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I. Hand Hygiene

Introduction

Hand Hygiene (HH) is the single most effective strategy to reduce HAI and serves as the foundation of this toolkit. HAI prevention efforts should begin with a detailed review of all NICU HH practices, protocols, and staff education efforts. HH is complex in the NICU and application of the WHO's "five moments for hand hygiene" may not be detailed enough for healthcare providers caring for NICU patients. Variations in NICU layout and the fragility of the infant during handling require detailed modifications to standard HH protocols and/or additional processes to assure HH is both robust and practical.

NICU design varies from open-bay concepts to single, individual rooms and hybrid layouts, all of which impacts hand hygiene practices and protocols. For example, in open-bay designs, the beginning of one bed space and the start of another may be unclear, making the requirement to ensure HH before/after room entry difficult to follow. NICUs are encouraged to adopt specific HH protocols that reflect their current physical layout and clearly communicate HH requirements to all healthcare providers.



Providing care to the infant in an isolette/bassinette, along with the fragility of the infant during handling, impacts HH protocols. HH during in-room care is complex as health care providers may touch multiple pieces of equipment while directly caring for and supporting the infant (e.g., oxygen blender, cardiorespiratory monitor, radiant warmer controls) and be physically unable to perform hand hygiene before and after contact with each piece of equipment. HH requirements while providing care should be detailed and standardized within each NICU, tailored to the unique in-room set up of equipment and supplies. The HH tools and protocols provided in this toolkit serve as examples of how other NICUs address these challenges.

POTENTIALLY BETTER PRACTICE

Establish hand hygiene standards and compliance monitoring as an integral component of a robust hospital acquired infection reduction program

Background, Rationale, and Goals

- Hand hygiene (HH) is the single most important factor in preventing the spread of pathogens and antibiotic resistance within healthcare settings.¹⁹ Therefore, HH must be made a priority to reduce infections in the NICU.
- Studies have demonstrated a significant reduction in HAI rates when antiseptic hand washing was performed by personnel. However, HH compliance rates among healthcare workers (HCWs) remains problematic with some centers reporting compliance below 50%.¹⁷
- Many factors contribute to HH compliance among HCWs including provider role, hospital setting, shifts worked, use of gown and gloves, automated sinks, type of activities being performed, and number of patient care interactions⁸
- HCW self-report lack of adherence with HH recommendations related to skin irritation, inaccessible supplies, interference with worker-patient relation, patient needs perceived as priority, wearing gloves, forgetfulness, ignorance of guidelines, insufficient time, high workload, under staffing, and lack of scientific information demonstrating impact of improved hand hygiene on hospital infection rates²⁰
- A multi-modal approach to HH improvement includes education, monitoring, and compliance. The use of formal and informal approaches to HH education with initial orientation as well as continuous intervals is effective. Formal HH

education includes educating all levels of HCWs on both the importance of HH and the correct procedures.^{1,5,23}

- The use of HH monitors can improve compliance through observing adherence to HH protocols, providing just in time peer to peer feedback, and promoting HH practices¹²

Recommended Guidelines and Algorithms

Select hand hygiene agents based on¹⁰:

- Efficacy of antiseptic agent
- Accessibility of the product
- Dispenser systems
- Acceptance of product by HCWs including factors such as:
 - Characteristic of product and ease of use
 - Skin irritation and dryness

Evidence-based hand hygiene guidelines in the NICU:

- All HCWs and families should perform an initial wash upon entry into the NICU as well as before and after patient contact
- Eliminate hand/wrist jewelry, artificial nails, and nail polish
 - Removal of jewelry has been shown to reduce HAI¹¹
 - Natural nail tips should be kept to ¼ inch in length. Artificial nails should not be worn when having direct contact with high-risk patients including in the NICU environment¹⁰
- HH with non-antimicrobial or antimicrobial soap and water should be performed when hands are visibly dirty, contaminated, or soiled
- If hands are not visibly soiled, use of a 60-95% alcohol-based hand gel is recommended for routinely decontaminating hands^{10,19}
- Healthcare personnel should use an alcohol-based hand rub or wash with soap and water:^{7,23}
 - Immediately before touching a patient
 - Before performing an aseptic task (e.g., placing an indwelling device) or handling invasive medical devices
 - Before moving from work on a soiled body site to a clean body site on the same patient
 - After touching a patient or the patient's immediate environment
 - After contact with blood, body fluids, or contaminated surfaces
 - Immediately after glove removal

Universal gloving in the NICU:

- The use of non-sterile gloves after hand hygiene, but before all patient contact, compared to hand hygiene alone to reduce HAI in the NICU is not recommended.⁷
 - A single randomized, non-blinded control study demonstrated a reduction in gram positive blood stream infections with the implementation of universal gloving in a subset of patients¹⁵
 - However, universal gloving has also been shown to increase infections among patients, particularly device related infections⁴
 - Universal gloving interferes with positive patient touch and interaction with patients. Positive patient touch may outweigh the perceived benefits of universal gloving.¹⁸

Family Integrated Care & HH:

- Parents in the NICU are an integral part of the team. Active patient and family empowerment may increase HH compliance among HCWs.^{9,13}
- Provide education to families on the importance and proper technique of HH
- Encourage families to be active participants in cross-monitoring HH in the NICU

Guidance on Quality and Process Improvement

- Review organizational and department HH policies and guidelines
- Implement a multidisciplinary program to improve adherence to recommended practices
- Standardize approach to hand hygiene (e.g., Targeted Solutions Tool, 5 Moments of Hand Hygiene)^{21,23}
- Provide staff education at all levels related to the importance of hand hygiene in reducing HAI in the NICU, appropriate HH technique, and isolation precaution standards. Use a variety of media and approaches to educate staff: rounding, return demonstration, signage/infographics, staff newsletters, and posters. In addition, education may include use of products that demonstrate thoroughness of HH techniques. Refer to examples under [Tools](#).
- Identify specific elements related to hand hygiene compliance to monitor and establish organizational goals
- Monitor HCW adherence with recommended hand hygiene practices through:
 - Direct observation with use of HH monitors/champions. Refer to sample observation worksheet under [Tools](#).

- Provider surveys
- Standardized compliance programs (e.g., the [Targeted Solutions Tool](#) from the Joint Commission²⁴)
- Select innovative strategies for providing feedback regarding hand hygiene:
 - Develop interdepartmental competitions and post results
 - Use electronic message boards to post compliance rates
 - Include HH in leadership and routine patient rounding
 - Report HH compliance feedback in staff meetings, unit huddles, and unit dashboards
 - Provide just in time peer to peer feedback/coaching
 - Implement signage as reminders of hand hygiene techniques (Refer to sample signage under [Tools](#))
 - Use of immediate feedback systems^{14,16}
 - To promote accountability, consider incentives and rewards for achieving HH compliance targets

Outcome, Balancing and Process Measures

- Monitor and record adherence to overall hand hygiene
- Monitor and record adherence to hand hygiene by discipline
- Monitor the volume of alcohol-based sanitizers used per 1,000 patient days
- Monitor adherence to department policies related to nails, jewelry, bare below the elbows
- Track method of hand hygiene
- Monitor adherence to posted isolation precautions
- Provide feedback to healthcare workers on individual performance

Refer to the Joint Commission's "[Measuring Hand Hygiene Adherence](#)" monograph for more information about these Outcome, Balancing and Process Measures.

Resources and Tools

Resources

CDC Resources

- <https://www.cdc.gov/infectioncontrol/pdf/QUOTS/Neonatal-Intensive-Care-Unit-Suite-P.pdf>

Joint Commission Resources

- https://www.jointcommission.org/-/media/tjc/documents/resources/hai/hh_monograph.pdf
- https://www.jointcommission.org/-/media/tjc/documents/resources/hai/jqps_1_15.pdf

World Health Organization Resources:

- <https://www.who.int/teams/integrated-health-services/infection-prevention-control/hand-hygiene/tools-and-resources>
- [https://cdn.who.int/media/docs/default-source/integrated-health-services-\(ihs\)/hand-hygiene/monitoring/hhsa-framework-october-2010.pdf?sfvrsn=41ba0450_6](https://cdn.who.int/media/docs/default-source/integrated-health-services-(ihs)/hand-hygiene/monitoring/hhsa-framework-october-2010.pdf?sfvrsn=41ba0450_6)
- https://cdn.who.int/media/docs/default-source/documents/health-topics/hand-hygiene-why-how-and-when-brochure.pdf?sfvrsn=9b52e145_2&download=true
- [https://cdn.who.int/media/docs/default-source/integrated-health-services-\(ihs\)/infection-prevention-and-control/your-5-moments-for-hand-hygiene-poster.pdf?sfvrsn=83e2fb0e_16](https://cdn.who.int/media/docs/default-source/integrated-health-services-(ihs)/infection-prevention-and-control/your-5-moments-for-hand-hygiene-poster.pdf?sfvrsn=83e2fb0e_16)

Tools

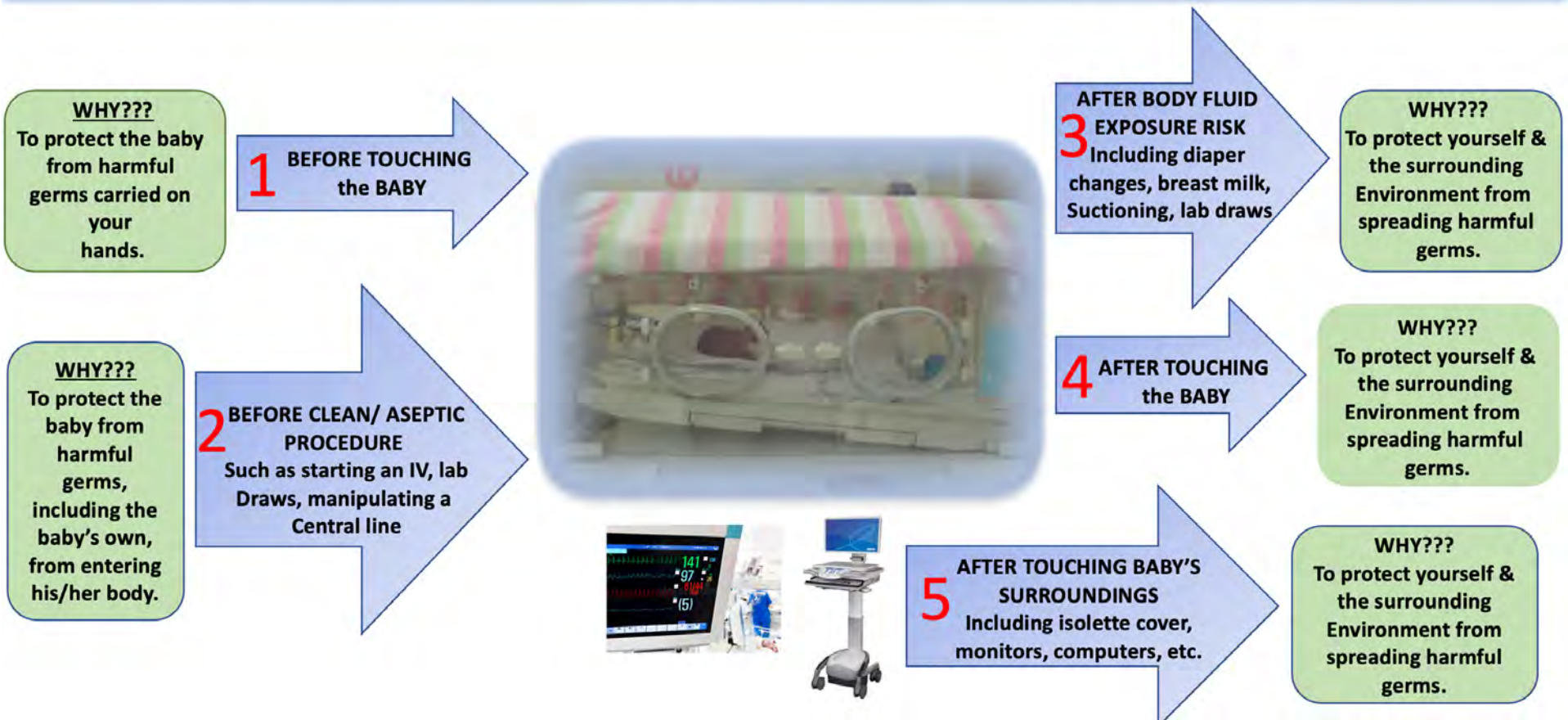
The following tools are included in this section:

1. Your 5 Moments for Hand Hygiene in the NICU - Example 1
2. Your 5 Moments for Hand Hygiene – Example 2
3. Hand Hygiene Audit
4. Standard Precautions: Observation of Hand Hygiene Provision of Supplies
5. Neonatal Environment: Observation of Nutritional Preparation Area
6. Hand Hygiene NICU Observation Tool
7. Hand Hygiene Sink Signage Example
8. Hand Hygiene Moments While Giving Care Tool

YOUR 5 MOMENTS FOR HAND HYGIENE IN THE NICU - EXAMPLE 1

SOURCE: Santa Clara Valley Medical Center

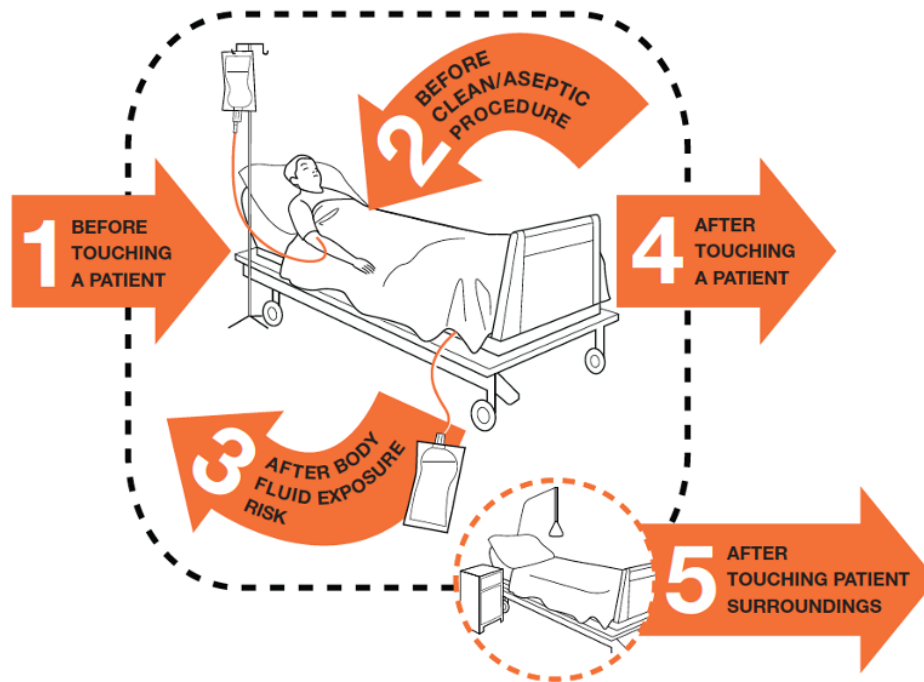
Your 5 Moments for Hand Hygiene in the NICU



YOUR 5 MOMENTS FOR HAND HYGIENE IN THE NICU - EXAMPLE 2

SOURCE: World Health Organization (WHO)

Your 5 Moments for Hand Hygiene



1 BEFORE TOUCHING A PATIENT	WHEN? Clean your hands before touching a patient when approaching him/her. WHY? To protect the patient against harmful germs carried on your hands.
2 BEFORE CLEAN/ASEPTIC PROCEDURE	WHEN? Clean your hands immediately before performing a clean/aseptic procedure. WHY? To protect the patient against harmful germs, including the patient's own, from entering his/her body.
3 AFTER BODY FLUID EXPOSURE RISK	WHEN? Clean your hands immediately after an exposure risk to body fluids (and after glove removal). WHY? To protect yourself and the health-care environment from harmful patient germs.
4 AFTER TOUCHING A PATIENT	WHEN? Clean your hands after touching a patient and her/his immediate surroundings, when leaving the patient's side. WHY? To protect yourself and the health-care environment from harmful patient germs.
5 AFTER TOUCHING PATIENT SURROUNDINGS	WHEN? Clean your hands after touching any object or furniture in the patient's immediate surroundings, when leaving – even if the patient has not been touched. WHY? To protect yourself and the health-care environment from harmful patient germs.



World Health Organization

Patient Safety

A World Alliance for Safer Health Care

SAVE LIVES
Clean Your Hands

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May 2009

ACCESSED FROM: <https://www.who.int/campaigns/world-hand-hygiene-day>



HAND HYGIENE AUDIT TOOL

SOURCE: Sharp Mary Birch Hospital for Women & Newborns

Hand Hygiene Audit

Objective: Observe another staff member's interaction with a patient and assess whether or not they are Adequately meeting the Center for Disease Control (CDC) hand hygiene guidelines.

The most accurate results will be achieved if your coworker has not been warned that you will be observing their behavior.

Person Observed: _____ **Initials**
 (Circle one) RCP RN MD Other

Date _____ Observer _____

Indicator (5 Moments of Hand Hygiene)		Yes	No	N/A
1.	Hand Hygiene completed prior to patient contact: Appropriate methods: a. washing hands for 15 seconds covering all surfaces and fingers with soap and water (turns off faucet with paper towel if no foot pedals) b. use of alcohol-based waterless antiseptic agent (rub hands together covering all surfaces and fingers until dry).			
2.	Before an aseptic task Appropriate methods: a. washing hands for 15 seconds covering all surfaces and fingers with soap and water (turns off faucet with paper towel if no foot pedals) b. use of alcohol-based waterless antiseptic agent (rub hands together covering all surfaces and fingers until dry).			
3.	After body fluid risk Appropriate methods: a. washing hands for 15 seconds covering all surfaces and fingers with soap and water (turns off faucet with paper towel if no foot pedals)			
4.	After patient contact Appropriate methods: a. washing hands for 15 seconds covering all surfaces and fingers with soap and water (turns off faucet with paper towel if no foot pedals) b. use of alcohol-based waterless antiseptic agent (rub hands together covering all surfaces and fingers until dry).			
5.	After contact with patient surroundings Appropriate methods: a. washing hands for 15 seconds covering all surfaces and fingers with soap and water (turns off faucet with paper towel if no foot pedals) b. use of alcohol-based waterless antiseptic agent (rub hands together covering all surfaces and fingers until dry).			
NICU only				
	Bare Below the Elbows (No jewelry below the elbow or long sleeves if providing direct patient care)			
	Before handling neonates in the NICU for the first time on a shift, personnel providing direct patient care/contact will wash their hands and arms to the elbow for at least 1 minute using liquid soap and water. The hands, wrists, and forearms are to be washed thoroughly.			

STANDARD PRECAUTIONS: OBSERVATIONS OF HAND HYGIENE PROVISION OF SUPPLIES

SOURCE: Center for Disease Control (CDC)

Standard Precautions: Observation of Hand Hygiene Provision of Supplies

NICU-2

Instructions: Observe patient care areas or areas outside of patient rooms. For each category, record the observation. In the column on the right, sum (across) the total number of “Yes” and the total number of observations (“Yes” + “No”). Sum all categories (down) for overall performance.

Standard Precautions: Observation Categories		Room 1	Room 2	Room 3	Room 4	Room 5	Summary of Observations	
		Yes	No	Yes	No	Yes	No	Yes
1	Are functioning sinks readily accessible in the patient care area?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
2	Are all handwashing supplies, such as soap and paper towels, available?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
3	Is the sink area clean and dry?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
4	Are any clean patient care supplies on the counter within a splash-zone of the sink?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
5	Are signs promoting hand hygiene displayed in the area?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
6	Are alcohol dispensers readily accessible?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
7	Are alcohol dispensers filled and working properly?	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No		
Total YES and TOTAL OBSERVED								

ACCESSED FROM: <https://www.cdc.gov/infectioncontrol/pdf/QUOTS/Standard-Precautions-Hand-Hygiene-Supplies-P.pdf>

NEONATAL ENVIRONMENT: OBSERVATION OF NUTRITIONAL PREPARATION AREA

SOURCE: Center for Disease Control (CDC)

Neonatal Environment: Observation of Nutritional Preparation Area

NICU-8

Instructions: Observe nutritional preparation area. Observe each practice below and answer Yes, No, or N/A. Sum all Yes and No responses. Divide by sum of "Yes" + "No".

Nutritional preparation area: Observation Categories			
1	Are surfaces in the nutrition preparation area visibly clean and free from clutter?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
2	If powdered formula is used, is sterile water provided for dilution or reconstitution?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
3	Thermometers in the breast milk storage refrigerator and freezer are easy to visualize and are within the range noted below?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
4	Are the breast milk storage refrigerator and freezer temperatures monitored and recorded every 4 hours?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
5	Is stored breast milk labeled with name, date, and time of pumping?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
6	Is breast milk stored in a manner that prevents misadministration (e.g., each mother's milk is in a dedicated tray?)	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
7	Is the refrigerator/freezer in which breast milk is stored clean and dedicated to patient nutrition supplies only?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
8	Are waterless warmers used to thaw and warm breast milk (i.e., there is no evidence of thawing by immersion in tap water)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
9	Are ready-for-use breast pumps clean, labeled as clean, and stored separately from breast pumps that have not been cleaned?	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
TOTAL (Total YES and No Only)			

Refer to human milk storage guidelines table at https://www.cdc.gov/breastfeeding/recommendations/handling_breastmilk.htm

ACCESSED FROM: <https://www.cdc.gov/infectioncontrol/pdf/QUOTS/Neonatal-Nutritional-Prep-Area-P.pdf>

HAND HYGIENE NICU OBSERVATION TOOL

SOURCE: Doctors Medical Center Modesto

NICU Hand Hygiene Observation

Month of Observation:

Shift:

Observer:

Directions: please collect 20 observations (20 rows). Please vary staff category if possible. Not all columns need to be completed. Due by the last day of the month. Place this form in Quality Binder, check yourself off.

#	Job Category RN	Before Patient Contact	After Patient Contact	After Removing Gloves	Before Invasive Procedure	No Jewelry During Care	Forearms Clear During Care	Comment: Indication for NO (see reference key)	Before Contact Clean Environ	After Contact Dirty Environ
1		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
2		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
3		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
4		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
5		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
6		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
7		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
8		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
9		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
10		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
	RCP									
1		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
2		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
3		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
4		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
5		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
	MD/NNP									
1		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
2		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
3		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
4		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
5		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
	Other									
1		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
2		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
3		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N
4		Y N	Y N	Y N	Y N	Y N	Y N		Y N	Y N

Reference Key: Performed the following activities without adequate HH. 2: phone 3: chart 4: touching self 5: Other (please list)

HAND HYGIENE SINK SIGNAGE EXAMPLE

SOURCE: University of California, Irvine (UCI) Health



HAND HYGIENE MOMENTS WHILE GIVING CARE TOOL

SOURCE: University of California, Irvine (UCI) Health

Clean vs Dirty

CLEAN items at head of bed

- Pacifier
- Suction equipment
- Bulb syringe/Neosucker

DIRTY items at foot of bed

- Rose bag/white chux to collect dirty items while giving care

General Guidelines

- Work head-to-toe (clean to dirty) when giving routine care
- Hand hygiene before entry to the isolette and immediately after exiting isolette
- Before/after performing a procedure (IV start, heelstick, etc.)
- Use a **clean white CHUX** during invasive procedures (heelstick, IV starts, etc.) to reduce contamination from bed linens
- All linen is changed **DAILY** including any cover on top of isolette
- Curtains are a part of the patient room; hand hygiene before/after touching

White Chux **HERE** for dirty items (if not using "rose" bag)

UCI Health

Hand Hygiene Moments During Cares

Before/After providing/handling feedings

Before/After respiratory care (NCPAP care, suctioning)

Before/After changing/handling diapers

Bathing Guidelines

Bathe every 3-4 days and PRN, stable infants and growing preterm infants

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