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*Original article*

# Assessment of Hand Hygiene Practices in Misurata Polyclinics Using the WHO HHSAF Tool

**Alyaa Azzain*, Rehab Eltayeb**

*Department of Community and Family Medicine, Misurata University, Misurata, Libya*
***Corresponding author***. alyaaazzain@gmail.com

**Abstract**
Hand hygiene is a simple, cost-effective intervention to reduce infection transmission. This study assessed hand hygiene compliance in Misurata polyclinic centers using the WHO Hand Hygiene Self-Assessment Framework (HHSAF). A cross-sectional study was conducted in June 2024 across all six public polyclinic centers. Data were collected through interviews with infection prevention and control staff using the HHSAF tool. Total scores ranged from 230 (basic level) to 377.5 (advanced level), with a mean of 304.58 (SD = 49.35), corresponding to an intermediate level. Domain mean scores were: system changes 70.00, education and training 73.33, evaluation and feedback 54.58, reminders in the workplace 59.17, and institutional safety climate 47.50. Education and training were the strongest domains, while institutional safety climate was the weakest. Hand hygiene programs in the Misurata polyclinic centers are moderately implemented. Strengths lie in education and training, but gaps in safety climate and monitoring highlight the need for targeted improvements to strengthen infection prevention practices.
**Keywords:** Hand Hygiene, Infection Prevention, HHSAF, Healthcare-Associated Infections (Hais).

## Introduction

Hospital-acquired infections (HAIs) affect up to 7% of patients in developed countries and up to 10% in developing countries during their hospital stay. The leading cause of HAIs is inadequate infection prevention and control (IPC) practices [1]. These infections reduce the quality of healthcare, increase healthcare costs, and compromise patient safety, resulting in more than 91,000 deaths annually in the European Union [2], and about 99,000 deaths in the United States [3]. The prevention of HAIs and the containment of antimicrobial resistance (AMR) rely heavily on robust antimicrobial stewardship and effective IPC measures [4]. Among these, hand hygiene stands out as a simple, low-cost, and effective intervention that significantly reduces the cross-transmission of pathogenic microorganisms and, consequently, the incidence of HAIs [5,6]. As a result, hand hygiene compliance is considered a key performance indicator of patient safety and the quality of healthcare services globally [1]. Despite its importance, global compliance with hand hygiene remains insufficient. Some healthcare facilities in low-income countries report compliance rates as low as 9%, while even in high-income countries, rates may not exceed 70.8% [7].

To address this gap, in 2009, the WHO introduced the Multimodal Hand Hygiene Improvement Strategy (MMIS) along with an Implementation Toolkit, which includes the Hand Hygiene Self-Assessment Framework (HHSAF). This tool helps healthcare facilities evaluate the level of hand hygiene implementation and monitor improvements over time [6,8]. Global surveys conducted in 2011 and 2015 using the HHSAF revealed wide variability in hand hygiene implementation across different healthcare settings [9]. In 2019, a follow-up global survey was conducted as part of the annual “SAVE LIVES: Clean Your Hands” campaign. The results showed that most facilities achieved an intermediate level of hand hygiene implementation, which was positively associated with the country’s income level and healthcare facility funding structure [10].

In Libya, an upper-middle-income country as classified by the World Bank (2019), there is currently no national data available on IPC program implementation or hand hygiene compliance [10]. This lack of data presents a significant gap in addressing HAIs and AMR at the national level. This study aims to conduct a systematic assessment of hand hygiene structures, resources, promotional activities, and practices in polyclinic centers in Misurata, Libya, using the WHO HHSAF tool. The objective is to evaluate the current level of hand hygiene implementation and highlight the urgent need to strengthen IPC measures as a critical step toward reducing HAIs and combating antimicrobial resistance.

## Method

### *Study design and setting*

A cross-sectional study conducted in Misurata city, including all the city's public polyclinic centers, counted six centers distributed in all areas of the city.

### *Data collection tool—The HHSAF*

Data was collected by interviewing the IPC personnel in the polyclinic centers of Misurata city in June 2024 using the HHSAF by WHO (appendix 1). The HHSAF is a self-administered questionnaire. It consists of 27 indicators (ten to 50 points for each), distributed over five MMIS (10) elements: System Change, Training and Education, Evaluation and Feedback, Reminders in the Workplace, and Institutional Safety Climate (each 100 points), with a maximum overall score of 500 points.


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### *Data interpretation and analysis*

Step 1: The subtotal scores were calculated for each core component, and then the final total score was calculated. Step 2: The healthcare facility was categorized based on the overall score obtained (Table 1). The median score for the overall scores of all health care centers included in the study was calculated using SPSS version 26.

***Table 1. HHSAF Scoring and Interpretation***

| Score | Category |
|---|---|
| 0–125 points | Inadequate |
| 126–250 | Basic |
| 251–375 | Intermediate |
| 376–500 | Advanced |

### *Ethical consideration*

Approval is obtained by the health care facilities' managers and the IPC department manager to apply the HHSAF tool and to use and publish the assessment results.

## Results

The study included assessment of sex polyclinic centers in the city, and the total scores obtained are calculated and interpreted as presented in (Table 2). The mean score of all-over scores was 304.58 (SD= 49.35), corresponding to an intermediate level of applying the hand hygiene program in the health care facilities. The minimum score was 230 – basic level_ and the maximum score was 377 – advanced score. Leadership criteria is applied for center 1, which achieved an advanced level. The score for leadership criteria was 11 out of 12 required to achieve the level.

***Table 2. Total scores of HHFE per health care centers***

| Center | Score | Level |
|---|---|---|
| Center 1 | 377.50 | Advanced |
| Center 2 | 280.00 | Intermediate |
| Center 3 | 330.00 | Intermediate |
| Center 4 | 230.00 | Basic |
| Center 5 | 310.00 | Intermediate |
| Center 6 | 300.00 | Intermediate |

According to Figure 1, the system changes scores ranged between 50 and 85 (each obtained by 2 centers) with a mean score = 70.00 and SD 16.12

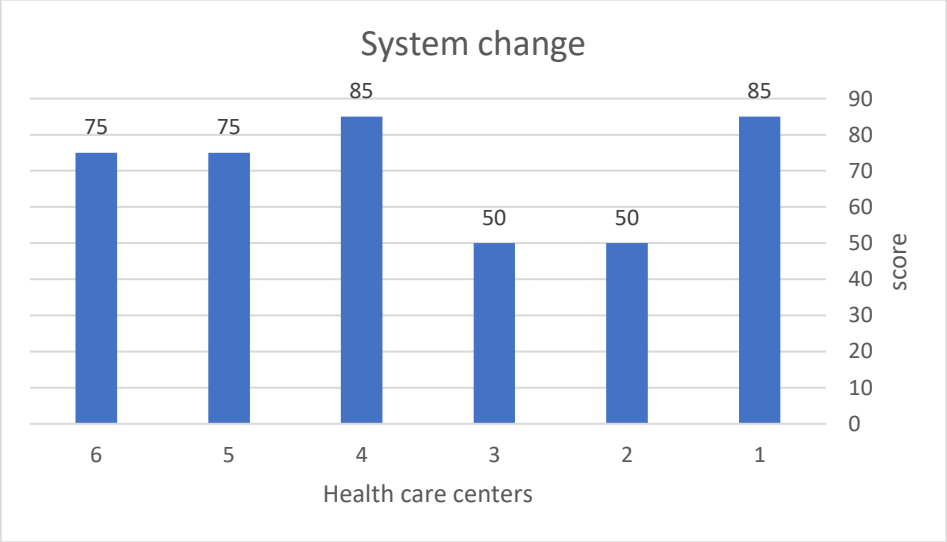


***Figure 1. System changes scores per center***

Figure 2 shows that education and training scores varied between centers, as the scores ranged between 30 for the lowest and as high as 95 for the highest score. With a mean score = 73.33 and SD= 23.16


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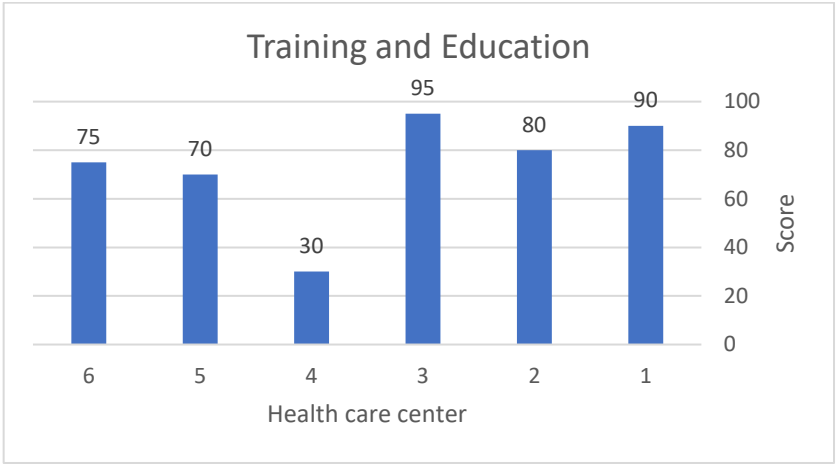


***Figure 2. Education and training scores per center***

In Figure 3, Evaluation and feedback scores varied between centers, as the scores ranged between 30 for the lowest and as high as 85 for the highest score. With a mean score = 54.58 and SD= 19.64

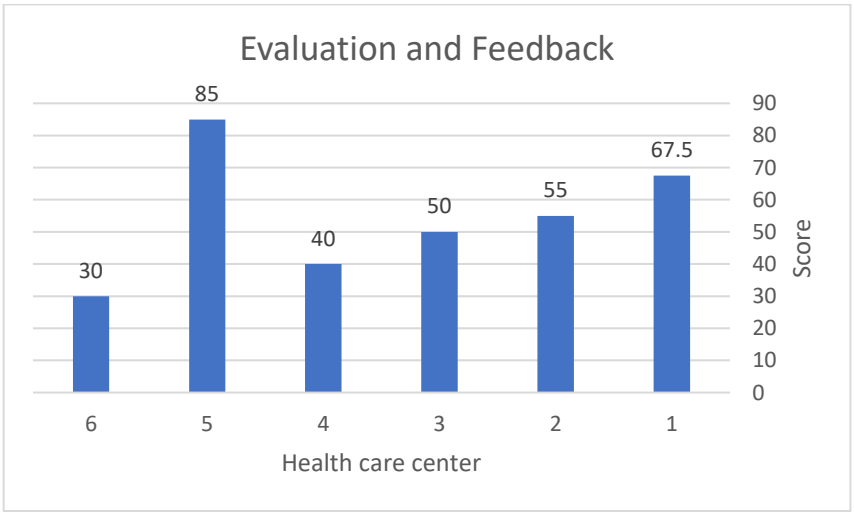


***Figure 3. Evaluation and feedback scores per center***

According to Figure 4, the Reminder in the workplace scores most centers, and the scores ranged between 40 for the lowest and as high as 80 for the highest score. With a mean score = 59.1667 and SD= 13.93

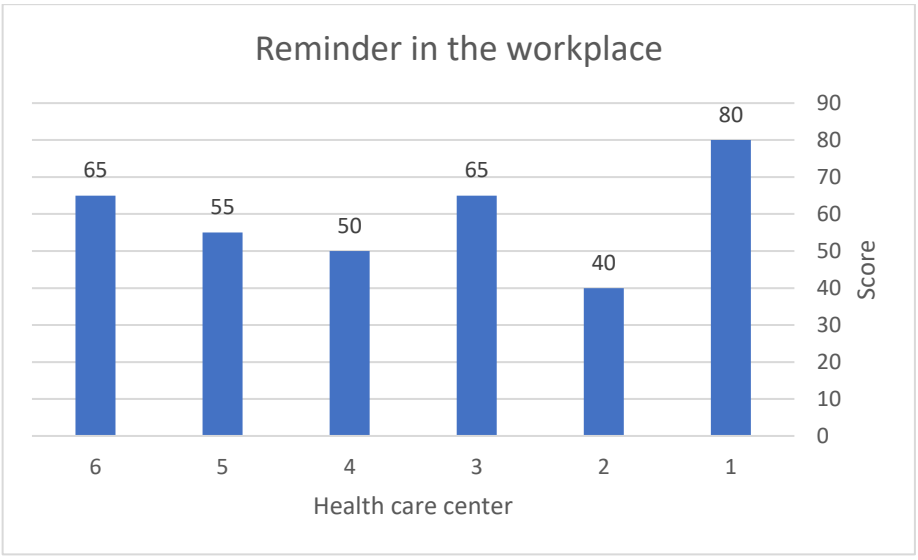


***Figure 4. Reminder in the workplace scores per center***

According to Figure 5, institutional safety climate scores, two out of 6 centers got scores as low as 25, and the highest score was only 70/100. With a mean score = 47.5 and SD= 18.37


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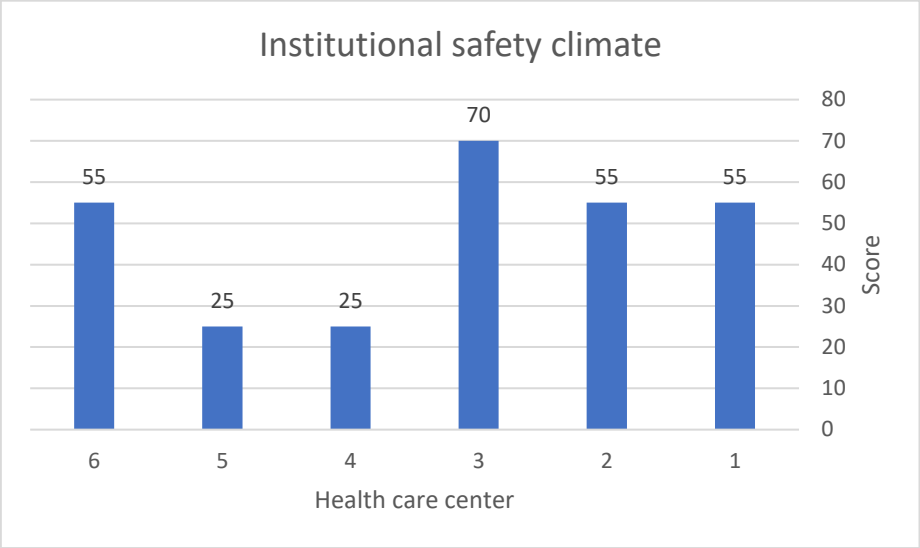


***Figure 5. Institutional safety climate scores per center***

## Discussion

While the majority of existing research utilizing the HHSAF framework focuses on large-scale data surveillance across various healthcare institutions, recognizing local patterns remains essential for enhancing current initiatives. Consequently, this study aims to assess the current hand hygiene compliance rates at the secondary healthcare level. In this study, the overall mean Hand Hygiene Self-Assessment Framework (HHSAF) score was 304.58 (SD = 49.35), indicating an intermediate level of hand hygiene implementation. This aligns with the WHO's 2019 global survey, which reported a median score of 350 across 90 countries [10]. Higher scores were typically observed in better-funded facilities. Compared to several other low- and middle-income countries, the average score observed in our study was higher than those reported in Cambodia (178), India (225), and Tanzania (187) [11-13]. These lower scores have been attributed to systemic challenges such as inadequate infrastructure, limited access to alcohol-based hand rubs (ABHRs), overcrowded healthcare settings, and insufficient training in infection prevention and control (IPC).

A study conducted in Saudi Arabia reported an initial HHSAF score of 330, also classified as intermediate, which is comparable to our findings. However, following the implementation of a structured intervention program, the total score improved significantly to 415, indicating a transition to an advanced level of hand hygiene implementation [14]. This suggests that targeted intervention strategies can effectively enhance hand hygiene compliance and elevate implementation levels, even in resource-constrained settings. Therefore, the development and integration of evidence-based interventions should be prioritized to strengthen hand hygiene practices and improve IPC outcomes.

In the current study, the system changes component of the Hand Hygiene Self-Assessment Framework (HHSAF) yielded scores ranging from 50 to 85, with a mean of 70.00 (SD = 16.12). While most healthcare facilities reported the continuous availability of alcohol-based hand rubs (ABHRs) at the facility level, their presence at the point of care was limited in the majority of wards. This shortcoming may hinder healthcare workers' (HCWs) adherence to hand hygiene protocols, particularly during high patient loads or in settings with constrained resources.

This finding is consistent with a post-intervention evaluation conducted in 2015 at Rawand Hospital, where implementation of the WHO Hand Hygiene Improvement Strategy led to a system change component score improving from 5 to 80 [15]. Despite these improvements, the lack of critical hand hygiene infrastructure remains a significant barrier. The 2020 Water, Sanitation, and Hygiene (WASH) global survey by the World Health Organization reported that one in three healthcare facilities worldwide lack adequate hand hygiene infrastructure at the point of care, and that approximately 50% of facilities in low- and middle-income countries do not provide basic hygiene services [16].

Although some facilities in our study lacked a dedicated budget for hand hygiene, many reported having active improvement plans. It is encouraging that, globally, the "system change" component has been the highest-scoring domain in HHSAF assessments [10]; however, this was not the case in our study, where it did not emerge as the strongest domain. Nevertheless, our observed scores align with the median scores reported globally for countries with comparable income levels, healthcare funding structures, and service delivery contexts [10].

To improve hand hygiene compliance, it is critical to enhance the availability of essential resources such as soap, disposable hand towels, functioning sinks, and ABHRs [17]. Among these, ABHRs are particularly advantageous due to their ease of use, cost-effectiveness, and minimal infrastructure requirements. As they do not necessitate running water, soap, or towels, ABHRs offer a practical solution for improving access to hand hygiene at the point of care, especially in resource-limited settings.


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Training and education play a critical role in improving hand hygiene (HH) compliance among healthcare workers. In a study conducted by Jerbi (2019) at Tripoli Hospital, nurses who had received hand hygiene training demonstrated a 60.5% compliance rate, significantly higher than those without training [18]. Similarly, Engdaw et al. (2019) reported that trained healthcare workers were 8.07 times more likely to adhere to HH protocols [19]. Numerous other studies support these findings, consistently showing marked improvements in the Training and Education (TE) domain following the implementation of structured intervention programs [15,20,14]. In our study, the TE component recorded the highest mean score among all HHSAF domains, with a mean of 73.33 (SD = 23.16). Most participating centers achieved scores of 70 or above, indicating relatively strong performance in this area. These findings underscore the positive impact of education on HH compliance.

Despite these encouraging results, several challenges persist—particularly concerning the lack of mandatory training and inadequate budget allocations. According to Kilpatrick et al. (2022), fewer than half of healthcare facilities globally reported having mandatory HH training programs, and less than 25% of public healthcare institutions had a dedicated training budget [10]. This lack of investment presents a barrier to sustaining long-term improvements. Furthermore, recent intervention studies have demonstrated significant improvements in TE scores following targeted training initiatives [21,22]. However, insufficient technical capacity—such as the shortage of trained, validated HH observers to monitor compliance—remains a critical obstacle to effective program implementation. These findings emphasize the need for greater investment in training infrastructure, the institutionalization of mandatory HH education, and the development of robust monitoring systems to ensure consistent, high-quality training. By addressing these gaps, healthcare systems can strengthen adherence to HH practices and ultimately improve patient safety and infection control outcomes.

The Evaluation and Feedback component, though vital for improving hand hygiene (HH), remains underdeveloped in many infections prevention and control (IPC) programs. In our study, it scored a mean of 54.58 (SD = 19.64), with nearly half of the facilities scoring ≤50, indicating major gaps in systematic monitoring and timely feedback. Immediate feedback was often absent, and monitoring was inadequate—direct observation showed generally low compliance, indirect methods like product consumption tracking were rare, and about half of facilities reported compliance below 50% (highest: 71–80%), falling short of WHO's global data (>60% compliance in half of facilities) [10]. Similar or lower scores are reported in Cambodia (27), India (50), and Sierra Leone (55) [11,12,20]. At Misurata Medical Center, this domain scored lowest, with feedback mechanisms nearly absent [23]. Other Libyan studies highlight related IPC challenges—Masud et al. (2022) found only 67% adherence to WHO IPC standards, citing time constraints, poor oversight, and PPE shortages [24], while Jerbi et al. (2022) reported protocol deviations at Maitiga Blood Bank [25].

Globally, 70.6% of facilities provide immediate feedback post-observation, but only 60% share it systematically with staff and leadership [10]. WHO designates HH monitoring with feedback as a core IPC indicator (Core Component 6). Strengthening this domain—through training, digital tools, and adequate human resources—is critical to improving HH compliance, IPC performance, and reducing healthcare-associated infections. The Reminders in the Workplace component scored a mean of 59.16 (SD = 13.93) in our study. Visual cues, such as hand hygiene posters, were often limited to a few areas or absent, reflecting a lack of systematic implementation likely linked to insufficient IPC budgets. This score was below the global median of 77.5 but close to the median of 60 in public facilities [10]. WHO data show that over half of facilities display posters in all wards, with 56.8% showing HH indications, proper hand rubbing, and hand washing techniques [10]. Other countries reported mixed results, Cambodia (58), India (50), and Saudi Arabia (85), with targeted interventions in Rwanda improving scores from 05 to 85 [11,12,14,15]. Given their low cost, quick impact, and role in reinforcing HH behavior, strategically placed and regularly updated reminders should be prioritized, especially in resource-limited settings.

The Institutional Safety Climate was the lowest-scoring component in both our study and the 2022 WHO global survey [10], with a mean of 47.5 (SD = 18.37). Scores ranged from 25 to 70, reflecting weak institutional support, absence or inactivity of IPC teams, and recurring issues such as poor leadership, limited staff engagement, and lack of patient involvement. Our score was below the global median of 55 for countries with similar income levels and aligned with low scores reported in Cambodia (13), India (25), Sierra Leone (43 in secondary hospitals), and Rwanda (45) [11,12,20,15]. It was, however, consistent with the median of 45 for public facilities globally, underscoring a widespread gap in leadership and organizational commitment to hand hygiene [10]. Improvement requires strong leadership, empowered staff, active IPC teams, and patient involvement to build a culture of safety, accountability, and sustained HH compliance.

To the best of our knowledge, this is the first published study to assess hand hygiene practices and promotional efforts across multiple public hospitals in Misurata using the WHO Hand Hygiene Self-Assessment Framework (HHSAF). The findings provide valuable insights that can inform the improvement and promotion of hand hygiene policies at the national level. However, this study has some limitations. It excluded primary, tertiary, and private healthcare facilities, which may limit the generalizability of the results. In addition, the cross-sectional design offers only a snapshot of implementation at a single point in time. Future research should include a wider range of healthcare facilities and adopt longitudinal


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approaches to capture changes over time, thereby providing a more comprehensive understanding of hand hygiene practices across the healthcare system.

## Conclusion

Our study revealed an intermediate level of implementation of the hand hygiene strategy in public secondary healthcare facilities in Misurata city. This level of implementation aligns with that observed in countries within the same economic classification. Further assessment is necessary to evaluate the progress of implementation and to monitor the long-term impact of improvements over time. These findings underscore the need for continued efforts to enhance hand hygiene practices and ensure sustained compliance in healthcare settings.

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***Conflicts of interest***

The authors declare no conflicts of interest.

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