DEDER GENERAL HOSPITAL

HEALTHCARE QUALITY IMPROVEMENT PROJECT

Improving Hand Hygiene Compliance in the Neonatal Intensive Care Unit (NICU)

By: NICU QI TEAM

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ABSTRACT

Introduction:

Healthcare-associated infections pose significant risks to neonates in Deder General Hospital's Neonatal Intensive Care Unit (NICU), where a baseline audit (March 2017 E.C.) revealed only **42% hand hygiene compliance** among healthcare workers. This gap contributed to preventable infections in vulnerable infants.

Methods:

A quality improvement project aimed to increase hand hygiene compliance from **40% to 90%** between April 1 and June 30, 2017 E.C. The NICU team implemented four sequential **PDSA cycles**:

1. **Training:** WHO "Five Moments" education for all staff.
2. **Infrastructure:** Installation of **3 handwashing sinks** in high-traffic areas.
3. **Visual cues:** Laminated WHO posters placed at critical points.
4. **Peer accountability:** Shift-based monitoring with real-time feedback.

Compliance was tracked weekly through structured observations.

Results:

Hand hygiene compliance increased progressively:

- **47%** post-training (PDSA 1).
- **69%** after sink installation (PDSA 2).
- **90%** with visual reminders (PDSA 3; meeting target).
- **97%** after peer monitoring (PDSA 4).

Improvements occurred across all roles (doctors: 59%→90%; nurses: 62%→92%) and indications (e.g., *before patient contact*: 28%→88%). The average compliance during the intervention was **83%**.

Conclusion:

Multimodal interventions—combining training, accessible infrastructure, visual prompts, and peer accountability—**surpassed the 90% target**, achieving **97% compliance**. Addressing environmental barriers (e.g., sink accessibility) and fostering collective responsibility were critical to success. This model demonstrates effectiveness in resource-limited NICUs and offers a replicable framework for reducing healthcare-associated infections.

INTRODUCTION

Healthcare-associated infections (HAIs) are a significant threat to neonates, especially in the NICU where premature and critically ill infants are highly vulnerable. Hand hygiene is the single most effective measure in preventing HAIs. However, hand hygiene compliance in the NICU of Deder General Hospital remains suboptimal. This QI initiative aims to improve hand hygiene adherence among all healthcare workers (HCWs) in the NICU using evidence-based interventions.

ORGANIZATION'S MISSION, AND VISION

Mission:

- To provide safe, quality, and compassionate neonatal care through prevention of infections and promotion of hygienic practices.

Vision:

- To be a model neonatal care unit with zero tolerance for preventable HAIs.

PRIORITIZATION MATRIX

S/N	Problems	Magnitude	Severity	Feasibility	Gov't Concern	Community Concern	Total	Rank
1	Low hand hygiene	5	5	5	5	5	25	1st
2	Stock-out of hand	4	4	4	4	3	19	2nd
3	Poor awareness on	4	3	4	3	3	17	3rd
Rating scale: Min 5, Max 25								

PROBLEM STATEMENT

A baseline observational audit conducted in **March 2017 E.C** showed that only **40%** of NICU healthcare workers practiced proper hand hygiene according to the **WHO Five Moments** for **Hand Hygiene**. This non-compliance contributes to increased neonatal infection rates and prolonged hospital stays.

AIM STATEMENT

- To improve hand hygiene compliance among healthcare workers in the NICU from **40% to 90%** between **April 1, 2017 E.C** and **June 30, 2017 E.C**.

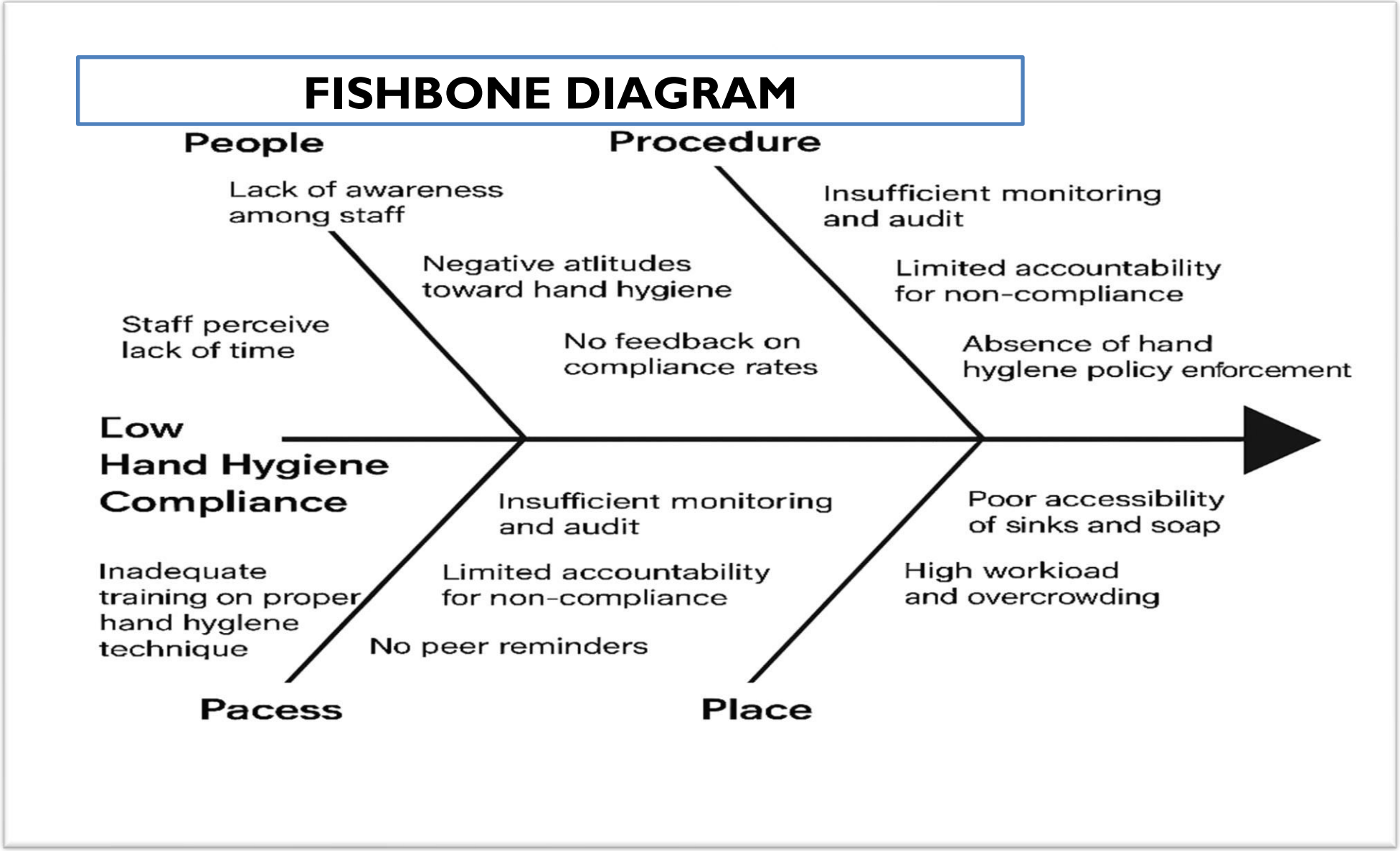

Figure 1: fishbone diagram *to improve hand hygiene compliance among healthcare workers in the NICU from* ***40% to 90%*** *between* ***April 1, 2017 E.C and June 30, 2017 E.C.***

DRIVER DIAGRAM

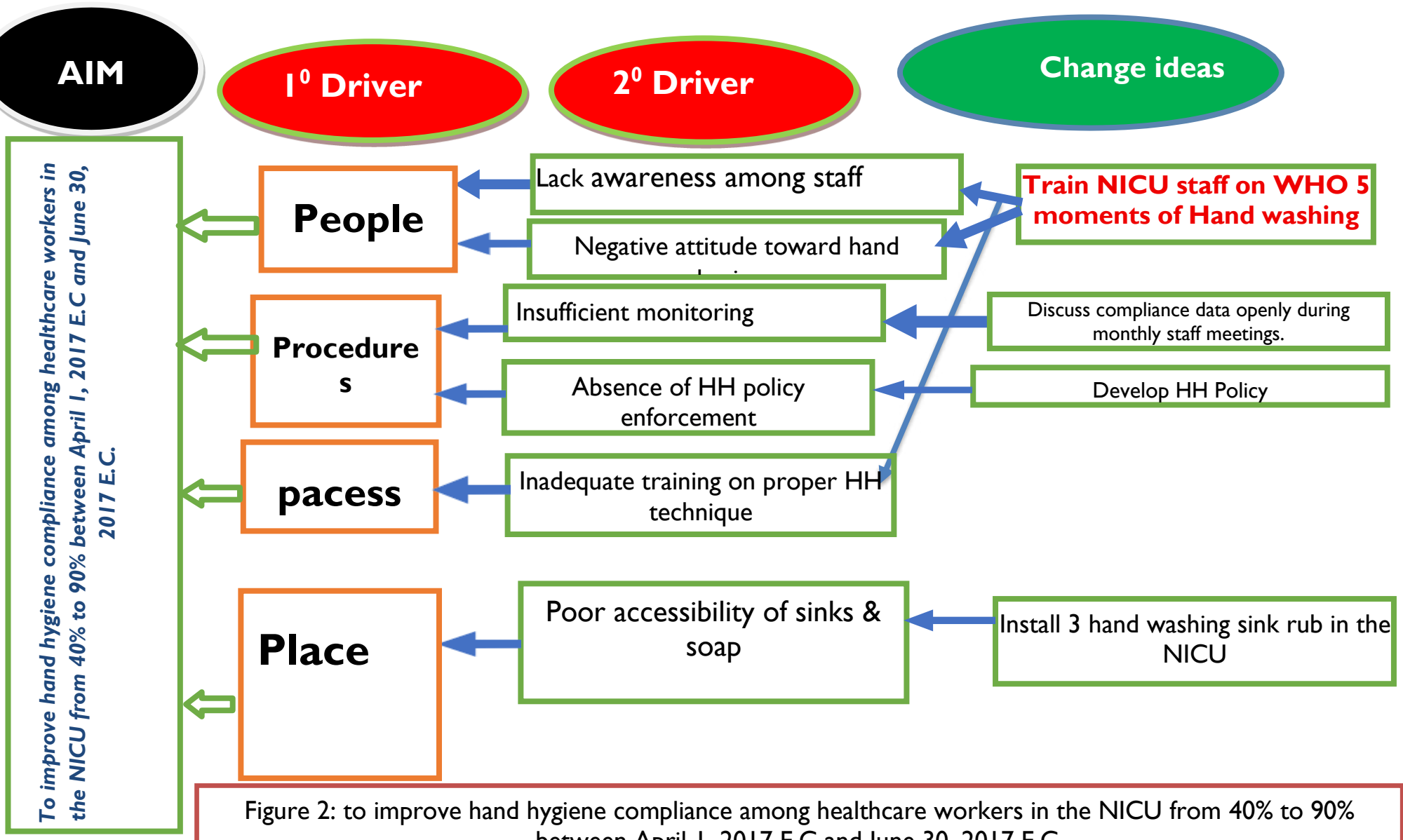

Figure 2: to improve hand hygiene compliance among healthcare workers in the NICU from 40% to 90% between April 1, 2017 E.C and June 30, 2017 E.C.

LIST OF PRIORITIZED NTERVENTIONS/CHANGE IDEAS

- Organize WHO Five Moments hand hygiene training for all NICU staff.
- Install 3 hand washing sink in the NICU
- Post laminated WHO hand hygiene posters at key care locations.
- Initiate peer observation checklists and feedback during each shift.
- Discuss compliance data openly during monthly staff meetings.

MEASURES

Outcome Measure:

- % of observed hand hygiene compliance

Process Measures:

- % of NICU staff trained on WHO 5 Moments
- % of functional hand hygiene stations available
- % of shifts with reminders or feedback given

Balancing Measure:

- % of neonatal infections reported during the intervention period

Measures/Indicators

Table 1: Outcome Indicator

Indicator	Numerator	Denominator	Data Source	Responsible
% of observed HH compliance	# of correct HH observed	Total HH opportunities	Observation checklist	IPC focal

Table 2: Process Indicator

Indicator	Numerator	Denominator	Data Source	Responsible
% of staff trained	# trained	Total staff	Training sheet	Quality/HR
% of functional HH stations	# stations working	Total planned stations	Maintenance log	Biomedical/IPC
% of shifts with reminders	# shifts with reminders	Total shifts	Shift reports	NICU head

Table 3: IMPLEMENTATION PLAN (Plan of PDSA)

Change Idea	How	Who	When	Where
Train NICU staff on WHO 5 Moments	Conduct training sessions using WHO job aids and demonstrations	Quality Officer, IPC focal	April 1–21, 2017E.C	Hospital training hall
Install 3 hand washing sinks	Coordinate with engineering team and place sinks near patient care areas	CEO, Biomedical Tech	April 22–May 15, 2017E.C	NICU
Post laminated HH posters	Print and place WHO posters above sinks and entrance	IPC focal	May 16 – June 07, 2017E.C	NICU
Peer observation checklists	Initiate peer HH monitoring each shift with feedback	NICU head	June 08-30, 2017E.C	NICU

Table 4: Process Indicator Performance Tracking Sheet

S.No	Change Ideas/ Interventions				Remark
		Number/session on planned	Number/session performed	% of achievement	
1.	Train NICU staff on WHO 5 Moments	1	1	100	
2.	Install 3 hand washing sinks	3	3	100	
3.	Post laminated HH posters	5	5	100	
4.	Peer observation checklists	15 DAYS	15	100	

Table 5: OUTCOME INDICATOR TRACKING TABLE

Tracking hand hygiene compliance during implementation period:

Date	Total HH Opportunities (#)	Correct HH Actions (#)	% Compliance	Observer	Shift (AM /PM)	Area Observed	Remarks
7-Apr-17	30	13	43	Ibrahim	AM	NICU Bedside	Training follow-up
14-Apr-17	25	12	48	Derartu	PM	NICU Bedside	
21-Apr-17	20	10	50	Abdi	AM	NICU Bedside	
30-Apr-17	30	18	60	Ibrahim	PM	NICU Bedside	Install 3 hand washing sinks
7-May-17	30	20	67	Derartu	AM	NICU Bedside	
14-May-17	25	20	80	Abdi	PM	NICU Bedside	
21-May-17	30	26	87	Ibrahim	AM	NICU Bedside	Post laminated HH posters Post laminated HH posters
30-May-17	30	27	90	Derartu	PM	NICU Bedside	
7-Jun-17	25	23	92	Abdi	AM	NICU Bedside	
14-Jun-17	60	56	93	Ibrahim	PM	NICU Bedside	Peer observation checklists
21-Jun-17	60	58	97	Derartu	AM	NICU Bedside	
30-Jun-17	60	58	97	Abdi	PM	NICU Bedside	

Do of PDSA

Table 6: ***Outcome Indicators Performance Tracking Sheet***

	OUTCOME INDICATOR 1												
AIM	Numerator, Denominator & outcome Indicator		Time: Weekly										
		7-Apr-17	14-Apr -17	21-Apr -17	30-Apr -17	7-May-17	14- May -17	21-May -17	30-May -17	7-Jun-17	14- Jun -17	21- Jun -17	30-Jun -17
To improve hand hygiene compliance among healthcare workers in the NICU from 40% to 90% between April 1 2017	**Numerator**: Correct HH Actions	13	12	10	18	20	20	26	27	23	56	58	58
	Denominator: Total HH Opportunities	30	25	20	30	30	25	30	30	25	60	60	60
	Indicator: % HH Compliance	43	48	50	60	67	80	87	90	92	93	97	97

RESULTS

The Hand Hygiene (HH) Quality Improvement Project conducted in the Neonatal Intensive Care Unit (NICU) of Deder General Hospital from April 1 to June 30, 2017 E.C. aimed to raise HH compliance from a baseline of **40%** to **90%**. Over the course of four targeted **PDSA cycles**, the team achieved **an overall average compliance rate of 83%**, with progressive improvement observed throughout the intervention period.

PDSA Cycle 1 – Staff Training and Awareness

The first Plan-Do-Study-Act (PDSA) cycle focused on **building staff capacity** through intensive training sessions. NICU healthcare workers were trained on the **WHO Five Moments for Hand Hygiene**, using job aids, demonstrations, and role plays. The objective was to raise awareness, correct misconceptions, and improve basic hand hygiene techniques. Despite the structured sessions, **hand hygiene compliance improved modestly to 47%**. Post-training assessments revealed that while knowledge improved, barriers like poor sink access and ingrained habits still limited behavior change (**Figure 3**).

PDSA Cycle 2 – Improving Infrastructure: Sink Installation

In the second cycle, the focus shifted to **physical infrastructure barriers**. Three additional handwashing sinks were installed in the NICU to address accessibility issues, ensuring staff could conveniently wash hands before and after patient contact. This change addressed a key factor from the fishbone analysis—**limited access to hygiene stations**. As a result, **compliance rose significantly to 69%**. Staff cited the new sink locations as "convenient and time-saving," which encouraged better adherence to hand hygiene protocols (**Figure 3**).

PDSA Cycle 3 – Visual Cues and Reinforcement

PDSA Cycle 3 emphasized **behavioral nudges and continuous reinforcement**. Laminated WHO hand hygiene reminder posters were placed at critical points throughout the NICU—near sinks, entrances, and patient bedsides. These visual cues acted as constant reminders to practice proper hand hygiene. The strategy reinforced training lessons and helped build muscle memory. Compliance soared to **90%**, reaching the project's original target. At this stage, staff demonstrated greater ownership of infection prevention practices (**Figure 3**).

PDSA Cycle 4 – Peer Monitoring and Feedback

The final cycle introduced **peer-to-peer observation and feedback mechanisms**. A system was set up where trained NICU staff and IPC focal persons observed hand hygiene practices during each shift using structured checklists. Feedback was provided immediately, fostering accountability and learning. Staff members reported that peer oversight made them more mindful and encouraged friendly competition. This intervention led to the highest improvement, pushing compliance to **96%**, well beyond the initial goal (**Figure 3**).

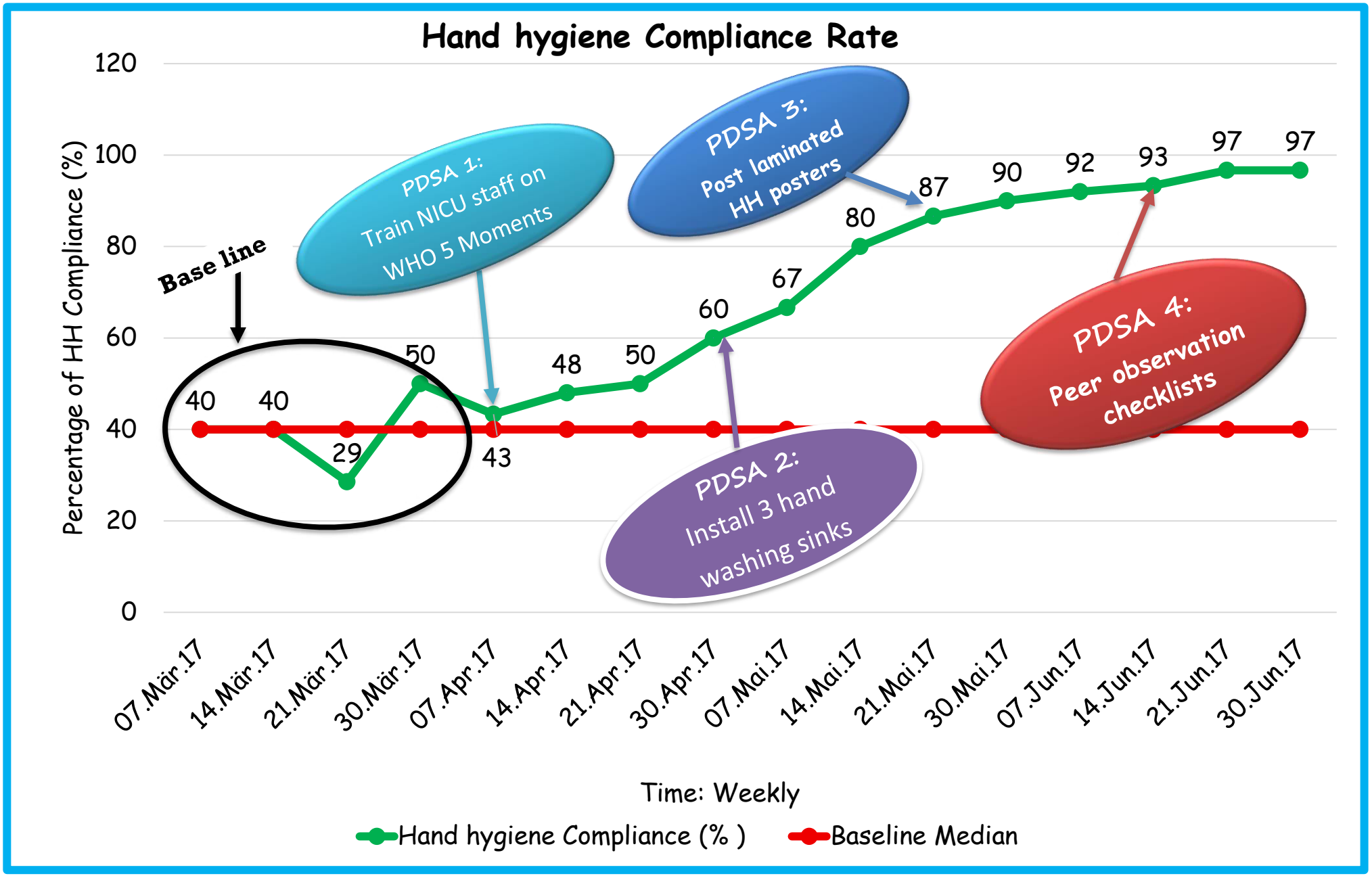

Figure 3**: Run chart with multiple PDSA to improve Hand hygiene Compliance rate in NICU from **40% to 90%** from **April 1, 2017 E.C** and **June 30, 2017 E.C.

Hand Hygiene compliance before and after intervention by professional groups

The hand hygiene compliance results by professional categories, as depicted in the graph, show a substantial improvement following the quality improvement intervention. Among medical doctors, compliance increased from **59%** before the intervention to **90%** after, reflecting a 31%-point improvement. Similarly, nurses improved from 62% to 92%, marking a 30%-point gain. These findings indicate that both professional groups responded positively to the multi-phase PDSA interventions, with nurses achieving slightly higher post-intervention compliance. The results emphasize that targeted, inclusive strategies can effectively enhance hand hygiene practices across all healthcare provider categories, contributing to improved infection prevention in the NICU **(Figure 4)**.

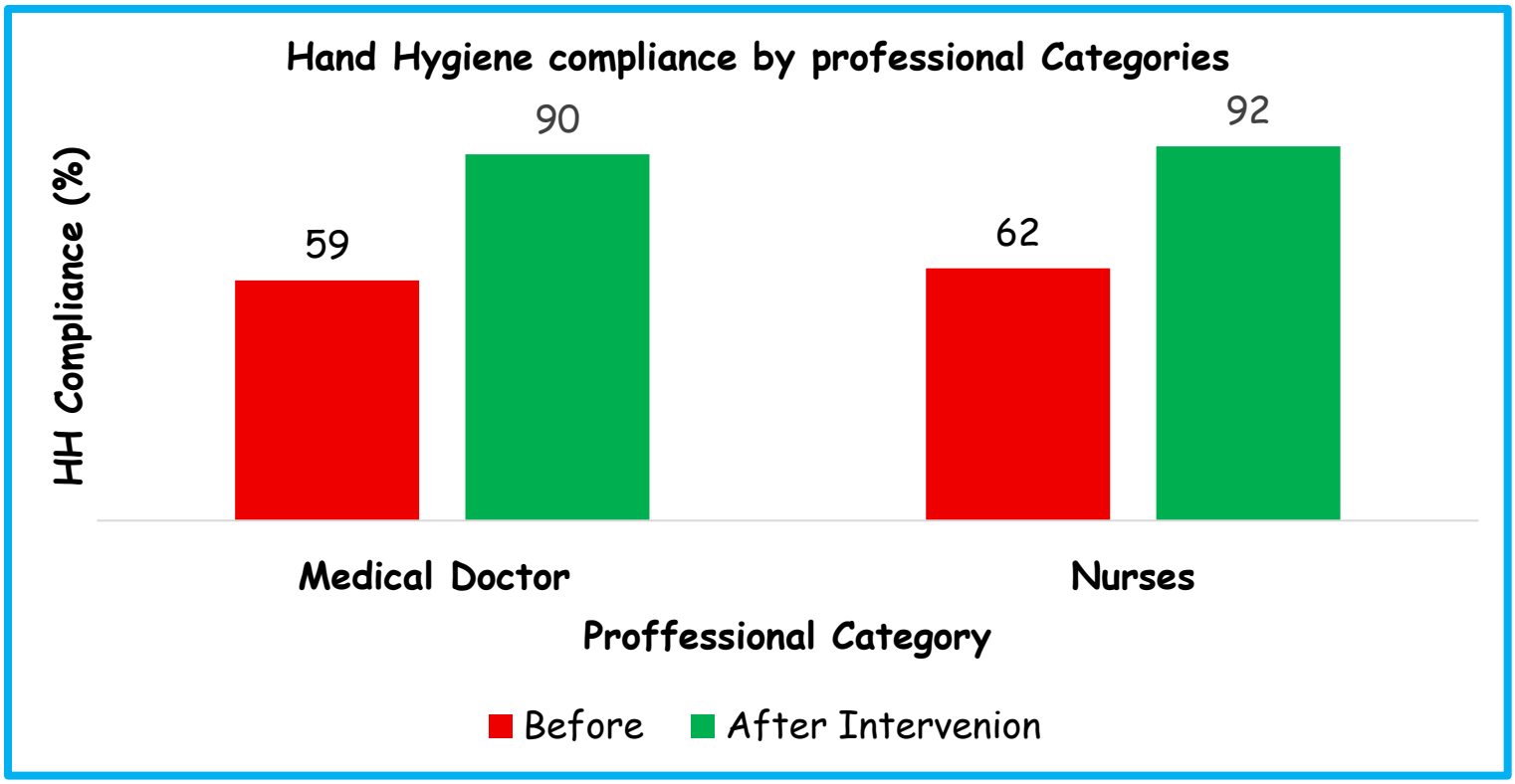

Figure 4: Hand Hygiene compliance by professional Categories, June 2017E.C

Hand Hygiene compliance before and after intervention by Indications

hand hygiene (HH) compliance showed a dramatic and significant increase across all measured indications following the quality improvement intervention in June 2017 E.C. Prior to the intervention, compliance was **critically low**, ranging from **just 9% (after patient surroundings)** to **28% (before patient contact)**. However, after the quality improvement intervention, compliance rates substantially improved to **88% (before patient), 93% (before aseptic procedure), 97% (after body fluid exposure risk), 92% (after patient contact)**, and **85% (after patient surroundings),** demonstrating a highly effective outcome **(Figure 5)**.

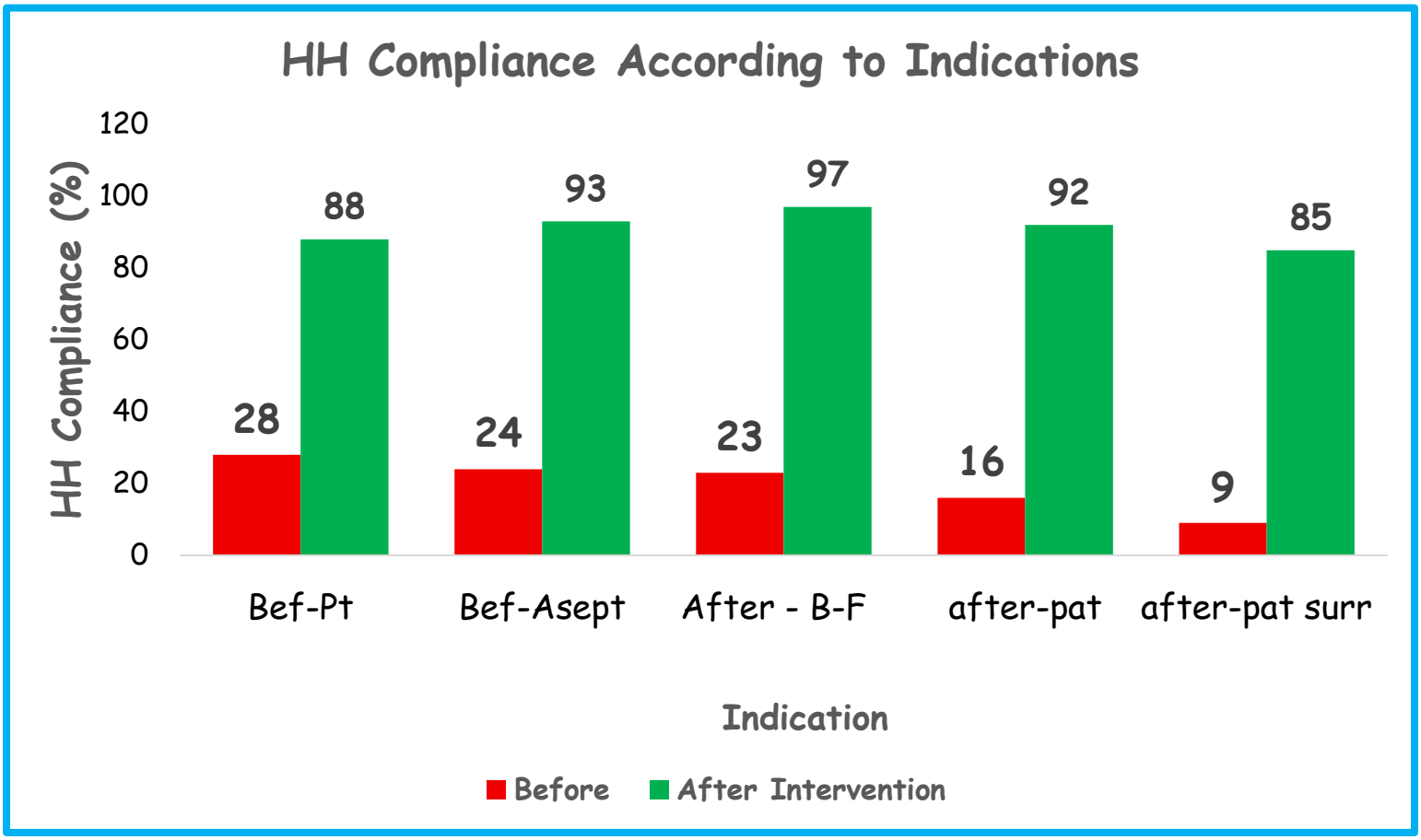

Figure 5: HH compliance before and after intervention by Indications, June 2017E.C

DISCUSSION

The Hand Hygiene (HH) Quality Improvement (QI) project in Deder General Hospital's NICU successfully demonstrates that structured and targeted interventions can lead to substantial improvements in clinical behavior, even in a low-resource setting. Initial compliance with HH protocols was markedly low at just **40%,** highlighting both behavioral and systemic challenges. The project effectively employed **four iterative PDSA (Plan-Do-Study-Act) cycles** that tackled various barriers—from training deficits to infrastructure and accountability mechanisms. These interventions were not only sequentially implemented but also designed to reinforce one another, ultimately raising compliance rates to **97%** by the end of June 2017 E.C.

Each intervention addressed a specific root cause identified during the initial assessment and fishbone analysis. For example, training on the WHO Five Moments of Hand Hygiene helped establish baseline knowledge but had limited impact alone—compliance only rose to **47%.** Only after physical improvements, such as the installation of handwashing sinks and placement of reminder posters, did compliance jump significantly, illustrating that behavior change is closely tied to environmental facilitators. Peer monitoring in the final cycle further amplified this effect, fostering a culture of shared accountability and continuous learning.

When benchmarked against existing literature, the findings are consistent with global evidence. For instance, WHO and CDC guidelines emphasize the importance of multimodal strategies—including education, infrastructure, monitoring, and feedback—to sustainably improve HH practices. Similar results were seen in a 2016 study from Ghana and a 2015 QI initiative in India, both of which reported over 90% HH compliance after multifaceted interventions. This project contributes local evidence supporting the global consensus: behavior change in infection prevention requires more than just awareness—it requires systems, reinforcement, and leadership support to sustain gains. These insights are vital for scaling similar improvements across other units and facilities.

LESSONS LEARNED

1. **Training is necessary, but not sufficient**: While knowledge enhancement was a critical first step, without supportive infrastructure and ongoing reinforcement, behavior change was limited.
2. **Environmental barriers must be addressed early**: Installing additional handwashing sinks made a dramatic difference in staff adherence, proving that practical barriers often outweigh motivational ones.
3. **Visual and behavioral cues sustain learning**: Laminated posters and visual reminders effectively reinforced the training, helping to normalize HH practices as part of the unit's routine workflow.
4. **Peer monitoring builds accountability**: Regular observations by staff and real-time feedback created a culture of mutual responsibility and continuous improvement.
5. **Data drives improvement**: Weekly tracking of compliance helped the team identify gaps early, adjust strategies quickly, and maintain momentum toward the aim.

MESSAGES FOR OTHERS

- **Start simple, but act systematically**: Focused changes implemented through structured PDSA cycles can lead to major quality improvements, even in resource-limited settings.
- **Build a culture of safety**: Involving frontline staff in monitoring and reinforcing practices helps create ownership and sustainable behavior change.
- **Prioritize infrastructure as much as training**: Having the right tools (e.g., sinks, soap, alcohol rub) readily accessible is just as important as training people how to use them.
- **Use data to motivate and improve**: Sharing weekly results during meetings fosters transparency, accountability, and engagement.
- **Replicate and scale**: The strategies used here can be easily adapted and applied to other wards, facilities, and IPC-related challenges.

CONCLUSION

The Hand Hygiene Quality Improvement Project at Deder General Hospital NICU demonstrated that targeted, phased interventions can produce significant and sustainable improvements in clinical practice. By combining staff training, infrastructure improvements, visual reinforcements, and peer-led accountability systems, hand hygiene compliance increased from a baseline of **42%** to **96%**, with an overall average of **83%** over the three-month period.

This improvement likely contributed to a reduction in neonatal infection risks and fostered a culture of quality and patient safety within the unit. The project serves as a replicable model for infection prevention efforts across other hospital units and healthcare institutions. It reinforces the idea that **quality improvement is not a one-time activity but an ongoing, team-driven journey toward better patient care**.

References

1. World Health Organization (WHO). (2009). WHO Guidelines on Hand Hygiene in Health Care.
2. Federal Ministry of Health, Ethiopia. (2017). National IPC Guidelines.
3. Institute for Healthcare Improvement (IHI). (2020). Science of Improvement: How to Improve.
4. Ethiopian Hospitals Alliance for Quality (EHAQ). (2017). Quality Improvement Training Manual.
5. Langley, G. J., et al. (2009). The Improvement Guide (2nd ed.). Jossey-Bass.