene is covered in ICAR Module 2 in detail. Please refer to ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 2: Hand Hygiene Facilitator Guide for additional discussion on hand hygiene policies, practices, and observations. The ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 1: Training, Auditing and Feedback Facilitator Guide may also be used for further discussion on policies related to hand hygiene education and auditing.

Notes:

ISOLETTES

Isolettes (also referred to as incubators) are where neonates and infants are most frequently cared for in NICU environments and are an important environmental reservoir to consider when assessing for potential transmission of pathogens. As an environmental surface, they can harbor pathogens which may colonize or infect infants. These surfaces can become contaminated through routine care, particularly when there are gaps in hand hygiene practices.

Both routine cleaning and disinfecting, and terminal reprocessing of an isolette are labor- and time-intensive processes. Terminal reprocessing often occurs around sinks and drains to allow for rinsing, when indicated, of germicidal chemicals which can be caustic to neonatal skin. Ensure that all surfaces are cleaned and disinfected, according to the manufacturer's instructions for use (MIFU) and observe for potential nonsterile water exposures throughout this process (e.g., tap water, touching sinks, splash zones around sinks and sink drains). Due to these complexities, manufacturers may provide education to personnel responsible for cleaning and disinfection upon request. Isolette humidification may be used during routine neonatal care and appropriate water sources, based on the MIFUs, can prevent inadvertent exposure to opportunistic pathogens of premise plumbing.

Obtaining information about the type(s) of isolettes used by the facility in advance of the ICAR assessment, including the device-specific instructions for cleaning and disinfection, can help facilitate the process.

An additional non-CDC resource which discusses best practices for the NICU is referenced in this supplemental ICAR tool: *American Academy of Pediatrics, American College of Obstetricians and Gynecologists. Guidelines for Perinatal Care, Eighth Edition. Elk Grove Village (IL): AAP; Washington, DC: ACOG; 2017.*

Additional ICAR modules and other resources that may be helpful in assessing practices around isolette cleaning and disinfection include:

- ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 4: Environmental Services Facilitator Guide
- ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 11: Water Exposure Facilitator Guide
- Water Infection Control Risk Assessment (WICRA) for Healthcare Settings

1. Is isolette use tracked (i.e., log for dates of use, bedspace and/or patient)?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

1a. If yes, describe process used for tracking:

2. Are MIFUs followed for cleaning and disinfection (routine and terminal) of isolettes?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

CDC Recommendation: CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)
"Cleaning of Medical Equipment

Manufacturers of medical equipment should provide care and maintenance instructions specific to their equipment. These instructions should include information about a. the equipments' compatibility with chemical germicides, b. whether the equipment is water-resistant or can be safely immersed for cleaning, and c. how the equipment should be decontaminated if servicing is required. In the absence of manufacturers' instructions, non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs, dialysis machines, and equipment knobs and controls) usually only require cleansing followed by low- to intermediate-level disinfection, depending on the nature and degree of contamination."

Source: https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf

CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings
"Manufacturer's instructions for reprocessing reusable medical equipment should be readily available and used to establish clear operating procedures and training content for the facility. Instructions should be posted at the site where equipment reprocessing is performed. Reprocessing personnel should have training in the reprocessing steps and the correct use of PPE necessary for the task. Competencies of those personnel should be documented initially upon assignment of their duties, whenever new equipment is introduced, and periodically (e.g., annually)."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Review protocols and practices for cleaning and disinfection of isolettes and cribs and ensure they align with [MIFU]"

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

3. When was the most recent education (i.e., in-service) provided on cleaning and disinfection (routine and/or terminal) by the manufacturer of the isolette(s) used in the NICU?

For Questions 4-13, please complete the table below to discuss policies and practices for cleaning and disinfection of isolettes. The left column refers to routine cleaning and disinfection of high-touch surfaces on the isolette, while the right column refers to terminal cleaning of isolettes. When a column is not applicable to the prompt or question, the cell is marked as N/A. Please skip cells marked as N/A.

Please complete the below questions:	**For Routine Cleaning and Disinfection of high-touch surfaces (infant often remains in the isolette):**	**For Terminal cleaning and disinfection of isolettes (when an infant is moved or discharged and the isolette is dismantled for thorough cleaning and disinfection prior to use with another infant):**
4. Who is responsible for cleaning and disinfection of isolettes? (*Select all that apply*)	Select all that apply: ☐ Nurses ☐ Nursing aides ☐ Environmental services personnel ☐ Other (*specify*): _____ ☐ Unknown ☐ Not assessed	Select all that apply: ☐ Nurses ☐ Nursing aides ☐ Environmental services personnel ☐ Other (*specify*): _____ ☐ Unknown ☐ Not assessed
5. Describe the training provided to those responsible for cleaning and disinfection of isolettes:		
6. What is the frequency of cleaning and disinfection of isolettes?		

CDC Recommendation for questions 4 and 5: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"All personnel who clean and disinfect reusable patient care equipment and environmental surfaces in patient care areas must understand their roles and responsibilities."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide job-specific, infection prevention education and training to all healthcare personnel for all tasks."

"Reprocessing personnel should have training in the reprocessing steps and the correct use of PPE necessary for the task. Competencies of those personnel should be documented initially upon assignment of their duties, whenever new equipment is introduced, and periodically (e.g., annually)."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

CDC Recommendation for question 6: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"Identify standardized, setting-specific protocols for cleaning and disinfection, including use of technologies and products

- Emphasize that surfaces, including high-touch surfaces, must be cleaned effectively, accounting for differences in room layout, equipment, and patient risk."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

Please complete the below questions:	For Routine Cleaning and Disinfection of high-touch surfaces (infant often remains in the isolette):	For Terminal cleaning and disinfection of isolettes (when an infant is moved or discharged and the isolette is dismantled for thorough cleaning and disinfection prior to use with another infant):
6a. Are infants regularly moved to a new isolette to terminally clean and disinfect the current isolette?	N/A	◯ Yes ◯ No, isolettes only terminally cleaned at infant discharge ◯ Unknown ◯ Not assessed **CDC Recommendation:** CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003) "Infants who remain in the nursery for an extended period should be moved periodically to freshly cleaned and disinfected bassinets and incubators." ***Source:*** https://www.cdc.gov/infection-control/media/pdfs/guideline-environmental-h.pdf
6b. If yes, describe the rotation frequency (i.e., after 30-days of use or other set frequency):	N/A	
7. Describe the process for cleaning and disinfection of isolettes:	**CDC Recommendation:** Considerations for Reducing Risk: Surfaces in Healthcare Facilities "Identify standardized, setting-specific protocols for cleaning and disinfection, including use of technologies and products • Emphasize that surfaces, including high-touch surfaces, must be cleaned effectively, accounting for differences in room layout, equipment, and patient risk." ***Source:*** https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html	**CDC Recommendation:** CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003) "Manufacturers of medical equipment should provide care and maintenance instructions specific to their equipment. These instructions should include information about a. the equipments' compatibility with chemical germicides, b. whether the equipment is water-resistant or can be safely immersed for cleaning, and c. how the equipment should be decontaminated if servicing is required. In the absence of manufacturers' instructions, non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs, dialysis machines, and equipment knobs and controls) usually only require cleansing followed by low- to intermediate-level disinfection, depending on the nature and degree of contamination." ***Source:*** https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf
7a. Where are isolettes terminally cleaned and disinfected?	N/A	
8. What products are used for cleaning and disinfection of isolettes?		
9. What is the contact time of the products used for cleaning and disinfection of isolettes?		

CDC Recommendation for questions 7a, 8, and 9: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Follow manufacturers' instructions for proper use of cleaning and disinfecting products (e.g., dilution, contact time, material compatibility, storage, shelf-life, safe use and disposal)."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

"Special precautions for cleaning incubators, mattresses, and other nursery surfaces have been recommended to address reports of hyperbilirubinemia in newborns linked to inadequately diluted solutions of phenolics and poor ventilation. These medical conditions have not, however, been associated with the use of properly prepared solutions of phenolics. Non-porous housekeeping surfaces in neonatal units can be disinfected with properly diluted or pre-mixed phenolics, followed by rinsing with clean water. However, phenolics are not recommended for cleaning infant bassinets and incubators during the stay of the infant. Infants who remain in the nursery for an extended period should be moved periodically to freshly cleaned and disinfected bassinets and incubators. If phenolics are used for cleaning bassinets and incubators after they have been vacated, the surfaces should be rinsed thoroughly with water and dried before either piece of equipment is reused. Cleaning and disinfecting protocols should allow for the full contact time specified for the product used. Bassinet mattresses should be replaced, however, if the mattress cover surface is broken."

Source: https://www.cdc.gov/infection-control/media/pdfs/guideline-environmental-h.pdf

Please complete the below questions:	**For Routine Cleaning and Disinfection of high-touch surfaces (infant often remains in the isolette):**	**For Terminal cleaning and disinfection of isolettes (when an infant is moved or discharged and the isolette is dismantled for thorough cleaning and disinfection prior to use with another infant):**
10. Where are the products used for cleaning and disinfection of isolettes stored?		
11. Do the isolette MIFUs require rinsing of parts of isolettes with water after cleaning and disinfection?	◯ Yes ◯ No ◯ Unknown ◯ Not assessed	◯ Yes ◯ No ◯ Unknown ◯ Not assessed
If yes, **11a.** Do the isolette MIFUs specify which type of water to use for rinsing, if indicated, after cleaning and disinfection?	◯ Yes ◯ No ◯ Not indicated ◯ Unknown ◯ Not assessed	◯ Yes ◯ No ◯ Not indicated ◯ Unknown ◯ Not assessed
11b. *If yes*, specify:		
11c. Where are isolette parts rinsed after cleaning and disinfection?		
11d. What is the process used for drying isolette parts after rinsing?		

CDC Recommendation for question 10: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"Make sure that cleaning and disinfection supplies are easily accessible"

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

CDC Recommendation for question 11: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Note in the mIFU the steps, if any, to remove residual disinfectant and if these include rinsing with water or cloths dampened with water. Determine the type of water being used (e.g., tap, sterile), where this occurs (e.g., near a sink), if there is a potential for isolette parts to touch a sink during rinsing, and how and where parts are dried to prevent contamination. During an outbreak of a water-related organism, consider the option of sterile or filtered water to rinse isolettes and associated parts (e.g., reusable mattresses)."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

CDC Recommendation for questions 11a, b, c, and d: CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

"Special precautions for cleaning incubators, mattresses, and other nursery surfaces have been recommended to address reports of hyperbilirubinemia in newborns linked to inadequately diluted solutions of phenolics and poor ventilation. These medical conditions have not, however, been associated with the use of properly prepared solutions of phenolics. Non-porous housekeeping surfaces in neonatal units can be disinfected with properly diluted or pre-mixed phenolics, followed by rinsing with clean water. However, phenolics are not recommended for cleaning infant bassinets and incubators during the stay of the infant. Infants who remain in the nursery for an extended period should be moved periodically to freshly cleaned and disinfected bassinets and incubators. If phenolics are used for cleaning bassinets and incubators after they have been vacated, the surfaces should be rinsed thoroughly with water and dried before either piece of equipment is reused. Cleaning and disinfecting protocols should allow for the full contact time specified for the product used. Bassinet mattresses should be replaced, however, if the mattress cover surface is broken."

Source: https://www.cdc.gov/infection-control/media/pdfs/guideline-environmental-h.pdf

Considerations for Reducing Risk: Water in Healthcare Facilities

"Avoid placing patient care or personal items on counters next to sinks" as "splashes can spread droplets containing OPPP to the surrounding environment"

Source: https://www.cdc.gov/healthcare-associated-infections/php/toolkit/water-management.html

Please complete the below questions:	**For Routine Cleaning and Disinfection of high-touch surfaces (infant often remains in the isolette):**	**For Terminal cleaning and disinfection of isolettes (when an infant is moved or discharged and the isolette is dismantled for thorough cleaning and disinfection prior to use with another infant):**
12. Where are isolettes stored to prevent contamination once terminal cleaning and disinfection is complete?	N/A	
13. How are isolettes that are terminally cleaned and disinfected designated as such so healthcare personnel know they are ready-to-use (i.e., tagged, bagged)?	N/A	

CDC Recommendation for questions 12 and 13: Considerations for Reducing Risk: Surfaces in Healthcare Facilities "Develop standardized protocols for routine (e.g., daily) and discharge/transfer (also known as terminal) cleaning and disinfection for each major patient care room type." Include in the protocols "processes for easy identification of equipment and rooms that have been properly cleaned and disinfected and are ready for patient use (e.g., tagging system, placement in dedicated clean area)."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/

CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Maintain separation between clean and soiled equipment to prevent cross contamination."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

Related Outbreak Articles:

- *Cadot L, Bruguière H, Jumas-Bilak E, et al. Extended spectrum beta-lactamase-producing Klebsiella pneumoniae outbreak reveals incubators as pathogen reservoir in neonatal care center. Eur J Pediatr. 2019;178(4):505-513. doi:10.1007/s00431-019-03323-w (https://pubmed.ncbi.nlm.nih.gov/30671695/)*
- *Chavignon M, Reboux M, Tasse J, Tristan A, Claris O, Laurent F, Butin M. Persistent microbial contamination of incubators despite disinfection. Pediatr Res. 2021 Dec;90(6):1215-1220. doi: 10.1038/s41390-021-01407-8 (https://pubmed.ncbi.nlm.nih.gov/33627818/)*
- *Hernandez-Alonso E, Bourgeois-Nicolaos N, Lepainteur M, Derouin V, Barreault S, Waalkes A, Augusto LA, Gera S, Gleizes O, Tissieres P, Salipante SJ, de Luca D, Doucet-Populaire F. Contaminated Incubators: Source of a Multispecies Enterobacter Outbreak of Neonatal Sepsis. Microbiol Spectr. 2022 Aug 31;10(4):e0096422. doi: 10.1128/spectrum.00964-22 (https://pubmed.ncbi.nlm.nih.gov/35703554/)*
- *Morillo Á, González V, Aguayo J, et al. A six-month Serratia marcescens outbreak in a Neonatal Intensive Care Unit. Enferm Infecc Microbiol Clin. 2016;34(10):645-651. doi:10.1016/j.eimc.2016.01.006. (https://pubmed.ncbi.nlm.nih.gov/26900002/)*
- *Weng MK, Brooks RB, Glowicz J, et al. Outbreak investigation of Pseudomonas aeruginosa infections in a neonatal intensive care unit. Am J Infect Control. 2019;47(9):1148-1150. doi:10.1016/j.ajic.2019.03.009 (https://pubmed.ncbi.nlm.nih.gov/31047691/)*
- *Wenger PN, Tokars JI, Brennan P, et al. An outbreak of Enterobacter hormaechei infection and colonization in an intensive care nursery. Clin Infect Dis. 1997;24(6):1243-1244. doi:10.1086/513650 (https://pubmed.ncbi.nlm.nih.gov/9195091/)*

Notes:

Isolette Humidifiers

14. How often are isolette humidifier chambers cleaned and disinfected?

15. What type of water is used in isolette humidifier chambers?

CDC Recommendation: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Determine how frequently isolette humidifiers are cleaned and disinfected and what type of water (e.g., sterile water, tap water, or other source) is used in the humidifiers. Humidification systems generally use sterile water in a heated chamber on the underside of an isolette. These chambers need to be routinely cleaned and disinfected according to the mIFU."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

Related Outbreak Article: *Weng MK, Brooks RB, Glowicz J, et al. Outbreak investigation of Pseudomonas aeruginosa infections in a neonatal intensive care unit. Am J Infect Control. 2019;47(9):1148-1150. doi:10.1016/j.ajic.2019.03.009 (https://pubmed.ncbi.nlm.nih.gov/31047691/)*

Notes:

Medical Tapes and Adhesives

Medical tapes and adhesives are used throughout the course of care in many units in a hospital and the NICU is no exception. While no CDC guidance exists related to use of tapes or adhesives for securing medical devices in the NICU, considerations regarding infection control and use of tapes/adhesives may be important as infections have been tied to their use in the literature. In a review article by Bernatchez, et al., the authors state that "tapes cannot be cleaned or disinfected…" and:

> "Medical tape is one of the most routinely used items in the healthcare environment, providing a level of support that can range from routine and mundane to critical and life-sustaining. The myriad of touchpoints it has throughout its product lifecycle is unlike any other used in the provision of care. While the evidence surrounding its role in the risk of cross contamination has been reported on for decades, the lack of formal guidance around its use and storage highlights the lack of recognition for the important role medical tape plays in providing safe and effective care to patients."

Source: *Bernatchez SF, Schommer K. Infection prevention practices and the use of medical tapes. Am J Infect Control. 2021 Sep;49(9):1177-1182. doi: 10.1016/j.ajic.2021.03.007 (https://pubmed.ncbi.nlm.nih.gov/33766550/)*

Related Outbreak Articles:

- *James MJ, Lasker BA, McNeil MM, Shelton M, Warnock DW, Reiss E. Use of a repetitive DNA probe to type clinical and environmental isolates of Aspergillus flavus from a cluster of cutaneous infections in a neonatal intensive care unit. J Clin Microbiol. 2000 Oct;38(10):3612-8. doi: 10.1128/JCM.38.10.3612-3618.2000 (https://pmc.ncbi.nlm.nih.gov/articles/PMC87445/)*
- *Bernatchez SF, Schommer K. Infection prevention practices and the use of medical tapes. Am J Infect Control. 2021 Sep;49(9):1177-1182. doi: 10.1016/j.ajic.2021.03.007 (https://pubmed.ncbi.nlm.nih.gov/33766550/)*

A supplemental question that may be helpful to ask about management of medical tape use on isolettes includes:

16. Is there a policy for ensuring medical tape/adhesives are removed from isolettes during isolette terminal cleaning and disinfection?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

If yes,

16a. What is included in this policy?

CDC Recommendation: No CDC guidance related to medical tape on NICU isolettes.

Notes:

NUTRITION AND NUTRITION PREPARATION

Lactation equipment plays a vital role in supporting the health and wellbeing of infants in the NICU. The complex physiology of infants in the NICU requires precise measurement of nutritional needs and may include adding fortifiers to supplement calories or other nutritional needs. Lactation equipment and nutrition supplies are frequently handled and may be shared among families; lapses in handling and storage have been associated with pathogen transmission in NICUs.

Milk storage, preparation, and administration may be subject to additional state or local regulations as they include both food handling practices and healthcare infection prevention practices.

CDC-related webpages address feeding and nutrition in a variety of settings including in the home and childcare settings. These principles apply to many aspects of NICU nutrition and nutrition preparation. Webpages used for the questions and discussion of this supplement include:

- Information on breast pump hygiene, including cleaning and sanitization: https://www.cdc.gov/hygiene/about/about-breast-pump-hygiene.html
- Information on breast milk storage and preparation: https://www.cdc.gov/breastfeeding/breast-milk-preparation-and-storage/handling-breastmilk.html
- Infographic on storage and preparation of breast milk: https://www.cdc.gov/breastfeeding/pdf/preparation-of-breast-milk_H.pdf
- Infographic on storage, handling, and preparation of breast milk in early care and education programs: https://www.cdc.gov/obesity/strategies/early-care-education/pdf/Breastmilk-ECE-082022-508.pdf

Two additional non-CDC resources which discuss best practices for nutrition and nutrition preparation in the NICU are referenced in this supplemental ICAR tool:

- *Pediatric Nutrition Dietetic Practice Group, Caroline Steele, Emily A. Collins. Infant and Pediatric Feedings: Guidelines for Preparation of Human Milk and Formula in Health Care Facilities, Third Edition. Chicago, IL: Academy of Nutrition and Dietetics; 2019.*
- *Steele C. Best Practices for Handling and Administration of Expressed Human Milk and Donor Human Milk for Hospitalized Preterm Infants. Front Nutr. 2018 Sep 3;5:76. doi: 10.3389/fnut.2018.00076.* (https://pubmed.ncbi.nlm.nih.gov/30234121/)

Additional ICAR modules and other resources that may be helpful in assessing practices around nutrition and nutrition preparation include:

- ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 4: Environmental Services Facilitator Guide (cdc.gov)
- ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 11: Water Exposure Facilitator Guide
- Water Infection Control Risk Assessment (WICRA) for Healthcare Settings

1. What types of nutrition are used in the NICU? (*Select all that apply*)

- ☐ Maternal breast milk
- ☐ Donor human milk
- ☐ Ready-to-feed / pre-mixed infant formula
- ☐ Powdered infant formula
- ☐ Total parenteral nutrition (TPN)
- ☐ Lipids
- ☐ Other (*specify*):
- ☐ Unknown
- ☐ Not assessed

Previous Joint HHS Consensus Statement: FDA, CDC, NIH Consensus Statement on Recent Advisory Council Report on Premature Infants and Necrotizing Enterocolitis

"While mother's milk is the preferred source of nutrition – with pasteurized donor human milk as a next best alternative – preterm infant formulas are a critically important option for premature infants. These formulas can be critical for premature infants for whom parental or donor milk is not an option, or where a supplement to parental or donor milk is necessary for the health of the infant."

Source: https://www.hhs.gov/about/news/2024/10/03/fda-cdc-nih-consensus-statement-recent-advisory-council-report-premature-infants-necrotizing-enterocolitis.html

Please note that some donor milk may be shelf-stable, while other products may require refrigeration. This will depend on the specific product used. Donor milk is regulated as a food by FDA. FDA has additional information on use of donor milk: https://www.fda.gov/science-research/pediatrics/use-donor-human-milk

Additional Consideration from Common Practice: NICUs will have policies for which type of nutrition is used and when. In general, milk is preferred. Ready-to-feed or premixed formula may be used when human milk is not available or for certain nutritional needs. Powdered infant formula is generally not used as it is not a sterile product (see https://www.cdc.gov/cronobacter/prevention/ and https://www.cdc.gov/infant-toddler-nutrition/formula-feeding/preparation-and-storage.html for more information). Total parenteral nutrition may be used based on clinical needs.

Donor milk safety guidelines are also provided by the Human Milk Banking Association of North America (HMBANA): https://www.hmbana.org/

Related Outbreak Article: Bechmann L, Böttger R, Baier C, et al. Serratia marcescens outbreak in a neonatal intensive care unit associated with contaminated donor milk. Infect Control Hosp Epidemiol. 2023 Jun;44(6):891-897. doi: 10.1017/ice.2022.187. (https://pubmed.ncbi.nlm.nih.gov/35929043/)

2. Is facility-owned lactation equipment available for family use in the NICU?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

2a. If yes, is lactation equipment specifically designed for use by multiple users?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

2b. If yes, are personal accessory kits provided for each family who uses the lactation equipment?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

FDA Recommendation: Buying and Renting a Breast Pump

"Only breast pumps that are designed for multiple users should be used by more than one person. With the exception of multiple user pumps, the FDA considers breast pumps to be single-user devices."

Source: https://www.fda.gov/medical-devices/breast-pumps/buying-and-renting-breast-pump

What to Know When Buying or Using a Breast Pump

If lactation equipment is shared or rented from "an authorized provider (such as a hospital, lactation consultant, or specialty medical supply store), do so only if the pump is designed for multiple users… Multiple-user pumps are designed so that the breast milk can never touch the working parts of the pump that are shared. The only part of a multiple-user breast pump that you can safely share is the pump itself." Multiple user pumps require each user to have their "own accessories kit to avoid contamination. The accessories kit typically includes the milk container, breast-shield, and tubing."

Source: https://www.fda.gov/consumers/consumer-updates/what-know-when-buying-or-using-breast-pump

3. Can families bring in their own lactation equipment for use in the NICU?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

4. Who is responsible for cleaning and disinfecting lactation equipment? *(Select all that apply)*

- ☐ Family member
- ☐ Nurses
- ☐ Nursing aides
- ☐ Environmental services personnel
- ☐ Other (*specify*): _____
- ☐ Unknown
- ☐ Not assessed

5. How often is lactation equipment cleaned and disinfected?

CDC Recommendation: How to Clean and Sanitize Breast Pumps

"Germs can grow quickly in breast milk or breast milk residue that remains on pump parts." and outbreaks have been related to contaminated breast pumps.

Additional FAQs and information on how to clean, sanitize, and store infant feeding items are available: https://www.cdc.gov/hygiene/faq/index.html

Source: https://www.cdc.gov/hygiene/about/about-breast-pump-hygiene.html

FDA Recommendation: Cleaning a Breast Pump

"All breast pump parts that come in contact with breast milk, such as bottles, valves and breast shields, should be cleaned after each use."

Source: https://www.fda.gov/medical-devices/breast-pumps/cleaning-breast-pump

Related Outbreak Article: Gransden WR, Webster M, French GL, Phillips I. An outbreak of Serratia marcescens transmitted by contaminated breast pumps in a special care baby unit. J Hosp Infect. 1986;7(2):149-154. doi:10.1016/0195-6701(86)90057-5. (https://pubmed.ncbi.nlm.nih.gov/2871077/)

6. Are manufacturers' instructions for use (MIFU) available for cleaning and disinfection of lactation equipment?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

CDC Recommendation: CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

"Cleaning of Medical Equipment Manufacturers of medical equipment should provide care and maintenance instructions specific to their equipment. These instructions should include information about a. the equipments' compatibility with chemical germicides, b. whether the equipment is water-resistant or can be safely immersed for cleaning, and c. how the equipment should be decontaminated if servicing is required. In the absence of manufacturers' instructions, non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs, dialysis machines, and equipment knobs and controls) usually only require cleansing followed by low- to intermediate-level disinfection, depending on the nature and degree of contamination."

Source: https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf

7. Please describe the training provided to healthcare personnel on cleaning and disinfection of lactation equipment:

8. Please describe the training provided to families on cleaning and disinfection of lactation equipment:

CDC Recommendation: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"All personnel who clean and disinfect reusable patient care equipment and environmental surfaces in patient care areas must understand their roles and responsibilities."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide job-specific, infection prevention education and training to all healthcare personnel for all tasks."

"Provide appropriate infection prevention education to patients, family members, visitors, and others included in the caregiving network."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

9. Please describe the process for cleaning and disinfection of lactation equipment and where this occurs:

CDC Recommendation: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Review the process for cleaning and disinfection of lactation equipment (e.g., breast pump, breast pump parts), including who is responsible for this process (e.g., parents, clinical team), where it occurs, where supplies are kept, if cleaning and disinfection occur near a sink, and where equipment is left to dry and be stored. Ensure that breast pump equipment is appropriately cleaned and disinfected, dried thoroughly, and kept away from sink splash zones."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

Additional FAQs and information on how to clean, sanitize, and store infant feeding items are available: https://www.cdc.gov/hygiene/faq/index.html

Related Outbreak Article: *Gransden WR, Webster M, French GL, Phillips I. An outbreak of Serratia marcescens transmitted by contaminated breast pumps in a special care baby unit. J Hosp Infect. 1986;7(2):149-154. doi:10.1016/0195-6701(86)90057-5. (https://pubmed.ncbi.nlm.nih.gov/2871077/)*

10. Where is reprocessed lactation equipment allowed to dry?

11. Where and how is lactation equipment stored to prevent contamination once cleaning and disinfection is complete?

CDC Recommendation: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Review the process for cleaning and disinfection of lactation equipment (e.g., breast pump, breast pump parts), including who is responsible for this process (e.g., parents, clinical team), where it occurs, where supplies are kept, if cleaning and disinfection occur near a sink, and where equipment is left to dry and be stored. Ensure that breast pump equipment is appropriately cleaned and disinfected, dried thoroughly, and kept away from sink splash zones."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

How to Clean and Sanitize Breast Pumps

Once cleaned and disinfected, the equipment should be allowed to "air-dry thoroughly before storing to help prevent germs and mold from growing. Once completely dry, the items should be stored in a clean, protected area [i.e., a location that avoids contamination from surfaces or splashes from plumbing (e.g., sink splash zones)] to prevent contamination during storage."

Source: https://www.cdc.gov/hygiene/about/about-breast-pump-hygiene.html

"Avoid placing patient care or personal items on counters next to sinks" as "splashes can spread droplets containing [opportunistic pathogens of premise plumbing] (OPPP) to the surrounding environment"

Source: https://www.cdc.gov/healthcare-associated-infections/php/toolkit/water-management.html

Additional FAQs and information on how to clean, sanitize, and store infant feeding items are available: https://www.cdc.gov/hygiene/faq/index.html

Related Outbreak Article: *Gransden WR, Webster M, French GL, Phillips I. An outbreak of Serratia marcescens transmitted by contaminated breast pumps in a special care baby unit. J Hosp Infect. 1986;7(2):149-154. doi:10.1016/0195-6701(86)90057-5. (https://pubmed.ncbi.nlm.nih.gov/2871077/)*

12. Is/are refrigerator(s) used to store milk (i.e., maternal breastmilk, donor milk)?

- ◯ Yes
- ◯ No, milk is not stored at the facility
- ◯ Unknown
- ◯ Not assessed

13. (For NICUs with private rooms) Do private rooms have milk fridges in the room?

- ◯ Yes
- ◯ No
- ◯ Not applicable, no private rooms in NICU
- ◯ Unknown
- ◯ Not assessed

14. What policies are in place to prevent contamination of milk?

CDC Recommendation: Breast Milk Storage and Preparation

"Various factors affect how long human milk can be stored safely. The storage and preparation techniques recommended [at Breast Milk Storage and Preparation | Breastfeeding | CDC] can help maintain the safety and quality of expressed breast milk for the baby's health. This page provides information for storing human milk at different temperatures and for preparing human milk after storage."

Source: https://www.cdc.gov/breastfeeding/breast-milk-preparation-and-storage/handling-breastmilk.html

Additional Consideration from Common Practice: Appropriately storing milk that is not immediately consumed in a refrigerator or freezer prevents bacterial growth. Refrigerators dedicated for the storage of milk may prevent cross-contamination of milk bottles. Other examples of facility policies include requiring glove removal and performing hand hygiene prior to accessing the refrigerator, wiping down a bottle with a germicidal wipe prior to storage, placing bottles in a storage bin within the refrigerator, keeping milk located further back on a shelf (as opposed to doors or front of shelves) to prevent temperature changes when accessing the refrigerator.

Private rooms may have their own refrigerators for storing milk. A case study from the Agency for Healthcare Research and Quality describes how misadministration errors may occur if milk is not removed from private room refrigerators at the time of patient discharge.

Source: https://psnet.ahrq.gov/web-mm/mothers-milk-whose-mother

15. Does the NICU utilize a first-in-first-out (FIFO) strategy where the oldest milk is used before newer milk?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

CDC Recommendation: Breast Milk Storage and Preparation

"Remember: First in, first out. Always thaw the oldest breast milk first. Over time, the quality of breast milk can decrease."

Source: https://www.cdc.gov/breastfeeding/breast-milk-preparation-and-storage/handling-breastmilk.html

16. How is stored milk labeled?

17. What system is used to prevent administering milk to the wrong infant (i.e., infant given expressed breast milk from another mother)? *(Select all that apply)*

- ☐ Bar code system
- ☐ Labeling system
- ☐ Two-person confirmation system
- ☐ Other system (*specify*):
- ☐ No system
- ☐ Not applicable
- ☐ Not assessed

18. What system is used to ensure any leftover milk is sent home with the infant at the time of discharge or discarded, including milk in a central location (e.g., nutrition preparation) and private room refrigerators (if applicable)?

CDC Recommendation: Storage Handling and Preparation of Breast Milk in Early Care and Education (ECE) Programs

Some methods for preventing milk misadministration are discussed in the CDC Early Care and Education Program webpage: https://www.cdc.gov/obesity/strategies/early-care-education/pdf/Breastmilk-ECE-082022-508.pdf.

Additional Consideration from Common Practice: Facilities have established policies to prevent milk misadministration. There are multiple different options and processes available including labeling (manual vs. automated), two-person systems, bar codes, binning, and others. Several options are discussed in the Frontiers in Nutrition review article:

- "Bar code scanning technology is commonly used in the health care setting to promote patient safety by reducing the risk of misadministration (providing the wrong product to the wrong patient) for processes such as medication, blood, and human milk administration. Bar code scanning is often used in lieu of a two-person double check to reduce risk of human error and confirmation bias which may occur when a manual check is used. Such systems have been shown to reduce errors and improve efficiencies. Scanning technology can assist with monitoring expiration dates and time."

Source: *Steele C. Best Practices for Handling and Administration of Expressed Human Milk and Donor Human Milk for Hospitalized Preterm Infants. Front Nutr. 2018 Sep 3;5:76. doi: 10.3389/fnut.2018.00076. (https://pubmed.ncbi.nlm.nih.gov/30234121/)*

19. Where is milk (e.g., expressed maternal breastmilk, donor milk) prepared for use in the NICU? (*Select all that apply*)

- ☐ Within NICU (e.g., nutrition room)
- ☐ Central processing
- ☐ Dietary department
- ☐ Pharmacy
- ☐ Other location (*specify*): _____
- ☐ Unknown
- ☐ Not assessed

CDC Recommendation: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Assess the area where nutrition preparation is taking place, noting the presence of sinks. Precautions, such as relocating nutrition preparation away from the sink or installation of splash guards can prevent inadvertent contamination of supplies."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

20. Who is responsible for preparing milk for use in the NICU? (*Select all that apply*)

- ☐ Nursing staff
- ☐ Dietician/Nutritionist
- ☐ Pharmacist
- ☐ Family member
- ☐ Other (*specify*): _____
- ☐ Unknown
- ☐ Not assessed

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide appropriate infection prevention education to patients, family members, visitors, and others included in the caregiving network."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

Additional Consideration from Common Practice: Facilities prepare milk in a manner to prevent contamination. While CDC does not have specific guidance for milk preparation in NICUs, basic hygiene practices such as performing hand hygiene before handling milk along with preparing milk in a clean area away from potential sources of contamination would apply. Additional best practices are discussed in the Frontiers in Nutrition review article:

- "For handling of human milk, fortifiers, and feeding systems, preparation location and practices that minimize microbial growth (such as adherence to good hand-hygiene practices and use of 'no touch' preparation and administration techniques) are critical. A location dedicated for the purpose of handling human milk feedings that is separate from patient care areas reduces risk of contamination and is considered a best practice. [expressed human milk] or [donor human milk] feedings should not be prepared in any patient care area, including the patient's bedside, due to risk of contamination."

Source: *Steele C. Best Practices for Handling and Administration of Expressed Human Milk and Donor Human Milk for Hospitalized Preterm Infants. Front Nutr. 2018 Sep 3;5:76. doi: 10.3389/fnut.2018.00076.* (*https://pubmed.ncbi.nlm.nih.gov/30234121/*)

While family members are unlikely to be involved in the main steps of preparation, they may be involved in warming, particularly if a warmer is at the bedside. Training family members on unit procedures may help to avoid contamination.

21. Is powdered infant formula used in the NICU?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

If yes,

21a. Where is powdered infant formula prepared for use in the NICU? (*Select all that apply*)

- ☐ Within NICU (e.g., nutrition room)
- ☐ Central processing
- ☐ Dietary department
- ☐ Pharmacy
- ☐ At the bedside
- ☐ Other location (*specify*): _____
- ☐ Unknown
- ☐ Not assessed

21b. Who is responsible for preparing powdered infant formula for use in the NICU? (*Select all that apply*)

- ☐ Nursing staff
- ☐ Dietician/Nutritionist
- ☐ Pharmacist
- ☐ Family member
- ☐ Other (*specify*): _____
- ☐ Unknown
- ☐ Not assessed

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide appropriate infection prevention education to patients, family members, visitors, and others included in the caregiving network."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

Additional Consideration from Common Practice: While family members are unlikely to be involved in the main steps of preparation, they may be involved in warming, particularly if a warmer is at the bedside. Training family members on unit procedures may help to avoid contamination.

21c. Are powdered infant formula containers shared among different patients (e.g., the same container may be used for more than one patient)?

- ◯ Yes, powdered formula containers may be shared for multiple patients
- ◯ No, powdered formula containers are dedicated to a single patient
- ◯ Other (specify): _____
- ◯ Unknown
- ◯ Not assessed

21d. What type(s) of water is used to mix with powdered infant formula?

21e. What practices are in place to prevent contamination of powdered infant formula?

CDC Recommendation: Morbidity and Mortality Weekly Report. Enterobacter sakazakii Infections Associated with the Use of Powdered Infant Formula --- Tennessee, 2001. Summary Interim Recommendations for Preparation of Powdered Infant Formula in the Neonatal Intensive Care Unit Setting

1. "Formula products should be selected based on nutritional needs; alternatives to powdered forms should be chosen when possible.
2. Trained personnel should prepare powdered formula under aseptic technique in a designated preparation room.
3. Manufacturer's instructions should be followed; product should be refrigerated immediately and discarded if not used within 24 hours after preparation.
4. The administration or "hang" time for continuous enteral feeding should not exceed 4 hours.
5. Written hospital guidelines should be available in the event of a manufacturer product recall, including notification of health-care providers, a system for reporting and follow-up of specific formula products used, and retention of recall records."

Source: https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5114a1.htm#box

Additional Consideration from Common Practice: Many NICUs utilize ready-to-feed (RTF, pre-mixed) infant formulas due to the risk of contamination of powdered infant formula. However, this may not always be the case and some NICUs may need to utilize powdered infant formula for specific dietary needs or other nutrient needs of infants. If powdered infant formulas are used, trained personnel prepare powdered formula under aseptic technique in a designated preparation room to avoid contamination of the container as well as the equipment used to measure and mix formula.

The Academy of Nutrition and Dietetics' Infant and Pediatric Feedings, 3rd Edition states:

"Sterile water should be used for formula preparation in the health care setting"

Source: Pediatric Nutrition Dietetic Practice Group, Caroline Steele, Emily A. Collins. Infant and Pediatric Feedings: Guidelines for Preparation of Human Milk and Formula in Health Care Facilities, Third Edition. Chicago, IL: Academy of Nutrition and Dietetics; 2019. p. 11-14.

Related Outbreak Article: *Sánchez-Carrillo C, Padilla B, Marín M, Rivera M, Cercenado E, Vigil D, Sánchez-Luna M, Bouza E. Contaminated feeding bottles: the source of an outbreak of Pseudomonas aeruginosa infections in a neonatal intensive care unit. Am J Infect Control. 2009 Mar;37(2):150-4. doi: 10.1016/j.ajic.2008.04.259. (https://pubmed.ncbi.nlm.nih.gov/19059675/)*

22. When are milk and formula preparation areas disinfected?

23. How are the milk and formula preparation areas disinfected?

24. How are staff trained on environmental surface cleaning and disinfection practices related to milk and formula preparation?

CDC Recommendation: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Review the process and location for storage of formula and maternal breast milk, warming, and administration. Review the process for cleaning and disinfection of lactation equipment (e.g., breast pump, breast pump parts), including who is responsible for this process (e.g., parents, clinical team), where it occurs, where supplies are kept, if cleaning and disinfection occur near a sink, and where equipment is left to dry and be stored. Ensure that breast pump equipment is appropriately cleaned and disinfected, dried thoroughly, and kept away from sink splash zones."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

Additional Consideration from Common Practice:

"Use of dedicated staff for the handling and preparation of human milk feedings within the health care setting is considered a best practice and has been shown to reduce risk of misadministration errors. Staff should be well trained in aseptic technique and demonstrate proper steps for handling human milk and fortifiers. Hand hygiene is critical in the handling of human milk to prevent introduction of exogenous microbial contamination."

Source: *Steele C. Best Practices for Handling and Administration of Expressed Human Milk and Donor Human Milk for Hospitalized Preterm Infants. Front Nutr. 2018 Sep 3;5:76. doi: 10.3389/fnut.2018.00076. (https://pubmed.ncbi.nlm.nih.gov/30234121/)*

Related Outbreak Article: *Shaik Ismail B, Toh HX, Seah JH, Tan KY, Lee LC, Tay YY, Khong KC, Seet AWM, Tesalona KC, Ngeow AJH, Ho SKY, Poon WB, Lai DCM, Ko KKK, Ling ML. Serratia marcescens outbreak at a neonatal intensive care unit in an acute care tertiary hospital in Singapore. J Hosp Infect. 2025 Feb;156:21-25 doi: 10.1016/j.jhin.2024.10.002. (https://pubmed.ncbi.nlm.nih.gov/39447651/)*

25. Are sinks located near the nutrition preparation area?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed
- ◯ Not applicable

If yes,

25a. What practices are in place to prevent contamination of nutrition supplies?

CDC Recommendation: Outbreaks of Infections Caused by Water-Related Organisms in Acute Care Hospitals

"Assess the area where nutrition preparation is taking place, noting the presence of sinks. Precautions, such as relocating nutrition preparation away from the sink or installation of splash guards can prevent inadvertent contamination of supplies."

Source: https://www.cdc.gov/healthcare-associated-infections/media/pdfs/Water-pathogen-response-508.pdf

Related Outbreak Articles:

- *Shaik Ismail B, Toh HX, Seah JH, Tan KY, Lee LC, Tay YY, Khong KC, Seet AWM, Tesalona KC, Ngeow AJH, Ho SKY, Poon WB, Lai DCM, Ko KKK, Ling ML. Serratia marcescens outbreak at a neonatal intensive care unit in an acute care tertiary hospital in Singapore. J Hosp Infect. 2025 Feb;156:21-25. doi: 10.1016/j.jhin.2024.10.002. (https://pubmed.ncbi.nlm.nih.gov/39447651/)*
- *Bicking Kinsey C, Koirala S, Solomon B, et al. Pseudomonas aeruginosa Outbreak in a Neonatal Intensive Care Unit Attributed to Hospital Tap Water. Infect Control Hosp Epidemiol. 2017;38(7):801-808. doi:10.1017/ice.2017.87 (https://pubmed.ncbi.nlm.nih.gov/28516821/)*
- *Low JM, Ko KKK, Ong RTH, et al. Pathogenic bacteria rapidly colonize sinks of a neonatal intensive care unit: results of a prospective surveillance study. J Hosp Infect. 2025;159:71-78. doi:10.1016/j.jhin.2025.01.013. (https://pubmed.ncbi.nlm.nih.gov/39922499/)*

Notes:

Thawing and Warming of Milk and Formula

When a column is not applicable to the prompt or question, the cell is marked as N/A. Please skip cells marked as N/A.

Please complete the below questions:	For thawing milk if it is frozen:	For warming milk and formula feeds prior to feeding:
26. How is milk/formula thawed and warmed? *(Select all that apply)*	*Select all that apply:* ☐ Thawed in warm sterile water ☐ Thawed in warm tap water ☐ Waterless warmer (e.g., Medela) ☐ Bead warmer (sometimes called bead bath) ☐ Thawed in refrigerator ☐ Thawed at room temperature ☐ Other (*specify*): _____ ☐ Unknown ☐ Not assessed	*Select all that apply:* ☐ Warmed in sterile water ☐ Warmed in tap water ☐ Waterless warmer (e.g., Medela) ☐ Bead warmer (sometimes called bead bath) ☐ Milk and formula feeds are not actively warmed prior to administration ☐ Other (*specify*): _____ ☐ Unknown ☐ Not assessed
27. If milk and formula are thawed/warmed, where does this occur (i.e., private room bedside, nutrition preparation area)?		
28. If milk/formula is thawed/warmed in warm tap water, what steps are taken to avoid contamination of the milk container with tap water (e.g., use of liners)?		

CDC Recommendation for questions 26, 27, and 28: Breast Milk Storage and Preparation

Multiple methods which are available to thaw frozen milk, including thawing at room temperature, in a refrigerator, or in warm water. "Never thaw or heat breast milk in a microwave. Microwaving can destroy nutrients in breast milk and create hot spots, which can burn a baby's mouth."

Source: https://www.cdc.gov/breastfeeding/breast-milk-preparation-and-storage/handling-breastmilk.html

Considerations for Reducing Risk: Water in Healthcare Facilities

If water is used to thaw or warm milk, note that "water can carry germs that threaten patient safety and spread antimicrobial-resistant pathogens or cause healthcare-associated infections (HAIs)"

Source: https://www.cdc.gov/healthcare-associated-infections/php/toolkit/water-management.html

Additional Consideration from Common Practice: Use of non-sterile water in water-based warmer may lead to contamination of the bottle or milk. To avoid direct contact and potential contamination with the water, sometimes a bottle is placed inside a single-use plastic bag. Despite using a bag, splashes and sprays or direct contact with water may still occur as the bottle or bag are handled. Similarly, hand hygiene observations can help identify potential practices leading to contamination of the bottle or milk/formula as well.

Related Outbreak Article: *Molina-Cabrillana J, Artiles-Campelo F, Dorta-Hung E, Santana-Reyes C, Quori A, Lafarga-Capuz B, Hernández-Vera JR. Outbreak of Pseudomonas aeruginosa infections in a neonatal care unit associated with feeding bottles heaters. Am J Infect Control. 2013 Feb;41(2):e7-9. doi: 10.1016/j.ajic.2012.08.004. PMID: 23369317 (https://pubmed.ncbi.nlm.nih.gov/23369317/)*

Please complete the below questions:	For thawing milk if it is frozen:	For warming milk and formula feeds prior to feeding:
29. If a warmer is used, how frequently is it cleaned and disinfected? (*Select all that apply*)	☐ At change of shift ☐ Daily ☐ Weekly ☐ As needed after a spill or leak ☐ Another regular interval (*specify*): _____ ☐ Unknown ☐ Not assessed ☐ Warmer not used	☐ At change of shift ☐ Daily ☐ Weekly ☐ As needed after a spill or leak ☐ Another regular interval (*specify*): _____ ☐ Unknown ☐ Not assessed ☐ Warmer not used
30. If a warmer is used, do healthcare workers have access to the manufacturer's instructions for cleaning and disinfection?	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Warmer not used	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Warmer not used
31. If a warmer is used, please describe the cleaning and disinfection process:		
32. Describe how the warmer is cleaned and disinfected in the event of a spill of milk or formula:		
33. How long can milk be administered after thawing?		N/A

CDC Recommendation for questions 29, 30, 31, and 32: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

1. "Require routine and targeted cleaning of environmental surfaces as indicated by the level of patient contact and degree of soiling.
   - Clean and disinfect surfaces in close proximity to the patient and frequently touched surfaces in the patient care environment on a more frequent schedule compared to other surfaces.
   - Promptly clean and decontaminate spills of blood or other potentially infectious materials.
2. Select EPA-registered disinfectants that have microbiocidal activity against the pathogens most likely to contaminate the patient-care environment.
3. Follow manufacturers' instructions for proper use of cleaning and disinfecting products (e.g., dilution, contact time, material compatibility, storage, shelf-life, safe use and disposal)."

"When information from manufacturers is limited regarding selection and use of agents for specific microorganisms, environmental surfaces or equipment, facility policies regarding cleaning and disinfecting should be guided by the best available evidence and careful consideration of the risks and benefits of the available options.

Refer to "CDC Guidelines for Environmental Infection Control in Health-Care Facilities [https://www.cdc.gov/infection-control/hcp/environmental-control/index.html]" and "CDC Guideline for Disinfection and Sterilization in Healthcare Facilities [https://www.cdc.gov/infection-control/hcp/disinfection-and-sterilization/index.html]" for details."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

CDC Recommendation for question 33: Storage and Preparation of Breast Milk

In general, "use milk within 24 hours of thawing in the refrigerator" and "within 2 hours of bringing to room temperature or warming. Never refreeze thawed milk"

Source: https://www.cdc.gov/breastfeeding/pdf/preparation-of-breast-milk_H.pdf

Additional Consideration from Common Practice: Milk storage and use recommendations are more conservative for the critically ill infants in the NICU than for the otherwise healthy infants in a home environment. Additional best practices for NICUs are summarized in the Frontiers in Nutrition article:

- "Human milk that is beyond its expiration is at greater risk for excessive microbial growth which could be particularly devastating in the critically ill neonate."
- "Stored milk should be rotated using first-in-first-out (FIFO) principles with the oldest milk being used first. Storage times and temperatures impact nutritional quality, biologically active components in human milk, and rate/incidence of microbial growth. Within the acute care setting when human milk is used for immunocompromised patients, storage recommendations are more conservative than for the healthy infant at home. Therefore, it is generally recommended:
  - Fresh milk be stored in the refrigerator (≤ 4°C or ≤ 39°F) for a maximum of 48 h
  - Thawed unpasteurized milk be stored in the refrigerator (≤ 4°C or ≤ 39°F) for a maximum of 24 h
  - Thawed pasteurized DHM be stored in the refrigerator (≤ 4°C or ≤ 39°F) for a maximum of 48 h
  - Fortified milk be stored in the refrigerator (≤ 4°C or ≤ 39°F) for a maximum of 24 h
  - Hang time for continuous feedings at room temperature for a maximum of 4 h
  - Frozen human milk be stored in the freezer for 6–12 months at ≤ −20°C (≤ −4°F) or beyond 12 months at −70 to −80°C (−94 to −112°F)."

Source: *Steele C. Best Practices for Handling and Administration of Expressed Human Milk and Donor Human Milk for Hospitalized Preterm Infants. Front Nutr. 2018 Sep 3;5:76. doi: 10.3389/fnut.2018.00076. (https://pubmed.ncbi.nlm.nih.gov/30234121/)*

Notes:

SHARED MEDICAL EQUIPMENT

Medical equipment used in the NICU may be shared among patients (e.g., diaper scales, stethoscopes, ocular examination equipment, respiratory equipment) and among different units within the same hospital, including adult units (e.g., mobile X-ray machine, ultrasound, echocardiogram, and ventilator). Shared equipment that is not properly cleaned and disinfected between patients has potential to spread pathogens, which may result in healthcare-associated infections or colonization. In general, adults have higher rates of colonization with certain multidrug-resistant organisms (MDROs). If an ICAR is being conducted due to an outbreak or transmission of an organism like carbapenemase-producing bacteria, *Candida auris*, or other MDRO generally not seen in children, it is important to take note of medical equipment that may travel between both adult and NICU units within a facility.

CDC-related webpages used for the questions and discussion in this section include:

- Environmental Infection Control Guidelines - https://www.cdc.gov/infection-control/hcp/environmental-control/index.html
- CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings - https://www.cdc.gov/infection-control/hcp/core-practices/index.html
- Considerations for Reducing Risk: Surfaces in Healthcare Facilities - https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

Additional ICAR modules that may be helpful in assessing practices around shared medical equipment include:

- Module 4: Environmental Services Facilitator Guide - https://www.cdc.gov/infection-control/media/pdfs/IPC-mod4-EVS-508.pdf
- Module 5: High-level Disinfection and Sterilization Facilitator Guide - https://www.cdc.gov/infection-control/media/pdfs/IPC-mod5-disinfection-sterilization-508.pdf

Large Mobile Medical Equipment

1. In addition to ICAR Module 4 Environmental Services and Module 5: High-level Disinfection and Sterilization, the below table and questions may be used to assess practices related to mobile medical equipment in the NICU:

Equipment	**Is the equipment shared among different units in the hospital (e.g., the equipment can travel between the NICU and another ICU or ward)? (*Select all that apply*)**	**Who is responsible for cleaning and disinfection of the equipment? (*Select all that apply*)**	**Which product(s) are used for cleaning and disinfecting the equipment?**
Portable X-ray	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Electrocardiogram (ECG/EKG)	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Ventilator(s) (e.g., conventional mechanical ventilators, high-frequency oscillatory ventilation, high-frequency jet ventilation)	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Respiratory therapists ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	

Equipment	Is the equipment shared among different units in the hospital (e.g., the equipment can travel between the NICU and another ICU or ward)? (*Select all that apply*)	Who is responsible for cleaning and disinfection of the equipment? (*Select all that apply*)	Which product(s) are used for cleaning and disinfecting the equipment?
Continuous Positive Airway Pressure Machine (CPAP)	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Respiratory therapists ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
High-flow oxygen equipment	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Respiratory therapists ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Dialysis machine	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Extracorporeal membrane oxygenation (ECMO) equipment	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Crash cart/resuscitation cart	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Other large mobile medical equipment, specify 1:	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Other large mobile medical equipment, specify 2:	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	

Equipment	Is the equipment shared among different units in the hospital (e.g., the equipment can travel between the NICU and another ICU or ward)? (*Select all that apply*)	Who is responsible for cleaning and disinfection of the equipment? (*Select all that apply*)	Which product(s) are used for cleaning and disinfecting the equipment?
Other large mobile medical equipment, specify 3: _____	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): _____ ☐ Unknown ☐ Not assessed	

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Clean and reprocess (disinfect or sterilize) reusable medical equipment* (e.g., blood glucose meters and other point-of-care devices, blood pressure cuffs, oximeter probes, surgical instruments, endoscopes) prior to use on another patient and when soiled."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/

CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

"Cleaning of Medical Equipment

Manufacturers of medical equipment should provide care and maintenance instructions specific to their equipment. These instructions should include information about a. the equipments' compatibility with chemical germicides, b. whether the equipment is water-resistant or can be safely immersed for cleaning, and c. how the equipment should be decontaminated if servicing is required. In the absence of manufacturers' instructions, non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs, dialysis machines, and equipment knobs and controls) usually only require cleansing followed by low-to intermediate-level disinfection, depending on the nature and degree of contamination."

Source: https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf

Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"All personnel who clean and disinfect reusable patient care equipment and environmental surfaces in patient care areas must understand their roles and responsibilities."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide job-specific, infection prevention education and training to all healthcare personnel for all tasks."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

ICAR Module 4 Environmental Services and Module 5: High-level Disinfection and Sterilization may be used for a further assessment of practices related to cleaning, disinfection, reprocessing, and storage of non-critical equipment in the NICU.

1a. Are all the examples of medical equipment listed above cleaned and disinfected after each use?

◯ Yes
◯ No
◯ Unknown
◯ Not assessed

1b. If no, please list which equipment and when they are cleaned and disinfected:

1c. Is there a process to ensure that mobile medical equipment that has been cleaned and disinfected is designated as such, so healthcare personnel know it is ready-to-use (i.e., tagged, bagged)?

◯ Yes
◯ No
◯ Unknown
◯ Not assessed

1d. If yes, please describe:

CDC Recommendation: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"Develop standardized protocols for routine (e.g., daily) and discharge/transfer (also known as terminal) cleaning and disinfection for each major patient care room type." Include in the protocols "processes for easy identification of equipment and rooms that have been properly cleaned and disinfected and are ready for patient use (e.g., tagging system, placement in dedicated clean area)."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/

ICAR Module 4 Environmental Services and Module 5: High-level Disinfection and Sterilization may be used for a further assessment of practices related to cleaning, disinfection, reprocessing, and storage of non-critical equipment in the NICU.

Notes:

Ultrasound Equipment

2. In addition to ICAR Module 4 Environmental Services and Module 5: High-level Disinfection and Sterilization, the below table and questions may be used to assess practices related to ultrasound equipment in the NICU:

Equipment	**Is the equipment shared among different units in the hospital (e.g., the equipment can travel between the NICU and another ICU or ward)?** (*Select all that apply*)	**Who is responsible for cleaning and disinfection of the equipment?** (*Select all that apply*)	**Which product(s) are used for cleaning and disinfecting the equipment?**
Portable ultrasound	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Bladder scanner	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Echocardiogram	☐ Shared with other pediatric units ☐ Shared with adult units ☐ Dedicated to NICU ☐ Unknown ☐ Not Used in NICU ☐ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	

2a. Describe the process for reprocessing ultrasound equipment that is used with intact skin:

CDC Recommendation: Morbidity and Mortality Weekly Report. Outbreak of *Burkholderia stabilis* Infections Associated with Contaminated Nonsterile, Multiuse Ultrasound Gel - 10 States, May–September 2021

"**Reprocessing of ultrasound equipment**

- Follow manufacturer's instructions for ultrasound probe reprocessing to ensure recommended cleaning and disinfection protocols are being followed.
- Clean and thoroughly disinfect ultrasound consoles and other parts of the ultrasound device that do not come into direct contact with the patient (e.g., handles, cables, connectors, and holders) and any warming devices or other noncritical surfaces associated with ultrasound procedures before use on another patient.† Containers for ultrasound gel and consoles should be considered high-touch surfaces.
- All transducers used on either mucous membranes or nonintact skin (e.g., use in transvaginal, transrectal, and transesophageal procedures) require high-level disinfection or sterilization before use on another patient.

* For all ultrasonography, standard precautions including adherence to hand hygiene and the use of personal protective equipment are recommended. Surgical hand scrub and use of sterile barriers is recommended for sterile procedures."

Source: *Hudson MJ, Park SC, Mathers A, et al. Outbreak of Burkholderia stabilis Infections Associated with Contaminated Nonsterile, Multiuse Ultrasound Gel — 10 States, May–September 2021. MMWR Morb Mortal Wkly Rep 2022;71:1517–1521. doi: 10.15585/mmwr.mm7148a3.* (https://www.cdc.gov/mmwr/volumes/71/wr/mm7148a3.htm?s_cid=mm7148a3_w)

Additional Consideration from Common Practice: Additional information related to cleaning and preparing ultrasound transducers is available from the Association for Medical Ultrasound: https://www.aium.org/resources/official-statements/view/guidelines-for-cleaning-and-preparing-external--and-internal-use-ultrasound-transducers-and-equipment-between-patients-as-well-as-safe-handling-and-use-of-ultrasound-coupling-gel

2b. Please describe the training provided to those responsible for cleaning and disinfection of ultrasound equipment:

CDC Recommendation: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"All personnel who clean and disinfect reusable patient care equipment and environmental surfaces in patient care areas must understand their roles and responsibilities."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Provide job-specific, infection prevention education and training to all healthcare personnel for all tasks."

"Reprocessing personnel should have training in the reprocessing steps and the correct use of PPE necessary for the task. Competencies of those personnel should be documented initially upon assignment of their duties, whenever new equipment is introduced, and periodically (e.g., annually)."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/index.html

3. What type of ultrasound gel is used for **external transducer** ultrasound procedures (e.g., echocardiography, cranial ultrasound)? *(Select all that apply)*

- ☐ Sterile, single use packet
- ☐ Nonsterile, single use packet
- ☐ Nonsterile, multiuse container
- ☐ Unknown
- ☐ Not applicable
- ☐ Not assessed

4. What type of ultrasound gel is used for **interventional percutaneous** ultrasound procedures (e.g., placement of central and peripheral intravenous lines)? *(Select all that apply)*

- ☐ Sterile, single use packet
- ☐ Nonsterile, single use packet
- ☐ Nonsterile, multiuse container
- ☐ Unknown
- ☐ Not applicable
- ☐ Not assessed

CDC Recommendation: Morbidity and Mortality Weekly Report. Outbreak of *Burkholderia stabilis* Infections Associated with Contaminated Nonsterile, Multiuse Ultrasound Gel - 10 States, May–September 2021

"Sterile ultrasound gel

- Use single-use, sterile ultrasound gel for ultrasonography performed in preparation for or during percutaneous procedures (e.g., placement of central and peripheral intravenous lines, amniocentesis, paracentesis, tissue biopsy, and surgical procedures).
  - Do not use nonsterile ultrasound gel for visualization before such procedures.
  - If nonsterile ultrasound gel is inadvertently used before such procedures (e.g., unanticipated procedure), care must be taken to ensure that all residual gel is removed from the skin and the appropriate skin antisepsis is performed before the procedure.
- Use single-use, sterile ultrasound gel for all ultrasound procedures performed on nonintact skin or near fresh surgical sites.
- Whenever feasible, use single-use, sterile ultrasound gel inside single-use or sterile ultrasound probe covers.

Nonsterile ultrasound gel

- If multiuse containers are used:
  - Do not refill; discard and replace multidose containers when empty.
  - Seal container when not in use.
  - Avoid direct contact between gel container dispensing tip and any persons or instrumentation, including the ultrasound transducer.
- If a patient under contact precautions undergoes an ultrasound using gel dispensed from a multiuse container, discard the container after use.
- After ultrasonography, clean the skin, ensuring that all residual ultrasound gel is removed."

"* For all ultrasonography, standard precautions including adherence to hand hygiene and the use of personal protective equipment are recommended. Surgical hand scrub and use of sterile barriers is recommended for sterile procedures."

Source: *Hudson MJ, Park SC, Mathers A, et al. Outbreak of Burkholderia stabilis Infections Associated with Contaminated Nonsterile, Multiuse Ultrasound Gel — 10 States, May–September 2021. MMWR Morb Mortal Wkly*

Rep 2022;71:1517–1521. doi: 10.15585/mmwr.mm7148a3. (*https://www.cdc.gov/mmwr/volumes/71/wr/mm7148a3.htm?s_cid=mm7148a3_w*)

Related Outbreak Article: *Weist K, Wendt C, Petersen LR, Versmold H, Rüden H. An outbreak of pyodermas among neonates caused by ultrasound gel contaminated with methicillin-susceptible Staphylococcus aureus. Infect Control Hosp Epidemiol. 2000;21(12):761-764. doi:10.1086/501729. (https://pubmed.ncbi.nlm.nih.gov/11140910/)*

Notes:

Smaller Mobile Medical Equipment

5. In addition to ICAR Module 4 Environmental Services and Module 5: High-level Disinfection and Sterilization, the below table and questions may be used to assess practices related to smaller mobile medical equipment in the NICU:

Equipment	**Is the equipment dedicated to a single patient or shared in the NICU?**	**Who is responsible for cleaning and disinfection of the equipment?** *(Select all that apply)*	**Which product(s) are used for cleaning and disinfecting the equipment?**
Stethoscope	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Blood pressure cuff	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Thermometer	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Glucose monitor	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Blood gas monitor	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Diaper scale	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	

Equipment	Is the equipment dedicated to a single patient or shared in the NICU?	Who is responsible for cleaning and disinfection of the equipment? *(Select all that apply)*	Which product(s) are used for cleaning and disinfecting the equipment?
Weight scale	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Bilirubin light	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Bilirubin blanket	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Length board	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Tape measure	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Skin transilluminator (i.e., vein finder)	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Ophthalmology equipment (i.e., lens, ophthalmoscope)	◯ Dedicated to a single patient ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	

Equipment	Is the equipment dedicated to a single patient or shared in the NICU?	Who is responsible for cleaning and disinfection of the equipment? *(Select all that apply)*	Which product(s) are used for cleaning and disinfecting the equipment?
Wash basin (e.g., pink tub)	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Other smaller medical equipment, specify 1:	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Other smaller medical equipment, specify 2:	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	
Other smaller medical equipment, specify 3:	◯ Dedicated to a single patient ◯ Disposable equipment used ◯ Shared among patients ◯ Unknown ◯ Not used in NICU ◯ Not assessed	☐ Nurses ☐ Nursing aides ☐ Environmental services ☐ Other (*specify*): ☐ Unknown ☐ Not assessed	

CDC Recommendation: CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings

"Clean and reprocess (disinfect or sterilize) reusable medical equipment* (e.g., blood glucose meters and other point-of-care devices, blood pressure cuffs, oximeter probes, surgical instruments, endoscopes) prior to use on another patient and when soiled."

Source: https://www.cdc.gov/infection-control/hcp/core-practices/

CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

"Cleaning of Medical Equipment

Manufacturers of medical equipment should provide care and maintenance instructions specific to their equipment. These instructions should include information about a. the equipments' compatibility with chemical germicides, b. whether the equipment is water-resistant or can be safely immersed for cleaning, and c. how the equipment should be decontaminated if servicing is required. In the absence of manufacturers' instructions, non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs, dialysis machines, and equipment knobs and controls) usually only require cleansing followed by low- to intermediate-level disinfection, depending on the nature and degree of contamination."

Source: https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf

CDC/STRIVE Infection Control Training on Cleaning and Disinfection Strategies for Non-Critical Surfaces & Equipment.

"Use dedicated disposable devices when available. If a dedicated, disposable device is not available, disinfect all non-critical patient care equipment before removing the device from the room and before using it with another patient." Source: https://www.cdc.gov/infection-control/media/pdfs/Strive-EC102-508.pdf

ICAR Module 4 Environmental Services and Module 5: High-level Disinfection and Sterilization may be used for a further assessment of practices related to cleaning, disinfection, reprocessing, and storage of equipment in the NICU.

Related Outbreak Articles:

- *Sammons JS, Graf EH, Townsend S, et al. Outbreak of Adenovirus in a Neonatal Intensive Care Unit: Critical Importance of Equipment Cleaning During Inpatient Ophthalmologic Examinations. Ophthalmology. 2019;126(1):137-143. doi:10.1016/j.ophtha.2018.07.008. (https://pubmed.ncbi.nlm.nih.gov/30180976/)*

- *Cullen MM, Trail A, Robinson M, Keaney M, Chadwick PR. Serratia marcescens outbreak in a neonatal intensive care unit prompting review of decontamination of laryngoscopes. J Hosp Infect. 2005;59(1):68-70. doi:10.1016/j.jhin.2004.08.003. (https://pubmed.ncbi.nlm.nih.gov/15571857/)*
- *van den Berg RW, Claahsen HL, Niessen M, Muytjens HL, Liem K, Voss A. Enterobacter cloacae outbreak in the NICU related to disinfected thermometers. J Hosp Infect. 2000;45(1):29-34. doi:10.1053/jhin.1999.0657. (https://pubmed.ncbi.nlm.nih.gov/10917779/)*

5a. Are all the examples of smaller medical equipment listed above cleaned and disinfected after each use?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

5b. If no, please list which equipment and when they are cleaned and disinfected?

5c. Is there a process to ensure that reusable, shared, smaller medical equipment that has been cleaned and disinfected is designated as such, so healthcare personnel know it is ready to use (i.e., tagged, bagged)?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

5d. If yes, please describe:

CDC Recommendation: Considerations for Reducing Risk: Surfaces in Healthcare Facilities

"Develop standardized protocols for routine (e.g., daily) and discharge/transfer (also known as terminal) cleaning and disinfection for each major patient care room type." Include in the protocols "processes for easy identification of equipment and rooms that have been properly cleaned and disinfected and are ready for patient use (e.g., tagging system, placement in dedicated clean area)."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/

Related Outbreak Articles:

- *Sammons JS, Graf EH, Townsend S, et al. Outbreak of Adenovirus in a Neonatal Intensive Care Unit: Critical Importance of Equipment Cleaning During Inpatient Ophthalmologic Examinations. Ophthalmology. 2019;126(1):137-143. doi:10.1016/j.ophtha.2018.07.008. (https://pubmed.ncbi.nlm.nih.gov/30180976/)*
- *Cullen MM, Trail A, Robinson M, Keaney M, Chadwick PR. Serratia marcescens outbreak in a neonatal intensive care unit prompting review of decontamination of laryngoscopes. J Hosp Infect. 2005;59(1):68-70. doi:10.1016/j.jhin.2004.08.003. (https://pubmed.ncbi.nlm.nih.gov/15571857/)*
- *van den Berg RW, Claahsen HL, Niessen M, Muytjens HL, Liem K, Voss A. Enterobacter cloacae outbreak in the NICU related to disinfected thermometers. J Hosp Infect. 2000;45(1):29-34. doi:10.1053/jhin.1999.0657. (https://pubmed.ncbi.nlm.nih.gov/10917779/)*

Notes:

Laundry and Linens in the NICU

Laundry and linens are covered in detail in the ICAR Tool for General Infection Prevention and Control (IPC) Across Settings - Module 9. Healthcare Laundry Facilitator Guide. NICU outbreaks have been associated with NICU linens, often with spore-forming fungi (i.e., *Aspergillus* spp.) or bacteria (i.e., *Bacillus* spp., *Clostridium* spp.). As neonatal skin is friable and immature, they may be at risk for cutaneous (skin) infections through direct contact with contaminated linens. Family and visitors may also bring linens to the NICU from home, and it is important to understand how those linens are handled. Examples of these may include items like hats/bonnets, blankets, clothing, or isolette covers. In addition to the questions in Module 9: Healthcare Laundry, additional supplemental linen questions for the NICU include:

6. Where are NICU linens stored?

7. How are linens stored in the NICU to prevent environmental contamination?

8. Are linens donated for use in the NICU (e.g., clothing for an infant, bonnets, isolette covers or blankets)?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

8a. If yes, how are these laundered prior to use?

9. Are families/visitors able to bring linens into the NICU for use (e.g., clothing for an infant, bonnets, isolette covers or blankets)?

- ◯ Yes
- ◯ No
- ◯ Unknown
- ◯ Not assessed

9a. If yes, how are these laundered prior to use?

CDC Recommendation: CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003)

"Although the American Academy of Pediatrics in previous guidelines recommended autoclaving for linens in neonatal intensive care units (NICUs), studies on the microbial quality of routinely cleaned NICU linen have not identified any increased risk for infection among the neonates receiving care." However, NICU linens have been reported as a rare source of outbreaks due to environmental contamination. There are a variety of methods facilities can use to protect clean laundry from environmental contamination until used. The CDC Guidelines for Environmental Infection Control in Health-Care Facilities (2003) states, "Package, transport, and store clean textiles and fabrics by methods that will ensure their cleanliness and protect them from dust and soil during interfacility loading, transport, and unloading."

Sources:

- https://www.cdc.gov/infection-control/media/pdfs/Guideline-Environmental-H.pdf
- https://www.cdc.gov/infection-control/hcp/environmental-control/laundry-bedding.html

"Develop policies and procedures for storage of patient and visitor personal items, which can make it difficult to properly clean a room."

Source: https://www.cdc.gov/healthcare-associated-infections/hcp/infection-control/index.html

Related Outbreak Articles:

- *Duffy J, Harris J, Gade L, Sehulster L, Newhouse E, O'Connell H, Noble-Wang J, Rao C, Balajee SA, Chiller T. Mucormycosis outbreak associated with hospital linens. Pediatr Infect Dis J. 2014 May;33(5):472-6. doi: 10.1097/INF.0000000000000261 (https://pubmed.ncbi.nlm.nih.gov/24667485/)*
- *Westerling G, Davis M, Khuon D. Do donated linens put patients at risk for fungal infections during hospitalization? A pediatric case investigation and subsequently implemented process changes. Am J Infect Control. 2018 Jan;46(1):118-119. doi: 10.1016/j.ajic.2017.09.021 (https://pubmed.ncbi.nlm.nih.gov/29174656/)*
- *Birch BR, Perera BS, Hyde WA, Ruehorn V, Ganguli LA, Kramer JM, Turnbull PC. Bacillus cereus cross-infection in a maternity-unit. J Hosp Infect. 1981 Dec;2(4):349-54. doi: 10.1016/0195-6701(81)90067-0 (https://pubmed.ncbi.nlm.nih.gov/6175691/)*

Notes:

Part B. NICU Observations

Conducting observations is an important part of the ICAR process. Existing ICAR modules break down observations based on specific content rather than specific locations of the hospital. Additional observations which may be unique to the NICU are included below, however, the observations from other modules will still apply depending on the focus of the ICAR. Additional observations from their corresponding modules that may be of use include:

- Module 2 – Hand Hygiene
- Module 3 – Transmission-Based Precautions (TBP)
- Module 4 – Environmental Services (EVS)
- Module 9 – Healthcare Laundry

*(*above links will link directly to observation portion of the module)*

Availability of hand hygiene and cleaning and disinfection supplies in the NICU

Observe using a mix of both open bay/pod and single/private rooms, if available

(ABHS – Alcohol-based hand sanitizer)

Isolette Space	1. ABHS dispenser is easily accessible at point of care?	2. ABHS dispenser is ready to dispense (i.e., not empty)?	3. Adequate volume of ABHS is dispensed on activation?*	4. Handwashing sink is available within 20-feet of isolette?^	5. Isolette is at least 3 feet away from handwashing sink?	6. Supplies for routine cleaning and disinfection are easily accessible?
Isolette 1	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable
Isolette 2	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable
Isolette 3	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable
Isolette 4	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable
Isolette 5	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable	◯ Yes ◯ No ◯ Unknown ◯ Not assessed ◯ Not applicable

**A single activation dispenses a volume that covers all surfaces of the hands and that requires a minimum of 20 seconds to rub before drying.*

^The requirement for a handwashing sink within 20 feet of each bed position in the NICU was first introduced in the 2010 FGI (Facility Guidelines Institute) Guidelines for Design and Construction of Hospitals. State codes may modify or supersede this requirement.

Notes:

Nutrition Preparation

1. Is there a dedicated space for nutrition preparation?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed

2. Is the nutrition preparation area on a non-porous surface which can be cleaned and disinfected (i.e., laminate or other hard surface)?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed

3. Is the nutrition preparation area outside splash zone of any sinks or drains (i.e., at least three feet from nearest sink/drain or a splash guard is in place)?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed

4. Are hand hygiene supplies readily available in the nutrition preparation area?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed

5. If milk/formula warmers are used in the NICU, are they located in the nutrition preparation area?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Milk/formula warmers are not used in the NICU

6. If milk/formula warmers are used in the NICU, do they appear clean without evidence of soilage?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Milk/formula warmers are not used in the NICU

Notes:

Milk storage

7. Is refrigerated maternal/donor breastmilk clearly labeled (patient information, date of collection, use by date, etc.)?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Refrigerator not used in the NICU

8. Is the refrigerated maternal/donor breastmilk storage area free of soilage (e.g., spills)?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Refrigerator not used in the NICU

9. Is the refrigerator used to store maternal/donor breastmilk in an area that is free of potential sources of contamination (e.g., used medical equipment, diaper scale)?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Refrigerator not used in the NICU

10. Does the refrigerator have a temperature log to record appropriate storage temperatures?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Refrigerator not used in the NICU

11. Does the refrigerator have an alarm to alert staff if storage temperatures are not appropriate?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Refrigerator not used in the NICU

Notes:

Lactation Equipment

12. Is lactation equipment clean and free of visible soilage?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Lactation equipment not used in the NICU

13. Is lactation equipment labeled or identified in some manner as clean?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Lactation equipment not used in the NICU

14. Is clean lactation equipment stored separately from equipment that has not been cleaned?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Lactation equipment not used in the NICU

15. Is clean lactation equipment stored in a manner to prevent splashes/sprays from sinks or drains?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Lactation equipment not used in the NICU

16. Are cleaning and disinfection supplies readily available for lactation equipment?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed
- ◯ Lactation equipment not used in the NICU

Notes:

Isolette Cleaning and Disinfection

Given the complexity of reprocessing/terminally cleaning and disinfecting an isolette, it may be helpful to observe this process. The questions below may be used to assist your observations and to note practices being used during the cleaning and disinfection process.

17. Is there a dedicated area for cleaning and disinfection of an isolette (i.e., a location outside of the immediate care area of the NICU or a separate hospital location such as central supply)?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed

18. What isolette cleaning and disinfecting products are available for isolette cleaning and disinfection?

a. Product #1: _____

b. Product #2: _____

c. Product #3: _____

d. Product #4: _____

e. Product #5: _____

19. Are disinfection products used according to their appropriate contact time?

- ◯ Yes
- ◯ No
- ◯ Not observed but endorsed by frontline staff
- ◯ Not observed and not endorsed by frontline staff
- ◯ Not assessed

20. If isolette parts are rinsed with water after disinfection:

20a. Describe what type of water is available for rinsing:

20b. Describe how parts are rinsed:

20c. Describe where parts are dried after rinsing:

20d. Describe how drying parts are protected from splashes/sprays of sinks or drains:

21. Describe how isolettes are stored after cleaning and disinfection to ensure they remain clean and ready for use:

Notes: