National Journal of Advanced Research
ISSN: 2455-216X
Impact Factor: RJIF 5.12
www.allnationaljournal.com
Volume 4; Issue 3; September 2018; Page No. 20-24

Effect of an interventional health education program on the knowledge and practice of caregivers towards infection control measures in Mygoma Orphanage center 2014-2017

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Abstract
Background: Infection is a major health problem in orphanage centers and represents a major cause of morbidity and mortality among residents. Health education is an essential component of infection control and should be offered to all children and their caregivers.
The aim of current study: to evaluate the effect of a health education program about infection control on knowledge, practice of caregivers & on infection rates in Mygoma orphanage center.
Materials and methods: An Intervention study (Quasi-experimental: pre and posttest design for the same group)**.**The study was conducted in Mygoma orphanage center in Khartoum state. The study sample consisted of 92 caregivers. Data were collected using a checklist (to measure practice), questionnaire (to measure knowledge) and laboratory investigations. The intervention program included infection control lectures, handouts, posters, and attention to environmental cleaning and disinfection. Compliance with these measures was monitored and recorded. Data were analyzed using Statistical Packages for Social Sciences (SPSS).
Results: the study showed, the overall mean knowledge of the caregivers about managing infectious diseases in child care settings was 0.35±0.36 at pretest increased to 0.81±0.37 at posttest measurement indicates statistically significant difference ($P = 0.01 < 0.05$) after attendance of the program. Also a significant differences were found regarding correct practices between the pretest and posttest ($P < 0.05$) also the study revealed that, the swab for culture and sensitivity, in food table the isolated organisms were staph 23.1%, E coli 7.7%, Protus 7.7%, Bacillus 7.7%. and klebseilla 15.4% at pretest investigation, while at posttest the isolated organisms were staph 15.4%, and klebseilla 7.7%. In diapering table the isolated organisms were staph 15.4%, E coli 30.7%, Protus 7.7%, klebseilla 15.4% and Pseudomonas 7.7% at pretest investigation, while at posttest measurement the isolated organisms were E coli 15.4% and klebseilla 7.7%.
Conclusion: The study concluded that educational and environmental infection control program had a significant impact related to the improvement of the caregiver's knowledge, practice skills and decrease in infection rates post application of the program.

Keywords: health education program, knowledge, practice, caregivers, infection control measures, Mygoma Orphanage

1. Introduction
Infection control program was a protocol in every hospital to stop the spurt of communicable diseases in various health settings. Apparently, programs have been started and extended in other institutions like schools and childcare centers, where they focused in controlling the infection among the specific population [1]. Furthermore the program was also recognized in the community and group homes, where the infection control strategies is very much needed such as overcrowding, food preparation, sewage disposal and other possible health concerns [2]. The Worldwide Orphans Foundation (WWO) and the Wide Horizons for Children (WHFC) introduced a manual for orphans in 2009, containing recommendations in details for inhibiting infection among orphan institutions which includes Hand hygiene, Bathing practices, Diaper changing, Clothing and sleeping equipment, General cleanliness and Other concerns regarding caregivers and staff [3]. In addition such precautions and guidelines were formulated to help staff and caregivers in providing the necessary attention, care and techniques to totally prevent infection in specific health care setting [4].

2. Materials and Methods
The materials and methods begins by presenting the research design, followed by setting and duration of the study, sample, sample size, data collection technique and tools, phases of the study, validity and reliability of instruments and ethical consideration.

2.1 Study design: A Quasi-experimental study: pretest and posttest for the same group.

2.2 Study setting: Mygoma Orphanage center, Khartoum state, Sudan.

2.3 Sample: Care givers deal with abandoned children in Mygoma orphanage center during the study period.

2.4 Sample size: The recommended sample size given by the total coverage of caregivers (120), but there are 17 refused to be included and 11 were excluded because either they went for a vacation or resigned from their posts. So the total numbers of participants were 92 caregivers.

2.5 Data collection technique and tools: Three tools were used to collect the needed data to achieve the aim of the study, they were: Structured Interview questionnaire to assess caregiver's knowledge regarding managing infectious diseases in child care setting, Infection control and hygienic checklist to assess the caregiver's performance regarding infection control in orphanage center and Bacteriological assessment that included swab for culture and sensitivity from food tables and diapering tables.

2.6 Phases of the study

2.6.1 Pre intervention phase: Baseline survey was conducted.

2.6.2 Intervention phase: Started from (June-September, 2016), the education was given through lectures, small group work, demonstration and remonstration regarding infection prevention and control.

2.6.3 Post Intervention Monitoring: The researcher started a posttest after memory gap six months. She was using the same tools to compare between pre and post intervention program which were conducted to evaluate the effect of the program on respondents.

2.7 Ethical Consideration: An official letter was taken from the National Al Ribat University to Mygoma orphanage center administrator for permission to carry out the study. Participants provided verbal consent to participate they have also been assured of confidentiality and of freedom to withdraw without conditions.

3. Results

Total numbers of respondents were 92 and 13 focusing on the food table and diapering table in the children's rooms. The results of the present study showed in figures and tables as follows:

3.1 Demographic characteristic in the study population

Most respondents had secondary education (46.7%) next in rank was primary education (35.9%) and few were illiterate (5.4%) (fig 1).

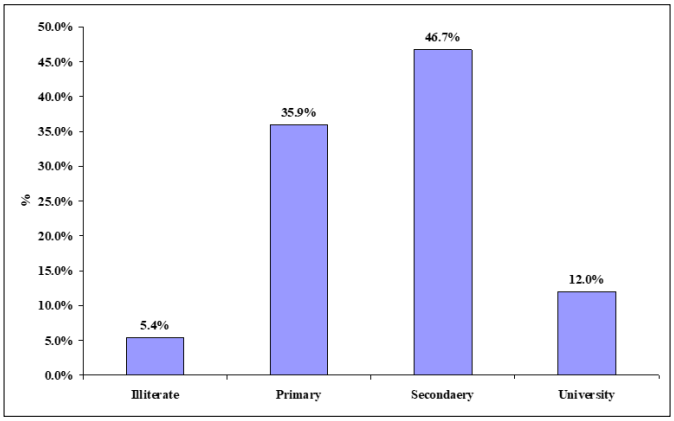

Fig 1: Distribution of the caregivers according to education level in Mygoma orphanage center 2014 -2017 (n=92)

Almost half studied population worked in this center for 1-5 years (54.3%), while about one quarter had an experience of <1year (fig 2).

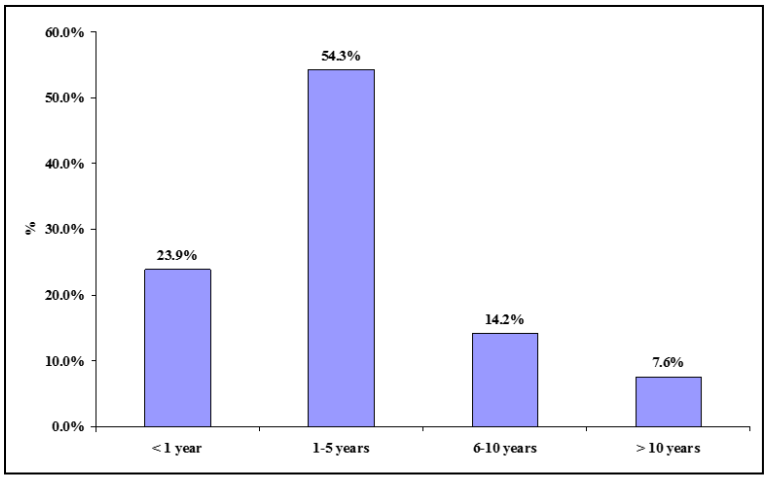

Fig 2: Distribution of the caregivers according to their Experience in giving care in Mygoma orphanage center 2014 -2017 (n=92)

The mean values of the caregivers on the items 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 of the knowledge of the caregivers regarding managing infectious diseases in childcare settings were (0.14±0.35, 0.42±0.50, 0.34±0.36, 0.39±0.11, 0.14±0.35, 0.32±0.27, 0.46±0.50, 0.42±0.15, 0.33±0.34, 0.42±0.50, and 0.49±0.50) respectively at pretest measurement (before attendance of the program), and at posttest were (0.52±0.50, 0.84±0.37, 0.99±0.10, 0.85±0.30, 0.87±0.34, 0.78±0.49, 0.94±0.20, 0.73±0.34, 0.78±0.49, 0.84±0.50, and 0.75±0.49) respectively; T values were (-5.86, -4.92, -3.70, -7.04, -14.33,

-9.21, -7.39, -8.74, -4.00, -6.19, and -4.90) respectively indicate significant differences between pre and posttest measurements regarding knowledge on all of the 11 items of managing infectious diseases in childcare settings (Table 1).

Table 1: Differences in knowledge of the study population regarding managing infectious diseases in childcare settings before and after attendance of the program in Mygoma Orphanage center 2014-2017 (n=184)

Items	Pre		Post		SE	C/I 95%		t	DF	P
	Mean	SD	Mean	SD		Lower	Upper			
Viruses should be treated with antibiotics	0.14	0.35	0.52	0.50	0.06	-0.50	-0.25	-5.86	182	0.011
Devices like catheters can also carry bacteria even if the catheter is sterile and good cleaning procedures are followed	0.42	0.50	0.84	0.37	0.06	-0.45	-0.19	-4.92	182	0.013
Children who attend child care are more resistant to infections after their first year of attendance.	0.34	0.36	0.99	0.10	0.04	-0.22	-0.07	-3.70	182	1014
The most important surface to clean to avoid spread of disease is our hands.	0.39	0.11	0.85	0.30	0.03	0.83	0.96	-7.04	182	0.001
Children's immune systems a. Get stronger as they are exposed to infectious diseases	0.14	0.35	0.87	0.34	0.05	-0.83	-0.63	-14.33	182	0.001
Mixing children from different groups together when staffing is short spreads infection from group to group.	0.32	0.27	0.78	0.49	0.06	0.42	0.65	-9.21	182	0.001
The best answer for how to reduce the number of germs in child care settings? a. Circulate fresh outdoor air, use right-size flushing toilets, wash hands, and clean and sanitize surfaces that have been in contact with body fluids	0.46	0.50	0.94	0.20	0.06	0.30	0.52	-7.39	182	0.001
Children should be excluded If they f. B.C. and D	0.42	0.15	0.73	0.34	0.04	-0.18	-0.03	-8.74	182	0.001
The goal of exclusion is to d. A and C	0.33	0.34	0.78	0.49	0.06	-0.37	-0.13	-4.00	182	0.013
A note from a child's health care professional to return to child care after an illness is not necessary for children who act and feel well.	0.42	0.50	0.84	0.50	0.07	-0.16	0.13	-6.19	182	0.010
To care for an ill child caregivers should d. A and B	0.49	0.50	0.75	0.49	0.07	-0.28	0.01	-4.90	182	0.012

The mean value of the caregivers regarding satisfaction on the item 1 of child feeding practice at pretest measurement was (1.00±0.00) and at posttest measurement was (1.17±0.51). On the item 2 of this dimension at pretest measurement the mean value was (1.00±0.00) and at posttest measurement was (1.17±0.51). The mean value of the item 3 of this practice at pretest measurement was (1.29±0.46) and at posttest measurement was (2.29±0.83). The mean value of the caregivers regarding satisfaction on the item 4 of this practice at pretest measurement was (1.54±0.50) and at posttest measurement was (2.57±0.65) (Table 2)

Table 2: Differences in the degree of satisfaction regarding caregivers,s feeding practice in Mygoma Orphanage center 2014-2017 at pre and posttest measurements (n=184)

Items	Pre		Post		SE	C/I 95%		T	DF	P
	Mean	SD	Mean	SD		Lower	Upper			
1. Do caregivers wash their hands Before feeding each child?	1.00	0.00	1.17	0.51	0.05	-0.28	-0.07	-3.3	182	0.012
2. Do caregivers wash their hands after feeding each child?	1.00	0.00	1.17	0.51	0.05	-0.28	-0.07	-3.3	182	0.012
3. Are surfaces used to serve food cleaned and sanitized before meal?	1.29	0.46	2.29	0.83	0.10	-1.20	-0.80	-10.1	182	0.002
4. Are surfaces used to serve food cleaned and sanitized after meal?	1.54	0.50	2.57	0.65	0.09	-1.19	-0.85	-11.9	182	0.001

Concerning bathing practices in the center techniques and precautions needed to be looked into and was changed after the interventions were carried out indicates significance differences between pretest and posttest measurements in all items ($P < 0.05$) (Table 3)

Table 3: Differences in the degree of satisfaction regarding caregivers bathing practices in Mygoma Orphanage center 2014-2017 before and after program (n=184)

Items	Pre		Post		SE	C/I 95%		t	DF	P
	Mean	SD	Mean	SD		Lower	Upper			
1. Are shower areas, basins and sinks used for bathing babies and children are cleaned and disinfected prior to use?	1.00	0.00	1.40	0.79	0.08	-0.56	-0.24	-4.91	182	0.013
2. Are shower areas, basins and sinks used for bathing babies and children are cleaned and disinfected after use?	1.00	0.00	2.22	0.87	0.09	-1.40	-1.04	-13.35	182	0.001
3. Do caregivers wash their hands prior to bathing children/babies?	1.00	0.00	1.77	0.87	0.09	-0.95	-0.59	-8.55	182	0.003
4. Do caregivers wash their hands after bathing children/babies?	1.00	0.00	2.28	0.77	0.08	-1.44	-1.12	-15.87	182	0.001

Diapers care; The mean value of the caregivers regarding satisfaction on the item 2 of diaper care at pretest measurement was (1.01±0.00) and at posttest measurement was (1.95±0.86) indicates significance differences between pretest and posttest measurements in this item ($P < 0.05$). The mean value of the caregivers regarding satisfaction on the item

3 at pretest measurement was (1.00±0.00) and at posttest measurement was (2.18±0.74) indicates significance differences between pretest and posttest measurements in this item (P < 0.05). The mean value of the caregivers regarding satisfaction on the item 4 at pretest measurement was (1.00±0.00) and at posttest measurement was (2.12±0.89) indicates significance differences between pretest and posttest measurements in this item (P < 0.05). The mean value of the item 5 at pretest measurement was (1.07±0.25) and at posttest measurement was (2.39±0.63) indicates significance differences between pretest and posttest measurements in this item (P < 0.05). The mean value of the item 6 at pretest measurement was (1.00±0.00) and at posttest measurement was (2.83±0.57) indicates significance differences between pretest and posttest measurements in this item (P < 0.05). (Table 4).

Table 4: Differences in the degree of satisfaction regarding diaper care in Mygoma Orphanage center 2014-2017 (n=184)

Items	Pre		Post		SE	C/I 95%		T	DF	P
	Mean	SD	Mean	SD		Lower	Upper			
1. Are diapers changing surfaces made of impervious material and free of cracks or crevices?	2.11	1.00	2.11	1.00	0.15	-0.29	0.29	0.11	182	0.09
2. Do caregivers wash their hands before changing diapers?	1.01	0.10	1.95	0.86	0.05	-0.83	-0.65	-16.06	182	0.001
3. Do caregivers wash children's hands after changing diapers?	1.00	0.00	2.18	0.74	0.03	-2.02	-1.90	-13.99	182	0.001
4. Do caregivers clean and sanitize the diaper changing surfaces after each use?	1.00	0.00	2.12	0.89	0.08	-1.34	-1.03	-15.35	182	0.001
5. Do caregivers wash their hands after changing diapers?	1.07	0.25	2.39	0.63	0.09	-1.30	-0.94	-11.06	182	0.001
6. Are there instructional signs posted showing proper diaper changing techniques?	1.00	0.00	2.83	0.57	0.07	-1.47	-1.19	-18.83	182	0.001

Table 5 shows swab for culture and sensitivity, in food table the isolated organisms were staph 23.1%, E coli 7.7%, Protus 7.7%, Bacillus 7.7%. and klebseilla 15.4% at pretest investigation, while at posttest the isolated organisms were staph 15.4%, and klebseilla 7.7%. In diapering table the isolated organisms were staph 15.4%, E coli 30.7%, Protus 7.7%, klebseilla 15.4% and Pseudomonas 7.7% at pretest investigation, while at posttest measurement the isolated organisms were E coli 15.4% and klebseilla 7.7%.

Table 5: Swab for culture and sensitivity from surfaces in the children's rooms before and after attendance of the program in Mygoma Orphanage center 2014-2017 (n=26)

		Group			
		Pre (n=13)		Post (n=13)	
		N	%	N	%
Food table	No growth	5	38.5	10	76.9
	Staph	3	23.1	2	15.4
	E.coli	1	7.7	0	0.0
	Protus	1	7.7	0	0.0
	Bacillus	1	7.7	0	0.0
	Klebsiella	2	15.4	1	7.7
Diapering table	No growth	3	23.1	10	76.9
	Staph	2	15.4	0	0.0
	E.coli	4	30.7	2	15.4
	Protus	1	7.7	0	0.0
	Klebsiella	2	15.4	1	7.7
	Pseudomonas	1	7.7	0	0.0

4. Discussion

It is generally agreed that implementation of infection control program is important in minimizing disease transmission [5]. It was obvious that caregivers were not aware about the measures to be adopted in infection control at orphanage home. This is why it was difficult to explain to them what is needed to keep themselves and the environment clean. Spread of infection and the use of hand washing and cleansing with Alcohol hand sanitizer was not at all in the mind of many of them. Only few of them were aware of how to reduce the number of germs in child care settings. Also, they did not recognize the importance of isolating infectious children from the rest and they did not know what to do with it. Acceptable knowledge of caregivers regarding managing infectious diseases in childcare settings was found to be significantly better concerning all items of the questionnaire (Table1). The overall mean knowledge of the caregivers was 0.35±0.36 at pretest increased to 0.81±0.37 at posttest measurement indicates statistically significant improvement (P = 0.01 < 0.05) after attendance of the program. Similarly, Uhari and Mottonen reported a 15 month randomized controlled trial to evaluate a programme for reducing infection transmission in 20 US child daycare centers. They found that both the children and the personnel in the program centers had significantly fewer infections than those in control centers, the reduction being 9% (P < 0.002) among 3- year-old children and 8% (P = 0.049) among older children [6]. Another study by Krilov *et al*. reported an intervention study in a preschool daycare center for children, found that during the interventional year the median number of illnesses/ child/month decreased significantly from the baseline year (0.70 vs 0.53 P < 0.05), with a trend toward a decrease in the number of respiratory illnesses (0.67 vs 0.42, P < 0.07) [5]. Correct practices of the caregivers were significantly improved after application of the program. Concerning child feeding practices, most caregivers did not wash their hands or washed it but not satisfactory before child feeding. All caregivers did not wash their hands after feeding each child. Most caregivers did not clean and sanitize tabletops before and after serving food. Results indicated that slight improvement occurred in child feeding practice by caregivers after attendance of the program. In the dimension of bathing children, the center does not have bathing facilities for infants and young children (a regular installed bathtub, infant-size bathtub or large sink within the washroom area and stack of clean towels available and wash them after each use). The children were bathed in sink that used for diapering and hand washing for staff. Also the center

has no a clear plan for cleaning and disinfection to be followed by caregivers. Regarding diaper care, the center was not provided with enough numbers of diapering tables. In some rooms surface of diapering tables were not free of cracks or crevices that are difficult to clean and sanitize after every use. There was no separate, dedicated hand washing sink for staff in the nappy change areas, no hand-washing facilities (liquid soap and single serve towels, wipes, and creams labeled and stored separately for each child, special waste containers with lids that operate by a foot pedal and diapering procedure poster to ensures the health and safety of staff, and the caregivers were not flow the hygienic practice during nappy changing process. This was comparable to a previous study conducted in North Carolina about hand-washing and diapering equipment reduces disease among children in out-of-home child care centers. The results show that hygiene and sanitation behaviors was improved in both intervention and control centers and also there was a significant difference favoring the intervention centers with respect to frequency of diarrheal illness (0.90 vs 1.58 illnesses per 100 child-days in control centers) [7]. Concerning bacteriological assessment about swabs for culture and sensitivity from surfaces in the children's rooms before and after attendance of the program results revealed that, In food table the isolated organisms were staph 23.1%, E coli 7.7%, Protus 7.7%, Bacillus 7.7%. and klebseilla 15.4% at pretest investigation, while at posttest the isolated organisms were staph 15.4%, and klebseilla 7.7%. In diapering table the isolated organisms were staph 15.4%, E coli 30.7%, Protus 7.7%, klebseilla 15.4% and Pseudomonas 7.7% at pretest investigation, while at posttest measurement the isolated organisms were E coli 15.4% and klebseilla 7.7%, Results indicate that improvement was occurred about swabs for culture and sensitivity from surfaces in the children's rooms after attendance of the program. Our study was comparable with a previous study of Cole *et al* about comprehensive family hygiene promotion in peri-urban Cape Town: Gastrointestinal and respiratory illness and skin infection reduction in children aged under 5. The result show that there is meaningful reduction of gastrointestinal and respiratory illnesses and skin infections across all communities, families with hygiene education plus the consistent use of provided hygiene products experienced greater illness reduction in children aged under 5 years [8].

5. Conclusion

According to the study findings the researcher concluded that: there was significant statistical improvement in the knowledge, practical skills and infection rate after educational program. There was a statistically significant difference between pre and posttest after application of the educational program ($P < 0.05$) in the knowledge of caregivers regarding managing infectious diseases in childcare. In addition better practices after attendance of the program had seen among the caregivers regarding infection control in terms of hand washing, cleaning and disinfection, diapering demonstration. ($P < 0.05$) in all aspect indicates statistically significant difference. And infection rate after an interventional health education program in orphanage center found to be decreased.

6. Recommendations

Field survey for infection control measures indicators must be done, (Hand washing, wearing personal protective equipment, diapering changing……..) at regular intervals to determine the extent to which caregivers apply the recommendations of the infection control and dissemination of results.

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