

Hand-hygiene audit of preschool caregivers in Ibadan, Nigeria

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Abstract

Introduction: Health-related practices in settings where children or adults cluster are receiving a renewed focus especially with the recent COVID-19 pandemic. Practices such as caregivers' respiratory and Hand Hygiene (HH) in preschools can directly and indirectly predispose to the spread of infection within daycare/preschool children. Hand-hygiene is affected by several factors at individual, management, infrastructural and policy levels. Studies focus on proximal factors such as availability of soap and water. This short communication article expounds on the intricacies of hand hygiene moments generally in infection, prevention and control of communicable diseases and highlights the socio-occupational factors associated with hand hygiene practices of carers in preschools.

Methods: The study design was cross-sectional. A total of 799 pre-school caregivers were interviewed. The data were statistically analyzed using SPSS software Version 20. Descriptive analysis was performed and showed frequency distribution for demographic information of samples such as Gender, age and school-based variables of caregivers and handwashing moments. This was done using a graduated scale. The summed frequency scoring of the likert scale of caregivers who responded "always washing hands" was dichotomized. Kruskal Wallis test was conducted to find differences in associated factors for each hand hygiene moments.

Results: High frequencies of self-reported hand hygiene is related to type of tasks performed by caregivers and their understanding of risks of major childhood infections.

Conclusion: Salient strategies to improve childcare practices will need to be hinged on practical trainings of caregivers on principles of hand hygiene and scaling up of sustainable hand hygiene infrastructure/facilities in day-cares/preschools.

Keywords: Hand-washing, Hand hygiene, Disease Prevention, childcare practices, daycares/preschools

Introduction

Newer infection patterns, increased risks and rates of infections occur more frequently within daycares/preschool settings compared with home-care settings. Intestinal parasitic infections[1-3]; respiratory tract infections[4, 5], diarrhoeal diseases/hepatitis A[7,8] and otitis media are commoner communicable diseases described in literature in daycares/preschools[6]. The risk of acquiring infections is two to three times greater for daycares/preschools children[7].

Prevention of infections in day-cares/preschools demands inculcating childcare skills: environmental sanitation, good personal hygiene, proper feeding, hand hygiene practices for both the caregivers and the

children [8-11]. Hand hygiene is a very important operational process in childcare because of its pivotal role in the spread of pathogens and prevention of infections or diseases.[11-16]. Ineffective hand hygiene in preschools can both directly and indirectly serve as a highly mobile source of transmission of infection within daycares/preschools.

The daily chores carried out by caregivers in preschools can be broadly classified under: contact with the children, contact with toys/gadgets; contact with other adults; contact with surfaces and exposure to the environment. These tasks with the required hand-hygiene moments are exceedingly more complex and extensive in preschools. Caregivers are ideally required to wash their hands at resumption and at close of work at the daycares/preschools, contact with surfaces, arranging toys and gadgets,

after handling food or utensils, during food preparation, serving and eating or feeding the children, exposure to theirs or the children's bodily fluids/secretions, coughing, after contact with soiled clothing or vomitus and toileting children [19].

The frequency and extent of input for these tasks against the need for hand hygiene moments could be overwhelming for mother, (primary caregivers) let alone preschool caregivers given that each caregiver usually has oversight on a number of children. Account from an interventional study showed that daycares' period of operation', mean age of children in classrooms and caregivers' hand-washing were factors significantly associated with diarrhoea among pre-schoolers [17].

With COVID-19 pandemic and the rekindled attention on infection, prevention and control measures in communicable diseases for example Hand hygiene practices; this review article highlights patterns to hand hygiene practices related to each HH moments and illustrates likely challenges to optimal hand hygiene. At this crucial post pandemic phase, this short communication serves as a useful audit of daycare/preschool practices with regard to the crucial path and implications of cognitive, behaviours, occupational and social barriers to effective hand hygiene in the daycares/preschools.

Methods

The study design was cross-sectional. A total of 799 pre-school caregivers were interviewed. In a multi-stage sampling technique, a settlement was selected by balloting, each from 10 different wards in the five metropolitan Local Government Areas in Oyo state, Nigeria. Survey instrument was adapted from standardized UNICEF and CDC hand hygiene tool and administered to all consenting pre-school caregivers. The data were statistically analyzed using Statistical Package for the Social Sciences (SPSS) software Version 20; IBM Corp., Armonk, NY, USA for Windows. Descriptive analysis was performed and showed frequency distribution for demographic information of samples such as Gender, age and school-based variables of caregivers and handwashing moments. This was done using a graduated scale. We summated ratings to quantify the hand hygiene construct(s). Each correct response was given a score of 1 with the maximum score of 5. The summed frequency scoring of the Likert scale of caregivers who responded "always washing hands" was dichotomized. Kruskal Wallis test was conducted to find differences in associated factors for each hand hygiene moments. The level of significance was set at $P < 0.05$.

Results

The sociodemographic characteristics of the respondents are provided in Table 1. Mean age of respondents was 33.7 ± 9.5 years. Majority of them, 552 (69.1%) had had tertiary education. Most, 594 (74.3%), of caregivers did not have any form of pre-employment childcare training. Only 71(8.9%) acknowledged in-service training which on the average was organized twice yearly by the management (Table 2).

Table 1: Socio-demographic characteristics of the respondents

Demographic characteristics	Frequency (N=799)	Percentage (%)
Age (yr)		
<21	53	6.6
21-29	246	30.8
30-39	287	35.9
40-49	157	18.9
>50	62	7.8
Sex		
Males	23	2.9
Females	776	97.1
Marital Status		
Single	238	29.8
Married	559	70.0
Widowed	2	0.3
No of Children		
Alive		
≤5	258	32.4
> 5	343	42.9
No Children	198	24.7
Total	799	100.0

Table 2: Occupational profile of respondents

Occupational variables	Frequency N=799	Percentage (%)
Average duration of services		
≤ 8hrs	561	70.2
>8hrs	23	29.8
Job description of caregivers		
Teacher	503	63.0
Child caregiver	219	27.4
Both	62	7.8
Others (Specify)	15	1.9
Years as childcare worker		
< 1	82	10.3
1 - 9	566	71.1
10- 19	126	15.8
20-29	24	3.0
≥ 30	1	0.1

Table 3: Frequency distributions of self-report of hand hygiene moments of respondents

Hand hygiene moments	Frequency		
	Always	Sometimes	Hardly
Washing of hands immediately you get to work before you start handling the children	629 (78.7)	72 (9.0)	97 (12.1)
Washing of hands before feeding each child	636 (79.6)	78 (9.8)	85 (10.6)
Washing of hands after using the toilet	764 (95.6)	12 (1.5)	23 (2.9)
Washing of hands after removing each child's soiled pampers or cleaning buttocks	656 (82.1)	12 (1.5)	131 (16.4)

The background knowledge of hand hygiene was indirectly assessed through their major source of information on childcare practices and vaccine preventable diseases (mass media, television 567 (71.0%) and radio 557 (69.7%) of respondents. Majority of the children claimed that their background knowledge on handwashing can be attributed to their parents. The next biggest contribution of handwashing knowledge on the children is their teachers (28.7%). Based on self-report, majority of the respondents reported that they always wash their hands prior to commencing work in the morning (78.7%), prior to feeding the children (79.6%), changing each child's soiled pampers (82.1%) and after using the toilet (95.6%). The distribution of distributions of self-report of hand hygiene moments of respondents is provided in Table 3. Several factors were differently associated with each of the hand hygiene moments (Table 4).

Discussion

Data pertaining to hand hygiene compliance in pre-schools is still not yet ample enough especially in the area of social and cognitive factors. This review article highlights the pattern of hand hygiene practices related to each HH moments and illustrates likely challenges to optimal hand hygiene. Hand hygiene moments differ but what they all have in common is a pre-determined task with varying potential to cause infection.

This study confirms that caregivers' household size and high perception of disease risks was associated with HH moments. The performance of Hand hygiene thus expectedly varies instinctively depending on the mode of transmissions of infection, specific hand hygiene moments, and perception of load and risk of infection. Classical examples are the pronounced emphases on Hand hygiene during cholera and Ebola outbreaks or its combination with other IPC measures in the recent COVID-19 pandemic. In the occupational study settings, strict compliance to combined IPC measures irrespective of outbreaks or pandemics are constantly advocated.

In this study, job specification and perception of potential source of and portal of entry of infective agents of educational level were found statistically associated with higher proportions of HH moments. These factors represent deeper cognitive processes that influence and facilitate public IPC orientations

and thus depending on the settings, may incline certain occupational types to place higher premium on certain hand hygiene moments over the others. The cognitive learning curve from the educational exposures is its intentionality, the derived well-internalized association of exposure to disease outcome or from experience of inadequate hand hygiene by caregivers with increased occurrences of diseases especially gastrointestinal illnesses [27] and the scale of its impact. Yet still, evidence from a 2015 study reveal sub-optimal childcare disease prevention practices, dichotomy in the understanding of basic disease-agent-infection triad [28], and the fundamental principles of infection, prevention and control with the care roles.

Another finding from this study indicates that higher level of education (tertiary) over other educational levels is statistically associated with respondents' self-report of "always washing hands during feeding children". Other closely related factors were current job specification, knowledge of infection risks in children, knowledge of Vaccine preventable diseases (VPDs) and adequate childcare practices were significantly associated many HH moments. The observed effects from these outcome factors cut across at least 3 of the 4 of the hand hygiene moments.

A sub-national behavioural study of hand washing in peri-urban and rural areas of Peru in which most respondents were inclined to associating the occurrence of diarrhoea in children to the children eating something dirty or drinking untreated water [29]. Drawing from a behavioural economic model, people tend to rationalize their behavior (inactions or any inadequate practice) by framing it otherwise in other to gain psychological distance from the plausible actions.

There are several challenges in assessing Hand hygiene Moments and respondents' perception of disease risk. The input and assessment of optimal levels of hand-hygiene in and by-itself can be very complex [18, 19]. A study demonstrated that proper hand washing practice decreased with increasing number of nappies changed [20]. In another study of Hand hygiene, this notion was validated in that findings 3-month following an interventional study was inconclusive.

Table 4: Kruskal Wallis Non-parametric test for Hand hygiene moments of respondents

Variables: Occupational, Childcare knowledge of infection risks and Practice related variables	Chi-square χ^2 , p value					
	Hand hygiene on getting to work		Hand hygiene prior feeding children		Hand hygiene after using toilet	
Registration status						7,542 p=0.023
Level of education: Tertiary versus others	-		7.120 p=0.028		-	
Current job specification:	14.991, p= 0.001		12.203, p= 0.002		-	9.618 p=0.008
Routine medical checkup is done for staff	-		6.756 p=0.034		-	
Number of hour worked per days	-				7,913 p=0.019	
Year worked as childcare	37,250 p< 0.001*		11,441 p= 0.003		-	
Increased measles risk with overcrowding of infants and children in a place	27,637 p< 0.001		-		21,732 p< 0.001	20,644 p< 0.001
Fresh air in the classroom can help spread respiratory infections	21,514 p< 0.001		13.974 p= 0.001		11,2 31 p=0.004	
Dead tissues and deep dirty wounds provide good conditions for tetanus	22.466 p<0.001		13.941 p= 0.001		9,752 p=0.008	16.028 p< 0.001
Media sources of VPDs info	-		9,261 p= 0.010		-	8,297 p< 0.016
Practice Groups	75,251 p< 0.001*		64,483 p< 0.001*		-	47.245 p< 0.001*
Knowchildhood diseases	17,813 p< 0.001				6.932 p=0.031	9,450 p< 0.009
Allow immunization exercises	27,312 p< 0.001		-			
Give herbs for child illness	13,546 p= 0.001		-		11,533 p=0.003	6.746 p=0.034

Gender was not significant; p-value *- infinite significant value

The study had assessed the effect of displaying communication posters of handwashing in restrooms of public facilities. Soap and paper roll usage afterwards were as well considered. The challenges highlighted in the second assessment included not knowing the daily number of people using the restrooms, how much soap each person used, and whether soap and paper towels were used for other activities other than toileting such as cleaning cups or utensils [21].

These concerns are further impaired by respondents' self-report of handwashing moments. As expected in most health-related practices, the practice is always likely to be over-reported [24]. This type of socially conforming bias is called social desirability bias. [19, 22, 23]. Which with Hawthorne's bias (occupationally related desirability bias) affects data collection on the act of the practice, type of water, detergents used for cleaning the daycares/preschools and frequency of the act.

In the study by Cotzen, over-reporting was higher for food- than stool-related key times particularly before eating and the least mean value was found for handwashing after defecation or urination [18].

The patterns of sensitivity to handwashing moments documented above greatly differed with findings from a previous study and other local studies in which hand hygiene moments were overtly highest after helping children with toileting and after defecation.

The comparison of actual observed performance of handwashing with self-report of hand hygiene for same tasks in another study, drawn inference showed that participants in the two study groups were truly different. Over-reporting from self-report of handwashing differed from the actual performance of HH by as much as between 50%–60%. Participants who consistently washed their hands at all stool- or food-related key HH moments and those who inconsistently washed their hands correlated for all stool-related key assessments however differed significantly on household size. Our study equally substantiates the effect of number of children with effective HH for each of the HH moments.

In general, reports of higher stool-related handwashing moments of between (70%-90%) have been observed in more recent studies both at household and school settings) compared with (10%-50%) in older studies[24-26]. Higher estimates of stool-related handwashing moments may reflect over decade visible improvement in hand hygiene standards of caregivers recruited. While, the observed low level of hand hygiene report among caregivers in older studies specifically for food-related handwashing moments may be accounted for by caregivers' indifference towards food-related

handwashing moments due to impulsive reliance on cutleries in feeding the children.

Several other factors influence proper hand-hygiene of caregivers' factors (caregivers' level of education, age, workload, misconceptions related to child's faeces being harmless). Some of the deterrents documented in literature in daycare/preschool settings include age and sex of child, geographical settings, religious and cultural beliefs, unavailability of clear guidelines on hand washing, unavailability of clean water and hand washing products such as soap and other infrastructure [30-33].

In literature, some mitigation measures in addressing over-reporting in assessing hand **hygiene** include (1) optimisation of the interview situation; (2); statistical control of causative factors and (3) improvement of self-report measures. Measures such as emphases on the dangers of inaccurate information about a health practice or experience and possible loss of intervention, monitoring systems that may be hidden or unhidden observant participatory approach or hidden cameras, first 24-hour recall of handwashing done, combined with participants awareness of an additional validation measure of hand contamination by estimating viral or micro-bacterial load [34-36]. Contemporary best practice in hand hygiene research is expected to make use of culture independent methods: molecular assays to determine microbiome characteristics and effects of handwashing products to reduce the bias, limitations of self-report and culture dependent measures altogether [37].

In terms of infrastructure, the assessment of the availability of hand hygiene infrastructure and regularity of its supplies for hand hygiene are important constraints to effective hand hygiene. Current African based studies in school settings in Nigeria, Kenya, and Malaysia still reveal gaps in the availability of enabling factors for proper hand hygiene.[38-45]. Only 16% of assessed schools had a functional water facility, hand-washing receptacles (bowl) were shared by students, single cotton towel use to dry hands after hand-washing.[46] In another, classrooms, desks and chairs, play kits, toilets/latrines, kitchen and water and sanitation were insufficient, while outdoor play space were available but not well maintained [47].

The Water, Sanitation and Hygiene (WASH or Watsan, WaSH) United, a collaborative initiative of UNICEF, World bank, CDC and USAID, provides universal, sustainable, and equitable access to safe drinking water, sanitation and hygiene, as well as aims to eliminate open defecation by 2030. The WASH initiative and related prototypes (in Nigeria: Effective WASH, SHAWN) have enhanced effective behavioural response to hand hygiene practices [25, 48-55].

WASH project are examples of policy investments and economic motivations to hand hygiene, in the absence of which the expected efficiency in hand hygiene behaviour might be far-fetched. Evidence shows that in a study conducted in households in Karachi, Pakistan, soap purchases and diarrhoea experiences (impact) immediate post intervention period was better among the intervention group. Evaluation 2 years afterward without free soap, the intervention group were not significantly different from controls [56]. Handwashing facilities ownership at household levels was associated with wealth quintile and level of education [31].

The provision and readily available WASH infrastructure coupled with compliance with WHO and CDC recommendations will improve the quality of handwashing processes conducted in the daycare/preschool settings: rigorous hand-rubbing, lathering with soap, and rinsing off lather under *flowing water*) and the mechanical dislodgement of micro-organism that causes contamination of surfaces, food, water and transmission of pathogens to other persons within the preschools [57].

Conclusion

This review article highlights patterns of hand hygiene in childcare occupational settings. It also details possible limitations (cognitive, beliefs, methodological, managerial, policy) to hand hygiene and its assessment among daycares/preschools caregivers. The findings coalesce to show that exposure to the right information/education relates to better practices. Opportunities for sustainability framework for the prevention and control of infections generally will include deliberate extension of regular and practical sessions on childcare disease prevention measures especially hand hygiene sessions for caregivers and devising efficient hand hygiene infrastructure in these settings.

Any objective research work on the evaluation of hand hygiene with require serious and careful consideration and prioritizing addressing the outlined methodological issues and other limitations. All stakeholders beyond primary caregivers and different occupational setting where people cluster should be targeted for interventional training sessions. Media is recommended as a powerful tool for social change and can be deployed in promoting childcare practices.

List of abbreviations

CDC – Centre for Disease Control, USA
UNICEF – United Nations Children’s Fund
USAID – United States Agency for International Development

Declarations

Ethical approval

None provided.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

No conflict of interest associated with this work.

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Contribution of Authors

We declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. AO and PA conceived the research idea. Both wrote the proposal and the manuscript. AO designed the survey tool and did the data analyst. AO is the corresponding author. All the authors approved the final version of the manuscript

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