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Maternal and Child Survival Program

Tools for Improving Quality of Care for Mothers and Newborns

A Review and Gap Analysis of Critical Environmental Conditions

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Introduction

Adequate environmental health infrastructure, environmental hygiene items for infection prevention and control (IPC), effective hygienic behaviors, and effective facility design are essential critical conditions for safe maternal and newborn health (MNH) care. Despite the importance of these critical conditions, an estimated one in 50 health care facilities (HCFs) in low- and middle-income countries (LMICs) provide basic water, sanitation, hygiene (WASH) and waste management services.[1] Many HCFs in LMICs lack IPC items, with an estimated 77% of facilities with disposable gloves available, 26% with guidelines for standard precautions, 44% with gowns, and 7% with eye protection for health care workers.[1] Even when environmental health infrastructure and environmental hygiene items are available, health workers and caregivers often do not comply with proper hygiene and infection prevention behaviors, citing reasons such as lack of knowledge and inconvenience.[2]

Key Facts

- Over 20 quality of care (QoC) and quality improvement (QI) tools for maternal and newborn health (MNH) were reviewed.
- Tools had general references to adequate facility conditions, but many did not describe specifics.
- Hand hygiene—one of the most important infection prevention measures—was only referenced in about half of the tools reviewed.
- QoC/QI tools in MNH should include environmental standards, along with guidance for supporting activities such as monitoring.

Inadequate infrastructure, lack of environmental hygiene items, and inconsistent compliance with IPC practices contribute to health care-acquired infections (HCAIs). An estimated 16% of patients in LMICs develop one or more infections when visiting an HCF.[3] Infections account for 22% of neonatal deaths and 11% of maternal deaths.[4,5] The costs of treating HCAIs are substantial: The average cost to treat an HCAI is $25,000[6] in the US, $12,155 in Mexican intensive care units,[7] and was estimated at $22,873 in one Indian hospital.[7]

[1] Cronk R, Bartram J. 2018. Environmental conditions in healthcare facilities in low-and middle-income countries: coverage and inequalities. *Int J Hyg Environ Health*. 221(3):409-422. doi:10.1016/j.ijheh.2018.01.004.
[2] World Health Organization (WHO). 2009. *WHO Guidelines on Hand Hygiene in Health Care: A Summary*. Geneva: WHO.
[3] Allegranzi B, Bagheri Nejad S, et al. 2011. Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. *Lancet*. 377:228–241. doi:10.1016/S0140-6736(10)61458-4.
[4] UNICEF. 2016. *Monitoring the Situation of Children and Women*. New York City: UNICEF.
[5] UNICEF. 2018. *Every Child Alive: The Urgent Need to End Newborn Deaths*. New York City: UNICEF.
[6] O'Neill J, ed. 2016. *Infection Prevention, Control and Surveillance: Limiting the Development and Spread of Drug Resistance*. London: Review on Antimicrobial Resistance.
[7] WHO. 2011. *Report on the Burden of Endemic Health Care-Associated Infection Worldwide*. Geneva: WHO.

The Maternal and Child Survival Program (MCSP) is a global, $560 million, 5-year cooperative agreement funded by the United States Agency for International Development (USAID) to introduce and support scale-up of high-impact health interventions among USAID's 25 maternal and child health priority countries, as well as other countries. MCSP is focused on ensuring that all women, newborns and children most in need have equitable access to quality health care services to save lives. MCSP supports programming in maternal, newborn and child health, immunization, family planning and reproductive health, nutrition, health systems strengthening, water/sanitation/hygiene, malaria, prevention of mother-to-child transmission of HIV, and pediatric HIV care and treatment.

MCSP has worked to improve the care provided for mothers and their newborns during antenatal care, labor and delivery, postnatal care, child health, immunization, and family planning services through quality of care (QoC) and quality improvement (QI) programs.[8] While many QoC/QI training and implementation tools are available, many do not describe the critical conditions necessary to enable safe and dignified care for patients.

To address this, the objectives of this brief are to:

- Review QoC/QI tools (including training materials, implementation guides, and supervision and coaching resources) commonly used in MNH care.
- Assess these tools for completeness in their coverage of critical environmental conditions for safe care, including presence of adequate WASH infrastructure, environmental hygiene items for IPC, and other WASH/IPC-related activities, such as training.
- Provide recommendations for consistent and comprehensive integration of these critical environmental conditions within QoC/QI tools.

Methods

Databases of MNH resources, including MCSP, the Maternal Health Task Force, and WASH in Health Care Facilities, were reviewed for relevant tools related to QoC and QI.

Searches were conducted in PubMed and Google Scholar using combinations of the following terms (and associated terms): "maternal and newborn health," "quality improvement," "training," and "tools." Systematic reviews, critical reviews, and expert reviews that documented QoC/QI tools were reviewed.[9,10] All identified publications, reports, and tools were reviewed for completeness in their coverage of critical conditions for safe care, such as basic WASH services and IPC items.

Each of the tool components (defined as individual manuals, written standards, guides, etc., within a tool "package") were assessed based on alignment with the World Health Organization (WHO) Essential Environmental Health Standards in Health Care[11] and service levels for WASH, health care waste, and environmental cleaning in HCFs defined by the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation, and Hygiene (JMP),[13] as well as the presence of priority IPC items, such as gloves and disinfectants for environmental cleaning.

Twenty-five critical conditions for safe care were reviewed, including conditions on WASH, waste management, environmental cleaning, and IPC (Table 1). Each tool was scanned for the presence of these 25 conditions, and the results were tabulated in order to document patterns, trends, and gaps.

[8] For more on quality of care and quality improvement programs, refer to: WHO. 2016. *Standards for Improving Quality of Maternal and Newborn Care in Health Facilities*. Geneva: WHO.
[9] Althabe F, Bergel E, Cafferata ML, et al. 2008. Strategies for improving the quality of health care in maternal and child health in low-and middle-income countries: an overview of systematic reviews. *Paediatr Perinat* Epidemiol. 22:42-60. doi: 10.1111/j.1365-3016.2007.00912.x.
[10] Raven J, Hofman J, Adegoke A, Van Den Broek N. 2011. Methodology and tools for quality improvement in maternal and newborn health care. *Int J Gynaecol Obstet.* 114(1):4-9. doi:10.1016/j.ijgo.2011.02.007.
[11] Adams J, Bartram J, Chartier Y, eds. 2008. *Essential Environmental Health Standards in Health Care*. Geneva: WHO.

Table 1. Critical conditions assessed within quality of care and quality improvement tools for maternal and newborn health

Critical Conditions	Condition	Example Normative Statement
Water (4 conditions)	Water source type[12,13]	*"Main source of water is an improved source … which [has] the potential to deliver safe water. Improved sources include: piped water, boreholes or tubewells, protected dug wells, protected springs, rainwater, and packaged or delivered water."*
	Water availability[13,14]	*"Water from the main water source is available on the day of the survey."*
	Distance to water source[13,14]	*"Water is accessed within buildings or within the facility grounds."*
	Additional water considerations[13,14]	*"Advanced service [may include] water quantity; water access; drinking water quality, availability, accessibility; water for cooking, personal hygiene, cleaning…"*
Sanitation (7 conditions)	Sanitation type[13,14]	*"Improved … sanitation facilities, [including] flush/pour-flush to piped sewer system, septic tanks, or pit latrines; ventilated improved pit latrines, composting toilets, or pit latrines with slabs."*
	Functional sanitation[13,14]	*"The toilet is not broken, the toilet hole is not blocked, there should be no cracks or leaks in the toilet structure, and water is available for flush/pour-flush toilets."*
	Private sanitation[13,14]	*"There are closable doors that can be locked from the inside and no large gaps or holes in the structure."*
	Meets the needs of women[13,14]	*"At least one toilet is separated for use by women/girls, and has a bin with a lid on it and/or water and soap available in a private space for washing."*
	Meets the needs of staff[13,14]	*"There are separate toilet facilities dedicated for patient and staff use."*
	Meets the needs of people with limited mobility[13,14]	*"Toilets should be accessible without stairs or steps, have handrails for support attached either to the floor or sidewalls, a door which is at least 80 cm wide, and the door handle and seat within reach of people using wheelchairs or crutches/sticks."*
	Additional sanitation considerations[13]	*"Advanced service [may include] toilet ratio; cleanliness; lighting; wastewater treatment; [ease of] access…"*
Hygiene (4 conditions)	Hand hygiene stations near toilets[13,14,15]	*"Functional hand hygiene facilities available … such as a sink with tap, water tank with tap, bucket with tap ... located no more than 5 meters from the toilets."*
	Hand hygiene stations near points of care[13,14,15,15]	*"Functional hand hygiene facilities available at one or more points … where care or treatment is delivered (e.g., consultation/exam rooms)."*
	Water, soap, and/or alcohol-based hand rub[13,14,15,16]	*"Hand hygiene facilities at points of care must either have alcohol-based hand rub or soap and water. Alcohol-based hand rub is not considered adequate for hand hygiene at toilet. Chlorinated water is not considered an adequate substitute."*
	Additional hand hygiene considerations[13,14,15]	*"Advanced service [may include] hygiene promotion materials, hygiene promotion activities…"*
Waste management, cleaning (6 conditions)	Waste segregation[13,14,16]	*"At least three clearly labeled or color-coded bins should be in place to separate sharps waste, infectious waste, and non-infectious general waste. … Bins should be appropriate to the type of waste they are to contain."*
	Sharps disposal/treatment[13]	*"Safe treatment and disposal methods include incineration, autoclaving, burial in a lined, protected pit, [and collection and transport] off site for medical waste treatment and disposal."*

[12] WHO/UNICEF (2019). WASH in health care facilities: global baseline report 2019. Geneva, 2019.
[13] WHO (2016). Guidelines on core components of infection prevention and control programmes at the national and acute health care facility level. Geneva, 2016.
[14] WHO (2009). WHO guidelines on hand hygiene in health care. Geneva, 2009.
[15] WHO (2018). Global guidelines for the prevention of surgical site infection, second edition. Geneva, 2018.

Critical Conditions	Condition	Example Normative Statement
	Infectious waste disposal/treatment[13,14]	*"Safe treatment and disposal methods include incineration, autoclaving, burial in a lined, protected pit, [and collection and transport] off site for medical waste treatment and disposal."*
	Protocols for cleaning[13,14,16]	*"Protocols should include: step-by-step techniques for specific tasks [and] a cleaning roster or schedule."*
	Training on cleaning responsibilities[13]	*"Staff … have all received training on cleaning procedures. Training refers to structured training plans or programs led by a trainer or appropriately qualified supervisor."*
	Additional waste management, cleaning considerations[13]	*"Advanced service [may include] visible cleanliness, budget allocation, mechanisms to track out of stock materials, disinfection of beds and linen…"*
Infection prevention and control (IPC) supplies (4 conditions)	Disinfectants (ex. chlorine-based bleach)[16]	*"Chlorine solution is used for … spot-disinfection of countertops and floors, manikins, laundry, medical waste before disposal, water treatment…"*
	Gloves[14,15,16]	*"Sterile surgical gloves are required for surgical interventions." "Medical nonsterile and surgical sterile gloves ... are considered as essential personal protective equipment."*
	Sterile instruments[16]	*"All medical devices that are reprocessed, such as surgical instruments, must undergo rigorous cleaning [and] decontamination and sterilization procedures."*
	Additional IPC supplies considerations[14]	*"Surgical masks, goggles, or face shields and gowns are considered as essential personal protective equipment." "All health care facilities should implement a standardized operating procedure for the safe and effective decontamination of … reusable items." "Basic IPC should include ... aseptic technique and device management."*

Results

Plenty of QoC and QI Tools

Twenty-one tools used in QoC and QI for MNH programs were identified (Table 2). These included a total of 37 tool components (e.g., individual manuals, facilitator guides). The majority of these tools were resources for program facilitators or staff; the others included tools for managers, tools for auditors, and frameworks for assessing MNH and HCF conditions.

General Language on Environmental Conditions and IPC

Many QoC/QI tools included some general language describing the need for adequate physical infrastructure and supplies in order to provide safe care, even if they did not reference specific critical conditions. For example, EngenderHealth's COPE (Client-Oriented, Provider-Efficient Services) toolkit states that "clients have a right to affordable, available, accessible services … health care staff need reliable, sufficient inventories of supplies, instruments, and working equipment, as well as infrastructure."[17] As another example, UNICEF's Every Mother Every Newborn toolkit includes a standard stating that "the physical environment of the health facility [should be] safe for providing maternal and newborn care,"[18] and recognizes that staff training and policies, such as those for infection prevention, also play a role in achieving high-quality care.

Indirect Examples of Environmental Critical Conditions

Some tools did not directly include critical conditions in their materials but included relevant illustrative examples. For example, one of the COPE tools (*COPE® Handbook: A Process for Improving Quality in Health Services*) did not directly reference critical conditions in any of the provided self-assessment forms, checklists,

[16] Rutala WA, Weber DJ. 2008. *Guideline for Disinfection and Sterilization in Healthcare Facilities*. Atlanta: Centers for Disease Control and Prevention.
[17] EngenderHealth. 2003. *COPE® Handbook: A Process for Improving Quality in Health Services*. New York City: EngenderHealth.
[18] UNICEF. 2016. *Every Mother Every Newborn (EMEN) Quality Improvement Guide for Health Facility Staff*. New York City: UNICEF.

and interview guides. However, the handbook described a health center where COPE was used to improve cleaning practices, as well as another example where the COPE process allowed facility personnel to identify and repair a broken water pipe.

Specific Conditions Rarely Described

On average, each tool component included 16% of the water-related conditions, 10% of the sanitation-related conditions, 32% of the hand hygiene-related conditions, 22% of the health care waste management and cleaning-related conditions, and 34% of the IPC supplies-related conditions.

Overall, an average of 21% (or five) of the critical conditions were represented in each QoC/QI tool component. A median of two conditions were represented in each tool component.

Table 2. Quality of care and quality improvement tools and the inclusion of critical condition conditions

First author or organization and overall tool name	Tool components	Proportion of critical conditions included (%)					
		Water	Sanitation	Hygiene	Waste Mgt/ Cleaning	IPC Supplies	Overall
AMDD *Criterion-Based Audit*	Improving Emergency Obstetric Care through Criterion-Based Audit	0%	29%	0%	33%	0%	16%
AAP *Helping Babies Survive*	Essential Care for Every Baby. Provider Guide	0%	0%	0%	0%	0%	0%
	Essential Care for Small Babies. Provider Guide	25%	0%	75%	33%	50%	32%
	Helping Babies Breathe: Provider Guide. Second ed.	0%	0%	75%	17%	100%	32%
AAP *Improving Care of Mothers and Babies*	Guide for improvement teams	0%	0%	0%	0%	0%	0%
EFCNI *European Standards of Care for Newborn Health*	NICU Design	0%	14%	75%	17%	75%	32%
	Data Collection and Documentation	0%	0%	0%	0%	0%	0%
	Patient Safety and Hygiene Practice	0%	0%	75%	17%	50%	24%
EngenderHealth *COPE® Handbook*	Improving Quality in Health Services	0%	0%	0%	0%	0%	0%
	Improving the Quality of Maternal Health Services	50%	14%	75%	67%	100%	56%
	Emergency Obstetric Care: Leadership Manual	25%	14%	0%	50%	100%	36%
	Emergency Obstetric Care: Toolbook	50%	14%	50%	83%	100%	56%
Jhpiego *Private Maternity Care – Quality Toolkit (PMC-QT)*	Private Maternity Care - Quality Toolkit	50%	14%	75%	50%	75%	48%
Jhpiego *Standards-Based Management and Recognition (SBM-R)*	Standards-Based Management and Recognition (SBM-R): A Field Guide	0%	0%	0%	0%	0%	0%
	National Infection Prevention and Control Standards for Hospitals in Tanzania: SBM-R for Improving Infection Prevention and Control Practices	75%	43%	75%	67%	100%	68%
NICE *Neonatal Quality Standard*	Neonatal infection quality standard (QS75)	0%	0%	0%	0%	0%	0%
Save the Children	Facilitation Guide: A Training Supplement	0%	0%	0%	0%	0%	0%

First author or organization and overall tool name	Tool components	Proportion of critical conditions included (%)					
		Water	Sanitation	Hygiene	Waste Mgt/ Cleaning	IPC Supplies	Overall
Partnership Defined Quality (PDQ)	Tool book for community and health provider collaboration for quality improvement	0%	0%	0%	0%	0%	0%
UNICEF	Toolkit for setting up special care newborn units, stabilization units, and newborn care corners	50%	0%	75%	83%	100%	56%
UNICEF *Every Mother Every Newborn*	Appendices	50%	86%	100%	67%	50%	72%
	Quality Improvement Guide for Health Facility Staff	0%	0%	0%	0%	0%	0%
University of Southampton	A framework for the evaluation of quality of care in maternity services	50%	29%	25%	33%	25%	32%
USAID *Applying Science to Strengthen and Improve Systems (ASSIST)*	Improvement Methods Toolkit	0%	0%	0%	0%	0%	0%
USAID *Quality Assurance Project (QAP)*	Methods & Tools	0%	0%	0%	0%	0%	0%
USAID *Maternal and Newborn Quality of Care Surveys*	Health Worker Line Listing	0%	0%	0%	0%	0%	0%
	Essential Inventory	25%	29%	25%	33%	75%	36%
	ANC Observation Checklist	0%	0%	50%	0%	0%	8%
	L&D (Labor and Delivery) Observation Checklist	0%	0%	25%	17%	75%	20%
	Interview & Knowledge Test	0%	0%	0%	0%	25%	4%
WHO	Recommendations on newborn health	0%	0%	0%	0%	0%	0%
WHO *Safe Childbirth Checklist*	Checklist	0%	0%	50%	0%	25%	12%
	Implementation Guide	50%	0%	50%	33%	75%	36%
WHO/PMNCH	Consultation on improving measurement of the quality of maternal, newborn, and child care in health facilities	0%	0%	50%	0%	0%	8%
WHO Quality of Care Network	Quality, Equity, Dignity: A WHO Network for Improving Quality of Care for Maternal, Newborn, and Child Health	0%	0%	50%	0%	0%	8%
WHO Quality of Care Network	Standards for Improving Quality of Maternal and Newborn Care In Health Facilities	75%	86%	100%	100%	75%	88%
WHO Regional Office for Southeast Asia *Point of Care Quality Improvement (POCQI)*	Coaching Manual	0%	0%	0%	0%	0%	0%
	Learning Manual	0%	0%	0%	0%	0%	0%
AVERAGE		16%	10%	32%	22%	34%	21%

Hand Hygiene Most Frequently, Sanitation Least Frequently Represented

The most commonly referenced critical conditions in MNH tools were hand hygiene stations at points of care (54%), water and soap or alcohol-based hand rub (51%), water availability (43%), gloves (43%), and additional IPC and cleaning considerations (43%). Examples of additional considerations include designation of an IPC focal person or IPC training at the facility.

The least commonly referenced conditions included water source type (0%), sanitation facility type (5%), and distance to water source (5%). Sanitation-related content was referenced less frequently than other critical condition areas, and these appeared in 5% to 27% of tools.

Table 3. The most commonly included critical conditions in quality of care and quality improvement tools

Critical conditions	Number of tool components including condition	%
Hand hygiene stations near points of care	20	54%
Water, soap, and/or alcohol-based hand rub	19	51%
Water availability	16	43%
Gloves	16	43%
Additional IPC and cleaning considerations	16	43%
Sterile instruments	15	41%
Waste segregation	12	32%
Infectious waste disposal/treatment	12	32%
Chlorine or other disinfectant	12	32%
Additional IPC supplies considerations	12	32%
Additional hand hygiene considerations	11	30%
Additional water considerations	10	27%
Additional sanitation considerations	10	27%
Protocols for cleaning	10	27%
Functional sanitation	6	16%
Sharps disposal/treatment	6	16%
Hand hygiene stations near toilets	4	11%
Sanitation meets the needs of people with limited mobility	3	8%
Private sanitation	2	5%
Sanitation meets the needs of women	2	5%
Sanitation meets the needs of staff	2	5%
Training on cleaning responsibilities	2	5%
Distance to water source	2	5%
Sanitation type	2	5%
Water source type	0	0%

Recommendations

Few QoC and QI tools for MNH account for WASH, health care waste management, environmental cleaning, and IPC in HCFs. This may be in part due to the nature of these tools, which are often focused on improving care by reallocating existing resources and might not encourage building additional infrastructure or obtaining more supplies, or this may be due to other reasons, such as the lack of integration between the

WaSH and health sectors.[19] However, these critical components should be prioritized as important components for improving the quality of MNH care. A lack of these critical conditions, along with poor compliance with IPC, represent a substantial health risk in HCFs and contribute to HCAI and increased morbidity and mortality among mothers and newborns. Furthermore, in cases where these essential environmental conditions are not met, QoC/QI efforts may be impossible to implement.

Below are several recommendations for consistent and comprehensive integration of environmental critical conditions within QoC and QI tools for MNH.

Table 4. Recommendations for improving quality of care and quality improvement tools for maternal and newborn health

Standards for environmental critical conditions	Standards used in MNH QI/QoC should reflect the environmental critical conditions necessary to provide safe care.
	While some tools defer to local governments to define context-appropriate minimum physical standards, it may still be helpful to provide a suggested minimum standard in case no local guidance is available.
Critical conditions represented in training tools	Tools should not assume that basic WASH and IPC supplies are available at all facilities or that these facilities are appropriate/usable by all groups (women, people with limited mobility, etc.).
	In order to provide dignified, quality care to patients, tools should recommend not only hand hygiene and IPC items but also accessible water and sanitation facilities.
Resources needed in training tools	Tools should include the following: • Guidelines for minimum environmental critical conditions • Concrete examples of the consequences of inadequate conditions, such as HCAIs, excess morbidity and mortality, and their impact on patients (ex. a mother has just given birth and has limited mobility, and is unable to access the sanitation facilities) • Resources for learning, monitoring, and reporting on environmental critical conditions
	Tools used to train HCF staff should be reviewed and adjusted to be context appropriate where necessary.
Standardizing indicators for WASH and IPC	Tools used for monitoring should be standardized and aligned with other widely used indicators, such as those developed by WHO/UNICEF JMP for HCFs.
	Standardized indicators enable comparison over time at facilities to measure performance and track gaps, as well as comparison between facilities to understand where deficiencies are occurring within a program area.

Adequate environmental health infrastructure, environmental hygiene items, effective hygienic behaviors, and effective facility design are critical for safe patient care and to protect health care workers, visitors, and the surrounding community. Accounting for environmental health critical conditions in MNH QoC and QI tools will help programmers to benchmark service levels, increase accountability, and contribute to improved decision-making related to policy and programming. Improved decision-making will enable efficient programming to make better use of available resources.

With improvements to tools, leadership from health care workers, HCF administrators, local and national governments, and external support actors associated with MNH, HCFs can deliver dignified, safe, and people-centered care, and protect the health of mothers and their newborns.

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[19] MCSP. 2017. Water, *Sanitation, and Hygiene at the Health Center: The Health System's Unaccounted for Responsibility*. Washington, DC: MCSP.