



Healthcare worker and family caregiver hand hygiene in Bangladeshi healthcare facilities: results from the Bangladesh National Hygiene Baseline Survey

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SUMMARY

Background: Healthcare facility hand hygiene impacts patient care, healthcare worker safety, and infection control, but low-income countries have few data to guide interventions.

Aim: To conduct a nationally representative survey of hand hygiene infrastructure and behaviour in Bangladeshi healthcare facilities to establish baseline data to aid policy.

Methods: The 2013 Bangladesh National Hygiene Baseline Survey examined water, sanitation, and hand hygiene across households, schools, restaurants and food vendors, traditional birth attendants, and healthcare facilities. We used probability proportional to size sampling to select 100 rural and urban population clusters, and then surveyed hand hygiene infrastructure in 875 inpatient healthcare facilities, observing behaviour in 100 facilities.

Findings: More than 96% of facilities had 'improved' water sources, but environmental contamination occurred frequently around water sources. Soap was available at 78–92% of handwashing locations for doctors and nurses, but just 4–30% for patients and family. Only 2% of 4676 hand hygiene opportunities resulted in recommended actions: using alcohol sanitizer or washing both hands with soap, then drying by air or clean cloth. Healthcare workers performed recommended hand hygiene in 9% of 919 opportunities: more after patient contact (26%) than before (11%). Family caregivers frequently washed hands with only water (48% of 2751 opportunities), but with little soap (3%).

Conclusion: Healthcare workers had more access to hand hygiene materials and performed better hand hygiene than family, but still had low adherence. Increasing hand hygiene materials and behaviour could improve infection control in Bangladeshi healthcare facilities.

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Introduction

Healthcare facility hand hygiene impacts patient care, infection control, and safety of patients, healthcare workers (HCWs), and communities.^{1,2} High-income countries have evidence-based infection control guidelines, but many low–mid income countries (LMICs) lack rigorous data to aid policy.³ A World Health Organization (WHO) report found that 38% of 66,101 healthcare facilities in 54 LMICs lacked rudimentary water, sanitation, and hygiene resources.³ Moreover, LMICs have healthcare-associated infection rates (HCAIs) three times higher than high-income countries: 15.5 versus 4.5 per 100 patients.² WHO recommends a five-component hand hygiene improvement strategy encompassing infrastructure, training, monitoring, reminders, and institutional culture.¹ Experimental studies demonstrated this strategy's feasibility in Costa Rica, Pakistan, Saudi Arabia, Italy, and Mali.^{4,5} The Mali study was the first successful WHO hand hygiene strategy implementation in a low-income country and showed a trend towards fewer HCAIs: 18.7 per 100 patients pre intervention versus 15.3 post intervention, although not statistically significant.⁵ HCW hand hygiene, however, was low: 8% pre intervention and 22% post intervention [odds ratio (OR): 2.40; 95% confidence interval (CI): 1.62–3.55], and the study was funded externally.⁵ By contrast, interventions in wealthier Costa Rica, Pakistan, Saudi Arabia, and Italy had higher hand hygiene: 38–55% pre intervention and 59–69% post intervention.⁴ LMICs have fewer resources and more HCAIs than high-income settings. Moreover, LMICs have to achieve even larger changes to reach global patient care standards.

Bangladesh is an important study country because high population density, emerging diseases, and poor infection control contribute to vulnerability to pandemics.^{6,7} Qualitative studies found that hospital wards were often contaminated with live animals and human excrement, cleansing materials were rarely available, family provided most patient care, and handwashing with soap occurred in 1% of hand hygiene opportunities.^{7,8} In national facility surveys, the only hand hygiene measures were presence of water, soap, or alcohol sanitizer.⁹ Our Bangladesh National Hygiene Baseline Survey explored hand hygiene across a nationally representative sample of schools, households, food vendors and restaurants, traditional birth attendants, and healthcare facilities. In healthcare facilities, we examined hand hygiene infrastructure and observed HCW, patient, and family behaviour pertaining to patient care, food, and general hand hygiene.

Methods

Two-stage stratified cluster sampling was used to select a nationally representative sample of population clusters.¹⁰ Bangladesh was divided into rural and urban strata and probability proportional to size sampling was then used to randomly select 50 out of 86,925 rural villages from the 2011 Bangladesh Census and 50 out of 10,552 urban sub-wards from the 2006 Urban Health Survey.^{11,12} It was calculated that 864 facilities were required to detect a 10% difference between rural and urban availability of soap and water at handwashing locations, assuming 50% prevalence in rural facilities, 80% power, 0.05 alpha, design effect 5, and intra-cluster correlation coefficient 0.45. A total of 875 healthcare facilities were sampled, nine

from 75 clusters and eight from 25 clusters, including facilities with overnight services and at least one inpatient on survey day. Field researchers conducted infrastructure spot checks and interviews with doctors, nurses, ward attendants, patients, and family about hand hygiene. One facility was chosen closest to each cluster's geographic centre for structured hand hygiene behaviour observations of HCWs, patients, and family caregivers for 5 h on inpatient paediatric wards or, if paediatric wards were unavailable, adult female wards. Paediatric wards were chosen first because our overall Bangladesh National Hygiene Baseline Survey focused on child caregiver hand hygiene and its direct impacts on child health. Healthcare facilities without dedicated paediatric wards usually admitted sick children to adult female wards. Data were collected July–October 2013.

Medians and interquartile ranges were calculated for skewed variables of number of beds and daily admissions. For water, sanitation, and hygiene indicators, percentages and prevalence ratios (PRs) with 95% CIs using Poisson regression were calculated, adjusting for geographic cluster and weighting for the proportion of government versus independent, private, and non-governmental organization (NGO) facilities in our sample versus national estimates. We defined 'improved' water source per the WHO/UNICEF Joint Monitoring Programme for Water Supply and Sanitation: 'by the nature of its construction and when properly used, adequately protects the source from outside contamination, particularly faecal matter' and included piped, public tap, standpipe, tube well, borehole, protected dug well, protected spring, or collected rainwater.¹³ We compared rural versus urban facilities and available resources across HCWs, patients, and family. Hand hygiene actions were classified as using water only, soap, alcohol sanitizer, and/or 'recommended' hand hygiene defined as using sanitizer or washing both hands with soap, then drying by air or with clean cloth.¹ We calculated hand hygiene PRs using generalized estimating equations, adjusting for multiple observations per facility and weighting for the proportion of government versus independent, private, and NGO facilities in our sample versus national estimates. We analysed behaviour across facility types, persons observed, and actions surrounding patient care, food, and general hygiene.

The International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b) Ethical Review Committee approved our protocol. Written informed consent was obtained from administrators, HCWs, patients, and family.

Results

A total of 875 healthcare facilities were surveyed: 443 in urban and 432 in rural clusters (Table I). Most frequently occurring types were sub-district (66% of government) and small private hospitals (94% of independent, private, and NGO). Our sample included 136 government and 739 independent, private, and NGO facilities out of 593 government and 2983 private and NGO facilities registered nationally in 2013.¹⁴ Among interview respondents, 11% of doctors, 97% of nurses, and 63–73% of ward attendants, patients, and family were female.

More than 96% of facilities had improved water sources based on the WHO/UNICEF JMP definition (Table II). Sources were located inside in 64% of government and 81–90% of

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